Roads and Maritime Services/Sydney Airport Corporation Limited

Sydney Gateway Road Project

Environmental Impact Statement/ Preliminary Draft Major Development Plan

Technical Working Paper 1

Transport, Traffic and Access

November 2019

Roads and Maritime Services

Sydney Gateway Road Project

Technical Working Paper 1 – Transport, Traffic and Access

Document No
SG00-G2S-DM-TMP-0012-04

7 November 2019

Distribution

Roads and Maritime Services, Gateway to Sydney Joint Venture (G2S JV)

Document owner

G2S JV Gateway to Sydney Joint Venture

WSP Australia Pty Limited and GHD Pty Ltd

ABN: 55 836 411 311
Project Office
Level 27 Ernst & Young Centre
680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001
Australia
Tel: +61 2 9272 5100
Fax: +61 2 9272 5101

Contents

Contents (continued)

Contents (continued)

Contents (continued)

List of tables

List of tables (continued)

List of figures

List of figures (continued)

List of appendices

Glossary

Airports Act	The Airports Act 1996 regulates airports in Australia.
Active Transport	Transport that is human powered, such as walking or cycling.
Alignment	The geometric layout (e.g. of a road or railway) in plan (horizontal) and elevation (vertical).
AM peak hour	Unless otherwise stated, this refers to vehicle trips arriving at their destination during the average on hour peak period between 7am–9am on a normal working weekday.
Arterial roads	The main or trunk roads of the road network that carry predominantly through traffic between regions.
At-grade	A road at ground level, not on an embankment or in a cutting.
AWT	Average weekday traffic
Background traffic	Growth between existing and future traffic volumes excluding any development forecast traffic.
Baseline	The reference point to calculate changes or differences.
Botany rail line	A dedicated freight rail line that forms part of the Sydney Freight Network. The line extends from near Marrickville Station to Port Botany.
Bus lane	A traffic lane dedicated to buses, but which can also be used by taxis, bicycles and motorcycles.
Capacity	The nominal maximum number of vehicles which has a reasonable expectation of passing over a given section of a lane or roadway in one direction during a given period under prevailing roadway conditions.
Carriageway	The portion of a roadway used by vehicles including shoulders and ancillary lanes.
Concept design	Initial functional layout of a road/road system or other infrastructure. Used to facilitate understanding of a project, establish feasibility and provide basis for estimating and to determine further investigations needed for detailed design.
Construction	Includes all physical work required to construct the project.
Construction ancillary facilities	Temporary facilities during construction that include, but are not limited to, construction work areas, sediment basins, temporary water treatment plans, pre-cast yards and material stockpiles, laydown areas, parking, maintenance workshops and offices, and construction compounds.
Construction compound	An area used as a base of construction activities, usually for the storage of plan, equipment and materials, and/or construction site offices and worker facilities.
Construction environnemental management plan (CEMP)	A site-specific plan developed for the construction phase of the project to ensure that all contractors and sub-contractors comply with the environmental conditions of approval for the project and that the environmental risks are properly managed.
Corridor	A linear area, in which parallel transport routes operate between two locations.
Cumulative impacts	Impacts that, when considered together, have different and/or more substantial impacts than a single impact assessed on its own.
Design speed	A nominal speed which determines the geometric design features of a road.

Detailed design	The stage of design where project elements are designed to a level suitable for construction.
Detour	An alternative route, using existing roads.
Deviation	An alteration to the alignment of a portion of a road.
Divided road	A road with a separate carriageway for reach direction of travel created by placing a physical separation (e.g. median) between the opposing traffic directions.
'Without project'	A model that does not incorporate the proposed project infrastructure.
'With project'	A model that incorporates the proposed project infrastructure.
EIS	Environmental impact statement
Enabling works	Works to prepare a site for the main construction works.
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
F6 Extension Stage 1	A proposed new motorway tunnel linking the New M5 Motorway in Arncliffe to President Avenue in Kogarah.
GEH	A formula that is used to compare two sets of traffic volumes.
Grade separation	The separation of road, rail or other traffic so that crossing movements at intersections are at different levels.
GMA	Greater Metropolitan Area
HCV	Heavy commercial vehicles – classified as a Class 3 vehicle (a two-axle truck) or larger, in accordance with the Austroads Vehicle Classification System.
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
Interchange	A grade separation of two or more roads with one or more interconnecting carriageways.
Lane	A portion of the carriageway allotted for the use of a single line of vehicles.
LCV	Light commercial vehicles - vehicles up to 4.5 tonnes Gross Vehicle Mass (GVM), including cars which have been registered for business use.
Level of Service (LoS)	A quantitative measure describing operational conditions within a traffic stream or intersection and the perception by motorists and passengers.
LGA	Local government area
Local road	A road or street used primarily for local trips within a neighbourhood.
M4 East	A component of the WestConnex program of works – a new motorway tunnel from Homebush to Haberfield (under construction).
M4 Widening	A component of the WestConnex program of works – an additional lane in each direction on the existing M4 Motorway between Parramatta and Homebush (under construction).
M4-M5 Link	A component of the WestConnex program of works - a new inner western bypass of the Sydney central business district connecting the M4 and M5 (under construction).
M5 East Motorway	Part of the M5 Motorway corridor between Beverly Hills and Sydney Airport (General Holmes Drive).
M5 Motorway Corridor	The M5 East Motorway and the M5 South West Motorway.

M5 South West Motorway	Part of the M5 Motorway corridor between Prestons and Beverly Hills.
Managed motorway	A managed motorway uses active traffic management to reduce congestion and inform travellers of real-time incidents and expected travel times to set destinations along the motorway.
MDP	Major development plan
Methodology	The method for analysis and evaluation of the relevant subject matter.
Midblock	Section of road between two intersections.
Motorway	Fast, high volume-controlled access roads. May be tolled or untolled.
NB	Northbound
New M5	A component of the WestConnex program of works – a new motorway from Kingsgrove to St Peters (under construction).
New M5 mainline stub tunnels	Northbound and southbound extensions of the New M5 mainline tunnel being built to connect the New M5 with the M4-M5 Link (under construction).
New M5 mainline connection	The underground connection between the M4-M5 Link mainline tunnels and the New M5 mainline stub tunnels (under construction).
OD	Origin and destination as it relates to traffic.
Pavement	The portion of a carriageway placed above the subgrade for the support of, and to form a running surface for vehicles.
PCU	Passenger car unit
PM peak hour	Unless otherwise stated, this refers to trips travelling on the network during the average one-hour peak period between 3 pm and 6 pm.
Pre-construction	All work prior to, and in respect of the State significant infrastructure, that is excluded from the definition of construction.
Private vehicle	Includes all motorised vehicles such as cars, 4WDs, vans, motorbikes, motor scooters, utes and trucks, not registered for commercial use.
Project	The construction and operation of the Sydney Gateway road project.
Project site	The area that would be directly affected by construction (also known as the construction footprint). It includes the location of operation project infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of the storage areas/compounds etc. that would be used to construct that infrastructure.
Public transport	Includes train, bus (government and private), ferry (government and private), and light rail (government and private).
Roads and Maritime	NSW Roads and Maritime Services
Saturation flow	The number of vehicles that could pass through a signalised intersection on a specific approach lane if the signal remained green for the entire 60 minutes.
SB	Southbound
Screenline	Theoretical boundaries specifically designed to collectively analyse directional and two-way traffic volumes.
SEARs	Secretary's environmental assessment requirements - prepared by the Secretary of the Department of Planning and Environment under section 5.16 of the *Environmental Planning and Assessment ACT 1979* (NSW).

SMPM	Sydney Strategic Motorway Planning Model – the strategic traffic model that covers the motorway network in the Greater Sydney Area.
STM	Strategic Travel Model operated by Transport for NSW.
St Peters interchange	A component of the New M5 project, located at the former Alexandria Landfill site at St Peters. In its ultimate configuration it would connect the new M5, the M5–M5 Link and the Sydney Gateway road project with Euston Road and Gardeners Road.
Staging	Refers to the division of the project into multiple contract packages for construction purposes, and/or the construction or operation of the overall project in discrete phases.
State significant infrastructure	Major transport and services infrastructure considered to have State significance as a result of size, economic value or operation of the overall project in discrete phases.
Study area	The study area is defined as the wider area including and surrounding the project site, with the potential to be directly or indirectly affected by the project (e.g. by noise and vibration, visual or traffic impacts). The actual size and extent of the study area varies according to the nature and requirements of each assessment and the relative potential for impacts.
Sydney Gateway Road project	Sydney Gateway Road project comprises road connections to Sydney Airport's terminals from the Sydney motorway network at St Peters interchange.
TCS	Traffic Control Signal.
Tempe Lands	Tempe Lands consists of land owned by Inner West Council that was formerly part of the Tempe Tip site. The land was remediated and now contains a number of open space and recreation facilities (including the Tempe Golf Range and Academy, dog exercise area and Tempe Wetlands).
Terminal 1	Sydney Airport's international terminal
Terminal 2	One of Sydney Airport's two domestic terminals, used by a number of domestic and regional airlines including Virgin Australia, Jetstar and Rex.
Terminal 3	Qantas' domestic terminal
Terminals 2/3	Sydney Airport's domestic terminals
TfNSW	Transport for New South Wales
TMC	Transport Management Centre
Traffic efficiency	Measured by savings (or delays) in travel time.
Transport for NSW	Transport for New South Wales
Transport infrastructure	Permanent installations including roads, rail, buildings and storage associated with transport.
Unreleased demand	In a microsimulation traffic model, this is the number of vehicles unable to enter the model due to congestion extending back into a model entry point. The number of unreleased vehicles is an indication of the effectiveness of the modelled network in meeting the forecast traffic demand. The lower the number of unreleased vehicles, the better the modelled network is able to accommodate the forecast demand flows.
Veh	Vehicles
Veh/h	Vehicles per hour
VHT	Vehicle hours travelled

VKT	Vehicle kilometres travelled
V/C	Volume to Capacity ratio
VTTS	Value of Travel Time Savings
WestConnex	WestConnex is a 33-kilometre-long, predominantly underground motorway currently under construction in Sydney. The WestConnex program of works includes widening and extension of the M4 Western Motorway (the M4 Widening project); construction of two tunnels connecting Homebush Bay Drive with Wattle Street and Parramatta Road at Haberfield (M4 East); a new section of the M5 South Western Motorway including a new interchange at St Peters (the New M5 project); and a new inner western bypass of the Sydney central business district connecting the M4 and M5 (the M4-M5 Link project).
Western Harbour Tunnel	Proposed new motorway tunnel currently in planning. The tunnel would connect to the M4-M5 Link at Rozelle, cross underneath Sydney Harbour and connect with the Warringah Freeway at North Sydney.
Beaches Link	Proposed new motorway tunnel currently in planning. The Beaches Link would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah and Wakehurst Parkway at Seaforth and the duplication of the Wakehurst Parkway between Seaforth and Frenchs Forest.
Work area	Areas within the project site that are subject to construction at any one time. These include: St Peters interchange, Eastern bridges, Western bridges, Qantas Drive, Terminals 2/3 and Airport Drive.

1. Introduction

1.1 Overview

1.1.1 Sydney Gateway and the project

Sydney Kingsford Smith Airport (Sydney Airport) and Port Botany are two of Australia's most important infrastructure assets, providing essential domestic and international connectivity for people and goods. Together they form a strategic centre, which is set to grow significantly over the next 20 years. To support this growth, employees, residents, visitors and businesses need reliable access to the airport and port, and efficient connections to Sydney's other strategic centres.

The NSW and Australian governments are making major investments in the transport network to achieve this vision. New road and freight rail options are being investigated to cater for the forecast growth in passengers and freight through Sydney Airport and Port Botany. Part of this solution is Sydney Gateway, which comprises the following road and rail projects:

- Sydney Gateway road project (the subject of this assessment)
- Botany Rail Duplication.

Sydney Gateway would expand and improve the road and freight rail networks to Sydney Airport and Port Botany to keep Sydney moving and growing. The Sydney Gateway road project forms part of the NSW Government's long-term strategy to invest in an integrated transport network and make journeys easier, safer and faster.

Roads and Maritime and Sydney Airport Corporation Limited propose the Sydney Gateway road project (the project). The project comprises new direct high capacity road connections linking the Sydney motorway network at St Peters interchange with Sydney Airport's terminals and beyond. It involves constructing and operating new and upgraded sections of road connecting to the airport terminals, four new bridges over Alexandra Canal, and other operational infrastructure and road connections.

The project and its location is shown on Figure 1-1.

1.1.2 Overview of approval requirements

The project is subject to approval under NSW and Commonwealth legislation. Parts of the project located on Commonwealth-owned land leased to Sydney Airport are subject to the Commonwealth *Airports Act 1996* (the Airports Act). In accordance with the Airports Act, these parts of the project are major airport development. A major development plan (MDP), approved by the Australian Minister for Infrastructure, Transport and Regional Development, is required before a major airport development can be undertaken at a leased airport.

Parts of the project located on other land are State significant infrastructure in accordance with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). As State significant infrastructure, these parts of the project require approval from the NSW Minister for Planning and Public Spaces (NSW). An environmental impact statement (EIS) is required to support the application for approval for State significant infrastructure under the EP&A Act.

A combined EIS and preliminary draft MDP is being prepared to:

- Support the application for approval of the project in accordance with NSW and Commonwealth legislative requirements
- Address the environmental assessment requirements of the Secretary of the Department of Planning and Environment (the SEARs), issued on 15 February 2019
- Address the MDP requirements defined by section 91 of the Airports Act.

This report was prepared on behalf of Roads and Maritime and Sydney Airport Corporation Limited to support the combined EIS/preliminary draft MDP.

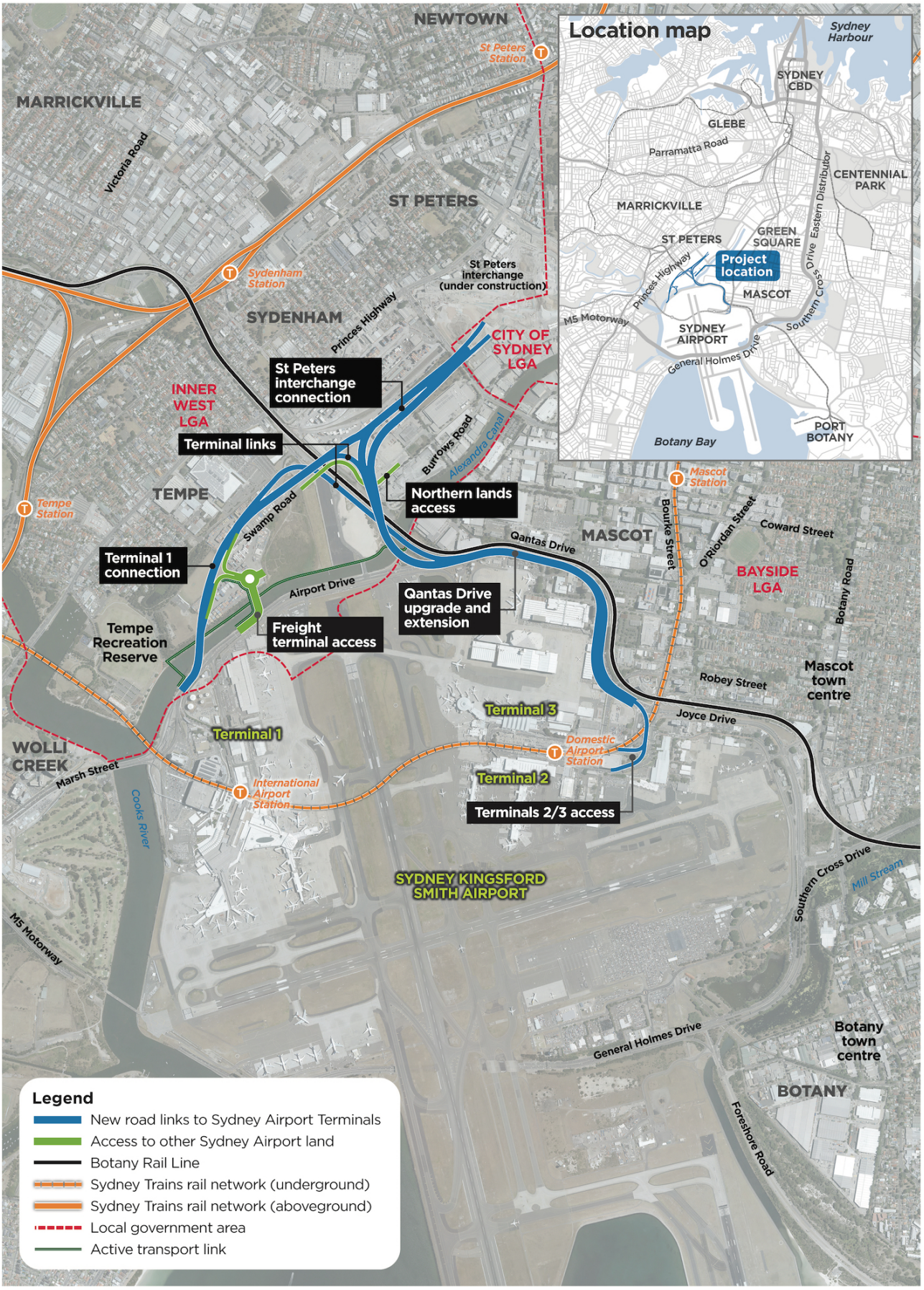


Figure 1-1 The project

1.2 Purpose and scope of this report

In preparing this technical report, the Secretary's Environmental Assessment Requirements (SEARs), issued for the Sydney Gateway Road project (SSI 8931) on 15 February 2019, have been addressed. The key matters raised by the SEARs for consideration in the traffic and transport assessment and where this technical report addresses these matters are outlined in Table 1-1.

MDP requirements (under section 91 of the *Airports Act 1996*) relevant to traffic and transport are addressed in this report are outlined in Table 1-2.

Table 1-1 SEARs relevant to this assessment

Desired performance outcome	Requirement	Where addressed in this report
Transport and Traffic		
Network connectivity, safety and efficiency of the transport system in the vicinity of the proposal are managed to minimise impacts	**1.** The proponent must assess construction transport and traffic (network, vehicle (including freight traffic), pedestrian and cyclists impacts), including, but not necessarily limited to:	
The safety of transport system customers is maintained Impacts on network capacity and the Level of Service are effectively managed	a) a considered approach to route identification and scheduling of construction vehicle movements, with particular consideration of traffic impacts and transport movements outside standard construction hours including 'cumulative' impacts	Section 5.2.5, section 8.7
Works are compatible with existing infrastructure and future transport corridors	b) the indicative number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements)	Section 5.2.7
	c) construction worker parking	Section 5.2.4
	d) the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times, pedestrian and cyclists and parking arrangements)	Section 4.3.3, section 5.4.1
	e) access constraints and impacts on public transport, pedestrians and cyclists (infrastructure and services)	Section 5.4.2, section 5.4.3
	f) the need to close, divert or otherwise reconfigure elements of the road, pedestrian and cycle network associated with construction of the proposal and the duration of these changes	Section 5.3, section 5.4.3
	g) impacts to on-street parking, including for residents and businesses	Section 5.4.4
	h) cumulative impacts on the road, pedestrian and cycle network from other key infrastructure proposal including but not limited to the Botany Rail Duplication and New M5.	Section 8.7
	2. The Proponent must assess (and model) the operational transport impacts of the proposal, including:	
	a) forecast travel demand and road traffic volumes for the proposal and the surrounding road, airport, freight, port, cycle and public transport networks	Section 7

Desired performance outcome	Requirement	Where addressed in this report
	b) travel time analysis for the different road transport modes	Section 7.3.6, section 7.4.1
	c) performance of key interchanges and intersections by undertaking a Level of Service analysis at key locations	Section 7.3.4 section 7.3.5
	d) wider transport interactions (local and regional roads, cycling, public transport, airport, port and freight transport)	Section 7
	e) induced traffic and operation implications for public transport (particularly with respect to strategic bus corridors and bus routes) and consideration of opportunities to improve public transport	Section 7.4
	f) property and business access and on-street parking.	Section 7.6
Place Making and Urban Design		
The proposal design complements the amenity, character and quality of the surrounding environment. The proposal contributes to the accessibility and connectivity of communities.	**3.** The Proponent must identify how functional 'place' outcomes of public benefit would be achieved, including design principles and strategies that: a) identify areas of reduced traffic volumes and reduction of traffic permeation, particularly in and around commercial and community centres.	Section 7.3.1, section 7.5
The proposal contributes to an increase in tree canopy for Greater Sydney.	**4.** The Proponent must describe the accessibility elements of the proposal including relevant accessibility legislation and guidelines, including: a) Impacts on public transport infrastructure and services	Section 5.4.2, section 7.4
	b) impacts on cyclists and pedestrian access, amenity and safety across and adjoining the proposal, including the relocation of cycle routes and delivery of new cycleways around the airport and Alexandra Canal.	Section 7.5

Table 1-2 Commonwealth MDP requirements – Traffic and Transport

MDP requirements	Where addressed in the document
91(1) (d) if a final master plan for the airport is in force—whether or not the development is consistent with the final master plan	Section 7.8.3
(g) the likely effect of the proposed developments that are set out in the major development plan, or the draft of the major development plan, on traffic flows at the airport and surrounding the airport	Construction impact assessment section 5.4.7 Operational impact assessment section 7.8 Cumulative impact assessment section 8.6

1.3 The project

1.3.1 Location

The project is located about eight kilometres south of Sydney's central business district and to the north of Sydney Airport on both sides of Alexandra Canal. The northern extent of the project is located at St Peters interchange, which is currently being constructed to the north of Canal Road in St Peters. The western extent of the project is located near the entrance to Sydney Airport Terminal 1 on Airport Drive, to the north of the Giovanni Brunetti Bridge and south-west of Link Road. The eastern extent of the project is located near the intersection of Joyce Drive, Qantas Drive, O'Riordan Street and Sir Reginald Ansett Drive.

The project is located mainly on government owned land in the suburbs of Tempe, St Peters and Mascot, in the Inner West, City of Sydney and Bayside local government areas.

1.3.2 Key design features

The project provides a number of linked road connections to facilitate the movement of traffic between the Sydney motorway network, Sydney Airport Terminal 1 (Terminal 1) and Sydney Airport Terminals 2 and 3 (Terminals 2/3). The project would connect Terminal 1 and Terminals 2/3 with each other and with the Sydney motorway network.

The project would also facilitate the movement of traffic towards Port Botany via General Holmes Drive. It would provide three main routes for traffic:

- Between the Sydney motorway network and Terminal 1, and towards M5 motorway and Princes Highway
- Between the Sydney motorway network and Terminals 2/3, and towards General Holmes Drive, Port Botany and Southern Cross Drive
- Between Terminal 1 and Terminals 2/3.

The key features of the project include:

- Road links to provide access between the Sydney motorway network and Sydney Airport's terminals, consisting of the following components:
  - St Peters interchange connection – a new elevated section of road extending from St Peters interchange to the Botany rail line, including an overpass over Canal Road
  - Terminal 1 connection – a new section of road connecting Terminal 1 with the St Peters interchange connection, including a bridge over Alexandra Canal and an overpass over the Botany rail line
  - Qantas Drive upgrade and extension – widening and upgrading Qantas Drive to connect Terminals 2/3 with the St Peters interchange connection, including a high-level bridge over Alexandra Canal
  - Terminal links – two new sections of road connecting Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal
  - Terminals 2/3 access – a new elevated viaduct and overpass connecting Terminals 2/3 with the upgraded Qantas Drive
- Road links to provide access to Sydney Airport:
  - A new section of road and an overpass connecting Sydney Airport's northern lands either side of the Botany rail line (the northern lands access)
  - A new section of road, including a signalised intersection with the Terminal 1 connection and a bridge connecting Sydney Airport's existing and proposed freight facility either side of Alexandra Canal (the freight terminal access)
- An active transport link approximately 1.3 kilometres in length along the northern side of Alexandra Canal to maintain connections between Sydney Airport, Mascot and the Sydney central business district
- Intersection upgrades or modifications
- Provision of operational ancillary infrastructure including maintenance bays, new and upgraded drainage infrastructure, signage and lighting, retaining walls, noise barriers, flood mitigation basin, utility works and landscaping.

1.3.3 Construction overview

A conceptual construction methodology has been developed based on the preliminary project design to be used as a basis for the environmental assessment process. Detailed construction planning, including programming, work methodologies, staging and work sequencing would be undertaken once construction contractor(s) have been engaged.

1.3.3.1 Timing and work phases

Construction of the project would involve four main phases of work. The indicative construction activities within each phase are outlined in Table 1-3.

Table 1-3 Indicative construction activities

Phase	Indicative construction activities
Enabling works	■ Construction of the temporary active transport link ■ Modification of various road intersections to facilitate main construction works.
Site establishment	■ Installing site fencing, hoarding and signage ■ Establishing construction compounds, work areas and site access routes.
Main construction works	■ Clearing/trimming of vegetation ■ Removal (or partial removal) of a number of buildings and other existing infrastructure e.g. concrete hardstand areas, drainage infrastructure, sheds, advertising structures, containers, etc. ■ Roadworks, including bridge and viaduct construction and drainage works ■ Utility works.
Finishing works	■ Erecting lighting, signage and street furniture, landscaping works and site demobilisation and rehabilitation in all areas.

Specific construction issues which would require careful planning and management and close coordination with relevant stakeholders include:

- Works within the prescribed airspace of Sydney Airport
- Works interfacing with the Botany rail line
- Piling in the vicinity of the T8 Airport and South line underground rail tunnels
- Works within the former Tempe Tip site and Alexandra Canal which are subject to remediation orders and specific management plans
- Excavation, storage and handling of contaminated soils generally within the project site and contaminated groundwater from the Botany Sands aquifer.

It is anticipated that construction would start mid- 2020 and take about three and a half years to complete. Detailed construction planning would be confirmed once construction contractor(s) have been engaged. Further information on construction is provided in Chapter 8 (Construction) of the EIS.

The project would include work undertaken during recommended standard hours as defined by the *Interim Construction Noise Guideline* (DECC, 2009):

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no work.

It would also include work outside these hours (out-of-hours work) to minimise the potential for aviation and rail safety hazards.

1.3.3.2 Construction footprint

The land required to construct the project (the construction footprint) is shown on Figure 1-2. The construction footprint includes the land needed to construct the proposed roadways, bridges, ancillary infrastructure and construction compounds. Utility works to support the project would generally occur within the construction footprint; however, some works (such as connections to existing infrastructure) may be required outside the footprint.

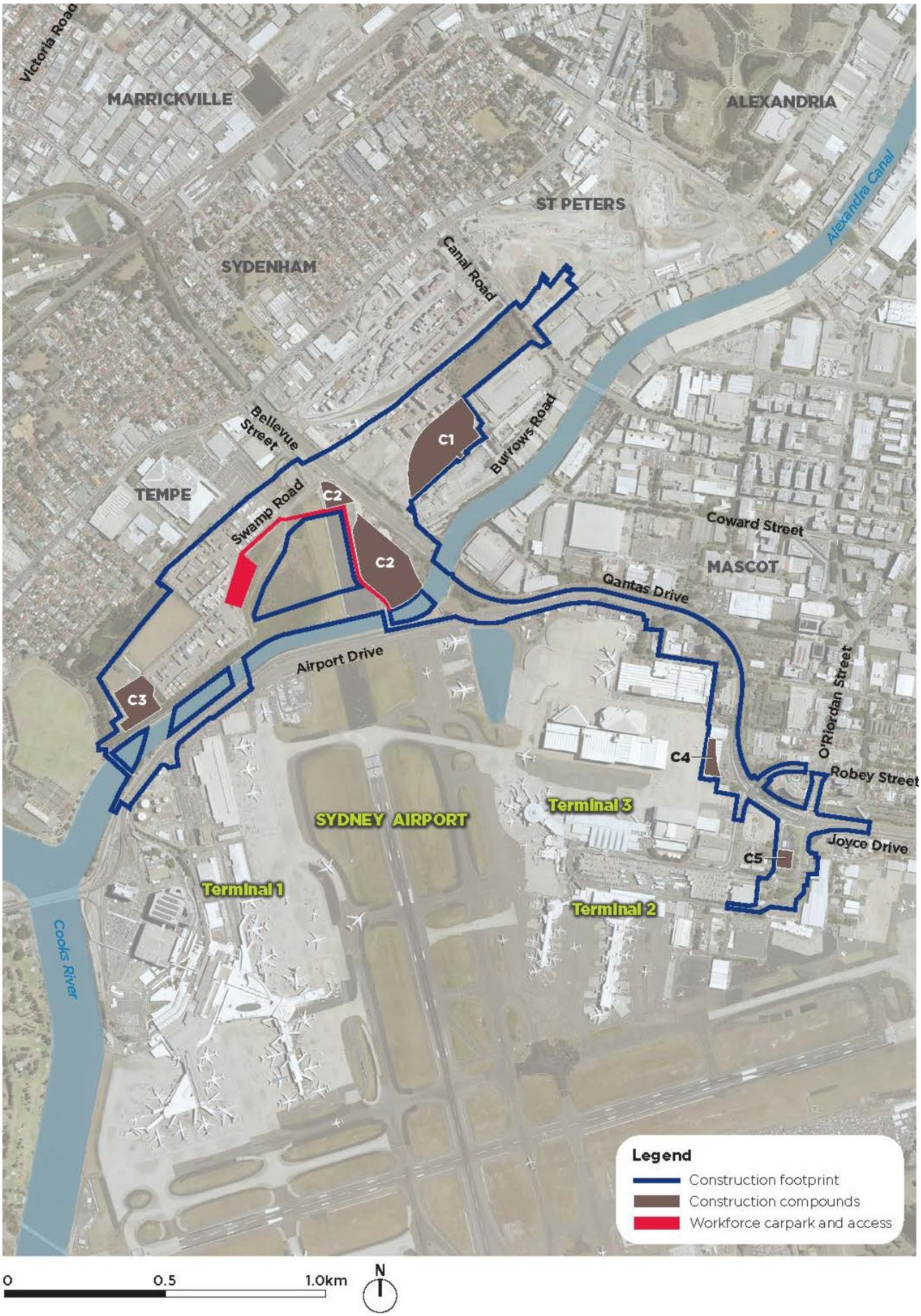


Figure 1-2 Construction footprint and facilities

1.3.3.3 Compounds, access and resources

Construction would be supported by five construction compounds located to support the main construction works (shown on Figure 1-2). Construction compounds would include site offices, staff amenities, storage and laydown areas, workshops and workforce parking areas.

Materials would be transported to and from work areas via construction haul routes, which have been selected to convey vehicles directly to the nearest arterial road.

The construction workforce requirements would vary over the construction period based the activities underway and the number of active work areas. The workforce is expected to peak at about 1,000 workers for a period of about 13 months, indicatively from the fourth quarter of 2021. Either side of this peak, workforce numbers are expected to reduce to about two thirds.

1.4 Structure of this report

The structure of the report is outlined below.

- **Section 1 – Introduction** – introduces the report and overview of the project
- **Section 2 – Strategic context of the project** – provides an appreciation of the strategic context for the project, including the legislative and policy setting, and broader transport objectives and planning for Sydney
- **Section 3 – Assessment methodology and criteria** – documents the methodology for traffic modelling including the approach adopted to assess construction and operational impacts and the relevant guidelines which were adopted
- **Section 4 – Existing traffic and transport environment** – describes the existing conditions for all modes of transport in the study area, such as heavy and light vehicles, public transport, pedestrians and cyclists including both infrastructure and operations or patterns for each of the modes
- **Section 5 – Construction impact assessment** – documents the potential impacts on the road and transport networks during construction
- **Section 6 – Future network operations without the project** – outlines the operational performance of the future transport network without the project
- **Section 7 – Operational impact assessment with the project** – outlines the operational performance of the future transport network with the project
- **Section 8 – Cumulative impact assessment** – documents the 'cumulative' impacts for a scenario where other planned infrastructure programs are also considered during both the construction and operational phases of the project
- **Section 9 – Recommended mitigation measures** – outlines the recommended measures to mitigate the identified operational and construction impacts
- **Section 10 – Conclusions** – outlines the overall conclusions for construction, operations and 'cumulative' impacts.

1.5 Study area

The study area for the traffic and transport assessment broadly encompasses an area extending from St Peters and Erskineville in the north to Banksia in the south-west and Botany in the south-east, as shown in Figure 1-3.

It is focused on the road network surrounding Sydney Airport and the area to the north, including Mascot and St Peters. The extent of the study area, including areas that require operational modelling assessment, was determined through analysis of forecast traffic flow differences as a result of the project, derived from the Sydney Strategic Motorway Planning Model (SMPM). The SMPM is a strategic traffic model that covers the Greater Sydney road network.

Figure 1-3 The study area

2. Strategic context of the project

Sydney Airport and Port Botany are of strategic and economic importance to the region, state and country. The project sits within a broader legislative and planning framework which provides regulatory, spatial, policy and economic strategic direction for Sydney's international gateways and associated transport and freight infrastructure. There are numerous legislative and strategic documents that outline important principles, objectives and targets which the project aims to align with. Section 2.1 provides an overview of these strategic documents.

In addition, there are several motorway projects happening across Sydney which this project would interface with. This project provides the crucial 'missing piece' to these projects by establishing a new connection to the airport from the Sydney motorway network, bypassing local roads and enabling faster, safer and more reliable journeys. The 'cumulative' effect of these motorway projects would alter travel patterns across the city and work to unlock access between Sydney Airport, Port Botany and the rest of the Sydney-wide transport network. Section 2.2 provides an overview of the important motorway projects happening in parallel with the planning for the project.

2.1 Legislation and policy setting

2.1.1 Commonwealth legislation

2.1.1.1 Airports Act 1996 and associated regulations

The *Airports Act 1996* (the Airports Act) and regulations are the statutory controls for ongoing regulation of development activities on Commonwealth-owned land leased from the Australian Government for the operation of Sydney Airport. The location of the Commonwealth-owned land is shown on Figure 2-1.

Under the Airports Act, this project is deemed 'major airport development' and requires a major development plan (MDP) to be approved by the Australian Minister for Infrastructure and Transport before major airport development can be undertaken on Commonwealth-owned land. Since an existing final master plan is in place for the airport, the Minister must not approve the MDP unless it is consistent with the master plan.

The Airports Act also requires that airport operators provide an assessment of the environmental issues associated with implementing the master plan and the plan for dealing with those issues. This is documented in an environment strategy that forms part of the airport's master plan.

Review of the Sydney Airport Master Plan and associated environment strategy are provided in section 2.1.3.

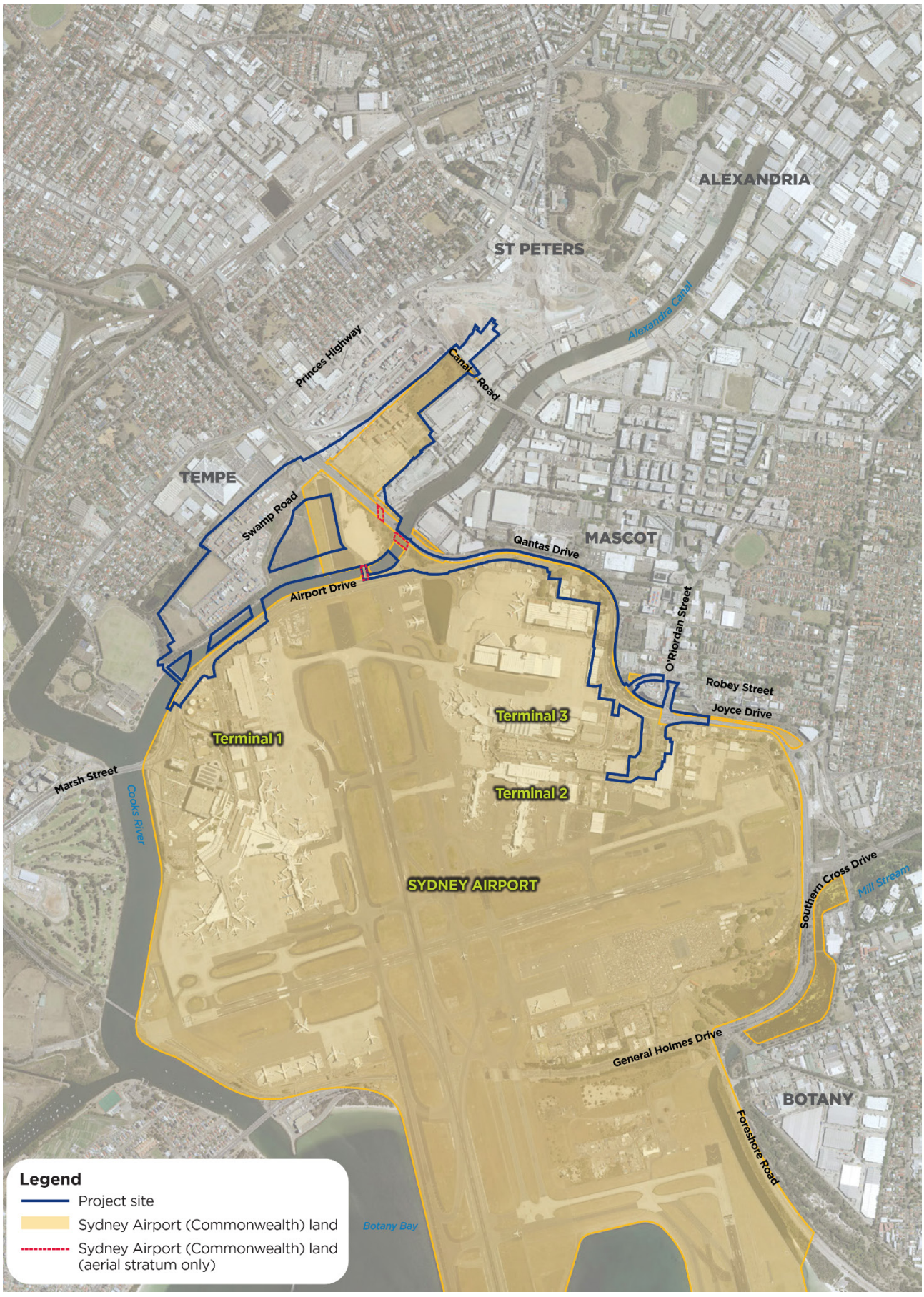


Figure 2-1 Commonwealth-owned land

2.1.2 State legislation

2.1.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* is administered by the NSW Department of Planning and Environment and includes provisions for the assessment of environmental impact statements, including for State Significant Infrastructure.

The project has been declared State Significant Infrastructure and must receive ministerial approval under Division 5.2 of the Act. The Act requires that an environmental impact statement (EIS) must be prepared according to the Planning Secretary's Environmental Assessment Requirements (SEARs). The Planning Secretary would then prepare an environmental assessment report for the purposes of the Minister's consideration of approval for the project.

2.1.3 Relevant master plans

2.1.3.1 Sydney Airport Master Plan 2039

The *Sydney Airport Master Plan 2039* outlines the strategic direction for Sydney Airport's operations and development over the next 20 years. It acknowledges that the continued growth of Sydney Airport is vital to achieving local, state and national employment, tourism and development objectives. The vision for Sydney Airport is to deliver a world-class airport experience to ensure growth of aviation which benefits Sydney, NSW and Australia. The master plan aims to enhance passenger experience and efficiency of the airport, focusing on safety, economic growth and improving environmental outcomes.

In accordance with the requirements of the Airports Act, the master plan:

- Establishes the strategic direction for efficient economic development at Sydney Airport over the planning period
- Provides for the development of additional uses of the Sydney Airport site
- Indicates to the public the intended uses of the Sydney Airport site
- Reduces potential conflicts between uses of the Sydney Airport site, to ensure that uses of the site are compatible with the areas surrounding the airport
- Ensures that operations at Sydney Airport are undertaken in accordance with relevant environmental legislation and standards
- Establishes a framework for assessing compliance with relevant environmental legislation and standards
- Promotes continual improvement of environmental management at Sydney Airport.

The key objectives relevant for this project include:

- Enhancing the experience of all passengers and airport users which includes ground transport facilities, rail stations, terminal forecourts and commercial precincts
- Improving ground access to and from the airport and in the surrounding area. This includes increased public and active transport use.

The *Airport Development Plan* forms part of the *Sydney Airport Master Plan 2039*. The *Airport Development Plan* outlines proposed improvements to the airfield, aviation, facilities, terminals and infrastructure to support expected increases in passenger numbers and aircraft movements. The plan aims to improve passenger experience and the operations of the airport.

Increases in demand from passengers and commuters would continue to increase pressure on ground transport infrastructure as more people travel to, from and around Sydney Airport. The *Five-Year Ground Transport Plan* and the *20-Year Ground Transport Strategy* contained in the *Sydney Airport Master Plan 2039,* identify proposed solutions to improve road network performance for access to and from Sydney Airport, taking into consideration expected growth in travel demand. In particular the Plans consider potential changes to traffic volumes and patterns due to the opening of WestConnex.

The project is consistent with the *Sydney Airport Master Plan 2039* in improving the overall passenger experience by reconfiguring the road network to improve capacity and access. Specifically, the project aligns with the following items outlined in the *Five-Year Ground Transport Strategy*:

- Providing increased capacity on Airport Drive and Qantas Drive by providing a new high-capacity connection
- Improving access to and from Terminals 2/3 by improving the performance of key access intersections at Qantas Drive, Robey Street and Seventh Street and Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive
- Providing new Link Road landside access.

Transport improvements at Terminal 1 and Terminals 2/3 are shown on Figure 2-2 and Figure 2-3.

2.1.3.2 NSW Ports' 30 year Master Plan

Navigating the Future: NSW Ports' 30 Year Master Plan outlines NSW Ports' priorities and objectives for Port Botany over the next 30 years, recognising that Port Botany would continue to have a vital role as Australia's premier port. The five objectives outlined in the plan include the following:

- Provide efficient road connections to the ports and intermodal terminals
- Grow rail transport of containers
- Use land and infrastructure efficiently
- Grow port capacity
- Protect the ports and intermodal terminals from urban encroachment.

The project supports many of these objectives by providing high-quality freight connections between Port Botany and Sydney's strategic transport network. While the Botany Rail Duplication would improve the road network by shifting freight from road to rail, the project would improve efficiency for freight that must be moved by road by creating an efficient connection to the Sydney motorway network that caters to over-height vehicles.

2.1.3.3 Mascot Station Town Centre Precinct Masterplan

The Mascot Station Town Centre Precinct is located one kilometre north of Sydney Airport Terminals 2/3 and lies within the study area. The *Mascot Station Town Centre Precinct Master Plan* (Bayside Council) outlines a framework for the urban development of the precinct for land use, built form, urban design, open space and transport. The Strategy was released in 2012 before planning for WestConnex and Sydney Gateway commenced, however recognises that the precinct has a high-density built form framed by important classified (State roads) including Ricketty Street, Canal Street, Gardeners Road and O'Riordan Street.

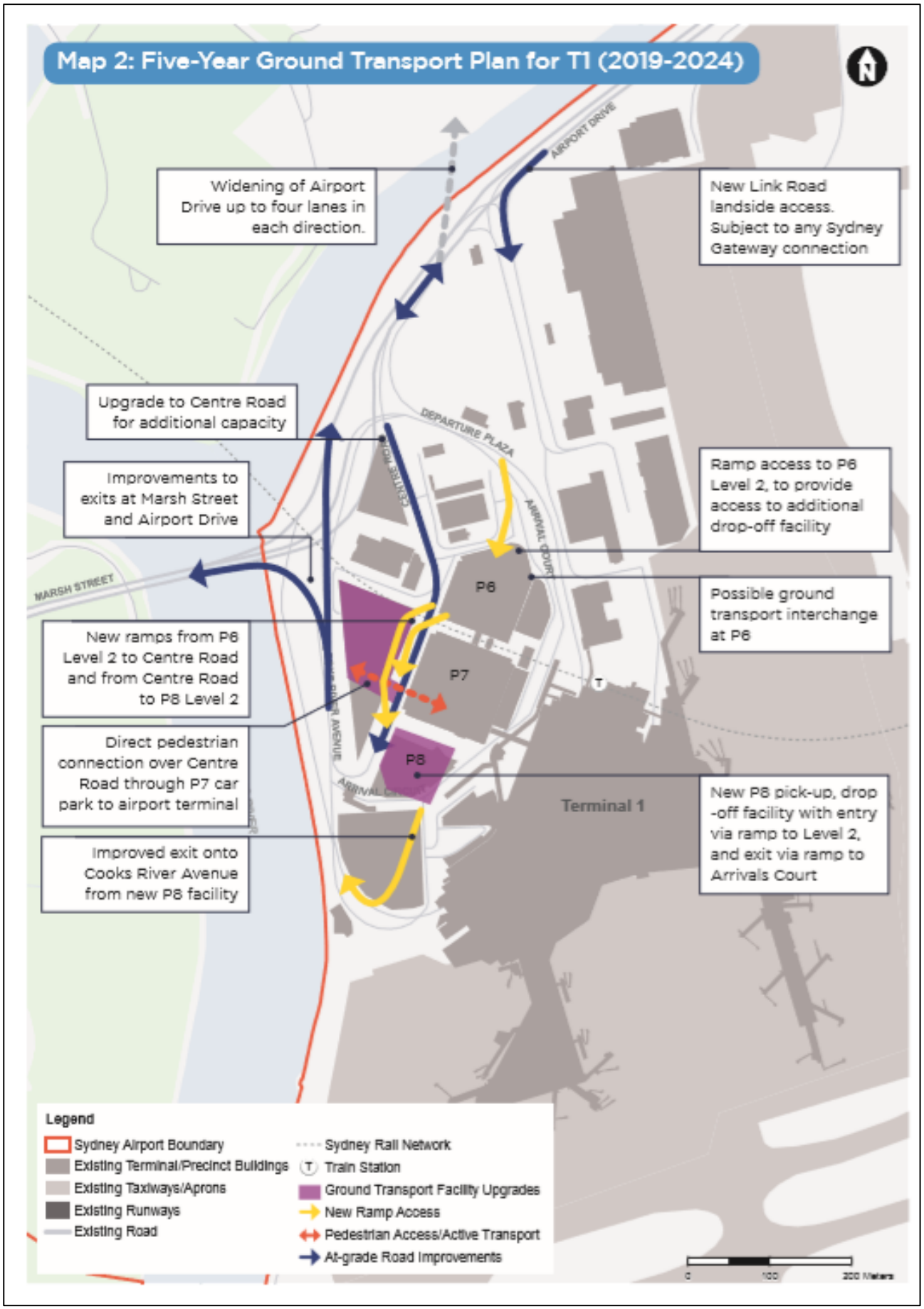


Figure 2-2 Transport Improvements at Sydney Airport Terminal 1

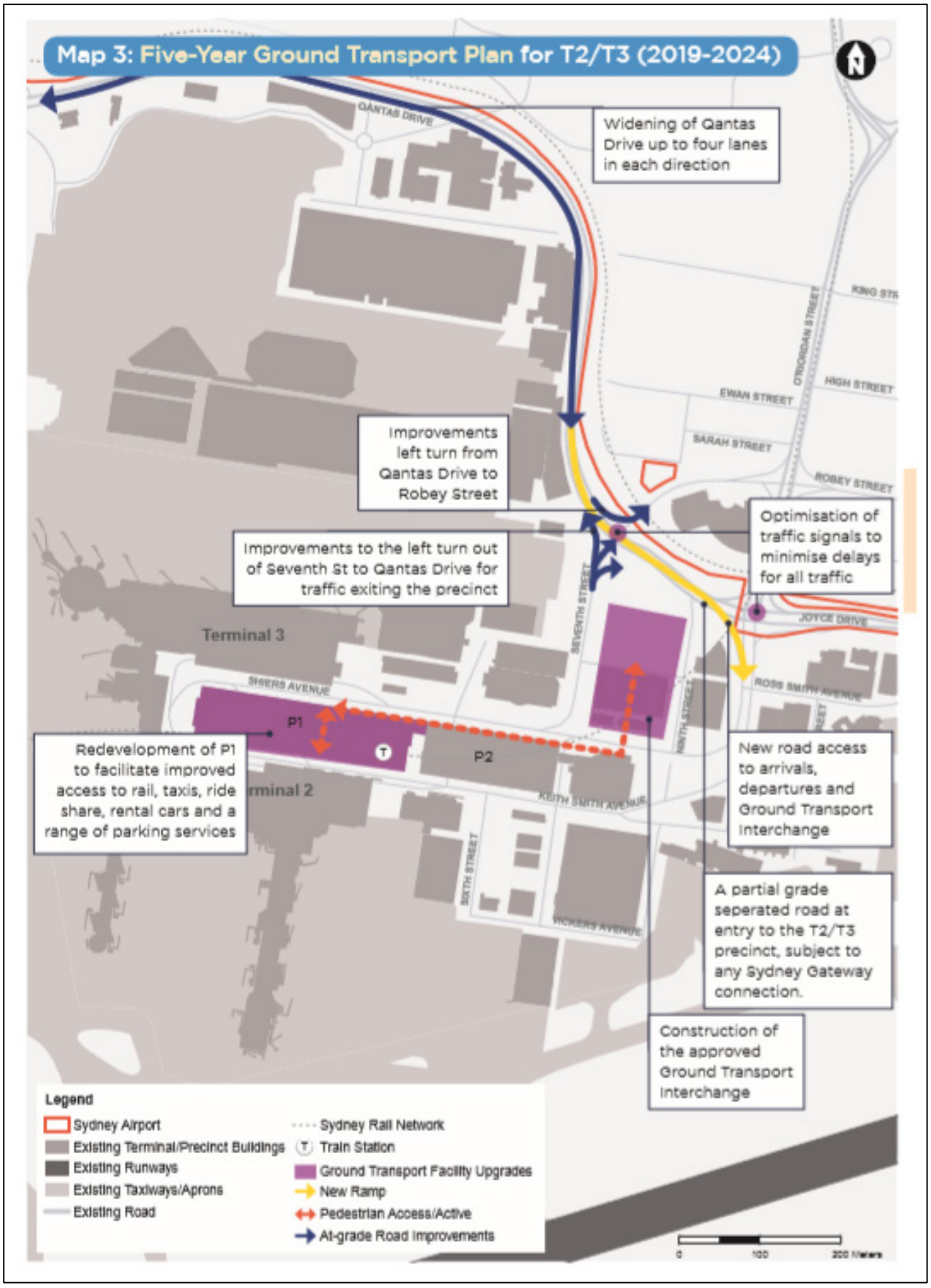


Figure 2-3 Transport Improvements at Sydney Airport Terminals 2/3

2.1.4 Policy and strategic plans

2.1.4.1 Australian Infrastructure Plan

The Australian Infrastructure Plan provides a positive reform and investment roadmap for Australia and sets out the infrastructure challenges and opportunities that the nation would face over the next 15 years.

The plan recognises the strategic importance of moving people and goods across the nation more efficiently, which is a driver of the project.

The project supports the following recommendations of the plan:

- Recommendation 3.1: Governments should upgrade legacy capital city passenger transport infrastructure to deliver higher capacity, high-frequency services across all modes
- Recommendation 3.4: Australia needs a *National Freight and Supply Chain Strategy*. Infrastructure Australia, in partnership with governments and the private sector, should lead the development of the Strategy. The Strategy should:
  - Map nationally significant supply chains and their access to supporting infrastructure and gateway
  - Evaluate the adequacy of the institutional framework support freight networks
  - Recommend reforms and investments that would enable the more efficient movement of freight
- Recommendation 3.5: All governments should establish targeted investment programs focused on removing first and last mile constraints across the national freight network. These investments should be informed by the findings of the recommended *National Freight and Supply Chain Strategy*.

2.1.4.2 Infrastructure Priority List

The *Infrastructure Priority List* has been developed in tandem with the *Australian Infrastructure Plan* to prioritise funding for infrastructure projects and initiatives across Australia according to their need and benefit over a 15-year horizon. Infrastructure Australia has assessed business cases for 100 projects and categorised them into 'High Priority' or 'Priority' projects or initiatives. The project is included on the *Infrastructure Priority List* as a 'High Priority Initiative' within the zero to five-year timeframe.

2.1.4.3 Greater Sydney Region Plan, A Metropolis of Three Cities

The *Greater Sydney Region Plan, A Metropolis of Three Cities* sets out a 40-year vision for Greater Sydney with integrated land use, transport and infrastructure planning across the three tiers of government and various State agencies.

Sydney Airport is recognised as a key cluster that supports the economy, requiring infrastructure to support the activities of the area and to meet future growth. The plan also recognises the strategic importance of Port Botany and Sydney Airport as nationally significant trade gateways that need to be sustained by surrounding industrial land uses and road and rail infrastructure. Retaining the competitiveness of freight operations in these locations is imperative to the NSW economy.

The project supports several objectives within the strategy, particularly those which promote growth and improved travel times, and optimisation of freight. The project is consistent with the following strategies:

- **Strategy 1.1** – Prioritise investment in infrastructure to support the vision of A Metropolis of Three Cities
- **Strategy 2.1** – Align forecast growth with infrastructure. The airport has indicated that there would be a significant increase in air traffic which would increase congestion on the roads surrounding the airport and put more pressure on the ability to get people and goods to the airport in a timely manner
- **Strategy 16.2** – Optimise the efficiency and effectiveness of the freight handling and logistics network by:
  - Protecting current and future freight corridors and shared freight corridors
  - Balancing the need to minimise negative impacts of freight movements on urban amenity with the need to support efficient freight movements and deliveries
  - Identifying and projecting key freight routes
  - Limiting incompatible uses in areas expected to have intense freight activity.

2.1.4.4 Future Transport 2056 Strategy

Future Transport 2056 provides an overarching, customer focused 40-year strategy that outlines a vision, strategic directions and customer outcomes for the state's transport system.

Future Transport includes a number of strategies to improve the movement of people and goods within the Greater Sydney area. In particular, road customers would have safe, direct and timely journeys via transport infrastructure and services which would respond to meet changing needs of road customers.

The strategy's vision is built on six outcomes, one of which is 'growing the economy'. This recognises that the state's transport network drives a $1.3 trillion economy and must maintain effective connections to Sydney's global gateways.

2.1.4.5 Greater Sydney Services and Infrastructure Plan

The *Greater Sydney Services and Infrastructure Plan* builds upon the state-wide outcomes set out in *Future Transport 2056* to establish specific outcomes for the Greater Sydney area. A key objective of the plan is to improve connections between Sydney's ports in the east and the manufacturing and distribution facilities primarily based in Western Sydney. Both WestConnex and the project are critical in achieving this goal.

2.1.4.6 NSW Freight and Ports Plan 2018–2023

The aim of the *NSW Freight and Ports Plan* is to provide a transport network that allows the efficient flow of goods by addressing the challenges associated with increased freight volumes in NSW. The strategy recognises the important role of the NSW road network and heavy vehicles in meeting the future growth in freight volumes. The plan proposes to increase freight capacity by delivering key road and rail infrastructure upgrades including WestConnex, and the project.

2.1.4.7 Road Safety Plan 2021

The *Road Safety Plan 2021* recognises the importance of reducing road trauma on NSW roads. The plan aims to achieve this by focusing on three interconnected areas: safe vehicles and equipment, safe roads and speeds, and safe people. The project seeks to support the objectives of the plan by providing a high-quality connection to Sydney Airport. General traffic and freight vehicles would be removed from the local road network, therefore reducing the risk of injury for pedestrians and other road users in this area.

2.1.4.8 NSW Heavy Vehicle Access Policy Framework

The *NSW Heavy Vehicle Access Policy Framework* aims to update the policy governing access to the road network for modern high productivity vehicles (HPVs). HPVs, such as Performance Based Standards (PBS) vehicles are desirable for the freight industry as they can carry more freight per vehicle and therefore reduce the number of trucks on the road. PBS vehicles are currently operating between Port Botany and the Cooks River Intermodal Terminal, as well as on the M5 corridor. The project supports the objectives of this framework by improving the road connection for freight vehicles between Port Botany and the Sydney wide motorway network for trips to Sydney's north and west.

2.1.4.9 State Infrastructure Strategy 2018–2038

Building Momentum: State Infrastructure Strategy 2018–2038 outlines a number of recommendations for infrastructure across the transport, energy, water, health, education, justice, social housing, culture, sport and tourism sectors.

The strategy identifies the project as an important connection between the key international gateways of Sydney Airport and Port Botany to Sydney's strategic road and rail networks through WestConnex and the Port Botany rail line. The following recommendations in the strategy are relevant to the project and related projects:

- **Recommendation 58** – Infrastructure NSW recommends that Transport for NSW leads the development of a bulk materials transport and handling plan for Greater Sydney by the end of 2019 to support the construction and waste management sectors

- **Recommendation 59** – Infrastructure NSW recommends that the Department of Planning and Environment updates the relevant State Environmental Planning Policies by the end of 2019 to further protect strategically important ports, airports, industrial lands, freight precincts and key corridors from incompatible uses to ensure the efficient movement of freight in Sydney and NSW, now and into the future
- **Recommendation 60** – Infrastructure NSW recommends that Transport for NSW finalises business cases by the end of 2018 to enable the NSW Government to partner with the Commonwealth Government to fund investment in the project, Botany Rail Duplication and Foreshore Road/Botany Road, as well as the Moorebank Intermodal Terminal Road Access Strategy, to remove bottlenecks on connections to and from Sydney Airport and Port Botany and to capitalise on development of the Moorebank Intermodal Terminal.

2.2 Transport projects

2.2.1 WestConnex program

The WestConnex program is an integrated motorway project which would provide faster, safer and more reliable journeys across the Sydney network. This project connects WestConnex to:

- Sydney Airport
- the Mascot/Botany local area, including Port Botany.

WestConnex is a regional motorway serving Western Sydney, complementing the Sydney Orbital Network, and would improve accessibility to the employment corridor from the CBD extending south to Sydney Airport and Port Botany.

Sections of WestConnex would be complete prior to the completion of the project. During early construction phases, the New M5 would be opened (expected during 2020), including St Peters interchange to Gardeners Road and Campbell Street. After this, the M4-M5 Link would open (expected during 2023). The opening of the project would enable the full benefits of WestConnex to be realised.

M4 Widening and M4 East project (New M4) – Widening of the existing M4 Motorway from Parramatta to Homebush and the tunnelled extension of the M4 Motorway between Homebush and Haberfield via Concord. The M4 East project includes interchanges at Concord Road, City West Link and Parramatta Road at Haberfield, with a future underground connection to the M4-M5 Link. The M4 Widening and M4 East projects are complete.

New M5 and St Peters interchange – Duplication of the M5 through new twin tunnels from Kingsgrove to a new interchange at St Peters to the east of the project site. The St Peters interchange would provide underground connections to the M4-M5 Link and the future F6 Extension, and surface connections to Gardeners Road (via a new bridge over Alexandra Canal) and the Alexandria to Moore Park Connectivity Upgrade at Euston Road. The New M5 is anticipated to be open to traffic in 2020.

M4-M5 Link and Rozelle Interchange – New mainline tunnels to connect the M4 East at Haberfield with the New M5 at the St Peters interchange, creating a continuous motorway network in the Inner West. Rozelle Interchange would connect the M4-M5 Link to the Anzac Bridge, Victoria Road via the Iron Cove Link and a future connection to the Western Harbour Tunnel. The Iron Cove Link would also provide an un-tolled tunnelled bypass of the congested Victoria Road between the Anzac Bridge and the Iron Cove Bridge. Both the M4-M5 Link and Rozelle Interchange are anticipated to be open to traffic in 2023.

Figure 2-4 shows how the project would connect with the above WestConnex projects.

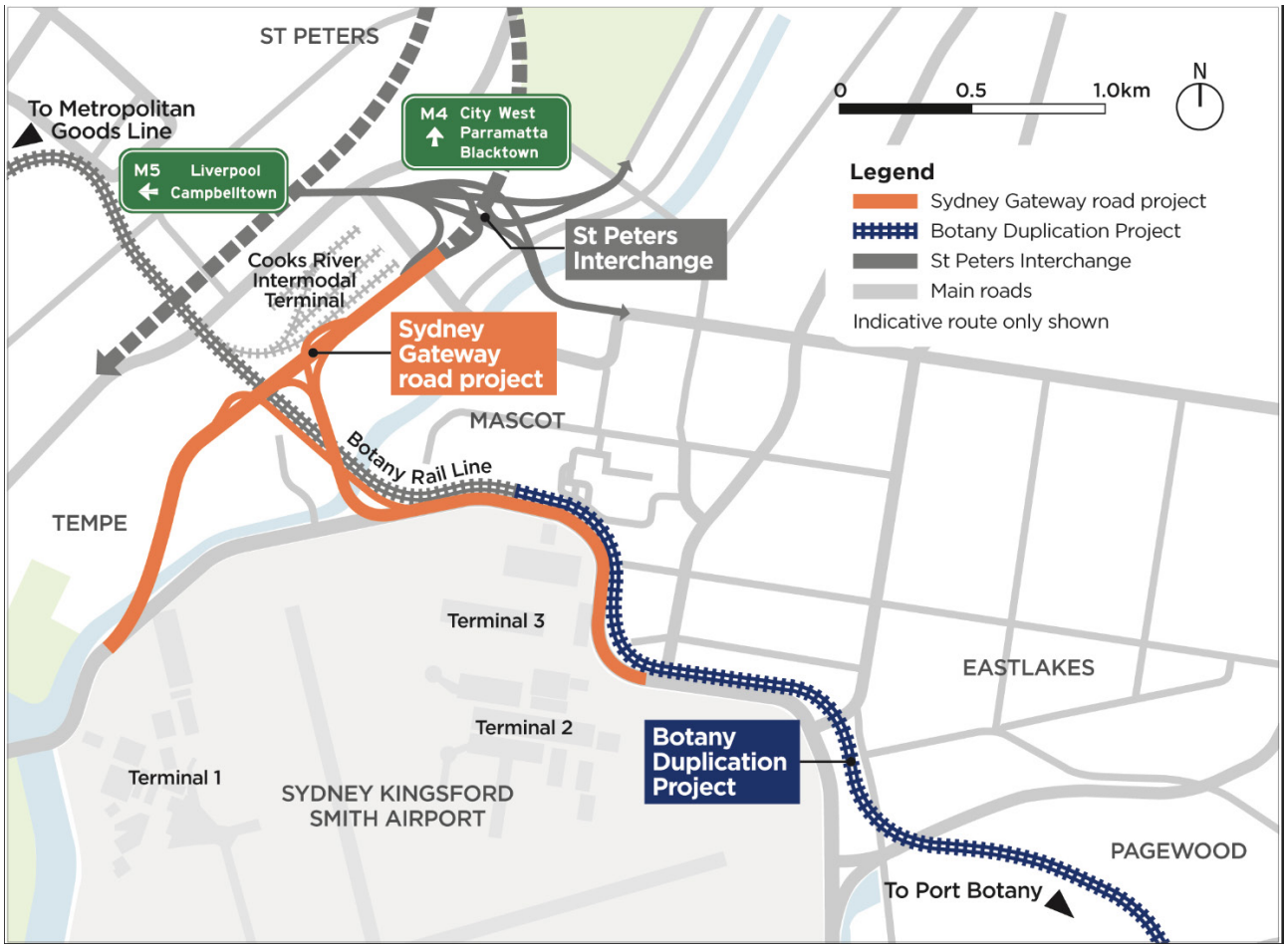


Figure 2-4 The project and WestConnex

2.2.2 Other Motorway projects

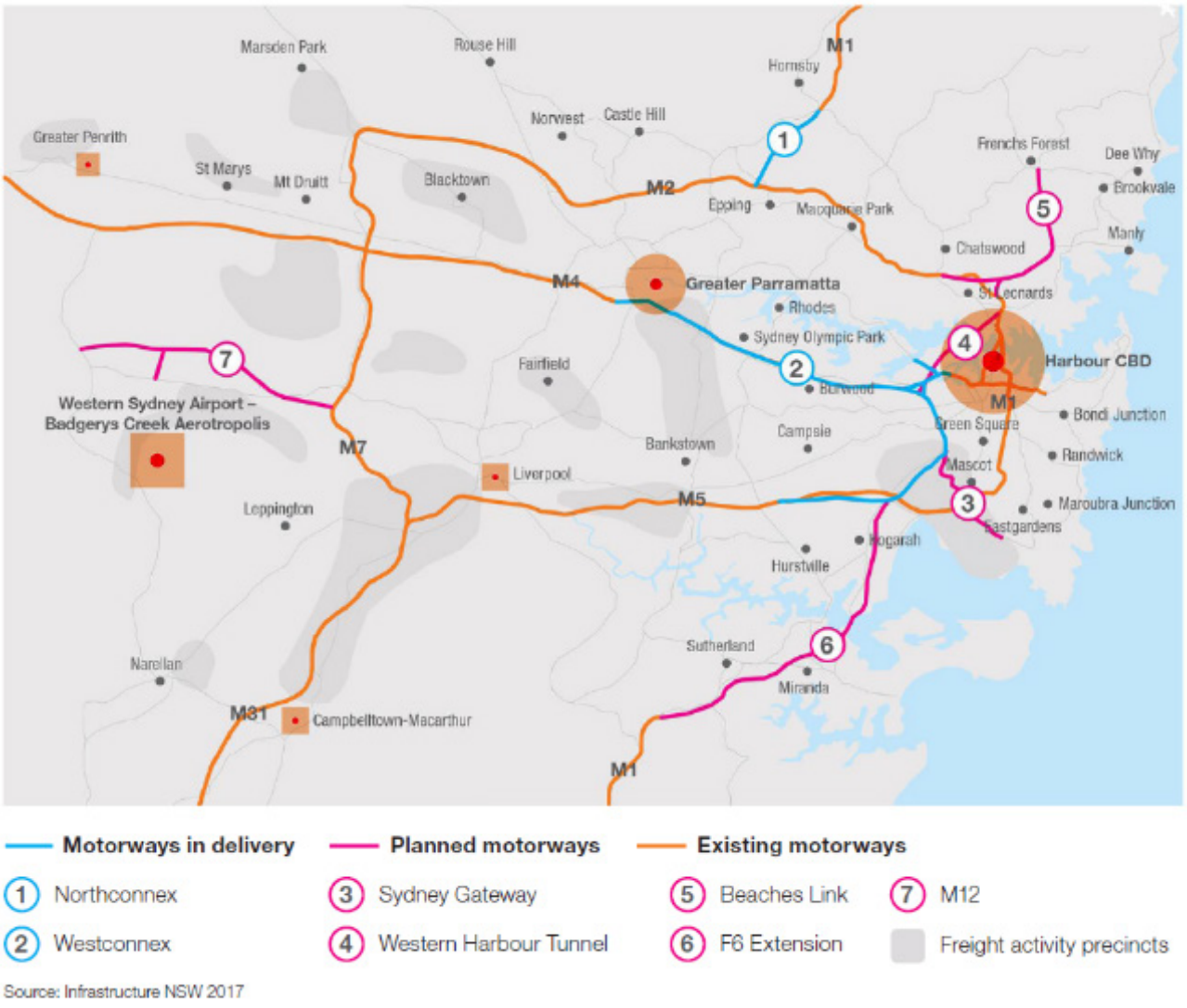
Other motorway projects currently in the planning phase include (see Figure 2-5):

Western Harbour Tunnel – A western bypass of the Sydney Harbour Bridge and Western Distributor running from the Warringah Freeway in North Sydney to the M4-M5 Link at the Rozelle Interchange.

Beaches Link – An underground bypass of Military Road and Spit Road, connecting the Wakehurst Parkway and Burnt Bridge Creek Deviation to the Warringah Freeway in North Sydney.

F6 Extension – A proposed motorway link between the New M5 at Arncliffe and the Princes Highway at Loftus. The first stage of the F6 Extension would extend to President Avenue at Kogarah with connections to Taren Point and Loftus to be delivered in future stages.

The cumulative effect of the project, WestConnex and related projects would alter travel patterns across the city and work to unlock access and improve travel times between Sydney Airport, Port Botany and the rest of the Sydney-wide transport network, as discussed in section 8.



Source: Infrastructure NSW 2017

Figure 2-5 Motorways in Greater Sydney (*State Infrastructure Strategy 2018-2038*)

2.2.3 Local road upgrades

There are a number of local road upgrades planned and underway within the Sydney Airport Precinct as follows:

- Airport East Precinct Upgrade – Upgrading east of Sydney Airport and replacement of the rail level crossing at General Holmes Drive with a new rail bridge, including:
  - Extending Wentworth Avenue to the west of Botany Road under the Botany rail line and a new rail bridge at the Wentworth Avenue extension
  - Closing General Holmes Drive between Joyce Drive and Botany Road, including removing the existing level crossing for the Botany rail line
  - Improving the Mill Pond Road intersections with General Holmes Drive and Botany Road with removal of the southbound right-hand turn
  - Widening Joyce Drive and General Holmes Drive between O'Riordan Street and Mill Pond Road to three lanes in each direction
  - Introducing a new right hand turn from Joyce Drive to enter Sydney Airport at Ross Smith Avenue

  The target completion date for these works is end of 2019
- Airport North Precinct Upgrade – Reconfiguring Robey Street and the southern end of O'Riordan Street to accommodate upgrades to the internal road network at Terminals 2/3 and improve network efficiency within Mascot. The target completion date for these works is December 2020.

2.2.4 Relationship with the project

The indicative construction program for the above motorways and local road upgrades, as well as the project are summarised in Figure 2-6. The project's construction traffic management phases are also shown and discussed further in section 5.3.1.

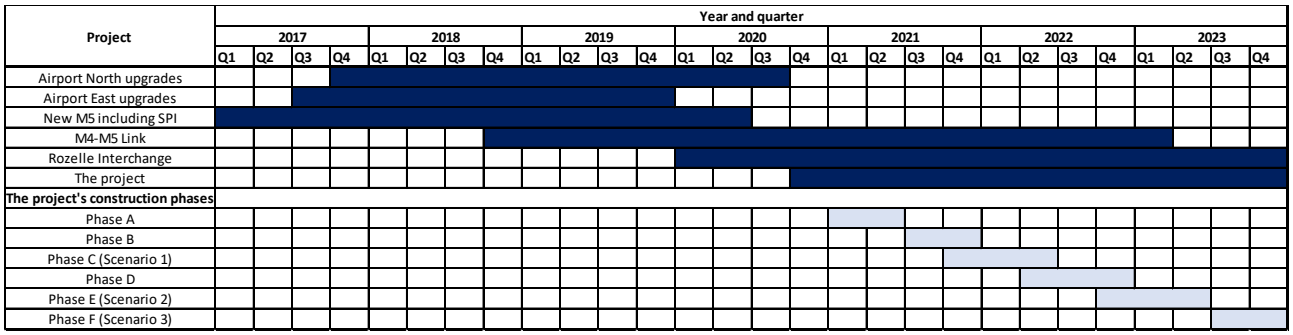


Figure 2-6 Indicative construction programmes for the relevant projects

Figure 2-6 shows the relevant road projects which would be completed prior to construction of the project including the Airport East Precinct and Airport North Precinct upgrades as well as the New M5, including St Peters interchange.

Figure 2-6 also shows that the M4-M5 Link would open during the project's construction period, with the Rozelle Interchange expected to open at a similar time to the project.

3. Assessment methodology and criteria

This section outlines the methodology followed and criteria used to assess the traffic and transport related impacts of the project in support of the SEARs and draft MDP requirements. The assessment considers both the operational and construction related impacts by comparing the existing traffic and transport environment to the future traffic and transport environment, with and without the project, using objective assessment criteria for the relevant performance measures.

3.1 Methodology overview

The assessment methodology broadly incorporates the following steps summarised in Figure 3-1:

- Identification of the assessment requirements for the SEARs and draft MDP
- Assessment of the existing conditions for the road, public transport and active transport networks, parking and access, and safety
- Identification of assessment criteria to enable a quantitative comparison between future scenarios without and with the project
- Assessment of forecast operational and construction impacts of the project
- Identification of mitigation measures to avoid or minimise any adverse impacts as well as measures to enhance the performance of the project.

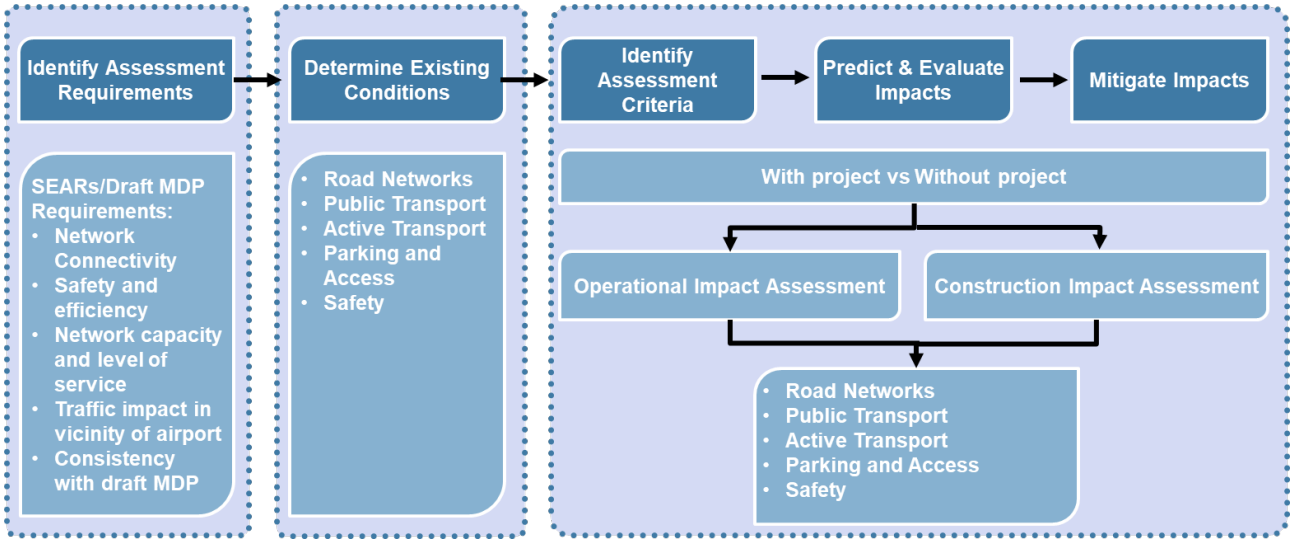


Figure 3-1 Methodology overview

The SEARs transport performance outcomes provide a framework for the analysis of the impacts of the project. The four desired performance outcomes are to ensure that:

- Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts
- The safety of the transport system customers is maintained
- Impacts on network capacity and the Level of Service (LoS) are effectively managed
- Works are compatible with existing infrastructure and future transport corridors.

3.2 Assessment scenarios

In considering the future impacts, several scenarios were considered, reflecting the timeframe under which the project would be delivered, the extent of future infrastructure developments, and the construction staging. The following years were represented in terms of traffic demand:

- 2016 was the adopted baseline for the strategic models
- 2018 was the adopted baseline for the operational model
- 2022 was adopted as the year in which construction impacts would be tested
- 2026 was adopted as the project opening year
- 2036 was adopted as the 10 years after opening scenario, as required in the *Traffic Modelling Guidelines*.

The adopted baseline years are considered as being representative of current network conditions and provide a baseline against which the performance of future scenarios can be compared. It is noted that there are two adopted baseline years namely 2016 and 2018 for the strategic and operational models respectively. This is due to the strategic models being developed and calibrated separately and prior to the development of the project specific operational model. The strategic models are developed for ABS Census years and are developed considering available data and inputs such as counts, travel times and census data, among other data, collected during 2016. The operational model baseline was based on data collected specifically for the purposes of the project in 2018 to reflect existing network conditions.

It is also noted that the project is planned to be open to motorists in 2023, however 2026 was modelled as the year of opening for traffic assessment purposes as this aligns with the forecast travel demand years for the strategic models, which aligns with the future ABS Census year 2026. The use of 2026 as the year of opening is considered a conservative approach.

The traffic demand scenarios were combined with the following transport network scenarios as detailed below and are summarised in Table 3-1 and Figure 3-2:

- **2016 baseline:** Includes the 2016 road network with no new projects or upgrades. For the strategic modelling, 2016 was adopted as the baseline as this aligns with the current strategic modelling scenarios available, which align with the ABS Census year
- **2018 baseline:** Includes the current 2018 road network with no new projects or upgrades. For the operational modelling, 2018 was adopted as the baseline to match the year of traffic survey data collection
- **2022 future baseline:** This scenario represents a future 2022 road network including any planned surface network upgrades completed up until that year. This scenario excludes any upgrades due the project and was developed as a benchmark from which to quantify the relative impact of the construction works on the network. These future baseline network and traffic demands were used to assess three construction scenarios across the proposed construction timeline. Further detail relating to these construction scenarios is outlined in section 5.4.1.1
- **2026 'without project'**: Includes a future 2026 network including planned surface network upgrades, NorthConnex, and the WestConnex program of works (M4 Widening and M4 East, New M5 and St Peters interchange, M4-M5 Link and Rozelle Interchange) but excludes the project. The 'without project' scenario also assumes that ongoing improvements would be made to the broader road and public transport network including some new infrastructure and intersection upgrades to improve capacity and cater for traffic growth
- **2026 'with project'**: Incorporates the 2026 'without project' upgrades as above but includes the project
- **2026 'cumulative'**: Incorporates the 2026 'with project' scenario in addition to the proposed F6 Extension Stage 1 (New M5 Motorway at Arncliffe to President Avenue at Kogarah) and the project
- **2036 'without project'**: Includes a future 2036 network including planned surface network upgrades, NorthConnex, and the WestConnex program of works (M4 Widening and M4 East, New M5 and St Peters Interchange, M4-M5 Link and Rozelle Interchange) but excludes the project. The 'without project' scenario also assumes that ongoing improvements would be made to the broader road and public transport network including some new infrastructure and intersection upgrades to improve capacity and cater for traffic growth

- **2036 'with project'**: Incorporates the 2036 'without project' upgrades as above but includes the project
- **2036 'cumulative'**: Incorporates the 2036 'with project' scenario in addition to the proposed F6 Extension Stage 1 (New M5 Motorway at Arncliffe to President Avenue at Kogarah), future stages of the F6 Extension between Kogarah and Loftus, the Western Harbour Tunnel and the Beaches Link and the project.

The future year scenarios are considered with and without the project to allow for the impacts of the project to be isolated and evaluated. The 'without project' scenario typically includes all committed transport infrastructure schemes and serves as a future baseline against which the project can be assessed.

The 'cumulative' scenario refers to the infrastructure already included within the 'with project' scenario, in addition to other planned motorway projects including the proposed F6 Extension, Western Harbour Tunnel and Beaches Link. In this context 'cumulative' is referring to proposed motorway projects which are still in the planning phase and which are not yet committed infrastructure projects for construction. This is therefore assessed as an additional scenario to ascertain the cumulative impacts of all planned motorway projects in future. 'Cumulative' scenarios were assessed for 2026 and 2036.

The following project is included in the 2026 'cumulative' scenario:

- The proposed F6 Extension (New M5 Motorway at Arncliffe to President Avenue at Kogarah). The F6 extension would improve connections and travel times in Sydney along Princes Highway and enhance connections for residents and businesses within the broader regional area as well as promote and support economic development in areas to the south, such as Sutherland and the Illawarra.

In addition to the above, the following projects are also included in the 2036 'cumulative' scenario:

- The Western Harbour Tunnel project, which provides an additional crossing of Sydney Harbour to the west of Sydney Harbour Bridge which, together with WestConnex, would act as a western bypass of the Sydney CBD
- The Beaches Link project which comprises a tunnel that would connect to the Warringah Freeway with the Burnt Bridge Creek Deviation at Balgowlah
- Extension of the F6 from Kogarah to Loftus.

The planned motorway projects included within the cumulative scenarios are summarised in Figure 3-2.

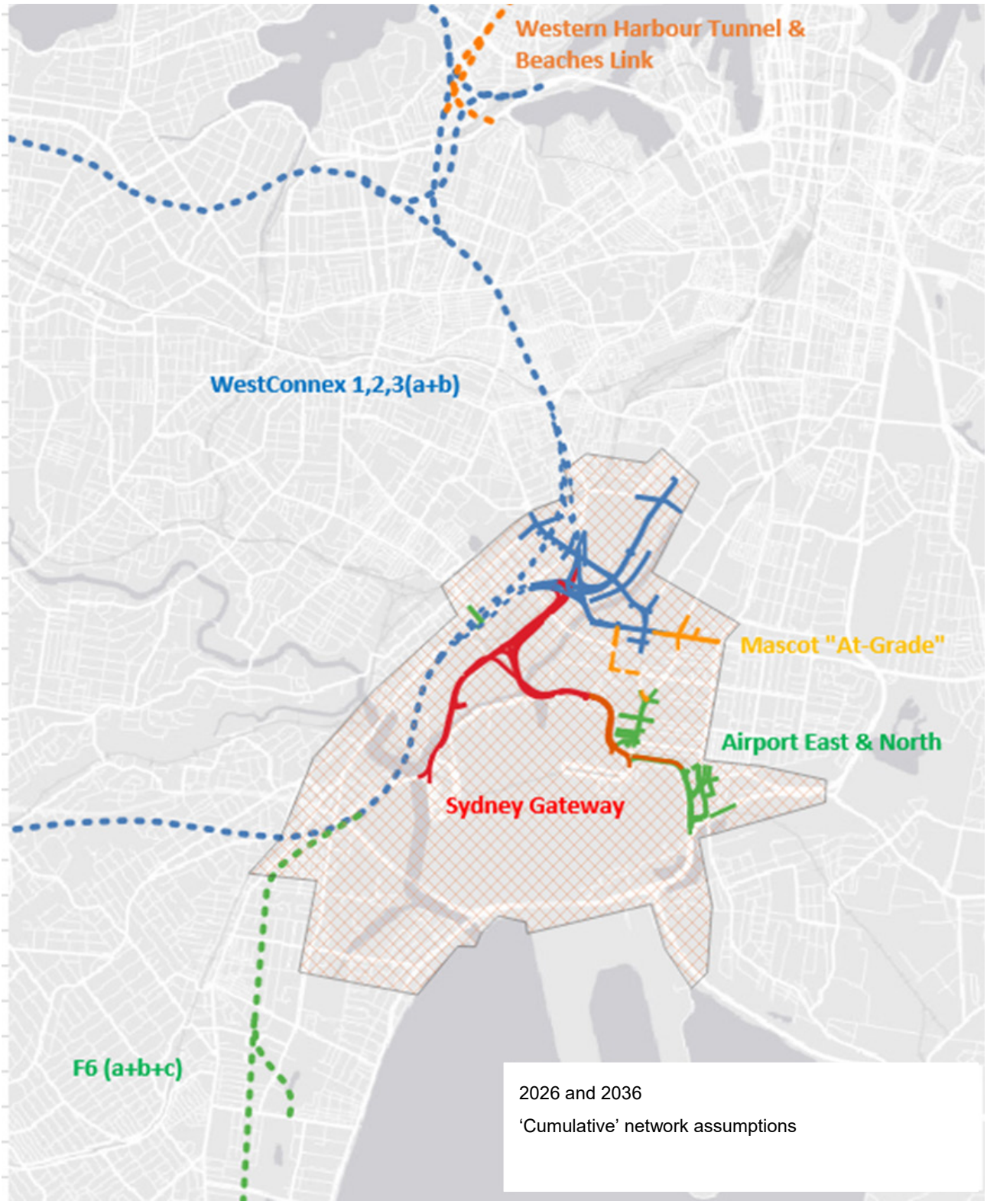


Figure 3-2 2026 and 2036 cumulative network assumptions

Table 3-1 Modelled scenarios

Year	Scenario	Baseline road network	Mascot intersection upgrades	Princes Highway/Railway Road upgrade	Airport North upgrade	Airport East upgrade	Sydney Gateway	NorthConnex	M4 upgrade and New M5 including SPI	M4-M5 Link and Rozelle Interchange	Western Harbour Tunnel	Beaches link	F6 Extension Stage 1 (Arncliffe to Kogarah)	F6 Extension (Kogarah to Loftus)
2016	Baseline (Strategic)	x												
2018	Baseline (Operational)	x												
2022	Future Baseline (For construction assessment)	x	x		x	x		x	x					
2026	'Without project'	x	x	x	x	x		x	x	x				
	'With project'	x	x	x	x	x	x	x	x	x				
	'Cumulative'	x	x	x	x	x	x	x	x	x			x	
2036	'Without project'	x	x	x	x	x		x	x	x				
	'With project'	x	x	x	x	x	x	x	x	x				
	'Cumulative'	x	x	x	x	x	x	x	x	x	x	x	x	x

3.3 Road network assessment methodology

3.3.1 Modelling overview

Modelling is used as an assessment tool supported by additional traffic engineering analysis and judgement to ensure that road projects are designed to optimise traffic outcomes, improve road network performance and serve NSW well into the future. Outputs of traffic models are typically used to:

- Guide project design (including all aspects of road design and active transport design)
- Inform planning and environmental assessment
- Inform community, stakeholders and regulators of traffic outcomes that are likely to be achieved both during project construction and during operation.

The objective of the transport modelling undertaken for the project was to assess and understand how traffic volumes would change over time as new infrastructure and upgrades are introduced into the surrounding road network. These changes and impacts on the road network were assessed at various levels of detail to assist in identifying the benefits of the project as well as any measures required to mitigate against adverse traffic and construction impacts due to the project. A variety of models are typically used within transport planning and engineering to satisfy these analytical needs including strategic and operational models.

To meet the objective of assessing the traffic impacts, specifically the SEARs and draft MDP requirements, a three-stage traffic forecasting and modelling approach including a combination of strategic and operational models was followed to incorporate the wider regional infrastructure and growth influences using the following models:

- Sydney Strategic Travel Model (STM)
- Strategic Motorway Planning Model (SMPM)
- Sydney Gateway Operational Model (Operational Model).

The three models used for this assessment are summarised in Figure 3-3 and explained further below.

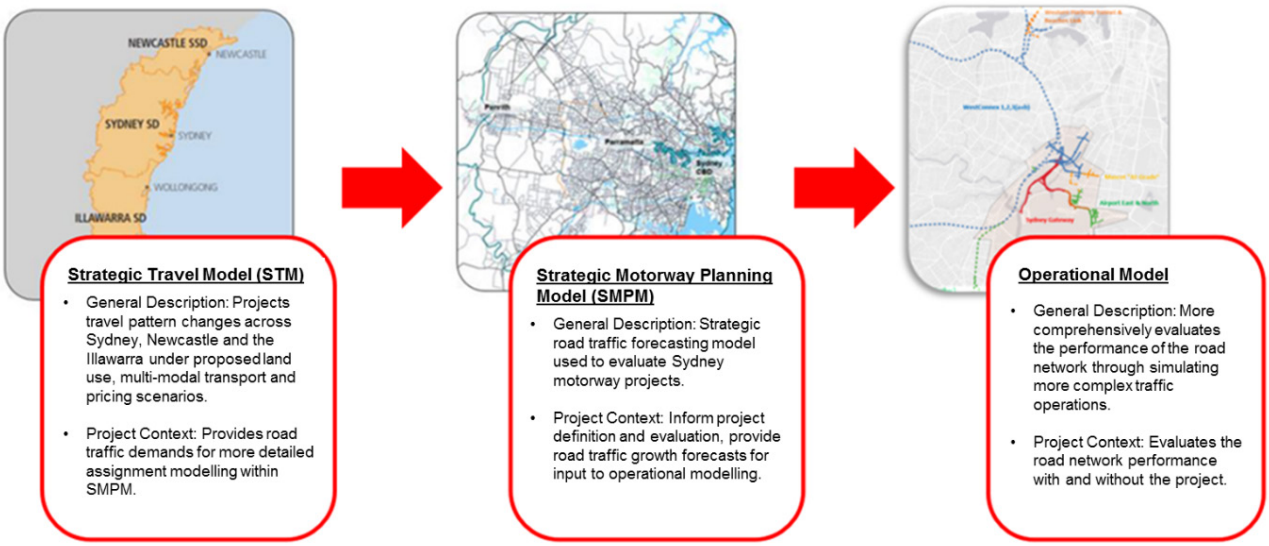


Figure 3-3 Transport models overview

The strategic models were used to estimate the current or future levels of travel demand and their impact on the transport network across the Greater Metropolitan Area (GMA). Strategic models typically cover an entire metropolitan area, region or state and are typically used to evaluate major infrastructure plans and population and employment changes over time.

The operational traffic model was developed specifically for this project and was used to assess and mitigate both the operational and construction traffic impacts on the local road network and surrounding intersections. The operational model covers a smaller, more detailed localised study. Therefore, the transport network in the operational model is significantly more detailed than in the strategic models and it includes traffic control systems (including signals, sensors, ramp meters). The operational model was used to evaluate the dynamic effects of the project on traffic flows including individual vehicle lane allocation and merging and weaving details among others.

3.3.2 Modelling approach

The modelling approach, shown in Figure 3-4, comprised three stages incorporating both strategic and operational modelling to allow for the assessment of the project's impacts at both the regional level on the wider Sydney road network and at the local level within the immediate vicinity of the project.

Three models have been used in developing traffic demand forecasts and assessing the traffic impacts due to the project for the purposes of the combined EIS/preliminary draft MDP. Incorporating these three stages allowed for the underlying assumptions relating to land use, mode choice, pricing strategies, induced demand, and traffic and transport infrastructure upgrades to be considered at each level of modelling.

This section describes the methodology followed to assess the expected traffic and transport impacts of the project at both the strategic and local operational level. It follows standard road network traffic modelling guidelines and best practice used for planning and assessing major road projects in NSW and addresses the SEARs and draft MDP requirements.

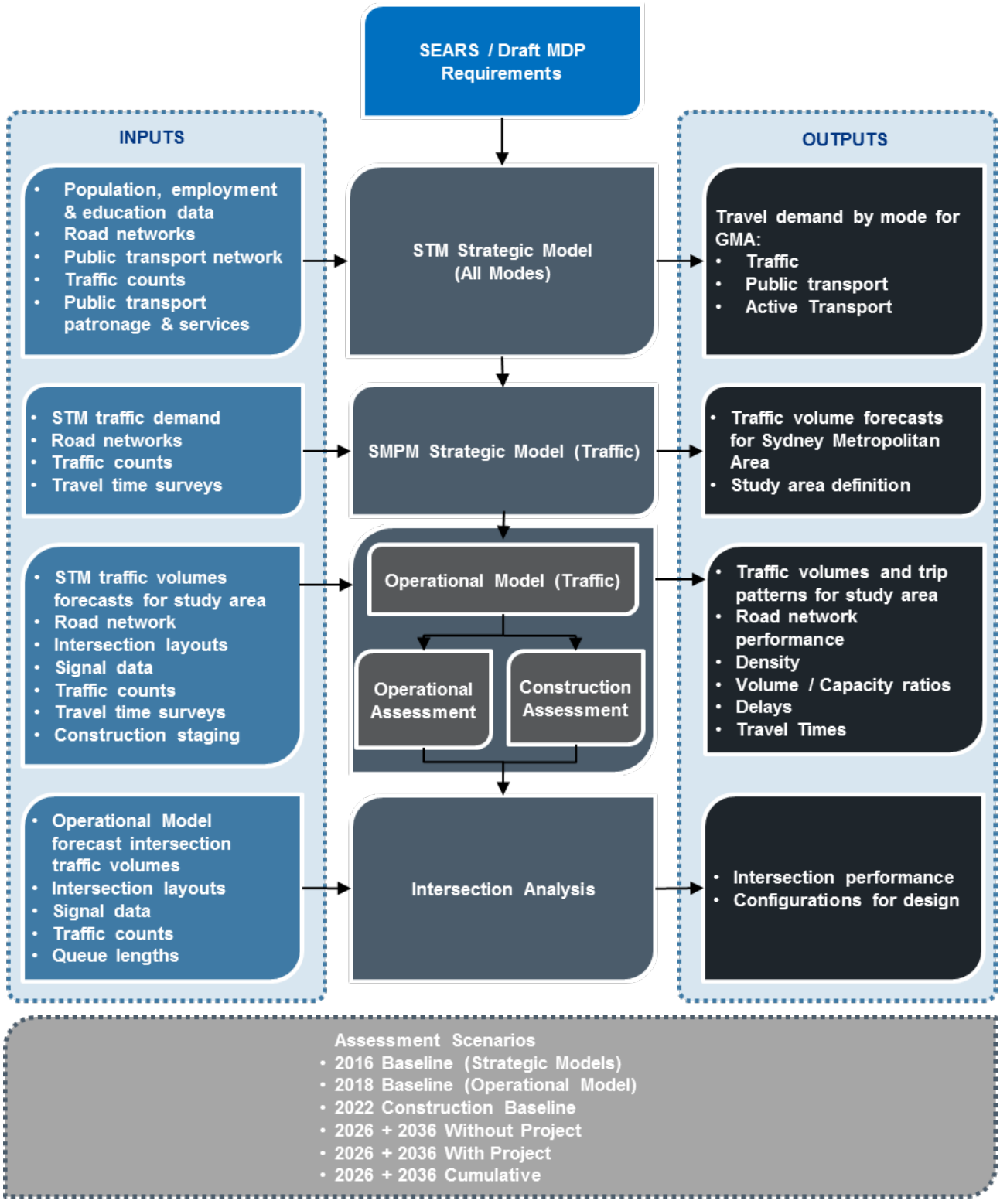


Figure 3-4 Modelling methodology overview

3.3.2.1 Sydney Strategic Travel Model

The Sydney Strategic Travel Model (STM) was used during the first stage of the modelling assessment to determine the resulting travel demand given the latest forecast land use inputs and transport infrastructure projects, in particular the latest planned motorway projects across Sydney, including the project.

The STM developed and operated by Transport for NSW, is the primary source for the extraction of region-wide trip patterns and travel demand on the transport network across Sydney, Newcastle and the Illawarra. The STM includes trip generation, trip distribution and mode choice modules and incorporates demographic data related to land uses including population, employment and education enrolment projections. This allows the STM to address changes in land use, trip distribution and mode choice and forecast the resulting vehicle traffic demands for peak and off-peak periods.

The STM is able to provide 24-hour travel demand estimates for both car and public transport modes, each one split by travel purposes (work, business, primary, secondary, tertiary education, shopping and other) for an average workday.

STM forecasts are produced for ABS Census years, including 2016, 2021, 2026, 2031 and 2036.

The population and employment projections incorporated within the STM have been projected using 2016 Census data and include the latest known land use developments across the GMA. It also incorporates the strategic directives contained in *A Plan for Growing Sydney (NSW Government 2014)*.

For this assessment, the resulting forecast vehicle demands for cars and heavy vehicles were passed onto the Strategic Motorway Planning Model (SMPM). The SMPM which specifically deals with assessing the strategic impacts of traffic on the Sydney road network, as discussed further below.

3.3.2.2 Strategic Motorway Planning Model

The Strategic Motorway Planning Model (SMPM)is a strategic traffic model that is developed and operated by Roads and Maritime. The SMPM encompasses existing and future road networks in the Sydney Metropolitan area and was principally developed to assess the road infrastructure improvements associated with the new motorway projects currently under assessment, both individually and in combination.

The SMPM uses the forecast traffic demand outputs from the STM for more detailed traffic assignment modelling within the SMPM. SMPM forecasts are normally produced for ABS Census years, such as 2016, 2021, 2026, 2031 and 2036. However, forecasts can also be made for intermediate years as required for specific projects.

The SMPM provides a platform to understand changes in future weekday travel patterns under different land use, transport infrastructure and pricing scenarios. The SMPM includes the following features:

- Known changes and upgrades to the road network in the Sydney metropolitan area
- Forecast traffic demand for cars and heavy vehicles based on the outputs from the STM
- A toll assignment module which allows for the impact of different toll pricing strategies to be assessed
- An induced traffic module which allows for an estimation of the additional traffic attracted onto the road network due to the additional capacity provided by major new road infrastructure projects.

The SMPM baseline year model was developed, calibrated and validated against 2016 Sydney-wide data including traffic count and travel time survey data. The SMPM comprises separate weekday time period sub-models for the following time periods:

- AM period: (7–9am)
- Daytime inter-peak: (9am–3pm)
- PM period: (3–6pm)
- Evening off-peak (6pm–7am).

Future demands were estimated by applying future year traffic growth forecasts from the STM to the SMPM to produce traffic estimates for the years 2021, 2026 and 2036. These traffic estimates were produced by time period for an average school day for each year and by vehicle class for assessment.

The construction program for the project has been assumed to occur between mid-2020 and December 2023. A future year of 2022 has been assumed for the construction modelling assessment. This 2022 scenario was created based on the 2021 SMPM road network with 2022 traffic demand based on an interpolation between 2021 and 2026 forecast traffic demands.

The key objective of the SMPM demand modelling was to forecast the growth in traffic volumes on key roads in the study area, considering the traffic impacts and diversionary effects due to the expected population and employment changes, and proposed road network improvements in the future. The forecast growth in traffic volumes on the road network were extracted at the local level for the project study area, for each traffic modelling scenario, for application in the more detailed operational model.

3.3.2.3 Operational traffic model (operational model)

While the SMPM provides strategic travel demand and traffic forecasts and assesses traffic impacts across the Sydney metropolitan area, more detailed operational models were required to evaluate the operational and construction impacts on the surrounding road network and intersections in the study area.

The project's operational model was developed specifically for the project and was calibrated and validated to represent a 2018 baseline year. The road network in the operational model covers the local road network area within the vicinity of the project and incorporates significantly more detail in relation to layout, lanes, intersections and signals than the strategic models. This allows for an operational performance assessment to be undertaken for the network and intersections both with and without the project and its construction to determine traffic impacts and identify mitigation measures where necessary.

The approach taken to develop the operational model is discussed further below.

Baseline year model development

The operational model was developed, calibrated and validated for a 2018 baseline year. The area covered by the model includes a large part of the road network in the Mascot, Alexandria, St Peters, Tempe, Wolli Creek, Arncliffe, Banksia and Kyeemagh areas. The 2018 network includes recent projects such as the opening of the Nigel Love Bridge and the Northern Lands car park and the ongoing roadworks related to the Airport North and Airport South projects.

In deciding the exact extent of the study area, the influence and impact of the project from an operational perspective was considered, specifically where the change in forecast traffic volumes due to the project were considered substantial as indicated by the SMPM assessment scenarios during the AM and PM peak periods. This aided in further refining the study area to exclude those areas at the boundaries of the study area which were found to have no clear traffic impacts due to the project i.e. the resulting change in traffic volumes between the with and without project scenarios were negligible (typically around five per cent or less). The areas which were excluded from the detailed modelling for this reason are as follows:

- Alexandria, north of Gardeners Road and east of Burrows Road
- Mascot, east of Botany Road
- Tempe, west of Princes Highway
- Banksia and Rockdale, west of West Botany Street.

The operational model study area for the project is shown in Figure 3-5.

Figure 3-5 Operational model study area

Baseline year model calibration and validation

The operational model for the project was calibrated and validated to represent a 2018 baseline year for both the AM (6–10am) and PM (3–7pm) peak periods. The model was developed in accordance with the New South Wales Roads and Maritime, 2013*, Traffic Modelling Guidelines* and approved by Roads and Maritime.

As part of the calibration and validation process a number of network parameters and attributes were considered at varying levels of detail and included the following components:

- Road network calibration
- Traffic demand estimation
- Traffic assignment calibration and validation.

Model calibration entails matching observed traffic conditions with the operational model to provide confidence that the model is representative of existing traffic conditions. Model calibration and validation has focused on observed traffic volumes and travel times.

In summary, the operational model was reviewed by Roads and Maritime and deemed suitable for the assessing the potential impacts of the project.

Future year model development

In developing the future year operational models, several scenarios were considered, reflecting the timeframe under which the project would be delivered, the extent of other infrastructure development, as well as reflecting various future traffic demands. Future year networks and traffic demands were developed for 2022, 2026 and 2036, to assess the future performance of the study area.

The calculated difference in traffic growth between the SMPM forecasts was used to derive the demands for the relevant future year models. While the simulation models are over multiple hour peak periods, the SMPM forecasts represent an average one-hour peak (morning and evening). The forecast one-hour volumes were extrapolated across the full simulation time period to reflect typical demand profiles on either side of the peak hour. This profile was based on observed count data across the relevant networks.

The SMPM was used to generate future year traffic demand matrices for the weekday AM and PM peak hours for 2016, 2021, 2026 and 2036. As previously mentioned, one of the key objectives of the SMPM demand modelling was to forecast traffic growth on key roads in the project area, based on expected population and employment changes, and proposed road network improvements in future. The resulting forecast growth in traffic demand on the road network was then extracted for each scenario for application in the more detailed operational modelling. Where the SMPM output years differed to that required for the operational modelling, growth was interpolated based on the SMPM forecast traffic years to create the required traffic demand for the operational assessment years, in this case 2018 (operational baseline) and 2022 (construction baseline).

The future year traffic demand for the operational and construction assessment was forecast as follows:

1. Establish a 'difference' or 'delta' matrix by calculating the difference in traffic growth between the SMPM Baseline Year Model (2016) and the relevant SMPM future 2026 or 2036 models
2. Establish a 'growth profile' i.e. distribute the traffic demand in the delta matrix estimated in step 1 across separate 15-minute matrices
3. Apply this growth via the 'profiled' 15-minute delta matrices to the each of the 15-minute calibrated 2018 operational model traffic matrices to establish new future year traffic matrices.

The general methodology which outlines how the estimated traffic growth from the SMPM is transferred to the operational model is summarised in Figure 3-6.

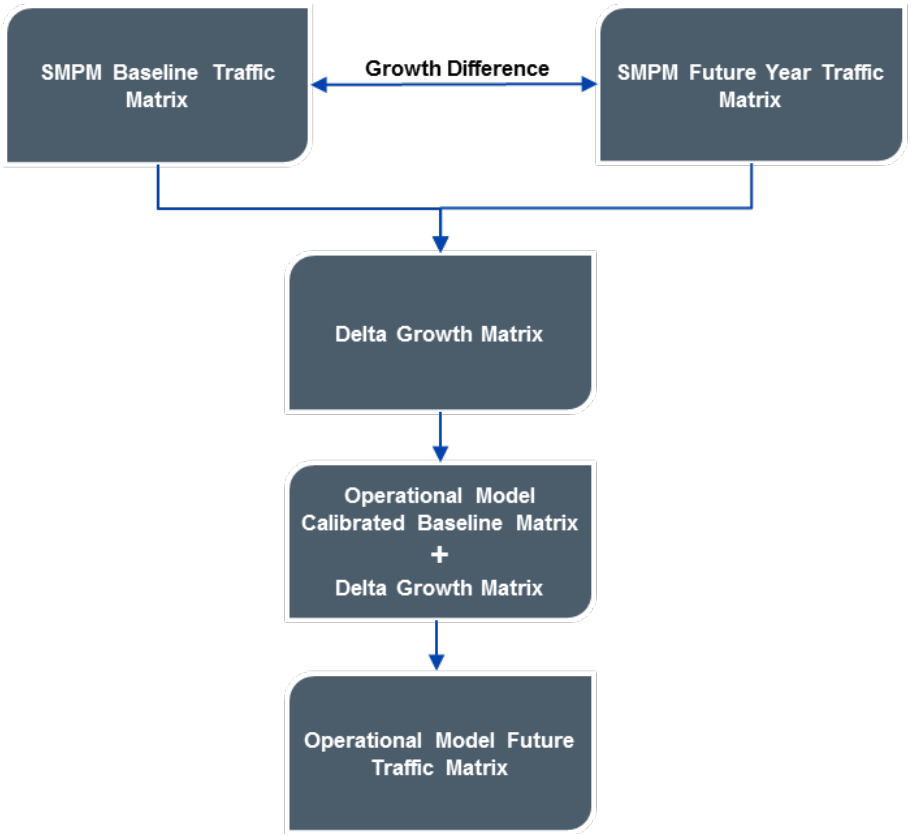


Figure 3-6 Operational modelling – Future year traffic demand process

This approach is consistent with the modelling adopted for the EIS assessment of other strategic road projects and makes best use of observed traffic count data as the basis for future year traffic demand and travel patterns. More specifically, this approach provides the most accurate representation of how the modelled increase in future traffic would affect existing observed network travel demands and the resultant network operation.

The future year road network scenarios were modelled in the first instance utilising the SMPM to consider the various infrastructure projects within the greater Sydney region. Using the SMPM models allowed for both the anticipated future growth in traffic as well as new infrastructure and their resulting diversionary impacts and induced demand effects, to be incorporated into the local operational model.

3.3.2.4 Construction traffic modelling assessment

The Sydney Gateway Operational Model was also used to complete the construction traffic modelling assessment for both the AM and PM peak periods.

A 2022 future baseline model scenario was created excluding any construction related inputs due to the project construction program. This baseline scenario acts as a benchmark against which the proposed construction impacts can be assessed. The future traffic demands for 2022 were generated based on an interpolation between the SMPM 2021 future baseline and 2026 'without project' traffic demands.

While construction commences in 2021 along Airport Drive and Qantas Drive, the network configuration at the end of 2020 with the completion of the New M5, the Airport North Precinct and Airport East Precinct projects is reflected within the construction traffic modelling assessment. These works would potentially be local impact issues at signalised intersections that would be managed through the design development phase by the contractor.

Based on the proposed construction traffic management phasing as shown in Appendix A, three construction modelling scenarios were assessed to simulate various construction activities and changes over the construction period. These scenarios were assessed as being representative of the most disruptive changes to traffic conditions. The location of these changes focussed on the most affected portions of the road network in vicinity of Terminals 2/3, Qantas Drive, Airport Drive and the access to Marsh Street and Terminal 1. Each scenario comprised changes at or near Airport Drive/Link Road and along Qantas Drive between Robey Street and O'Riordan Street:

- Scenario 1 (indicatively November 2021 to May 2022):
  - Eastbound Airport Drive traffic reduced to two lanes in the vicinity of Link Road and uses new Terminal 1 connection bridge
  - Reconfigured Airport Drive/ Link Road intersection, including second northbound right turn lane at Link Road intersection removed
  - Existing westbound kerbside lane removed from Qantas Drive from Ninth Street to west of Robey Street
  - Existing southbound kerbside lane removed on Sir Reginald Ansett Drive
  - Signals removed at Lancastrian Road and intersection converted to left in/out only
- Scenario 2 (indicatively October 2022 to June 2023) – same as Scenario 1 with the addition of:
  - Left turn from Seventh Street reconfigured to double left turn slip lane, merging to a single lane
  - Median lane removed eastbound on Qantas Drive both west and east of Robey Street
  - Ninth Street deceleration and acceleration lanes removed
- Scenario 3 (indicatively June to December 2023) – same as Scenario 2 with the addition of:
  - Westbound traffic uses the Terminal 1 connection bridge to Airport Drive west of Link Road
  - Existing westbound Airport Drive carriageway removed
  - Second northbound right turn lane at Link Road intersection re-introduced.

The changes in road geometry associated with the proposed construction traffic management phasing was coded into each of the construction scenario models. This allowed for an investigation into the impacts of construction works at different points during the construction timeframe. A detailed account of the network geometry changes associated with each construction traffic management phases and the associated modelled scenarios is provided in section 5.4.1.1.

The modelling excludes construction related traffic, as the impacts of this additional traffic was expected to be marginal at the assessed locations.

3.3.3 Assessment criteria

The assessment criteria used to evaluate the road network performance of the project is based on the SEARs and draft MDP requirements which include:

- Wider transport interactions on local and regional roads
- Forecast travel demand and road traffic volumes for the proposal and the surrounding road
- Identify areas of reduced traffic volumes and reduction of traffic permeation
- LoS analysis at locations and intersections
- Travel time analysis for the different road transport modes.

In addressing the above requirements, the following assessment criteria was used:

- Traffic volumes patterns
- Travel demand and traffic shifts
- Road network performance statistics
- Performance of intersections, midblock, motorways, and merge and diverge points
- Travel times.

3.3.3.1 Traffic volumes and patterns

Traffic volumes and patterns have been assessed across the wider network as well as the local study area by comparing the change in traffic volumes between the future 2026 and 2036 conditions with and without the project. This provides an assessment of the increases and decreases in traffic volumes on the surrounding road network due to the project as well as an indication of induced or additional traffic attracted to the local area and airport as a result of the new road infrastructure provision.

Outputs from both the SMPM and Operational model have been used to show:

- The difference in Average Weekly Traffic (AWT) volumes which is the total average traffic volume on the road network on a typical weekday excluding weekends
- The difference in AM and PM peak traffic volumes which the average peak period traffic volumes for an average weekday excluding weekends.

The above traffic volumes would represent an average work day during the week and would exclude days and weeks which are on public holidays or during school holidays.

The changes in traffic volumes have also been assessed for heavy vehicles as well as total vehicles (light vehicles and heavy vehicles combined).

3.3.3.2 Travel demand and traffic shifts

As per the assessment of traffic volumes and patterns, travel demand and traffic shifts have been assessed using outputs from the SMPM and Operational models to indicate AWT and AM and PM peak period traffic volumes in this instance across screenlines.

Traffic patterns including forecast growth and how traffic may shift between alternative routes or corridors can be identified by comparing the proportion of total traffic volumes that cross a line at specific points for various scenarios (known as a screenline assessment).

The screenlines identified for the purposes of the impact assessment and the corridors that they intersect with are shown in Figure 3-7 and include:

- Sydney Gateway screenline – includes routes that run parallel to the project to the north of the study area including Princes Highway, O'Riordan Street, Botany Road and Southern Cross Drive
- F6 screenline – includes north-south corridors to the south of the study area including the proposed F6 extension as well as Princes Highway, Marsh Street and General Holmes Drive
- Port Botany screenline – includes routes to the east of the study area which are primarily used to access Port Botany, including Foreshore Road, Botany Road and Wentworth Avenue.

For each of the screenlines, the directional and two-way traffic volumes on each key corridor, its proportion (per cent) of the total screenline traffic and the total traffic volumes across the screenline have been assessed for the existing conditions and the future 2026 and 2036 conditions with and without the project. The assessment provides information based on the following:

- Future year daily traffic volumes and patterns in the project area for each modelled scenario
- The level of travel demand that would transfer to the project, and the resultant impacts on surface road traffic
- The volume of traffic that is forecast to shift to alternative routes.

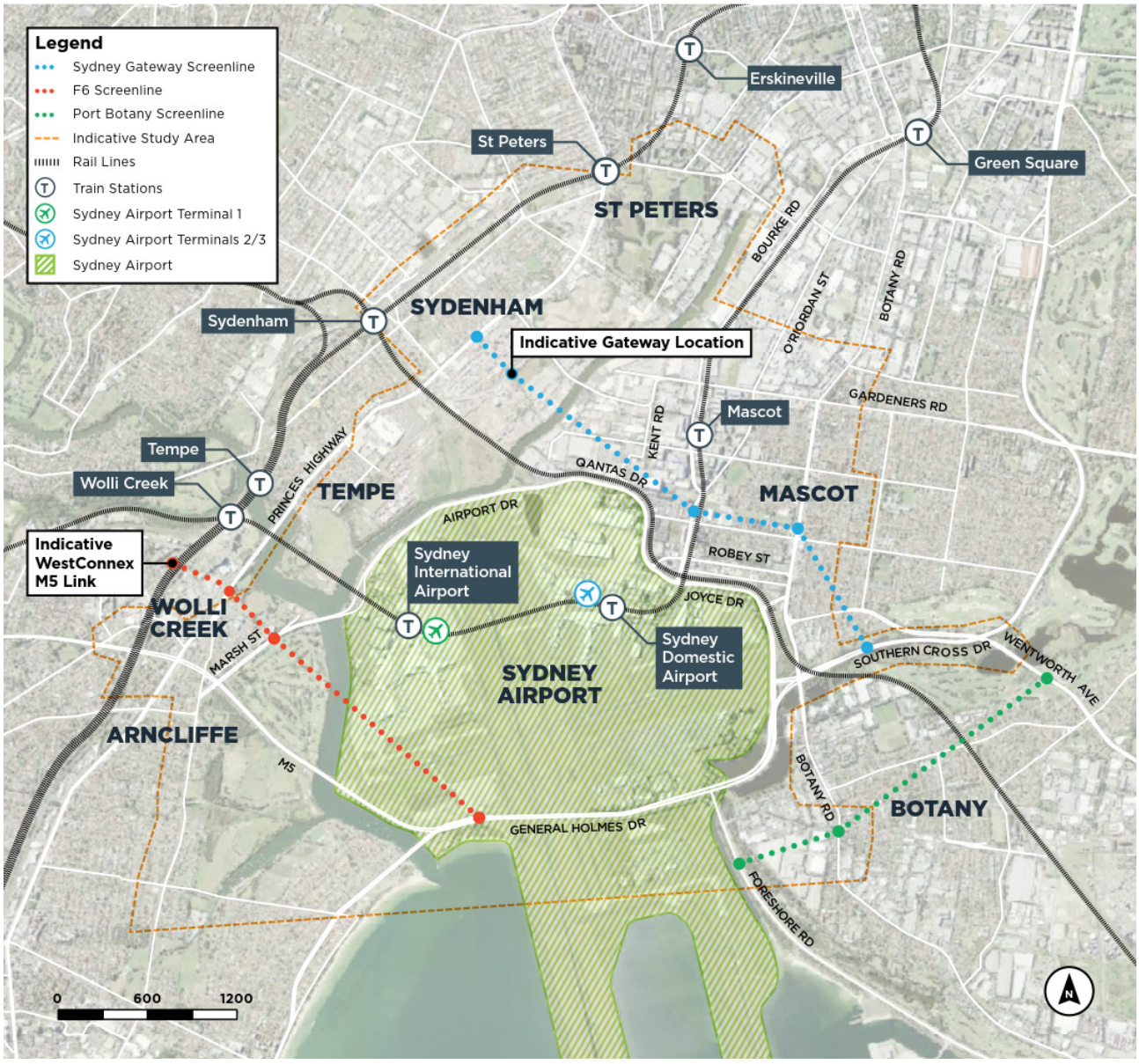


Figure 3-7 Screenline locations

3.3.3.3 Road network performance statistics

There are a number of criteria that are typically used, based on model outputs, to provide an indication of the overall road network performance. These criteria are collectively referred to as road network performance statistics and include the following:

- Total vehicle kilometres travelled (VKT) through network – this is calculated by multiplying the total number of vehicles on a given road or traffic network by the average length of their trips measured in kilometres
- Total vehicle travel time through the network (hours) – this is calculated by multiplying the total number of vehicles on a given road or traffic network by the average duration of their trips measured in hours
- Total vehicles entering the network – this criterion indicates how many vehicles were able to start and/or complete their journey during the time period being modelled, typically the AM and PM peak periods. A decrease in the number of vehicles entering the network would typically indicate increased congestion and capacity constraints
- Total number of stops – this is calculated by multiplying the total number of vehicles on a given road or traffic network by the average number of stops per trip. The higher the number of stops the more congested the network is expected to be
- Average vehicle trip length through the network measured in kilometres
- Average vehicle trip time through the network measure in minutes
- Average number of stops per trip – an increase in the number of stops would typically be reflective of increased congestion in a network
- Average trip speed in kilometres per hour
- Total unreleased trips – unreleased trips are those vehicles which were unable to enter the modelled network to start their journey during a given time period. An increase in unreleased trips is an indication of increasing congestion on a network due to traffic demand exceeding the available road network capacity.

3.3.3.4 Intersection/motorway/midblock performance

The assessment criteria used to evaluate intersection, motorway and midblock performance of the project is based on LoS. LoS is a measure to describe the operational conditions and efficiency of a roadway or intersection. The definition of LoS generally outlines the operating conditions in terms of speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience. It is a qualitative measure describing operational conditions within a roadway or intersection, as perceived by motorists and/or passengers. The unit of measurement used to determine the LoS differs between motorway sections and intersections and includes:

- Volume to capacity ratios for motorway sections with a design speed of 70 km/h or less
- Density for motorway sections with a design speed greater than 70 km/h
- Average delay per vehicle for intersections.

Motorway/midblock Level of Service

The LoS for freeway or motorway sections where the design speed is greater than 70 km/h is calculated based on the vehicle density, which is the traffic volume divided by the average passenger car speed. Density is measured in passenger car units per kilometre per lane (PCU/km/ln). The LoS for freeway or motorway sections where the design speed is 70 km/h or less is calculated based on the volume over capacity (V/C) ratio, which is the traffic volume divided by the capacity of the roadway. Table 3-2 shows the six levels of service for motorways, ranging from LoS A to F, with LoS A representing optimum operating conditions (free flow) and LoS F the worst (forced or breakdown in flow). When a roadway performance is worse than a LoS D, investigations are generally initiated to determine if suitable remediation can be provided.

Table 3-2 Midblock Level of Service definitions and criteria

Level of Service (LoS)	Definition	Multi-lane roads[1]	Freeways[2]
		V/C ratio	Density (PCU/km/ln)
A	A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high.	≤ 0.26	≤ 7.0
B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort is a little less than with LoS A.	0.27 to 0.41	7.1 to 11.0
C	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.	0.42 to 0.59	11.1 to 16.0
D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow would generally cause operational problems.	0.60 to 0.81	16.1 to 22.0
E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream would cause breakdown.	0.82 to 1.00	22.1 to 28.0
F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.	> 1.00	> 28.0

(1) Where free flow speed is taken as 70 km/h
(2) Where free flow speed is taken as 90 km/h

Source: Guide to Traffic Management – Part 3 Traffic Studies and Analysis, Austroads, Third Edition 2017

Intersection Level of Service

Average delay is commonly used to assess the operational performance of intersections, with LoS used as an index. Similar to the midblock performance measures, common practice suggests that when intersection performance is worse than LoS D, investigations should be initiated to determine if suitable remediation can be provided. However, limited road capacity and high demand often mean that LoS E and F are regularly experienced by motorists at pinch points on the existing strategic road network in Sydney, generally during peak periods.

A summary of the intersection LoS criteria is shown in Table 3-3.

Table 3-3 Level of Service criteria for intersections

Level of Service	Average delay/vehicles (seconds per vehicle)	Traffic signals/roundabouts	Give way and stop signs
A	≤ 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents would cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, RTA 2002

In the 2018 baseline year validated and calibrated operational model, end constraints were included along the model boundary to reflect network congestion due to pinch points, queues, or intersections beyond the model network extents.

For the purpose of assessing and optimising intersection performance however, these boundary constraints were removed. This removal allows for an assessment of the intersections within the modelled network, excluding any downstream queuing or capacity constraints that would hold back traffic and mask the actual operation of the intersection. This allows for a more conservative assessment of the intersections under increased traffic demand conditions should these capacity constraints be addressed and improved in future.

For the operational assessment, the following key intersections were assessed after being identified as important intersections within the study area and those most likely to change following completion of the project, as agreed with Roads and Maritime:

1. West Botany Street and Marsh Street
2. Marsh Street and M5
3. General Holmes Drive and Mill Pond Drive
4. Botany Road and Mill Pond Drive
5. Joyce Drive and General Holmes Drive
6. Botany Road and General Holmes Drive
7. Robey Street and O'Riordan Street
8. Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive
9. Qantas Drive, Robey Street and Seventh Street
10. King Street and O'Riordan Street
11. O'Riordan Street and Bourke Road
12. Bourke Street and Coward Street
13. Coward Street and O'Riordan Street
14. Gardeners Road and Bourke Street
15. Kent Road and Ricketty Street
16. Botany Road and Gardeners Road
17. Kent Road and Coward Street
18. Canal Road and Burrows Road
19. Airport Drive and Link Road
20. O'Riordan Street and Gardeners Road
21. Kent Street and Gardeners Road.

For the construction assessment, the following key intersections were assessed as they are anticipated to be most susceptible to change during construction:

- O'Riordan Street and Robey Street intersection
- Qantas Drive, Robey Street and Seventh Street intersection
- Airport Drive and Link Road intersection
- Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive intersection.

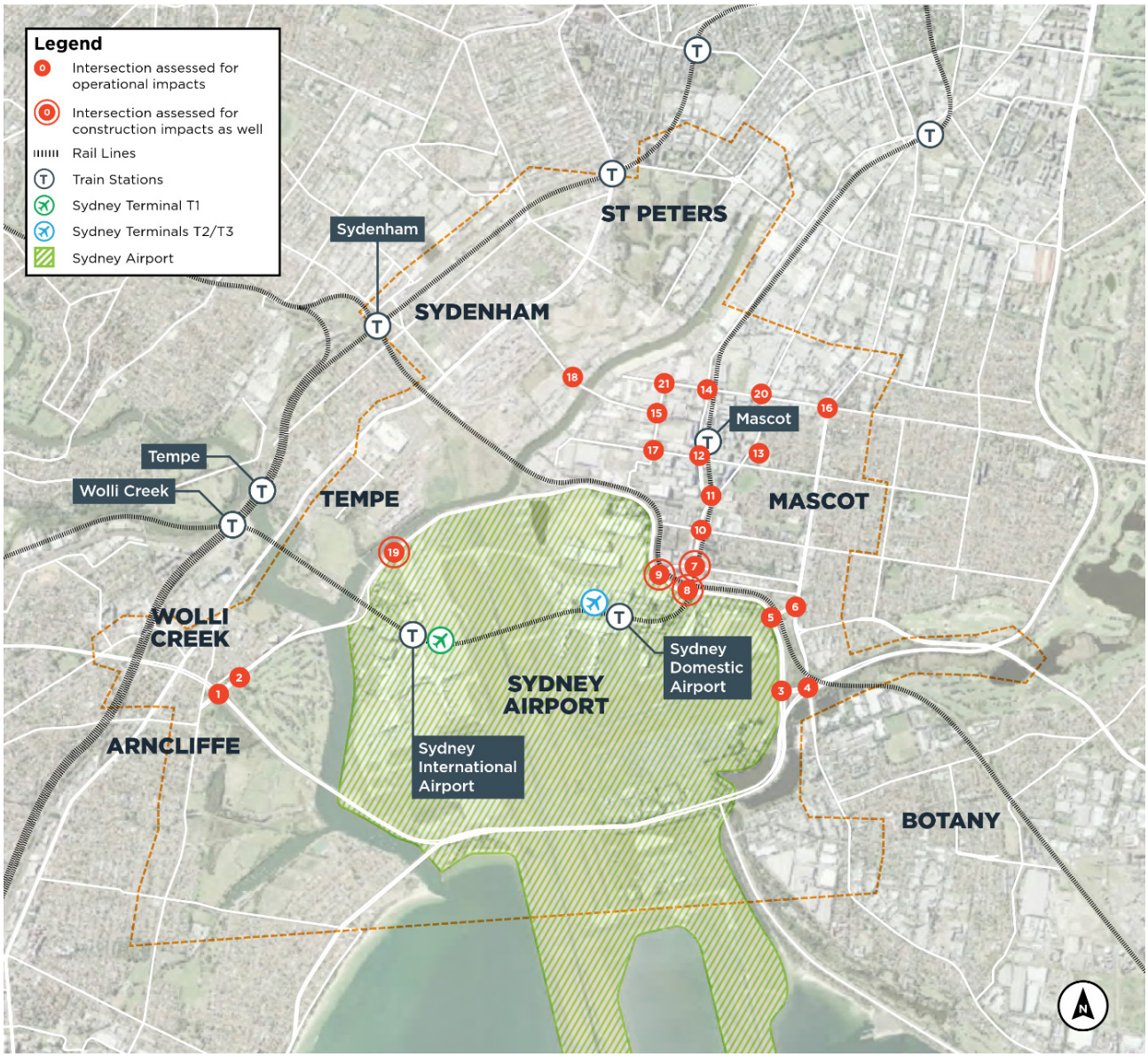


Figure 3-8 Assessed intersection locations for operational and construction impacts

3.3.3.5 Travel times

Travel times along key routes in each modelled area have been used to determine the relative impacts or benefits of the project by comparing the change in travel times with and without the project. Travel times are expressed in minutes and refer to both general traffic and buses. Bus and vehicle travel times have been assessed for key routes through each modelled area and have been used as a key indicator of the impacts of the project on bus and traffic performance.

The selected travel time routes for the operational assessment are identified in Table 3-4 and Figure 3-9. These routes have been selected as they provide a good coverage of the study area and are representative of the travel times through key origins and destinations as experienced by road users in the study area. The travel time routes were agreed with Transport for NSW.

Table 3-4 Description of travel time routes

Route ID	Description	Direction
1	Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	North–south
2	Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	North–south
3	M5 East – Marsh Street to M1 at Southern Cross Drive	East–west
4	M5 East – Marsh Street to Botany Road (Via M1)	East–west
5	Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	East–west
6	Canal Road – Princes Highway to Botany Road/Gardeners Road	East–west
7	Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	North–south
8	Robey Street – Qantas Drive – Botany Road	East–west
9	O'Riordan Street – Joyce Drive to Gardeners Road	North–south
10	O'Riordan Street – Joyce Drive to Gardeners Road via Bourke Street/Bourke Road	North–south
11	Coward Street – Kent Road to Botany Road	East–west
12	Unwins Bridge Road – May Street/Princes Highway to Railway Road	North–south

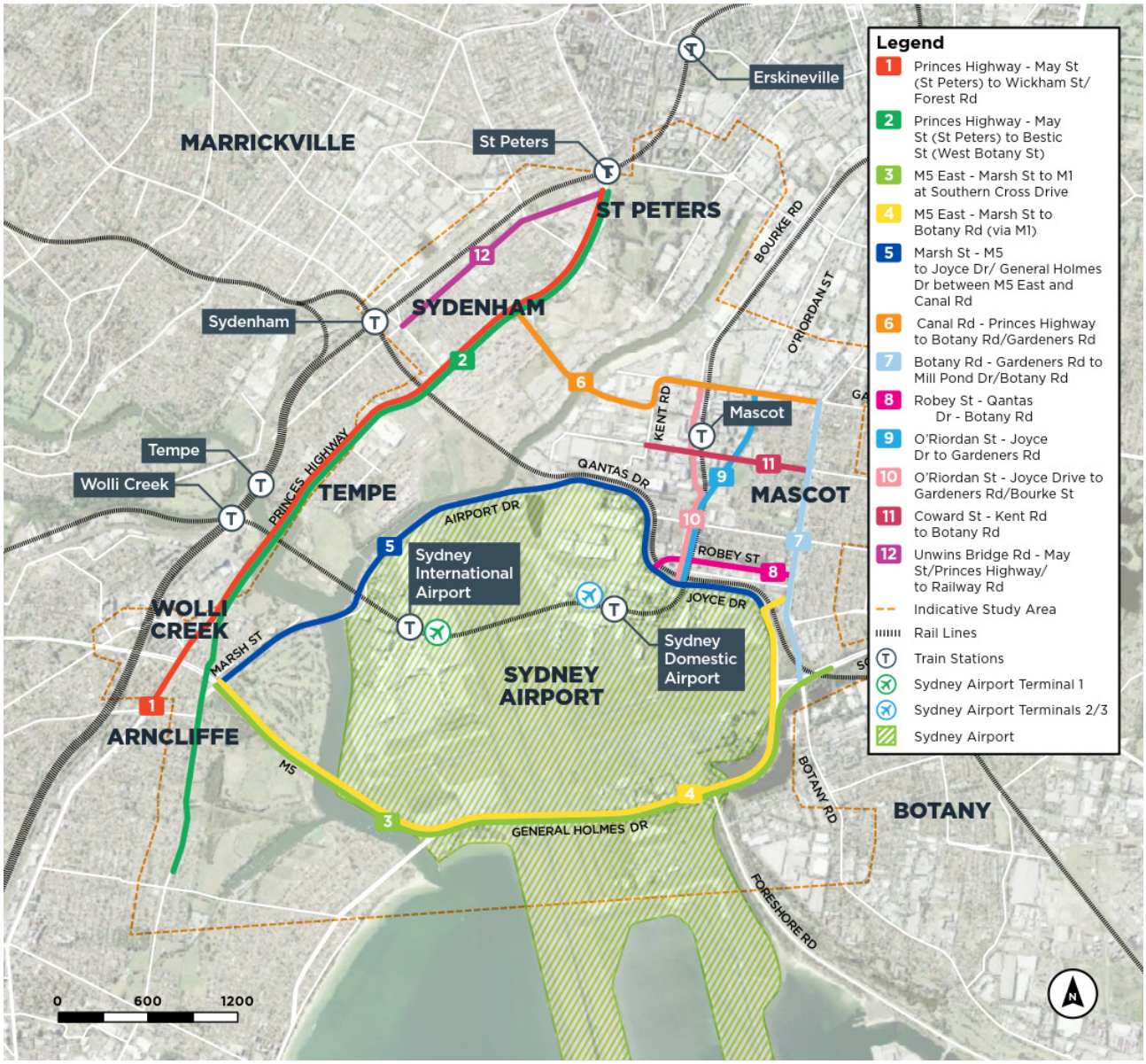


Figure 3-9 Selected routes for travel time analysis

For the construction assessment, the travel time performance along the following three routes were assessed. These were selected as they were anticipated to be the most susceptible to change during construction:

- Airport Drive between Flora Street and Robey Street
- O'Riordan Street between Terminals 2/3 and Gardeners Road
- General Holmes Drive between M5 and Mill Pond Road.

In addition to these travel time routes, the following routes were analysed as part of the operations and construction assessments, where relevant, to specifically determine the impacts of the project on Sydney Airport and Port Botany:

- Between Sydney Airport and St Peters interchange via the project and Mascot
- Between Foreshore Road near Port Botany and St Peters interchange via the project and Mascot
- Between Foreshore Road near Port Botany and M5 East.

3.4 Public transport assessment methodology

The public transport assessment was undertaken to address the SEARs and draft MDP requirements and included assessing the operational impacts on public transport services due to the project as well as due to its construction. In particular the requirements in relation to public transport include:

- Construction transport and traffic impacts on the public transport network
- Access constraints and impacts on public transport (infrastructure and services) due to construction
- The need to close, divert or otherwise reconfigure elements of the road network and its' associated impacts on the public transport network and infrastructure during construction
- Cumulative impacts on the public transport network due to other key infrastructure projects
- Operational transport impacts of the project including the impacts of forecast travel demand and road traffic volumes on the public transport network
- Travel time impacts on public transport services
- Wider transport interactions and connectivity of the public transport network
- Consideration of opportunities to improve public transport.

Within the context of operational and construction impacts, as well as location of the project, the primary public transport modes identified for assessment were buses. The passenger rail network in the area is not affected by the project. The bus impacts were assessed for the following scenarios:

- Existing conditions
- Construction of the project
- Future network without the project
- Future network with the project
- Cumulative with other project considerations.

The following assessment criteria were used in assessing the operational and construction impacts on public transport services, where required:

- Changes to current services and frequency
- Relocation or closure of bus stops
- Accessibility of stops
- Connectivity of services with the surrounding network
- Changes to walking distances to access public transport
- Changes in travel times along bus service routes.

Throughout the development phase of the project, mitigation measures have been considered to avoid or minimise any potential impacts identified as well as to enhance the performance of the project and the surrounding transport network and services through all phases. Any improvements identified formed part of an iterative process between the traffic modelling, construction staging and project design process to ensure that the connectivity, safety and efficiency of the public transport network is maintained throughout all project phases

The assessed travel time corridors and affected bus routes are listed in Table 3-5 and depicted in Figure 3-10.

Table 3-5 Description of bus travel time routes and associated bus services

ID	Corridor	Bus routes
1	Botany Road – Gardeners Road to Mill Pond Drive	M20, 309/ 309X/ 310
2	General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	303
3	Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	420, 420N, 400
4	Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Street and Gardeners Road)	418
5	O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Street intersection (via Kent Road)	305
6	Coward Street – Bourke Street to Botany Road/Wentworth Avenue	307, 400, 420, 420N
7	Princes Highway – Sydney Park Road to Brodie Spark Drive	348, 422

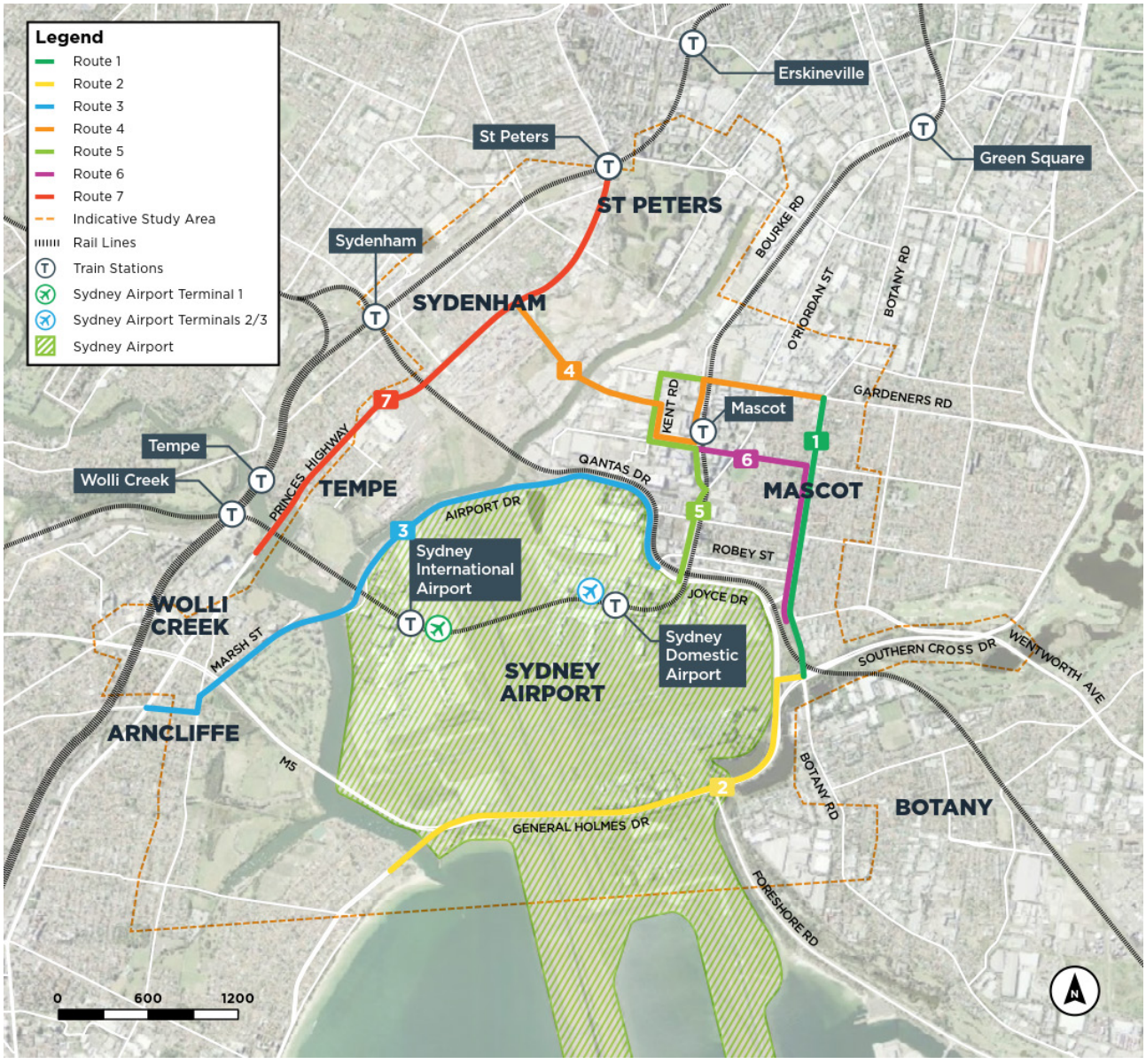


Figure 3-10 Selected corridors for bus travel time analysis

3.5 Active transport assessment methodology

The active transport assessment was undertaken in accordance with the SEARs and draft MDP requirements and included addressing the operational impacts on pedestrians and cyclists due to the project as well as during its' construction. In particular the requirements in relation to cycling and walking include:

- Construction transport and traffic impacts on pedestrians and cyclists
- Access constraints and impacts on pedestrians and cyclists
- The need to close, divert or otherwise reconfigure elements of the pedestrian and cycle network associated with construction of the project
- Cumulative impacts on the pedestrian and cycle network from other key infrastructure
- Operational transport impacts of the project including forecast travel demand and road traffic volumes on the pedestrian and cycle network
- Wider transport interactions including the accessibility and connectivity of the pedestrian and cycle network
- Consideration of opportunities to improve pedestrian and cycling infrastructure
- Impacts on cyclists and pedestrian access, amenity and safety across and adjoining the proposal, including the relocation of impacted cycle routes.

The operational and construction transport and traffic impacts on pedestrians and cyclists due to the project were assessed for the following scenarios:

- Existing conditions
- Construction of the project
- Future network without the project
- Future network with the project
- Cumulative with other project considerations.

The following assessment criteria were used in assessing the impacts on pedestrians and cyclists:

- Relocation or closure of footpaths or cycle paths
- Accessibility of pedestrian and cycling network
- Connectivity of the pedestrian and cycling network with the surrounding network
- Changes in distance walked due to closures or relocation
- Quality of pedestrian and cycling infrastructure
- Safety.

Throughout the development phase of the project mitigation measures have been considered to avoid or minimise any potential impacts identified due the project as well as during its' construction. Where possible enhancements and improvements to the pedestrian and cycle network have been considered for implementation as part of the project.

3.6 Parking and access assessment methodology

The parking and access assessment was undertaken to address the SEARs and draft MDP requirements and included assessing the operational impacts due to the project as well as due to its' construction. In particular, the requirements in relation to parking and access include:

- The nature of existing traffic on construction access routes including parking arrangements
- Construction transport and traffic impacts on construction worker parking
- Construction impacts to on-street parking, including for residents and businesses
- Operational transport impacts of the project on property and access and on-street parking.

Within the context of operational, cumulative and construction impacts, as well as location of the project, parking impacts were assessed for the following scenarios:

- Existing conditions
- Construction of the project
- Future network without the project
- Future network with the project
- Cumulative with other project considerations.

The following assessment criteria were used in assessing the operational, cumulative and construction impacts on parking:

- Changes to current parking
- Relocation or closure of existing parking
- Identification of any parking shortfall due to relocation or closure
- Accessibility of proposed parking
- Connectivity of parking access with the surrounding road and transport network
- Impacts of proposed parking on residents, business and during constriction
- Safety of proposed parking.

Throughout the development phase of the project, mitigation measures have been considered to avoid or minimise any potential impacts identified regarding on-street and off-street parking.

3.7 Safety assessment methodology

One of the desired performance outcomes of the SEARs is that the safety of transport system customers is maintained. The safety assessment was undertaken to address the SEARs and draft MDP requirements and included assessing the operational and construction impacts on safety due to the project as well as its' construction.

The operational and construction transport and traffic impacts were assessed for the following scenarios:

- Existing conditions
- Construction of the project
- Future network without the project
- Future network with the project
- Cumulative with other project considerations.

The following data was analysed to assess the baseline as well as future impacts of the project:

- Five years of crash data by crash type, location, and severity
- Current traffic volumes
- Forecast change in traffic volumes due to construction
- Forecast change in traffic volumes with and without the project
- Construction staging plans
- The project road and intersection design and standards.

The following assessment criteria were used to assess the operational and construction impacts on safety:

- Change in number of crashes
- Change in crash severity
- Change in crash type.

Throughout the development phase of the project, mitigation measures and design standards have been considered to avoid or minimise any potential safety impacts identified.

4. Existing traffic and transport environment

This section outlines the existing traffic and transport environment within the study area, which includes Tempe, Mascot and St Peters. The SEARs request a description of adequate baseline data in relation to the key issue of traffic and transport. By comparing the existing traffic and transport environment to the future traffic and transport environment with and without the project, the effectiveness of the project in addressing current and future needs can be assessed.

4.1 Overview of existing traffic and transport environment

The existing traffic and transport environment can be summarised as follows:

- O'Riordan Street/Robey Street and Botany Road provide access to/from Terminals 2/3 and combined with Princes Highway are the primary north-south roads through the study area
- Marsh Street/Airport Drive/Qantas Drive/Joyce Drive, M5 East Motorway, M1 General Holmes Drive and M1 Southern Cross Drive combine to provide ring roads around Sydney Airport and also provide access to/from the Sydney Airport terminals
- Canal Road/Ricketty Street/Kent Street/Gardeners Road is a primary east-west traffic route connecting to Princes Highway in the west and M1 Southern Cross Drive in the east and generally providing access to the local areas of Mascot, Alexandria, Rosebery and Eastlakes
- Sydney Airport has key access points as follows:
  - Terminal 1 is accessed via ramps to/from Marsh Street (connecting with Princes Highway) and from the east via Airport Drive
  - Terminals 2/3 are accessed via Qantas Drive, O'Riordan Street, Robey Street and from General Holmes Drive (off Southern Cross Drive)
- The road network is such that traffic serving the airport must interact with local and through traffic on several north-south and east-west roads. This is evident on O'Riordan Street between Gardeners Road and Qantas Drive/Joyce Drive. The M5 East and M1/General Holmes Drive also experience similar interaction between commuter through traffic, traffic accessing the Airport and freight traffic accessing Port Botany
- Existing travel patterns show eastbound and northbound traffic movements are higher in the AM peak period, while westbound and southbound traffic movements are generally higher in the PM peak period
- The road network is currently more congested in the AM peak than the PM peak, with poor performance evident at intersections in the AM peak. Only four of the assessed intersections in the study area operate at LoS D or better in the AM peak with the remaining operating at LoS E or F. In the PM peak intersection performance is generally better than in the AM peak however some intersections still operate at LoS E and F
- Strategic road and rail connections serve as freight routes to/from Sydney Airport and Port Botany including the M5 East Motorway, Foreshore Drive connecting with General Holmes Drive and the Botany rail line which links Port Botany with Western Sydney and regional NSW
- The project is located near several passenger heavy rail lines (the T8 Airport and South line and the T4 Eastern Suburbs and Illawarra Line) providing access to Greater Sydney, the Sydney CBD and the South Coast
- The study area is served by several bus routes which cover the Inner West and Eastern regions. Bus services also serve Princes Highway, Mascot Station precinct and the Mascot town centre on Botany Road providing access to the Sydney CBD
- The Alexandra Canal cycleway, Cooks River shared path and the Bourke Street Cycleway are the three key cycle corridors in the study area.

4.2 Land use, population and employment

The current population within the surrounding area consists of approximately 315,000 people, with high density residential areas closer to the CBD and low density in suburban areas near Sydney Airport and Port Botany. The residential population in the suburban areas is characterised by large proportions of young people and workers aged 20 to 34 years (41%), and cultural diversity with over 30% of people who speak another language than English. 65% of the population is in full time employment, and only 6% are unemployed.

The character of the southern part of the area is influenced by Sydney Airport and Port Botany infrastructure and therefore contains supporting industries, factories and warehousing.

Mascot is a residential, commercial and industrial area, with a large part comprising Sydney Airport and airport related businesses and operations. The residential population has a large proportion of couples with children, and culturally diverse people. The close proximity to Sydney Airport and Port Botany correlates with a large number of people employed in transport, postal and warehousing industries.

Mascot is located within the Bayside local government area and is one of the fastest growing areas of Sydney. Population growth is expected to continue and by 2036 the population of Mascot is expected to be 228,150 people, providing an increase of 23% (Department of Planning and Environment, 2016).

Tempe comprises a mix of residential, commercial and industrial land uses. The majority of the residential areas are located to the west of Princes Highway. The residential population has a large proportion of couples and single parents with children, people with a need for assistance and culturally diverse people.

St Peters is a residential, commercial and semi-industrial area. Residential properties are mainly located to the north of Princes Highway. Industrial buildings are mainly located to the south of Princes Highway.

Sydney Airport supports a significant and varied workforce. In 2017, over 43.3 million passengers used Sydney Airport (Deloitte Access Economics, 2018). Passenger trips are expected to grow to 66 million by 2039.

Sydney Airport is a significant source of employment for skilled workers, providing 57,400 full time jobs (Deloitte Access Economics, 2018). The majority are employed in transport and storage (63%), including airlines, taxis and transport support services. Other employment industries include retail, cafes, accommodation, construction and government services.

Port Botany is a major trade centre for NSW, operating 24 hours a day and seven days a week. The port employs 4,000 people and supports 21,000 jobs supplying goods (NSW Ports, 2015).

4.3 Road network

4.3.1 Key roads

This section describes the existing road network in terms of hierarchy, scale, posted speed limits, designated heavy vehicle routes and parking provision. The key roads in the study area are shown in Figure 4-1 and include the following:

Regional road connections – Motorways

- **M1 Southern Cross Drive** and **General Holmes Drive** extend along the southern edge of the airport, connecting the M5 East Motorway and the Eastern Distributor. Southern Cross Drive is six lanes, while General Holmes Drive has up to eight lanes with a section operating as a tidal flow system for peak periods. The roads are limited access motorways with no at-grade intersections and no stopping or parking at any point. The road has variable speed limits however is generally set at 70 km/h. This road is not tolled. The roads are also designated heavy vehicle routes
- **M5 East** is a four-lane motorway connecting the M5 South Western Motorway to the M1 at General Holmes Drive. The M5 East runs along the southern boundary of the Airport and then proceeds in tunnel west of Marsh Street. It then emerges at Bexley Road in Kingsgrove. The full access interchange with Marsh Street is

the primary access route from the motorway network to Terminal 1. The motorway has variable speed limits however is generally set at 80 km/h. This road is not currently tolled. However, it is planned to be tolled as part of WestConnex, on opening of the New M5. The road is also a designated heavy vehicle route.

Regional road connections – Arterial roads

- **Princes Highway** is an arterial road which begins at the intersection of Broadway and City Road in the City of Sydney, extending south through Sydney towards Wollongong. In the vicinity of the project, Princes Highway is a six-lane road with sections operating as tidal flow to increase lane capacity in the peak direction. The road has a posted speed limit of 60 km/h with a combination of 'no stopping', 'no parking' and clearways. The road is also a designated heavy vehicle route
- **Marsh Street**, **Airport Drive** and **Qantas Drive** run along the northern edge of the airport between the West Botany Street/M5 East and O'Riordan Street/Joyce Drive. Airport Drive and Qantas Drive are not state roads as they are located within the Sydney Airport leased lands. Airport Drive and Qantas Drive have two traffic lanes in each direction; have a posted speed limit of 70 km/h. These roads provide an important east–west connection between Terminal 1 and Terminals 2/3 precincts, and for over-height or restricted freight vehicles that cannot use General Holmes Drive due to the low clearance tunnel under the runway. Marsh Street is a six-lane road which links Terminal 1 to the M5 East across the Cooks River and has a posted speed limit of 60 km/h. These roads are signed as 'no stopping' along their entire length. Qantas Drive/Airport Drive is also a designated heavy vehicle route
- **Joyce Drive** and **General Holmes Drive** are State roads beginning at the intersection of Qantas Drive and O'Riordan Street, extending to meet the M1 on the eastern side of the airport. Joyce Drive has a posted speed limit of 60 km/h and has been widened to six lanes as a part of the Airport East Precinct upgrades which includes a new intersection with Wentworth Avenue. There is no parking permitted on this road. General Holmes Drive is a designated heavy vehicle route with the exception of between The Grand Parade and Foreshore Road. Dangerous goods are not permitted in this section because it is on Airport Lands
- **Botany Road** is a State road and an important north–south connection between the Sydney CBD in the north and Botany in the south. The road has a posted speed limit of 50–60 km/h and is generally four to six lanes wide, with bus lanes north of Wentworth Avenue. Short-term parking is permitted in designated areas outside of clearway and bus lane operating times. This road is a designated heavy vehicle route when Foreshore Road is closed
- **Canal Road**, **Ricketty Street**, **Kent Road and Gardeners Road** provide a key east–west function across the northern edge of the study area linking Princes Highway with the eastern suburbs at Kingsford. The road varies between four and six lanes with a posted speed limit of 60 km/h. The road generally has no stopping restrictions along its length however there is some parking allowed in Ricketty Street outside of clearway times
- **Foreshore Road** is a four-lane divided road which connects Port Botany to M1 General Holmes Drive and is an important link for road freight to and from the port. The posted speed limit is 80 km/h, with no stopping restrictions along its length. The road is also a designated heavy vehicle route.

Local road connections

- **O'Riordan Street/Robey Street** form the primary north–south corridor between the Sydney CBD and Sydney Airport. As a part of the Airport North Precinct upgrade works by Roads and Maritime, Robey Street has been configured to a one-way couplet with O'Riordan Street in conjunction with the reconfiguration of the internal airport road network. This allows traffic entering the airport to use O'Riordan Street and traffic exiting the airport to use Robey Street. O'Riordan Street and Robey Street are State roads with a posted speed limit of 60 km/h. O'Riordan Street is generally four to six lanes in width and has many signal-controlled intersections. No parking is permitted in the area near the airport
- **Bourke Street/Bourke Road** runs in a north–south direction, beginning at O'Riordan Street in Mascot and continuing north through Green Square to Woolloomooloo. The New M5 project would also include a new bridge across the Alexandra Canal, connecting Bourke Street to Campbell Street and Princes Highway. Bourke Street is a council-maintained road and accommodates a separated cycleway from the Mascot station precinct towards the CBD. The posted speed limit is 60 km/h and short-term parking is permitted in designated parking areas within the Mascot station precinct.

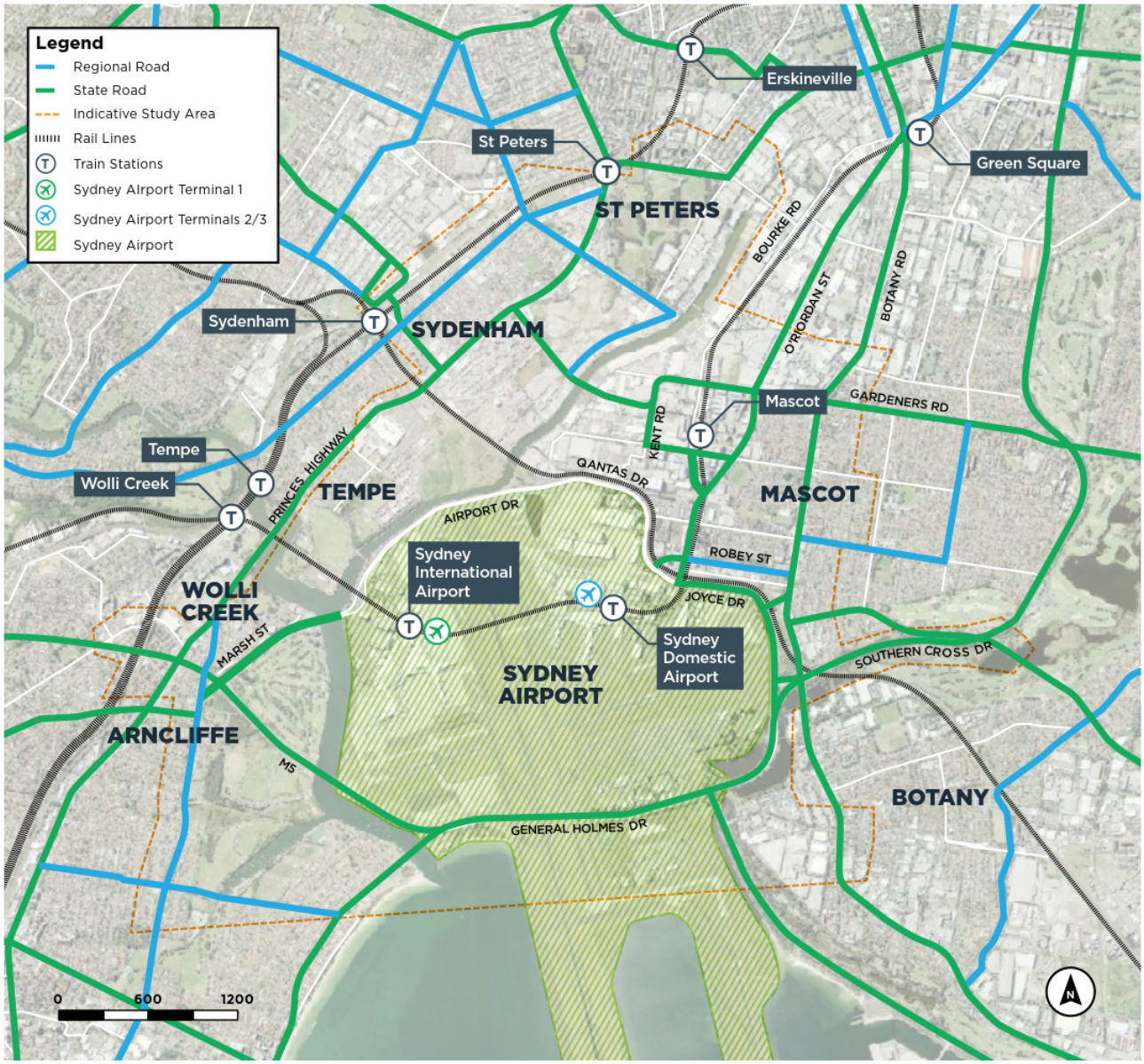


Figure 4-1 Road network within the study area

4.3.2 Heavy vehicle routes

Many of the roads around Sydney Airport and within the study area are designated heavy vehicle routes which can accommodate large vehicles, including B-Doubles and which are used to move road freight. These include routes to and from Sydney Airport and Port Botany such as the M5 Motorway, General Holmes Drive, Southern Cross Drive (and M1 Motorway beyond) and Foreshore Road, as shown in Figure 4-2. In addition, a B-Double route is currently available between the Princes Highway and Sydney Airport and Port Botany via Canal Road, Kent Road, Coward Street or Gardeners Road and O'Riordan Street.

Qantas Drive and Airport Drive, along with Robey Street and O'Riordan Street are also used for the movement of freight, particularly to/from Sydney Airport. Airport Drive and Qantas Drive are also used by overheight vehicles travelling between the M1 and M5 motorways along General Holmes Drive due to height restrictions of the M1 tunnel under the Sydney Airport runways.

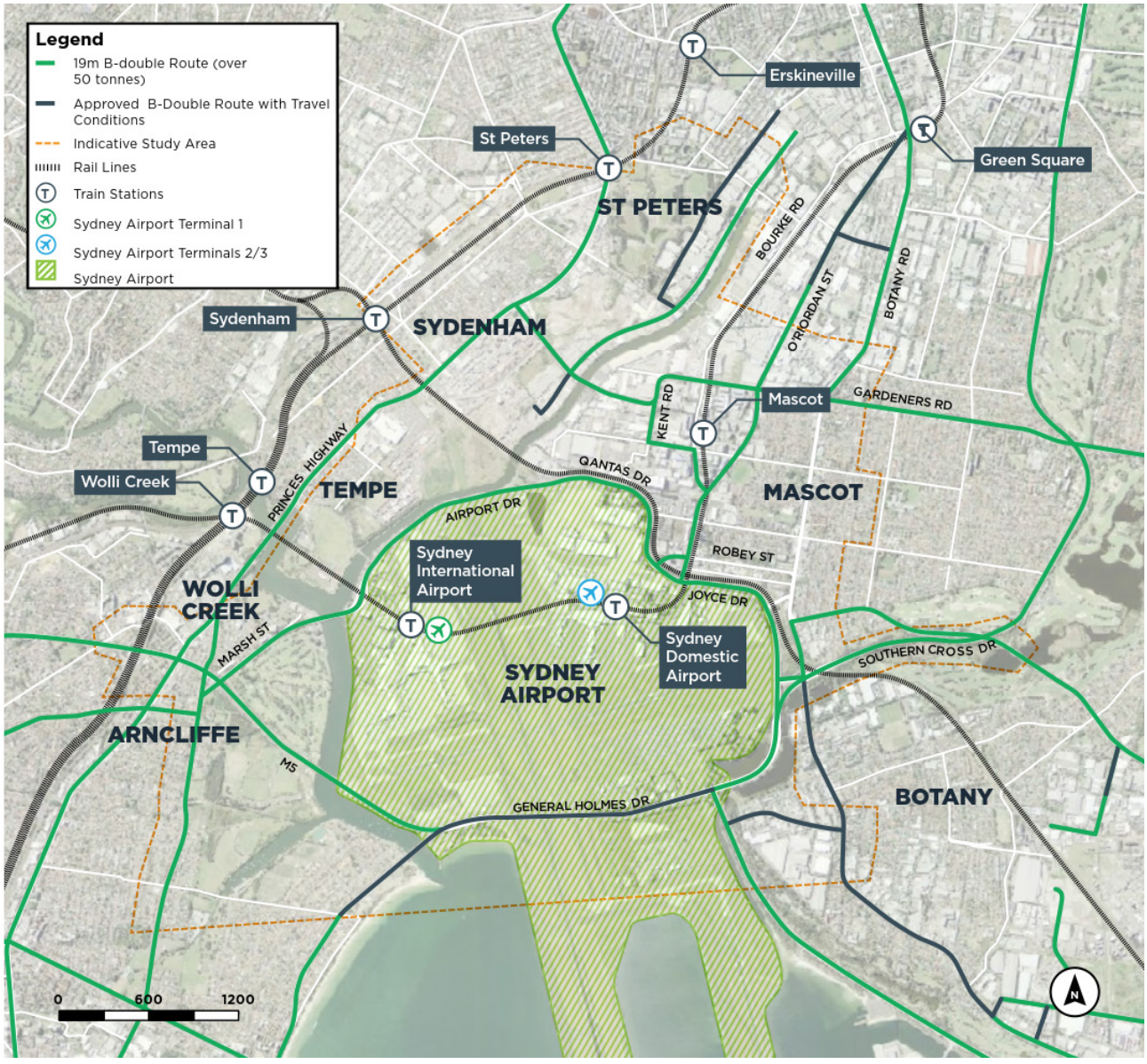


Figure 4-2 Existing heavy vehicle routes

4.3.3 Traffic volumes and patterns

This section outlines the existing traffic volumes on the road network within the study area and identifies current patterns of travel across the network. This is to establish a baseline for comparison and investigation of future alternatives and project performance.

Roads and Maritime traffic volume data has been analysed to understand the daily traffic profile in the study area. Counts were collected for a 24-hour period on a typical weekday (Tuesday, Wednesday or Thursday) in 2018 with public and school holidays excluded. The available count data was from the sites shown in Figure 4-3 and listed below.

- Canal Road – eastbound and westbound
- Wentworth Avenue – westbound
- General Holmes Drive – northbound and southbound
- Princes Highway – southbound.

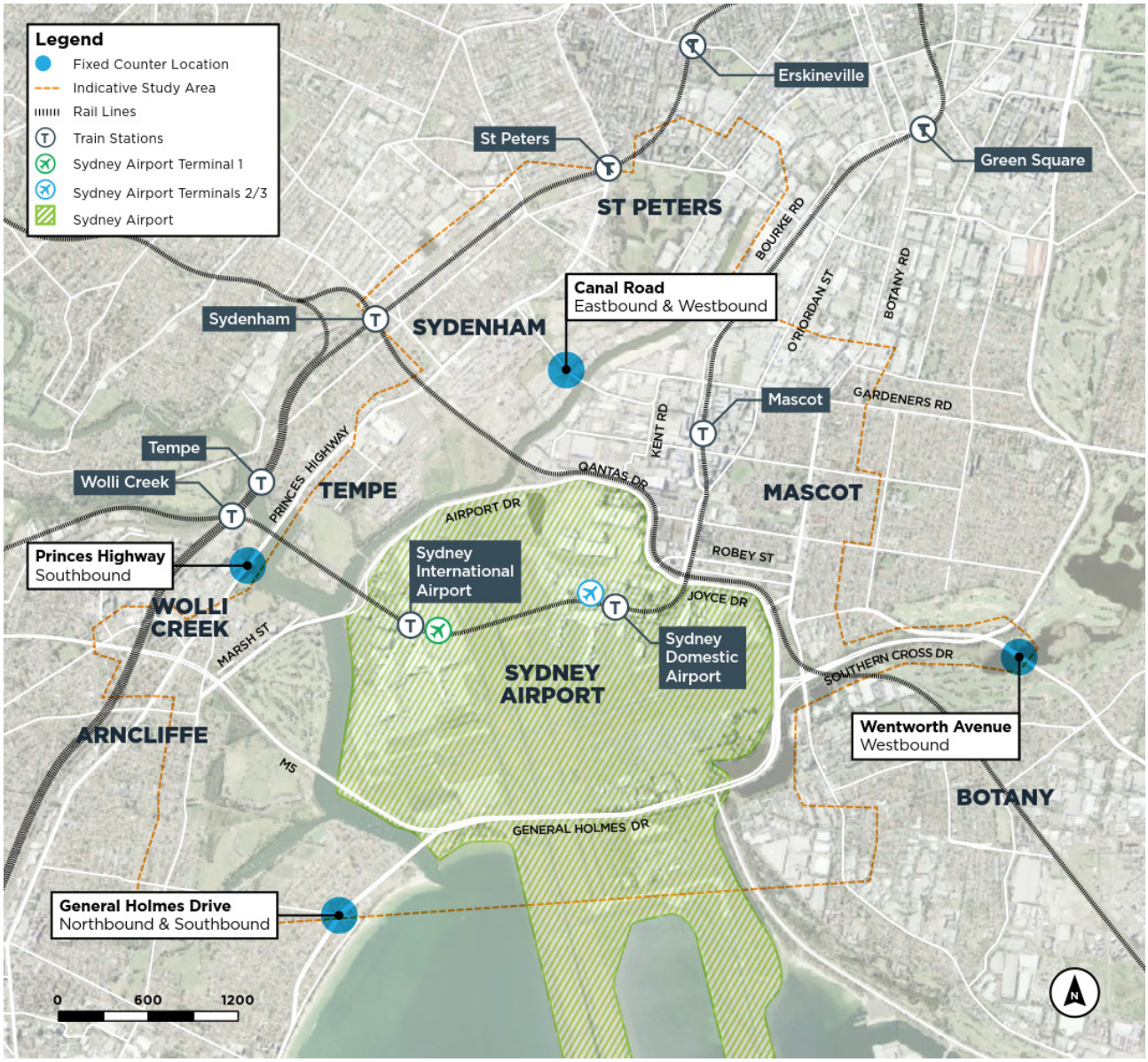


Figure 4-3 Roads and Maritime traffic count locations

Figure 4-4 outlines the 24-hour traffic profiles for each of the fixed count locations on a typical weekday. The AM and PM peak periods are evident in the profiles and correlate with the peak periods selected for use in the operational modelling. In the AM peak traffic volumes begin to rise at approximately 4am, peaking between 6am and 7am. Early increases are likely due to the occurrence of the earlier airport peak. The commuter peak is shown to carry more traffic than the airport peak at these locations.

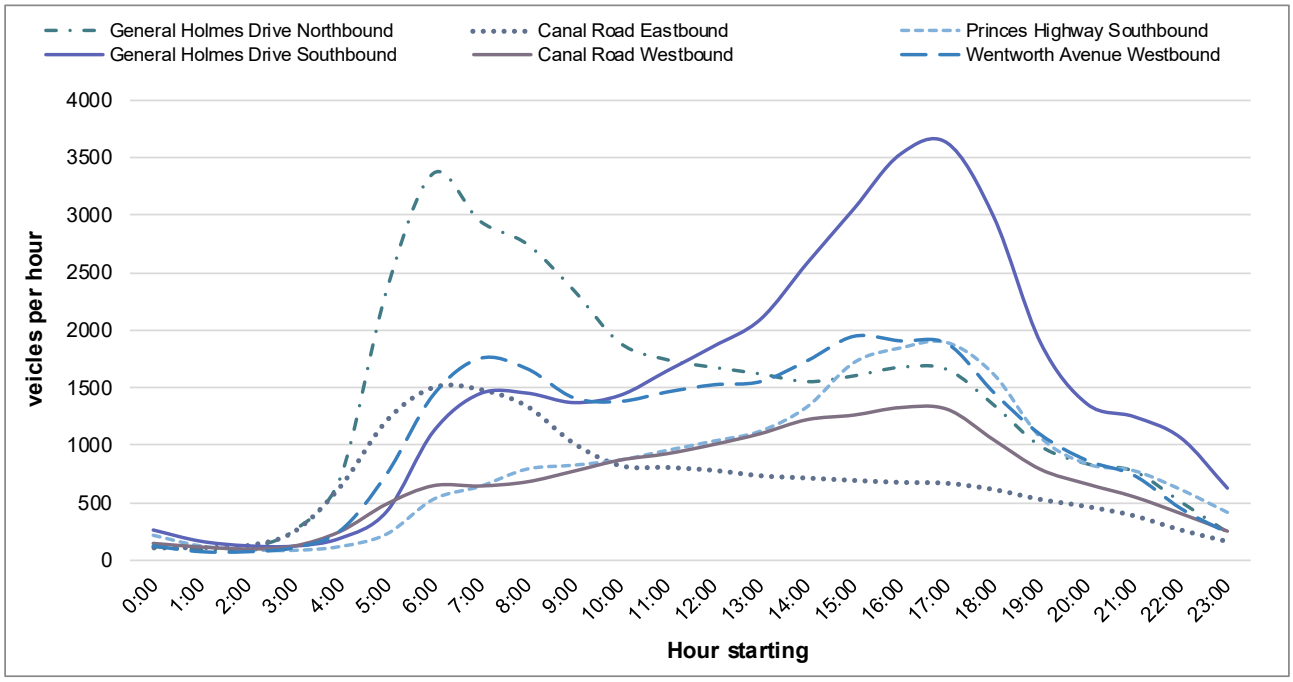


Figure 4-4 Weekday traffic volume profile (Roads and Maritime, 2019)

To gain a greater understanding of overall traffic patterns in the area the 2016 traffic volume outputs from the Strategic Motorway Planning Model (SMPM) were reviewed. The AM and PM peak hour traffic volumes and the average weekday traffic volumes for key roads within the study area are summarised in Table 4-1. The percentage of heavy commercial vehicles is also shown.

Table 4-1 shows that in the study area, eastbound and northbound traffic volumes, towards Sydney CBD, are typically higher during the AM peak hour. Conversely, traffic in the westbound and southbound directions are higher in the PM peak hour. This traffic pattern indicates a strong demand for movement between employment centres in the Sydney CBD and/or the eastern suburbs and residential areas to the south and west. However, Foreshore Drive experiences higher southbound traffic volumes during the AM peak hour and northbound vehicles during the PM peak hour as it is a major freight route to/from Port Botany.

The network traffic volumes summarised in Table 4-1 also shows:

- Peak directional traffic volumes in the AM peak hour are generally higher than during the PM peak hour, except along the M1/A1 corridor (including Southern Cross Drive and General Holmes Drive) where traffic volumes are marginally higher during the PM peak hour
- About 5–10 per cent of traffic on the network is heavy vehicles, increasing to 20–35 per cent of traffic on Foreshore Road
- The General Holmes Drive carries the highest daily traffic volumes in both the eastbound and westbound direction, with more than 80,000 vehicles per day in each direction using this corridor
- The Southern Cross Drive and the A1 also carry a high proportion of daily traffic volumes in both the eastbound and westbound directions, with around 60,000 and 40,000 vehicles per day in each direction, respectively.

Table 4-1 2016 AM, PM peak and average weekday traffic volumes

Location	Direction	AM peak		PM peak		Average weekday traffic	
		Vehicles per hour	Heavy vehicle percentage(1)	Vehicles per hour	Heavy vehicle percentage(1)	Vehicles per day	Heavy vehicle percentage(1)
Airport Drive west of Link Road	Eastbound	2,490	7%	1,300	8%	28,500	8%
	Westbound	1,350	6%	2,130	6%	24,500	7%
Qantas Drive east of Seventh Street	Eastbound	2,420	7%	1,360	7%	28,700	8%
	Westbound	1,530	5%	2,080	6%	24,800	6%
M1 General Holmes Drive	Eastbound	6,880	8%	4,360	8%	81,700	10%
	Westbound	3,910	13%	7,200	6%	87,000	10%
Princes Highway west of Railway Road	Northbound	2,470	6%	1,470	6%	27,900	8%
	Southbound	920	16%	2,150	6%	28,700	9%
O'Riordan Street south of King Street	Northbound	2,120	8%	1,530	8%	28,800	10%
	Southbound	1,280	9%	1,910	6%	25,100	9%
Bourke Street south of Gardeners Road	Northbound	610	7%	650	2%	9,600	4%
	Southbound	630	2%	380	3%	5,400	4%
Princes Highway south of West Botany Street	Northbound	1,610	6%	920	5%	17,400	7%
	Southbound	430	12%	1,590	4%	17,600	7%
Robey Street west of O'Riordan Street	Eastbound	1,410	9%	620	11%	14,600	11%
	Westbound	700	9%	1,100	6%	13,000	9%
Southern Cross Drive east of Botany Road	Eastbound	3,850	4%	3,360	4%	57,500	4%
	Westbound	3,520	4%	4,330	3%	62,500	4%
O'Riordan Street south of Church Avenue	Northbound	1,000	8%	830	5%	18,100	8%
	Southbound	900	6%	1,110	5%	16,500	7%
Botany Road south of Coward Street	Northbound	1,580	8%	1,020	9%	16,800	9%
	Southbound	890	10%	1,240	8%	15,600	10%
Foreshore Road south of M1	Northbound	1,160	34%	1,850	17%	22,400	30%
	Southbound	1,530	20%	910	29%	18,700	33%
General Holmes Drive south of the M5/M1 Interchange	Northbound	4,440	3%	2,100	4%	44,200	5%
	Southbound	1,500	7%	4,820	3%	45,000	5%
Canal Road	Eastbound	1,450	6%	630	13%	13,900	12%
	Westbound	670	18%	1,220	7%	17,200	11%
Gardeners Road east of Bourke Street	Eastbound	580	7%	940	5%	11,000	6%
	Westbound	550	11%	260	8%	5,200	9%
Burrows Road	Northbound	440	7%	390	5%	5,300	12%
	Southbound	240	17%	310	13%	4,500	15%

(1) Heavy commercial vehicles (HCV) classified as a Class 3 vehicle (a two-axle truck) or larger, in accordance with the Austroads Vehicle Classification System

4.3.4 Road network performance

This section describes the existing performance of the road network in the study area, in terms of the overall road network performance and for specific intersection performance.

The operational model performance results for the existing situation (model year 2018) have been included to allow comparison with future scenarios.

The existing network performance results for the AM and PM peak periods are provided in Table 4-2. The results indicate the following:

- The modelled network indicates congested conditions with low average speeds of around 25 km/h in the AM and PM peak periods
- Both peak periods have similar traffic demands and trip lengths
- The AM peak period records larger average vehicle trip times through the network and a lower average speed and increased number of stops compared to the PM peak. This indicates the modelled network is slightly more congested during the AM peak period when compared with the PM peak period
- A minimal number of unreleased trips (the number of vehicles unable to enter the model due to congestion extending back into a model's entry points) is shown for both peaks.

Table 4-2 Road network performance (2018 baseline)

Network measure	2018 AM peak period	2018 PM peak period
Network statistics for all vehicles		
Total traffic demand (vehicles)	83,231	82,857
Total vehicle kilometres travelled through network (km)	285,165	289,833
Total vehicle travel time through the network (hours)	12,361	10,970
Total vehicles entering the network	82,927	81,510
Total number of stops	156,882	136,649
Average vehicle statistics		
Average vehicle trip length through the network (km)	3.4	3.6
Average vehicle trip time through the network (min)	8.9	8.1
Average number of stops per trip	1.9	1.7
Average trip speed (km/h)	23.1	26.4
Unreleased traffic*		
Total unreleased trips	304	1,346
% of demand unreleased	<1%	2%

*Unreleased trips represent vehicles that were unable to enter the model due to congestion.

4.3.5 Intersection performance

Table 4-3 shows existing (2018) intersection performance at key intersections within the study area. Both the AM and PM peak average delay (seconds) and LoS is supplied for each intersection.

In the AM peak, most of the intersections operate at LoS E or F, with only four of the assessed intersections operating satisfactorily (LoS D or better). This suggests the study area's road network currently experiences a high level of delay at key intersections in the AM peak.

In the PM peak, the following key intersections operate at LoS E or F:

- Marsh Street and M5
- Botany Road and Mill Pond Drive
- Seventh Street and Qantas Drive
- Bourke Street and Coward Street
- Botany Road and Gardeners Road
- Kent Road and Coward Street
- Canal Road and Burrows Road
- O'Riordan Street and Gardeners Road.

All other intersections in the PM peak period operate satisfactorily.

Table 4-3 Existing intersection performance

ID	Intersection	AM peak (8 am–9 am)		PM peak (5 pm–6 pm)	
		Average delay (seconds)	Level of Service	Average delay (seconds)	Level of Service
1	West Botany Street/Marsh Street	51	D	26	B
2	Marsh Street/M5	43	D	68	E
3	General Holmes Drive/Mill Pond Drive	100	F	39	C
4	Botany Road/Mill Pond Drive	101	F	103	F
5	Joyce Drive/General Holmes Drive	152	F	41	C
6	Botany Road/General Holmes Drive	90	F	49	D
7	Robey Street/O'Riordan Street	56	D	26	B
8	Joyce Drive/O'Riordan Street/Sir Reginald Ansett Drive	130	F	52	D
9	Qantas Drive/Robey Street/Seventh Street	108	F	64	E
10	King Street/O'Riordan Street	69	E	33	C
11	O'Riordan Street/Bourke Road	43	D	31	C
12	Bourke Street/Coward Street	106	F	58	E
13	Coward Street/O'Riordan Street	78	F	51	D
14	Gardeners Road/Bourke Street	56	E	43	D
15	Kent Road/Ricketty Street	36	C	42	C
16	Botany Road/Gardeners Road	81	F	65	E
17	Kent Road/Coward Street	103	F	59	E
18	Canal Road/Burrows Road	59	E	93	F
19	Airport Drive/Link Road	6	A	6	A
20	O'Riordan Street/Gardeners Road	98	F	119	F

Access to Sydney Airport Terminals 2/3 is currently constrained with the intersections of Joyce Drive and O'Riordan Street and Seventh Street and Qantas Drive experiencing lengthy delays of more than 120 seconds during the AM peak hour.

Figure 4-5 shows the average delays currently experienced at the key intersections in the AM and PM peaks.

The intersections of Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive and the Qantas Drive, Robey Street and Seventh Street have levels of intersection delay greater than a typical 120 second cycle time. Cycle time is the time required for all green and red lights to be displayed before starting the sequence again, which is around 120 seconds on average for signalised intersections in the study area.

Despite the high delays at these intersections the existing network is generally able to accommodate the existing traffic demands in the AM and PM peak hours. Table 4-3 and Figure 4-5 show that intersection delays are greater in the AM than the PM peak overall.

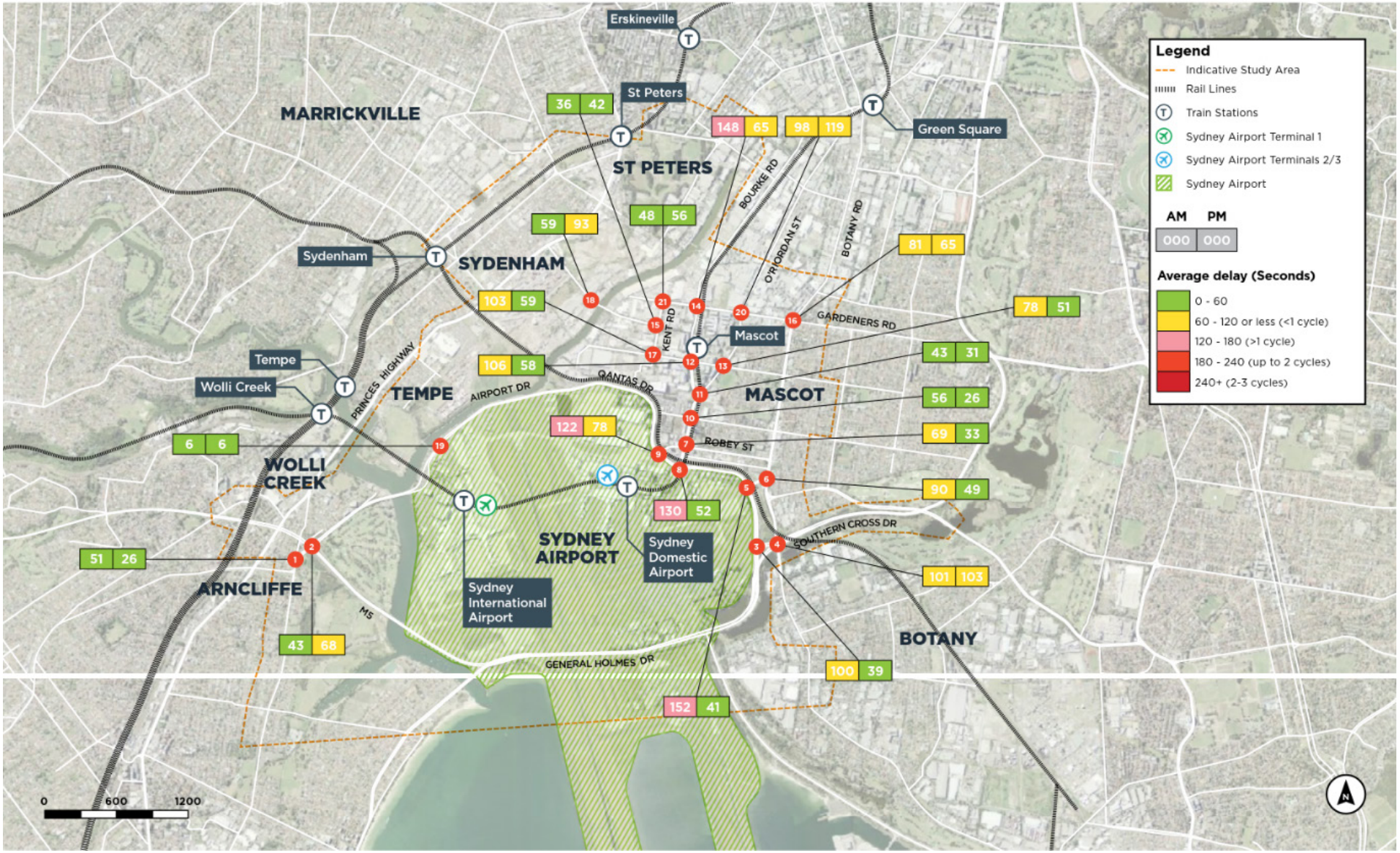


Figure 4-5 Existing average intersection delay

4.4 Public transport

4.4.1 Rail services

The project is located near several heavy passenger rail lines. Sydney Airport is serviced by the T8 Airport and South Line. The underground portion of the line extends between Wolli Creek and Central with stations at the International Airport, Domestic Airport, Mascot and Green Square. The T8 Airport and South Line continues to the City Circle via Central in the north and to Leppington in the south-west. During peak hours, a small number of trains on the Southern Highlands line travel between Campbelltown and Central using the T8 Airport and South Line. An additional station access fee of $14.90 is charged at the International Airport and Domestic Airport stations.

The T4 Eastern Suburbs and Illawarra Line runs along the western edge of the project area with stations at Wolli Creek, Tempe, and Sydenham, interchanging with the T8 Airport and South Line at Wolli Creek. The T3 Bankstown Line merges with the T4 Eastern Suburbs and Illawarra Line at Sydenham, serving Sydenham and St Peters stations. Passengers using the T4 line have convenient access to the airport via a direct interchange with the T8 Airport and South Line at Wolli Creek, however passengers originating from other lines must change trains at Central.

The T3 Bankstown Line is currently being upgraded and converted to a metro under the Sydney Metro City and Southwest project. When completed, the new metro would operate fully segregated from the existing Sydney Trains railway between Sydenham and Bankstown, addressing one of Sydney's biggest rail bottlenecks and increasing the rail network's overall capacity.

Table 4-4 outlines the AM and PM peak services and frequency of trains at stations within the study area. Figure 4-6 is a map of the Sydney Trains network in the study area.

A large proportion (27 per cent) of the population in the Bayside local government area use the train to travel to work. The largest mode is car (as the driver) for journeys to work (52 per cent).

Table 4-4 Service frequency for each rail line in the study area

Station	Line	AM peak weekday (citybound)		PM peak weekday (outbound)	
		Number of services	Average frequency (minutes)	Number of services	Average frequency (minutes)
Mascot	T8 Airport and South Line	18	7	16	8
Wolli Creek	T4 Eastern Suburbs Line	34	4	31	4
	T8 Airport and South Line	18	7	16	8
	South Coast Line	8	15	6	20
Sydenham	T3 Bankstown Line	24	5	20	6
	T4 Eastern Suburbs Line	23	5	12	10
	T8 Airport and South Line	6	20	–	–
	South Coast Line	2	60	–	–

AM peak period is 7–9am to the city and PM peak period is 4–6pm from the city.
Frequency rounded to the nearest minute.

Source: Sydney Trains, 2019

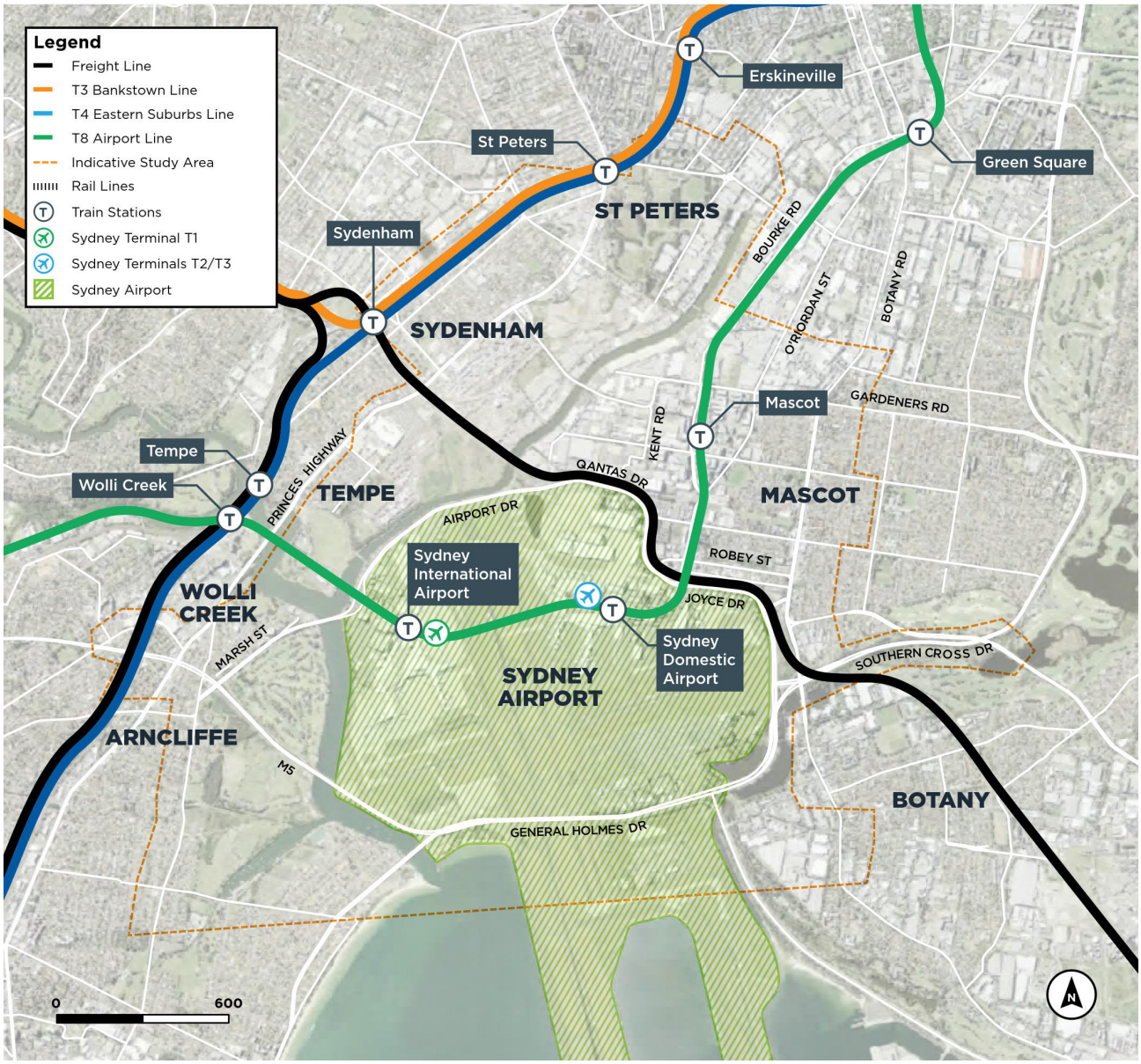


Figure 4-6 Greater Sydney rail network surrounding the study area

4.4.2 Bus services

Buses provide the primary public transport service in the study area. The key bus corridors and the related bus routes within the study area are as follows:

- Princes Highway – 348, 418, 422, 425
- O'Riordan Street and Bourke Street/Bourke Road – 305, 307, 357, 400, 420, 420N
- Botany Road – M20, 301, 303, 307, 309, 309X, 310X, 400, 420, 420N
- Gardeners Road – X93, 305, 357, 418
- Marsh Street, Airport Drive and Qantas Drive – 400, 420, 420N.

Botany Road serves the highest frequency of buses overall with up to 35 buses per hour in the peak period direction. As a major bus corridor, bus lanes are provided on Botany Road north of Wentworth Avenue. These are the only bus lanes located in the study area.

In terms of areas served, the primary destinations within the study area are the Mascot Station precinct, Mascot town centre and Terminal 1 and Terminals 2/3. Although most bus routes run to and from the Sydney CBD, Central or Redfern, there are also cross-regional services to destinations connecting Sydney Airport and Mascot with destinations to the east and west.

Figure 4-7 shows bus routes operated by Transit Systems in the Inner West bus region and bus routes operated by State Transit in the Eastern Suburbs bus region.

5.8 per cent of journeys to work in the Bayside local government area are made by bus (Sydney Gateway Socio-economic Impact Assessment, 2019).

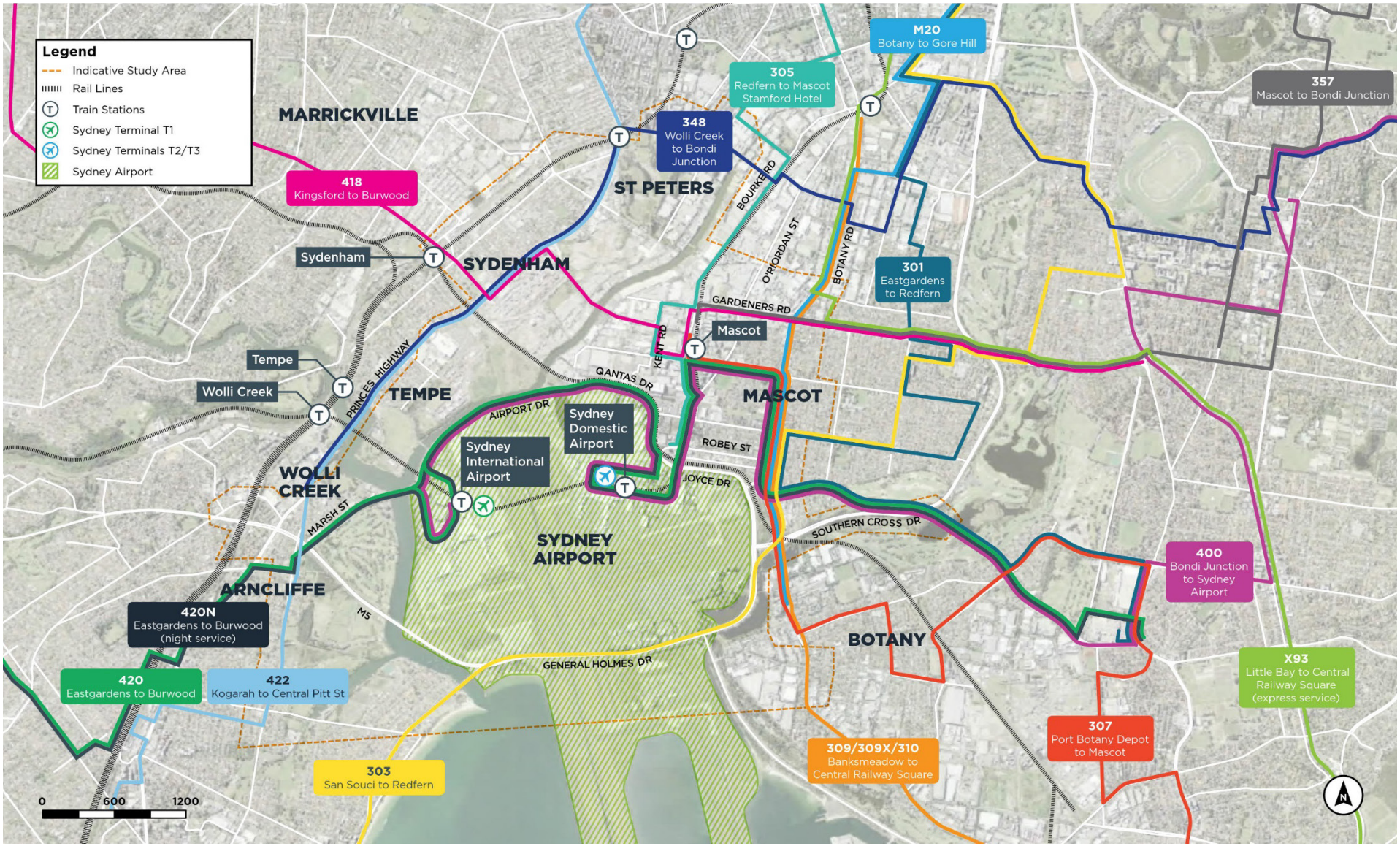


Figure 4-7 Bus routes within the study area

Table 4-5 details the AM and PM peak frequencies of bus routes in the study area in the peak direction. Routes 400 and 420 connect directly with Sydney Airport at Terminal 1 and Terminals 2/3. The Sydney Airport Master Plan 2019 supports the provision of additional bus routes to and from Sydney Airport.

Table 4-5 Bus services and frequency

Route	Operator	AM peak services (peak direction)	Average frequency	PM peak services (peak direction)	Average frequency
301 Eastgardens to Redfern via Mascot	State Transit	8	15 mins	6	20 mins
303 San Souci to Redfern via Mascot	State Transit	5	24 mins	8	15 mins
305 Mascot Stamford Hotel to Redfern	State Transit	–	–	4	30 mins
307 Port Botany Depot to Mascot	State Transit	6	20 mins	6	20 mins
309 Banksmeadow to Central Railway Square	State Transit	12	10 mins	14	9 mins
309X Port Botany to Central Railway Square	State Transit	12	10 mins	9	13 mins
310X Banksmeadow to Central Railway Square	State Transit	11	11 mins	10	12 mins
348 Wolli Creek to Bondi Junction	Transit Systems	7	17 mins	5	20 mins
357 Mascot Railway Station to Bondi Junction	State Transit	6	20 mins	6	20 mins
400 Bondi Junction to Sydney Airport via Eastgardens	State Transit	15	8 mins	16	7 mins
418 Kingsford to Burwood via Mascot, Sydenham and Dulwich Hill	Transit Systems	7	17 mins	7	17 mins
420 Eastgardens to Burwood via Sydney Airport and Rockdale	Transit Systems	6	20 mins	6	20 mins
420N East Gardens to Burwood via Sydney Airport and Rockdale	Transit Systems	–	–	–	–
422 Kogarah to Central Pitt Street	Transit Systems	8	15 mins	8	15 mins
425 Tempe to Dulwich Hill	Transit Systems	4	30 mins	5	24 mins
M20 Botany to Gore Hill	Transit Systems	12	10 mins	11	10 mins

AM peak is 7–9am and PM peak is 4–6pm.
Frequency rounded to the nearest minute.

4.5 Active transport

The active transport network within the study area has been recently updated to improve connections across the area. There are also plans proposed to increase the level of active transport infrastructure in future. The existing and proposed active transport network is shown in Figure 4-8.

The existing active transport network in the study area has been upgraded over the last few decades with updates to the commuter network connecting to Sydney CBD and the recreational network. Key trip generators are Sydney Airport (with up to 50 per cent of its 30,000 employees living within five kilometres of the airport), Mascot Station precinct, Green Square and Wolli Creek.

4.5.1 Cyclist network

The cycle network across the study area consists of a combination of treatment types including cycleways, shared paths, recreational facilities and on-road facilities. The quality of this infrastructure varies from poor (most notably along parts of Qantas Drive) to excellent such as the new facilities along the recently upgraded Marsh Street.

The key cycling infrastructure in the study area is made up of three off-road links:

- The Alexandra Canal cycleway
- Cooks River shared path and its connections
- Bourke Street Cycleway.

These are shown in Figure 4-8.

The Alexandra Canal cycleway is a shared path that is located within the project site and forms the main north-south connection for active transport across the study area and near Sydney Airport. The path runs on the southern side of the Alexandra Canal and along the northern side of Airport Drive. It connects to Terminal 1, Tempe via Tempe Recreation Reserve and Wolli Creek and surrounding areas via Marsh Street. The path continues north along the canal before joining Coward Street to connect with the Bourke Street Cycleway in Mascot, which travels to the Sydney central business district.

Local councils have proposed cycling infrastructure within or adjacent to the project site, including the following:

- A local route (shown in red in Figure 4-8) has been proposed to begin at Tempe Reserve and travel parallel and/or along the Princes Highway
- It is proposed to extend the Alexandra Canal cycleway east along the canal to Alexandria and Zetland and connect to existing and proposed active transport links
- Another future proposed route is located along Qantas Drive and Robey Street, which is designed to connect to the Alexandra Canal cycleway and provide east-west connectivity.

As part of the St Peters interchange, it is proposed to construct a cycle path along Campbell Road and a shared path to connect to the Alexandra Canal cycleway.

Less than one per cent of journeys to work in the Bayside local government area are made by cycling (Sydney Gateway Socio-economic Impact Assessment, 2019).

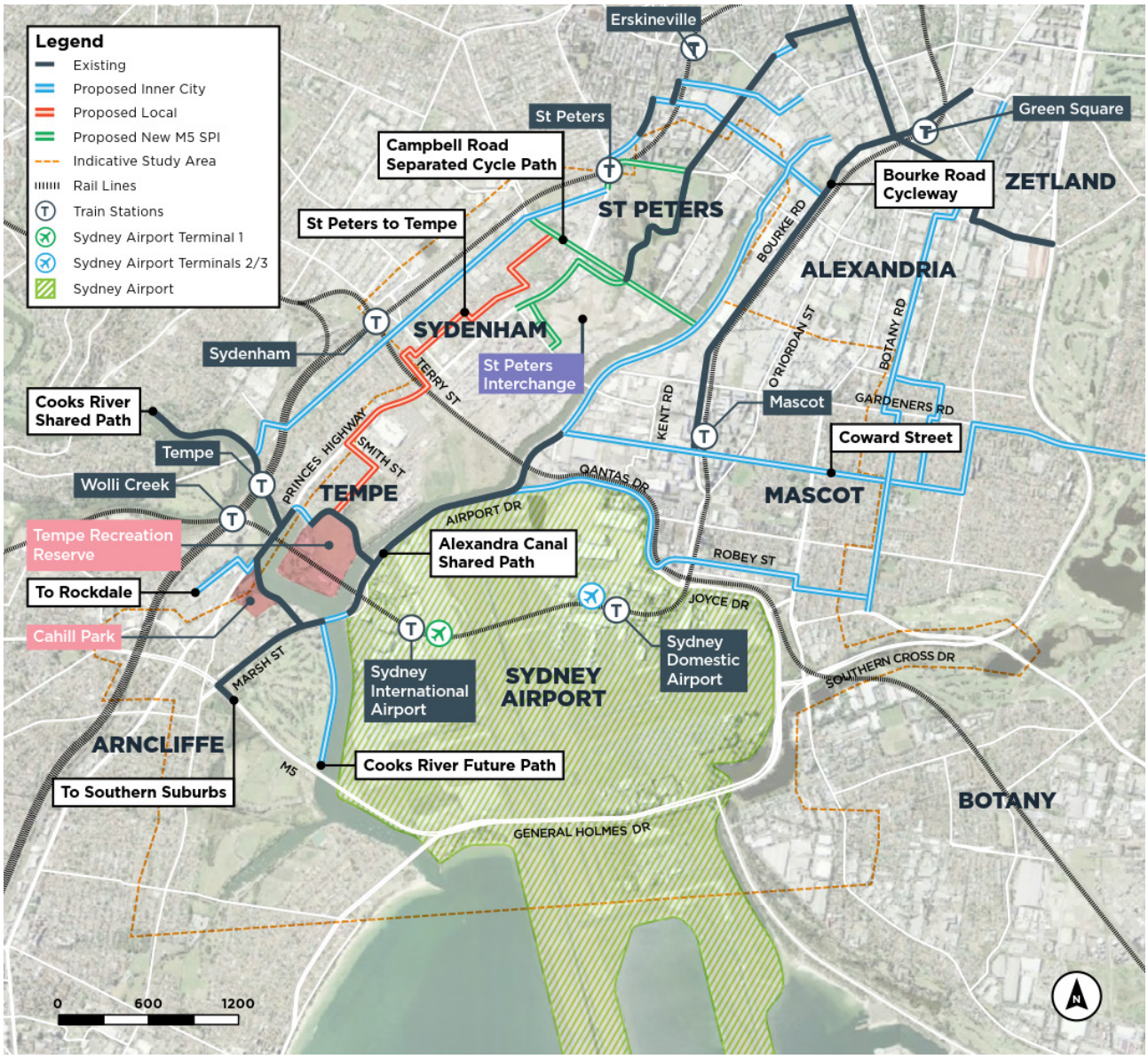


Figure 4-8 Existing and proposed cycle routes within the study area

4.5.2 Pedestrian network

The pedestrian network generally consists of footpaths, shared paths (pedestrian/cyclist) and dedicated road crossings along the existing road network. The local and arterial roads in the study area provide typical footpaths along their length with streets in Mascot (including around the station and the town centre) providing a higher degree of pedestrian amenity due to its network of small or detailed streetscapes and mix of residential and commercial land uses.

There are generally limited pedestrian facilities adjacent to Sydney Airport, with many of the existing facilities of poor quality due to uneven pavements and limited separation from busy roads.

Pedestrian accessibility to Terminal 1 via Marsh Street and Airport Drive is poor due to narrow footpaths on the Giovanni Brunetti bridge and flyovers at Airport Drive. However, there is a direct link from the Alexandra Canal cycleway to the Terminal 1 precinct via a pedestrian/cycle bridge and overpass.

The Terminals 2/3 precinct is linked to Mascot Station, with pedestrian access to the precinct provided via Robey and O'Riordan streets. Upgrades to the pedestrian network on Seventh Street, Sir Reginald Ansett Drive and Qantas Drive have recently been completed by Roads and Maritime.

A footpath on Canal Road provides access over Alexandra Canal between rickety Street and Princes Highway.

Nearly four per cent of journeys to work in the Bayside local government area are made by walking only and about 5.5 per cent of journeys to work within the Inner West local government area are made by walking (Sydney Gateway Socio-economic Impact Assessment, 2019).

4.5.3 Active transport activity

Roads and Maritime provided pedestrian and cyclist data collected along the Alexandra Canal cycleway in 2019. The data indicates that on average, the Alexandra Canal carries around 600 cyclists per day and 100 pedestrians per day. Peak use occurs during the weekday AM and PM peak periods, when the Alexandra Canal cycleway carries around 90 cyclists and 10 pedestrians during the AM peak and PM peak hours (8:30–9:30am and 5pm–6pm).

4.6 Parking

4.6.1 On-street

No roadways close to the project site currently provide on-street parking. The following streets along proposed haulage routes include parking:

- Botany Road, outside of clearway and bus lane operating times
- Ricketty Street, outside of clearway periods.

Within the broader study area, some on-street parking is available in the local surrounding areas, including Mascot, Tempe, Sydenham and Botany.

Within Mascot, most of the available on-street parking is time restricted to discourage long-term use by Sydney Airport passengers and staff, as well as general commuters and employees of the area. Conversely, on-street parking in Tempe, St Peters and Sydenham is largely unrestricted, particularly in residential streets. Near key commercial uses on-street parking is typically time restricted within these local areas.

4.6.2 Off-street

The following off-street parking areas are located within and adjacent to the project site:

- The Sydney Airport northern lands car park located on the northern side of Alexandra Canal, which is accessed from Airport Drive via the Nigel Love bridge and is used by Sydney Airport employees at times of peak demand
- A car park associated with the Tempe Golf Range and Academy
- A Sydney Airport car parking area east of Terminals 2/3, located south of the AMG building and accessed off Ninth Street
- Two car parking areas east of Terminals 2/3, which are accessed off Ross Smith Avenue and Sir Reginald Ansett Drive respectively and which are leased to DHL.

Public car parks are also located adjacent to Terminal 1 (P7 and P9) and Terminals 2/3 (P1, P2 and P3). The car parks at Terminal 1 have capacity for about 4,000 vehicles. The car parks at Terminals 2/3 have capacity for about 4,200 vehicles. None of these car parks are located within the project site.

4.7 Road safety

Five years of crash data has been analysed to determine a baseline for the current level of road network safety.

The latest crash data was obtained from Centre for Road Safety, Transport for NSW for the five-year period between 2013 and 2017 to estimate the recent accident pattern in the study area. The data was collated for the following road sections:

- Airport Drive and Qantas Drive between 150 metres west of Link Road and 200 metres east of O'Riordan Street
- Link Road – 100 metres to and from Airport Drive intersection
- North Precinct Road – 100 metres to and from Airport Drive intersection
- Seventh Street – 100 metres to and from Qantas Drive intersection
- Robey Street – between Qantas Drive and O'Riordan Street
- O'Riordan Street – between Qantas Drive and Robey Street
- Sir Reginald Ansett Drive – 100 metres to and from Qantas Drive intersection.

A review of the crash data indicates that 89 reported crashes have been recorded on the assessed road sections. These include one fatal crash, 50 injury crashes and 38 non-casualty crashes. The average crash rate for the assessed road sections, was found to be about 25.1 crashes per 100 million vehicle kilometres travelled (100 MVKT).

Table 4-6 Crash data for assessed road sections

Item assessed	Crash rate
Crashes	89
Casualty crashes	51
Casualties	56
Years	5
AADT [1]	57,034
Length (km)	3.4
Crash rate per 100 MVKT	25.1
Total crashes per km per year	5.2
Casualty crash rate per 100 MVKT	14.4
Casualty crashes per km per year	3.0

(1) Count obtained from Roads and Maritime permanent count station 23067 located 100 m south of Rockwell Avenue, Arncliffe

Analysis of the location of recorded crashes indicated that:

- 63 out of 89 crashes (57 per cent) occurred on Airport Drive/Qantas Drive including:
  - One fatal crash
  - 34 casualty crashes
  - 28 non-casualty crashes
- 26 out of 89 crashes (29 per cent) occurred on side roads adjacent to an intersection with Airport Drive/Qantas Drive including:
  - 16 casualty crashes
  - 10 non-casualty crashes
- 51 out of 89 crashes (57 per cent) were recorded as occurring within 10 metres of intersections with Airport Drive/Qantas Drive, while the other 38 crashes (43 per cent) occurred at midblock locations.

Figure 4-9 shows the crash distribution on Airport Drive and Qantas Drive. Crashes are evenly distributed along the section of Airport Drive and Qantas Drive with a higher concentration found at the intersections with Link Road and O'Riordan Street.

Figure 4-9 Crash locations between 2013 and 2017

Analysis of the crash types on the assessed road sections over the five-year period indicates the following:

- Rear-end crashes were the most common crash type within the study area. This is considered to be reflective of congested traffic conditions along Airport Drive and Qantas Drive. 34 out of 89 crashes (38 per cent) were reported as rear-end crashes
- Crashes involving lane changes were the second most common crash type which typically occur on roads with conflict points for traffic flow and lack of familiarity with the route. 13 out of 89 (14 per cent) were reported as lane change crashes
- Crashes involving vehicles on adjacent approaches at intersections accounted for 11 per cent (10 out of 89) of crashes recorded
- One fatal crash was reported on the assessed road sections over a five-year period which occurred at the intersection of Airport Drive and Lancastrian Road (Qantas Jet Base access) in 2015. The crash involved a pedestrian crossing Airport Drive during the day time
- Of the 11 crashes where the contributing factor was known, nine crashes were attributed to speeding and two were attributed to fatigue.

Figure 4-10 shows the number of crashes per crash type within the study are between 2013 and 2017.

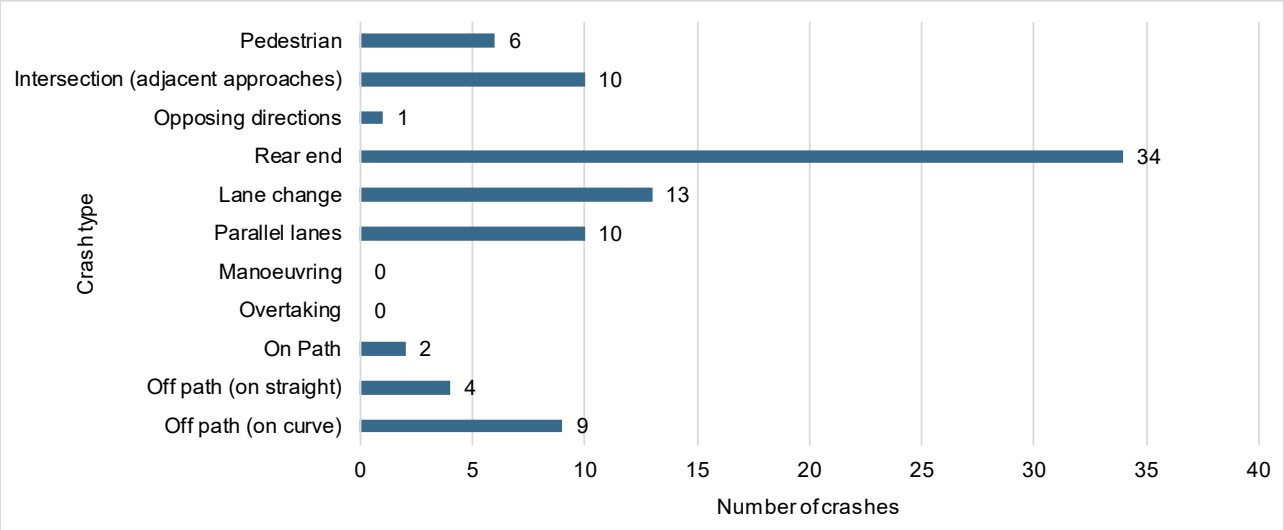


Figure 4-10 Crash types within the study area

5. Construction impact assessment

This section of the report provides a summary of the indicative construction methodology and associated impacts, as required in the SEAR's shown in Table 1-1 and the draft MDP requirements shown in Table 1-2.

5.1 Overview

A summary of the construction phase arrangements and their impacts is provided as follows:

- The construction works would generally involve four main phases of work including enabling works, site establishment, main construction works, and finishing and post-construction rehabilitation
- The construction works are estimated to take place over a three-and-a-half year period between mid-2020 and 2023
- The construction workforce is expected to peak at around 1,730 people per 24-hour period with a peak daytime workforce of 1,080 workers
- The number of construction vehicles is expected to peak at 3,300 light vehicles and 910 heavy vehicles per 24-hour period with a peak daytime volume of 3,090 light vehicles and 780 heavy vehicles
- An additional 980 parking spaces are proposed at construction compounds C1–C5 which would be slightly less than the peak 1,080 daytime workers at the sites
- Six construction traffic management phases are proposed for the works, as shown in Appendix A. The three traffic management phases that are expected to have the greatest impact on the road network performance (phases C, E and F) have been assessed (scenarios 1 to 3)
- Construction scenario 1 is expected to have minor impacts on overall intersection performance and road network travel times along Qantas Drive due to the loss of a westbound kerbside traffic lane to the west of Ninth Street
- Construction scenario 2 is expected to have minor impacts on overall intersection performance and road network travel times due to the following:
  - The removal of existing signalised intersections along Airport Drive would allow more free-flow traffic, enabling travel time savings
  - A new uncontrolled slip lane for the left turn from Seventh Street to Qantas Drive offsets the loss of an eastbound lane on Qantas Drive
- Construction scenario 3 would also have minor impacts on overall intersection performance and road network travel times, with the road network expected to operate similar to scenario 2
- Construction works would have the following substantial impacts on access to/from Terminals 2/3 in the AM peak hour:
  - Traffic turning right from Qantas Drive to Terminals 2/3 would experience an additional 95 seconds delay due to capacity reductions for this movement
  - Traffic exiting Terminals 2/3 and travelling northbound onto Robey Street would experience an additional 70 seconds delay due to insufficient capacity for the left turn from Qantas Drive to Robey Street
- The project's construction impacts on Port Botany would be limited to minor travel time increases along General Holmes Drive which would be up to one minute and 15 seconds during peak periods
- The 305, 400 and 420 bus routes which access Sydney Airport via Airport Drive, Qantas Drive and O'Riordan Street would be subject to the same minor delays as general traffic along their routes

- The existing bus stops located at Qantas Drive and Lancastrian Road would be closed permanently (affecting routes 400 and 420). Following the removal of these bus stops, the closest remaining bus stops serviced by the same routes would be located within Terminals 2/3
- During construction, several temporary and permanent changes to the current pedestrian and cyclist network within the vicinity of the project would be required, including:
  - Closure of the existing shared path along the southern side of Alexandra Canal, requiring a temporary route that is about 580 metres longer than the current shared path
  - Removal of the pedestrian crossing of Airport Drive at Link Road, requiring alternative access to Link Road freight facilities. Pedestrian access is proposed via an alternate route through T1 Terminal, which is about 775 metres longer than the existing route
  - Closure of the pedestrian path on the north side of Qantas Drive between Robey Street and O'Riordan Street
- There are expected to be minimal impacts to on-street parking in the area during construction as there would be no direct loss of on-street parking and 980 worker parking spaces would be provided across the construction compounds.

5.2 Construction strategy

Chapter 8 of the combined EIS/preliminary draft MDP describes an indicative approach to construction. It outlines the proposed construction strategy, footprint, methodology, program, working hours, materials, equipment, traffic management, site access arrangements and temporary construction facilities. Reference has been made to the information in Chapter 8 of the EIS/preliminary draft MDP in preparing the following sections.

The information discussed in this chapter is indicative to retain flexibility for a successful construction contractor(s) to refine and optimise, as required. A final construction methodology and program would be developed by the construction contractor(s) in line with the conditions of approval for the project (if approved) and adopting the mitigation and management measures identified in the EIS/preliminary draft MDP.

The construction strategy aims to balance the need for safe and efficient construction activities while managing constructability constraints including the safe and efficient operation of Sydney Airport and the Botany rail line. It also aims to minimise impacts on local communities, the environment and users of the surrounding transport network.

5.2.1 Construction overview

Construction would generally involve four main phases of work:

- Enabling works
- Site establishment
- Main construction works
- Finishing and post-construction rehabilitation.

Detailed construction planning, including timing, staging, and work sequencing, would be confirmed once construction contractors have been engaged.

5.2.2 Indicative construction program

It is anticipated that construction would start in mid-2020 and take about three and a half years to complete. The indicative timing for the primary work phases is shown in Figure 5-1.

	2020				2021				2022				2023			
Work phase	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Enabling works																
Site establishment																
Main construction works																
Finishing and post - construction rehabilitation																

Figure 5-1 Indicative construction program

5.2.3 Construction hours

The project would include work undertaken during recommended standard hours as defined by the *Interim Construction Noise Guideline* (DECC, 2009):

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no work.

The workers would generally be working on site during these standard construction hours. Accordingly, the workforce travel times would be in the hour before, and after these times.

Out-of-hours work would be required at some locations to minimise the potential for aviation and rail safety hazards, maintain the operation of the existing road network and minimise disruption of access to Sydney Airport. The following work would need to be undertaken out of hours (on weekends, public holidays, during the evening and overnight):

- Works with the potential to intrude into Sydney Airport's prescribed airspace (such as the use of cranes and piling rigs in certain locations) which would need to be undertaken during the Sydney Airport curfew (11pm to 6am)
- Works with the potential to affect the rail corridor danger zone which would need to be undertaken during scheduled weekend maintenance possession periods (24 hours a day during these periods).

Out-of-hours work would also be required to sustain the operation of the existing road network and minimise disruption of access to Sydney Airport, including consideration of the extended peak periods that occur on roads in the vicinity of Sydney Airport.

Further information regarding the expected out-of-hours work is described in Chapter 8 (Construction) and Chapter 10 (Noise and vibration) of the EIS/preliminary draft MDP.

5.2.4 Construction compounds and accesses

Five construction compounds (C1 to C5) are proposed to support construction works in adjacent work areas:

- C1 – St Peters interchange connection compound located within Sydney Airport, north of the rail corridor at the western end of Burrows Road
- C2 – Eastern bridges compound located between the road to the east of the Sydney Airport Corporation car park and the rail corridor
- C3 – Western bridges compound located within the Tempe Lands north of Alexandra Canal, on land that is currently occupied by the off-leash dog exercise area
- C4 – Qantas Drive compound located east of Qantas Drive within land currently occupied by part of the Qantas Flight Training Centre and Jet Base (to be partially removed as part of the project)
- C5 – Ninth Street compound located between Sir Reginald Ansett Drive and Ninth Street in an existing car park area.

Further details of the construction compounds, including the estimated number of parking spaces for workers and indicative vehicle access points, are summarised in Table 5-1.

The location of the five construction compounds, their access points and indicative access routes are shown in Figure 5-2, with further information discussed in Table 5-2.

Table 5-1 Construction compound accesses and worker parking provision

Compound ID and name	Main purpose	Worker parking spaces	Access points
C1 – St Peters interchange connection compound	Supports construction within the St Peters interchange connection work area	250 spaces	■ A1 – access via left-in/left-out on Canal Road, about 150 metres north-west of Burrows Road South ■ A2 – secondary access via left-in/left-out on Canal Road, located next to the car park to access the St Peters interchange connection ■ A3 – access located at the western end of Burrows Road South providing access from Canal Road.
C2 – Eastern bridges compound	Supports construction within the eastern bridges work area	330 spaces	■ A4, A5 and A6 – accesses located along the Northern Lands Access Road via Nigel Love Bridge and Airport Drive (construction vehicles would share the Northern Lands Access Road with Sydney Airport traffic, when the Northern Land Car Park is operational). During the AM peak, right turn movements from Airport Drive are banned and therefore vehicles approaching from the east would use A7 ■ A7 – access would be via Bellevue Street (temporarily) until the new Northern Lands Access Road is constructed.
C3 – Western bridges compound	Supports construction within the western bridges work area	250 spaces	■ A7 – access via an internal access road and Bellevue Street ■ A8 – access for light vehicles only via an internal access road and Holbeach Avenue, South Street and Smith Street.
C4 – Qantas Drive compound	Supports construction activities for the Qantas Drive upgrade and extension and the Terminals 2/3 access	50 spaces	■ A9 – access via left-in/left-out on Qantas Drive (westbound carriageway).
C5 – Ninth Street compound	Supports construction within the Terminals 2/3 access work area and would also provide support for works along Qantas Drive	100 spaces	■ A10 – access on Ninth Street via left-in/left-out on Qantas Drive (westbound carriageway).
Site accesses along Airport Drive	Supports construction of bridges over Alexandra Canal	0 spaces	■ A11, A12, A13 – left-in/left-out access on Airport Drive.
	Total parking provision	**980 spaces**	

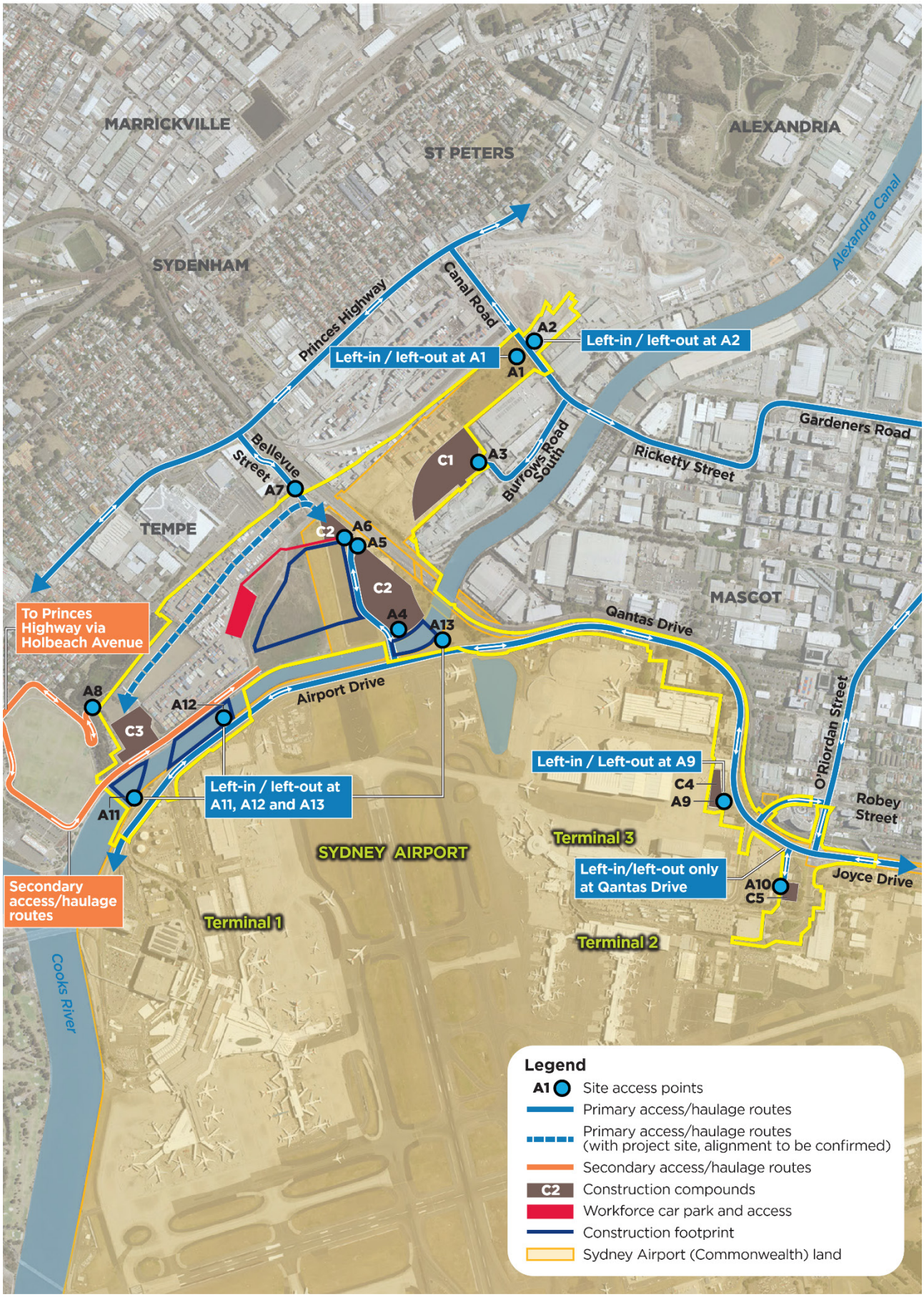


Figure 5-2 Location of construction compounds, access points and vehicle access routes

5.2.5 Vehicle access routes and scheduling

5.2.5.1 Worker access

Workers and worksite visitors are expected to access the compounds at the indicative locations discussed in Table 5-1 by private vehicle, using the existing public road network. The movement of workers to/from and around the site would be part of a worker transport strategy to be developed by the contractor. The strategy would include an objective to minimise vehicle movements during the road network peak periods.

5.2.5.2 Haulage routes

The construction activities would generate a range of different vehicles for different purposes, including:

- Light vehicles and light trucks/commercial vehicles (up to 4.5 tonnes) for deliveries and the arrival/departure of construction workers (e.g. vans and utes)
- Heavy vehicles (greater than 4.5 tonnes) for delivery of clean engineering fill, removal of spoil and waste and delivery of materials and equipment (e.g. semi-trailers, slow loaders, concrete trucks, concrete pumps and cranes)
- Oversize/over mass vehicles and special purpose vehicles (e.g. large cranes and low loaders carrying items such as precast concrete, steel beams and larger cranes).

Preliminary haulage routes for the movement of construction vehicles are shown in Figure 5-2 and discussed in Table 5-2. These routes have been selected to enable direct access to and from the arterial road network in a safe and efficient manner and where possible to avoid local roads. The majority of the proposed routes are existing restricted access vehicle routes, which are currently used for the movement of heavy vehicles (including B-doubles), as discussed in section 4.3.2.

The access arrangements for each compound have been developed such that the number of additional heavy vehicles generated by the project and using the Mascot road network would be minimised as much as practical. Most heavy vehicles accessing C1 at A1, A2 and A3 would use Canal Road and Princes highway, as demonstrated in Table 5-2.

Table 5-2 Preliminary haulage routes

Construction compound	Access point	Description of inbound routes	Description of outbound routes
C1 – St Peters interchange connection compound	A1	Southern Cross Drive or M5 Motorway (via General Holmes Drive) to Botany Road, Gardeners Road, Kent Road, Ricketty Street, Canal Road, left into the site	Left to Canal Road, left/right to Princes Highway
	A2	Left/right from Princes Highway to Canal Road and left to site access	Left to Canal Road, Ricketty Street, Kent Road, Gardeners Road, Botany Road to Southern Cross Drive (or M5 Motorway via General Holmes Drive)
	A3	Princes Highway, left/right to Canal Road, right to Burrows Road South Southern Cross Drive or M5 Motorway (via General Holmes Drive) to Botany Road, Gardeners Road, Kent Road, Ricketty Street, Canal Road, left to Burrows Road South	Left to Canal Road, left/right to Princes Highway Right to Canal Road, Ricketty Street, Kent Road, Gardeners Road, Botany Road to Southern Cross Drive (or M5 Motorway via General Holmes Drive)

Construction compound	Access point	Description of inbound routes	Description of outbound routes
C2 – Eastern bridges compound	A4, A5, A6	Princes Highway, Wickham Street, West Botany Street, Marsh Street, Airport Drive and left to Nigel Love Bridge M5 Motorway or Southern Cross Drive to General Holmes Drive, Joyce Drive, Qantas Drive, Airport Drive and right to Nigel Love Bridge	Right from Nigel Love Bridge to Airport Drive, Marsh Street, M5 Motorway or West Botany Street, Wickham Street to Princes Highway Left from Nigel Love Bridge to Airport Drive, Qantas Drive, Joyce Drive, General Holmes Drive, Southern Cross Drive or M5 Motorway (or minor haulage via Robey Street and O'Riordan Street)
C2 – Eastern bridges compound and C3 – Western bridges compound	A7	Right/left from Princes Highway to Bellevue Street	Right/left from Bellevue Street to Princes Highway
C3 – Western bridges compound	A8	Right/left from Princes Highway to Smith Street, South Street, Holbeach Avenue (light vehicles only)	Holbeach Avenue, South Street, Smith Street, right/left to Princes Highway (light vehicles only)
C4 – Qantas Drive compound	A9	M5 Motorway or Southern Cross Drive to General Holmes Drive, Joyce Drive, Qantas Drive, left into the site	Left to Qantas Drive, Airport Drive, Marsh Street (M5 Motorway access available at Marsh Street), or West Botany Street, Wickham Street to Princes Highway
C5 – Ninth Street compound	A10	M5 Motorway or Southern Cross Drive to General Holmes Drive, Joyce Drive, left from Qantas Drive to Ninth Street	Left from Ninth Street to Qantas Drive, Airport Drive, Marsh Street (M5 Motorway access available at Marsh Street), or West Botany Street, Wickham Street to Princes Highway
Other work areas	A11	Princes Highway, Wickham Street, West Botany Street, Marsh Street, Airport Drive, Qantas Drive, left into the site	Left from the site, Airport Drive, Qantas Drive, Joyce Drive, General Holmes Drive, Southern Cross Drive or M5 Motorway (or minor haulage via Robey Street and O'Riordan Street)
	A12	Princes Highway, Wickham Street, West Botany Street, Marsh Street, Airport Drive, Qantas Drive, left into the site	Left from the site, Airport Drive, Qantas Drive, Joyce Drive, General Holmes Drive, Southern Cross Drive or M5 Motorway (or minor haulage via Robey Street and O'Riordan Street)
	A13	Princes Highway, Wickham Street, West Botany Street, Marsh Street, Airport Drive, Qantas Drive, left into the site	Left from the site, Airport Drive, Qantas Drive, Joyce Drive, General Holmes Drive, Southern Cross Drive or M5 Motorway (or some minor haulage via Robey Street and O'Riordan Street)

The above routes would be used for most construction-related vehicle movements, including bringing clean engineering fill to site for retained earth embankments and ramp structures, and ground preparation activities.

5.2.6 Construction workforce

The construction workforce would comprise trades and construction personnel, sub-contractor's construction personnel, and engineering, functional and administrative staff. The construction workforce requirements would vary over the construction period in response to the activities underway and the number of active work areas.

The peak construction workforce is estimated to be about 1,000 people during the day, 150 people during the evening, and 500 people during the night which is summarised in Table 5-3. The peak is expected to occur for a period of about 13 months. Either side of this peak, workforce numbers are expected to reduce by about a third. A smaller start-up and close-out workforce of less than 400 workers would be on site for the initial and final months of the construction program. Final construction workforce requirements would be confirmed by the construction contractor(s).

Table 5-3 Estimated workforce by work site and time of day

Location	Peak construction workforce (people)			
	Day	Evening	Night	Total
C1 – St Peters interchange	150	0	30	180
C2 – Eastern bridges	460	40	240	740
C3 – Western bridges	200	40	80	320
C4 – Qantas Drive	50	0	20	70
C5 – Ninth Street	170	20	80	270
Other work areas	50	50	50	150
Peak workforce	**1,080**	**150**	**500**	**1,730**

5.2.7 Construction vehicle volumes

The anticipated number of peak construction light and heavy vehicles associated with material and equipment deliveries and the arrival and departure of the construction workforce for each work area is provided in Table 5-4.

Table 5-4 Peak construction vehicle estimates

Compound	Access points	Peak construction volumes (vehicles)									
		AM peak hour		PM peak hour		Daytime (15 hour)		Night time (9 hours)		Daily Total	
		Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
C1 – St Peters interchange connection compound	A1	0	20	330	20	850	150	40	0	890	150
	A2	10	10	10	10						
	A3	330	20	0	20						
C2 – Eastern bridges compound	A4, A5, A6 and A7	330	20	330	20	810	100	50	10	860	110
C3 – Western bridges compound	A7	250	0	250	0	650	200	30	20	680	220
	A8	10	20	10	20						
C4 – Qantas Drive compound	A9	50	20	50	20	200	100	20	20	220	120
C5 – Ninth Street compound	A10	100	20	100	20	400	100	30	20	430	120
Airport Drive	A11	10	10	10	10	40	40	10	20	50	60
	A12	10	10	10	10	40	40	10	20	50	60
Qantas Drive	A13	30	20	30	15	100	50	20	20	120	70
Total		**1,130**	**170**	**1,130**	**165**	**3,090**	**780**	**210**	**130**	**3,300**	**910**

5.3 Indicative construction traffic management

A traffic management strategy would be prepared by the successful contractor to define the traffic management measures and the associated staging that would be required to maintain a safe road network during the construction period. Further site-specific traffic management plans and traffic control plans would be prepared during detailed design in accordance with Safe Work Australia's Traffic Management: Guide for Construction Work (2014) and Roads and Maritime's Traffic Control at Work Sites manual (2018). The plans would be developed to show how the safe movement of vehicles, cyclists and pedestrians could be maintained while also providing a safe environment for workers.

The traffic management plans and traffic control plans would be established at the start of the works and updated throughout the construction process based on the agreed staging, to minimise changes and disruption to the travelling public. The contractor would consult with the Transport Management Centre (TMC) prior to and during construction. The TMC works closely with other government agencies and contractors to maximise the safety and efficiency of the NSW road network through advanced monitoring and traffic management systems. The TMC would also issue Road Occupancy Licenses (ROLs) that outline the times during which any lane changes and closures or delivery of large plant and materials can occur. As the existing study area carries high traffic volumes, these road works or large deliveries would be assessed in coordination with the TMC to determine whether they need to occur outside of peak periods or at night when traffic volumes are lower.

5.3.1 Phased delivery

The project would be delivered in phases where traffic would be diverted onto new sections of road at the end of each phase. This phased delivery approach would assist with:

- Maintaining access to Sydney Airport, Port Botany and surrounding areas
- Facilitating construction in existing roadway areas where there is limited space.

During all phases, two traffic lanes would generally be maintained along Airport Drive, Qantas Drive and Joyce Avenue (as per existing conditions) during the Sydney Airport terminals operating hours.

The alignment of Airport Drive and Qantas Drive carriageways would change during each phase. However, the functional configuration would be maintained.

During the early phases of construction, traffic along Qantas Drive (west of Seventh Street) would remain on its existing alignment while additional new westbound lanes would be constructed on the western side of Qantas Dive to the south of King Street.

Once the additional new westbound lanes are completed, westbound traffic would be moved to this new alignment, thus providing space to construct the Terminals 2/3 viaduct approach ramp between the two carriageways. Once the existing Flight Training Centre is vacated, the remainder of the westbound carriageway would be constructed. Once this is complete, all westbound travel would be moved to the new sections of roadway.

Similar to the above, new eastbound lanes on Qantas Drive between Robey Street and O'Riordan Street would be constructed to provide the ability to move eastbound traffic to a temporary alignment and facilitate construction of the viaduct between the two carriageways. Following construction of the viaduct, the eastbound lanes would be relocated to their final alignment.

In addition, the existing number of turn lanes at intersections would be maintained, as well as on the minor road approaches to intersections with Airport Drive, Qantas Drive and Joyce Drive. Notwithstanding this, modifications to the following intersections would be required during various phases throughout construction (excluding short-term lane closures):

1. Airport Drive and Link Road
2. Airport Drive and North Precinct Road
3. Airport Drive and Lancastrian Road
4. Qantas Drive, Robey Street and Seventh Street
5. Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive.

The road network arrangements at these specific locations during each of the six traffic management phases are diagrammatically shown in Appendix A and summarised in Table 5-5.

Table 5-5 Traffic management phases and arrangements

Location	Phase A	Phase B	Phase C	Phase D	Phase E	Phase F
Airport Drive and Link Road	Removal of a westbound lane and further shortening of short lanes	Same as Phase A	Eastbound traffic uses new Airport Drive alignment and existing eastbound carriageway converted to two-way Link Road extension	Same as Phase C	Same as Phase C	Eastbound and westbound traffic uses new Airport Drive alignment
Airport Drive and North Precinct Road	Existing arrangement maintained	Existing arrangement maintained	Signals restricted to right in and right out via existing signals	Same as Phase C	Same as Phase C	Existing signals removed, and North Precinct accessed via the new Link Road extension
Airport Drive and Lancastrian Road	Existing arrangement maintained	Existing arrangement maintained	Converted from signals to left-in and left-out	Same as Phase C	Same as Phase C	Same as Phase C
Qantas Drive, Robey Street and Seventh Street	Existing arrangement maintained	Removal of a westbound lane	Same as Phase B	Left-turn slip lane introduced from Seventh Street to Qantas Drive	One eastbound lane removed	Same as Phase E
Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive	Existing arrangement maintained	Removal of a southbound lane in Sir Reginald Ansett Drive	Same as Phase B	Same as Phase B	One of the eastbound right turn lanes from Qantas Drive shortened	Same as Phase E
Qantas Drive and Ninth Street	Existing arrangement maintained	Existing arrangement maintained	Existing arrangement maintained	Same as Phase D	Deceleration and acceleration lanes on Qantas Drive removed	Same as Phase E

In addition, short-term lane and carriageway closures would also be required to facilitate:

- Establishing site access points, particularly where access and egress lanes are required (e.g. access to the St Peters interchange connection work area and compound C1 via on Canal Road). Lane closures would only occur on one side of the road at a time
- Lifting bridge segments where a crane needs to be set up in traffic lanes (e.g. on Qantas Drive, Airport Drive and on Canal Road, to facilitate construction of the Terminals 2/3 access viaduct, the Terminal 1 connection bridge and the Canal Road overpasses respectively)
- Connecting new roads to existing roads (e.g. connecting the Terminal 1 connection to Airport Drive and Terminals 2/3 connection to Qantas Drive west of Lancastrian Road)
- Widening of Qantas Drive east and westbound carriageways
- Constructing new lanes along Qantas Drive as part of the Qantas Drive upgrade and extension
- Nightly closures of a single lane of traffic in each direction to facilitate widening of Qantas Drive and to facilitate the installation of utilities and drainage
- Modifying the Lancastrian Road/Qantas Drive intersection
- Traffic diversions to maintain capacity along Qantas Drive
- Lifting of viaduct bridge beams or segments.

To minimise the potential for traffic and access impacts, these short-term closures would be undertaken during night-time hours as far as possible, however major crane lifts would occasionally require full weekend closures with detours established to maintain access to the Sydney Airport terminals, Port Botany and operation of the road network.

These closures would be managed in accordance with a Construction Traffic and Access Management Plan, which would define the traffic management measures and communications plans required to manage traffic through or adjacent to work areas to ensure that access and road functionality is maintained (see section 9.1).

Swamp Road would be permanently closed. Once the project is operational, access to properties in this area, including the Sydney Airport northern lands, would be via the proposed northern lands access and the freight terminal access.

5.4 Impact assessment

5.4.1 Impacts on the road network

Based on the haulage routes described in Table 5-2 and the anticipated peak construction vehicle volumes generated by the construction compounds as shown in Table 5-4, the largest vehicle increases are expected along Canal Road, particularly at its west extent near the Princes Highway, as well as on Qantas Drive and Airport Drive and the local roads of Holbeach Avenue and Bellevue Street. The approximate traffic volume increases along these roads during the AM and PM peak hours are summarised in Table 5-6.

Table 5-6 Existing traffic volumes and proportional increases due to construction vehicles

Location	Direction	AM peak hour			PM peak hour		
		Existing traffic volumes (vehicles)	Additional construction related traffic (vehicles)	Percentage increase	Existing traffic volumes (vehicles)	Additional construction related traffic (vehicles)	Percentage increase
Canal Road west of Burrows Road	Eastbound	1,450	170	12%	630	20	3%
	Westbound	670	108	16%	1,220	350	29%
Qantas Drive/Airport Drive	Eastbound	2,490	25	1%	1,300	253	19%
	Westbound	1,350	10	1%	2,130	175	8%
Bellevue Street	Northbound	No data available (low volume roads)	10	Increases are proportionally high	No data available	20	Increases are proportionally high
	Southbound		195			10	
Holbeach Avenue	Northbound		0			250	
	Southbound		250			0	

Table 5-6 indicates that traffic volume on Canal Road could increase by up to 16 per cent and 29 per cent in the AM and PM peak hours in the westbound direction. Traffic volumes on Qantas Drive/Airport Drive would increase by up to 20 per cent in the eastbound direction in the PM peak hour. These volume increases are considered to be manageable given the existing traffic volume and road network conditions.

Holbeach Avenue would be used by workers to access C3, resulting in an additional 250 vehicles using this route during the AM and PM peak. The additional vehicles would generally be travelling in the opposite direction to the existing local traffic in the area. Therefore, the additional vehicles would be manageable on Holbeach Avenue.

Most of the properties that are accessed via Bellevue Street would be removed as part of the project, offsetting most of the traffic generated by the project's construction which are proposed to use Bellevue Street.

5.4.1.1 Traffic management assessment scenarios

Three construction scenarios have been assessed for their impact on intersection performance and network travel times. A 'without construction' year 2022 baseline scenario is also considered. A high-level overview of the modelled construction scenarios is provided in Table 5-7.

The three modelling scenarios were selected as they are expected to have the greatest impact on the road network performance. The modelling of the construction scenarios is focussed on the most affected portions of the construction works related to traffic in the Terminals 2/3 area, Qantas Drive, Airport Drive and the access to Marsh Street and the access to Terminal 1.

The construction traffic management scenarios which were not modelled (A, B and D) include minor changes from the 2022 baseline network and were not expected to result in substantially different results to the 2022 baseline results.

Table 5-7 Modelled construction scenarios

Construction period	Operational model scenario	Traffic demand scenario	Road network configuration
Without construction	2022 future baseline	2022 with M4 Upgrade, New M5 and without the project	No road network changes due to the project but including the completed M4 Upgrade and the New M5. This scenario was developed as a benchmark for quantifying the impacts of construction on the existing network.
Late 2021 to late 2022	Construction scenario 1	2022 with M4 Upgrade and New M5	Traffic management Phase C
Late 2022 to mid-2023	Construction scenario 2		Traffic management Phase E
Mid-2023 to late 2023	Construction scenario 3	2022 with M4 Upgrade and New M5	Traffic management Phase F

5.4.1.2 Future baseline description

To understand the impact of the indicative traffic management scenarios discussed in Table 5-7, the modelling results (intersection performance and travel times) for each of the construction scenarios has been compared against a 2022 future baseline scenario (without any construction related traffic management measures).

Traffic volumes along relevant roads in the 2018 baseline (per section 4.3.3) and 2022 future baseline scenarios are compared in Table 5-8. It is noted that the works completed as part of Airport East upgrades and Airport North upgrades are realised in the 2022 modelling results but not the 2018 modelling, noting the target completion of Airport East upgrade by the end of 2019 and Airport North upgrade by the end of 2020 (see section 2.2.4).

Traffic volumes would generally increase in 2022, with the largest increases during the AM and PM peak hours anticipated along Gardeners Road west of O'Riordan Street and Joyce Drive east of O'Riordan Street. The increased traffic volumes would be largely driven by wider network changes outside of the study area, forecast population and employment growth, and growth in the number of passenger trips generated by Sydney Airport.

The demand along Airport Drive and Qantas Drive (including the left turn from Qantas Drive onto Robey Street) would increase from 2018 to 2022 mostly due to increased demand from Terminal 1. However, northbound congestion on O'Riordan Street would affect the traffic throughput at Robey Street. In particular, the length of the left turn lanes on Qantas Drive for vehicles turning onto Robey Street would not be sufficient to accommodate the demand. Therefore, the left turn vehicle queues would affect the eastbound through traffic on Qantas Drive, causing a redistribution of eastbound traffic, equating to reduced traffic volumes (up to 20 percent) identified in Table 5-8 for eastbound traffic on Qantas Drive.

Table 5-8 2018 and 2022 baseline traffic volumes for AM and PM peak hours

Road location	Approach	AM peak hour (vehicle/hour) (1)			PM peak hour (vehicle/hour) (1)		
		2018 base	2022	% change	2018 base	2022	% change
Qantas Drive west of Seventh Street	West (eastbound)	1,954	1,548	-21%	1,178	988	-16%
Joyce Drive east of O'Riordan Street	East (westbound)	1,633	2,402	+47%	1,321	1,583	+20%
M5 East, east of Marsh Street	East (westbound)	770	916	+19%	703	810	+15%
Airport Drive west of Link Road	West (eastbound)	2,432	2,002	-18%	1,248	1,060	-15%
Gardeners Road west of O'Riordan Street	West (eastbound)	883	1,346	+53%	961	1074	+12%
O'Riordan Street south of Gardeners Road	South (northbound)	1,564	1,847	+18%	1,269	1,422	+12%
O'Riordan Street south of Robey Street	North (southbound)	1,249	1,522	+22%	1,837	2,207	+20%
Robey Street west of O'Riordan Street	West (eastbound)	2,556	2,737	+7%	1,463	1,596	+9%

(1) Modelled volume throughput on specific roads not actual traffic demand

The impact of the three construction scenarios has been assessed with regards to:

- Intersection performance (volume, average delay and LoS) at four key intersections which were anticipated to be most susceptible to change during construction (as shown in Figure 5-3):
  - O'Riordan Street and Robey Street intersection
  - Qantas Drive, Robey Street and Seventh Street intersection
  - Airport Drive and Link Road intersection
  - Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive intersection
- Travel time performance along three routes which were anticipated to be the most susceptible to change during construction (as shown in Figure 5-3):
  - Airport Drive between Flora Street and Robey Street
  - O'Riordan Street between Terminals 2/3 and Gardeners Road
  - General Holmes Drive between M5 and Mill Pond Road.

The intersection performance results and travel time results for the 2022 baseline are summarised in Table 5-9 and Table 5-10, respectively.

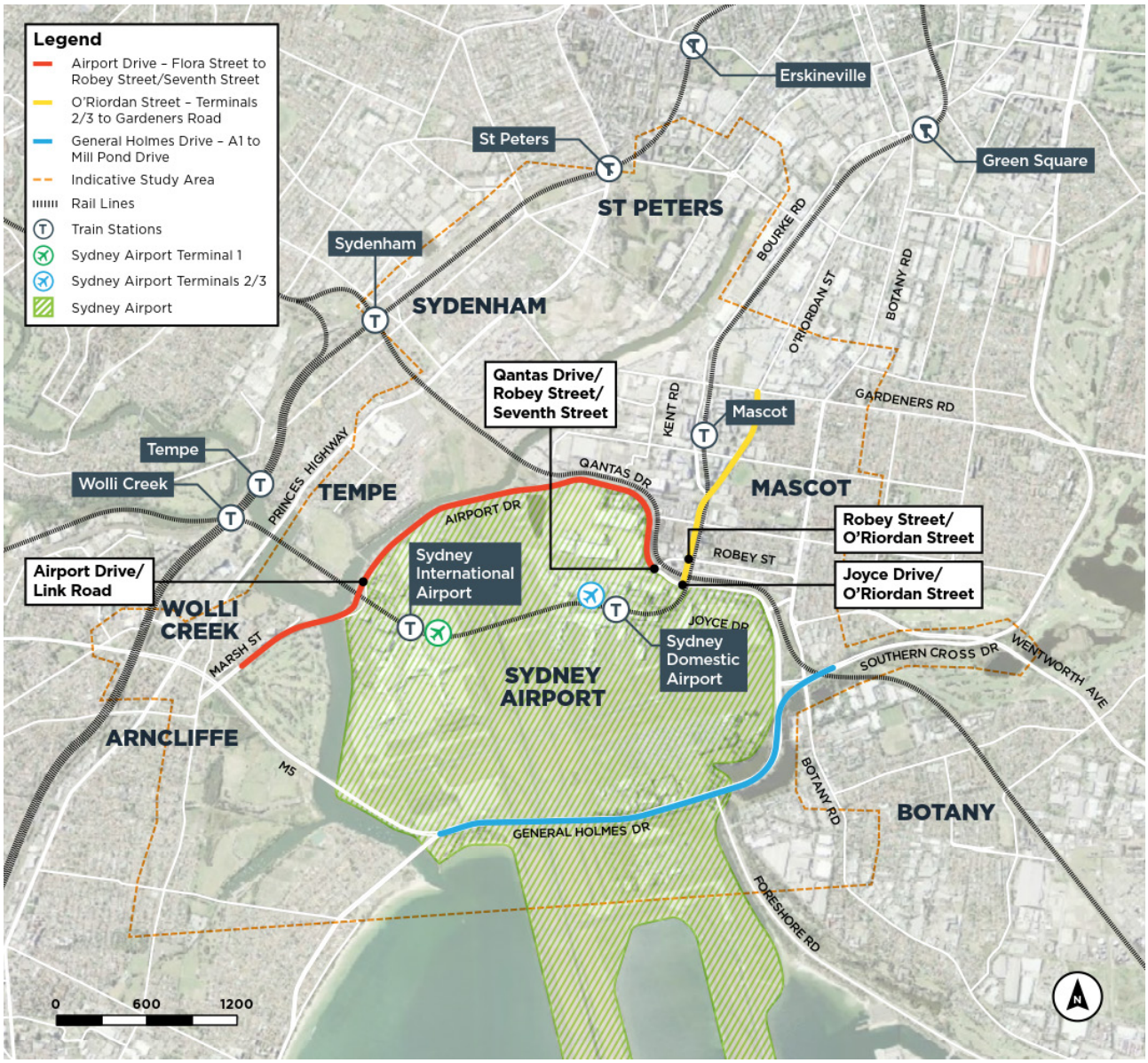


Figure 5-3 Intersections and travel time routes assessed for construction scenarios

Table 5-9 AM and PM peak intersection performance during 2022 baseline

Intersection	AM peak				PM peak			
	2018		2022 baseline		2018		2022 baseline	
	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service
O'Riordan Street and Robey Street	56	D	36	C	26	B	78	F
Qantas Drive, Robey Street and Seventh Street	108	F	213	F	64	F	44	D
Airport Drive and Link Road	6	A	36	C	6	A	12	A
Joyce Drive, Qantas Drive, O'Riordan Street and Sir Reginald Ansett Drive	130	F	74	F	52	D	110	F

Table 5-10 AM and PM travel times during 2022 baseline and compared with 2018 baseline

Travel time route	AM peak		PM peak	
	Travel time (minutes:seconds)		Travel time (minutes:seconds)	
	2018	2022	2018	2022
Airport Drive and Qantas Drive eastbound (Flora Street–Robey Street)	9:39	13:15	4:05	4:30
Airport Drive and Qantas Drive westbound (Seventh Street–Flora Street)	5:13	8:27	4:31	4:27
O'Riordan Street northbound (Terminals 2/3-Gardeners Road)	4:24	7:16	3:55	7:11
O'Riordan Street southbound (Terminals 2/3-Gardeners Road)	6:18	4:04	3:10	4:39
General Holmes Drive eastbound (M5-Mill Pond Drive)	6:56	7:13	2:38	2:46
General Holmes Drive westbound (M5-Mill Pond Drive)	2:49	2:26	2:36	3:28

Table 5-9 and Table 5-10 shows the following notable changes in 2022 when compared with the 2018 existing conditions (as modelled):

- Qantas Drive, Robey Street and Seventh Street intersection performance would deteriorate in the AM peak, as a result of the downstream congestion and capacity issues for the left turn from Qantas Drive to Robey Street discussed above
- O'Riordan Street and Robey Street intersection performance would improve in the AM peak hour due to increased southbound capacity on O'Riordan Street to be delivered as part of the Mascot North upgrades which would offset any increased delay associated with increased northbound demand

- Airport Drive and Link Road intersection performance would deteriorate in the AM peak as a result of the downstream congestion and capacity issues at the left turn from Qantas Drive to Robey Street discussed above
- Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive intersection performance would improve in the AM peak. This is due to increased southbound capacity on O'Riordan Street to be delivered as part of the Airport North upgrades and increased westbound capacity on Joyce Drive to be delivered as part of the Airport East upgrades.

Travel times would typically increase due to increased demand and associated congestion, except for O'Riordan Street southbound in the AM peak, which would experience reduced travel times due to increased capacity delivered as part of the Airport North upgrades.

5.4.1.3 Scenario 1 (November 2021–May 2022)

The intersection performance and the travel times for scenario 1 are shown in Table 5-11 and Table 5-12, respectively.

In the AM peak, all of the intersections would experience vehicle delays lower than the 2022 baseline except at the O'Riordan Street and Robey Street intersection, which would marginally increase by five seconds, maintaining LoS C.

In the PM peak, the average delays at the Qantas Drive, Seventh Street and Robey Street intersection and the Airport Drive and Link Road intersection would reduce. However, the average delay for the O'Riordan Street and Robey Street intersection would increase by 25 seconds and the average delay at the Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive intersection would increase by 21 seconds. These increases in average delays are due to downstream capacity reductions on Qantas Drive, specifically the removal of the westbound kerbside lane to the west of Ninth Street, which would cause some vehicle delays and queuing along O'Riordan Street.

These increased delays would present minor impacts for travellers to and from Terminals 2/3, including shuttle buses, taxis and private vehicles.

During the AM and PM peak hours, minor travel time increases would be expected across the network, with the exception of Airport Drive which is expected to have decreased travel times in both directions. The travel time decreases along Airport Drive are due to the removal of signals at Lancastrian Road.

In the PM peak hour, travel times along O'Riordan Street southbound would increase by one minute and 55 seconds (41 per cent) as a result of the Qantas Drive capacity reductions.

Travel times along General Holmes Drive eastbound would increase by one minute and six seconds (40 per cent).

Overall, the impacts on the road network identified for construction scenario 1 are considered to be manageable.

It is noted that Australian Rail Track Corporation (ARTC) would likely undertake works concurrently for the Botany Rail Duplication project in the vicinity of the Qantas Drive, Robey Street and Seventh Street intersection. Notwithstanding the road network performance results for scenario 1, indicating that a LoS C would be maintained at the Qantas Drive, Robey Street and Seventh Street intersection, it is likely that these adjacent works would result in impacts to the intersection well beyond those discussed above. In particular, these adjacent works may seek to close one lane of Robey Street and O'Riordan Street. The Botany Rail Duplication works are discussed further in section 8.7.

Table 5-11 AM and PM peak intersection performance during construction – scenario 1

Intersection	AM peak				PM peak			
	2022 baseline		Scenario 1		2022 baseline		Scenario 1	
	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service
O'Riordan Street and Robey Street	36	C	41	C	78	F	103	F
Qantas Drive, Robey Street and Seventh Street	213	F	159	F	44	D	37	C
Airport Drive and Link Road	36	C	15	B	12	A	7	A
Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive	74	F	74	F	110	F	131	F

Table 5-12 AM and PM travel times during construction – scenario 1

Travel time route	AM				PM			
	Travel time (minutes:seconds)				Travel time (minutes:seconds)			
	2022 baseline	Scenario 1	Change		2022 baseline	Scenario 1	Change	
Airport Drive and Qantas Drive eastbound (Flora Street–Robey Street)	13:15	9:20	−03:55	−30%	4:30	4:30	00:00	0%
Airport Drive and Qantas Drive westbound (Seventh Street–Flora Street)	8:27	6:35	−01:52	−22%	4:27	3:46	−00:41	−15%
O'Riordan Street northbound (Terminals 2/3–Gardeners Road)	7:16	7:21	00:05	1%	7:11	7:24	00:13	3%
O'Riordan Street southbound (Terminals 2/3–Gardeners Road)	4:04	4:38	00:34	14%	4:39	6:34	01:55	41%
General Holmes Drive eastbound (M5–Mill Pond Drive)	7:13	7:38	00:25	6%	2:46	3:52	01:06	40%
General Holmes Drive westbound (M5–Mill Pond Drive)	2:26	2:34	00:08	5%	3:28	3:38	00:10	5%

5.4.1.4 Scenario 2 (October 2022–June 2023)

The intersection performance and the travel times for scenario 2 are shown in Table 5-13 and Table 5-14, respectively. The intersection performance would generally be the same as scenario 1.

The loss of one eastbound lane on Qantas Drive (two right turn lanes turning into Sir Reginald Ansett Drive reduced to one) would increase the delay on the western approach. However, this increased delay would be offset by the new left turn slip lane from Seventh Street to Qantas Drive.

During the AM and PM peak hours, minor travel time increases would generally be expected across the network, with the exception of Airport Drive which is expected to have decreased travel times in both directions due to the removal of existing signalised intersections. In the PM peak, travel times along O'Riordan Street southbound would increase by two minutes and 12 seconds (47 per cent). Travel times along General Holmes Drive eastbound would increase by 48 seconds (29 per cent).

Overall, the impacts on the road network identified for construction scenario 2 are considered to be manageable.

Table 5-13 AM and PM peak intersection performance during construction – scenario 2

Intersection	AM peak				PM peak			
	2022 baseline		Scenario 2		2022 baseline		Scenario 2	
	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service
O'Riordan Street and Robey Street	36	C	41	C	78	F	112	F
Qantas Drive, Robey Street and Seventh Street	213	F	159	F	44	D	32	C
Airport Drive and Link Road	36	C	18	B	12	A	8	A
Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive	74	F	72	F	110	F	137	F

Table 5-14 Change to AM and PM travel times during construction – scenario 2

Travel time route	AM				PM			
	Travel time (minutes:seconds)				Travel time (minutes:seconds)			
	2022 baseline	Scenario 2	Change		2022 baseline	Scenario 2	Change	
Airport Drive and Qantas Drive eastbound (Flora Street–Robey Street)	13:15	9:47	−03:28	−26%	4:30	4:27	−00:03	−1%
Airport Drive and Qantas Drive westbound (Seventh Street–Flora Street)	8:27	7:45	−00:42	−8%	4:27	3:50	−00:37	−14%
O'Riordan Street northbound (Terminals 2/3–Gardeners Road)	7:16	7:28	00:12	3%	7:11	6:31	−00:39	−9%
O'Riordan Street southbound (Terminals 2/3–Gardeners Road)	4:04	4:18	00:14	6%	4:39	6:51	02:12	47%
General Holmes Drive eastbound (M5–Mill Pond Drive)	7:13	8:01	00:48	11%	2:46	3:34	00:48	29%
General Holmes Drive westbound (M5–Mill Pond Drive)	2:26	2:26	00:00	0%	3:28	3:58	00:30	15%

5.4.1.5 Scenario 3 (June 2023–December 2023)

The intersection performance and the travel times for scenario 3 are shown in Table 5-15 and Table 5-16, respectively. The intersection performance would generally be the same as scenario 1.

During the AM and PM peak hours, minor travel time increases would generally be expected across the network, with the exception of Airport Drive which is expected to have decreased travel times in the AM peak due to the removal of existing signalised intersections. In the PM, travel times along O'Riordan Street southbound would increase by two minutes and 55 seconds (63 per cent). Travel times along General Holmes Drive eastbound would also increase by one minute and 15 seconds (45 per cent).

Based on the above, scenario 3 would have a minor impact on the road network, with increased travel times during the PM peak. Recommended mitigation measures are discussed in section 9 of this report.

Table 5-15 AM and PM peak intersection performance during construction – scenario 3

Intersection	AM peak				PM peak			
	2022 baseline		Scenario 3		2022 baseline		Scenario 3	
	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service	Delay (seconds)	Level of Service
O'Riordan Street and Robey Street	36	C	40	C	78	F	109	F
Qantas Drive, Robey Street and Seventh Street	213	F	162	F	44	D	33	C
Airport Drive and Link Road	36	C	17	B	12	A	10	A
Joyce Drive, O'Riordan Street and Sir Reginald Ansett Drive	74	F	76	F	110	F	120	F

Table 5-16 Change to AM and PM travel times during construction – scenario 3

Travel time route	AM				PM			
	Travel time (minutes:seconds)				Travel time (minutes:seconds)			
	2022 baseline	Scenario 3	Change		2022 baseline	Scenario 3	Change	
Airport Drive and Qantas Drive eastbound (Flora Street–Robey Street)	13:15	9:59	−03:16	−25%	4:30	4:39	00:09	3%
Airport Drive and Qantas Drive westbound (Seventh Street–Flora Street)	8:27	7:48	−00:39	−8%	4:27	4:29	00:02	1%
O'Riordan Street northbound (Terminals 2/3–Gardeners Road)	7:16	7:24	00:08	2%	7:11	8:22	01:11	17%
O'Riordan Street southbound (Terminals 2/3–Gardeners Road)	4:04	4:39	00:36	15%	4:39	7:34	02:55	63%
General Holmes Drive eastbound (M5–Mill Pond Drive)	7:13	8:00	00:46	11%	2:46	4:01	01:15	45%
General Holmes Drive westbound (M5–Mill Pond Drive)	2:26	2:32	00:05	4%	3:28	3:35	00:07	3%

5.4.2 Impacts on public transport

The primary bus corridors affected during construction are the bus services that access the airport along Airport Drive, Qantas Drive and O'Riordan Street. The 305, 400 and 420 bus routes would be subject to the same delays, detours and diversions as general traffic along their routes. Therefore, these buses would experience some minor increases in travel times due to the proposed lane closures and construction activities as per the traffic impacts noted in section 5.4.1, particularly along O'Riordan Street. However, these impacts are manageable.

The existing bus stops located at Qantas Drive and Lancastrian Road would be closed permanently (affecting routes 400 and 420). These stops are located adjacent to the Qantas Jet Base facilities, some of which would be removed as part of the project and therefore would become less utilised than at present. Historical Opal card data indicates that less than 20 passengers use these stops daily. Following the removal of these bus stops, the closest remaining bus stops serviced by the same routes would be located within Terminals 2/3 (about 750 metres away). It is expected that the existing stops would experience lower levels of use once the Qantas Jet Base relocates.

The project would have no direct impact on passenger rail services or stations, however the changes to road network performance described in section 5.4.1 could result in increased travel times for commuters travelling to stations in the surrounding areas.

5.4.3 Impacts on pedestrians and cyclists

During construction, several temporary and permanent changes to the current pedestrian and cyclist network within the vicinity of the project would be required. Proposed changes to the pedestrian and cycling network and their impacts are discussed in Table 5-17. The temporary changes proposed would be agreed with the Sydney Transport Management Centre (TMC), Sydney Airport Corporation Limited and other key stakeholders prior to implementation.

It is proposed to close the Alexandra Canal cycleway between the existing footbridge west of the Terminal 1 connection bridge and Nigel Love Bridge. A new active transport link would be constructed as part of the project. During construction, a temporary active transport link would be provided on the northern side of Alexandra Canal to maintain connectivity for pedestrians and cyclists while the permanent link is being constructed. The route for the temporary link would vary throughout the construction stages. The various proposed temporary routes are shown in Figure 5-4.

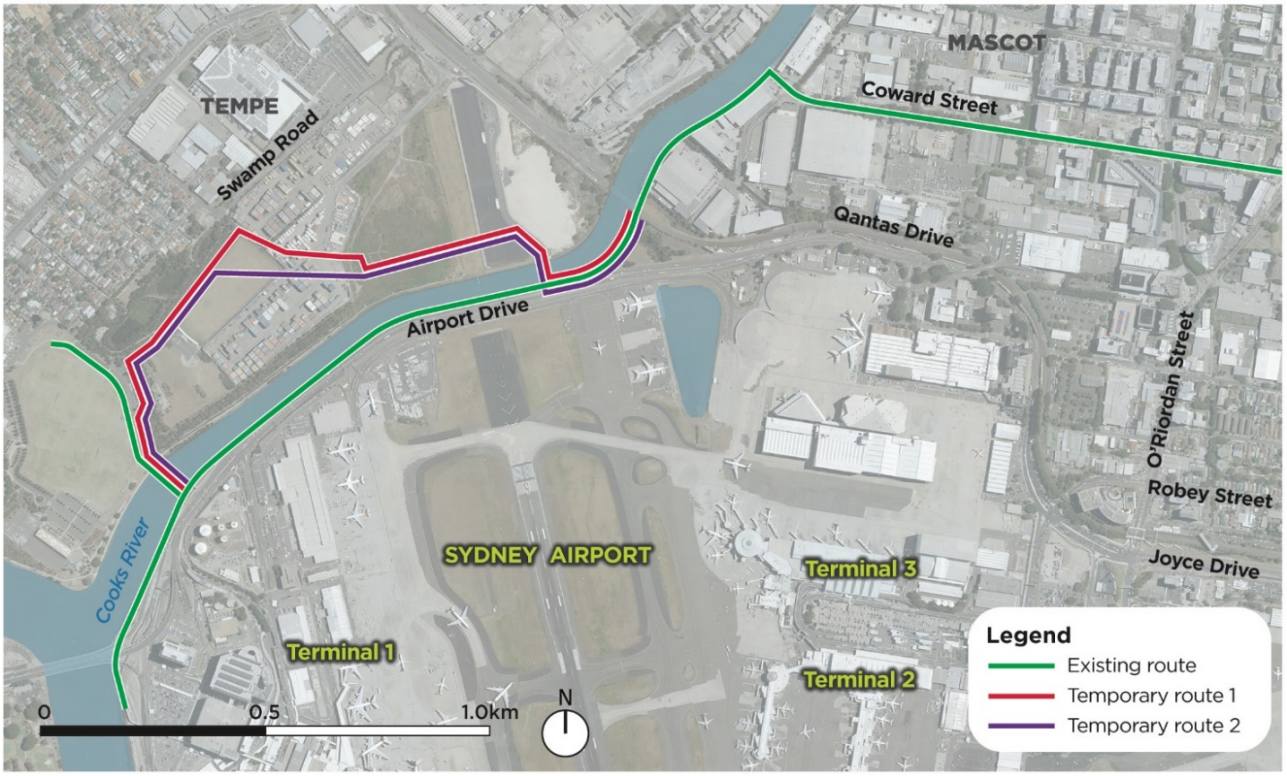


Figure 5-4 Temporary routes for cyclists and pedestrians

Table 5-17 Indicative changes to pedestrian and cycling networks

Location	Changes in network	Impacts
Canal Road	Short-term closures to footpaths on both sides of the road to facilitate construction. Closure would only occur on one side of the road at a time with pedestrians to be redirected to the other side during each closure.	There would be a negligible increase in walking times and distances travelled where pedestrians need to cross Canal Road to continue their journey. Traffic management would be implemented to facilitate pedestrians crossing Canal Road during major road closures.
Alexandra Canal cycleway	Permanent closure of the shared path (cycleway) on the southern side of Alexandra Canal between the existing pedestrian bridge and the Nigel Love bridge. During construction, an alternate route would be used (shown in Figure 5-4).	The temporary path would be about 580 metres longer than the existing path. This could result in only a minor increases for cyclists and an additional travel time of about nine to ten minutes for pedestrians.
	Temporary short-term closures of the shared path east of Nigel Love bridge during some construction activities e.g. major crane lifts for the Qantas Drive and terminal link bridges.	No impacts are anticipated as a temporary route is planned to accommodate pedestrians and cyclists for the duration of construction.
Qantas Drive	Permanent removal of the pedestrian crossing at the Lancastrian Road intersection.	This pedestrian crossing is used to access the bus stop on Qantas Drive, which would be closed as part of the project (see section 5.4.2). As the bus stop would be removed, and there are no other destinations in the area, the crossing would become redundant.
	Temporary removal of the pedestrian footpath located along the northern side of Qantas Drive, between Robey Street and O'Riordan Street to facilitate construction of the Terminals 2/3 access viaduct.	The footpath would mainly be used by pedestrians east of Sir Reginald Ansett Drive accessing the bus stop in Robey Street. The impact is considered limited as there is a parallel footpath on the other side of Qantas Drive which would be used.
	Permanent removal of a path between Robey Street west to the location of a former pedestrian bridge over the Botany Rail Line (west of Lancastrian Road). At the western end, the path and bridge was historically used by Qantas employees to walk between facilities on either side of the rail corridor. The pedestrian bridge over the rail line has been made inaccessible. As a result, the path is no longer able to be used for this purpose.	The existing path is generally of poor quality, including sections of very narrow widths, except for a short section near Robey Street that was recently completed. The path is also disconnected from the surrounding active transport network and does not currently serve any nearby land uses. Use of the path is undesirable and it is discouraged by Sydney Airport and other agencies due to its narrow widths and proximity to Qantas Drive traffic. Therefore, while a concrete path exists, its removal would have negligible impact on the active transport network and its users.
Robey Street	Adjustment of the pedestrian footpath on the northern side extending north from Qantas Drive to facilitate revised kerb alignment.	The footpath would be replaced in accordance with current design and accessibility requirements.
Link Road	Removal of the signalised pedestrian crossing at Link Road, with access to the freight facilities provided by existing paths located within the Terminal 1 area.	The existing pedestrian crossing at Link Road would be removed, with access to the freight facilities provided by existing paths located near Terminal 1. This route would be about 775 metres longer than the current route.

5.4.4 Impacts on parking

Most project construction staff are expected to drive to the construction sites and would require parking. Car parks would be provided for worker parking at the main compound sites (Compound C1 to C5) to avoid the need for workers to parking in nearby streets. Table 5-18 outlines the estimate of the amount of parking provision that would be provided at each construction compound.

Table 5-18 Indicative day time workforce and parking provision

Work area (Site ID)	Parking spaces	Daytime workforce
St Peters interchange connection (C1)	250	150
Eastern bridges (C2)	330	460
Western bridges (C3)	250	200
Qantas Drive (C4)	50	50
Ninth Street (C5)	100	170
Total	**980**	**1,030**

Construction compounds C2 and C5 would have fewer parking spaces available than the indicative daytime workforce. However, C1 and C3 would have surplus number of spaces. Overall, there may be a minor shortfall (of about 50 spaces) during peak periods. This would be managed by the measures provided in section 9.1, including:

- Developing and implementing a worker parking strategy including measures to encourage workers to use alternative transport arrangements, such as public transport
- Use of shuttle buses to move workers between compounds and work areas where capacity in one parking area is limited but other parking areas have capacity
- Further consideration of the need for additional parking within the construction footprint, particularly near work areas that are not directly serviced by a construction compound.

Given the above, impacts on on-street parking would be limited as no on-street parking is available along the roads that would be directly affected by construction (such as Airport Drive, Qantas Drive, Joyce Drive, and the impacted sections of Robey Street and O'Riordan Street). Some local roads within walking distance of some construction compounds, particularly in Mascot near compounds C4 and C5, have on-street parking available. However, the on-street parking is generally restricted to up to three-hour parking, limiting the ability for construction workers to use these spaces.

There would be a reduction in the amount of parking available in the Sydney Airport northern lands car park, as this land would be required to accommodate part of construction compound C2 and ultimately for the project. This car park is used by Sydney Airport employees at times of peak demand within the terminal car parks. The car park has sufficient capacity such that a reduction of about 24 spaces required by the project would have minimal impact on the overall availability of parking in this location.

The car parking area near Terminals 2/3 that is accessed off Ninth Street owned by Sydney Airport would be affected during construction. This car park, which currently has capacity for about 100 vehicles, would become part of construction compound C5. An additional 40 car parking spaces would be temporarily removed along the northern boundary of the Sydney Airport mail handling unit facility adjacent to Airport Drive at Terminal 1. These changes to car parking would be managed by Sydney Airport as part of an upcoming lease renewal of this area.

Two car parking areas near Terminals 2/3 that are accessed off Ross Smith Avenue and Sir Reginald Ansett Drive respectively, used by the adjacent DHL business, would also be affected during construction. These car parks have a combined capacity for about 81 vehicles and would become part of the construction footprint. Only one of these car parks would be able to be used for construction at any one time, which would reduce the impact for the users.

It is anticipated that there would be limited impacts on on-street parking for local businesses and the community. Businesses would still be accessible and where permitted, time restricted on-street parking would still be available. To ensure that parking remains available, parking restrictions would need to be enforced.

5.4.5 Impacts on access

Access to properties not required for construction would generally be maintained at all times wherever possible. Notwithstanding, some temporary impacts to access may be unavoidable during certain work periods or for some activities. In these instances, consultation would be undertaken with the occupant to ensure satisfactory alternative access is provided or that the impact is minimised.

The potential for impacts on access to Sydney Airport during construction are considered in section 5.4.7.

5.4.6 Impacts on safety

There is an increased risk associated with construction traffic interacting with general traffic especially where the construction vehicles are entering and exiting construction sites. Impacts on safety for all road users during construction would be mitigated through the requirement of the contractor to develop effective traffic management plans and traffic control plans in consultation with the TMC.

5.4.7 Summary of impacts on Sydney Airport

Overall, access to and from Sydney Airport would be maintained during construction and the surrounding road network would operate similarly to that expected without construction. Some localised worsening of congestion would occur along O'Riordan Street, resulting in travel time increases of around three minutes for southbound traffic on O'Riordan Street during the PM peak. This travel time increase would have a moderate impact on traffic and buses that would use this route to access Sydney Airport Terminals 2/3.

Table 5-19 and Table 5-20 shows the traffic flows and performance at key access and egress locations for Terminals 2/3 for the AM and PM peak hours during the worst performing scenarios. The modelling shows that the construction would have the following substantial impacts on access to/from Terminals 2/3:

- In the AM peak hour, traffic turning right from Qantas Drive to Terminals 2/3 would experience an additional 95 seconds delay due to capacity reductions for this movement
- In the AM peak hour, traffic exiting Terminals 2/3 and travelling northbound onto Robey Street would experience an additional 70 seconds delay due to insufficient capacity for the left turn from Qantas Drive to Robey Street.

There are opportunities to improve the configuration of roads and intersections to reduce the localised congestion impacts, which would be further developed prior to construction to minimise residual impacts, as discussed in section 9.1.

During scenario 1, traffic exiting Terminal 1 would need to merge with eastbound traffic on Airport Drive unlike current conditions. The merge length would be approximately 40 metres in length. Modelling indicates that the 40 metre lane length is adequate and that the merge would operate satisfactorily with LoS D and B in the AM and PM peak hours, respectively. Therefore, the exit to Terminal 1 would continue to operate satisfactorily.

Table 5-19 Intersection performance, access and egress movements – AM peak

Intersection and movement				2022			Worst performing scenario			
				Volume	Average delay	Level of Service	Volume	Average delay	Level of Service	Scenario
Terminals 2/3 Access	Qantas Drive	Eastbound	Through	1,044	20	B	1,193	29	C	1
			Right to Terminals 2/3	338	76	F	454	160	F	3
	O'Riordan Street	Southbound	Left	171	64	E	143	60	E	2
			Through to Terminals 2/3	648	53	D	663	58	E	2
			Right	710	56	D	739	61	E	2
	Qantas Drive	Westbound	Left to Terminals 2/3	1,389	188	F	1,385	192	F	3
			Through	1,002	118	F	1,173	121	F	3
Terminals 2/3 Egress	Qantas Drive	Eastbound	Left	1,125	230	F	1,172	105	F	3
			Through	902	152	F	1,071	101	F	3
	Seventh Street	Northbound	Left from Terminals 2/3	526	45	D	508	45	D	1
			Through from Terminals 2/3	934	108	F	936	177	F	2
			Right from Terminals 2/3	786	55	D	858	58	E	1
	Qantas Drive	Westbound	Through	926	14	B	1122	23	B	1
			Right	781	46	D	800	52	D	2

Table 5-20 Intersection performance, access and egress movements -PM peak

Intersection and movement				2022			Worst performing scenario			
				Volume	Average delay	Level of Service	Volume	Average delay	Level of Service	Scenario
Terminals 2/3 Access	Qantas Drive	Eastbound	Through	814	51	D	864	36	C	1
			Right to Terminals 2/3	433	149	F	433	71	F	1
	O'Riordan Street	Southbound	Left	605	53	D	447	82	F	3
			Through to Terminals 2/3	706	35	C	696	50	D	2
			Right	740	28	C	650	37	C	1
	Qantas Drive	Westbound	Left to Terminals 2/3	1,025	387	F	1,113	403	F	1
			Through	606	284	F	620	305	F	1
Terminals 2/3 Egress	Qantas Drive	Eastbound	Left	376	48	D	429	41	C	1
			Through	553	68	E	497	41	C	1
	Seventh Street	Northbound	Left from Terminals 2/3	536	31	C	493	35	C	1
			Through from Terminals 2/3	855	38	C	867	43	D	1
			Right from Terminals 2/3	721	36	C	809	40	C	1
	Qantas Drive	Westbound	Through	964	15	B	881	10	A	1
			Right	329	53	D	348	33	C	1

As described in section 5.4.4, there would be a minor reduction in the number of parking spaces at the Sydney Airport northern lands car park. However, there is considered to be sufficient spare capacity to meet the parking needs at this location.

Construction would also affect a Sydney Airport parking area located near Terminals 2/3, accessed off Ninth Street which provides parking for up to 100 vehicles. In addition, about 40 car parking spaces would be temporarily removed from the mail handling unit adjacent to Airport Drive at Terminal 1. These changes would be managed with Sydney Airport as part of the future lease of this area.

Two other car parks leased to DHL (with a combined capacity of 81 spaces) would also be occupied during construction, although only one of these two car parks would be able to be occupied at any time.

5.4.8 Summary of impacts on Port Botany

Access to and from Port Botany would be maintained throughout construction via its current access routes, including the M5, General Holmes Drive and Foreshore Road. The project's construction impacts on Port Botany would be limited to minor travel time increases along General Holmes Drive which would be up to one minute and 15 seconds.

6. Future network operations without the project

This section summarises the forecast transport network operation and performance in 2026 and 2036 without the project. These years are aligned with the traffic assessment and modelling undertaken for the project to enable comparative analysis of the operational transport impacts in the future as required by the SEARs.

The expected future conditions in 2026 and 2036 are compared with the existing conditions to understand the performance of the transport network in the future with the forecast population and employment growth, as well as planned and committed infrastructure (excluding the project) as discussed in section 3.2.

6.1 Overview

The analysis of the future road network without the project indicates that traffic volumes and travel times would continue to increase, and the overall LoS at key intersections in the study area would deteriorate considerably.

The opening of WestConnex would drive a substantial change to travel patterns in the area by shifting traffic from the M1, M5, Airport Drive, Southern Cross Drive and Canal Road towards the area surrounding St Peters interchange. For access to Sydney Airport and Port Botany, traffic would exit St Peters interchange and use the existing congested road network through Mascot, increasing pressure on Gardeners Road, Campbell Road, Botany Road, Bourke Street/Bourke Road and General Holmes Drive to Foreshore Drive.

The total traffic volumes across the measured screenlines for the north–south corridors in the study area would substantially increase by 2036. Overall, these corridors would collectively carry an additional 78,000 vehicles per day (two-way), representing around 13 per cent growth.

Without the project, these increases in traffic volumes and changes to travel patterns would result in substantial increases to travel times for general traffic and bus travel. The results indicate that the road network would not be able to accommodate the forecast peak hour traffic growth for AM and PM peak hours in 2026 and 2036 without the project. A snapshot of these results are summarised below:

- Average general traffic speeds across the network are predicted to decrease by 48 per cent and 43 per cent between 2018 and 2036 in the AM and PM peak respectively
- By 2026 the average intersection delay in the AM peak is predicted to more than double compared to the existing conditions. While in the PM peak, average intersection delay is predicted to more than triple compared to the existing conditions. This performance continues to degrade to 2036
- In line with the predicted deterioration in general network conditions, most bus routes are expected to experience an increase in travel time during the AM and PM peak hours of more than double the existing travel times. These increased travel times would reduce reliability and attractiveness of bus services.

In the future, no major changes to on-street parking provisions are expected. However, access to businesses could become less convenient and less reliable as a consequence of the forecast decrease in network performance and related increase in travel times across the road network.

6.1.1 Traffic volumes and patterns

The forecast traffic volume changes between the existing conditions and the future 2026 and 2036 conditions without the project are discussed in this section.

The traffic volume changes between 2016 and 2026 are diagrammatically shown on Figure 6-1 and the traffic volume changes between 2016 and 2036 are diagrammatically shown in Figure 6-2.

The green areas represent roads that are expected to carry less traffic in the future and the red areas represent roads that are expected to carry more traffic in the future. The thickness of the band indicates the magnitude of the change in volume.

The following discussion of forecast traffic volumes changes refers to average weekday traffic (AWT), unless otherwise mentioned.

6.1.1.1 General traffic

The green areas on Figure 6-1 and Figure 6-2 highlight a forecast reduction in traffic volumes in 2026 and 2036 primarily on the M1, M5, Southern Cross Drive and Canal Road. The traffic volume reduction on these roads is largely due to additional capacity introduced in the network by WestConnex.

Conversely, the red areas on Figure 6-1 highlight increased traffic volumes on several roads throughout the study area. Substantial traffic volume increases are expected along Gardeners Road, Botany Road and General Holmes Drive, as these roads form the primary route linking WestConnex (at St Peters interchange) to Sydney Airport and Port Botany, noting that WestConnex would attract high traffic volumes to the area.

Sydney Airport's traffic generation is expected to increase from around 110,000 vehicles per day to 140,000 vehicles per day in 2026, with further increases by 2036. This would result in increased traffic volumes along Robey Street, Airport Drive and the internal road network, as highlighted on Figure 6-1 and Figure 6-2.

Traffic volume increases are also anticipated on the local road network particularly around the Mascot Station precinct in 2026 and 2036, including Coward Street, Kent Road and Bourke Street/Bourke Road. These traffic increases would primarily be associated with the introduction of new infrastructure, as well as forecast population growth in Mascot, Tempe and St Peters, as noted in section 4.2.

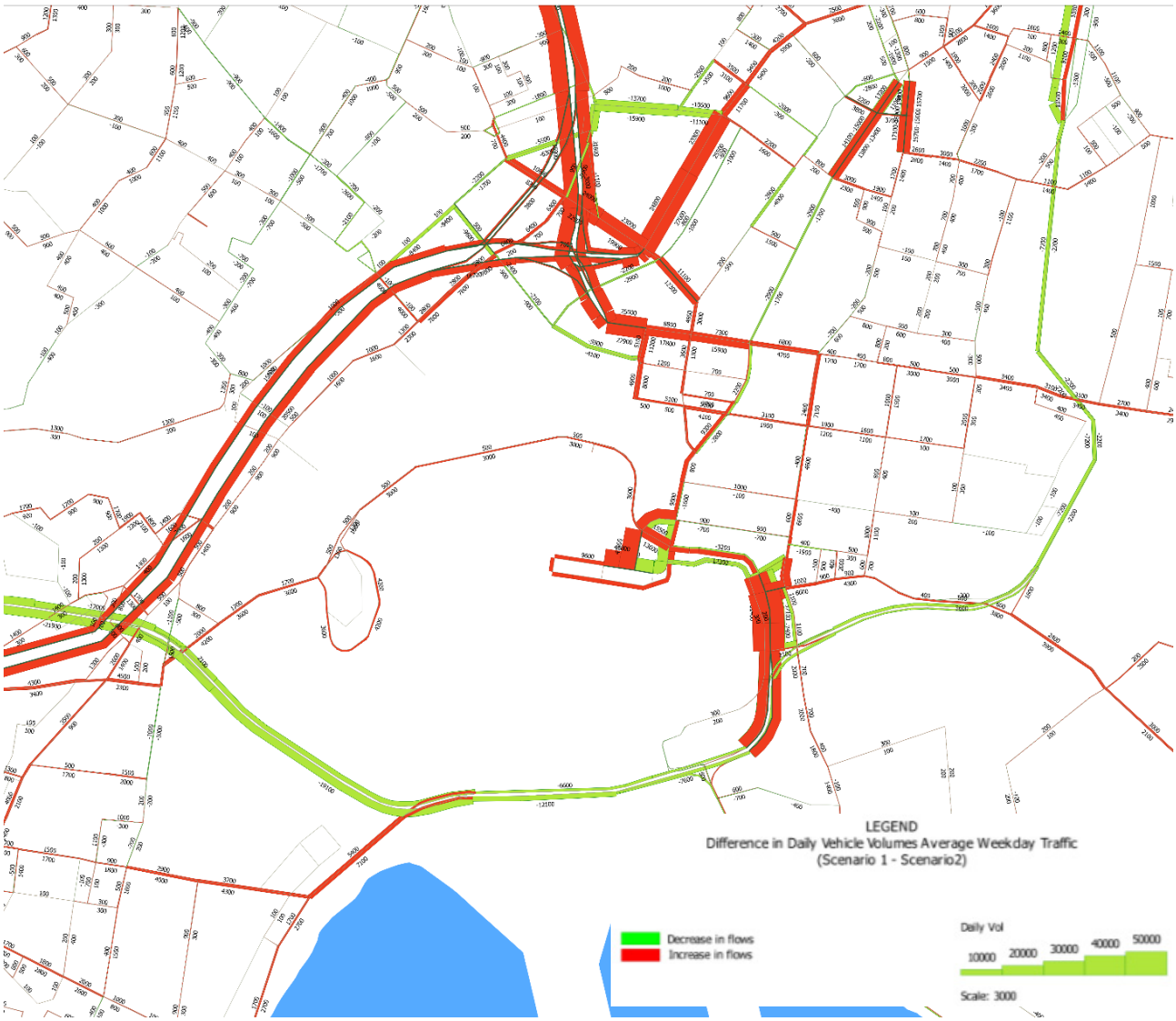


Figure 6-1 Change in traffic volumes between 2016 and 2026, without the project

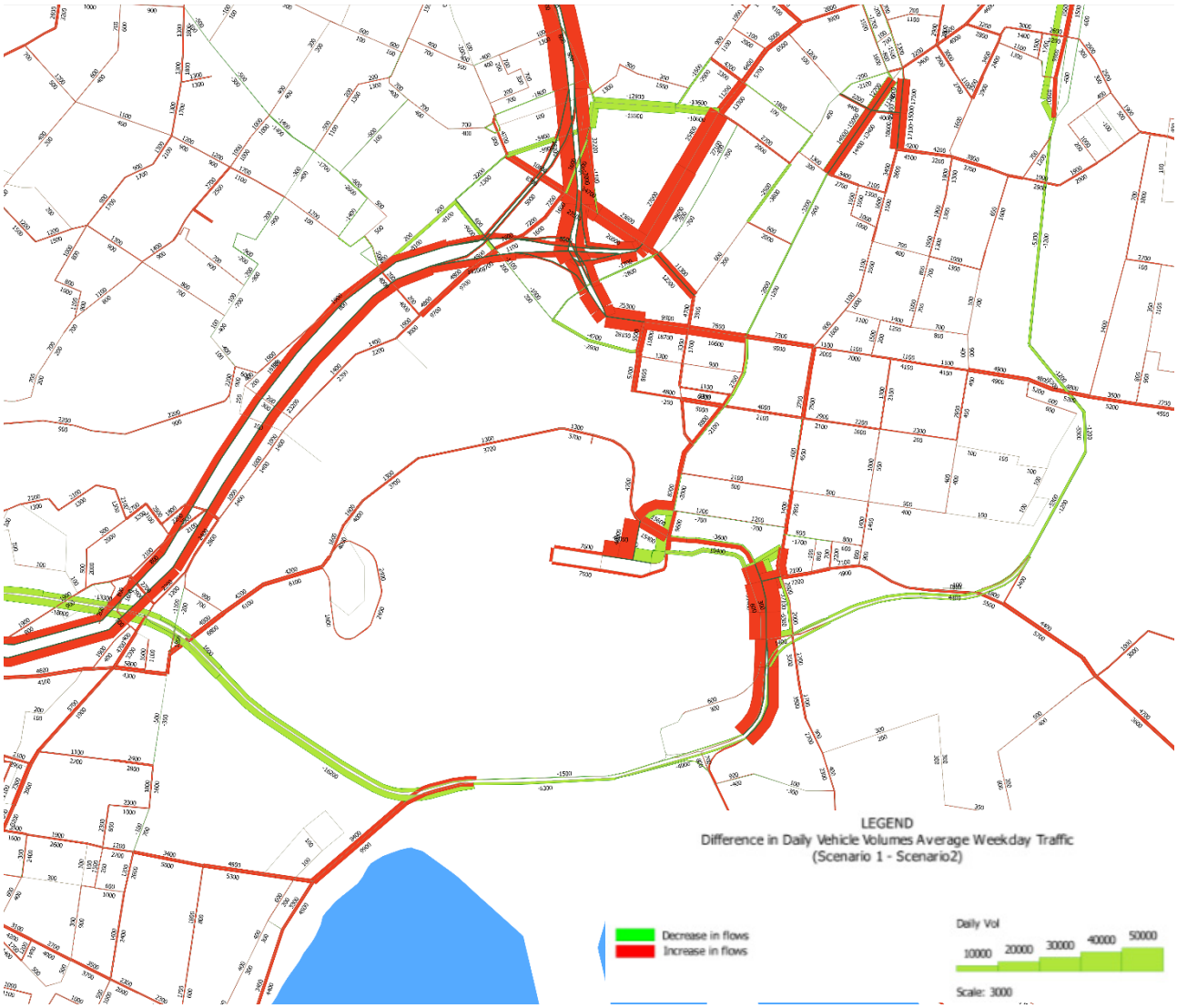


Figure 6-2 Change in traffic volumes between 2016 and 2036, without the project

6.1.1.2 On road freight

Changes to heavy vehicle travel patterns in 2026 and 2036 are forecast to follow a similar pattern to general traffic. That is, heavy vehicle volumes are forecast to decrease on the M1, M5 and Southern Cross Drive. However, in 2036, heavy vehicle volumes on these roads would increase from their current volumes.

WestConnex is forecast to carry high volumes of heavy vehicles, also leading to increased heavy vehicle volumes along Gardeners Road, Botany Road and Foreshore Road in 2026 and 2036. These changes in 2026 are included in Figure 6-3.

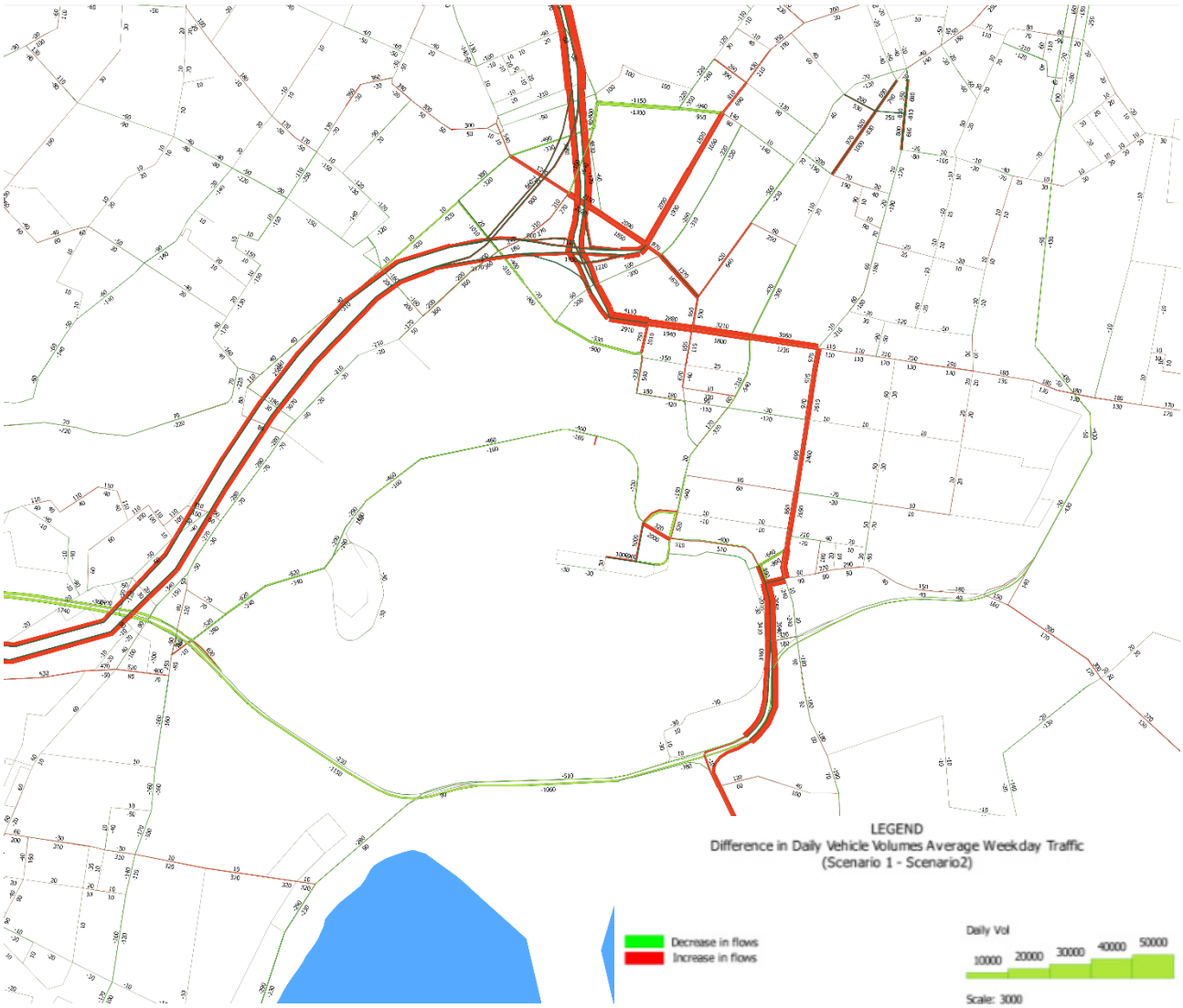


Figure 6-3 Change in heavy vehicle volumes between 2016 and 2026, without the project

6.1.2 Travel demand and traffic shifts

Traffic patterns including forecast growth and how traffic may shift between alternative routes or corridors can be identified by comparing the proportion of total traffic volumes that cross a line at specific points for various scenarios (known as a screenline assessment), as discussed in section 3.3.3.

Three screenlines were analysed which intersect with key north–south corridors which either provide access to/from Sydney Airport, are located within the study area or contain corridors that would be parallel to the project. The screenlines and the corridors that they intersect with are shown in Figure 6-4.

For each of the screenlines, the directional and two-way traffic volumes on each key corridor, its proportion (per cent) of the total screenline traffic and the total traffic volumes across the screenline have been assessed for the existing conditions, the future 2026 conditions without the project and the 2036 conditions without the project.

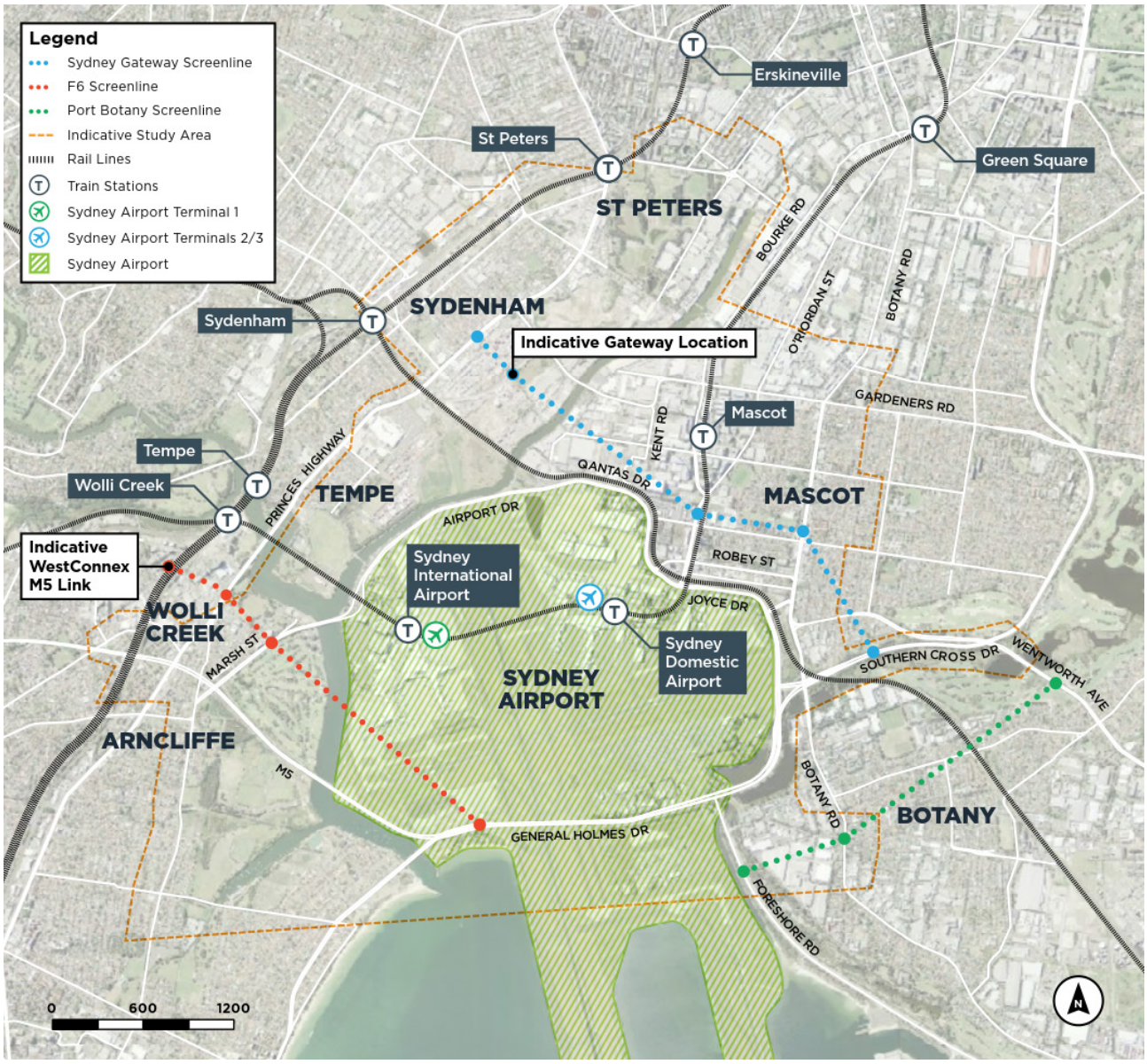


Figure 6-4 Screenline locations

6.1.2.1 Sydney Gateway screenline

Table 6-1 and Figure 6-5 depict the daily traffic volumes and proportion at key corridors crossing the Sydney Gateway screenline, which includes routes that would run parallel to the project to the north of the study area.

Table 6-1 Daily traffic volumes at points along the Sydney Gateway screenline

Location	Existing		2026 'without project'		2036 'without project'		Percentage change 2016–2036
	Vehicles	% total	Vehicles	% total	Vehicles	% total	
Princes Highway	26,800	12%	33,800	14%	35,500	14%	32%
Sydney Gateway	–	–	–	–	–	–	–
O'Riordan Street	52,000	22%	63,100	26%	64,000	26%	23%
Botany Road	32,400	14%	36,600	15%	36,300	15%	12%
Southern Cross Drive	120,000	52%	109,100	45%	110,100	45%	-8%
Total	**231,200**		**242,600**		**245,900**		**6%**

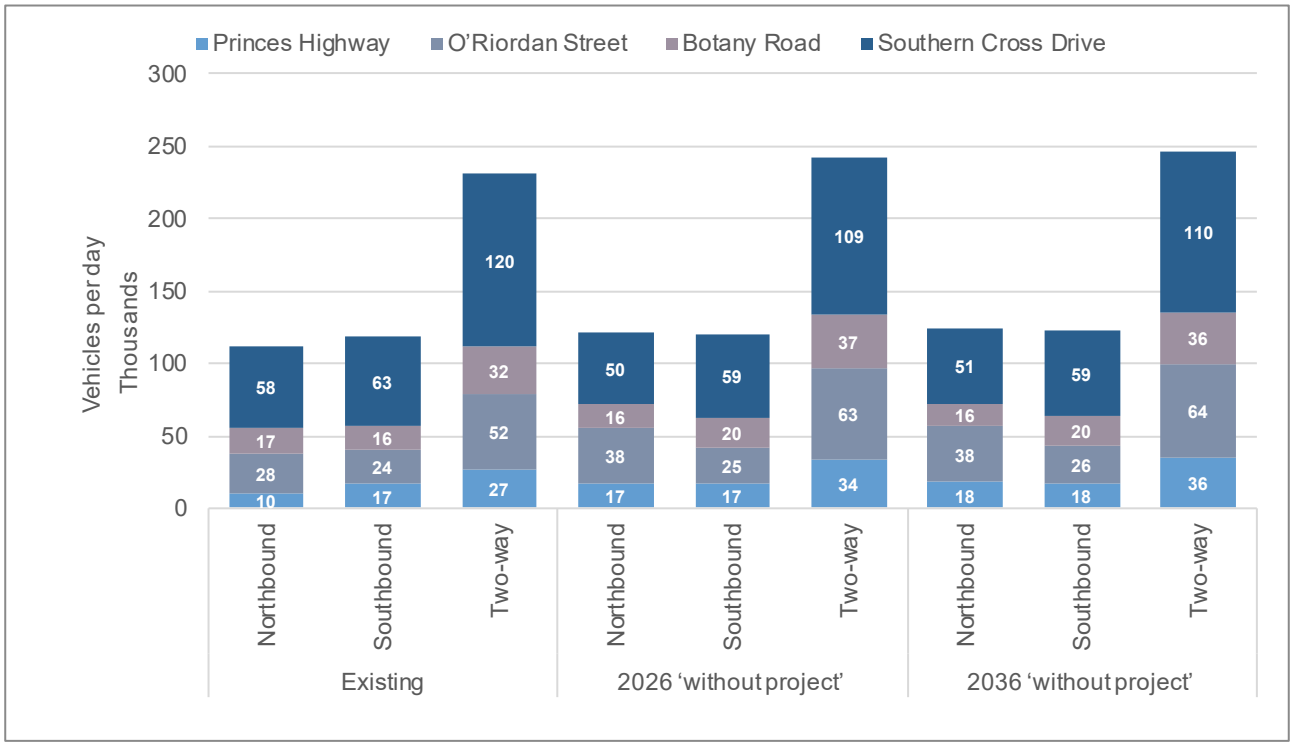


Figure 6-5 Proportion of traffic volumes at points along Sydney Gateway screenline

The total traffic volumes along the Sydney Gateway screenline are forecast to increase by approximately 14,700 vehicles per day (six per cent) to 2036. Most of this growth would occur by 2026, accounting for an increase by approximately 11,400 vehicles per day (five per cent).

As shown in Figure 6-5, higher traffic volume increases are expected on Princes Highway and O'Riordan Street in the northbound direction and Botany Road in the southbound direction.

Southern Cross Drive traffic volumes would decrease by around 10,000 vehicles per day (two-way).

The proportion of north–south traffic on each of the corridors would be similar to existing conditions, albeit with some traffic predicted to shift away from Southern Cross Drive instead using O'Riordan Street and Princes Highway in the northbound direction or Botany Road in the southbound. This is likely a result of traffic using these corridors between WestConnex at St Peters interchange and Sydney Airport.

6.1.2.2 F6 screenline

Table 6-2 and Figure 6-6 depict the daily traffic volumes and proportion at key corridors crossing the F6 screenline, which includes north–south corridors to the south of the study area.

Table 6-2 Daily traffic volumes at points along the F6 screenline

Location	Existing		2026 'without project'		2036 'without project'		Percentage change 2016-2036
	Vehicles	% total	Vehicles	% total	Vehicles	% total	
M4-M5 Link	–	–	36,300	11%	41,300	12%	–
Princes Highway	74,600	25%	75,800	23%	77,000	22%	3%
Marsh Street	55,800	19%	61,100	19%	66,000	19%	18%
General Holmes Drive	168,700	56%	150,000	46%	160,800	47%	-5%
Total	**299,100**		**323,200**		**345,100**		**15%**

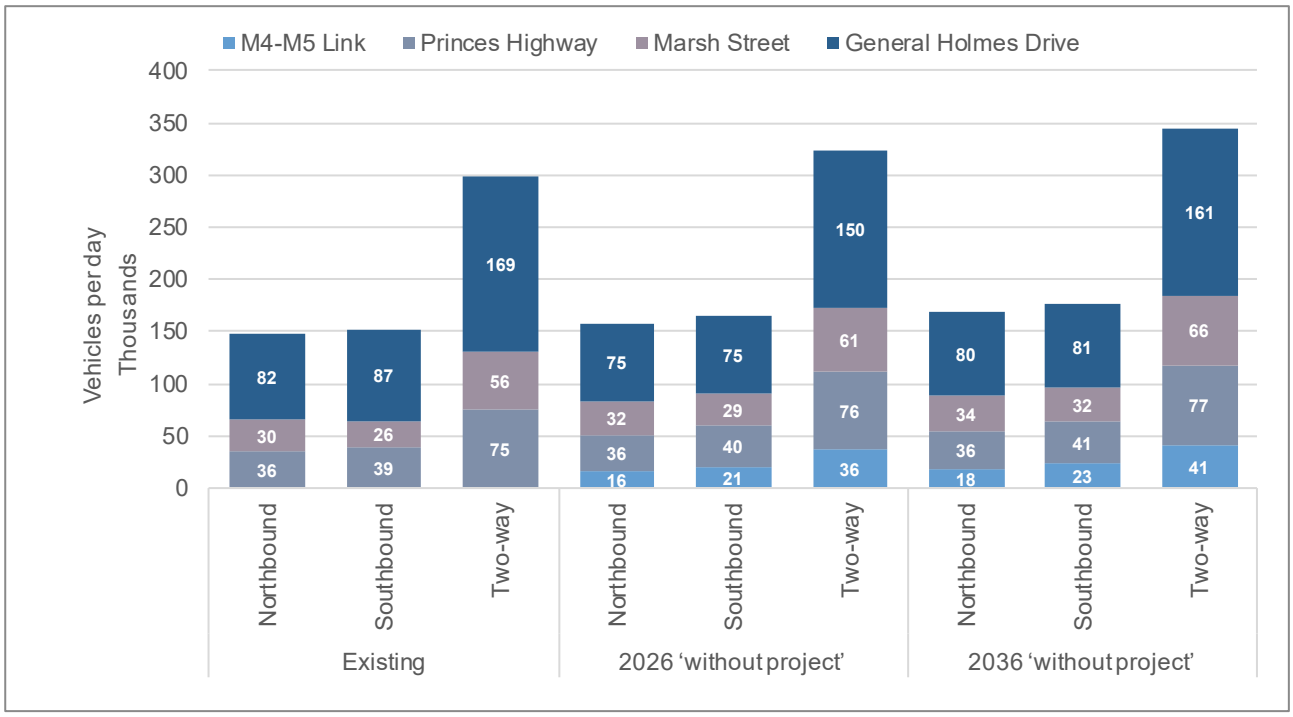


Figure 6-6 Proportion of traffic volumes at points along F6 screenline

The total traffic volumes along the F6 screenline are forecast to increase by around 46,000 vehicles per day (15 per cent) to 2036. At least half of this growth is to occur by 2026, accounting for approximately 24,100 (8 per cent) growth from the existing traffic volumes.

Substantial traffic volume increases are expected on Marsh Street in both directions. Conversely, traffic volumes on General Holmes Drive would decrease. This is associated with vehicles transferring from General Holmes Drive to WestConnex.

6.1.2.3 Port Botany screenline

Table 6-3 and Figure 6-7 below depict the daily traffic volumes and proportion at key corridors crossing the Port Botany screenline, which includes routes to the east of the study area.

Table 6-3 Daily traffic volumes at points along the Port Botany screenline

Location	Existing		2026 'without project'		2036 'without project'		Percentage change 2016-2036
	Volume	% total	Volume	% total	Volume	% total	
Foreshore Road	41,100	44%	39,800	40%	45,200	41%	10%
Botany Road	15,200	16%	16,900	17%	18,700	17%	23%
Wentworth Avenue	37,100	40%	43,300	43%	47,100	42%	27%
Total	**93,400**		**100,000**		**111,000**		**19%**

Figure 6-7 Proportion of traffic volumes at points along Port Botany screenline

The total traffic volumes along the Port Botany screenline are forecast to increase by around 17,600 vehicles per day (19 per cent) in year 2036.

Substantial traffic volume increases are expected on all of the north–south routes. However, some traffic would transfer from Foreshore Road to Wentworth Avenue in the northbound direction, which is likely attributed to Wentworth Avenue providing a more convenient access to WestConnex at St Peters interchange.

6.1.2.4 Overall

The total traffic volumes across the measured screenlines for the north–south corridors in the study area would substantially increase by 2036. Overall, these corridors would collectively carry an additional 78,000 vehicles per day (two-way), representing around 13 per cent growth.

Over the 20-year period, this represents a compound annual growth rate or 0.6 per cent. From 2002 to 2016, the historical compound annual growth rate on the Princes Highway was around 0.6 per cent. Other roads in the area had compound annual growth rates of between −0.4 per cent and 1.7 per cent.

6.1.3 Overall network performance statistics

Table 6-4 and Table 6-5 summarise the forecast road network performance statistics for the existing conditions, 2026 and 2036 for the AM and PM peak hours respectively.

In the AM, total network traffic demand would increase by around 19 per cent to 2026, with an additional increase of eight per cent predicted to 2036. This growth in demand is primarily due to forecast changes in background traffic and employment distribution and would cause a substantial worsening in network performance based on the following:

- The average vehicle speeds would decrease substantially from 23 km/h to less than 17 km/h in 2026 and around 12 km/h in 2036
- The average vehicle trip time through the network would increase from nine minutes to 12 minutes in 2026 and nearly 15 minutes in 2036
- The number of vehicles that would not be able to access the network due to upstream traffic congestion (total unreleased trips) would increase from around 300 vehicles to more than 9,000 vehicles in 2026 and nearly 25,000 vehicles in 2036.

In the PM, total network traffic demand would increase by around 22 per cent to 2026, with an additional increase of five per cent predicted to 2036 and would cause a substantial worsening in network performance based on the following:

- The average vehicle speeds would decrease substantially from around 26 km/h to around 16 km/h in 2026 and around 15 km/h in 2036
- The average vehicle trip time through the network would increase from around 8 minutes to 12 minutes in 2026 and nearly 13 minutes in 2036
- The number of vehicles that would not be able to access the network due to upstream traffic congestion (total unreleased trips) would increase from around 1,340 vehicles to more than 13,450 vehicles in 2026 and nearly 18,180 vehicles in 2036.

These performance statistics indicate that the road network would not able to accommodate the forecast peak hour traffic growth for AM and PM peak hours in 2026 and 2036 without the project. The network would perform worse in the AM peak.

Table 6-4 Network performance 2026 and 2036 'without the project' – AM peak

Network measure	Existing	2026 'without project'	Change	2036 'without project'	Change
Network statistics for all vehicles					
Total traffic demand (vehicles)	83,231	98,760	19%	106,345	8%
Total vehicle kilometres travelled through network (km)	285,165	289,826	2%	237,091	−18%
Total vehicle travel time through the network (hours)	12,361	17,890	45%	19,810	11%
Total vehicles entering the network	82,927	89,459	8%	81,534	−9%
Total number of stops	156,882	226,189	44%	240,240	6%
Average vehicle statistics					
Average vehicle trip length through the network (km)	3.4	3.2	−6%	2.9	−9%
Average vehicle trip time through the network (min)	8.9	12	35%	14.6	22%
Average number of stops per trip	1.9	2.5	32%	2.9	18%
Average trip speed (km/h)	23.1	16.2	−30%	12.0	−26%
Unreleased traffic					
Total unreleased trips	304	9,301	–	24,811	–
Per cent of demand unreleased	<1%	9%	–	23%	–

Table 6-5 Network performance 2026 and 2036 'without the project' – PM peak

Network measure	Existing	2026 'without project'	Change	2036 'without project'	Change
Network statistics for all vehicles					
Total traffic demand (vehicles)	82,857	100,760	22%	106,250	5%
Total vehicle kilometres travelled through network (km)	289,833	296,073	2%	288,172	−3%
Total vehicle travel time through the network (hours)	10,970	17,946	64%	19,116	7%
Total vehicles entering the network	81,510	87,303	7%	88,072	1%
Total number of stops	136,649	210,614	54%	219,646	4%
Average vehicle statistics					
Average vehicle trip length through the network (km)	3.6	3.4	-6%	3.3	−4%
Average vehicle trip time through the network (min)	8.1	12.3	52%	13.0	6%
Average number of stops per trip	1.7	2.4	42%	2.5	3%
Average trip speed (km/h)	26.4	16.5	−38%	15.1	−9%
Unreleased traffic					
Total unreleased trips	1346	13,457	–	18178	-
Per cent of demand unreleased	2%	13%	–	17%	–

6.1.4 Intersection performance

This section presents a summary of the anticipated intersection performance at key intersections during the AM and PM peaks. Table 6-6 and Table 6-7 compare the intersection performance for the existing conditions and the future 2026 and 2036 conditions 'without the project'.

The key intersections were identified as important intersections within the study area and those most likely to change following completion of the project, as agreed with Roads and Maritime.

Table 6-6 Intersection performance 2026 and 2036 'without the project' – AM peak

Intersection	Existing AM		2026 AM 'without project'		2036 AM 'without project'	
	Average delay (seconds)	Level of Service	Average delay (seconds)	Level of Service	Average delay (seconds)	Level of Service
West Botany Street/Marsh Street	51	D	79	F	88	F
Marsh Street/M5	43	D	93	F	155	F
General Holmes Drive/Mill Pond Drive	100	F	143	F	319	F
Botany Road/Mill Pond Drive	101	F	90	F	324	F
Joyce Drive/General Holmes Drive	152	F	76	F	205	F
Botany Road/General Holmes Drive	90	F	77	F	160	F
Robey Street/O'Riordan Street	56	D	100	F	165	F
Joyce Drive/O'Riordan Street	130	F	200	F	267	F
Seventh Street/Qantas Drive	108	F	241	F	311	F
King Street/O'Riordan Street	69	E	190	F	295	F
O'Riordan Street/Bourke Road	43	D	121	F	170	F
Bourke Street/Coward Street	106	F	349	F	554	F
Coward Street/O'Riordan Street	78	F	216	F	347	F
Gardeners Road/Bourke Street	56	E	178	F	244	F
Kent Road/Ricketty Street	36	C	299	F	405	F
Botany Road/Gardeners Road	80	F	305	F	426	F
Kent Road/Coward Street	103	F	283	F	432	F
Canal Road/Burrows Road	58	E	76	F	186	F
Airport Drive/Link Road	6	A	14	A	62	E
O'Riordan Street/Gardeners Road	98	F	182	F	359	F
Kent Street/Gardeners Road (1)	-	-	161	F	171	F

(1) The intersection of Kent Street and Gardeners Road was not included as part of the existing conditions analysis.

Table 6-7 Intersection performance 2026 and 2036 'without the project' – PM peak

Intersection	Existing PM		2026 PM 'without project'		2036 PM 'without project'	
	Average delay (seconds)	Level of Service	Average delay (seconds)	Level of Service	Average delay (seconds)	Level of Service
West Botany Street/Marsh Street	26	B	53	D	41	C
Marsh Street/M5	68	E	51	D	53	D
General Holmes Drive/Mill Pond Drive	39	C	64	E	100	F
Botany Road/Mill Pond Drive	103	F	70	E	117	F
Joyce Drive/General Holmes Drive	41	C	85	F	149	F
Botany Road/General Holmes Drive	49	D	117	F	128	F
Robey Street/O'Riordan Street	26	B	163	F	182	F
Joyce Drive/O'Riordan Street	52	D	219	F	291	F
Seventh Street/Qantas Drive	64	E	114	F	178	F
King Street/O'Riordan Street	33	C	221	F	238	F
O'Riordan Street/Bourke Road	31	C	168	F	184	F
Bourke Street/Coward Street	58	E	324	F	335	F
Coward Street/O'Riordan Street	51	D	250	F	268	F
Gardeners Road/Bourke Street	43	D	125	F	113	F
Kent Road/Ricketty Street	41	C	91	F	233	F
Botany Road/Gardeners Road	65	E	527	F	550	F
Kent Road/Coward Street	59	E	177	F	200	F
Canal Road/Burrows Road	93	F	117	F	137	F
Airport Drive/Link Road	6	A	8	A	9	A
O'Riordan Street/Gardeners Road	119	F	285	F	343	F
Kent Street/Gardeners Road (1)	-		81	F	174	F

(1) The intersection of Kent Street and Gardeners Road was not included as part of the existing conditions analysis.

In the AM peak, all intersections except for the intersection of Airport Drive and Link Road would operate at LoS F in 2026. The intersections within the network would have an average delay of around 165 seconds, more than double the existing average delay.

In 2036, the intersections within the network would have an average delay of around 270 seconds and the intersection of Airport Drive and Link Road would operate at LoS E.

In the PM peak, 76 per cent of the intersections would operate at LoS F in 2026 with an average delay of around 160 seconds. This is more than triple the existing average delay.

In 2036, 86 per cent of the network intersections would operate with LoS F with an average delay of around 193 seconds. The delay at most of the intersections would be more than one signal cycle.

Based on the above, the key intersections would perform considerably worse than they do now during the AM and PM peak hours in 2026 and 2036.

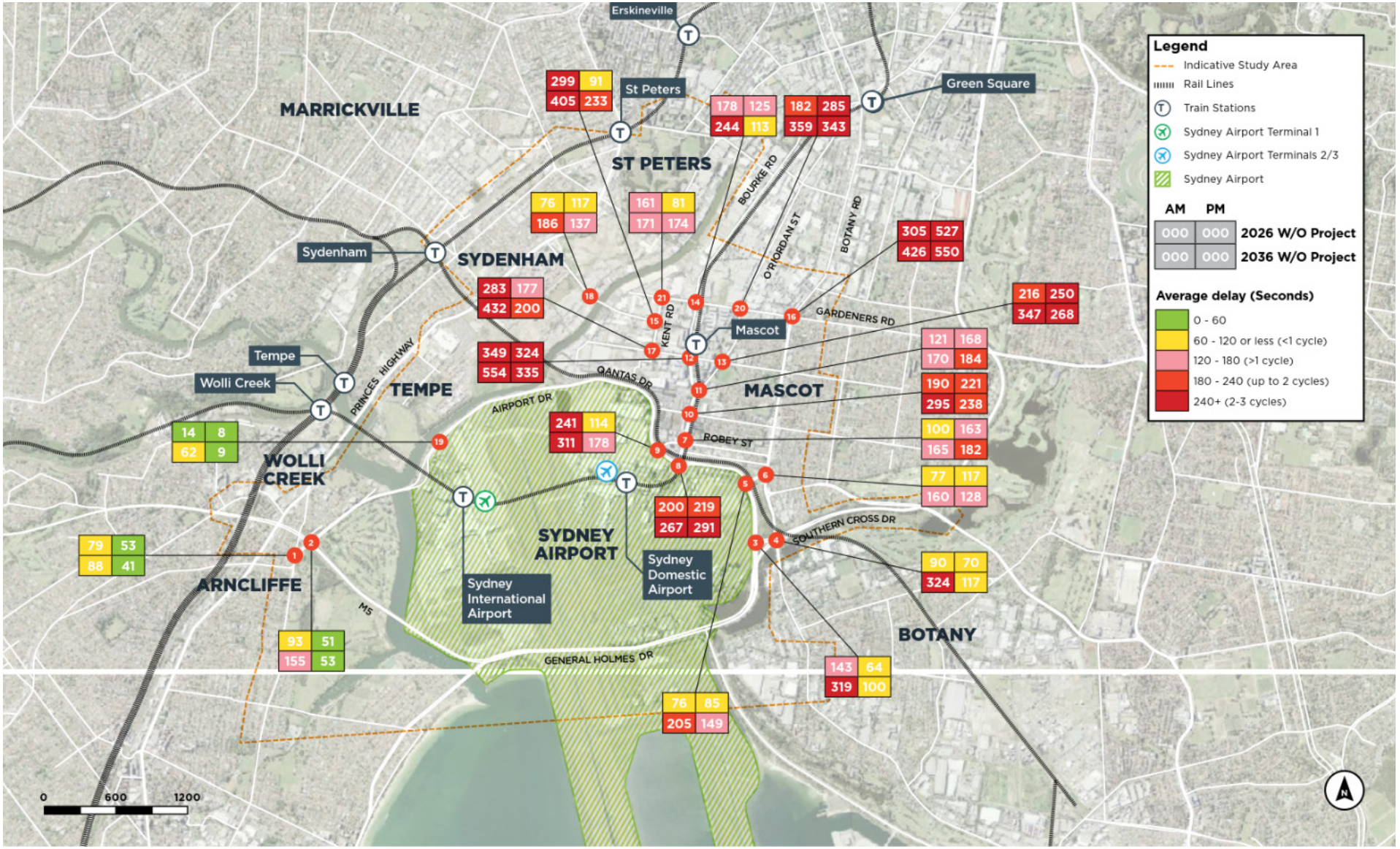


Figure 6-8 Average intersection delays for 2026 and 2036 'without project'

6.1.5 Travel times

The travel times currently experienced on key routes are compared to those forecast in 2026 and 2036 without the project, considering the population growth and other committed projects being completed in this time.

The selected travel time routes are identified in Table 6-8 and Figure 6-9. These routes have been selected as they provide a good coverage of the study area and are representative of the travel times through key origins and destinations as experienced by road users in the study area. The travel time routes were agreed with Roads and Maritime.

Table 6-8 Description of travel time routes

Route ID	Description	Direction
1	Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	North–south
2	Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	North–south
3	M5 East – Marsh Street to M1 at Southern Cross Drive	East–west
4	M5 East – Marsh Street to Botany Road (Via M1)	East–west
5	Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	East–west
6	Canal Road – Princes Highway to Botany Road/Gardeners Road	East–west
7	Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	North–south
8	Robey Street – Qantas Drive – Botany Road	East–west
9	O'Riordan Street – Joyce Drive to Gardeners Road	North–south
10	O'Riordan Street – Joyce Drive to Gardeners Road/Bourke Road/Bourke Street	North–south
11	Coward Street – Kent Road to Botany Road	East–west
12	Unwins Bridge Road – May Street/Princes Highway to Railway Road.	North–south

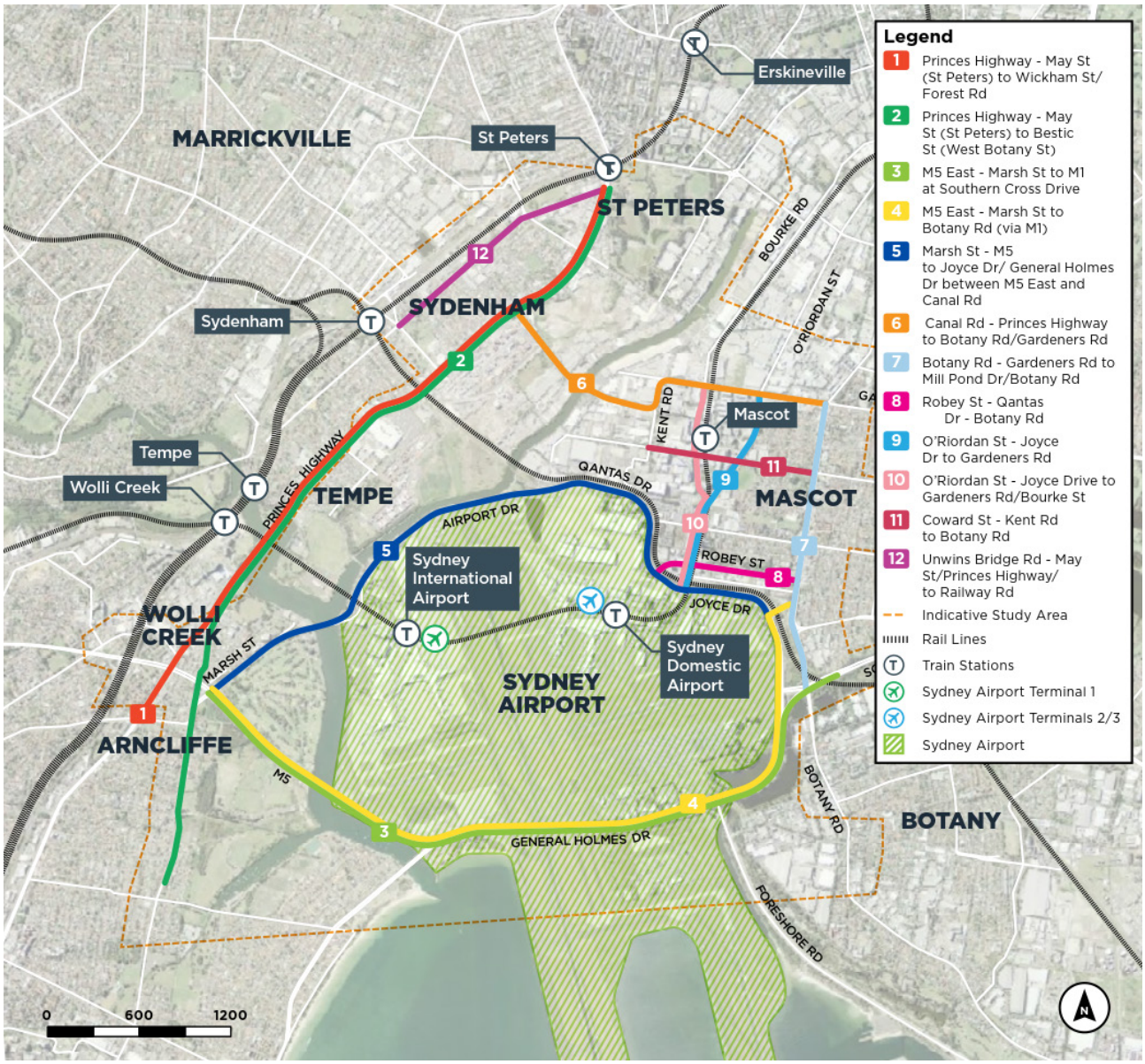


Figure 6-9 Selected routes for travel time analysis

6.1.5.1 AM peak

Figure 6-10 and Figure 6-11 depict the differences in the AM peak travel times for the north–south and east–west assessed routes respectively. The graphs include the travel time performance in each direction in comparison to existing conditions.

The peak hours for the AM peak was identified to be between 8am and 9am.

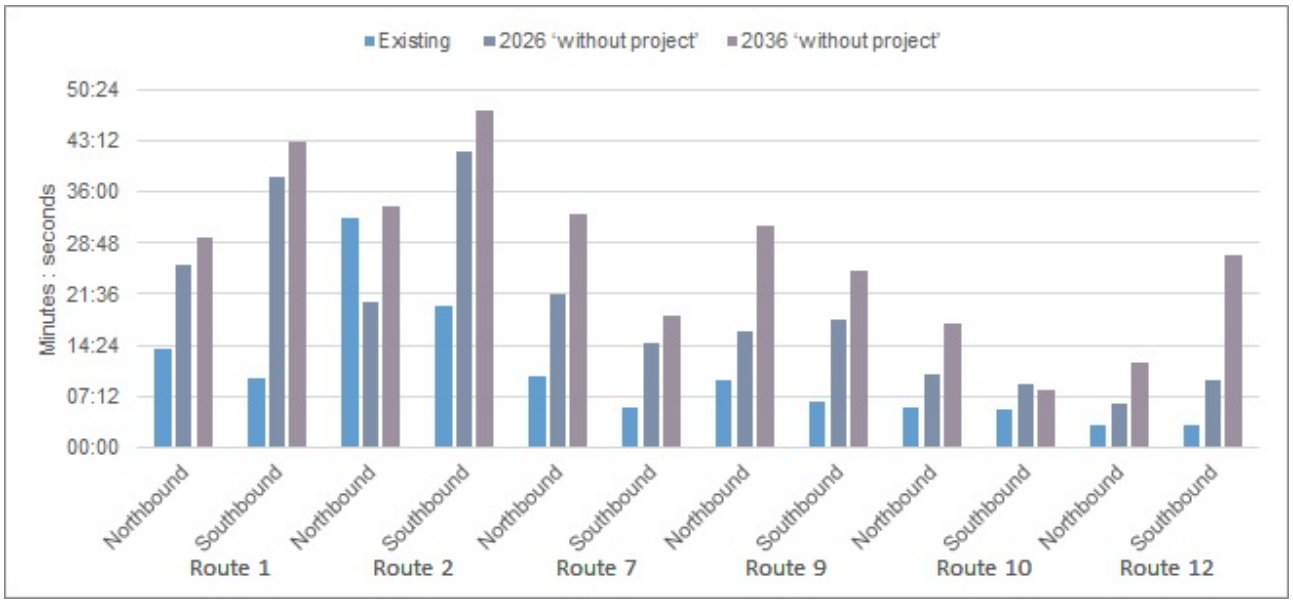


Figure 6-10 North–south routes average travel time comparison – AM peak

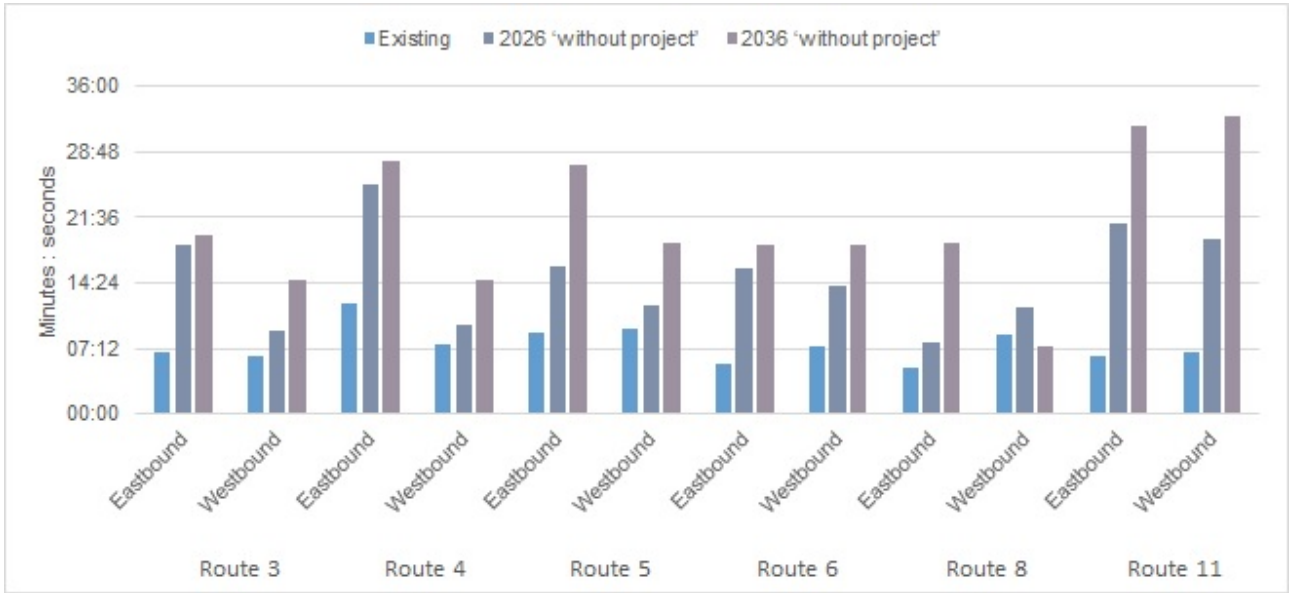


Figure 6-11 East–west routes average travel time comparison – AM peak

- In the AM peak, travel times would substantially increase on most of the travel routes that were analysed. In 2026, travel times would more than double on the following routes:
  - North–south routes towards the north–west of the study area (Princes Highway routes and Unwins Bridge Road, being routes 1, 2 and 12)
  - Canal Road/Ricketty Street/Gardeners Road (route 6)
  - O'Riordan Street/Bourke Street/Bourke Road (route 10), which passes through the centre of the Mascot Station precinct
- In 2036, travel times would further increase particularly on the:
  - East–west routes on M5 East (routes 3 and 4)
  - Canal Road/Ricketty Street/Gardeners Road and Unwins Bridge Road would continue to deteriorate (routes 6 and 12)
  - North–south routes east of the study area including Botany Road and O'Riordan Street (routes 7 and 9).

The highest increased travel time in 2026 is anticipated on the north–south route along Princes Highway (northbound) between May Street in St Peters to Bestic Street (route 2). The current travel time of approximately eight to nine minutes in the northbound direction would increase to approximately 47 minutes, more than four times higher than the existing conditions.

6.1.5.2 PM peak

Figure 6-12 and Figure 6-13 depict the differences in the PM peak travel times for the north–south and east–west assessed routes respectively. The graphs also include the travel time performance in each direction in comparison to existing conditions.

The peak hours for the PM peak was identified to be between 5pm and 6pm.

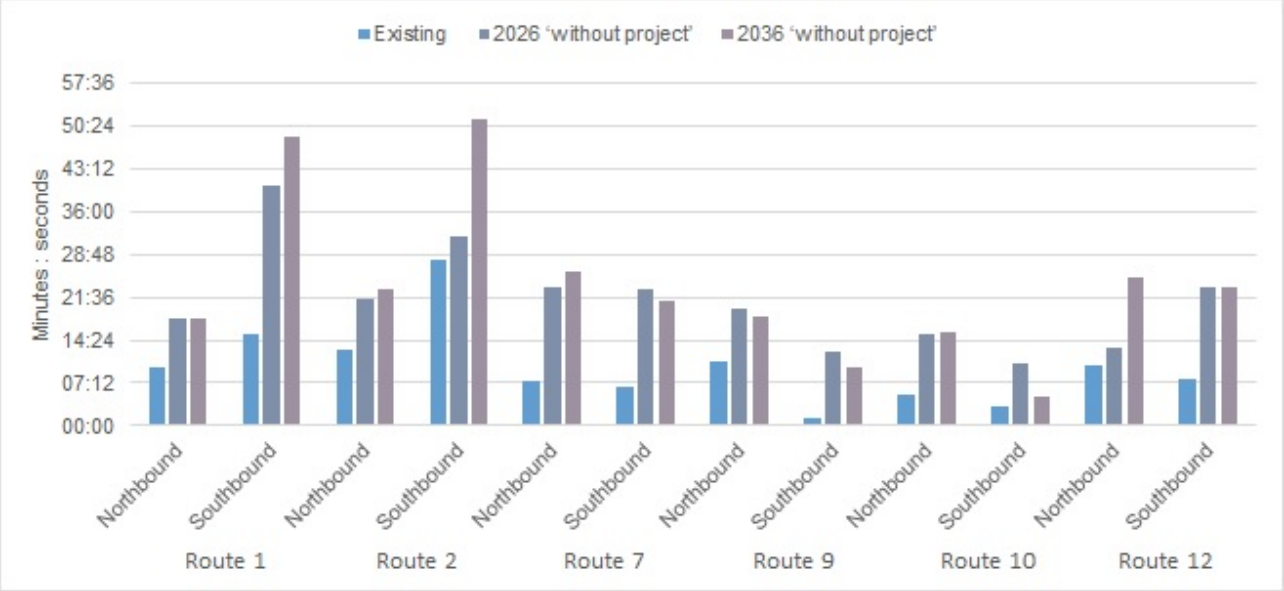


Figure 6-12 North–south routes average travel time comparison – PM peak

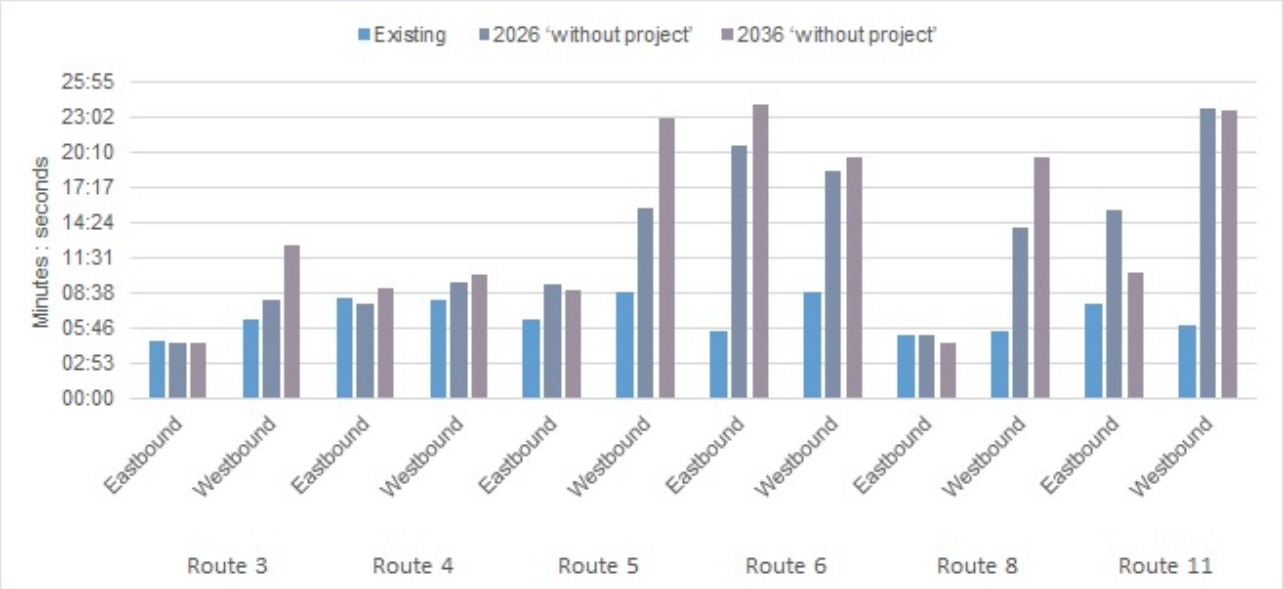


Figure 6-13 East–west routes average travel time comparison – PM peak

In the PM peak, travel times would substantially increase on most of the travel routes that were analysed. In 2026, travel times would more than double on the following routes:

- Canal Road/Ricketty Street/Gardeners Road (route 6)
- Robey Street between Qantas Drive to Botany Road (route 8)
- Coward Street between Kent Road to Botany Road (route 11)
- North-south routes towards the east of the study area along Botany Road and O'Riordan Street (routes 7 and 9).

Further travel time increases would be expected across the network in 2036.

The highest increase in travel time in 2026 is observed on the north–south route 9 along O'Riordan Street between Joyce Drive and the intersection of Gardeners Road and Bourke Street. The current travel time of one to two minutes in the southbound direction is forecast to increase to 19 minutes.

Overall, the travel time increases across the study area highlight the levels of congestion, leading to an unsatisfactory performance level across the road network.

6.2 Public transport

6.2.1 Planned network changes

There are no committed public transport changes that would affect the study area proposed in Future Transport 2056.

6.2.2 Bus travel times

A series of bus corridors have been assessed to understand the proposed impact on bus travel times in the future without the project. The assessed corridors and affected bus routes are listed in Table 6-9 and depicted in Figure 6-14.

Table 6-9 Description of bus travel time routes and associated bus services

ID	Corridor	Bus routes
1	Botany Road – Gardeners Road to Mill Pond Drive	M20, 309, 309X, 310
2	General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	303
3	Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	420, 420N, 400
4	Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Street and Gardeners Road)	418
5	O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Road/Bourke Street intersection (via Kent Road)	305
6	Coward Street – Bourke Street to Botany Road/Wentworth Avenue	307, 400, 420, 420N
7	Princes Highway – Sydney Park Road to Brodie Spark Drive	348, 422

Figure 6-14 Selected corridors for bus travel time analysis

Figure 6-15 and Figure 6-16 depict the differences in the AM and PM peak travel times for assessed routes. The graphs also include the travel time performance in each direction in comparison to the existing conditions.

Similar to the assessment for the general traffic routes, the peak hours were identified to be at 8–9am and 5–6pm for the respective AM and PM peaks.

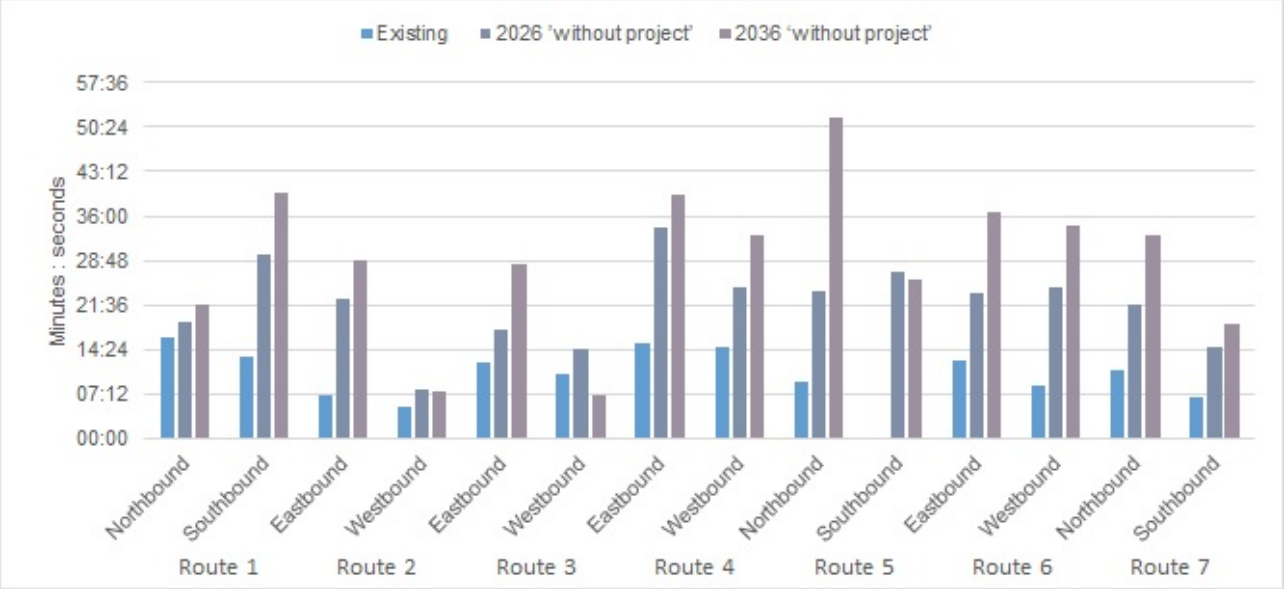


Figure 6-15 Assessed bus routes travel time comparison – AM peak

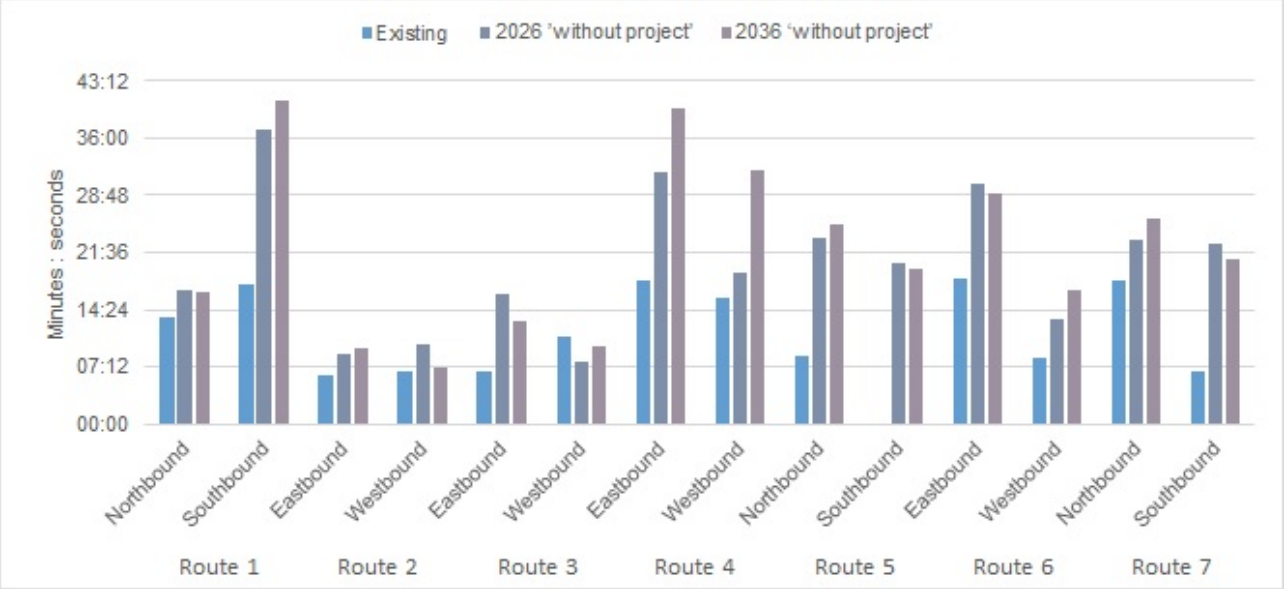


Figure 6-16 Assessed bus routes travel time comparison – PM peak

Most routes are expected to experience an increase in travel time during the AM and PM peak hours of more than double the existing travel times. These increased travel times would reduce reliability of bus services particularly the following bus services, which use the affected routes:

- M20, and 309, 309X, 310 using route 1, southbound along Botany Road (Gardeners Road to Mill Pond Drive)
- 420, 420N, and 400 using route 3 eastbound along Airport Drive (Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive)
- 418 using route 4 eastbound along Canal Road/Ricketty Street
- 305 along route 5, along O'Riordan Street/Qantas Drive to Gardeners Road/Bourke Street via Kent Road
- 307, 400, 420, and 420N using route 6, eastbound along Coward Street (Botany Road/Wentworth Avenue to Bourke Street)
- 348 and 422 using route 7 southbound along Sydney Park Road to Brodie Spark Drive.

Further increases in travel time are forecast in 2036.

6.3 Parking and access

Currently on-street parking is prohibited (no stopping or no parking) along the state and regional road network within the study area including Qantas Drive, Airport Drive, O'Riordan Street, Robey Street (west of O'Riordan Street), Seventh Street and Sir Reginald Ansett Drive. In the future, no major changes to the on-street parking provisions are expected.

Implementation of timed clearways and localised removal of on-street parking at approaches to intersections may occur over time to increase capacity in the road network and at some intersections. These considerations however would not occur without prior detailed investigations and consultation with the community by the relevant road authorities.

Access to businesses could become less convenient and reliable as a consequence of the increased forecast traffic volumes and reduced travel time reliability across the road network. With no known design changes, existing access arrangements for delivery and service vehicles are likely to be maintained.

6.4 Road safety

As noted in section 4.6, the main crash types that have occurred in the study area over the assessed period were rear-end, lane change and intersection related crashes involving vehicles travelling from adjacent approaches.

Due to the forecast increase to traffic density in the road network, drivers may not be able to move as freely in the traffic stream which may exacerbate the two most common types of crashes currently recorded in the study area (rear-end and lane change). However, an increase in traffic density would also reduce the overall travel speed, which may consequently result in less severe crashes.

Increased traffic volumes and constraints in the road network are not the only factors which contribute to road safety issues. Road safety assessments at known crash clusters in the road network would need to be assessed in detail and the appropriate mitigation measures would need to be implemented to reduce the road safety risks at the location. Traffic management and precinct planning which considers road safety initiatives would also assist in reducing road trauma.

7. Operational impact assessment with the project

7.1 Overview

The analysis of the future road network with the project indicates that the total traffic volumes within the study area would marginally increase with the introduction of a new high capacity and continuous connection between the Sydney motorway network via St Peters interchange and the Sydney Airport terminals. Notwithstanding this, the road network would operate with substantially less congestion and improved travel times than it would have without the project (section 6).

Around 84,800 and 87,800 vehicles per day would use the project in the respective 2026 and 2036 future years. Most of this demand would shift away from congested parallel corridors, particularly O'Riordan Street and Botany Road which would carry up to 30 per cent less traffic than they would have without the project.

The project would provide an alternative freight access route between Sydney's motorway network and Port Botany via Joyce Drive, General Holmes Drive and Foreshore Road. Therefore, the project would substantially reduce the number of heavy vehicles that would have otherwise used Gardeners Road, Botany Road and O'Riordan Street with Mascot.

During the weekday AM and PM periods, it is anticipated that more than 60 per cent of the project's traffic demand would have origins or destinations at Sydney Airport. Therefore, the project allows vehicles to bypass the surrounding road network, minimising unnecessary 'through' traffic from travelling through the Mascot Station precinct and adjacent areas. Further, motorists accessing Sydney Airport would benefit from the continuous motorway network with improved access to/from Sydney Airport, with improved travel times and reliability for most of their journey.

In 2026, travel time savings between St Peters interchange and Sydney Airport terminals of up to 23 minutes would be experienced, increasing to up to 30 minutes in 2036. Conversely, the existing route via Mascot would see travel time savings of up to 10 minutes in 2026 and 2036, benefiting the local communities. In addition, the project would alleviate most of the travel time increases more broadly across the study area that were forecast to occur in 2026 and 2036. The travel time benefits associated with the project would be more prevalent in the AM peak, with decreases of around 40 to 60 per cent forecast across most of the assessed routes.

Similarly, the project would lead to substantial bus travel times savings, including up to 30 per cent travel time reductions for the 420 and 400 which service Sydney Airport.

While most intersections within the Mascot area would continue to operate at LoS E or F during the AM and PM peak hours with and without the project in 2026 and 2036, the average delay at most intersections would substantially decrease as a result of the project, particularly at the intersections that provide access to Sydney Airport Terminals 2/3.

At some locations such as the intersection of Bourke Street and Coward Street which accommodates high pedestrian crossing activity, average delay decreases of more than 240 seconds (70%) are forecast in 2036. This has the potential to improve permeability for travel across these roads and improve amenity throughout the Mascot local area more generally. Improvements in amenity would make walking and cycling more attractive in these areas, while also improving road safety for vulnerable road users.

In addition to the above benefits, the project would:

- Maintain the same level of on-street parking within the study area
- Improve local area access, as a result of the substantially reduced average delay at key intersections, as well as reduced travel times through the study area
- Improve road safety and amenity on the local area's transport network due to reduced traffic, improved amenity and safer design outcomes.

7.2 The project

The project would form an integral missing link in Sydney's motorway network by providing a direct connection between St Peters interchange (and beyond) and Sydney Airport, as well as an indirect connection to Port Botany. Regional traffic with origins or destinations at Sydney Airport could use the project instead of the alternative local road network through Mascot. Therefore, the project would improve connections to Sydney Airport, while also improving urban amenity due to reduced traffic volumes in the local area.

The project is predicted to carry around 84,800 and 87,800 vehicles per day in the respective 2026 and 2036 future years. Of these, around 60 per cent would be generated by Sydney Airport as illustrated in Figure 7-1, including:

- 40% to/from Terminal 1
- 50% to/from Terminals 2/3
- 10% to/from other airport access roads.

Overall, around 50% of Sydney Airport's total future forecast traffic generation is forecast to use the project.

Up to 15 per cent of the projects daily traffic volumes would be generated by Port Botany and its surrounds.

Table 7-1 and Table 7-2 highlight the additional through, local and airport generated trips that can be accommodated across the network as a result of the additional network capacity that the project would provide. Overall, by 2036, an additional 60,000 vehicle trips per day could be accommodated across the network.

Table 7-1 2026 network daily traffic volumes

Vehicle Trip type	Existing (vehicles)	'Without project' (vehicles)	'With project' (vehicles)	Difference (vehicles)
Through	290,000	330,000	350,000	20,000
Local	190,000	240,000	240,000	0
Airport	110,000	130,000	160,000	30,000
Internal	40,000	50,000	50,000	0
Total	**630,000**	**750,000**	**800,000**	**50,000**

Table 7-2 2036 network daily traffic volumes

Vehicle Trip type	Existing (vehicles)	'Without project' (vehicles)	'With project' (vehicles)	Difference (vehicles)
Through	290,000	360,000	380,000	20,000
Local	190,000	260,000	270,000	10,000
Airport	110,000	130,000	160,000	30,000
Internal	40,000	50,000	50,000	0
Total	**630,000**	**800,000**	**860,000**	**60,000**

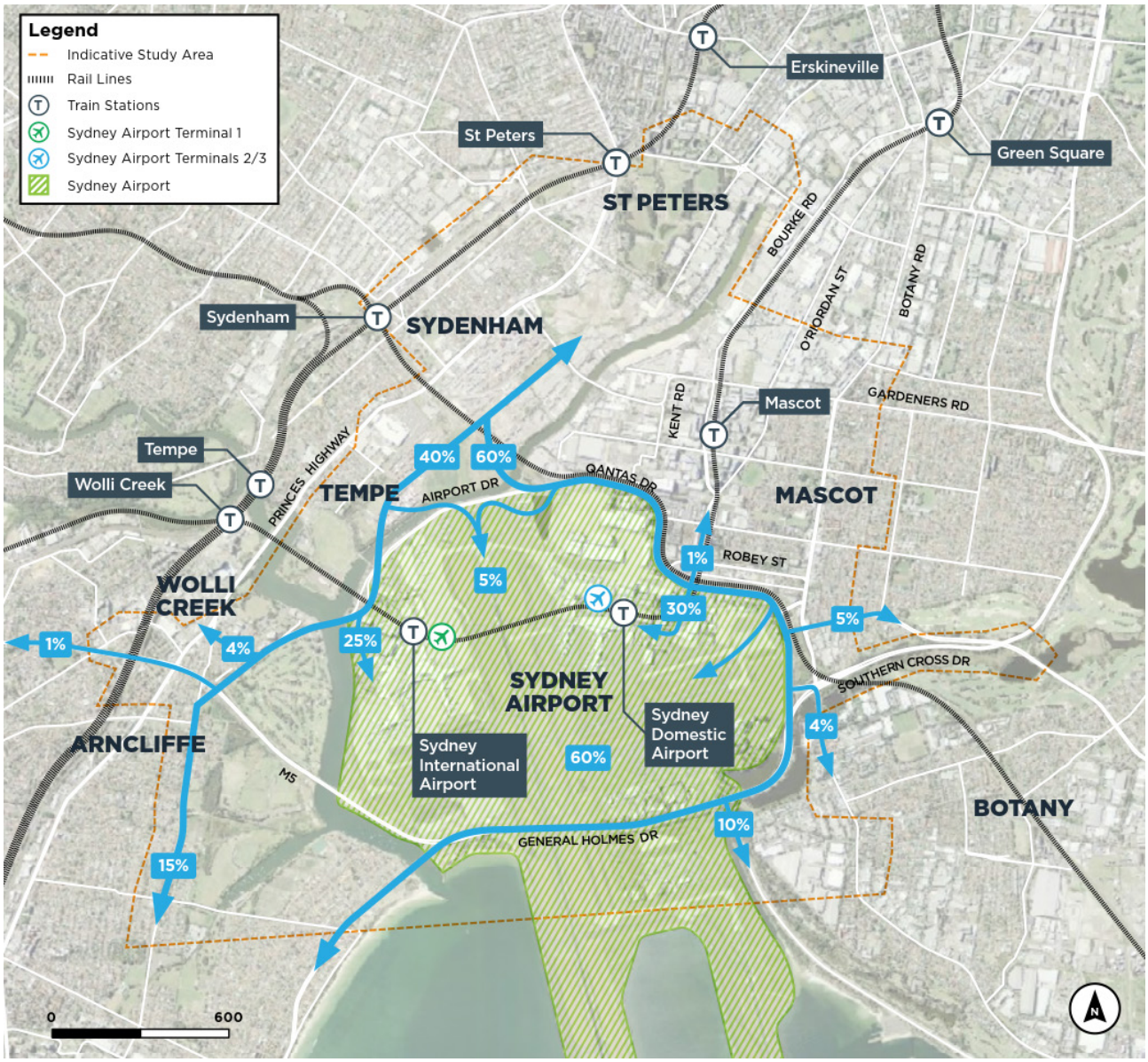


Figure 7-1 Proportional origins and destinations of project traffic

7.3 Operational impacts on the road network

This section summarises the forecast transport network operation and performance in 2026 and 2036 with the project. The future road network conditions are compared with the existing conditions to understand the impacts of the project on the road network.

With the exception of the project, all other infrastructure changes in 2026 and 2036 are consistent with those discussed in section 6 for the 'without project' analysis.

7.3.1 Traffic volumes and patterns

The forecast traffic volume changes between the future 2026 and 2036 conditions without the project and the future conditions with the project are discussed in this section.

The traffic volume changes between the forecast conditions with and without the project are diagrammatically shown in Figure 7-2 and Figure 7-3 for 2026 and 2036, respectively.

7.3.1.1 General traffic

The green areas in Figure 7-2 and Figure 7-3 indicate that the project would attract traffic away from local and state roads within the study area, resulting in lower traffic volumes on most roads throughout the study area when compared with what is otherwise predicted without the project in 2026 and 2036.

A higher proportion of traffic would use WestConnex and the project to access Sydney Airport, as demonstrated by the reduced traffic growth forecast on the M5, General Holmes Drive, Southern Cross Drive, O'Riordan Street and Botany Road.

The project would also reduce the traffic growth along local roads including in and around the Mascot Station precinct.

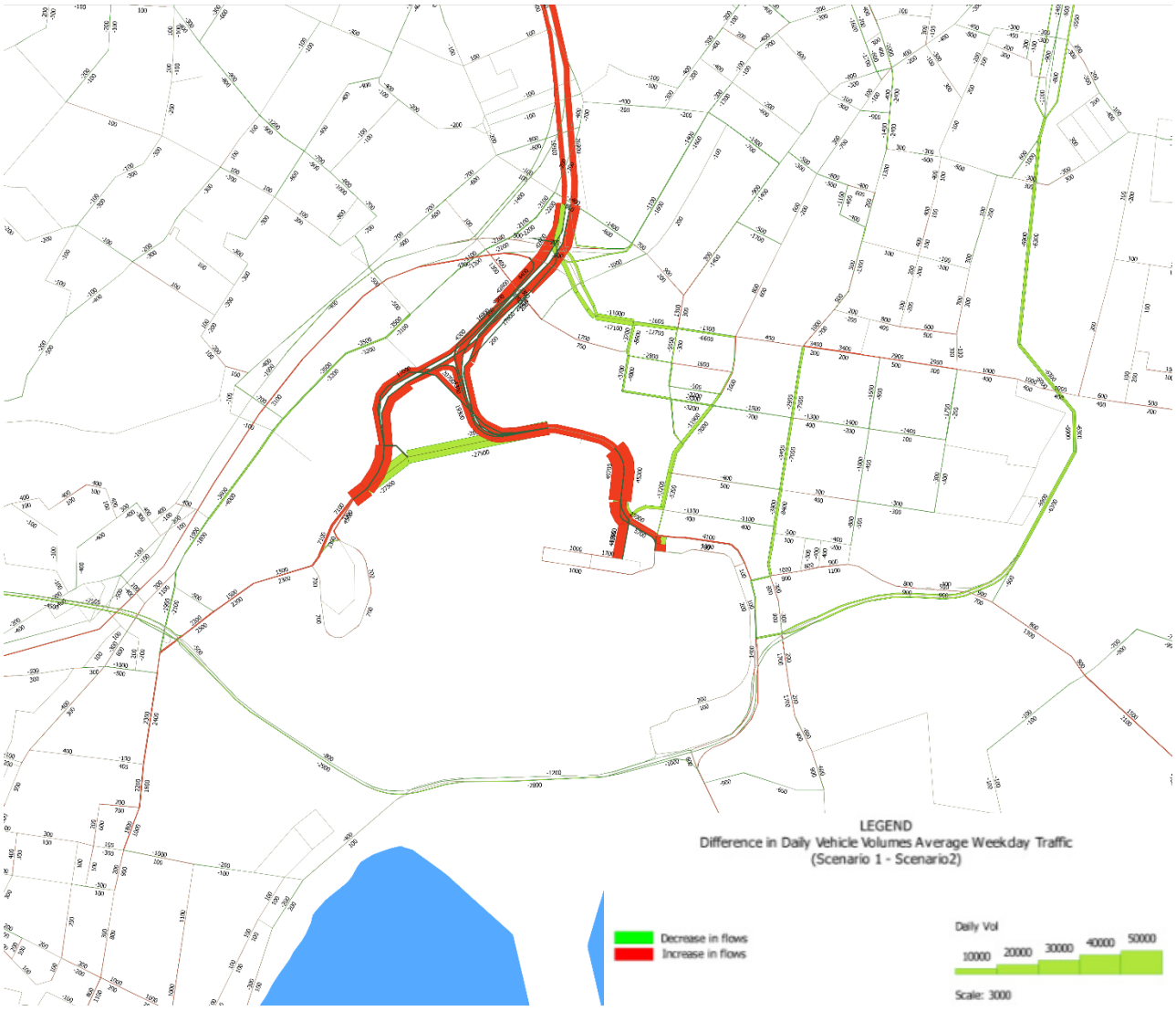


Figure 7-2 Change in traffic volumes in 2026 for the 'with project' and 'without project' scenarios

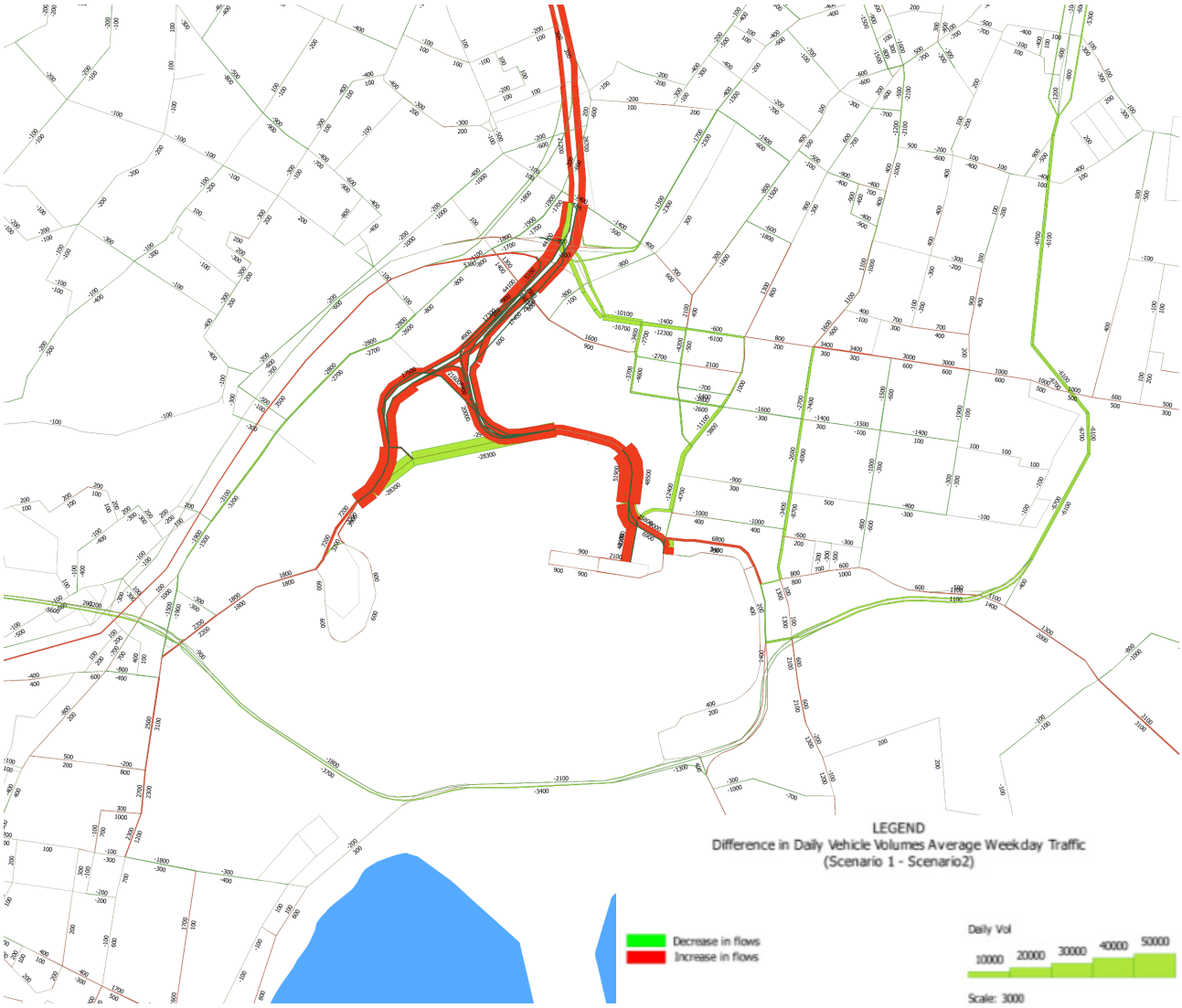


Figure 7-3 Change in traffic volumes in 2036 for the 'with project' and 'without project' scenarios

7.3.1.2 On-road freight

Similar to general traffic, the project provides an alternative route for heavy vehicles accessing the freight terminal and Port Botany. This alternative route would result in substantially fewer heavy vehicles using the existing road network, particularly, Gardeners Road, Botany Road and Qantas Drive, as shown in Figure 7-4.

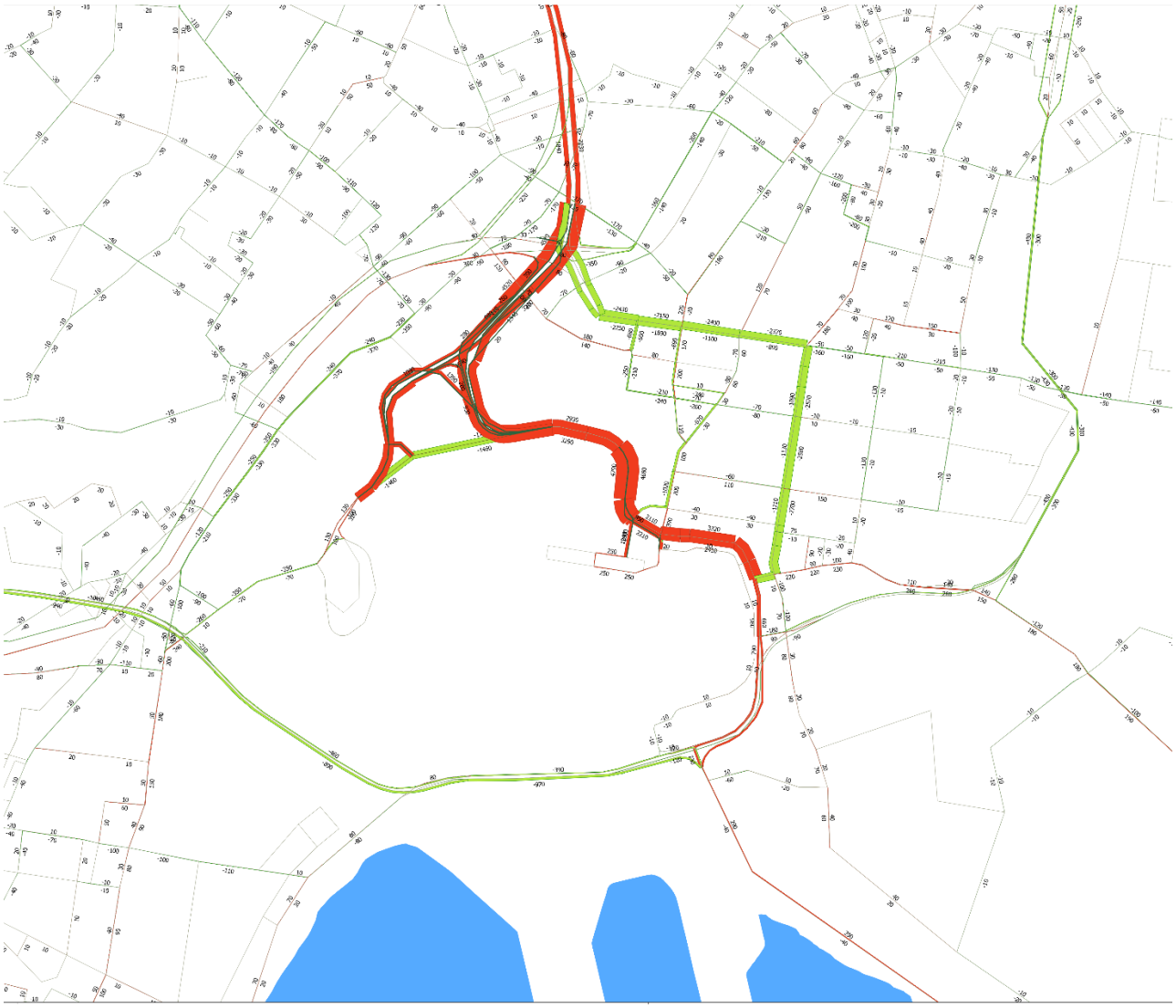


Figure 7-4 Change in heavy vehicle volumes in 2026 for the 'with project' and 'without project' scenarios

7.3.2 Travel demand and traffic shifts

The screenline/parallel route analysis below uses the same screenlines and outputs for future year AWT volumes and patterns, level of travel demand and volume of traffic expected to shift routes as referenced in section 6.1.2 and shown in Figure 6-4.

7.3.2.1 Sydney Gateway screenline

Table 7-3 and Figure 7-5 depict a comparison of the forecast daily traffic volumes and proportions at key corridors crossing the Sydney Gateway screenline north–south corridors to the south of the study area in 2026 with and without the project.

The project is forecast to accommodate 30 per cent of two-way daily traffic crossing the screenline in both 2026 and 2036. Traffic would shift away from parallel corridors, particularly O'Riordan Street and Botany Road which would carry up to 30 per cent less traffic then they would've without the project, as discussed in 6.1.2. The project would be a more attractive north–south route than the parallel roads resulting in some traffic bypassing the Mascot Station precinct and its surrounds to travel between WestConnex and Sydney Airport.

Overall, the total north–south traffic demand across the assessed corridors in 2026 and 2036 would be more than 15 per cent higher with the project than without the project. When this is considered in combination with the forecast improved network performance and intersection performance discussed in section 7.3.3 and 7.3.4, it is evident that the project would increase the north–south capacity within the network to accommodate a greater portion of the forecast traffic demand (as discussed in section 7.2), while traffic volumes would reduce along parallel congested corridors and their overall performance would improve.

Table 7-3 Comparison of daily traffic volumes at points along the Sydney Gateway screenline

Location	2026 'without project'		2026 'with project'		Change	2036 'without project'		2036 'with project'		Change
	Vehicles	% total	Vehicles	% total		Vehicles	% total	Vehicles	% total	
Princes Highway	33,800	14%	29,500	11%	−13%	35,500	14%	32,000	11%	−10%
Sydney Gateway			84,800	30%				87,800	30%	
O'Riordan Street	63,100	26%	43,300	15%	−31%	64,000	26%	44,500	15%	−30%
Botany Road	36,600	15%	26,300	9%	−28%	36,300	15%	26,800	9%	−26%
Southern Cross Drive	109,100	45%	96,800	34%	−11%	110,100	45%	98,000	34%	−11%
Total	**242,600**		**280,700**		**16%**	**245,900**		**289,100**		**17%**

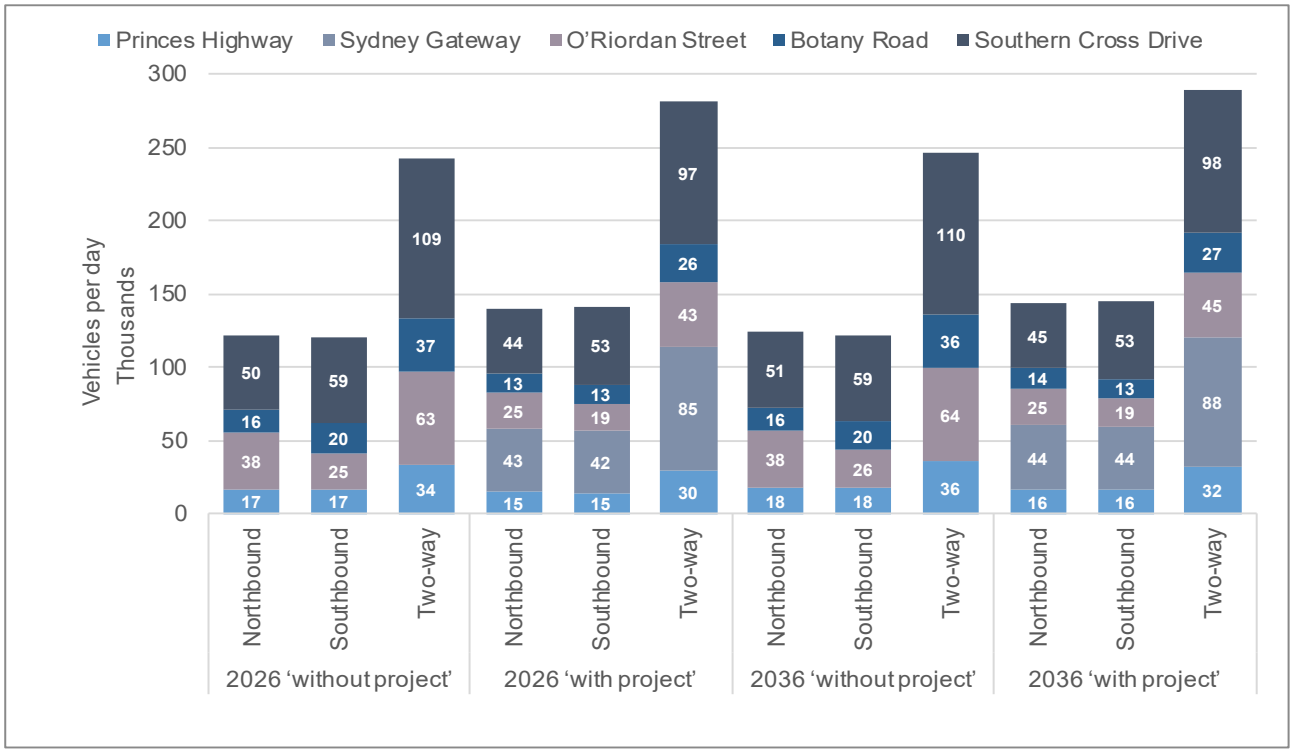


Figure 7-5 Proportion of traffic volumes at points along Sydney Gateway screenline

7.3.2.2 F6 screenline

Table 7-4 and Figure 7-6 depict a comparison of the forecast daily traffic volumes and proportion at key corridors crossing the F6 screenline north–south corridors to the south of the study area in 2026 and 2036 with and without the project.

The project would reduce demand on Princes Highway by around 11,000 vehicles per day (15 per cent) and more than 6,000 vehicles per day (eight per cent) in 2026 and 2036, respectively. Reduced traffic volumes on the currently congested Princes Highway would improve its overall performance.

Conversely, it would also lead to a minor increase in traffic volumes along Marsh Street and the New M5, which is necessary to accommodate access to/from the project.

Table 7-4 Comparison of daily traffic volumes at points along the F6 screenline

Location	2026 'without project'		2026 'with project'		Change	2036 'without project'		2036 'with project'		Change
	Vehicles	% total	Vehicles	% total		Vehicles	% total	Volume	% total	
M4-M5 Link	36,300	11%	38,500	12%	6%	41,300	12%	44,000	13%	7%
Princes Highway	75,800	23%	64,800	21%	−15%	77,000	22%	70,700	21%	−8%
Marsh Street	61,100	19%	64,500	21%	6%	66,000	19%	69,600	20%	5%
General Holmes Drive	150,000	46%	146,100	47%	−3%	160,800	47%	155,300	46%	−3%
Total	**323,200**		**313,900**		**−3%**	**345,100**		**339,600**		**−2%**

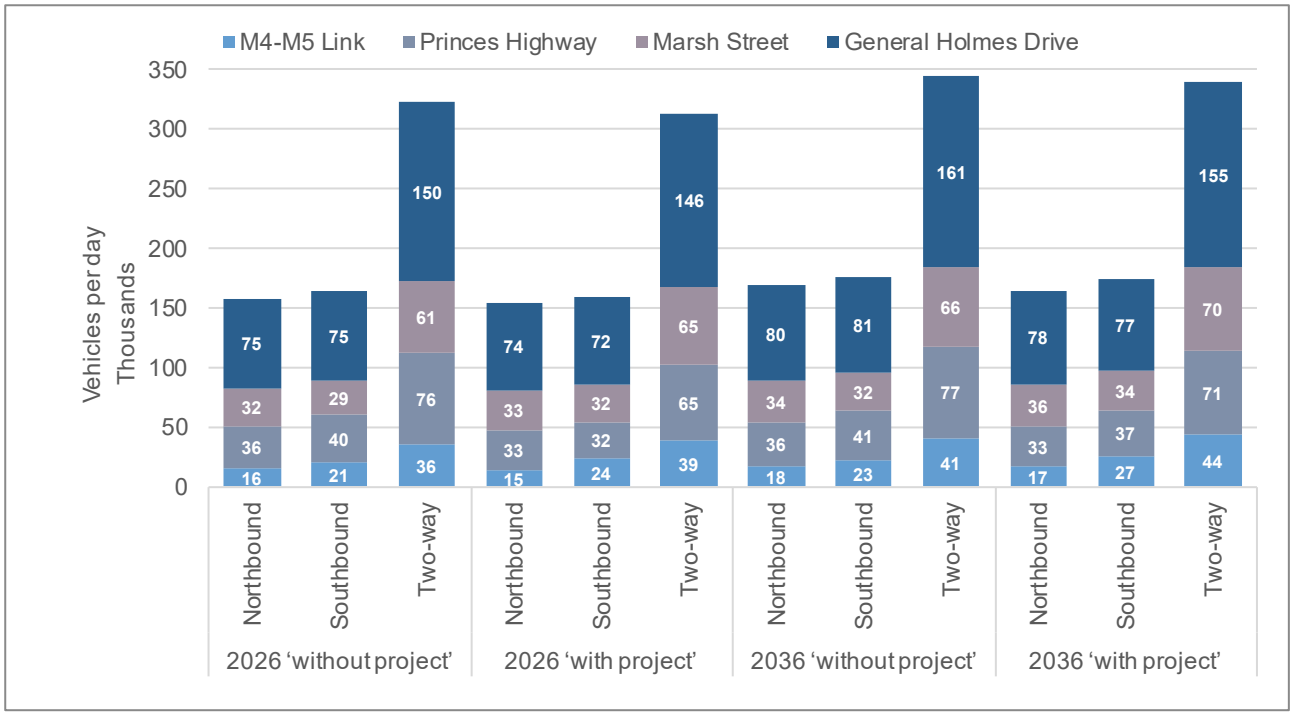


Figure 7-6 Proportion of traffic volumes at points along F6 screenline

7.3.2.3 Port Botany screenline

Table 7-5 and Figure 7-7 depict a comparison of the forecast daily traffic volumes and proportion at key corridors crossing the Port Botany screenline north–south corridors to the east of the study area in 2026 and 2036 with and without the project.

Overall, traffic demand along the Port Botany screenline increases by around five per cent as a result of the project. However, the split of traffic across the Foreshore Road, Botany Road and Wentworth Avenue corridors would be maintained. This indicates that there would be no noticeable changes in port traffic along these routes. However, changes to travel times (discussed in section 7.3.6) would be substantial.

Table 7-5 Comparison of daily traffic volumes at points along the Port Botany screenline

Location	2026 'without project'		2026 'with project'		Change	2036 'without project'		2036 'with project'		Change
	Vehicles	% total	Vehicles	% total		Vehicles	% total	Vehicles	% total	
Foreshore Road	39,800	40%	41,200	39%	4%	45,200	41%	45,800	39%	1%
Botany Road	16,900	17%	17,800	17%	5%	18,700	17%	20,300	17%	9%
Wentworth Avenue	43,300	43%	45,600	44%	5%	47,100	42%	50,400	43%	7%
Total	**100,000**		**104,600**		**5%**	**111,000**		**116,500**		**5%**

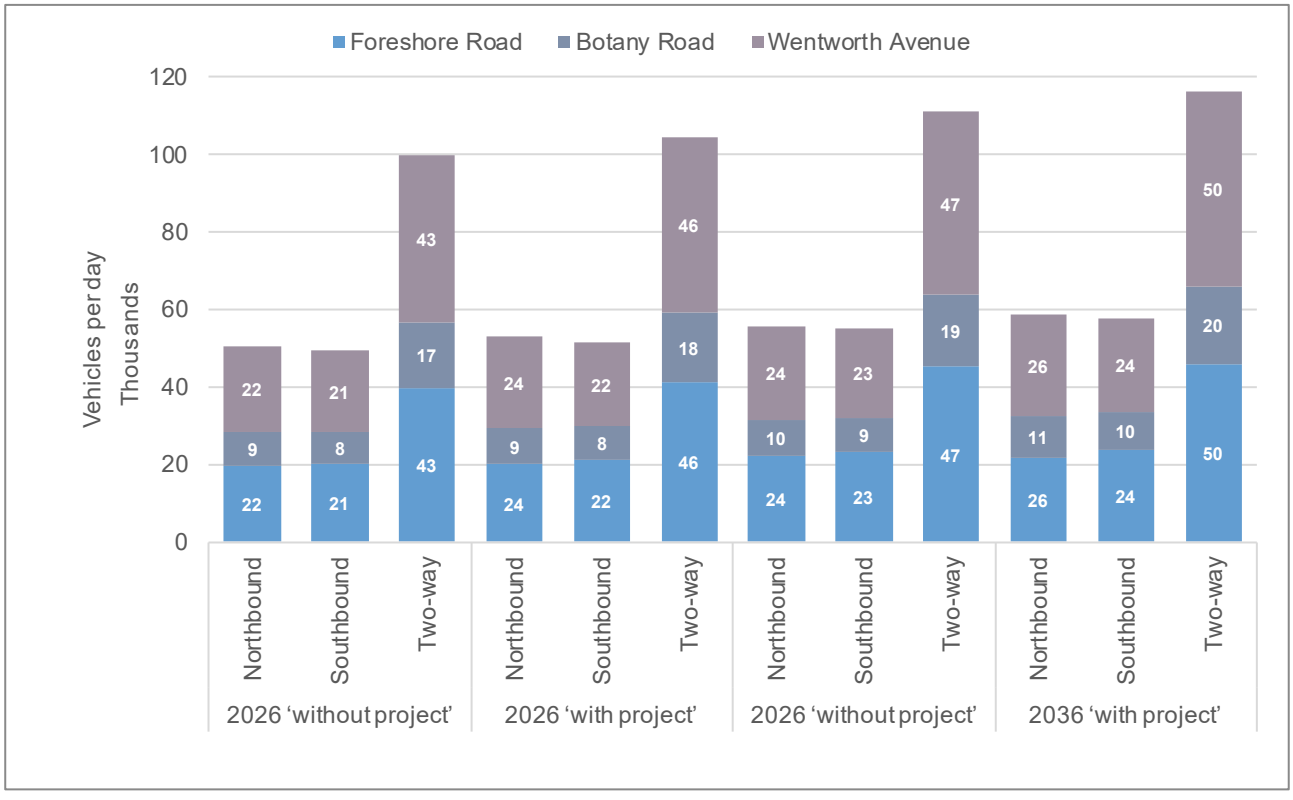


Figure 7-7 Proportion of traffic volumes at points along Port Botany screenline

7.3.2.4 Heavy vehicle analysis

Similar to general traffic, the screenline analysis indicates that most heavy vehicles would use the project, shifting away from the existing commonly used north-south routes such as O'Riordan Street, Botany Road, Princes Highway and General Holmes Drive.

7.3.3 Overall network performance statistics

Table 6-4 and Table 6-5 compare the forecast road network performance statistics for the existing with and without project conditions in 2026 and 2036 for the AM and PM peak hours respectively.

In the AM, the total network traffic demand would be similar with and without the project. However, the overall road network performance would be substantially improved based on the following:

- The average vehicle speeds would increase from 12 km/h without the project to 18 km/h with the project in 2036
- The average vehicle trip time through the network would decrease from nearly 15 minutes without the project to less than 12 minutes with the project in 2036
- The number of vehicles that would not be able to access the network due to upstream traffic congestion (total unreleased trips) would decrease from around 25,000 vehicles to less than 9,000 vehicles in 2036.

Similarly, in the PM, total network traffic demand would be similar with and without the project. However, the project would improve the overall network performance based on the following:

- The average vehicle speeds would increase from 15 km/h without the project to around 21 km/h with the project in 2036
- The average vehicle trip time through the network would decrease from 13 minutes without the project to less than 11 minutes with the project in 2036
- The number of vehicles that would not be able to access the network due to upstream traffic congestion (total unreleased trips) would decrease from around 18,000 vehicles to less than 9,000 vehicles in 2036.

Based on the above, the additional capacity that the project brings to the area would substantially reduce the number of unreleased vehicles to the network and therefore reduce the extent of vehicle queuing on major corridors that provide access to/from the study area.

Table 7-6 Network performance 2026 and 2036 'without project' and 'with project' – AM peak

Network measure	2026 'without project'	2026 'with project'	Change	2036 'without project'	2036 'with project'	Change
Network statistics for all vehicles						
Total traffic demand (vehicles)	98,760	102,819	4%	106,345	110,705	4%
Total vehicle kilometres travelled through network (km)	289,826	338,686	17%	237,091	339,361	43%
Total vehicle travel time through the network (hours)	17,890	16,602	−7%	19,810	19,322	−3%
Total vehicles entering the network	89,459	97,759	9%	81,534	101,828	25%
Total number of stops (1)	226,189	200,679	−11%	240,240	247,729	3%
Average vehicle statistics						
Average vehicle trip length through the network (km)	3.2	3.5	8%	2.9	3.3	15%
Average vehicle trip time through the network (min)	12	10.2	−15%	14.6	11.4	−22%
Average number of stops per trip	2.5	2.1	−18%	2.9	2.4	−17%
Average trip speed (km/h)	16.2	20.4	26%	12.0	17.6	47%
Unreleased traffic						
Total unreleased trips	9,301	5,060	-	24,811	8,877	-
Per cent of demand unreleased	9%	5%	-	23%	8%	-

(1) More stops generated 'with project' due to a less congested network with more stop-start traffic instead of the gridlock conditions

Table 7-7 Network performance 2026 and 2036 'without project' and 'with project' – PM peak

Network measure	2026 'without project'	2026 'with project'	Change	2036 'without project'	2036 'with project'	Change
Network statistics for all vehicles						
Total traffic demand (vehicles)	100,760	103,728	3%	106,250	109,903	3%
Total vehicle kilometres travelled through network (km)	296,073	362,623	23%	288,172	370,250	29%
Total vehicle travel time through the network (hours)	17,946	16,023	−11%	19,116	17,918	−6%
Total vehicles entering the network	87,303	96,765	11%	88,072	101,203	15%
Total number of stops	210,614	191,968	−9%	219,646	217,026	−1%
Average vehicle statistics						
Average vehicle trip length through the network (km)	3.4	3.7	11%	3.3	3.7	12%
Average vehicle trip time through the network (min)	12.3	9.9	−19%	13.0	10.6	−18%
Average number of stops per trip	2.4	2.0	−18%	2.5	2.1	−14%
Average trip speed (km/h)	16.5	22.6	37%	15.1	20.7	37%
Unreleased traffic						
Total unreleased trips	13,457	6,963	-	18,178	8,700	-
Per cent of demand unreleased	13%	7%	-	17%	8%	-

7.3.4 Intersection performance

This section presents a comparison of the anticipated intersection performance at key intersections during the AM and PM peak hours for the 'with project' and 'without project' conditions in 2026 and 2036. The average delay at each intersection is shown in Figure 7-8 and Figure 7-9, with further details relating to intersection performance included in Appendix C.

The results show that most intersections would continue to operate at LoS E or F during the AM and PM peak hours with and without the project in 2026 and 2036. However, the average delay at most intersections would substantially decrease as a result of the project. Therefore, the subsequent information focuses only on these changes.

The average delays at the following intersections would be substantially improved in 2026:

- Joyce Drive and O'Riordan Street – decreases of 129 seconds and 189 seconds in the AM and PM, respectively
- Qantas Drive, Robey Street and Seventh Street – decreases of 129 seconds and 81 seconds in the AM and PM, respectively
- O'Riordan Street and Gardeners Road – decreases of 86 seconds and 82 seconds in the AM and PM, respectively
- Botany Road and Gardeners Road – decreases of 145 seconds and 230 seconds in the AM and PM, respectively
- Bourke Street and Coward Street – decreases of 152 seconds and 213 seconds in the AM and PM, respectively.

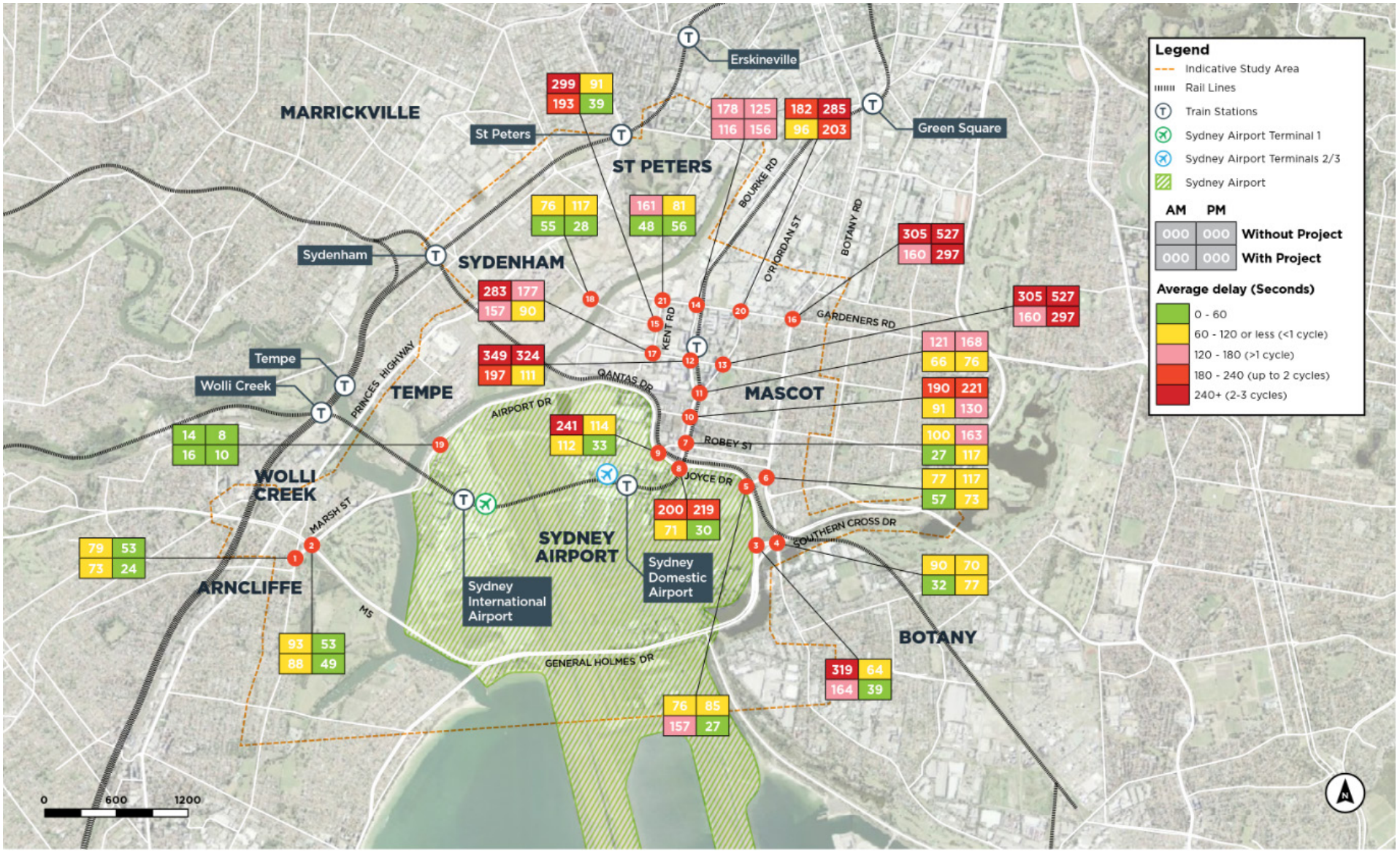


Figure 7-8 Intersection delays with and without the project in 2026

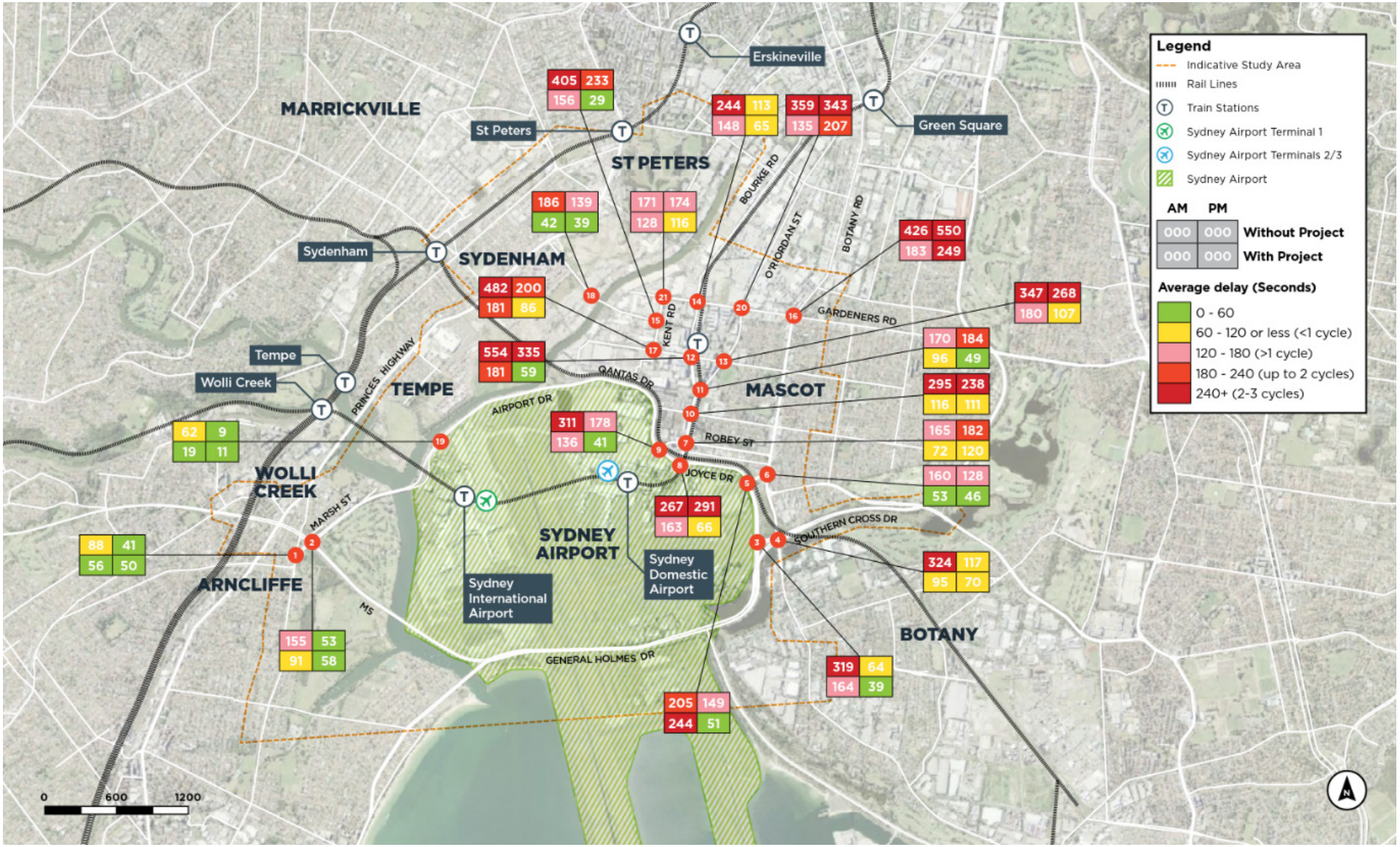


Figure 7-9 Intersection delays with and without the project in 2036

As a result of these reduced average delays, specifically at the Joyce Drive and O'Riordan Street intersection and the Qantas Drive, Robey Street and Seventh Street intersection, the project would reduce vehicle delays and alleviate congestion that would occur at the primary access points to Terminals 2/3.

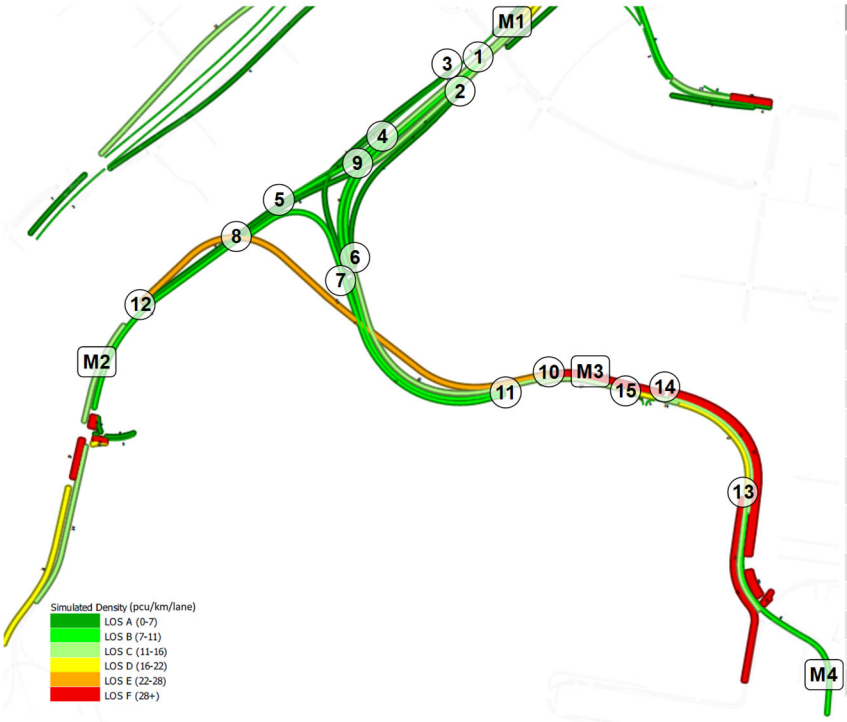
Further improvements would occur for the majority of the intersections in 2036. For instance, the intersection of Bourke Street and Coward Street would experience a decrease of 373 seconds and 276 seconds in the AM and PM respectively, a considerable decrease in comparison to 2026 results.

7.3.5 Midblock and merge and diverge assessment

The performance of 15 key locations where traffic would merge or diverge along the project, and four midblock locations (i.e. between intersections) have been assessed in 2036, as shown on Figure 7-10 and Figure 7-11.

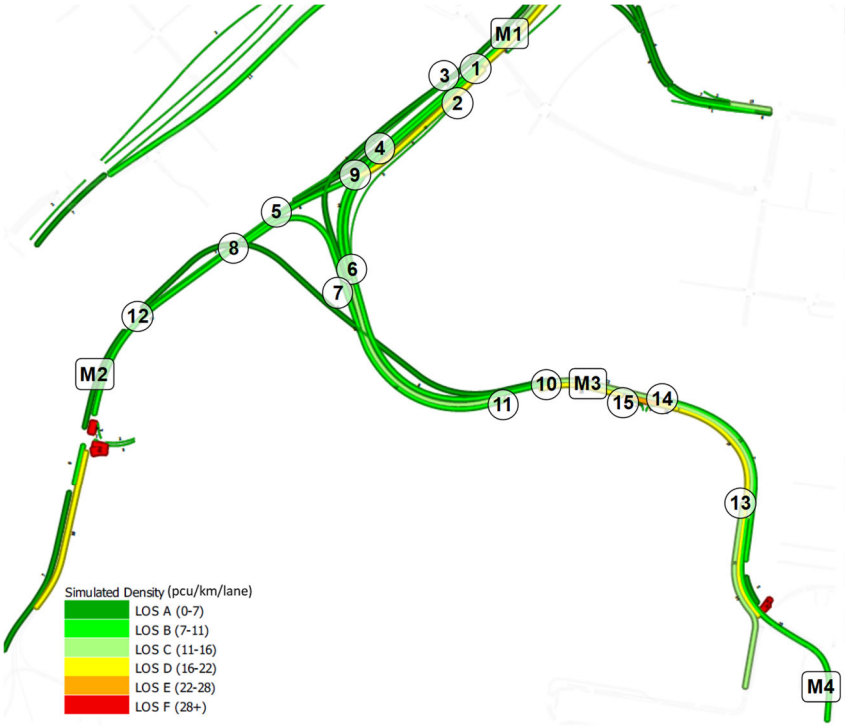
The assessment methodology is discussed in section 3.3.3.4.

Figure 7-10 and Figure 7-11 also show the expected density (i.e. number of vehicles per kilometre of road) and LoS during the AM and PM peak hours. These are also summarised in Table 7-8.



No.	Description
1	**Southbound Diverge** M4 to Airport Drive and Qantas Drive
2	**Southbound Diverge** M5 to Airport Drive and Qantas Drive
3	**Northbound Merge** Airport Drive and Qantas Drive to M5
4	**Northbound Merge** Airport Drive and Qantas Drive to M4
5	**Northbound Diverge** Airport Drive to M4 and M5
6	**Southbound Merge** M4 and M5 to Qantas Drive
7	**Northbound Diverge** Qantas Drive to M4 and M5
8	**Southbound Merge** New Airport Drive and M4 to Airport Drive
9	**Southbound Merge** M4 and M5 to Airport Drive
10	**Eastbound Merge** Airport Drive and M4 to Qantas Drive
11	**Westbound Diverge** Qantas Drive to Airport Drive and M4
12	**Northbound Diverge** Airport Drive to Qantas Drive and M4
13	**Westbound Merge** Seventh Street Slip Lane and Qantas Drive
14	**Eastbound Diverge** Qantas Drive to Qantas Drive and Central Flyover
15	**Westbound Merge** M5 and M4 to Airport Drive
M1	**Midblock** North of Canal Road
M2	**Midblock** East of West Ramps
M3	**Midblock** Qantas Drive
M4	**Midblock** Central Flyover

Figure 7-10 AM density and Level of Service at merge and diverge locations on the project



No.	Description
1	**Southbound Diverge** M4 to Airport Drive and Qantas Drive
2	**Southbound Diverge** M5 to Airport Drive and Qantas Drive
3	**Northbound Merge** Airport Drive and Qantas Drive to M5
4	**Northbound Merge** Airport Drive and Qantas Drive to M4
5	**Northbound Diverge** Airport Drive to M4 and M5
6	**Southbound Merge** M4 and M5 to Qantas Drive
7	**Northbound Diverge** Qantas Drive to M4 and M5
8	**Southbound Merge** New Airport Drive and M4 to Airport Drive
9	**Southbound Merge** M4 and M5 to Airport Drive
10	**Eastbound Merge** Airport Drive and M4 to Qantas Drive
11	**Westbound Diverge** Qantas Drive to Airport Drive and M4
12	**Northbound Diverge** Airport Drive to Qantas Drive and M4
13	**Westbound Merge** Seventh Street Slip Lane and Qantas Drive
14	**Eastbound Diverge** Qantas Drive to Qantas Drive and Central Flyover
15	**Westbound Merge** M5 and M4 to Airport Drive
M1	**Midblock** North of Canal Road
M2	**Midblock** East of West Ramps
M3	**Midblock** Qantas Drive
M4	**Midblock** Central Flyover

Figure 7-11 PM density and Level of Service at merge and diverge locations on the project

In the AM peak hour, the majority of midblock locations and merge/diverge sections are forecast to operate satisfactorily at LoS D or better. However, it is forecast that the following locations would operate unsatisfactorily at LoS E or F:

- Airport Drive and M4 to Qantas Drive eastbound (Merge point 10)
- Airport Drive to Qantas Drive and M4 westbound (Diverge point 12)
- Qantas Drive and Seventh Street Slip Lane westbound (Merge point 13)
- Qantas Drive to Qantas Drive and Central Flyover (Diverge point 14)
- Midblock location on Qantas Drive eastbound (Merge point 3).

The majority of the above results are due to high competing demands at Sydney Airport access points and vehicle delays and queuing on the western approach to the intersection of Qantas Drive and Robey Street.

In the PM peak hour, all midblock and merge or diverge locations are forecast to operate satisfactorily in 2036, with a LoS D or better, except for the westbound merge from the M5 and M4 to Airport Drive (merge 15), which is expected to perform unsatisfactorily at LoS E.

Mitigation measures to address the above are discussed in section 9.2.

Table 7-8 The midblock and merge performance in 2036

Segment or location	Type	Direction	AM		PM	
			Density (PCU/km/lane)	Level of Service	Density (PCU/km/lane)	Level of Service
1	Diverge	Southbound	14	C	18	D
2	Diverge	Southbound	4	A	0	A
3	Merge	Northbound	5	A	6	A
4	Merge	Northbound	12	C	10	C
5	Diverge	Northbound	7	B	4	A
6	Merge	Southbound	12	C	9	B
7	Diverge	Northbound	11	B	13	C
8	Merge	Southbound	9	B	10	B
9	Merge	Southbound	14	C	18	D
10	Merge	Eastbound	39	F	12	C
11	Diverge	Westbound	14	C	18	D
12	Diverge	Eastbound	23	E	7	A
13	Merge	Westbound	29	F	19	D
14	Diverge	Eastbound	59	F	15	C
15	Merge	Westbound	19	D	23	E
North of Canal Road	Midblock	Northbound	12	C	10	B
		Southbound	14	C	18	D
East of West Ramps	Midblock	Eastbound	14	C	5	A
		Westbound	8	B	10	B
Qantas Drive	Midblock	Eastbound	39	F	12	C
		Westbound	14	C	18	D
Central Flyover	Midblock	Southbound	8	B	10	B

7.3.6 Travel times

The travel times forecast on key routes in 2026 and 2036 with the project are compared to those without the project, as discussed in section 6.1.5.

The assessed travel time routes were described and shown in Table 6-8 and Figure 6-9.

Figure 7-12 to Figure 7-15 depict the differences in the AM peak and PM peak travel times for the north–south and east–west routes. The travel time changes for 2036 are also diagrammatically shown in Figure 7-16.

The project would alleviate the travel time increases within the study area that were forecast to occur in 2026 and 2036 on most of the travel routes that were analysed in the AM and PM peak. The travel time benefits associated with the project would be more prevalent in the AM peak, with decreases of around 30 to 70 per cent forecast across most of the routes including:

- Canal Road (route 6)
- Coward Street (route 11)
- Botany Road (route 7)
- O'Riordan Street (routes 9 and 10)
- Unwins Bridge Road (route 12).

Further to the above, eastbound travel times along Robey Street would increase by around 86 per cent in 2036 due to increased demand for this movement (particularly west of O'Riordan Street).

Similar travel time savings are forecast for the PM peak, with the exception of a minor travel time increase of 22 per cent for westbound on the M5 East to Southern Cross Drive.

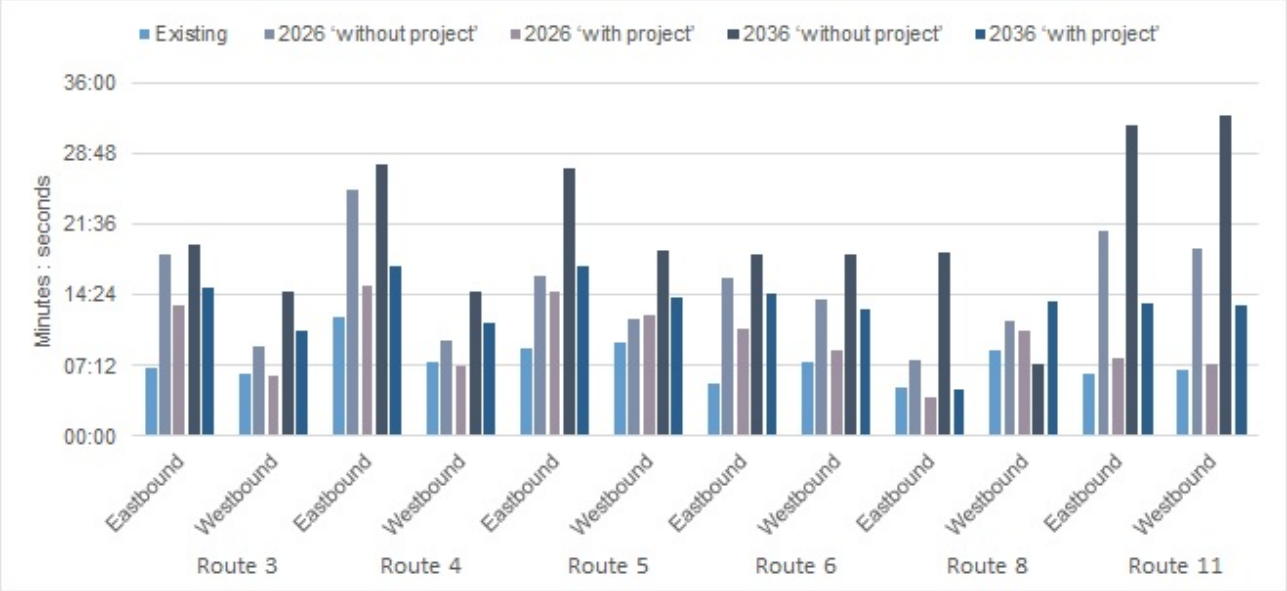


Figure 7-12 East-west routes average travel time comparison – AM peak

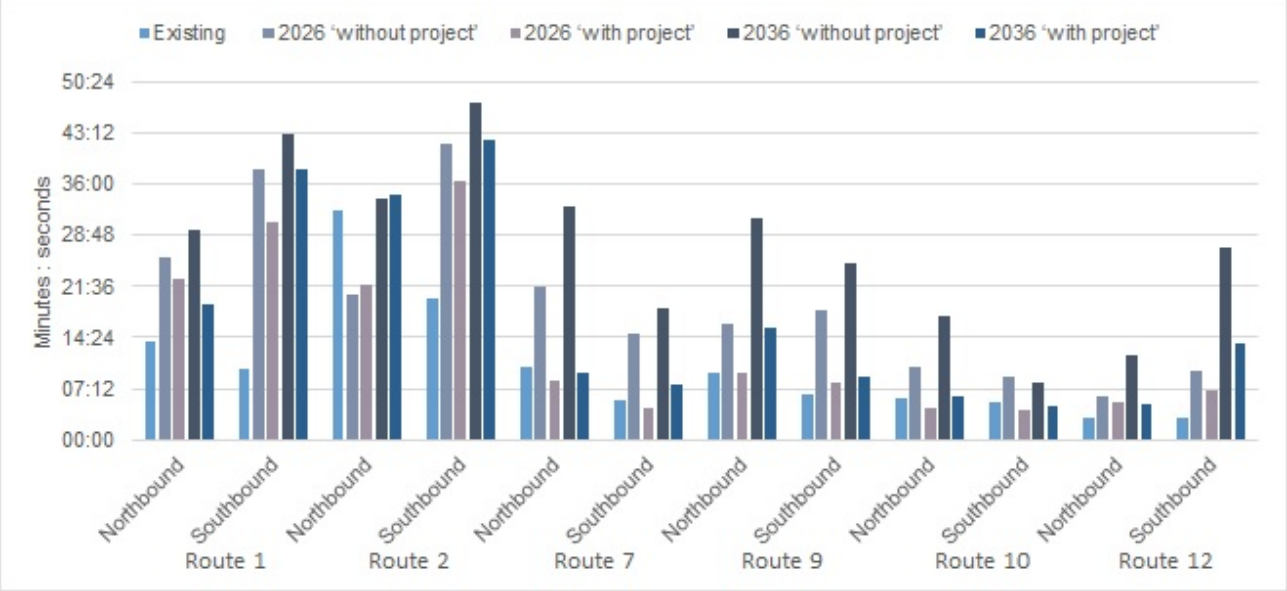


Figure 7-13 North-south routes average travel time comparison – AM peak

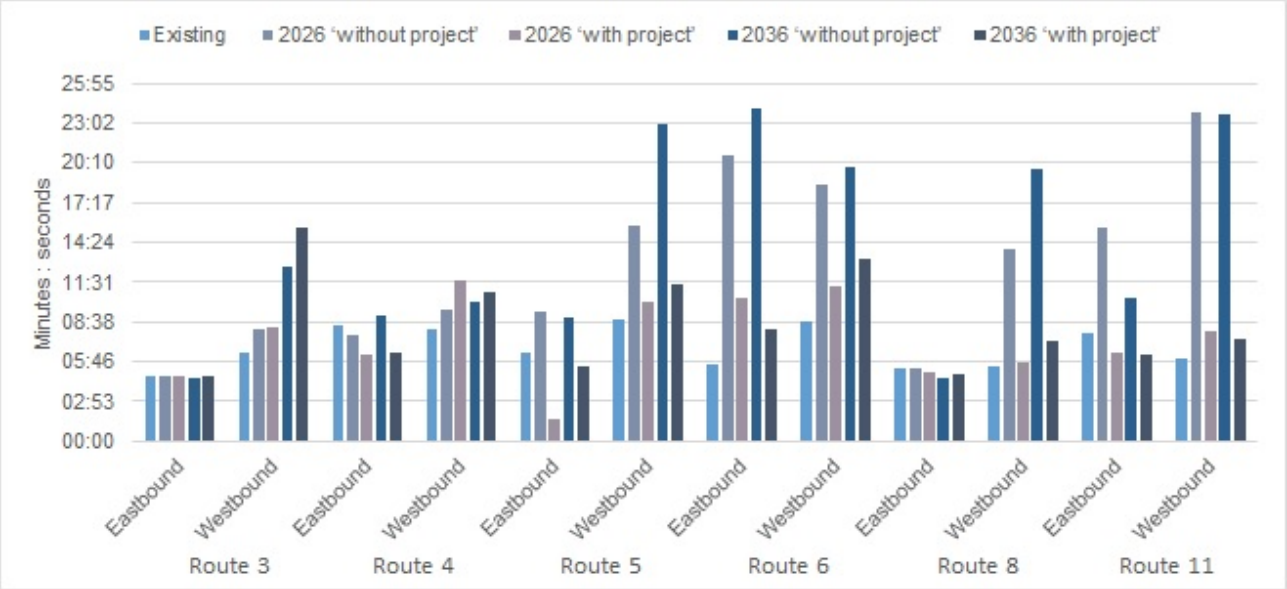


Figure 7-14 East–west routes average travel time comparison – PM peak

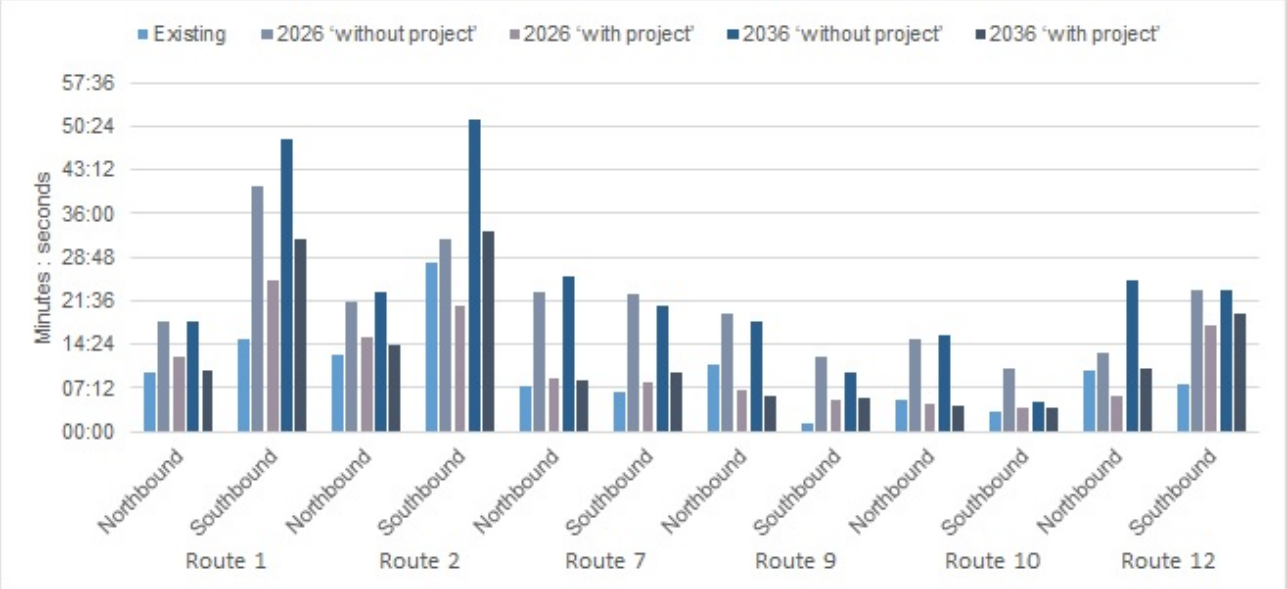


Figure 7-15 North–south routes average travel time comparison – PM peak

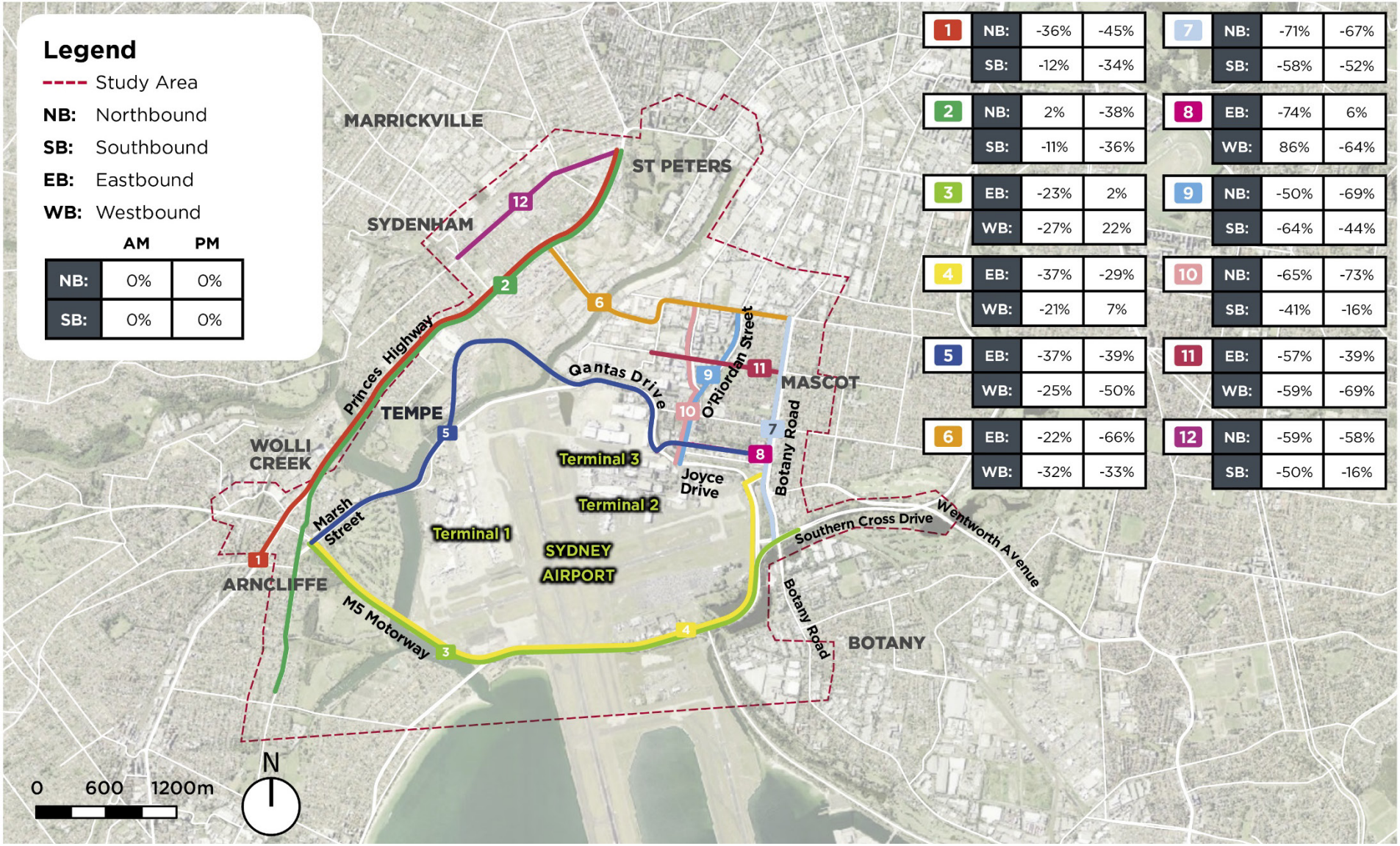


Figure 7-16 Travel time changes – 'with project' 2036 vs 'without project' 2036

7.4 Operational impacts on public transport

No specific changes to public transport services and routes are included in the scope of the project, as no opportunities exist for buses to use the project. However, the improvements to the road network performance detailed in section 7.3, would also result in improvements to public transport where buses use individual roads within the study area.

The project would have the following implications for bus travel within the study area:

- Reduced bus travel times due to reduced road network travel times
- Improved bus reliability due to a less congested road network
- Removal of bus stops near on Qantas Drive near Lancastrian Road.

These impacts are discussed further below.

It is noted that the SMPM considers induced traffic demand to some extent including latent demand within its forecasts. For the project, induced demand is less relevant because the project is completing a 'missing link' between the Sydney motorway network and Sydney Airport. It is therefore unlikely to generate new vehicle trips and there would be minimal latent demand associated with Sydney Airport. Notwithstanding this, any induced demand considered as part of the modelling has been included in the road network performance predictions and their impacts on public transport discussed below.

7.4.1 Bus travel times

The bus travel times forecast on key routes in 2026 and 2036 with the project are compared to those without the project, as discussed in section 6.2.2. The assessed bus travel time routes were described and shown in Table 6-9 and Figure 6-14.

Figure 7-17 and Figure 7-18 depict the differences in the AM and PM peak travel times for assessed routes.

The project would lead to substantial bus travel time savings along most of the assessed corridors compared with the impacts on services due to the future road conditions without the project. Bus travel times in 2026 would reduce by 20 to 50 per cent with some routes reducing by up to 70 per cent. Specifically, the following travel time savings would occur in 2026 as shown on Figure 7-17 and Figure 7-18:

- Up to 70 per cent for M20, and 309, 309X, 310 using route 1, on Botany Road (Gardeners Road to Mill Pond Drive)
- Up to 45 per cent for 303 using route 2 travelling eastbound, on General Holmes Drive – Botany Road/Mill Pond Drive to M5
- Up to 30 per cent for 420, 420N, and 400 using route 3, on Airport Drive (Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive)
- Up to 45 per cent for 418 using route 4 on Canal Road/Ricketty Street
- Up to 70 per cent for 305 along route 5, along O'Riordan Street/Qantas Drive to Gardeners Road/Bourke Road/Bourke Street via Kent Road
- Up to 65 per cent for 307, 400, 420, and 420N using route 6, along Coward Street (Bourke Road to Botany Road/Wentworth Avenue)
- Up to 40 per cent for 348 and 422 using route 7 along Sydney Park Road to Brodie Spark Drive.

Notwithstanding the above, the westbound travel times for the 303 using route 2 on General Holmes Drive are forecast to increase by up to 50 per cent.

Further bus travel time savings are forecast in 2036 as shown in Figure 7-19. However, the westbound travel times for the 303 using route 2 on General Holmes Drive are forecast to increase by up to 130 per cent.

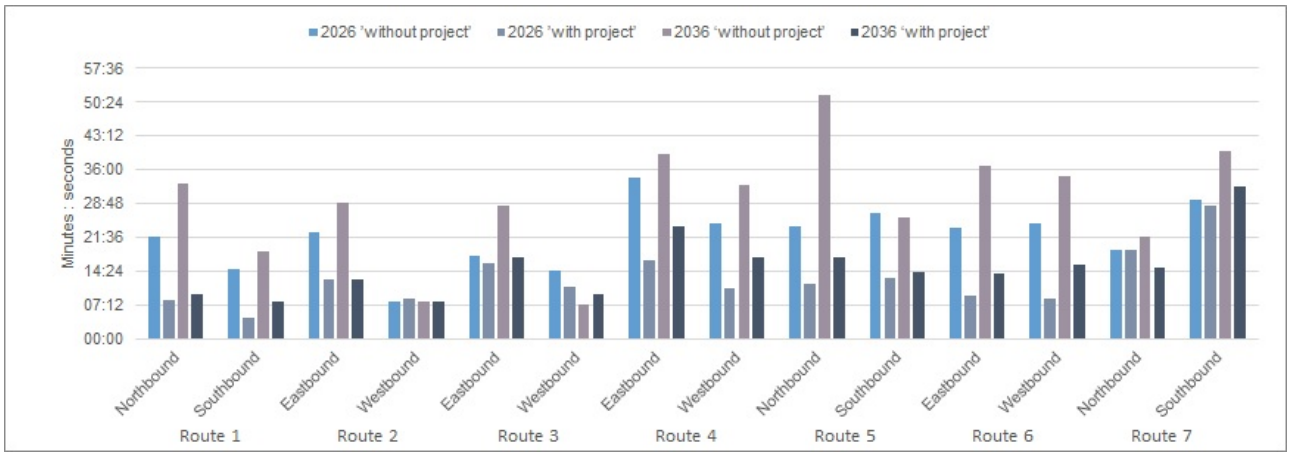


Figure 7-17 Travel time comparisons for bus routes – AM peak

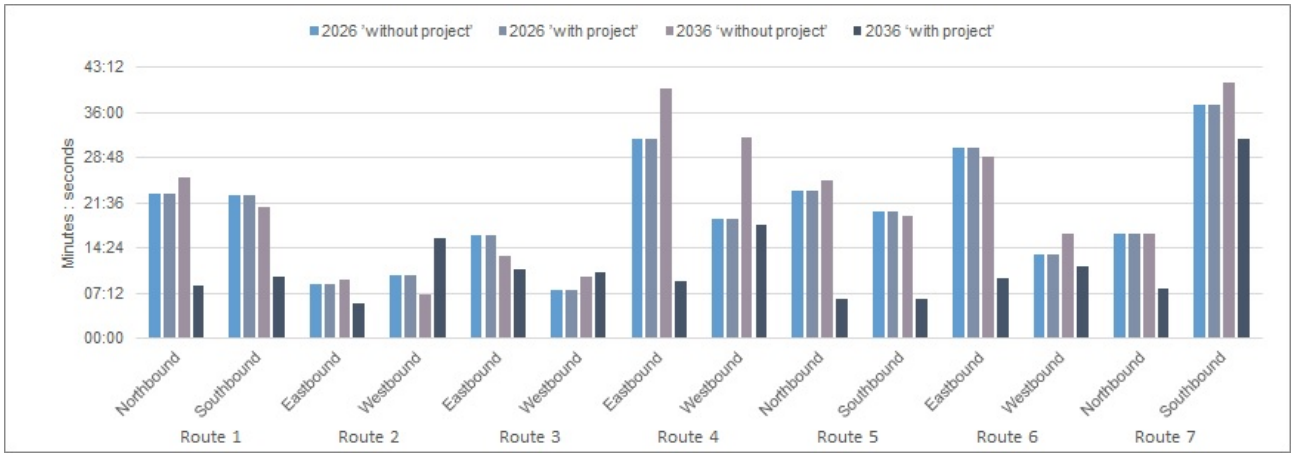


Figure 7-18 Travel time comparisons for bus routes – PM peak

A full analysis of each of the key bus travel time routes is included in Appendix C.

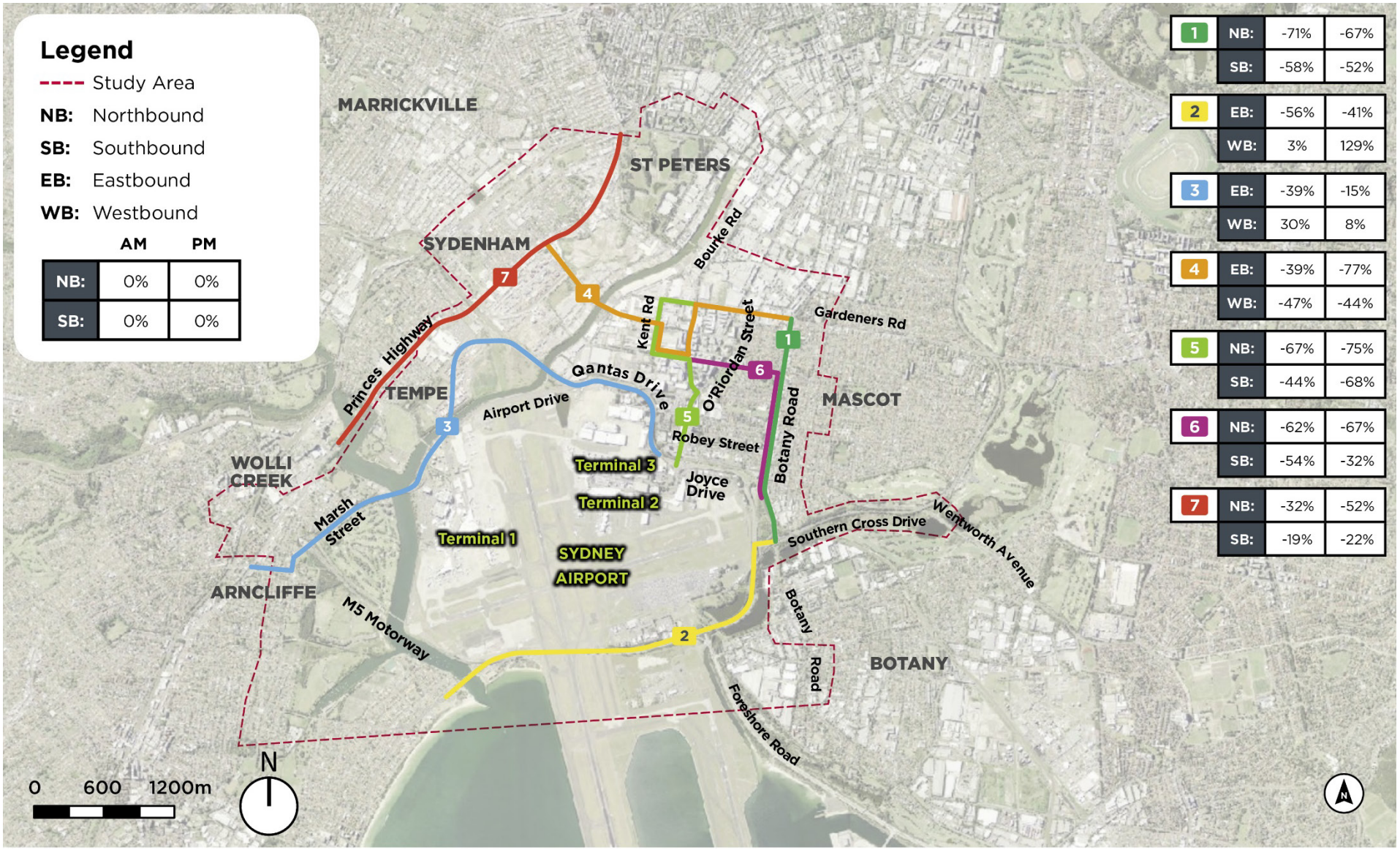


Figure 7-19 Bus travel time changes – 'with project' 2036 vs 'without project' 2036

7.4.2 Changes to infrastructure and services

The bus stops located along Qantas Drive at Lancastrian Road would be permanently closed as a result of the project. The bus stops have low usage and the removal of some aspects of the Qantas Jet Base would further reduce the demand for these bus stops.

Following the removal of these bus stops, the closest bus stops that are serviced by the same bus routes would be located within Terminals 2/3. With the removal of aspects of the Qantas Jet Base the overall impacts of this closure is considered to be minimal.

The project would not have any impact on train services.

7.5 Operational impacts on active transport

The project would include the relocation of the existing shared path located along the southern side of Alexandra Canal. This path would be relocated to the northern side of Alexandra Canal as shown in Figure 7-20. At its western end, the path would use an existing bridge over the Alexandra Canal connecting to Tempe Reserve. At its eastern end, the path would cross to the southern side of the canal at Qantas Drive beneath the project.

Several options for the project's active transport link were investigated, and the preferred option was selected as it would provide a direct and flat route that was easily navigable and would therefore provide a pleasant riding experience. The new path would also connect directly to other active transport links within Tempe Reserve, therefore improving general connectivity within the study area.

As pedestrians and cyclists would have to cross Alexandra Canal, the new path would increase travel distances by around 160 metres. Therefore, travel times would increase by less than one minute for cyclists and less than four minutes for pedestrians. These travel time increases are minimal and therefore, the current level of active transport access and connectivity would be maintained once the project is operational.

Existing pedestrian facilities would be maintained along all roads affected by the project (except Lancastrian Road) and upgraded to current standards. The existing pedestrian crossing at the Lancastrian Road intersection would be removed as part of the project. The impact of this change is considered minimal, because the existing crossing provides access to bus stops that would be removed as part of the project.

The new pedestrian access to the Terminal 1 freight facility at Link Road would be along the proposed freight terminal access bridge and a signalised intersection with the Terminal 1 connection. The impact of this change would depend on the point of origin. Additional travel distances could be up to 1,400 metres.

New cycle and pedestrian paths are included in the New M5 program of works at St Peters interchange, which would improve the connectivity and safety for active transport network users within the broader network. These works would include new walking and cycling infrastructure, including a new bridge over the Alexandra Canal which would connect to the Mascot Station precinct.

The project would also provide a new high capacity and continuous road connection between the Sydney motorway network via St Peters interchange and the Sydney Airport terminals minimising unnecessary 'through' traffic from travelling through the Mascot Station precinct and reducing traffic flow along key roads such as Botany Road and O'Riordan Street by around 30%. As discussed in section 7.3.4, the average delay at intersections within the study area including in the Mascot Station precinct area would substantially improve. For example, the intersection of Bourke Street and Coward Street which accommodates high pedestrian crossing activity would experience average delay decreases of more than 240 seconds (70 per cent) in 2036. This has the potential to improve permeability and accessibility for travel across these roads and improve amenity throughout the Mascot local area more generally. Improvements in amenity would make walking and cycling more attractive in these areas, also improving safety compared to the scenario where the project is not implemented.

It is understood that Roads and Maritime and Sydney Airport would develop an active transport route strategy with the input of relevant stakeholders to guide the future coordination of active transport network development by the relevant parties.

Figure 7-20 Preferred active transport network alignment

7.6 Operational impacts on parking and access

The project would improve access to Sydney Airport by providing new, direct connections between the Sydney motorway network (via St Peters interchange) and Sydney Airport's terminals. The improved access to the Airport would lead to decreased congestion in the surrounding local roads by reducing the level of through traffic that would use the Mascot Station precinct road network.

The project is not expected to directly impact access for any adjacent properties with all existing access to be maintained.

The project would however result in some changes in the way a number of land uses are accessed due to changes in the surrounding road network. These are summarised in Table 7-9.

Table 7-9 Changes to access due to project

Land use	Changes to access
Airport Drive	The project would include closing a section of Airport Drive between the proposed freight terminal access and Qantas Drive. This section of Airport Drive would be replaced by roadways forming part of the project (i.e. the Terminal 1 connection, terminal links and the Qantas Drive upgrade and extension). This change would increase the travel distance between Terminal 1 and Terminals 2/3 by about one kilometre. However, this is not considered to be significant given the overall benefits in terms of travel time.
Freight terminal at Terminal 1	The freight terminal located north of Terminal 1 is currently accessed from Airport Drive via the intersection at Link Road. The projects alignment on the north side of Alexandra Canal would result in a change to the access route to/from the freight terminal. The project includes the construction of a new freight terminal access which would result in an increased travel distance compared to the existing (about one kilometre from both the east and west). Notwithstanding this, travel times would be less due to less congestion and higher travel speeds and therefore this impact is minor.
Sydney Airport Corporation's northern lands	Sydney Airport's northern lands (south of the Botany rail corridor) and the employee car park is currently accessed via the Nigel Love Bridge off Airport Drive. With the closure of Airport Drive, this access would no longer be available. To facilitate access to the northern lands, the project includes a new northern lands access from Burrows Road (south). The project also includes a stub road on the proposed freight terminal access, which would facilitate future connections to the northern lands.
Qantas Jet Base via Lancastrian Road	The project would include removing the right-in/right-out turning movements from Lancastrian Road from the eastbound lanes. Changes to this intersection would increase travel distances and times for people accessing Lancastrian Road from the west or exiting to the east. The existing overbridge over Qantas Drive could be used to access areas located within the Qantas Mascot Campus north of the Botany Rail Line.
Businesses accessed via Ross Smith Avenue	The project includes the removal of the right turn from Qantas Drive to Sir Reginald Ansett Drive to accommodate the Terminals 2/3 viaduct. Eastbound traffic on Qantas Drive would need to turn right into Ross Smith Avenue from Joyce Drive, to access the businesses fronting Ross Smith Drive (currently accessed via Sir Reginal Ansett Drive). This movement is facilitated by the recently completed right turn facilities. This results in an increased travel distance of around 600 metres, which would have minor impact on access to these businesses.
Businesses accessed via Swamp Road and Bellevue Street	The project includes closing Swamp Road south of Bellevue Street. Access to land that is currently accessed via Swamp Road would be via the proposed northern lands access and the freight terminal access. A cul-de-sac would be installed at the southern end of Bellevue Street to the north of the project site.

The project would not impact the availability of on-street parking, as none of the roads affected by the project provide formal on-street parking. The project does not include the provision of any new on-street parking.

The project would however potentially result in the permanent loss of some off-street parking in the following locations/facilities:

- Sydney Airport northern lands staff car park: About 24 car parking spaces at the northern end of the car park would be removed and some additional spaces may also be lost due to the need to reconfigure the internal car park roads.

The loss of the above parking spaces is considered to be manageable with some reconfiguration of parking areas by Sydney Airport to minimise the loss. The loss of these spaces would not result in impacts to on-street (public) parking availability.

7.7 Operational impacts on safety

The project is expected to improve road safety on the existing travel routes to and from the Airport (Airport Drive, Qantas Drive and O'Riordan Street) as a result of reduction in traffic volumes and improved traffic flow. Average delays at key intersections are predicted to substantially decrease compared to the future without the project conditions and travel times are also predicted to improve in both the AM and PM peak hours.

Based on improved road network performance and reduced congestion levels, the following road safety advantages would be expected in the project area:

- The reduction in travel times and average delays at key intersections with the project is expected to result in less rear-end crashes, the most commonly occurring crash type currently experienced on the existing network
- Road network upgrades would be designed as per new standards, so it is expected that the number of crashes would reduce in wet weather conditions due to the inclusion of newer design and construction methods such as the use of non-skid pavement treatment
- At the intersection of Qantas Drive and O'Riordan Street, the risk of crashes occurring between crossing and turning vehicles for both eastbound and westbound directions would be eliminated as right turning vehicles would be shifted onto the flyovers to access Terminals 2/3 and the Robey Street intersection with a one-way traffic arrangement.

Notwithstanding the above, the new active transport link proposed on the north side of Alexandra Canal may present some personal security concerns due to its isolated location between the canal and surrounding industrial uses, as well as the provision of underpasses.

7.8 Summary of impacts on Sydney Airport

The project would provide a more direct route from the Sydney motorway network (via St Peters interchange) to the Sydney Airport terminals which would bypass several signalised intersections between Sydney Airport and WestConnex and beyond. As outlined in sections 7.3.1 and 7.3.2, should the project not be constructed, traffic with a destination at or near the airport (including Port Botany) would use the surrounding local road network to access their destinations. This arrangement would result in traffic congestion within the Mascot area.

Therefore, the operational benefits of the project would be largely realised the local Mascot communities and motorists travelling to/from Sydney Airport during the weekday AM and PM peak periods. Airport-related vehicle trips could use the continuous motorway network, with improved travel time efficiency and reliability and reduced delays at intersections, particularly those that currently provide access to Terminals 2/3. Further details specifically relating to this is included in section 7.8.1 and 7.8.2.

Improved road network travel times and operational efficiency would also decrease bus travel times to/from Sydney Airport.

7.8.1 Travel times to/from Sydney Airport

As seen in Figure 7-21 and Figure 7-22, the travel times between St Peters interchange and the Sydney Airport terminals would substantially reduce with the project if compared with the alternative routes through Mascot.

In 2026, travel time savings of up to 23 minutes would be experienced, increasing to up to 30 minutes in 2036. Conversely, vehicles travelling between St Peters interchange and the Sydney Airport terminals along the project would reduce demand on the existing road network through Mascot. The route through Mascot would see travel time savings of up to 10 minutes in 2026 and 2036, benefiting the local communities.

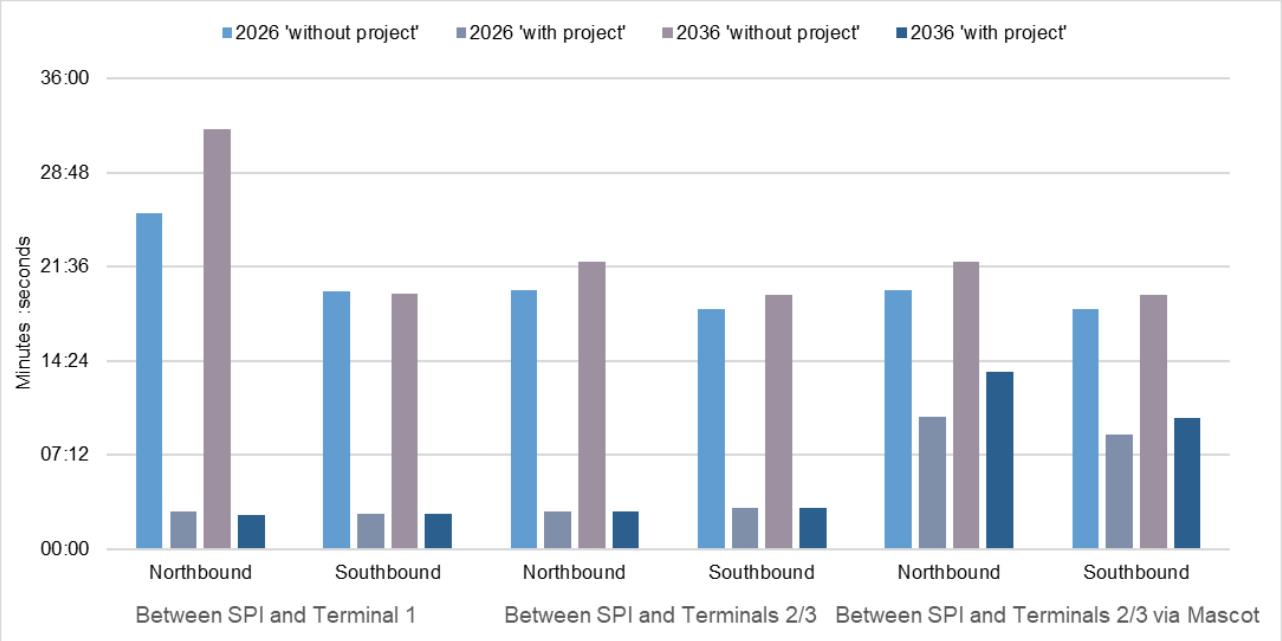


Figure 7-21 Travel time between St Peters interchange and Sydney Airport terminals in the AM peak

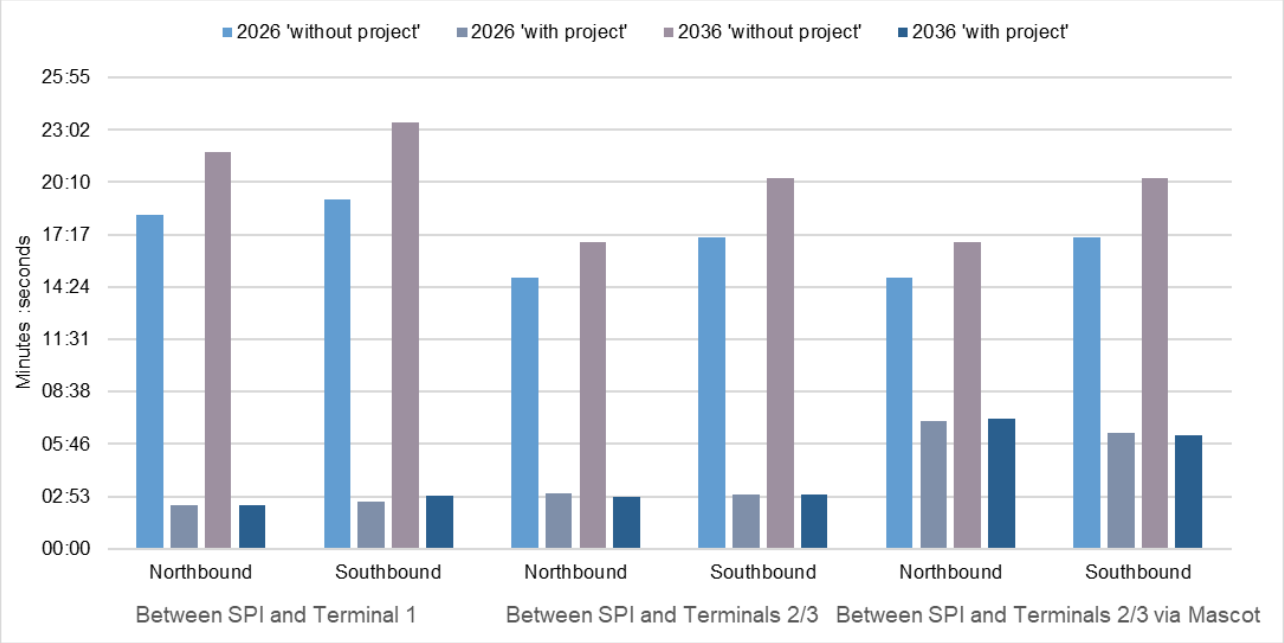


Figure 7-22 Travel time between St Peters interchange and Sydney Airport terminals in the PM peak

7.8.2 Sydney Airport access impacts

Table 7-10 and Table 7-11 show the traffic flows and average delays at the access and egress for Terminals 2/3 in the AM and PM peaks in 2026 and 2036.

The access and egress arrangements to Terminals 2/3 could accommodate higher traffic volumes with the project than without the project. In particular, the new elevated access to Terminals 2/3 would accommodate more than double the traffic volumes than existing Qantas Drive (eastbound) would have accommodated in 2026 and 2036.

Overall, the project would allow the Terminals 2/3 accesses to carry:

- More than 20 per cent additional traffic entering Terminals 2/3 during the AM peak hour in 2026 and 2036
- 80 per cent and 90 per cent more traffic exiting Terminals 2/3 during the AM peak hour in 2026 and 2036, respectively
- More than 30 per cent more traffic entering Terminals 2/3 during the PM peak hour in 2026 and 2036
- Around five per cent more traffic exiting Terminals 2/3 during the PM peak hour in 2026 and 2036.

During the AM and PM peak hours, the accesses to/from Terminals 2/3 would generally perform satisfactorily at LoS D or better, except the through and right turn egress movements at Seventh Street, which would continue to operate at LoS F. Notwithstanding this, in the AM peak, the average delay for these movements would reduce substantially.

Table 7-10 and Table 7-11 indicate the average delay for the right turn out of Seventh Street would increase. However, there is opportunity for the signal timings to be adjusted to avoid this, by increasing the delay to westbound traffic on Qantas Drive.

The removal of the right turn from Qantas Drive into Sir Reginald Ansett Drive would mean that the Blu Emu car park bus route would have a longer route via Robey Street and O'Riordan Street to access Sir Reginald Ansett Drive and Ross Smith Avenue, resulting in a change in their operations. The time to complete a circuit to the car park would likely increase in comparison with existing times. Other traffic would be less effected as an alternative route from Joyce Drive into Ross Smith Avenue is available about 600 metres further east along Qantas Drive/Joyce Drive.

Table 7-10 Terminals 2/3 access and egress performance – AM peak

Intersection and movement (1)				2026						2036					
				'without project'			'with project'			'without project'			'with project'		
				Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS
Terminals 2/3 Access	Qantas Drive	Eastbound	Through	872	14	B	1,185	30	C	799	12	A	1,290	36	C
			Right to Terminals 2/3	563	52	D	1,304	40	C	468	52	D	1,272	40	C
	O'Riordan Street	Southbound	Left	170	26	B	173	9	A	245	21	B	257	9	A
			Through to Terminals 2/3	551	117	F	536	36	C	542	99	F	472	31	C
			Right	556	146	F	811	28	C	576	138	F	899	31	C
	Joyce Drive	Westbound	Left to Terminals 2/3	1,121	161	F	879	33	C	1,069	157	F	880	43	D
			Through	1,147	226	F	1,810	32	C	1,259	219	F	2,169	50	D

Intersection and movement (1)				2026						2036					
				'without project'			'with project'			'without project'			'with project'		
				Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS
Terminals 2/3 Egress	Qantas Drive	Eastbound	Left	1,192	194	F	511	63	E	1,030	253	F	516	54	D
			Through	967	154	F	390	48	D	822	204	F	451	48	D
	Seventh Street	Northbound	Left from Terminals 2/3	513	302	F	1,486	4	A	504	297	F	1,416	3	A
			Through from Terminals 2/3	396	497	F	534	98	F	342	583	F	530	89	F
			Right from Terminals 2/3	470	348	F	481	117	F	451	359	F	518	102	F
	Qantas Drive	Westbound	Through	823	10	A	1,646	8	A	1,016	46	D	1,870	16	B
			Right	841	121	F	932	44	D	783	181	F	1,176	51	D

(1) 2026 and 2036 includes demand associated with M4-M5 Link and Rozelle Interchange which causes high levels of congestion within Mascot and the network would have high unmet demand

Table 7-11 Terminals 2/3 access and egress performance – PM peak

Intersection and movement (1)				2026						2036					
				'without project'			'with project'			'without project'			'with project'		
				Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS
Terminals 2/3 Access	Qantas Drive	Eastbound	Through	743	34	C	998	44	D	775	27	B	1,063	43	D
			Right to Terminals 2/3	592	63	E	1,613	40	C	473	42	C	1,454	40	C
	O'Riordan Street	Southbound	Left	765	15	B	1,024	11	A	1,028	16	B	1,247	16	B
			Through to Terminals 2/3	959	49	D	740	27	B	665	40	C	482	26	B
			Right	721	41	C	1,085	24	B	782	43	D	999	23	B
	Joyce Drive	Westbound	Left to Terminals 2/3	1,078	98	F	1,054	37	C	907	188	F	818	30	C
			Through	1,097	92	F	1,942	32	C	780	289	F	1,891	26	B

Intersection and movement (1)				2026						2036					
				'without project'			'with project'			'without project'			'with project'		
				Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS	Volume	Average delay	LoS
Terminals 2/3 Egress	Qantas Drive	Eastbound	Left	425	54	D	95	36	C	571	33	C	96	36	C
			Through	705	59	E	304	37	C	670	33	C	409	37	C
	Seventh Street	Northbound	Left from Terminals 2/3	678	32	C	1,403	2	A	691	32	C	1,408	2	A
			Through from Terminals 2/3	946	66	E	417	51	D	930	36	C	355	50	D
			Right from Terminals 2/3	657	39	C	560	98	F	589	32	C	548	98	F
	Qantas Drive	Westbound	Through	1,089	26	B	2,283	16	B	1,094	70	F	2,170	16	B
			Right	657	117	F	694	32	C	398	330	F	684	27	B

(1) 2026 and 2036 includes demand associated with M4-M5 Link and Rozelle Interchange which causes high levels of congestion within Mascot and the network would have high unmet demand

7.8.3 Consistency with Sydney Airport Master Plan 2039

The project is consistent with the ground transport goals and objectives of the *Sydney Airport Master Plan 2039* and the *Environment Strategy 2019-2024*. An objective of the master plan is to 'improve ground access, to, from and past the airport' and the Sydney Gateway road project is expected to play a principal role in achieving this objective.

The project is designed to improve access to Sydney Airport, reduce congestion around Sydney Airport and improve travel times to/from Sydney Airport. The project would complement future *Master Plan 2039* upgrades taking place within and connecting to the Sydney Airport terminals.

Specifically, the project would deliver the following works that were identified in the master plan:

- Widening of Airport Drive
- Widening and upgrading Qantas Drive
- Improvements to the intersection of Link Road and Airport Drive
- Improvements to the intersection of Qantas Drive, Robey Street and Seventh Street
- Grade separation at the entry to Terminals 2/3.

The project is therefore considered to be consistent with the *Sydney Airport Master Plan 2039* as it would deliver a number of key aspects of the Sydney Airport *Five Year Ground Transport Plan* and would result in improved ground access to Sydney Airport.

7.9 Summary of impacts on Port Botany

As seen in Figure 7-23 and Figure 7-24 the travel times between St Peters interchange and Foreshore Road (near Port Botany) would substantially reduce with the project. In 2026, travel time savings of up to 17 minutes would be experienced, increasing to more than 20 minutes in 2036. Conversely, the project would reduce demand for the existing route between Port Botany and M5 East. Travel times along this route would improve marginally. In particular, in the westbound direction travel times would improve by more than two minutes in 2026 and 2036.

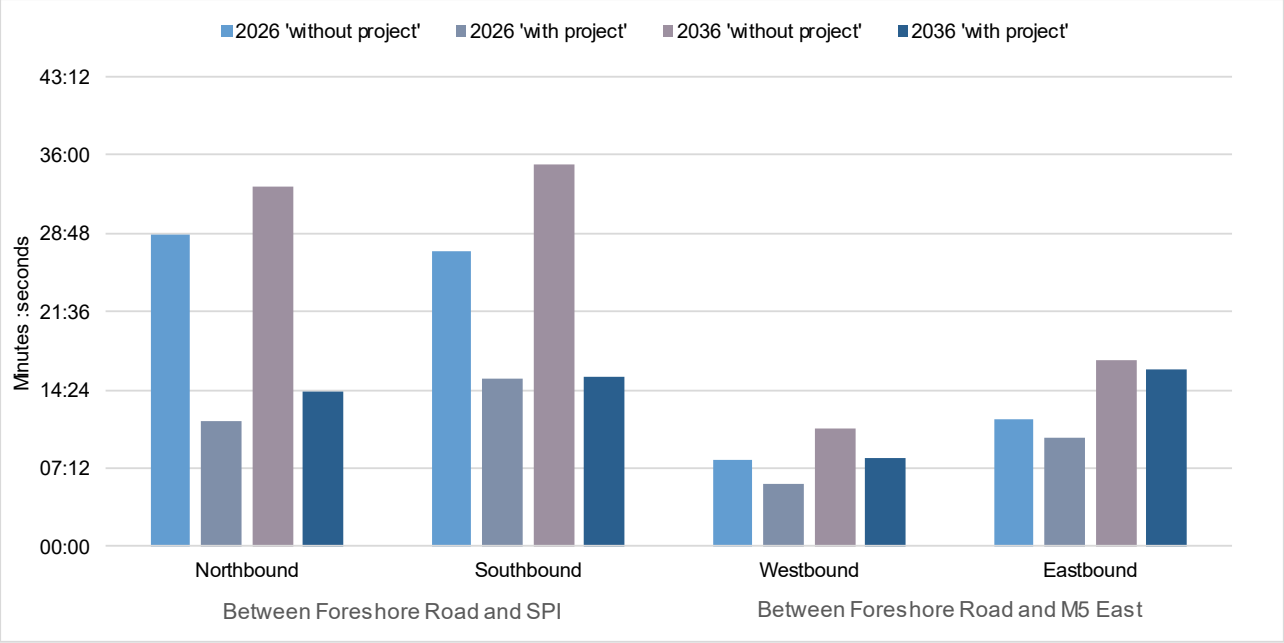


Figure 7-23 Travel times to/from Foreshore Road in the AM peak

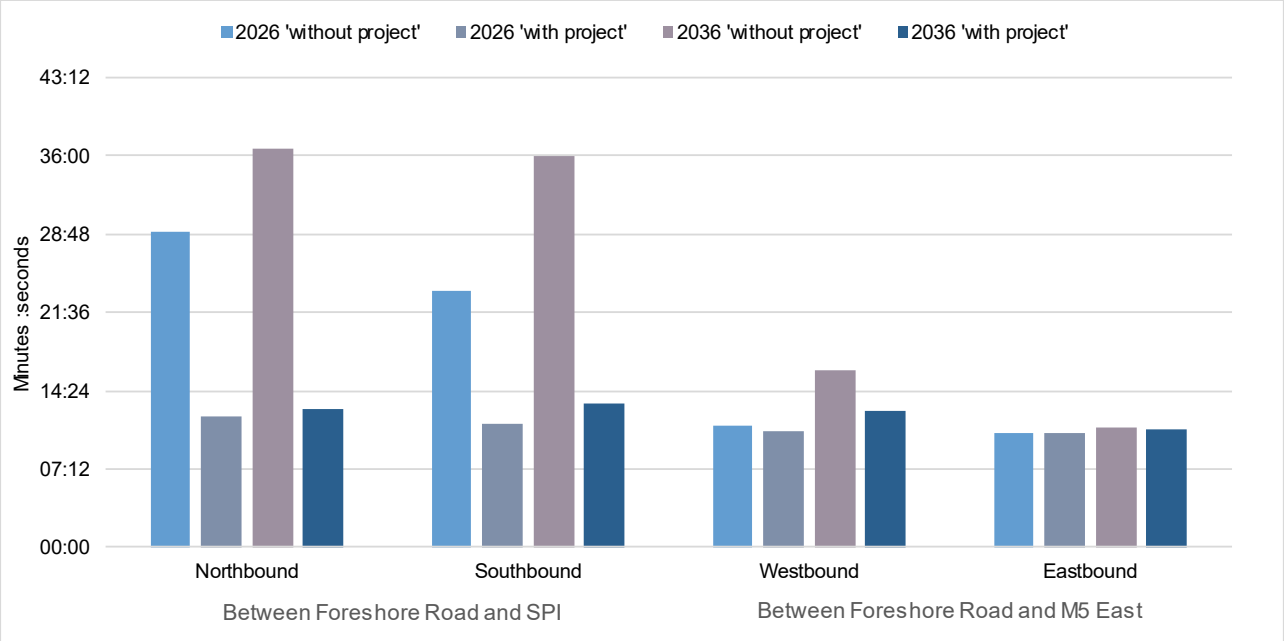


Figure 7-24 Travel times to/from Foreshore Road in the PM peak

8. Cumulative impact assessment

This section summarises and compares the forecast transport network operation and performance for the 'cumulative' and 'with project' scenario in 2036. This year aligns with the traffic assessment and modelling undertaken for the project to enable comparative analysis of the operational transport impacts in the future as required by the SEARs.

While 'cumulative' scenarios were generated for both 2026 and 2036, only the first stage of the F6 Extension would be open by 2026 which has a marginal impact on the study area road network. The majority of the additional planned (uncommitted) infrastructure considered under the 'cumulative' scenario are planned to be completed by 2036 and as such the impact assessment has focused on this forecast year.

The 'cumulative' scenario refers to the infrastructure already included within the 'with project' scenario, in addition to other planned motorway projects in this case the proposed F6 Extension, the Western Harbour Tunnel and Beaches Link. In this context 'cumulative' is referring to proposed motorway projects which are still in the planning phase and which are not yet committed infrastructure projects for construction.

The methodology that was adopted to complete the cumulative assessment is discussed in section 3.

8.1 Overview

8.1.1 Operational impacts

The analysis of the future road network including the F6 Extension and the Western Harbour Tunnel and Beaches Link in 2036 indicates a general reduction on the surrounding local road network with a shift in traffic onto WestConnex and the F6 Extension. The key routes benefiting from this shift in traffic to the new motorway network are the M1 (along Southern Cross Drive and General Holmes Drive) and Princes Highway through St Peters, Sydenham and Tempe. The opening of the additional motorway infrastructure does result in some minor increases in traffic to and from the project from St Peters interchange which provides access to the wider motorway network.

The opening of the F6 Extension and the Western Harbour Tunnel and Beaches Link in 2036 attracts additional traffic due to the increased capacity provided by the new infrastructure with the total traffic demand increasing from 110,705 vehicles to 113, 827 vehicles (three per cent) in the AM peak, and from 109,903 vehicles to 113,801 vehicles (four per cent) in the PM peak.

The additional capacity results in an overall improvement in the road network performance in the AM peak, however results in little to no change in the road network performance in the PM peak, with the additional traffic unable to access the network due to upstream congestion constraints.

The majority of intersections would continue to operate at similar levels of service in 2036 once the F6 Extension and Western Harbour Tunnel and Beaches Link are opened with most of them indicating a marginal improvement in average delays. Only two intersections indicated a slightly higher increase in delay, namely at O'Riordan Street and Gardeners Road intersection and Gardeners Road and Bourke Street intersection which may warrant further collaborative investigation during further design phases of the project.

Similarly, the midblock and merge and diverge assessment indicated that the majority of locations would continue to operate at similar levels of service after the opening of the F6 Extension and the Western Harbour Tunnel and Beaches Link in 2036. The assessment did however highlight increases in traffic to and from the project via St Peters interchange and Qantas Drive, in particular in the westbound direction during the PM peak in 2036.

The changes in travel time due to the opening of the F6 Extension and Western Harbour Tunnel and Beaches Link indicate marginal changes overall for both the AM and PM peaks with the majority of routes indicating a slight improvement in travel times. Three routes however were noted as being impacted by increased delays due to the opening of the additional planned motorway infrastructure in 2036 which would warrant further investigation:

- Robey Street – Qantas Drive – Botany Road eastbound in the AM peak and westbound in the PM peak
- M5 East – Marsh Street to M1 at Southern Cross Drive eastbound in the PM peak
- Unwins Bridge Road – May Street and Princes Highway to Railway Road (route 12) in both directions in the PM peak.

A general reduction in traffic volumes along existing bus routes on local roads due to the opening of the F6 Extension and Western Harbour Tunnel and Beaches Link in 2036 would result in bus travel time savings. This would improve bus reliability for the majority of bus routes including substantial improvements along Sydney Park Road to Brodie Spark Drive in the AM and PM peak and on General Holmes Drive in the PM peak. In the AM peak only one route shows a substantial increase in travel times of around 33 per cent along Airport Drive in the westbound direction. The PM peak also only has one route indicating a substantial increase of 30 per cent along O'Riordan Street and Qantas Drive in the northbound direction. In both cases, however, while the percentage increase appears substantial, the resulting increase in travel time is under three minutes.

The new F6 Extension includes new shared cycle and pedestrian pathways in 2036. However, these do not connect to the active transport corridors within the project area. Given the proximity of the F6 Extension to the project study area there would be an opportunity to investigate measures to connect the corridors to further encourage active transport.

In addition to the above benefits, there are no differences identified to the impacts on parking and access in the 'cumulative' scenario in 2036.

8.1.2 Construction impacts

Based on assessment of the proposed construction staging and proposed time-frames, the following key conclusions on 'cumulative' construction impacts are noted:

- The key projects which are relevant for the cumulative assessment are the M4-M5 Link, Botany Rail Duplication and the F6 extension
- The construction traffic volumes generated by the projects identified above represent less than three per cent of existing traffic volumes and are unlikely to affect traffic network performance outside the bounds of daily variation. Therefore, the cumulative traffic impacts are minor
- Substantial impacts are expected due to the proposed construction phase weekend closures of Robey Street and O'Riordan Street. This proposal requires further clarification with the Botany Rail Duplication project team to ensure that cumulative impacts can be mitigated and managed.

As plans for each of the projects further develop and contractors finalise construction programs and methodologies, there would be further opportunity to refine the Construction Traffic and Access Management Plan (CTAMP) for the project. The CTAMP needs to consider any overlap in heavy vehicle and other access routes across the multiple projects. In addition, the proposed weekend closures of Robey Street and O'Riordan Street require further clarification with the Botany Rail Duplication project team to ensure that cumulative impacts can be mitigated and managed. Therefore, the CTAMP should be developed in collaboration with the Botany Rail Duplication project team.

8.2 Operational impacts on the road network

This section summarises the future road network conditions in 2036 with the project to those conditions in the 2036 'cumulative' scenario to understand the impacts of the planned F6 Extension and Western Harbour Tunnel and Beaches Link on the road network and the project. The 'cumulative' scenario includes the project in addition to other planned motorway projects, in this case, the F6 Extension and the Western Harbour Tunnel and Beaches Link.

8.2.1 Traffic volumes and patterns

The traffic volume changes between the 2036 'cumulative' and 'with project' scenarios are diagrammatically shown on Figure 8-1.

The green areas represent roads that are expected to carry less traffic in the future and the red areas represent roads that are expected to carry more traffic in the future. The thickness of the band indicates the magnitude of the change in volume.

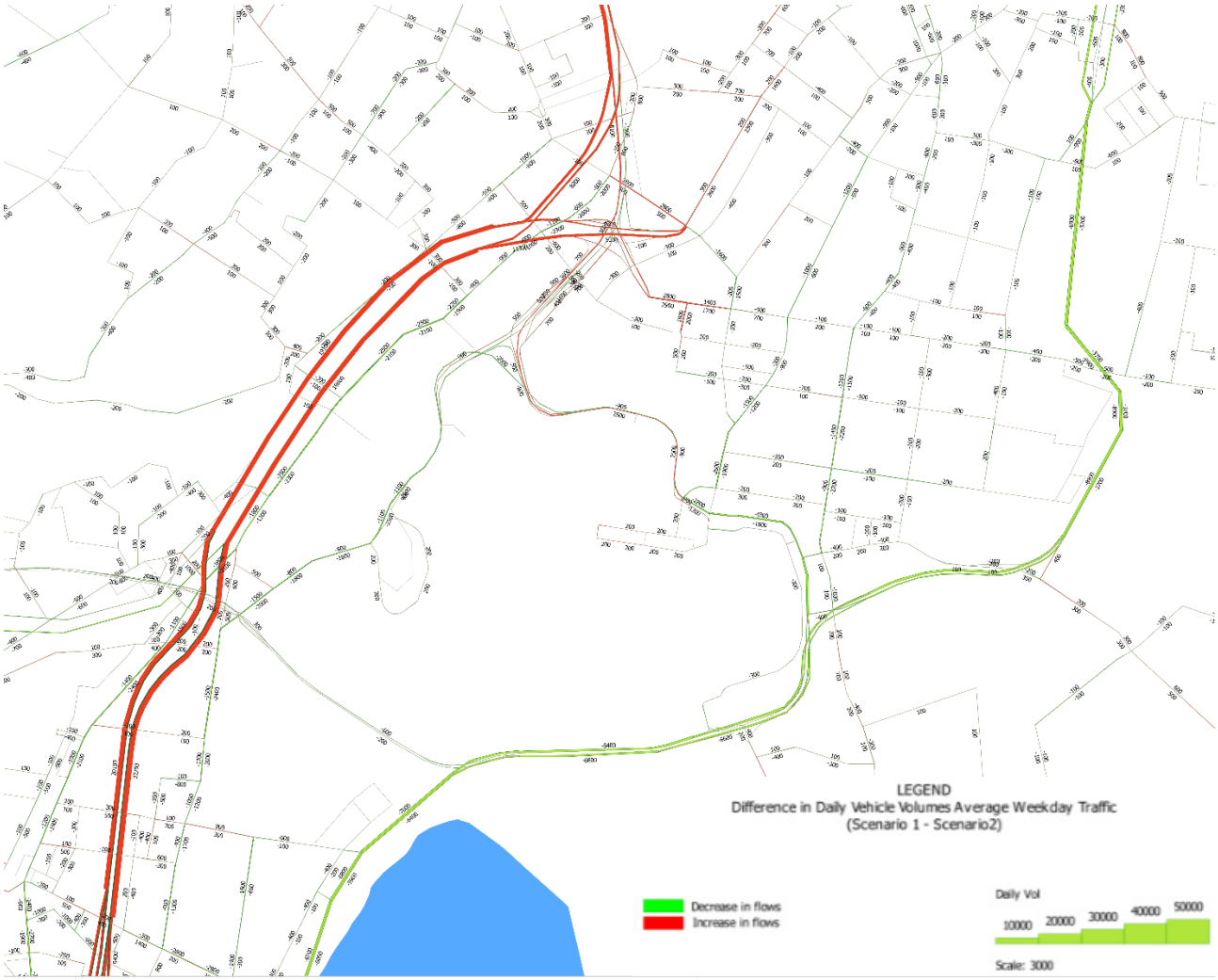


Figure 8-1 Change in traffic volumes between 2036 'cumulative' and 'with project' scenarios

The following discussion of forecast daily traffic volumes changes refers to average weekday traffic (AWT), unless otherwise mentioned.

8.2.1.1 General traffic

The inclusion of the F6 Extension and the Western Harbour Tunnel and Beaches Link in 2036 results in increased traffic volumes along the New M5 and M4-M5 Link travelling in a north-south direction. The New M5 and the F6 Extension appear to have attracted traffic from the surrounding Local road network in general, but primarily from the M1 (Southern Cross Drive and General Holmes Drive) as well as Princes Highway through St Peters, Sydenham and Tempe. A marginal decrease in traffic along O'Riordan Street through central Mascot, and Botany Road is also predicted.

The impact of the additional motorway projects on the project and the surrounding study area are marginal with a minor decrease in traffic along Marsh Street and a minor increase in traffic to and from St Peters interchange connecting to the New M5 and M4-M5 Link.

8.2.1.2 On-road freight

Changes to heavy vehicle travel patterns in 2036 due to the F6 Extension and Western Harbour Tunnel and Beaches Link are forecast to follow a similar pattern to the general traffic. That is, heavy vehicles are predicted to shift to the new infrastructure in the 2036 'cumulative' scenario from the surrounding local road network in particular from the M1 (along Southern Cross Drive and General Holmes Drive) to the New M5, M4-M5 Link and F6 Extension.

8.2.2 Travel demand and traffic shift

Traffic patterns including forecast growth and how traffic may shift between alternative routes or corridors can be identified by comparing the proportion of total traffic volumes that cross a line at specific points for various scenarios (known as a screenline assessment). The shift in traffic was analysed across three screenlines as defined in section 3.

8.2.2.1 Sydney Gateway screenline

Table 8-1 and Figure 8-2 compare the daily traffic volumes and proportions on key corridors crossing the Sydney Gateway screenline, which includes routes that run parallel to the project to the north of the study area.

Overall, there is a reduction in both directions along the routes crossing the screenline in the 'cumulative' scenario compared to the 'with project' scenario.

Table 8-1 Daily traffic volumes at points along the Sydney Gateway screenline

Location	2036 'with project'		2036 'cumulative'		Percentage change
	Vehicles	% total	Vehicles	% total	
Princes Highway	32,000	11%	28,600	11%	−11%
Sydney Gateway	87,800	30%	90,100	34%	3%
O'Riordan Street	44,500	15%	40,800	15%	−8%
Botany Road	26,800	9%	23,200	9%	−13%
Southern Cross Drive	98,000	34%	85,000	32%	−13%
Total	**289,100**		**267,700**		**−7%**

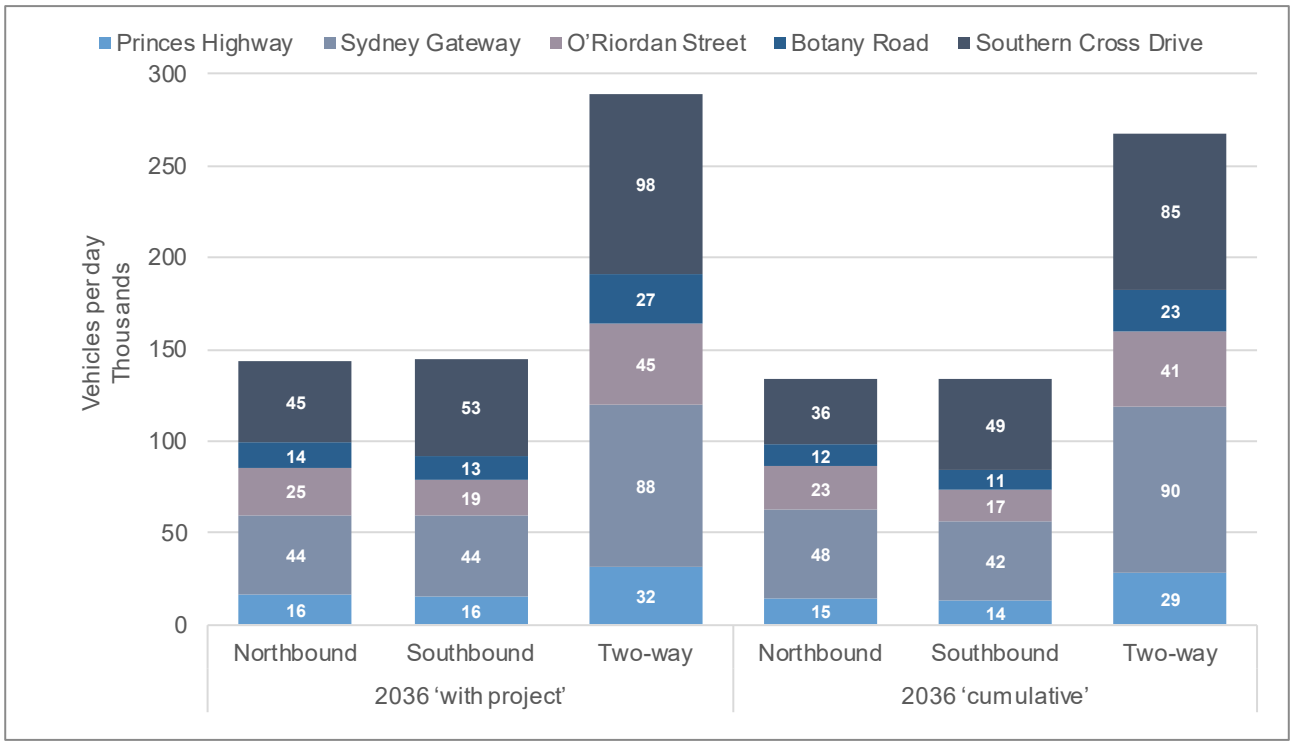


Figure 8-2 Proportion of traffic volumes at points along Sydney Gateway screenline

The total traffic volumes along the Sydney Gateway screenline are forecast to decrease overall by approximately 21,400 vehicles per day (seven per cent) in 2036 as a result of the F6 Extension and Western Harbour Tunnel and Beaches Link.

As shown in Figure 8-2, traffic volume decreases are expected on Princes Highway, O'Riordan Street, Botany Road and Southern Cross Drive due to traffic shifting to the New M5, M4-M5 Link and F6 Extension. The project however shows a marginal increase in traffic volumes of 2,300 vehicles per day (three per cent) due to an increase in traffic between St Peters interchange and Sydney Airport as a result of the additional traffic attracted to WestConnex once the F6 Extension is opened.

8.2.2.2 F6 screenline

Table 8-2 and Figure 8-3 compare the daily traffic volumes and proportions on key corridors crossing the F6 screenline, which includes north-south corridors to the south of the study area.

Table 8-2 Daily traffic volumes at points along the F6 screenline

Location	2036 'with project'		2036 'cumulative'		Percentage change
	Vehicles	% total	Vehicles	% total	
M4-M5 Link	44,000	13%	82,700	23%	88%
Princes Highway	70,700	21%	65,900	19%	−7%
Marsh Street	69,600	20%	67,000	19%	−4%
General Holmes Drive	155,300	46%	140,400	39%	−10%
Total	**339,600**		**356,000**		**5%**

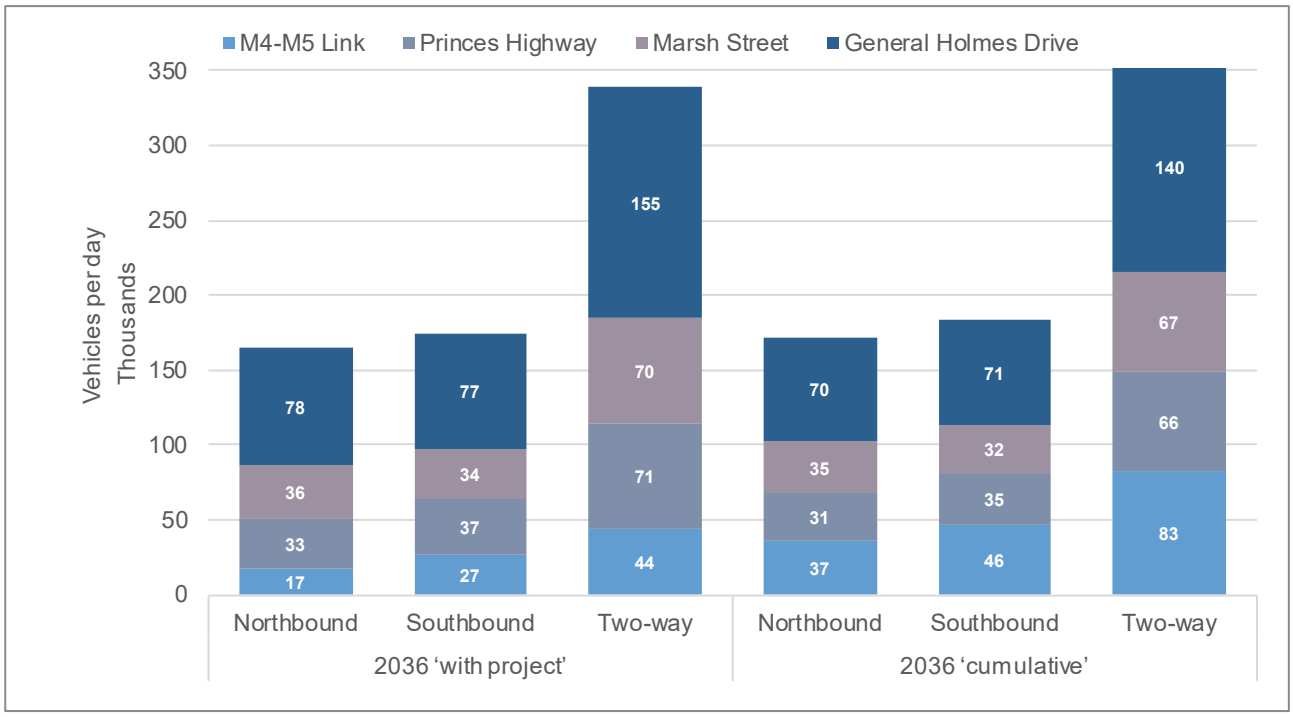


Figure 8-3 Proportion of traffic volumes at points along F6 screenline

The total traffic volumes along the F6 screenline are forecast to increase by around 16,400 vehicles per day (five per cent) due to the 'cumulative' impacts of the planned motorway projects opening in 2036. This increase is largely due to the increase in traffic on the new F6 Extension linking into WestConnex resulting in a substantial increase of 38,700 vehicles per day (88 per cent) on the M4-M5 Link. This shift in traffic to the M4-M5 Link results in a decrease in traffic along Princes Highway, Marsh Street and General Holmes Drive.

Overall the proportion of traffic on the M4-M5 Link increases particularly in the southbound direction in the 2036 'cumulative' scenario resulting in a decrease in traffic along the other routes but in particular along General Holmes Drive which indicates the largest shift in traffic to the M4-M5 Link and F6 Extension at 14,900 vehicles per day (10 per cent).

8.2.2.3 Port Botany screenline

Table 8-3 and Figure 8-4 below compare the daily traffic volumes and proportion on key corridors crossing the Port Botany screenline, which includes routes to the east of the study area.

Table 8-3 Daily traffic volumes at points along the Port Botany screenline

Location	2036 'with project'		2036 'cumulative'		Percentage change
	Vehicles	% total	Vehicles	% total	
Foreshore Road	45,800	39%	46,900	40%	2%
Botany Road	20,300	17%	20,500	17%	1%
Wentworth Ave	50,400	43%	51,000	43%	1%
Total	**116,500**		**118,400**		**2%**

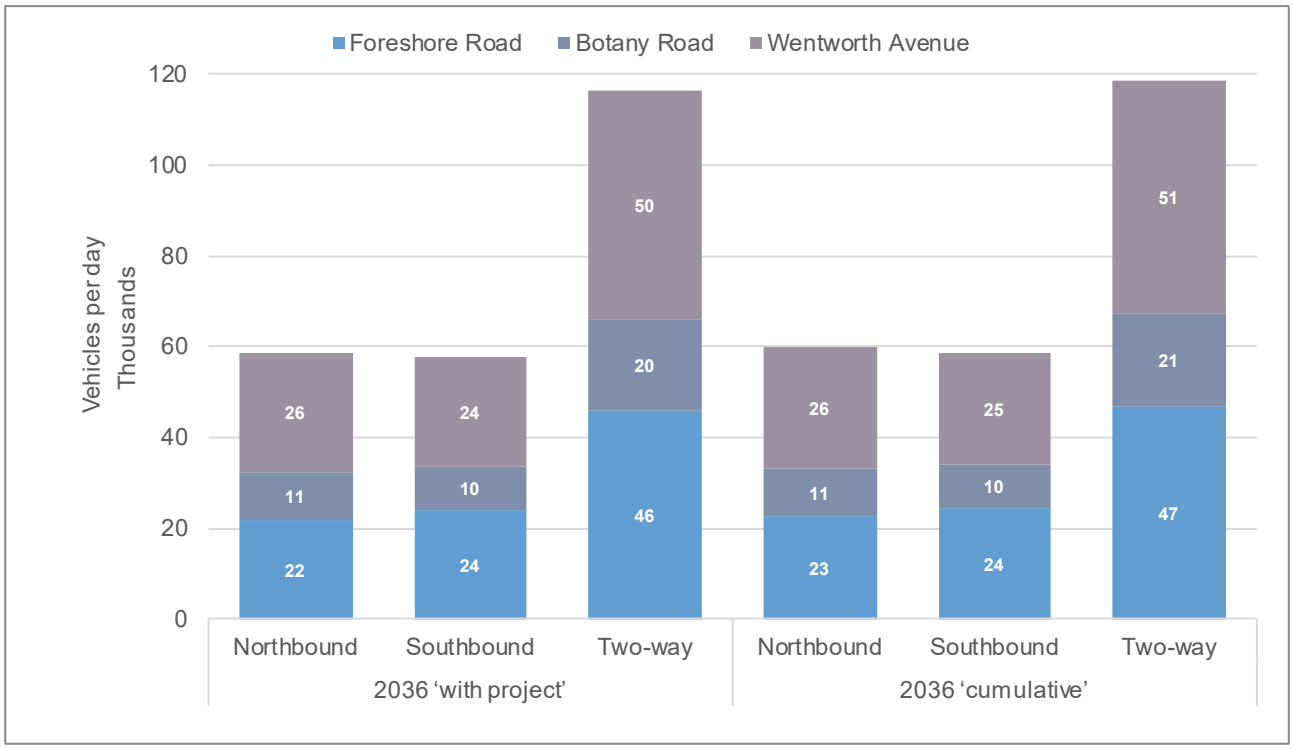


Figure 8-4 Proportion of traffic volumes at points along Port Botany screenline

The total traffic volumes along the Port Botany screenline are forecast to marginally increase by around 1,900 vehicles per day (two per cent) in 2036 due to the 'cumulative' impacts of the F6 Extension and Western Harbour and Beaches Link opening in 2036.

Overall there is very little change along Foreshore Road, Botany Road and Wentworth Avenue in terms of traffic volumes and proportions with all roads indicating a negligible increase in traffic volumes of around one to two per cent per day.

8.2.2.4 Overall

The total traffic volumes across all the measured screenlines for the corridors in the study area would only marginally decrease in 2036 due to the opening of the F6 extension and Western Harbour Tunnel and Beaches Link. Overall these corridors would collectively carry 3,100 vehicles per day less (two-way), representing around less than 0.5 per cent growth.

8.2.2.5 Heavy vehicle analysis

Heavy vehicle traffic patterns are similar to those noted above for general traffic across the three screenlines. The following observations are noted for heavy vehicle traffic:

- Traffic crossing the Sydney Gateway screenline would decrease overall
- Traffic crossing the F6 screenline is forecast to decrease at all locations except the F6 Extension which attracts more traffic once open
- Traffic crossing the Port Botany screenline is expected to slightly increase.

8.2.3 Overall network performance statistics

Table 8-4 and Table 8-5 compare the forecast road network performance statistics for the 'cumulative' and 'with project' conditions in 2036 for the AM and PM peak hours respectively.

In the AM, the total network traffic demand increases from 110,705 to 113,827 vehicles, an increase of three per cent, due to additional induced traffic as a result of the opening of the F6 Extension and Western Harbour Tunnel and Beaches Link. Overall a marginal improvement in road network performance is noted based on the following:

- The average vehicle speeds would increase from approximately 18 km/h with the project to 19 km/h with the additional planned motorway improvements in 2036
- The marginal increase in average vehicle speeds has a corresponding impact on average vehicle trip time through the network decreasing from just over 11 minutes with the project to less than 11 minutes in the 'cumulative' scenario in 2036
- The number of vehicles that would not be able to access the network due to upstream traffic congestion (total unreleased trips) would decrease marginally from around 8,877 vehicles to 8,189 vehicles in 2036 once the F6 Extension and Western Harbour Tunnel and Beaches Link are opened
- The decrease in the total number of unreleased trips is noted even with an increase in total traffic demand once the additional planned motorway projects are opened in 2036 with the percentage of unreleased trips dropping from eight per cent to seven percent.

While the AM peak shows a marginal improvement overall, the PM peak indicates little to no change in the road network performance once the F6 Extension and Western Harbour Tunnel and Beaches Link are opened based on the following:

- The average vehicle speeds would marginally decrease by one per cent with speeds remaining around 30 km/h once the F6 Extension and Western Harbour Tunnel and Beaches Link are opened in 2036
- The average vehicle trip time through the network increases by less than one percent with the opening of F6 Extension and Western Harbour Tunnel and Beaches link in 2036 with the average time remaining relatively unchanged at just under 11 minutes
- The number of vehicles that would not be able to access the network due to upstream traffic congestion (total unreleased trips) would increase from around 8,700 to 13,082 due to the increased travel demand resulting from the opening of the F6 Extension and Western Harbour Tunnel and Beaches Link in 2036.

Based on the above, the opening of the F6 Extension and Western Harbour Tunnel and Beaches Link project results in a marginal improvement in the overall network performance during the AM peak, however results in little to no change in performance in the PM peak. This indicates that the network is at capacity during the PM peak with congestion constraints restricting the number of additional vehicles being able to enter the network in 2036.

Table 8-4 Network performance –2036 'with project' vs 'cumulative' scenario – AM peak

Network measure	2036 AM 'with project'	2036 AM 'cumulative'	% change 'with project' vs 'cumulative'
Network statistics for all vehicles			
Total traffic demand (vehicles)	110,705	113,827	3%
Total vehicle kilometres travelled through network (km)	339,361	355,916	5%
Total vehicle travel time through the network (hours)	19,322	18,885	−2%
Total vehicles entering the network	101,828	105,639	4%
Total number of stops	247,729	243,539	−2%
Average vehicle statistics			
Average vehicle trip length through the network (km)	3.3	3.4	1%
Average vehicle trip time through the network (min)	11.4	10.7	−6%
Average number of stops per trip	2.4	2.3	−5%
Average trip speed	17.6	18.8	7%
Unreleased traffic			
Total unreleased trips	8,877	8,189	–
Per cent of demand unreleased	8%	7%	–

Table 8-5 Network performance –2036 'with project' vs 'cumulative' scenario – PM peak

Network measure	2036 PM 'with project'	2036 PM 'cumulative'	% change 'with project' vs 'cumulative'
Network statistics for all vehicles			
Total traffic demand (vehicles)	109,903	113,801	4%
Total vehicle kilometres travelled through network (km)	370,250	376,590	2%
Total vehicle travel time through the network (hours)	17,918	18,028	1%
Total vehicles entering the network	101,203	100,719	−1%
Total number of stops	217,026	217,884	<1%
Average vehicle statistics			
Average vehicle trip length through the network (km)	3.7	3.7	0%
Average vehicle trip time through the network (min)	10.6	10.7	1%
Average number of stops per trip	2.1	2.2	1%
Average trip speed	20.7	20.9	1%
Unreleased traffic			
Total unreleased trips	8,700	13,082	-
Per cent of demand unreleased	8%	12%	-

8.2.4 Intersection performance

This section presents a comparison of the anticipated intersection performance at key intersections during the AM and PM peak hours for the 'with project' and 'cumulative' conditions in 2036. The average delay at each intersection is shown in Figure 8-5, with further details relating to intersection performance included in Appendix C.

The majority of intersections would operate with the same or better LoS in 2036 once the F6 Extension and Western Harbour Tunnel and Beaches Link are opened. The exception is at the Bourke Road and Gardeners Road intersection which deteriorates from LoS E to F in the PM peak hour.

The average delay across major of the intersections would decrease by up to 70 seconds. However, eight intersections would experience increased average delays by up to 45 seconds in the AM peak hour. In the PM peak hour, five intersections would experience increased average delays of up to 26 seconds.

Based on the above changes, the road network would perform in a similar manner in 2036 once the F6 Extension and Western Harbour Tunnel and Beaches Link open, albeit with some moderate increased delays at around 40 per cent of the nearby intersections.

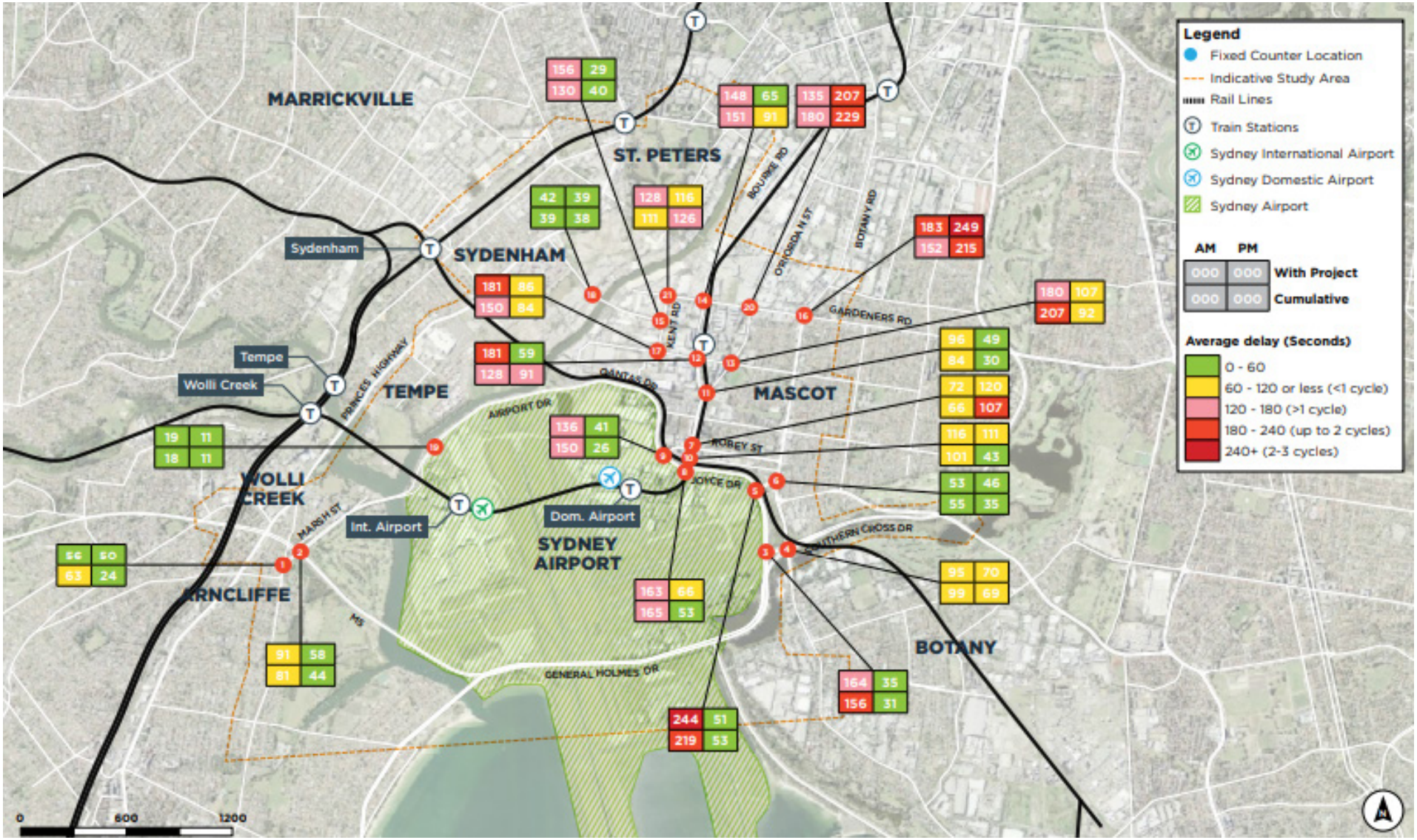


Figure 8-5 Intersection delays 'with project' and 'cumulative' scenario in 2036

8.2.5 Midblock and merge and diverge assessment

Figure 8-6 and Figure 8-7 indicatively show the density and LoS for the AM and PM 'cumulative' scenarios at the midblock and merge and diverge locations.

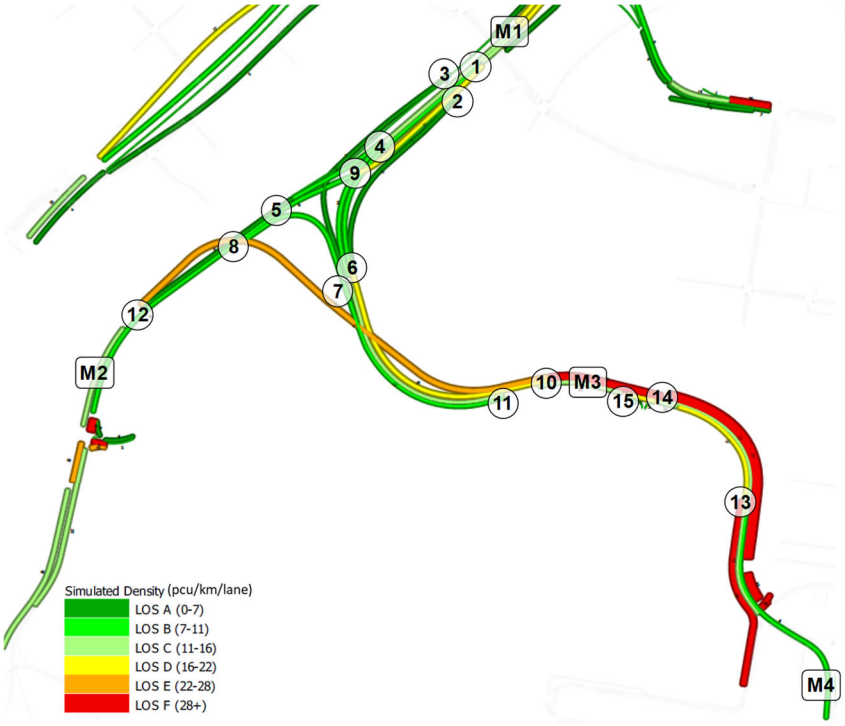
Table 8-6 and Table 8-7 provide a summary of the midblock, merges and diverges for the 'cumulative' scenario. These tables compared the LoS at each location against the 2036 'with project' scenario in the AM and PM peak hours.

In the AM peak, most locations assessed are expected to operate at the same LoS after the F6 Extension and the Western Harbour Tunnel and Beaches Link open. This indicates that there would not be a significant change in the number of vehicles per kilometre of the road. There are four locations where the LoS would deteriorate after the F6 Extension and the Western Harbour Tunnel and Beaches Link open. However, these locations would operate satisfactorily at LoS D or better.

The results for the PM peak also indicate that the majority of the locations assessed are forecast to operate at the same LoS after the F6 Extension and the Western Harbour Tunnel and Beaches Link open. However, the performance of the following four locations would deteriorate to LoS E or F:

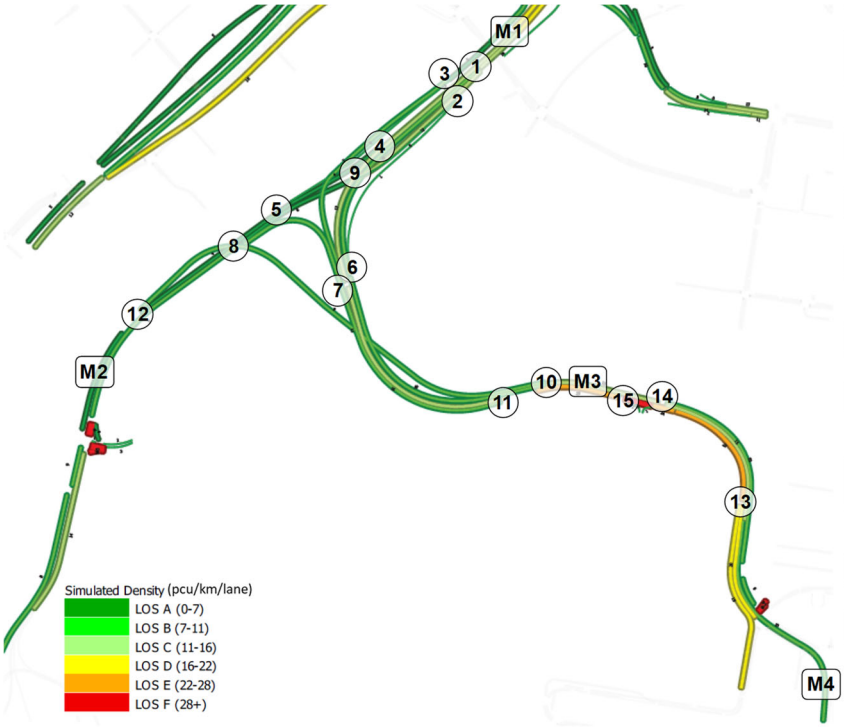
- Qantas Drive to St Peters Interchange M4 westbound (Merge/Diverge Point 11) lowers from LoS D to E
- Qantas Drive and Seventh Street Slip Lane westbound (Merge/Diverge Point 13) lowers from LoS D to E
- Qantas Drive westbound (Merge/Diverge Point 15) lowers from LoS E to F
- The midblock location on Qantas Drive westbound lowers from LoS D to E.

The above locations are all located along Qantas Drive and only affect the westbound direction and are likely due to traffic exiting Terminals 2/3 heading towards St Peters interchange via the project, to connect with the Sydney motorway network.



No.	Description
1	**Southbound Diverge** M4 to Airport Drive and Qantas Drive
2	**Southbound Diverge** M5 to Airport Drive and Qantas Drive
3	**Northbound Merge** Airport Drive and Qantas Drive to M5
4	**Northbound Merge** Airport Drive and Qantas Drive to M4
5	**Northbound Diverge** Airport Drive to M4 and M5
6	**Southbound Merge** M4 and M5 to Qantas Drive
7	**Northbound Diverge** Qantas Drive to M4 and M5
8	**Southbound Merge** New Airport Drive and M4 to Airport Drive
9	**Southbound Merge** M4 and M5 to Airport Drive
10	**Eastbound Merge** Airport Drive and M4 to Qantas Drive
11	**Westbound Diverge** Qantas Drive to Airport Drive and M4
12	**Northbound Diverge** Airport Drive to Qantas Drive and M4
13	**Westbound Merge** Seventh Street Slip Lane and Qantas Drive
14	**Eastbound Diverge** Qantas Drive to Qantas Drive and Central Flyover
15	**Westbound Merge** M5 and M4 to Airport Drive
M1	**Midblock** North of Canal Road
M2	**Midblock** East of West Ramps
M3	**Midblock** Qantas Drive
M4	**Midblock** Central Flyover

Figure 8-6 AM density and Level of Service at merge and diverge locations on the project



No.	Description
1	**Southbound Diverge** M4 to Airport Drive and Qantas Drive
2	**Southbound Diverge** M5 to Airport Drive and Qantas Drive
3	**Northbound Merge** Airport Drive and Qantas Drive to M5
4	**Northbound Merge** Airport Drive and Qantas Drive to M4
5	**Northbound Diverge** Airport Drive to M4 and M5
6	**Southbound Merge** M4 and M5 to Qantas Drive
7	**Northbound Diverge** Qantas Drive to M4 and M5
8	**Southbound Merge** New Airport Drive and M4 to Airport Drive
9	**Southbound Merge** M4 and M5 to Airport Drive
10	**Eastbound Merge** Airport Drive and M4 to Qantas Drive
11	**Westbound Diverge** Qantas Drive to Airport Drive and M4
12	**Northbound Diverge** Airport Drive to Qantas Drive and M4
13	**Westbound Merge** Seventh Street Slip Lane and Qantas Drive
14	**Eastbound Diverge** Qantas Drive to Qantas Drive and Central Flyover
15	**Westbound Merge** M5 and M4 to Airport Drive
M1	**Midblock** North of Canal Road
M2	**Midblock** East of West Ramps
M3	**Midblock** Qantas Drive
M4	**Midblock** Central Flyover

Figure 8-7 PM density and Level of Service at merge and diverge locations on the project

Table 8-6 2036 AM peak hour midblock, merge and diverge Level of Service

Segment or location	Type	Direction	2036 'with project'		2036 'cumulative'	
			Density (PCU/km/lane)	Level of Service	Density (PCU/km/lane)	Level of Service
1	Diverge	Southbound	14	C	17	D
2	Diverge	Southbound	4	A	7	A
3	Merge	Northbound	5	A	4	A
4	Merge	Northbound	12	C	13	C
5	Diverge	Northbound	7	B	7	B
6	Merge	Southbound	12	C	18	D
7	Diverge	Northbound	11	B	12	C
8	Merge	Southbound	9	B	9	B
9	Merge	Southbound	14	C	17	D
10	Merge	Eastbound	39	F	50	F
11	Diverge	Westbound	14	C	15	C
12	Diverge	Eastbound	23	E	27	E
13	Merge	Westbound	29	F	32	F
14	Diverge	Eastbound	59	F	77	F
15	Merge	Westbound	19	D	19	D
Midblock south of St Peters interchange	Midblock	Northbound	12	C	13	C
		Southbound	14	C	16	C
Midblock east of west ramps	Midblock	Eastbound	14	C	12	C
		Westbound	8	B	9	B
Midblock Airport Drive	Midblock	Eastbound	39	F	50	F
		Westbound	14	C	15	C
Midblock central flyover	Midblock	Southbound	8	B	8	A

Table 8-7 2036 PM peak hour midblock, merge and diverge Level of Service

Segment	Merge or Diverge	Direction	2036 'with project'		2036 'cumulative'	
			Density (PCU/km/lane)	Level of Service	Density (PCU/km/ lane)	Level of Service
1	Diverge	Southbound	18	D	14	C
2	Diverge	Southbound	0	A	1	A
3	Merge	Northbound	6	A	7	B
4	Merge	Northbound	10	C	13	C
5	Diverge	Northbound	4	A	4	A
6	Merge	Southbound	9	B	10	B
7	Diverge	Northbound	13	C	16	C
8	Merge	Southbound	10	B	11	B
9	Merge	Southbound	18	D	12	C
10	Merge	Eastbound	12	C	15	C
11	Diverge	Westbound	18	D	23	E
12	Diverge	Eastbound	7	A	9	B
13	Merge	Westbound	19	D	23	E
14	Diverge	Eastbound	15	C	15	C
15	Merge	Westbound	23	E	35	F
Midblock South of St Peters interchange	Midblock	Northbound	10	B	12	C
		Southbound	18	D	14	C
Midblock east of west ramps	Midblock	Eastbound	5	A	7	A
		Westbound	10	B	8	B
Midblock Airport Drive	Midblock	Eastbound	12	C	15	C
		Westbound	18	D	23	E
Midblock central flyover	Midblock	Southbound	10	B	10	B

8.2.6 Travel times

The travel times forecast on key routes in 2036 for the 'with project' scenario are compared to the 'cumulative' scenario for the travel time routes described and shown in Table 6-8 and Figure 6-9 previously.

The changes in travel time due to the opening of the F6 Extension and Western Harbour Tunnel and Beaches Link indicate marginal changes overall for both the AM and PM peaks with the majority of routes indicating a slight improvement but with some routes experiencing substantially reduced travel times, in particular:

- M5 East – Marsh Street to M1 at Southern Cross Drive (route 3) in the westbound direction in the PM peak with savings of over seven minutes
- Princes Highway – May Street to Bestic Street (route 2) in the northbound direction in the AM peak with savings of over 12 minutes
- Princes Highway – May Street to Wickham Street and Forest Road (route 1) in the southbound direction in the PM peak with savings of over four minutes.

There are however a few routes which indicate an increase in travel time due to traffic changes in the 'cumulative' scenario when compared to the 'with project' scenario:

- Marsh Street – M5 Intersection to Joyce Drive and General Holmes Drive (route 5) in the westbound direction in the AM peak increases by over three minutes
- M5 East – Marsh Street to M1 at Southern Cross Drive (route 1) in the northbound direction in the PM peak increased by around three minutes
- Unwins Bridge Road – May Street and Princes Highway to Railway Road (route 12) in the eastbound and westbound direction in the PM peak by just over five minutes and seven minutes respectively.

A full analysis of each travel time route is included in Appendix C.

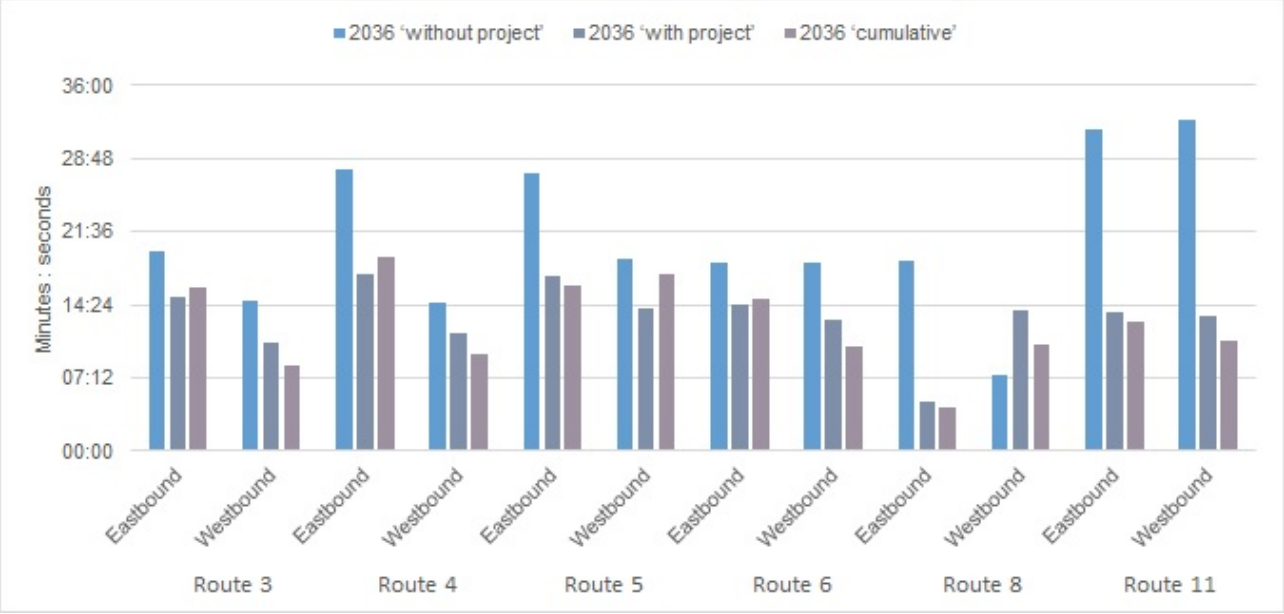


Figure 8-8 East–west routes average travel time comparison – AM peak

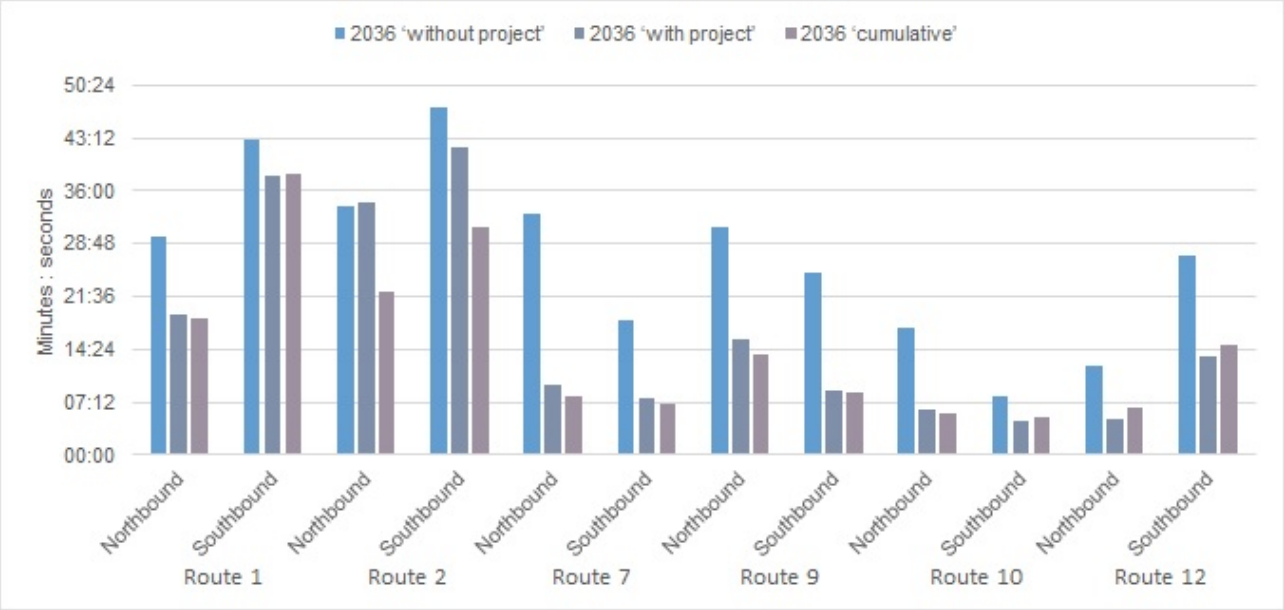


Figure 8-9 North–south routes average travel time comparison – AM peak

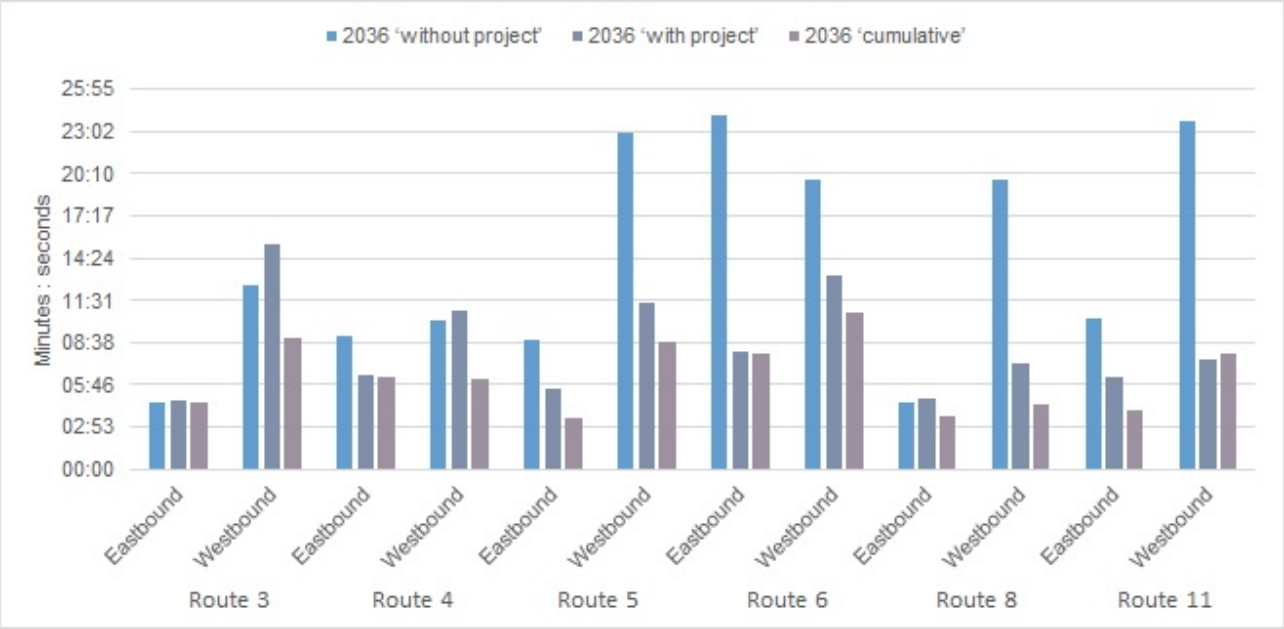


Figure 8-10 East–west routes average travel time comparison – PM peak

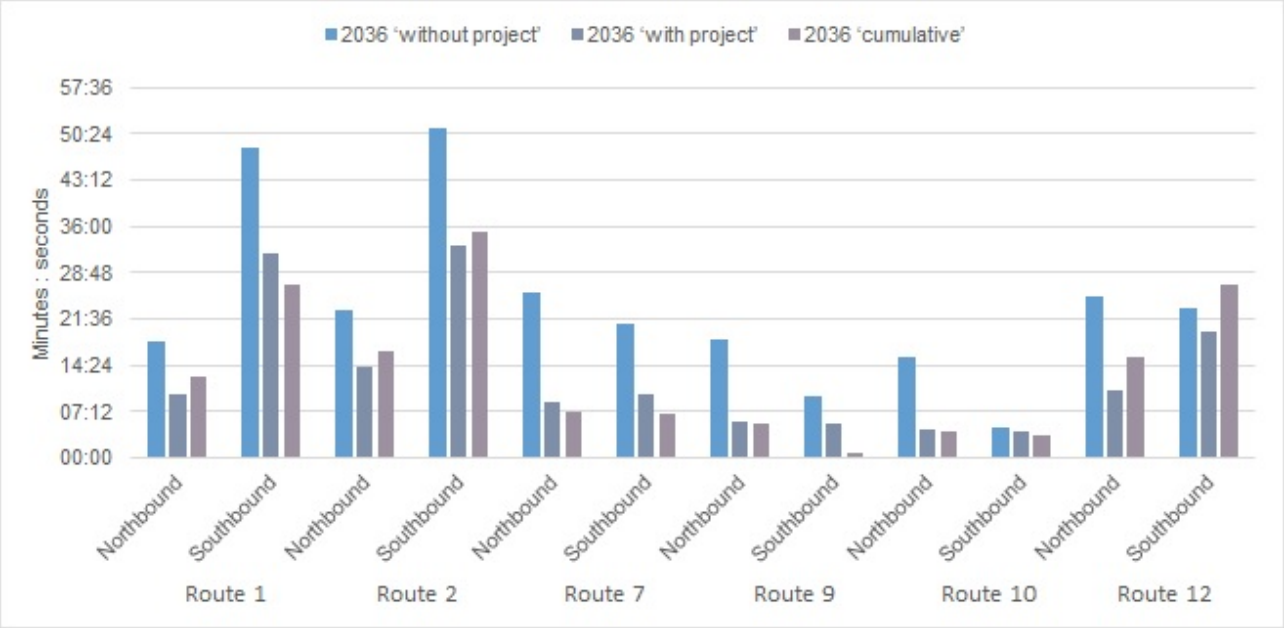


Figure 8-11 North–south routes average travel time comparison – PM peak

8.3 Operational Impacts on public transport

No specific changes to public transport services and routes are included within the 'cumulative' scenario in 2036 when compared to the 'with project' scenario. Overall the travel times for the majority of buses in the study area in both AM and PM peak periods would improve due the F6 Extension and Western Harbour Tunnel and Beaches Link attracting traffic away from the surrounding local road network in 2036. The locations of the bus travel time routes are shown in Figure 7-14.

8.3.1 Bus travel times

A general reduction in traffic volumes along existing bus routes on local roads due to the opening of the F6 Extension and Western Harbour Tunnel and Beaches Link in 2036 would result in improved bus travel times and reliability for the majority of bus routes. Substantial travel time savings are noted along Sydney Park Road, General Holmes Drive, and Coward Street in particular, indicating:

- Up to a 25 per cent reductions for 307, 400, 420, and 420N using route 6 eastbound along Coward Street (Bourke Road to Botany Road and Wentworth Avenue) in the AM peak
- Up to a 65 per cent reductions for 303 using route 2 westbound on General Holmes Drive in the PM peak
- Up to 35 per cent reductions for M20, and 309, 309X, 310 using route 1 southbound, on Botany Road (Gardeners Road to Mill Pond Drive) in the PM peak.

The following three routes show a substantial increase in travel times:

- Up to a 15 per cent increase, or three minutes, for the 303 using route 4 westbound on Canal Road/Ricketty Street in the AM peak
- Up to a 55 per cent increase, or five minutes, for the 420, 420N, and 400 buses using route 3 westbound on Airport Drive
- Up to a 30 per cent increase for 348 and 422 using route 7 in the northbound direction along the Princes Highway in the PM peak.

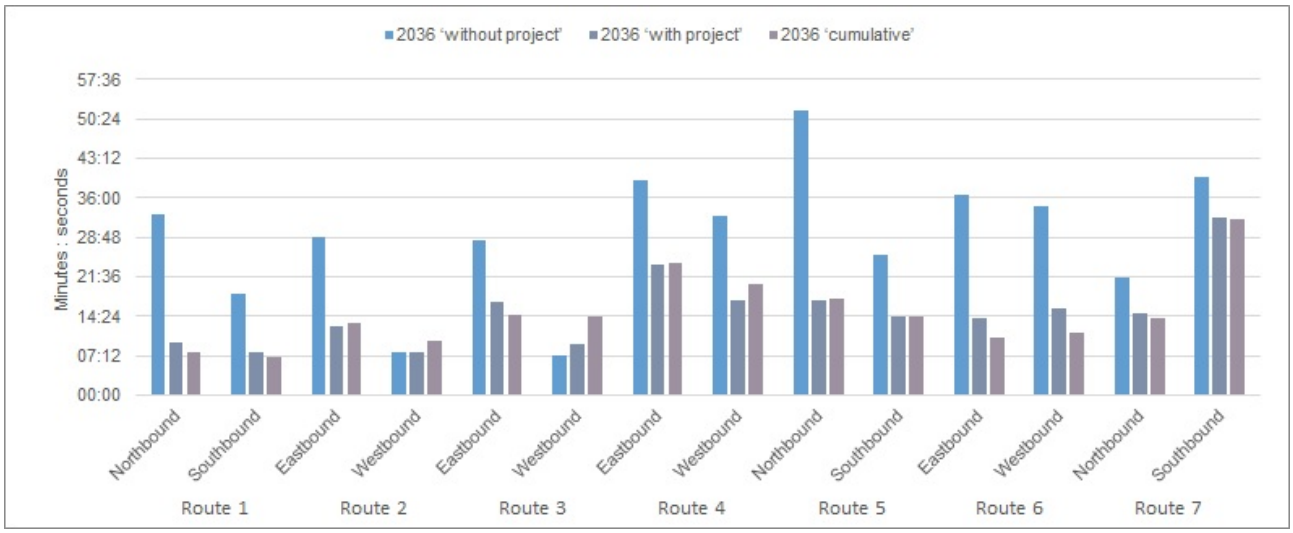


Figure 8-12 Assessed bus routes travel time comparison – AM peak

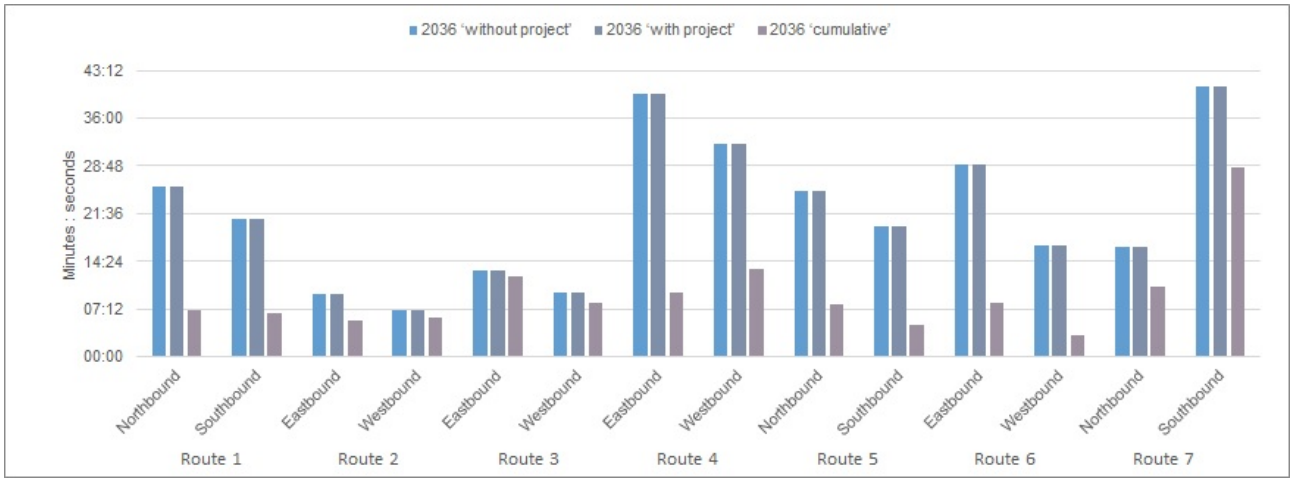


Figure 8-13 Assessed bus routes travel time comparison – PM peak

8.4 Operational impacts to active transport

The new F6 extension includes new shared paths. However, these would not connect to the active transport corridors within the project area. Given the proximity of the F6 Extension to the project study area, there is an opportunity to investigate measures to connect the corridors to further encourage active transport.

8.5 Operational impacts on parking and access

Compared with the 'with project' option, there are no differences identified to the impacts on parking and access in the 'cumulative' scenario in 2036.

8.6 Summary of impacts on Sydney Airport

The opening of the additional motorway infrastructure in the 'cumulative' scenario, results in some minor increases in traffic to and from the project from St Peters interchange which provides access to the wider motorway network. However, as seen in Figure 8-14 and Figure 8-15, the travel times between St Peters interchange and the Sydney Airport terminals would have little change between the 'cumulative' and 'with project' scenarios.

Similarly, the opening of the F6 Extension, Western Harbour Tunnel and Beaches Link would have minor impacts on the average delay and traffic volumes at the accesses to Terminals 2/3, as summarised in Table 8-8 and Table 8-9 for the AM and PM peak hours, respectively.

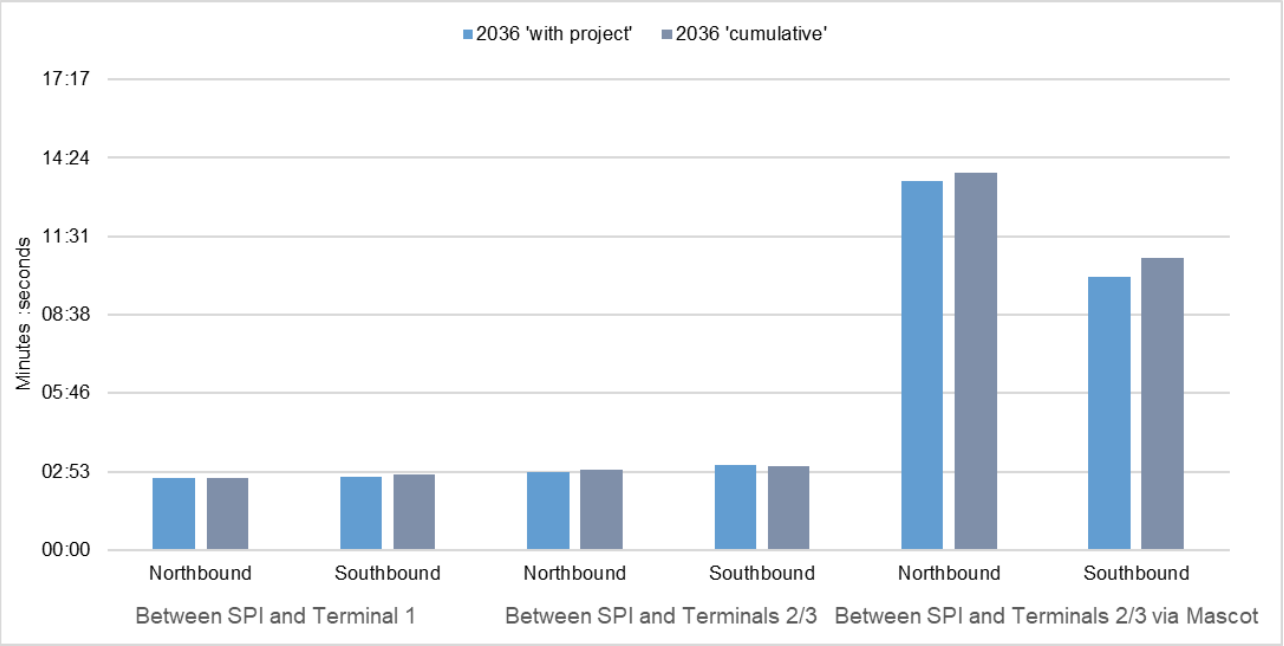


Figure 8-14 Travel time comparisons between St Peters interchange and Sydney Airport terminals in the AM peak

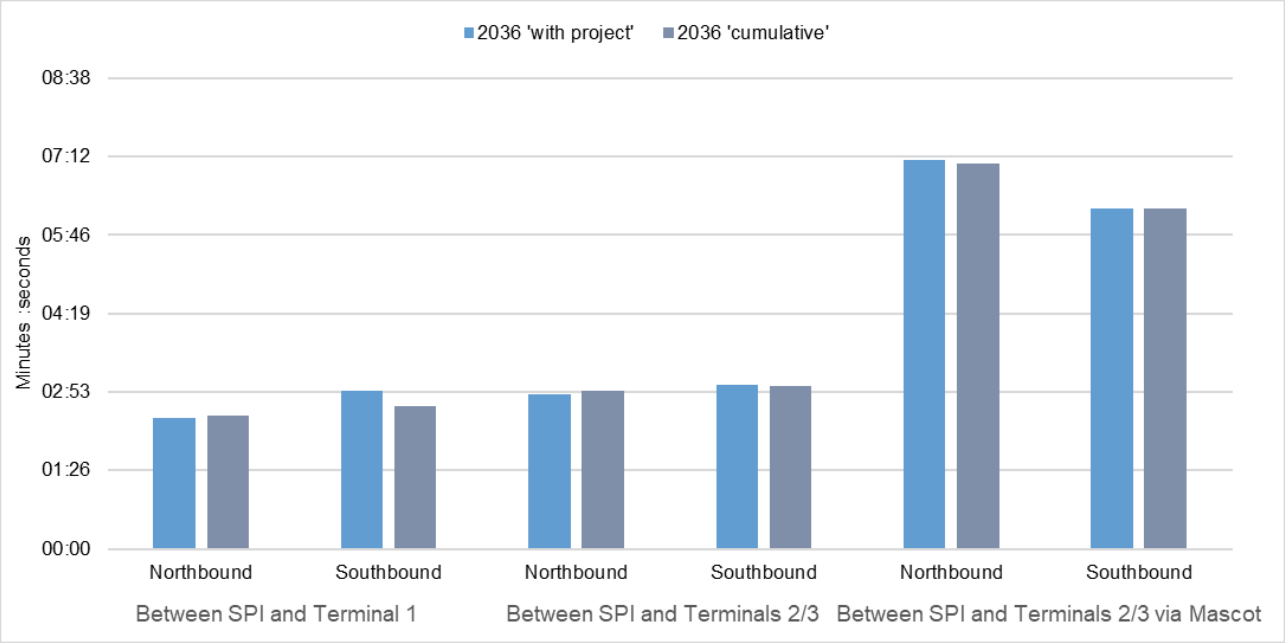


Figure 8-15 Travel time comparisons between St Peters interchange and Sydney Airport terminals in the PM peak

Table 8-8 Terminals 2/3 access and egress performance – AM Peak

Intersection and movement				2036 'with project'			2036 'cumulative'		
				Volume	Average delay	LoS	Volume	Average delay	LoS
Terminals 2/3 Access	Qantas Drive	Eastbound	Through	1,290	36	C	1,339	39	C
			Right to Terminals 2/3	1,272	40	C	1,386	40	C
	O'Riordan Street	Southbound	Left	257	9	A	191	7	A
			Through to Terminals 2/3	472	31	C	453	32	C
			Right	899	31	C	900	28	B
	Qantas Drive	Westbound	Left to Terminals 2/3	880	43	D	874	42	D
			Through	2,169	50	D	2,167	43	D
Terminals 2/3 Egress	Qantas Drive	Eastbound	Left	516	54	D	526	65	E
			Through	451	48	D	548	55	D
	Seventh Street	Northbound	Left from Terminals 2/3	1,416	3	A	1,501	5	A
			Through from Terminals 2/3	530	89	F	503	73	F
			Right from Terminals 2/3	518	102	F	452	135	F
	Qantas Drive	Westbound	Through	1,870	16	B	1,940	12	A
			Right	1,176	51	D	1,109	45	D

Table 8-9 Terminals 2/3 access and egress performance – PM Peak

Intersection and movement				2036 'with project'			2036 'cumulative		
				Volume	Average delay	LoS	Volume	Average delay	LoS
Terminals 2/3 Access	Qantas Drive	Eastbound	Through	1,063	43	D	958	43	D
			Right to Terminals 2/3	1,454	40	C	1,505	40	C
	O'Riordan Street	Southbound	Left	1,247	16	B	1,104	11	A
			Through to Terminals 2/3	482	26	B	487	16	B
			Right	999	23	B	1,196	23	B
	Qantas Drive	Westbound	Left to Terminals 2/3	818	30	C	808	32	C
			Through	1,891	26	B	2,045	27	B
Terminals 2/3 Egress	Qantas Drive	Eastbound	Left	96	36	C	76	37	C
			Through	409	37	C	315	36	C
	Seventh Street	Northbound	Left from Terminals 2/3	1,408	2	A	1,333	2	A
			Through from Terminals 2/3	355	50	D	471	63	E
			Right from Terminals 2/3	548	98	F	540	96	F
	Qantas Drive	Westbound	Through	2,170	16	B	2,542	20	B
			Right	684	27	B	644	33	C

8.7 Cumulative construction impacts

This section considers the 'cumulative' construction impacts on the road, pedestrian and cycle network from other major projects included in the surrounding area. There are two key items related to adjacent projects that have been considered in assessing the cumulative construction impacts as follows:

- Construction traffic generation and movements from those projects
- Road diversions and closures during their construction phase.

The key projects which are relevant for the cumulative assessment are the M4-M5 Link, Botany Rail Duplication and the F6 extension. These have been selected due to their construction timeline, which aligns with the construction of the project, as well as their proximity to the project.

The main impacts from the construction of the M4-M5 link and the F6 extension are related to their construction traffic generation. As these construction sites are remote from the study area there would not be any impact due to road diversions and closures during their construction phase.

The construction of the Botany Rail Duplication would impact on the project in terms of construction traffic generation as well as temporary road diversions and closures. The temporary road diversions and closures due to the Botany Rail Duplication are discussed in section 8.7.2.

8.7.1 Construction traffic generation

The expected construction traffic generation through the study area for each of the adjacent projects is identified as follows:

- F6 extension – the only construction haulage route identified in the F6 extension EIS that affects the project is from the Kogarah Golf Course compound onto Marsh Street, then southbound to the M5 East. The peak period volume of heavy vehicles identified for this route is 66 trucks per hour (two-way) in the AM peak and 82 in the PM peak
- M4-M5 Link – the only construction haulage route identified in the M4-M5 Link EIS that affects the project is from Campbell Street, southbound along Princes Highway. The peak period volume of heavy vehicles identified for this route is 14 trucks per hour (two-way)
- Botany Rail Duplication – the construction traffic generation of this project is expected to be low. The most intensive construction vehicle movements would be at the General Holmes Drive compound with no more than 36 trucks and 88 light vehicles per hour.

Overall the construction traffic volumes identified above represent low traffic volumes when compared with existing traffic volumes along key haulage routes and are unlikely to affect traffic network performance outside the bounds of daily variation. Therefore, the cumulative traffic impacts are minor. In addition to this, with the exception of the Botany Rail Duplication, all construction traffic routes are remote from the project and therefore there is little likelihood of cumulative impacts.

As plans for each of the projects further develop and contractors finalise construction programs and methodologies, there would be further opportunity to refine the Construction Traffic and Access Management Plan for the project to consider any overlap in heavy vehicle and other access routes across the multiple projects.

8.7.2 Botany Rail Duplication

The most substantial cumulative construction impacts are likely to result from Botany Rail Duplication construction activities, which are proposed to affect access to Terminals 2/3. During the construction of the Botany Rail Duplication, weekend closures of Robey Street and O'Riordan Street would occur up to four times per year for construction of new bridges at Robey Street and O'Riordan Street. These road closures would occur during weekends to avoid impacting weekday peak period traffic.

Potential detours for the Robey Street and O'Riordan Street road closures are indicatively shown in Figure 8-16 , with their impacts discussed below.

The impact of the botany Rail Duplication's Robey Street and O'Riordan Street road closures on the following eight intersections were assessed:

- Qantas Drive/Seventh Street/Robey Street
- Robey Street/O'Riordan Street
- O'Riordan Street/Sir Reginald Ansett Drive/Joyce Drive/Qantas Drive
- Ross Smith Avenue/General Holmes Drive/Joyce Drive
- General Holmes Drive/Wentworth Avenue
- Botany Road/Wentworth Avenue
- Botany Road/General Holmes Drive
- Botany Road/Robey Street.

It is understood that the Botany rail line would be maintained during the Botany Rail Duplication construction works except during short-term closures at nights and on weekends. Therefore, the cumulative impact assessment associated with these works are limited to the above road closures.

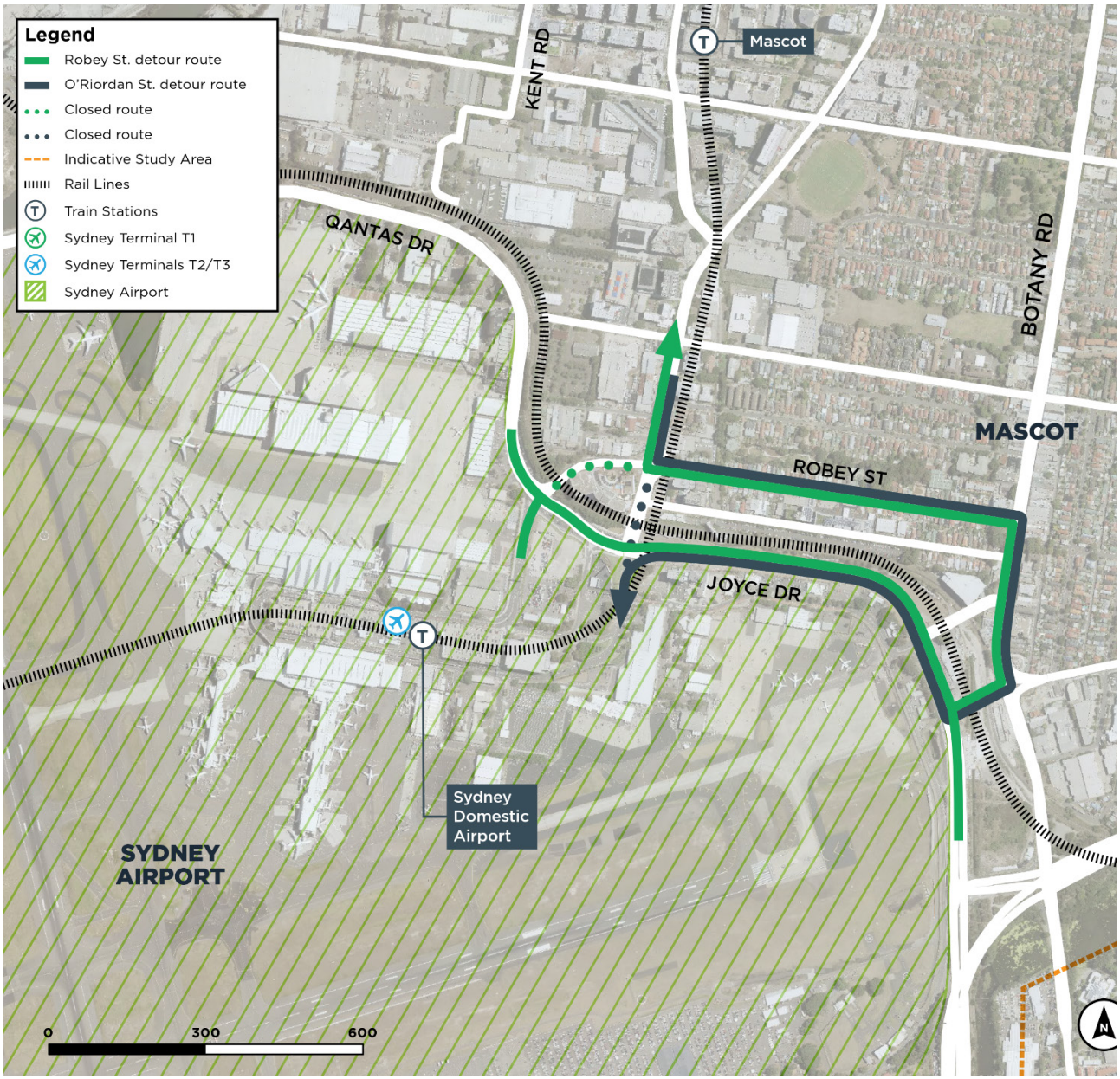


Figure 8-16 Detour route for Robey Street and O'Riordan Street closures

8.7.2.1 Robey Street closure

Given that Robey Street, between Qantas Drive and O'Riordan Street is one-way northbound, a diversion is required for northbound traffic only. During the 48-hour weekend closures, traffic would be diverted along Qantas Drive/Joyce Drive to Wentworth Avenue. From Wentworth Avenue the detour would continue north on Botany Road to Robey Street and then turning right onto O'Riordan Street.

The performance of the key intersections during the Robey Street closure are shown in Table 8-10.

The proposed detours would result in substantial impacts to the following intersections, operating at LoS F with long delays forecast:

- Qantas Drive/Robey Street/Seventh Street
- O'Riordan Street/Robey Street
- General Holmes Drive/Wentworth Avenue
- Botany Road/Wentworth Avenue.

The detours would have the following travel time impacts:

- Left turning vehicles from Qantas Drive to Robey Street would continue straight along Joyce Drive (eastbound) resulting in around 12 minutes additional travel time
- Vehicles exiting Seventh Street (Terminals 2/3) would turn right onto Joyce Drive (eastbound) resulting in around 20 minutes additional travel time
- Right turning vehicles from Joyce Drive to Robey Street would turn right onto Wentworth Avenue (to the east) resulting in around eight minutes additional travel time.

Based on the above, the Robey Street weekend road closures would have a substantial impact on the road network, with travel times anticipated to increase by 10 to 20 minutes.

Table 8-10 Weekend peak intersection performance – Robey Street closure

Intersection	2022 Baseline		2022 Botany Rail Duplication – Robey Street detour	
	Average delay (seconds per vehicle)	Level of Service	Average delay (seconds per vehicle)	Level of Service
Qantas Drive/Robey Street/Seventh Street	52	D	193	F
Joyce Drive/Qantas Drive/O'Riordan Street/Sir Reginald Ansett Drive	40	C	36	C
O'Riordan Street/Robey Street	32	C	84	F
Robey Street/Botany Road	19	B	15	B
General Holmes Drive/Botany Road	9	A	<10	A
General Holmes Drive/Joyce Drive	10	A	<10	A
General Holmes Drive/Wentworth Avenue	23	B	82	F
Botany Road/Wentworth Avenue	40	C	186	F

8.7.2.2 O'Riordan Street closure

Given that O'Riordan Street is one way southbound between Joyce Drive and Robey Street, a diversion is required for southbound traffic only. Southbound traffic on O'Riordan Street is generally accessing Terminals 2/3 or Joyce Drive/Qantas Drive. During the 48-hour weekend closures, traffic would be diverted to turn left from O'Riordan Street to Robey Street (east of O'Riordan Street), right onto Botany Road and left or right at Wentworth Avenue to continue southbound or northbound to access Terminals 2/3.

The intersection performance during the O'Riordan Street closure is shown in Table 8-11.

The proposed detours would result in substantial impacts to the following intersections, operating at LoS F, with long delays forecast:

- Robey Street/Botany Road
- Botany Road/Wentworth Avenue.

The detours would have the following impacts:

- The travel times for vehicles that currently use O'Riordan Street to access Sir Reginald Ansett Drive would increase by around 10 minutes
- The travel time for vehicles that currently use O'Riordan Street to access Joyce Drive (eastbound) would increase by around eight minutes.

As such, the anticipated maximum delay for vehicles using the road network during the proposed weekend closure of O'Riordan Street is anticipated to be about 10 minutes.

Table 8-11 Weekend peak intersection performance – O'Riordan Street closure

Intersection	2022 Baseline		2022 Botany Rail Duplication – O'Riordan Street detour	
	Average delay (seconds per vehicle)	Level of Service	Average delay (seconds per vehicle)	Level of Service
Qantas Drive/Robey Street	52	D	51	D
Qantas Drive/O'Riordan Street	40	C	29	C
O'Riordan Street/Robey Street	32	C	15	B
Robey Street/Botany Road	19	B	74	F
General Holmes Drive/Botany Road	9	A	19	B
General Holmes Drive/Joyce Drive	10	A	9	A
General Holmes Drive/Wentworth Avenue	23	B	28	B
Botany Road/Wentworth Avenue	40	C	177	F

Overall the impact of the proposed weekend closures of Robey Street and O'Riordan Street due to the Botany Rail Duplication project are substantial and therefore require mitigation, as discussed in section 9.

8.7.2.3 Active transport

The footpaths on Robey Street and O'Riordan Street would be unavailable during any proposed short-term closures of Robey Street or O'Riordan Street (as long as a weekend) e.g. for major crane lifts of the Botany Rail Duplication. However, the potential closures would likely occur independent of each other. During the Robey Street closure, pedestrians would use O'Riordan Street, increasing walking distances by around 100 metres. Similarly, during the O'Riordan Street closure, pedestrians would use Robey Street, increasing walking distances by around 260 metres. Cyclists would also need to dismount and use these alternative routes, given that no formal cycling facilities are provided along Robey Street or O'Riordan Street.

Where road closure is not required, pedestrians would be diverted to the opposite site of the road, via traffic control at the adjacent signalised intersections and crossings.

Overall, the cumulative construction impacts to pedestrians and cyclists are considered to be manageable.

9. Recommended mitigation measures

This section describes recommended mitigation measures for the construction and operational phases of the project.

Throughout the development phase of the project, design improvements and construction and operational methodologies have been considered to avoid potential impacts and enhance the performance of the project through all phases. These improvement areas are highlighted here, demonstrating the feedback loop which has occurred between the traffic modelling and assessment and the development of the project.

Adverse impacts which have not been avoided during this phase of the project are also noted below. Recommended mitigation measures and their likely effectiveness are provided below thereby ensuring that the connectivity, safety and efficiency of the network in the area surrounding the project is maximised throughout all project phases.

The mitigation measures recommended aim to remove or ameliorate impacts (where possible) by:

- Managing network connectivity, safety and efficiency of the transport system in the vicinity of the project
- Making sure the safety of the transport system for customers is maintained
- Managing network capacity and LoS.

9.1 Construction

During construction there would be inevitable delays in the road network within the project area. However, it is possible to reduce the impacts through a number of mitigation measures. The following sections include potential mitigation measures for the construction phase.

9.1.1 Construction road geometry changes

In consultation with the project delivery team on the initial traffic modelling results, it was identified that some minor changes to the construction phase road geometry and construction area operations should be explored further in order to minimise related traffic impacts. These are listed below:

- **Maintain a minimum posted speed of 60 km/h along the construction zones**: Maintaining a 60 km/h posted speed limit during construction would provide benefit to local traffic operations or at least not negatively impact traffic operations, when compared to a 50 km/h posted speed limit. This is based upon traffic modelling analyses
- **Maintain three eastbound traffic lanes on Airport Drive at the Airport Drive and Link Road intersection**: By retaining three eastbound lanes at the stop-line on Airport Drive at the Link Road intersection, this would produce notable improvements to this intersection's performance as well as reducing travel times on this section of road
- **Provide three traffic lanes into Terminals 2/3 on Sir Reginald Ansett Drive:** This recommendation extends beyond the construction staging and should be explored as part of the final intersection design. The opportunity to provide three lanes on Sir Reginald Ansett Drive would assist in improving intersection vehicle throughput capacity for travel to Terminals 2/3 during construction
- **Provide three left turn lanes from Qantas Drive to Robey Street, as early as possible:** Providing the ultimate arrangement for the triple left turn into Robey Street earlier in the construction traffic management phasing (if possible) would alleviate many of the road network impacts that are discussed in sections 5.4.1 and 5.4.7.

9.1.2 Mitigation measures

There would be impacts on the road network within the vicinity of the project area that cannot be avoided. These impacts, which have been identified in section 5.4, would be minimised through the recommended mitigation or management measures identified in Table 9-1.

Table 9-1 Construction impacts and recommended mitigation measures

Impact	Measure	Effectiveness	Jurisdiction
Travel time impacts during construction along O'Riordan Street and General Holmes Drive.	**1.** Prepare construction traffic and assessment management plan (CTAMP) for each work site to minimise travel delays and disruptions and respond to changes in road conditions resulting from construction works. (Details follow this table) **2.** Develop a communications plan, including media strategy outlining the dates and durations of specific phases of construction work and those works that require out of hours activities. This would also include information about specific lane and road closures and the times of day when these works would be primarily carried out.	Medium This would allow for increased safety, awareness of the project and permit advanced planning for road users.	Contractor/ TfNSW – Transport Coordination Office
Impact on road network by construction vehicles	**1.** Minimise heavy vehicles accessing construction sites and compounds during peak periods.	Medium to high This would reduce the impact of heavy vehicles on peak period traffic operations	Contractors/ TfNSW – Transport Coordination Office
Cumulative impact of traffic from the broader network	**1.** A travel demand management (TDM) plan could be introduced to recommend measures that could reduce the number of vehicles travelling within the study area. This plan would provide an outline of travel options for residents, business and people travelling to Sydney Airport, as well as measures to minimise additional traffic generation of the project's construction workers.	Medium An effective TDM plan would provide a comprehensive set of travel mode options and communications strategies to reduce the number of people using the road network within the project area.	TfNSW – Transport Coordination Office

Impact	Measure	Effectiveness	Jurisdiction
Management and control of traffic	**1.** Other than developing a CTAMP, there should be additional measures to ensure safety such as separating work areas from general traffic, use of variable message signs to provide information to road users, maintain connections for cycling and pedestrian movements and monitoring of the construction areas **2.** Manage local road closures and maintain adequate access to Sydney Airport and other properties in the area. **3.** Provide traffic management as outlined in Chapter 8.	Medium Improved safety and access would lessen the impacts of the construction overall	TfNSW – Transport Coordination Office
Parking impacts on local areas	**1.** Prepare a parking and access management plan for construction site access	Medium Encourage the use of alternative transport modes, carpooling, and measures that minimise workers from parking in adjacent local areas and off-street car parks such as the Tempe Reserve car park. The plan should also consider measures to transport workers between construction compounds, including the potential use of a shuttle bus.	Contractor/ TfNSW – Transport Coordination Office
Increased delays to Sydney Airport access/egress	**1.** Reroute traffic away from the area by directing drivers away from the right turn movement into Robey Street from Qantas Drive in combination with signal phasing adjustments to prioritise access to/from Sydney Airport instead of through traffic. a potential rerouting strategy is detailed in section 9.1.4	High	Contractors/ TfNSW – Transport Coordination Office
Cumulative construction traffic impacts	Review and ongoing coordination of all construction works. The review would include: **1.** Consideration of relevant construction projects with the potential to affect access and capacity, particularly in the vicinity of Terminals 2/3 **2.** Detailed reviews of the programs for traffic staging, lane and road closures for all projects **3.** Co-ordination of works and identification of efficient re-routing options during periods of road and lane closures.	High	TfNSW – Transport Coordination Office

9.1.3 Construction traffic and access management plan

A CTAMP is proposed as part of the Construction Environmental Management Plan. The CTAMP would include guidelines, general requirements and principles of traffic management to be implemented during construction and would be prepared in collaboration with the Botany Rail Duplication project team. It would be prepared in accordance with Austroads Guide to Road Design (with appropriate Roads and Maritime supplements), the Roads and Maritime *Traffic control at work sites* manual and AS1742.3: *Manual of uniform traffic control devices – Part 3: Traffic control for works on roads*, and any other relevant standard, guide or manual. It would seek to minimise travel delays and disruptions and identify and respond to changes in road conditions and safety as a result of project construction works.

The overarching strategy of the CTAMP would be to:

- Ensure relevant key stakeholders are considered during all stages of the project's construction
- Provide safe routes for pedestrians and cyclists during construction
- Develop project staging plans in consultation with relevant key stakeholders, which would include measures to manage impacts during special events and school holiday periods
- Plan and stage works to minimise the need for road occupancy, where possible
- Minimise the number of changes to the road users' travel paths and, where changes are required, implement a high standard of traffic controls which effectively warn, inform and guide road users
- Comprehensively communicate changes in traffic conditions on roads or paths to emergency services, public transport operators, other road user groups and other affected stakeholders
- Identify measures to manage the movements of construction-related traffic to minimise traffic and access disruptions in the public road network
- Minimise the use of local roads by the project's heavy vehicles and identify suitable haulage routes
- Propose a car parking strategy for construction staff at the various worksites, in consultation with local councils and relevant key stakeholders associated with any facilities adjacent to the project site
- Minimise the loss of on-road parking for local residents
- Consider the provision of bus transport to work sites from the nearest public transport hub by contractors, provision of onsite employee parking where space is available, and encourage workers to car pool to reduce loss of any on-street parking near construction sites
- Stage the construction works on key parts of the network – such as Airport Drive, Qantas Drive and Sir Reginald Ansett Drive – to enable these key roads to continue to function with as minimal impact as possible.

9.1.4 Routing strategy to mitigate construction impacts

The existing high traffic demands at the entrance to Sydney Airport Terminals 2/3 would be further impacted with the project's construction activities. As discussed in section 5.4.7, the average delays for traffic turning right into Terminals 2/3 and traffic exiting Terminals 2/3 would substantially increase.

A rerouting strategy that directs general traffic away from the area during peak construction periods could assist to minimise these impacts. The option with the greatest potential to reroute demand away from the Terminals 2/3 construction zone would include:

- Diverting westbound traffic from General Holmes Drive (via Joyce Drive) onto Robey Street (via the new Wentworth Avenue link provided in the Airport East Upgrade) and Botany Road instead of using the right turn from Qantas Drive to Robey Street, as indicatively shown in Figure 9-1
- Consolidating and supporting the function of the left turn from Qantas Drive onto Robey Street and traffic out of Seventh Street through the re-allocation of signal green time taken away from the diverted or banned right turn movement (from Qantas Drive to Robey Street) during peak periods or potentially ban the right turn movement in the peak periods
- Introducing an additional left turn lane into Robey Street from Qantas Drive to improve traffic flows based on traffic modelling analyses.

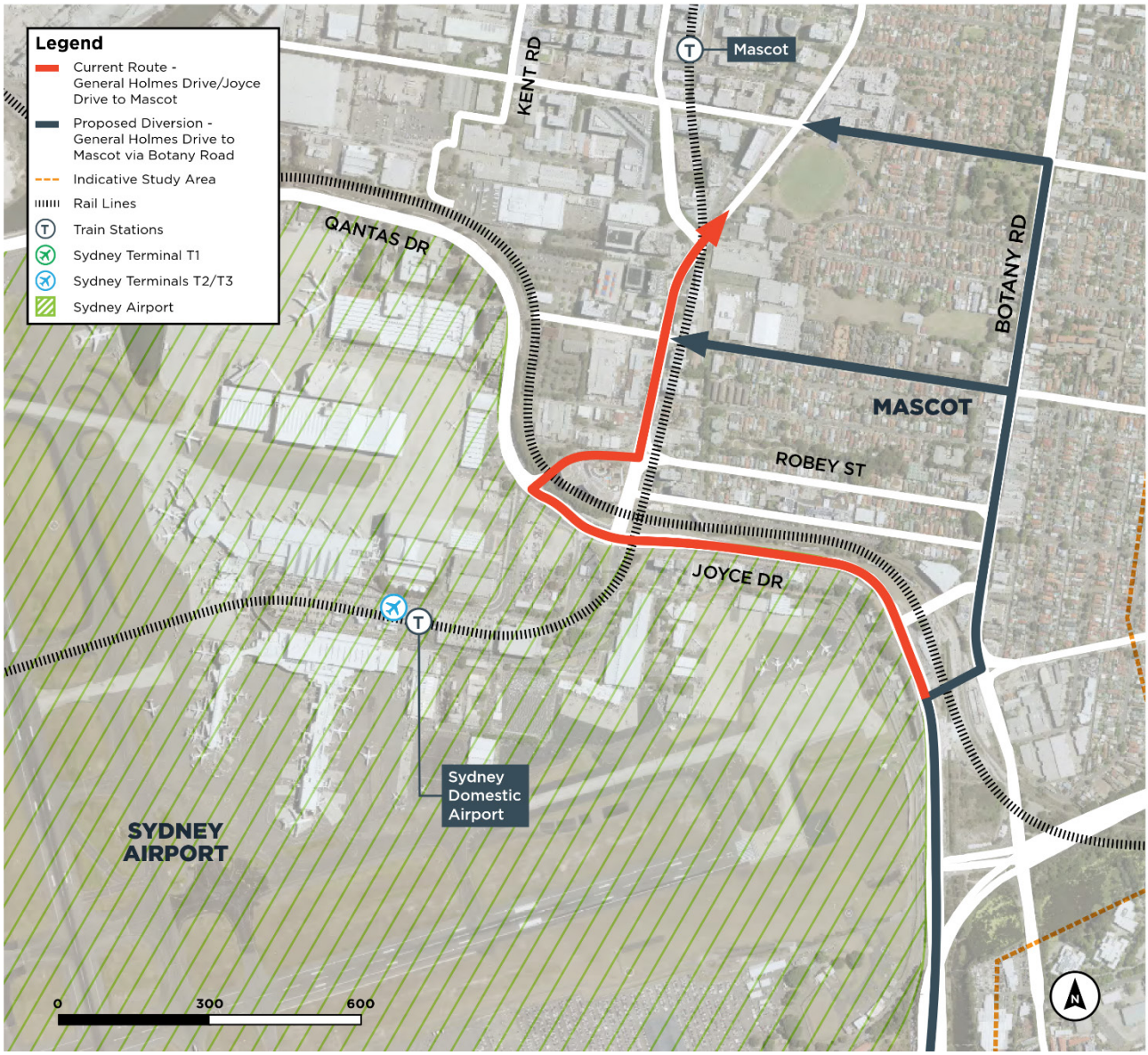


Figure 9-1 Potential traffic diversion to improve access to Terminals 2/3 during construction

9.1.5 Residual impacts

Despite the mitigation measures introduced in Table 9-1, there would be residual impacts. It is inevitable that there would be travel time delays along the key routes within the study area as well as at key intersections. While the CTAMP would include measures to reduce these impacts, there would continue to be impacts that rerouting of traffic and travel demand management measures cannot completely mitigate.

9.2 Management of operational impacts

The intent of the project is to improve travel times to Sydney Airport via a direct, free-flowing motorway network and to reduce traffic demands on the adjacent local road network in the Mascot and Tempe areas. As shown in sections 7.3.4, 7.3.6 and 7.8, generally travel times would improve, and intersection delays would reduce on key access roads to/from Sydney Airport. This would allow passengers and workers to have more reliable journeys to/from Sydney Airport. Table 9-2 lists specific locations that would experience increased travel times or increased intersection delays with associated mitigation measures.

Table 9-2 Operational impacts and associated mitigation measures

Impact	Mitigation measure
Travel time increases and increases to average intersection delay, as a result of increased population and employment growth that would increase travel demand along the road network by 2036. Travel times would be impacted further by increases in passenger traffic at the airport.	TDM plan and program should encourage travel to non-peak times which could spread the peak travel period and reduce overall delays along these corridors. The use of other travel modes such as public and active transport should also be encouraged through this measure.
	In addition, the use of ITS systems including variable message signs to redirect traffic away from the Sydney Airport area.
	Comprehensive work place travel program for workers at Sydney Airport and nearby businesses to encourage staff to use alternative transport modes.
	Monitoring the transport activity for the surrounding network to ensure that performance is as expected once the project is opened to traffic. Further network integration measures can be taken as required if problems are identified beyond that expected during the assessment phase.
Operational constraints at some midblock and merge locations along the project	Smart motorway systems on the project. A Smart Motorway uses technology to monitor, provide intelligence and control the motorway to ease congestion and keep traffic flowing more effectively.
	Design refinement during detailed design would focus on limiting these operational issues in 2036.
Personal security concerns associated with the proposed active transport link due to its isolated location between the canal and surrounding industrial uses, as well as the provision of underpasses.	Further consideration of Crime Prevention Through Environmental Design (CPTED) would be considered during detailed design.
Active transport opportunities	Roads and Maritime and Sydney Airport Corporation would prepare an active transport strategy to integrate and enhance accessibility opportunities. The strategy would be prepared in conjunction with relevant stakeholders and provide a guide for future active transport infrastructure provision.

10. Conclusions

This report has assessed the expected traffic and transport impacts of the project during construction and operation. The assessment has followed standard road network traffic modelling methods used for planning major road projects in NSW and addresses the requirements of the SEARs and draft MDP, which are outlined in section 1.1.2.

Traffic scenarios were assessed to understand what would happen if the project is not built ('without project'), compared to what would happen if the project is built ('with project'). By comparing future traffic patterns for the with and without project scenarios, the effectiveness of the project in addressing current and future transport needs has been assessed.

Overall, the assessment demonstrates that the project would enable faster, safer and more reliable journeys to and from Sydney Airport, resulting in less congestion across the Mascot local area. In summary, the project would:

- Support the forecast growth of the passenger, air freight and commuter movements across the Sydney Airport region, through improved connectivity and capacity of the road network to and from the Sydney Airport
- Improve road connections and travel times between the Sydney Airport and Port Botany to Sydney's motorway network via WestConnex, and planned projects such as the F6 Extension and the Western Harbour Tunnel and Beaches Link
- Reduce road congestion and improve road safety in adjacent local areas such as Mascot and Botany by redirecting cars from local roads by providing a more direct connection between Sydney Airport and the Sydney motorway network.

Full consideration of the likely impacts and mitigation measures for the construction and operational phases of the project have been addressed in this report. Key impacts are summarised below.

10.1 Construction

Construction of the project is anticipated to occur over a period of approximately three-and-a-half years, from mid-2020 through to the end of 2023. The construction strategy focuses on balancing the need for construction to occur in a safe and also an efficient manner. It would manage constructability constraints, particularly the safe and efficient operation of Sydney Airport, while minimising impacts on local communities, the environment and users of the surrounding road and transport networks.

A series of construction scenarios have been modelled and assessed based on the construction traffic management phases that were expected to have the largest impact on the road network, during the construction program to understand the potential impacts to transport and traffic during this period.

In all modelled construction scenarios, construction activity would have minor impacts on overall intersection performance and road network travel times. The assessment indicating that the staging of works provides additional capacity in some locations to offset the loss of capacity at other locations.

Notwithstanding this, the construction works would have some substantial impacts on access to/from Terminals 2/3 in the AM peak hour. Traffic turning right from Qantas Drive to Terminals 2/3 would experience an additional 95 seconds delay due to capacity reductions for this movement and traffic exiting Terminals 2/3 and travelling northbound onto Robey Street would experience an additional 70 seconds delay due to insufficient capacity for the left turn from Qantas Drive to Robey Street.

The project's construction impacts on Port Botany would be limited to minor travel time increases along General Holmes Drive which would be up to one minute and 15 seconds during peak periods.

There would be temporary closure of lanes, footpaths and shared paths in various locations throughout the study area in order to accommodate construction activities. Appropriate diversions have been considered in the construction management planning and would be refined when the construction management plans for each stage of the project are created.

While it is not possible to avoid all impacts, the following specific measures have been recommended to avoid, mitigate or manage, to the extent possible, impacts on transport and traffic:

- Construction is to be sequenced over stages to ensure access to Sydney Airport is maintained throughout the construction phase
- Construction traffic would use specific routes which have been identified for construction activities
- Specific works are to be scheduled overnight and during non-peak travel times to limit congestion on existing roads and to comply with aviation safety requirements
- Contractors would be required to develop and implement a CTAMP in consultation and collaboration with stakeholders and the Botany Rail Duplication project team. Potential transport and traffic impacts associated with the project during construction would be mitigated and managed through the implementation of the CTAMP.

10.2 Operations

Three main traffic scenarios were assessed to understand the operational impact if the project is not built ('without project') compared to what would happen if the project is built ('with project').

The report describes and compares modelling results for the following scenarios:

- Current situation – existing traffic and intersection performance in the project study area (section 4)
- Future 'without project' – future traffic and intersection performance (2026 and 2036 forecasts) if the project is not constructed. This is the 'without project' option which assumes WestConnex has been delivered and proposed upgrades as part of the Sydney Airport Master Plan and Mascot Intersection Upgrades have been completed (section 5)
- Future 'with project' – future traffic and intersection performance (2026 and 2036 forecasts) that can be expected if the project is constructed. This is the 'with project' option which includes all schemes as part of the 'without project' assessment and the project (section 6).

In 2026 and 2036, the future traffic network operations would be worse than the current situation as traffic volumes would continue to increase; travel times would increase and the overall LoS at key intersections in the study area would deteriorate considerably.

In contrast, the analysis of the impacts on the road network when the project is built indicates that traffic volumes would decrease along local roads, travel times would decrease and the average delay at key intersections in the study area would improve considerably, compared with the current situation.

The opening of the project would provide a direct link from the Sydney motorway network to Sydney Airport, enabling journeys to/from Sydney Airport and beyond to bypass local roads. This would allow for reduced travel times to Sydney Airport, while also reducing traffic volumes on local road networks. Generally, the following would result:

- Around 84,800 and 87,800 vehicles per day would use the project in the respective 2026 and 2036 future years, with around 60 per cent of these vehicles having destinations or origins at Sydney Airport
- Most of the project's demand would shift away from congested parallel corridors, resulting in reduced traffic on local roads in the Mascot Station precinct, Botany Road, Gardeners Road, Bourke Street/Bourke Road, O'Riordan Street, Princes Highway, the M1 and Southern Cross Drive
- In 2026 travel time savings between St Peters interchange and Sydney Airport terminals of up to 23 minutes would be experienced, increasing to up to 30 minutes in 2036. Conversely, the existing route via Mascot would see travel time savings of up to 10 minutes in 2026 and 2036, significantly benefiting the local Mascot community
- Intersection delays would decrease, alleviating congestion across the road network including at the primary access points to Sydney Airport Terminals 2/3

- Improved network-wide performance, with average trip speed predicted to increase as the network is able to accommodate more vehicles and the average trip time through the network is reduced
- Within the Mascot Station precinct, the above road network performance improvements have the ability to improve permeability for people to travel across local roads, improving amenity throughout the Mascot local area more generally and encouraging walking and cycling in these areas, while also improving road safety for vulnerable road users
- Bus travel times would substantially reduce, including up to 30 per cent for the 420 and 400 which service Sydney Airport.

10.3 Cumulative impacts

The impacts of the project when delivered with other key infrastructure programs has been modelled and assessed under the 'cumulative' option. The delivery of WestConnex and upgrades part of the Airport Master Plan and Mascot Intersection Upgrade have been included in the 'with project' option, however the 'cumulative' option also considers the 'cumulative' impacts of the project and the proposed F6 Extension, Western Harbour Tunnel and Beaches Link and Botany Rail Duplication.

The cumulative analysis indicates that traffic volumes would decrease along local roads and in the Mascot Station precinct, average travel times would decrease and the average delay at key intersections in the study area would improve compared to the 'with project' scenario.

The F6 Extension, Western Harbour Tunnel and Beaches Link would create a new north–south route for Sydney which would cause a shift in traffic patterns as large volumes of traffic are attracted to these new routes. Consequently, traffic volumes are predicted to decrease on the M1, General Holmes Drive, Southern Cross Drive, O'Riordan Street, Princes Highway and Botany Road. However, overall traffic volumes would increase in the modelled area. Generally, the following would result:

- Compared to the 2036 'with project' scenario, in the AM peak travel times would decrease, and the total number of unreleased trips would decrease. During the PM peak the 'cumulative' scenario is expected to perform at a similar level
- While most intersections in the 2036 'cumulative' scenario are expected to continue to operate at LoS F, there are some improvements over the 2036 'with project' scenario
- Reductions in travel time are largely predicted in the 2036 'cumulative' scenario in the AM and PM peak. Where increases in travel times are apparent, these are no greater than four minutes in magnitude
- Bus travel times show similar or improved durations in both peak periods.

Overall, these improvements in network performance suggest the road network would operate better in the AM 2036 'cumulative' scenario compared to the AM 2036 'with project' scenario. In the PM peak hour, the 2036 'cumulative' network is forecast to perform at a similar level to the 'with project' scenario network.

10.4 Consistency with Airport Master Plan 2039

In the *Sydney Airport Master Plan 2039* and *Sydney Airport Environmental Strategy 2019*, the airport aims to encourage the use of sustainable transport modes, minimise traffic-related environmental impacts, and 'improve ground access, to, from and past the airport'.

As expected, the construction of the project would temporarily impact traffic and transport near Sydney Airport as well as temporary closure of pedestrian and cyclist facilities and the removal of a bus stop. Strategies for diverting these modes and mitigating these impacts have been included in this report.

Ultimately, the project would play a principal role in achieving the objectives of the *Sydney Airport Master Plan 2039* by improving access to Sydney Airport, reducing congestion around Sydney Airport and improving travel times to/from Sydney Airport. The project would complement future *Master Plan 2039* upgrades taking place within and connecting to the Sydney Airport terminals.

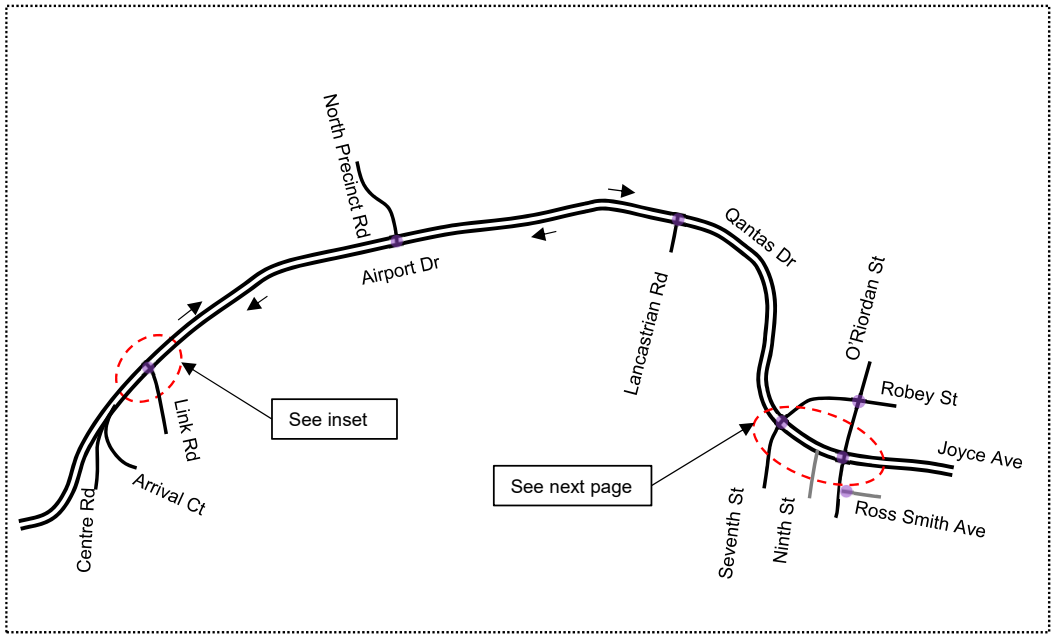
The project would also enable the improvement of connections for active travel to Sydney Airport terminals from the surrounding areas, enabling increased use of sustainable travel options.

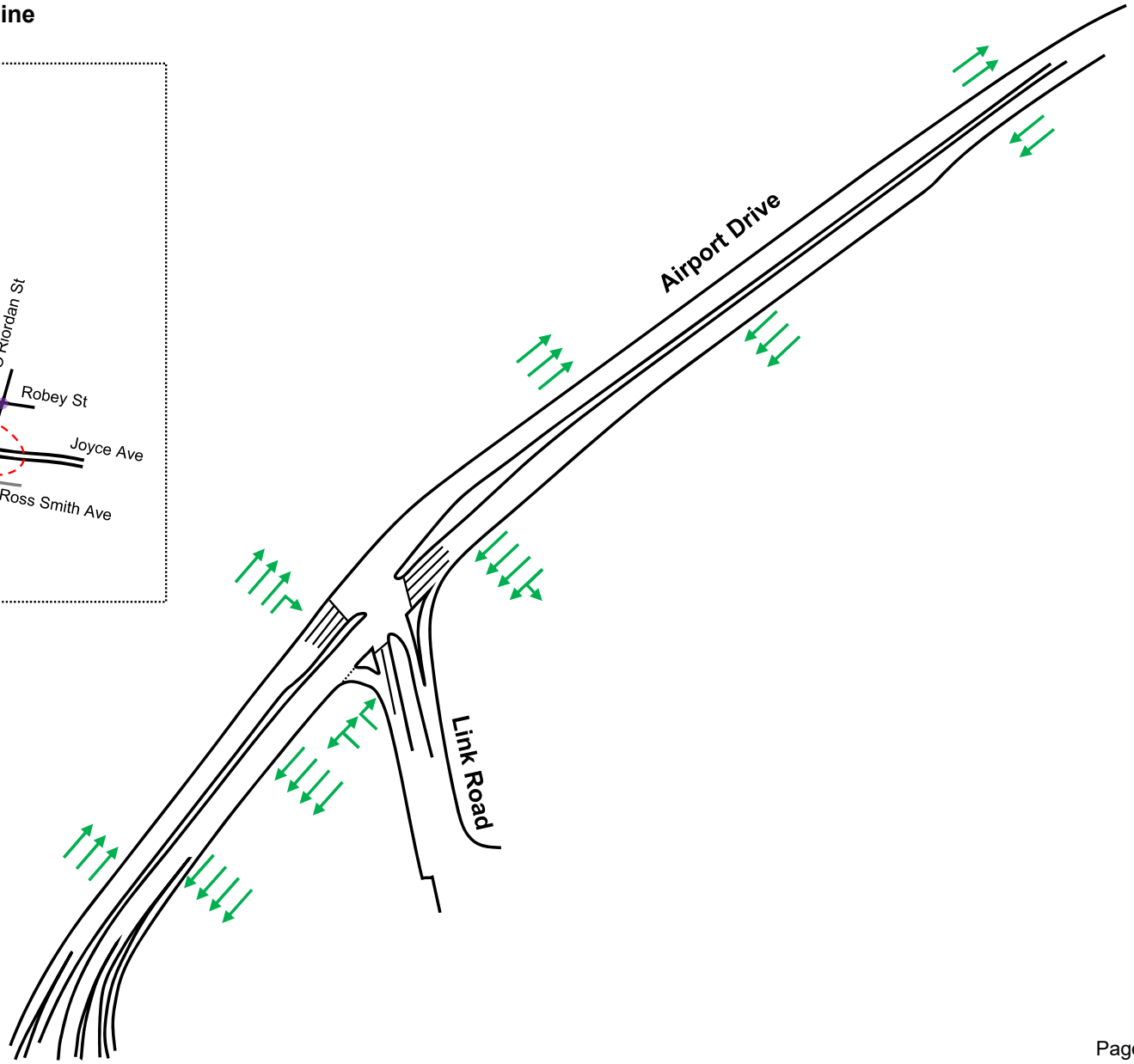
The project is therefore considered to be consistent with the *Sydney Airport Master Plan 2039* as it would deliver a number of key aspects of the Sydney Airport *Five Year Ground Transport Plan*, and would result in improved ground access to Sydney Airport.

Appendix A
Construction traffic management phases

Construction Traffic Management – 2022 and 2023 Future Baseline

Area 1 - Airport Drive and Link Road



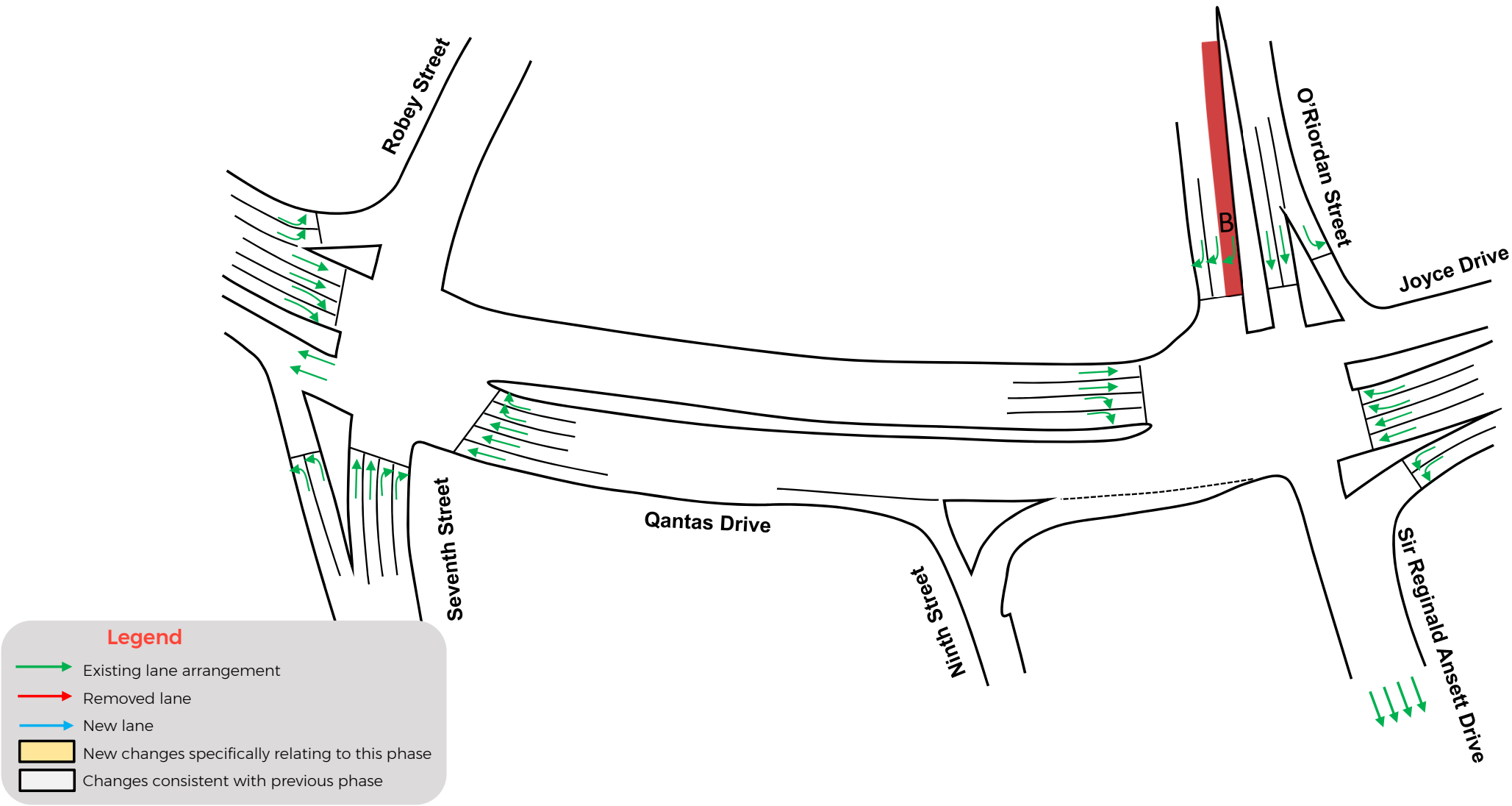


Legend

- Existing lane arrangement
- Removed lane
- New lane
- New changes specifically relating to this phase
- Changes consistent with previous phase

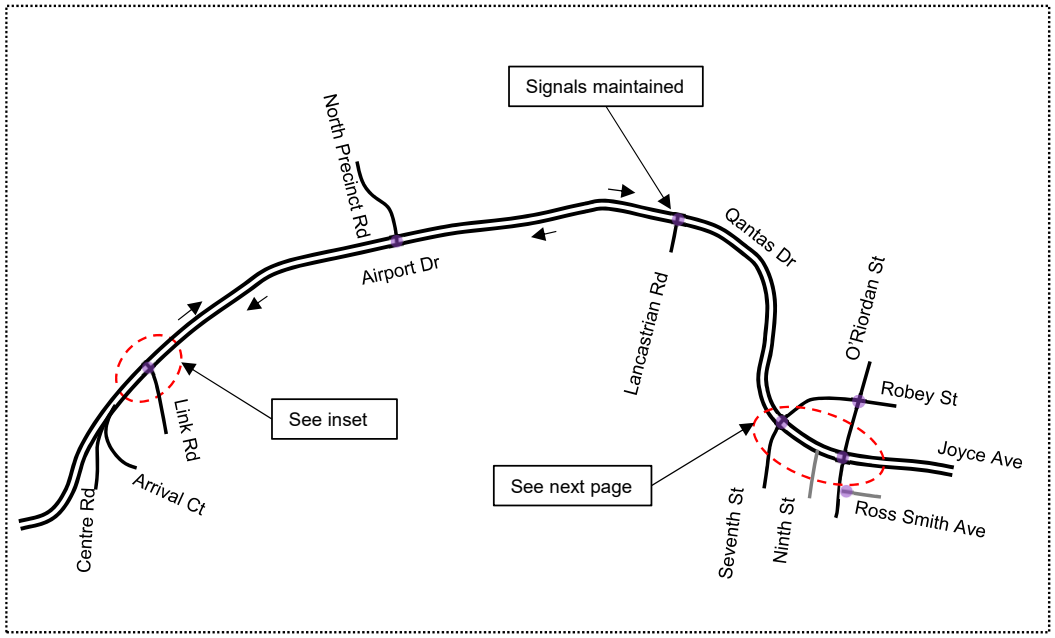
Construction Traffic Management – 2022 and 2023 Future Baseline

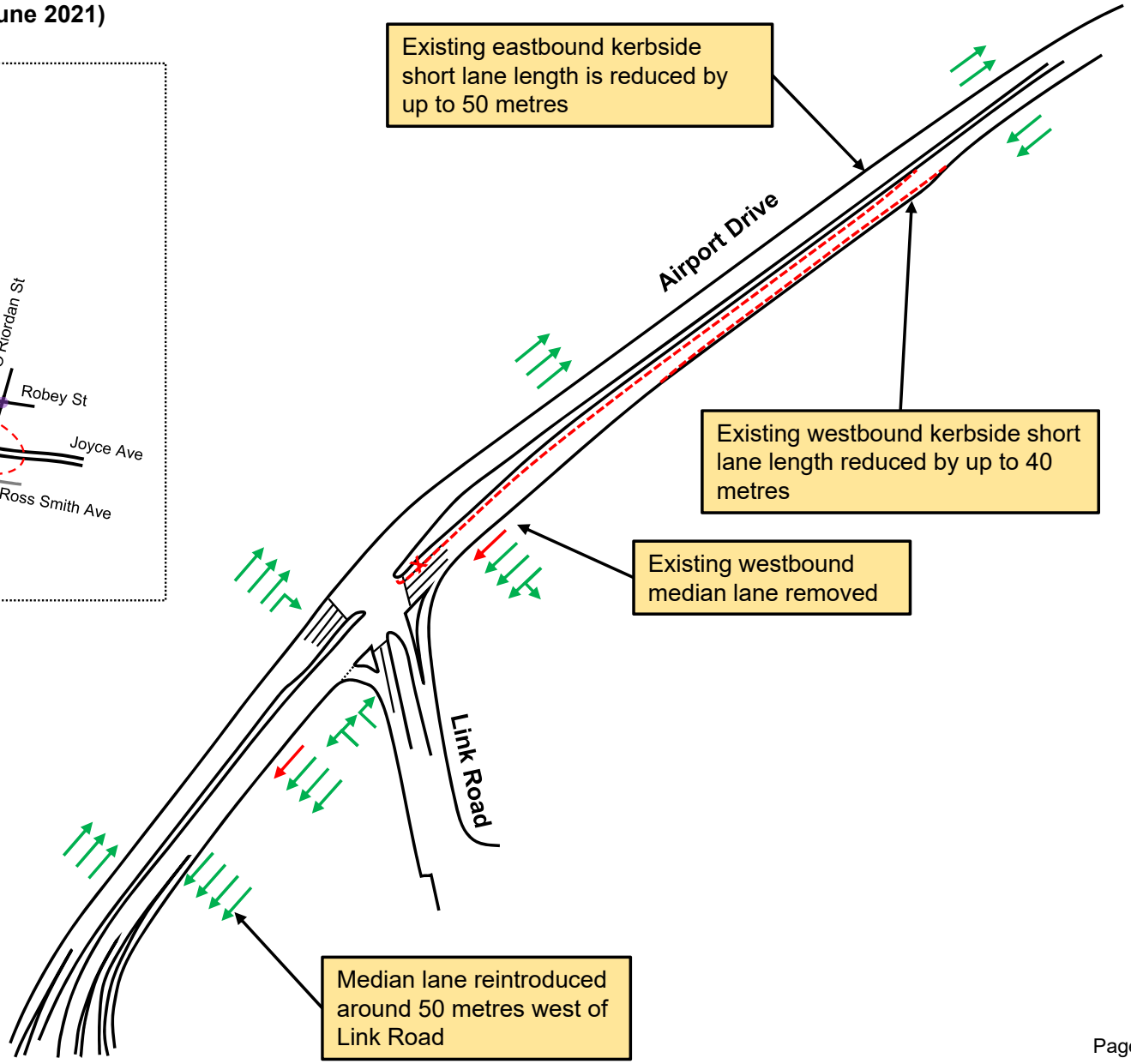
Area 2 - Qantas Drive/Joyce Drive/Seventh Street/Robey Street/O'Riordan Street and Sir Reginal Ansett Drive - Phase 0



Construction Traffic Management – Phase A (January 2021 to June 2021)

Area 1 - Airport Drive and Link Road - Phase 1



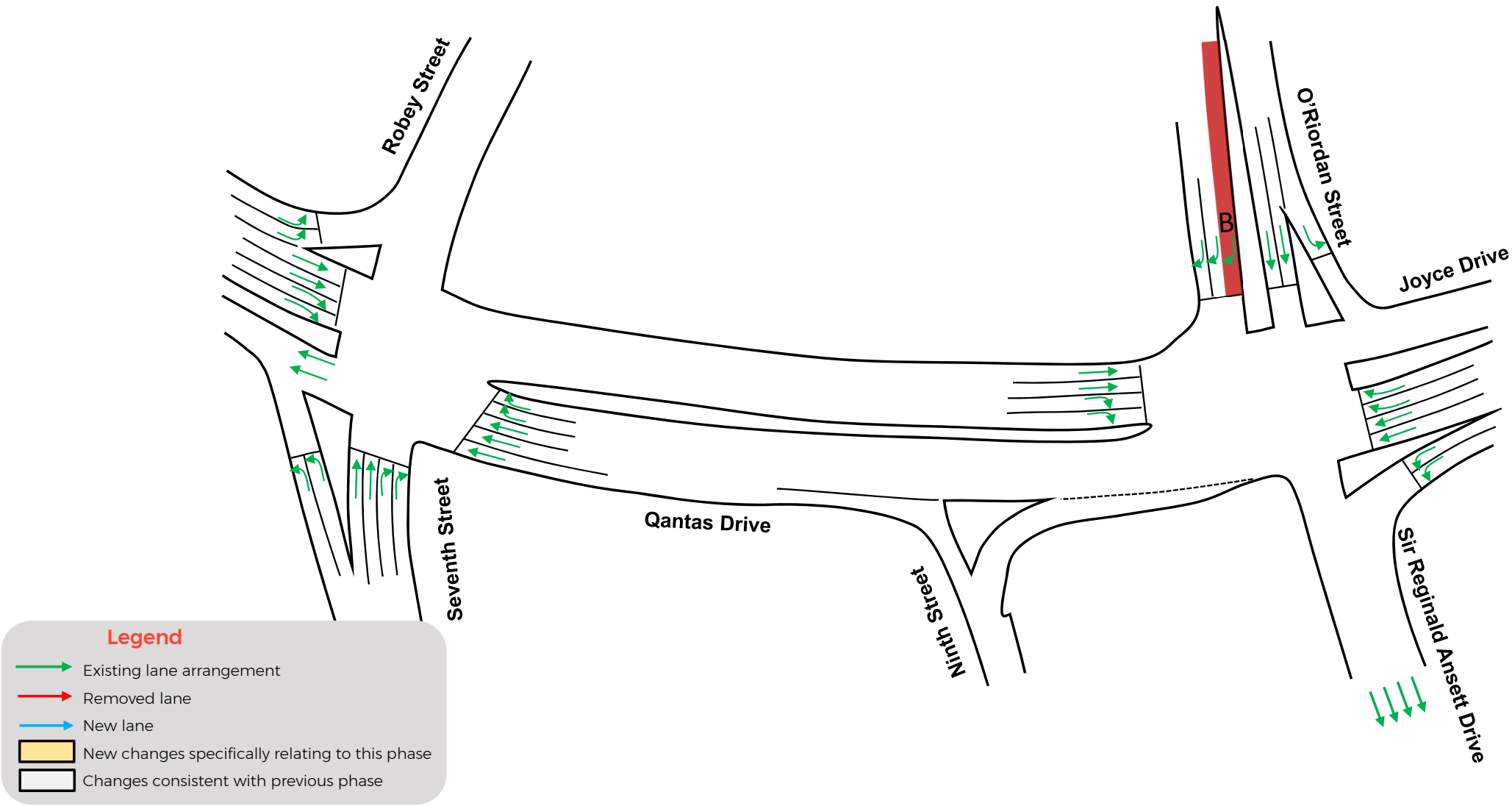


Legend

- Existing lane arrangement
- Removed lane
- New lane
- New changes specifically relating to this phase
- Changes consistent with previous phase

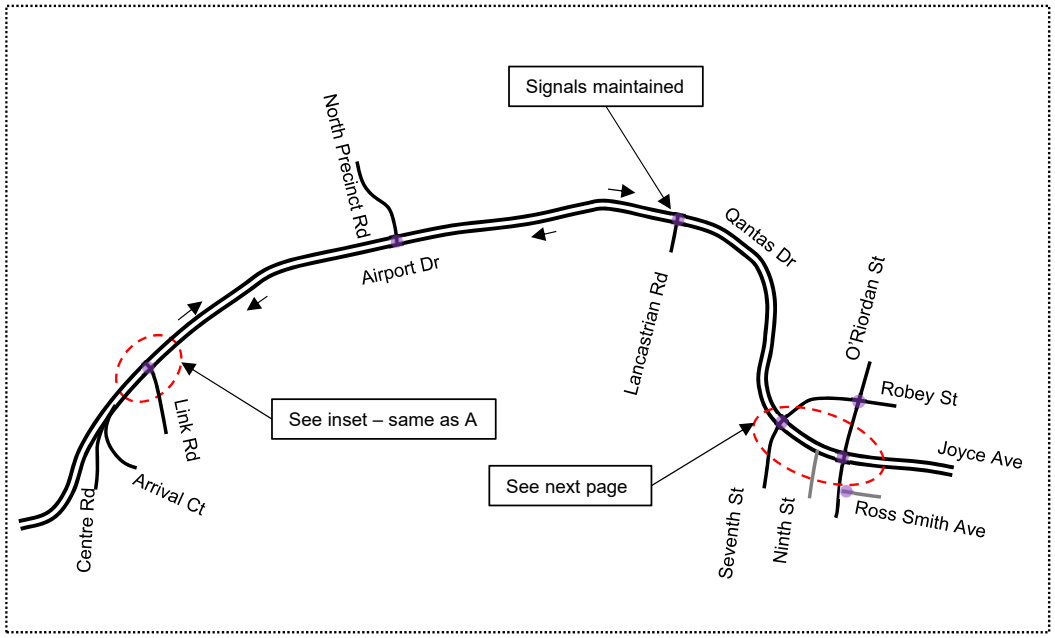
Construction Traffic Management – Phase A (January 2021 to June 2021)

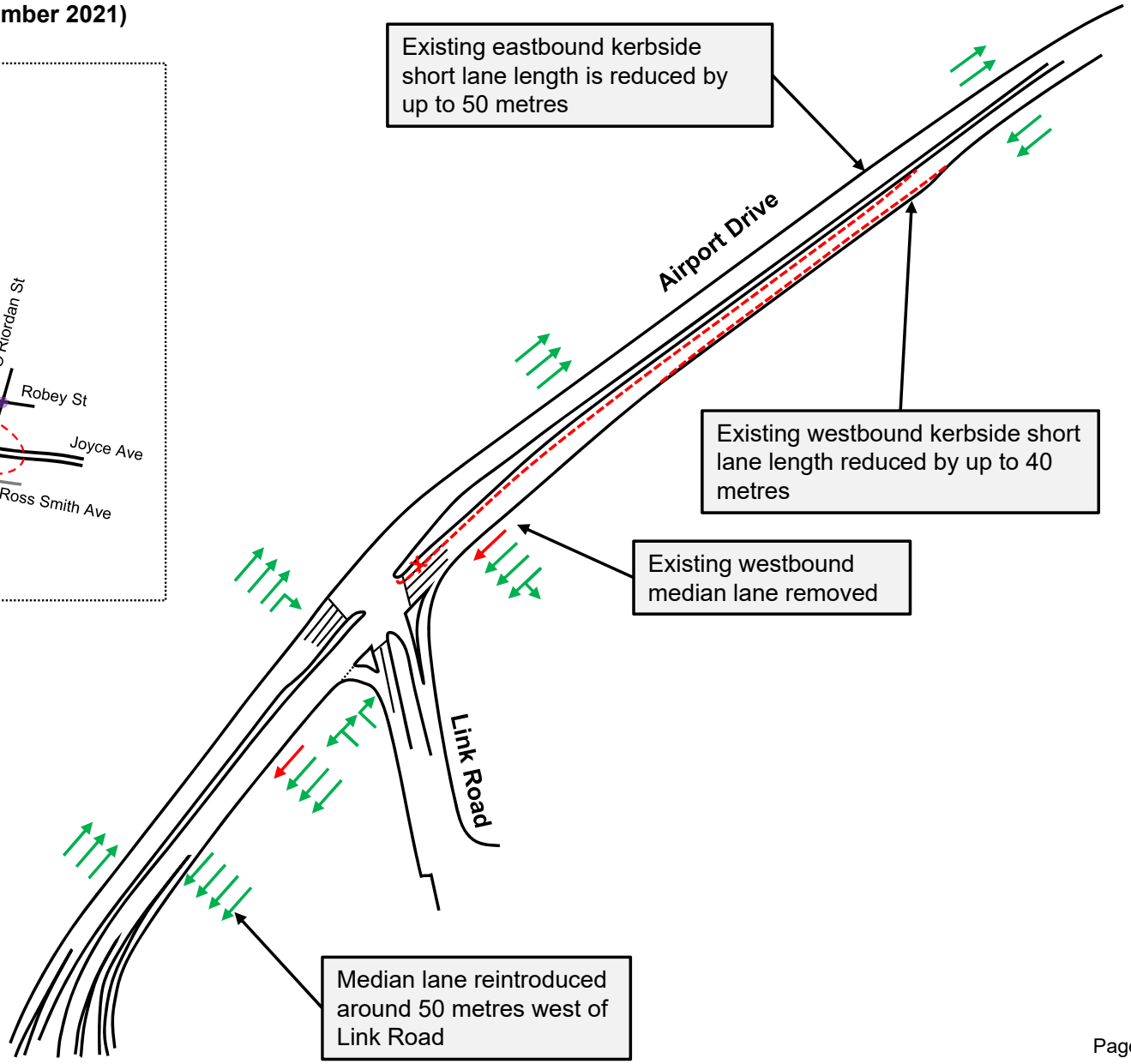
Area 2 - Qantas Drive/Joyce Drive/Seventh Street/Robey Street/O'Riordan Street and Sir Reginal Ansett Drive - Phase 0



Construction Traffic Management - Phase B (June 2021 to November 2021)

Area 1 - Airport Drive and Link Road – Phase 1



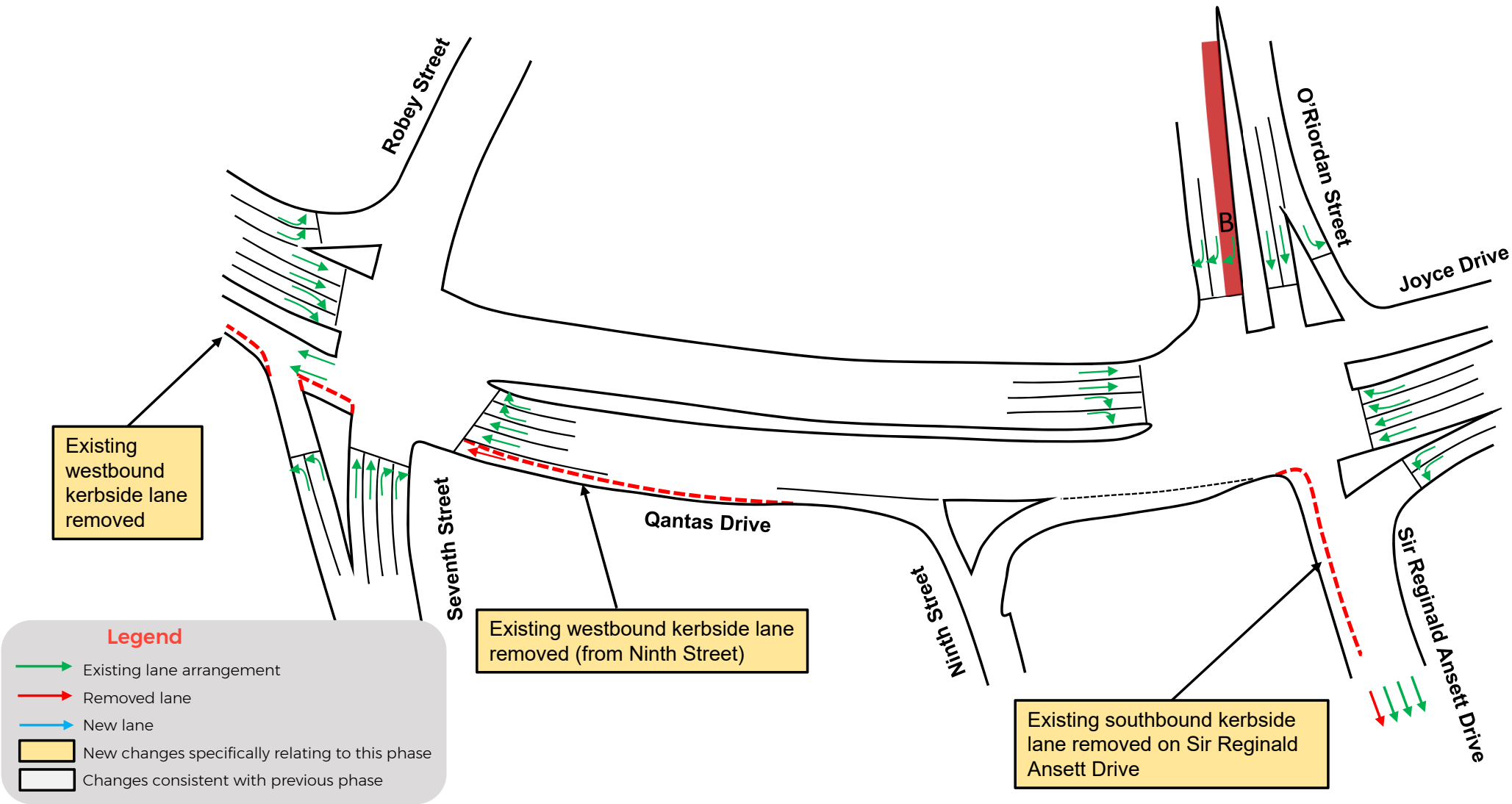


Legend

- Existing lane arrangement
- Removed lane
- New lane
- New changes specifically relating to this phase
- Changes consistent with previous phase

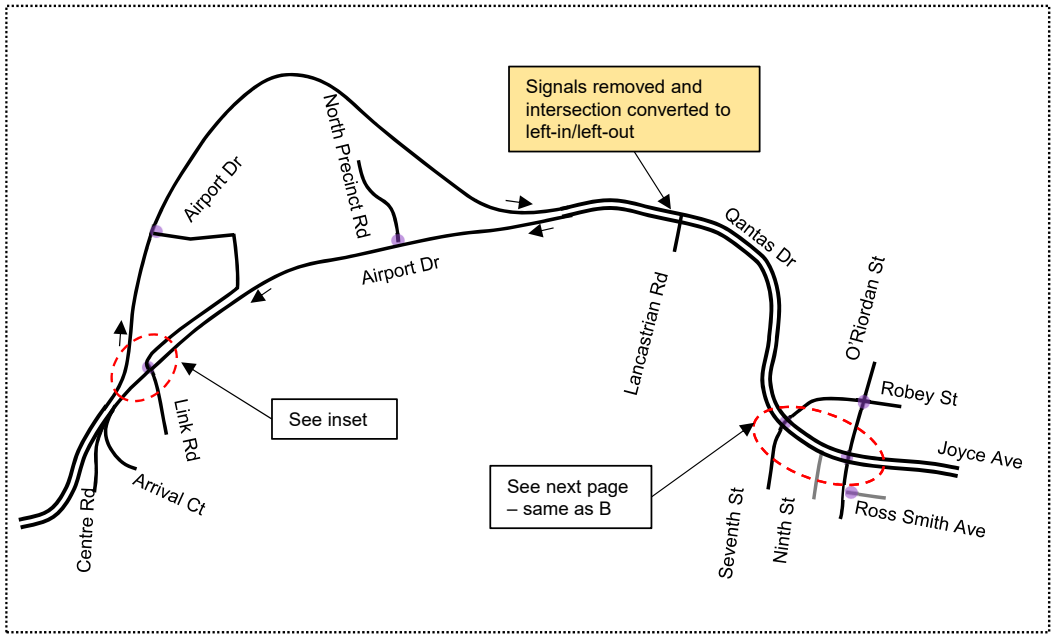
Construction Traffic Management - Phase B (June 2021 to November 2021)

Area 2 - Qantas Drive/Joyce Drive/Seventh Street/Robey Street/O'Riordan Street and Sir Reginal Ansett Drive – Phase 1



Construction Traffic Management - Phase C (November 2021 to May 2022)

Area 1 - Airport Drive and Link Road – Phase 2



Existing eastbound Airport Drive carriageway is converted to a two-way Link Road extension, with one lane in each direction, which connects to a new Airport Drive and Link Road intersection (not shown)

Airport Drive

Kerbside lane length reduced by up to 40 metres

Median lane removed

Airport Drive and Link Road intersection reconfigured

Eastbound Airport Drive traffic uses new alignment

Kerbside lane converted to 40 metre short lane

Link Road

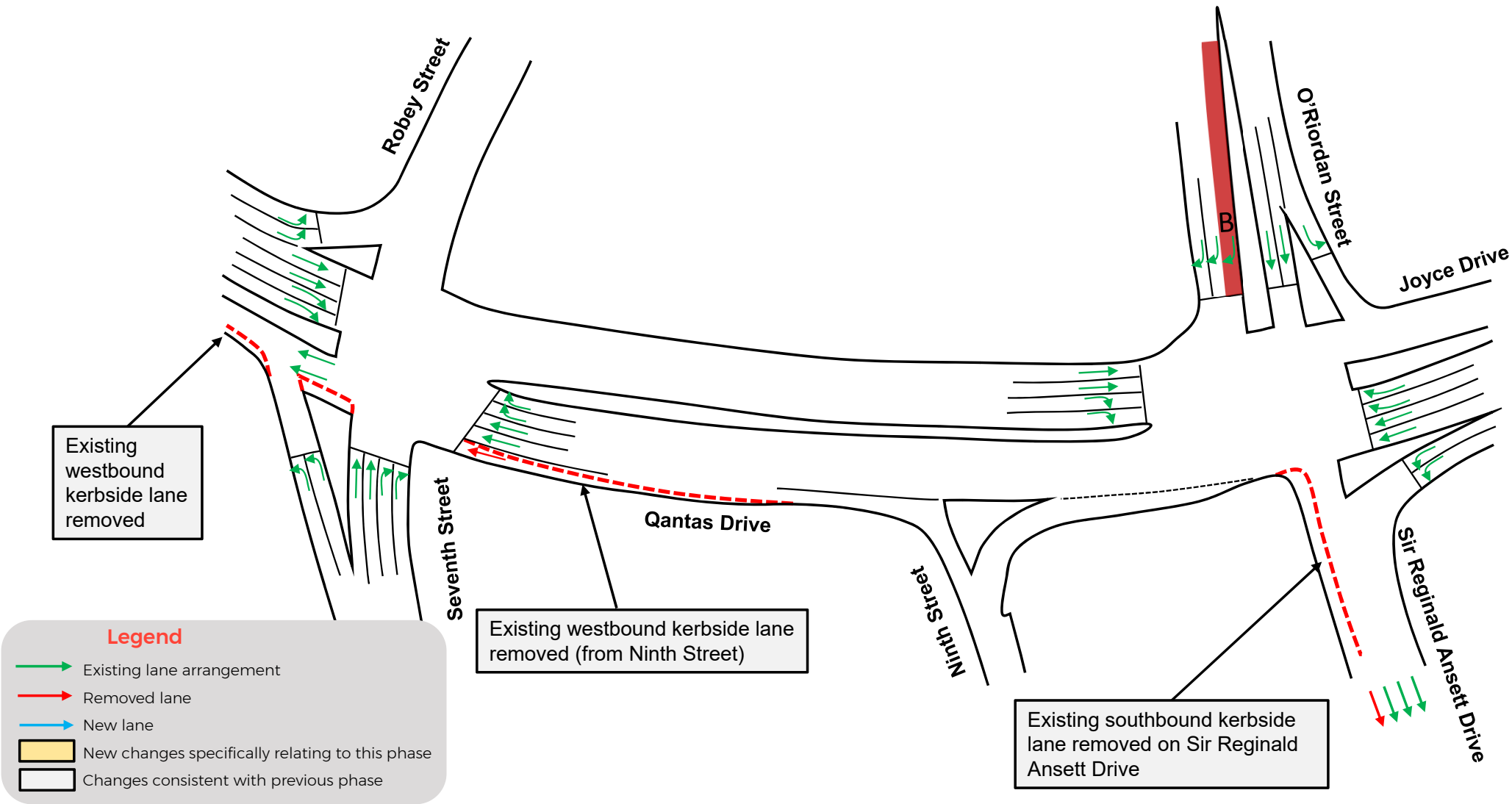
Northbound lane at intersection removed

Median lane reintroduced around 50 metres west of Link Road

Legend

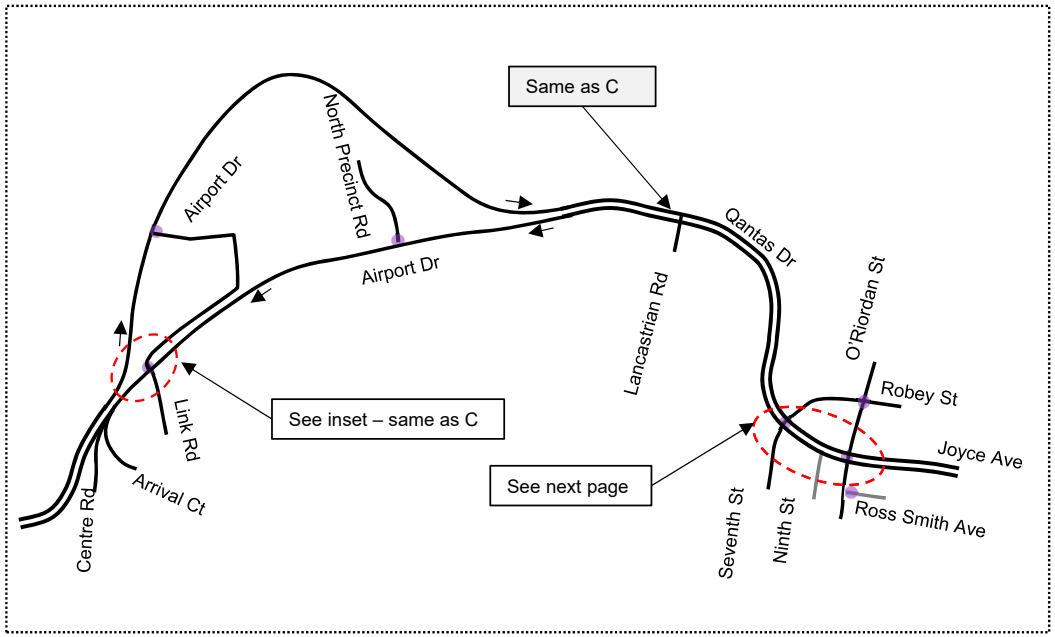
- Existing lane arrangement
- Removed lane
- New lane
- New changes specifically relating to this phase
- Changes consistent with previous phase

Construction Traffic Management - Phase C (November 2021 to May 2022)
Area 2 - Qantas Drive/Joyce Drive/Seventh Street/Robey Street/O'Riordan Street and Sir Reginal Ansett Drive – Phase 1



Construction Traffic Management - Phase D (May 2022 to October 2022)

Area 1 - Airport Drive and Link Road – Phase 2



Existing eastbound Airport Drive carriageway is converted to a two-way Link Road extension, with one lane in each direction, which connects to a new Airport Drive and Link Road intersection (not shown)

Airport Drive

Kerbside lane length reduced by up to 40 metres

Median lane removed

Airport Drive and Link Road intersection reconfigured

Eastbound Airport Drive traffic uses new alignment

Kerbside lane converted to 40 metre short lane

Link Road

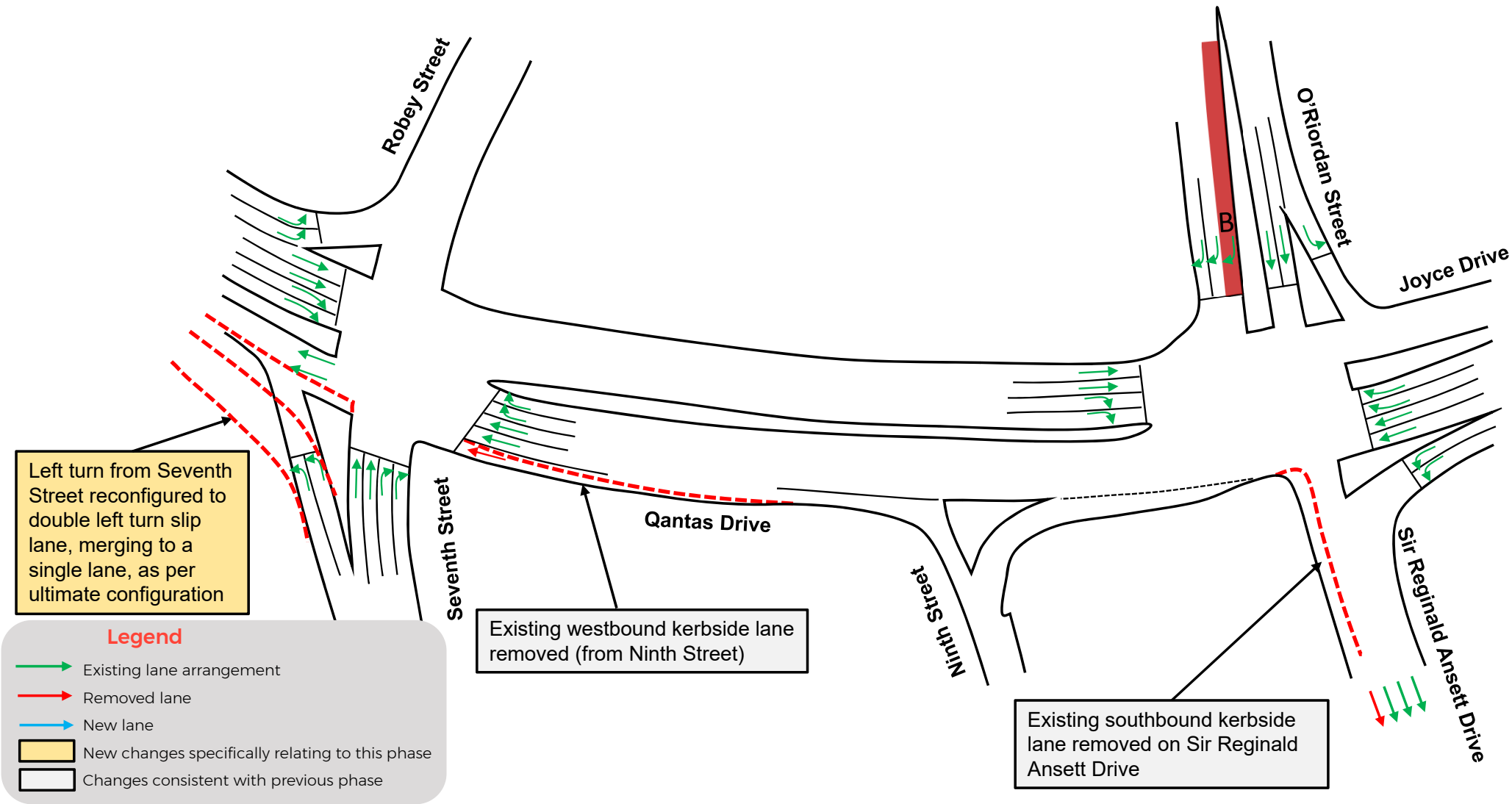
Northbound lane at intersection removed

Median lane reintroduced around 50 metres west of Link Road

Legend

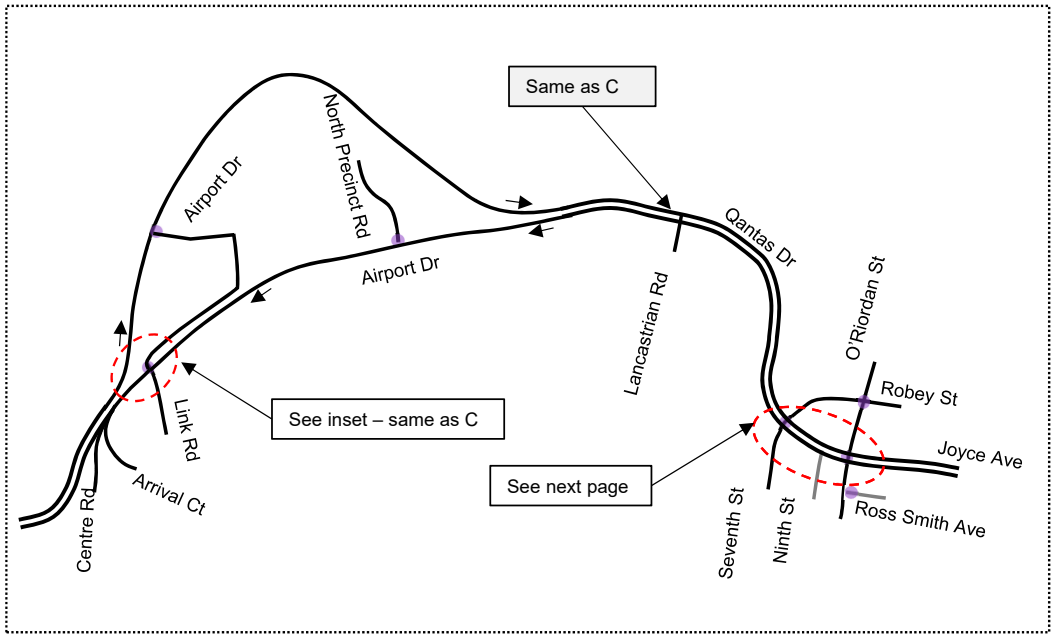
- Existing lane arrangement
- Removed lane
- New lane
- New changes specifically relating to this phase
- Changes consistent with previous phase

Construction Traffic Management - Phase D (May 2022 to October 2022)
Area 2 - Qantas Drive/Joyce Drive/Seventh Street/Robey Street/O'Riordan Street and Sir Reginal Ansett Drive – Phase 2



Construction Traffic Management - Phase E (October 2022 to June 2023)

Area 1 - Airport Drive and Link Road – Phase 2



Existing eastbound Airport Drive carriageway is converted to a two-way Link Road extension, with one lane in each direction, which connects to a new Airport Drive and Link Road intersection (not shown)

Airport Drive

Kerbside lane length reduced by up to 40 metres

Median lane removed

Airport Drive and Link Road intersection reconfigured

Eastbound Airport Drive traffic uses new alignment

Kerbside lane converted to 40 metre short lane

Link Road

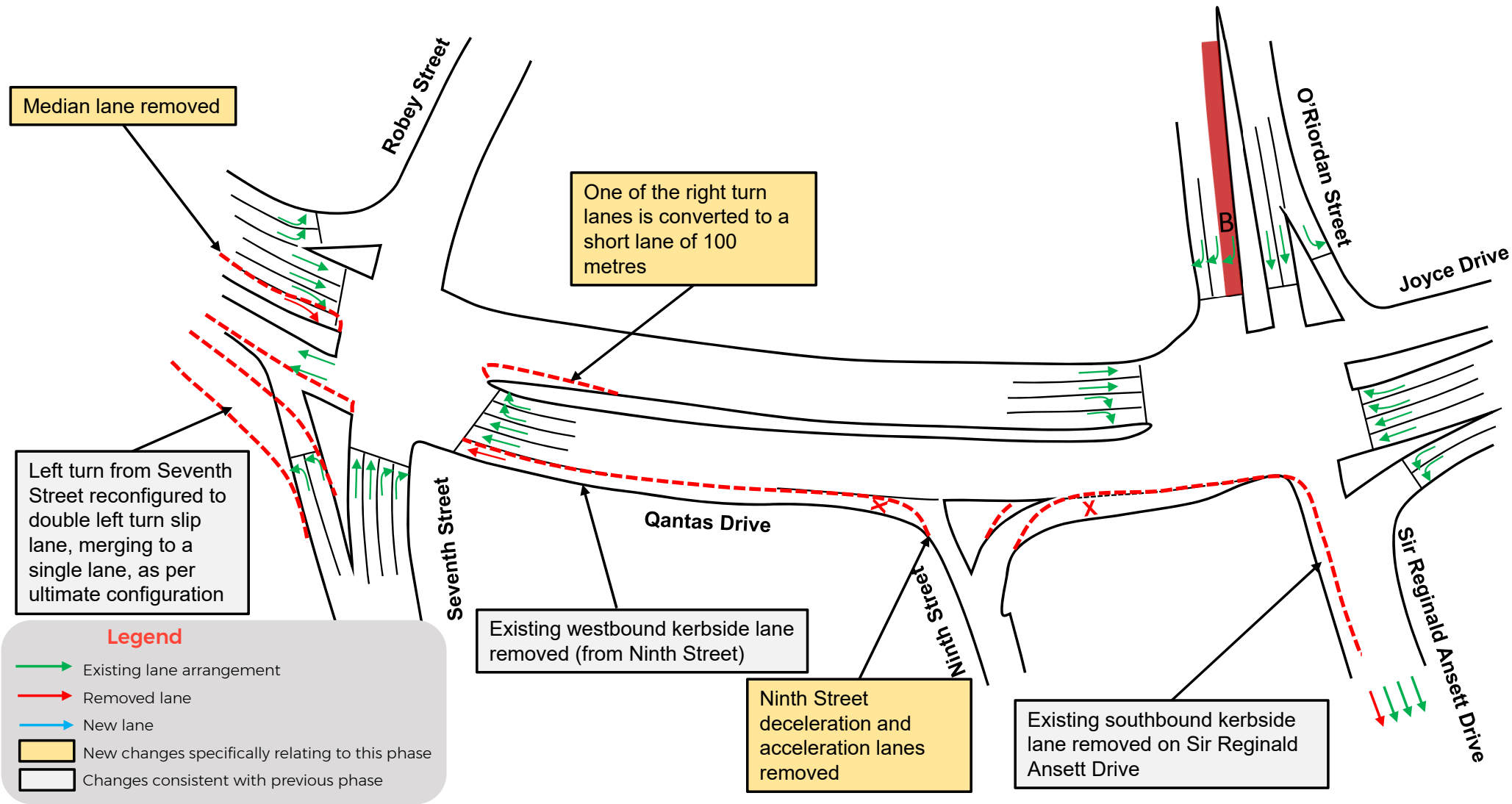
Northbound lane at intersection removed

Median lane reintroduced around 50 metres west of Link Road

Legend

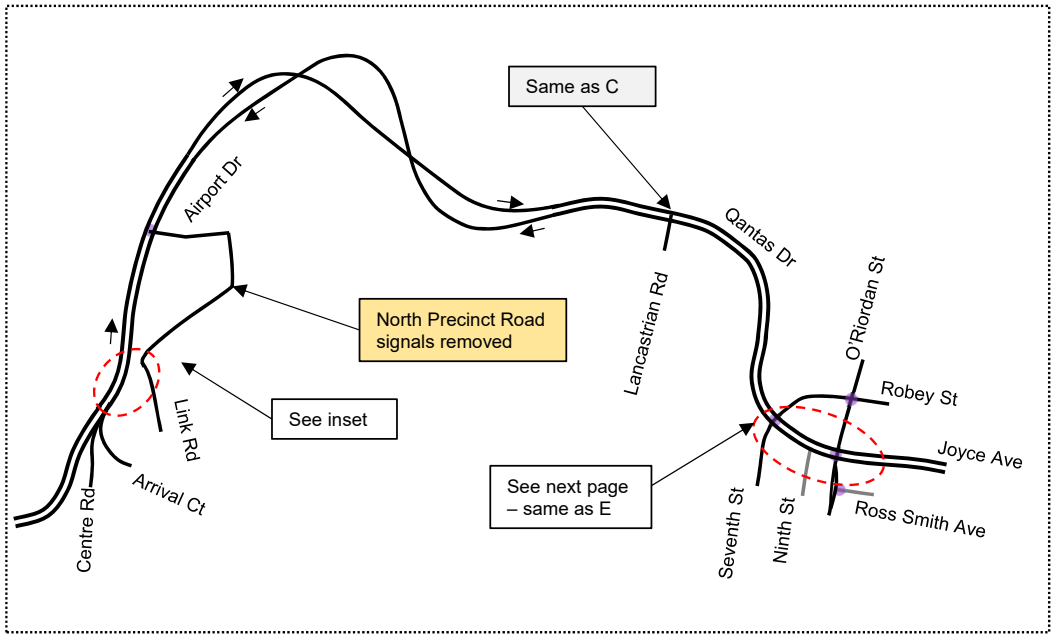
- Existing lane arrangement
- Removed lane
- New lane
- New changes specifically relating to this phase
- Changes consistent with previous phase

Construction Traffic Management - Phase E (October 2022 to June 2023)
Area 2 - Qantas Drive/Joyce Drive/Seventh Street/Robey Street/O'Riordan Street and Sir Reginal Ansett Drive – Phase 3



Construction Traffic Management - Phase F (June 2023 to December 2023)

Area 1 - Airport Drive and Link Road – Phase 3



Existing eastbound Airport Drive carriageway is converted to a two-way Link Road extension, with one lane in each direction, which connects to a new Airport Drive and Link Road intersection (not shown)

Existing westbound Airport Drive carriageway removed

Airport Drive and Link Road intersection reconfigured

Eastbound and westbound Airport Drive traffic uses new (ultimate) alignment

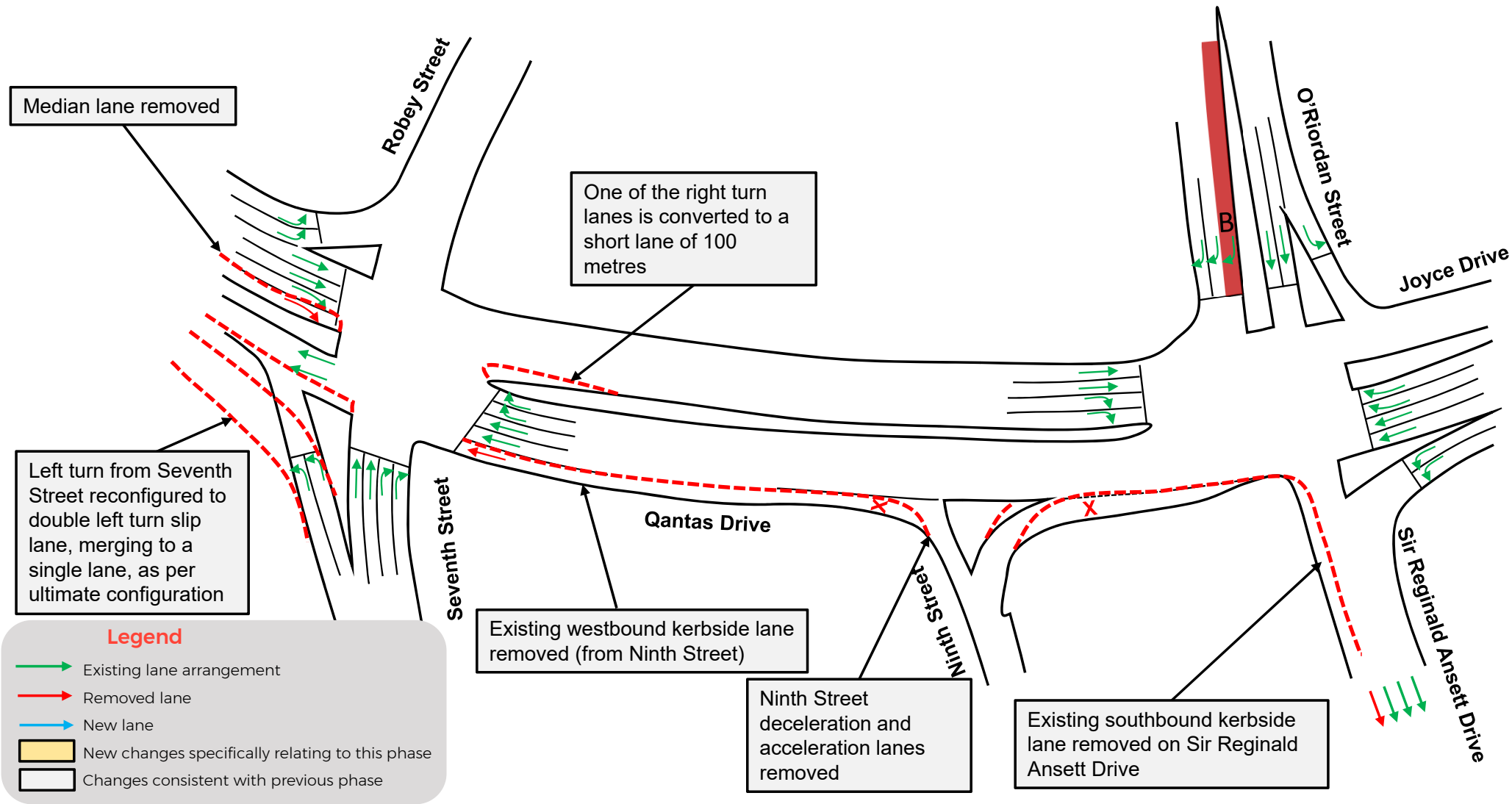
Second right turn lane re-introduced

Legend

- Existing lane arrangement
- Removed lane
- New lane
- New changes specifically relating to this phase
- Changes consistent with previous phase

Construction Traffic Management - Phase F (June 2023 to December 2023)

Area 2 - Qantas Drive/Joyce Drive/Seventh Street/Robey Street/O'Riordan Street and Sir Reginal Ansett Drive – Phase 3



Appendix B
Without project operational analysis

Table B-1 Travel times for 'without project' AM peak

Route	Direction	2018 (8am-9am) (minutes:seconds)	2026 'without project' (minutes:seconds)	2036 'without project' (minutes:seconds)
Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	Northbound	13:58	25:48	29:38
	Southbound	09:52	38:01	43:00
Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	Northbound	32:18	20:25	33:54
	Southbound	19:55	41:46	47:24
M5 East – Marsh Street to M1 at Southern Cross Drive	Eastbound	06:52	18:34	19:36
	Westbound	06:19	09:05	14:41
M5 East – Marsh Street to Botany Road (via M1)	Eastbound	12:05	25:09	27:41
	Westbound	07:34	09:50	14:39
Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	Eastbound	08:54	16:18	27:22
	Westbound	09:27	12:00	18:51
Canal Road – Princes Highway to Botany Road/Gardeners Road	Eastbound	05:26	16:04	18:31
	Westbound	07:27	13:58	18:33
Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	Northbound	10:08	21:37	32:54
	Southbound	05:32	14:48	18:28
Robey Street/Qantas Drive/Botany Road	Eastbound	04:59	07:50	18:40
	Westbound	08:44	11:45	07:23
O'Riordan Street – Joyce Drive to Gardeners Road	Northbound	09:21	16:15	31:07
	Southbound	06:28	18:09	24:53
O'Riordan Street – Joyce Drive to Gardeners Road/Bourke Road/Bourke Street	Northbound	05:43	10:17	17:23
	Southbound	05:17	08:50	08:03
Coward Street – Kent Road to Botany Road	Northbound	06:22	20:52	31:40
	Southbound	06:50	19:10	32:42
Unwins Bridge Road – May Street/Princes Highway to Railway Road	Northbound	03:11	06:12	12:02
	Southbound	03:06	09:36	27:07

Table B-2 Travel times for 'without project' PM peak

Route	Direction	2018 (5pm-6pm) (minutes:seconds)	2026 'without project' (minutes:seconds)	2036 'without project' (minutes:seconds)
Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	Northbound	09:51	18:07	18:07
	Southbound	15:20	40:21	48:22
Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	Northbound	12:37	21:25	22:57
	Southbound	27:45	31:39	51:19
M5 East – Marsh Street to M1 at Southern Cross Drive	Eastbound	04:45	04:38	04:34
	Westbound	06:27	08:09	12:34
M5 East – Marsh Street to Botany Road (via M1)	Eastbound	08:19	07:42	09:04
	Westbound	08:04	09:28	10:08
Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	Eastbound	06:25	09:18	08:52
	Westbound	08:45	15:35	22:56
Canal Road – Princes Highway to Botany Road/Gardeners Road	Eastbound	05:35	20:44	24:05
	Westbound	08:39	18:36	19:48
Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	Northbound	07:25	23:08	25:45
	Southbound	06:27	22:49	20:50
Robey Street/Qantas Drive/Botany Road	Eastbound	05:12	05:16	04:37
	Westbound	05:28	13:57	19:45
O'Riordan Street – Joyce Drive to Gardeners Road	Northbound	10:54	19:35	18:16
	Southbound	01:16	12:26	09:39
O'Riordan Street – Joyce Drive to Gardeners Road/Bourke Road/Bourke Street	Northbound	05:19	15:15	15:46
	Southbound	03:23	10:22	04:47
Coward Street – Kent Road to Botany Road	Northbound	07:49	15:27	10:19
	Southbound	05:57	23:50	23:42
Unwins Bridge Road – May Street/Princes Highway to Railway Road	Northbound	10:00	13:06	25:01
	Southbound	07:48	23:12	23:21

Table B-3 Bus travel times for 'without project' AM peak

Bus corridor	Direction	2018 baseline (minutes:seconds)	2026 'without project' (minutes:seconds)	2036 'without project' (minutes:seconds)
Botany Road – Gardeners Road to Mill Pond Drive	Northbound	10:57	21:37	32:54
	Southbound	06:38	14:48	18:28
General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	Eastbound	07:01	22:40	28:50
	Westbound	05:16	07:59	07:43
Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	Eastbound	12:26	17:45	28:22
	Westbound	10:33	14:27	07:09
Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Road and Gardeners Road)	Eastbound	15:26	34:14	39:17
	Westbound	14:56	24:32	32:50
O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Road intersection (via Kent Road)	Northbound	09:20	23:57	52:00
	Southbound	NA	26:51	25:42
Coward Street – Bourke Road to Botany Road/Wentworth Avenue	Eastbound	12:32	23:34	36:42
	Westbound	08:27	24:36	34:37
Princes Highway – Sydney Park Road to Brodie Spark Drive	Northbound	16:15	18:50	21:34
	Southbound	13:22	29:39	39:54

Table B-4 Bus travel times for 'without project' PM peak

Bus corridor	Direction	2018 baseline (minutes:seconds)	2026 'without project' (minutes:seconds)	2036 'without project' (minutes:seconds)
Botany Road – Gardeners Road to Mill Pond Drive	Northbound	17:58	23:08	25:45
	Southbound	06:34	22:49	20:50
General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	Eastbound	06:11	08:43	09:26
	Westbound	06:31	10:08	07:01
Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	Eastbound	06:38	16:26	13:02
	Westbound	11:03	07:43	09:47
Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Road and Gardeners Road)	Eastbound	18:11	31:45	39:46
	Westbound	15:57	18:58	32:02
O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Road intersection (via Kent Road)	Northbound	08:29	23:33	25:06
	Southbound	NA	20:14	19:38
Coward Street – Bourke Road to Botany Road/Wentworth Avenue	Eastbound	18:22	30:21	28:58
	Westbound	08:14	13:18	16:46
Princes Highway – Sydney Park Road to Brodie Spark Drive	Northbound	13:29	16:46	16:40
	Southbound	17:37	37:07	40:51

Appendix C

With project operational analysis

Table C-1 Intersection performance for 'with project' AM peak

Intersection	Existing		2026 'without project'		2026 'with project'		2036 'without project'		2036 'with project'		2036 change
	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	
West Botany Street/Marsh Street	51	D	79	F	73	F	88	F	56	D	−36%
Marsh Street/M5	43	D	93	F	88	F	155	F	91	F	−41%
General Holmes Drive/Mill Pond Drive	100	F	143	F	94	F	319	F	164	F	−49%
Botany Road/Mill Pond Drive	101	F	90	F	32	C	324	F	95	F	−71%
Joyce Drive/General Holmes Drive	152	F	76	F	157	F	205	F	244	F	19%
Botany Road/General Holmes Drive	90	F	77	F	57	E	160	F	53	D	−67%
Robey Street/O'Riordan Street	56	D	100	F	27	B	165	F	72	F	−56%
Joyce Drive/O'Riordan Street	130	F	200	F	71	F	267	F	163	F	−39%
Seventh Street/Qantas Drive	108	F	241	F	112	F	311	F	136	F	−56%
King Street/O'Riordan Street	69	E	190	F	91	F	295	F	116	F	−61%
O'Riordan Street/Bourke Road	43	D	121	F	66	E	170	F	96	F	−44%
Bourke Street/Coward Street	106	F	349	F	197	F	554	F	181	F	−67%
Coward Street/O'Riordan Street	78	F	216	F	146	F	347	F	180	F	−48%
Gardeners Road/Bourke Street	56	E	178	F	116	F	244	F	148	F	−39%
Kent Road/Ricketty Street	36	C	299	F	193	F	405	F	156	F	−61%
Botany Road/Gardeners Road	80	F	305	F	160	F	426	F	183	F	−57%
Kent Road/Coward Street	103	F	283	F	157	F	432	F	181	F	−58%
Canal Road/Burrows Road	58	E	76	F	55	D	186	F	42	D	−77%

Intersection	Existing		2026 'without project'		2026 'with project'		2036 'without project'		2036 'with project'		2036 change
	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	
Airport Drive/Link Road	6	A	14	A	16	B	62	E	19	B	−69%
O'Riordan Street/Gardeners Road	98	F	182	F	96	F	359	F	135	F	−62%
Kent Street/Gardeners Road	Not available		161	F	48	D	171	F	128	F	−25%

Table C-2 Intersection performance for 'with project' PM peak

Intersection	Existing		2026 'without project'		2026 'with project'		2036 'without project'		2036 'with project'		2036 change
	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	
West Botany Street/ Marsh Street	26	B	53	D	24	B	41	C	50	D	22%
Marsh Street/M5	68	E	51	D	49	D	53	D	58	E	9%
General Holmes Drive/Mill Pond Drive	39	C	64	E	39	C	100	F	35	C	−65%
Botany Road/Mill Pond Drive	103	F	70	E	77	F	117	F	70	F	−40%
Joyce Drive/General Holmes Drive	41	C	85	F	27	B	149	F	51	D	−66%
Botany Road/General Holmes Drive	49	D	117	F	73	F	128	F	46	D	−64%
Robey Street/ O'Riordan Street	26	B	163	F	117	F	182	F	120	F	−34%
Joyce Drive/O'Riordan Street	52	D	219	F	30	C	291	F	66	E	−77%
Seventh Street/Qantas Drive	64	E	114	F	33	C	178	F	41	C	−77%
King Street/ O'Riordan Street	33	C	221	F	130	F	238	F	111	F	−53%
O'Riordan Street/ Bourke Road	31	C	168	F	76	F	184	F	49	D	−73%
Bourke Street/Coward Street	58	E	324	F	111	F	335	F	99	F	−70%
Coward Street/ O'Riordan Street	51	D	250	F	144	F	268	F	107	F	−60%
Gardeners Road/ Bourke Street	43	D	125	F	156	F	113	F	65	E	−42%

Intersection	Existing		2026 'without project'		2026 'with project'		2036 'without project'		2036 'with project'		2036 change
	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	
Kent Road/Ricketty Street	41	C	91	F	39	C	233	F	29	C	−88%
Botany Road/ Gardeners Road	65	E	527	F	297	F	550	F	245	F	−55%
Kent Road/Coward Street	59	E	177	F	90	F	200	F	86	F	−57%
Canal Road/Burrows Road	93	F	117	F	28	B	137	F	39	C	−72%
Airport Drive/Link Road	6	A	8	A	10	A	9	A	11	A	22%
O'Riordan Street/ Gardeners Road	119	F	285	F	203	F	343	F	207	F	−40%
Kent Street/ Gardeners Road	Not available		81	F	56	D	174	F	116	F	−33%

Table C-3 Travel times for 'with project' AM peak

Route	Direction	Existing	2026 'without project'	2026 'with project'	2036 'without project'	2036 'with project'	2036 change
Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	Northbound	13:58	25:48	22:47	29:38	19:04	-36%
	Southbound	09:52	38:01	30:33	43:00	38:02	-12%
Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	Northbound	32:18	20:25	21:55	33:54	34:30	2%
	Southbound	19:55	41:46	36:20	47:24	42:03	-11%
M5 East – Marsh Street to M1 at Southern Cross Drive	Eastbound	06:52	18:34	13:18	19:36	15:07	-23%
	Westbound	06:19	09:05	06:11	14:41	10:39	-27%
M5 East – Marsh Street to Botany Road (Via M1)	Eastbound	12:05	25:09	15:16	27:41	17:23	-37%
	Westbound	07:34	09:50	07:13	14:39	11:38	-21%
Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	Eastbound	08:54	16:18	14:42	27:22	17:17	-37%
	Westbound	09:27	12:00	12:17	18:51	14:05	-25%
Canal Road – Princes Highway to Botany Road/Gardeners Road	Eastbound	05:26	16:04	10:56	18:31	14:27	-22%
	Westbound	07:27	13:58	08:47	18:33	12:52	-31%
Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	Northbound	10:08	21:37	08:18	32:54	09:32	-71%
	Southbound	05:32	14:48	04:31	18:28	07:47	-58%
Robey Street/Qantas Drive/Botany Road	Eastbound	04:59	07:50	03:54	18:40	04:49	-74%
	Westbound	08:44	11:45	10:41	07:23	13:45	86%
O'Riordan Street – Joyce Drive to Gardeners Road	Northbound	09:21	16:15	09:29	31:07	15:41	-50%
	Southbound	06:28	18:09	08:04	24:53	08:53	-64%
O'Riordan Street – Joyce Drive to Gardeners Road/Bourke Road/Bourke Street	Northbound	05:43	10:17	04:30	17:23	06:07	-65%
	Southbound	05:17	08:50	04:13	08:03	04:44	-41%
Coward Street – Kent Road to Botany Road	Northbound	06:22	20:52	08:01	31:40	13:34	-57%
	Southbound	06:50	19:10	07:21	32:42	13:22	-59%
Unwins Bridge Road – May Street/ Princes Highway to Railway Road	Northbound	03:11	06:12	05:26	12:02	04:55	-59%
	Southbound	03:06	09:36	07:02	27:07	13:32	-50%

Table C-4 Travel times for 'with project' PM peak

Route	Direction	Existing	2026 'without project'	2026 'with project'	2036 'without project'	2036 'with project'	2036 change
Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	Northbound	09:51	18:07	12:24	18:07	09:56	-45%
	Southbound	15:20	40:21	24:54	48:22	31:45	-34%
Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	Northbound	12:37	21:25	15:25	22:57	14:16	-38%
	Southbound	27:45	31:39	20:37	51:19	32:56	-36%
M5 East – Marsh Street to M1 at Southern Cross Drive	Eastbound	04:45	04:38	04:39	04:34	04:38	2%
	Westbound	06:27	08:09	08:14	12:34	15:23	22%
M5 East – Marsh Street to Botany Road (Via M1)	Eastbound	08:19	07:42	06:18	09:04	06:25	-29%
	Westbound	08:04	09:28	11:36	10:08	10:48	7%
Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	Eastbound	06:25	09:18	01:33	08:52	05:27	-39%
	Westbound	08:45	15:35	10:07	22:56	11:21	-50%
Canal Road – Princes Highway to Botany Road/Gardeners Road	Eastbound	05:35	20:44	10:19	24:05	08:05	-66%
	Westbound	08:39	18:36	11:13	19:48	13:10	-33%
Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	Northbound	07:25	23:08	08:42	25:45	08:31	-67%
	Southbound	06:27	22:49	08:13	20:50	09:54	-52%
Robey Street/Qantas Drive/Botany Road	Eastbound	05:12	05:16	05:02	04:37	04:53	6%
	Westbound	05:28	13:57	05:44	19:45	07:11	-64%
O'Riordan Street – Joyce Drive to Gardeners Road	Northbound	10:54	19:35	06:47	18:16	05:45	-69%
	Southbound	01:16	12:26	05:12	09:39	05:26	-44%
O'Riordan Street – Joyce Drive to Gardeners Road/Bourke Road/Bourke Street	Northbound	05:19	15:15	04:30	15:46	04:18	-73%
	Southbound	03:23	10:22	04:01	04:47	04:01	-16%
Coward Street – Kent Road to Botany Road	Northbound	07:49	15:27	06:25	10:19	06:16	-39%
	Southbound	05:57	23:50	07:57	23:42	07:27	-69%
Unwins Bridge Road – May Street/ Princes Highway to Railway Road	Northbound	10:00	13:06	05:56	25:01	10:26	-58%
	Southbound	07:48	23:12	17:29	23:21	19:31	-16%

Table C-5 Bus travel times for 'with project' AM peak

Bus corridor	Direction	Existing	2026 'without project'	2026 'with project'	2036 'without project'	2036 'with project'	2036 change
Botany Road – Gardeners Road to Mill Pond Drive	Northbound	10:57	21:37	08:18	32:54	09:32	-71%
	Southbound	06:38	14:48	04:31	18:28	07:47	-58%
General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	Eastbound	07:01	22:40	12:40	28:50	12:41	-56%
	Westbound	05:16	07:59	08:21	07:43	07:59	3%
Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	Eastbound	12:26	17:45	16:07	28:22	17:10	-39%
	Westbound	10:33	14:27	11:03	07:09	09:19	30%
Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Road and Gardeners Road)	Eastbound	15:26	34:14	16:34	39:17	23:57	-39%
	Westbound	14:56	24:32	10:34	32:50	17:27	-47%
O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Road intersection (via Kent Road)	Northbound	09:20	23:57	11:30	52:00	17:13	-67%
	Southbound	NA	26:51	13:01	25:42	14:17	-44%
Coward Street – Bourke Road to Botany Road/Wentworth Avenue	Eastbound	12:32	23:34	08:59	36:42	13:58	-62%
	Westbound	08:27	24:36	08:28	34:37	15:52	-54%
Princes Highway – Sydney Park Road to Brodie Spark Drive	Northbound	16:15	18:50	18:59	21:34	14:59	-31%
	Southbound	13:22	29:39	28:16	39:54	32:20	-19%

Table C-6 Bus travel times for 'with project' PM peak

Bus corridor	Direction	Existing	2026 'without project'	2026 'with project'	2036 'without project'	2036 'with project'	Change 2036
Botany Road – Gardeners Road to Mill Pond Drive	Northbound	17:58	23:08	08:42	25:45	08:31	-67%
	Southbound	06:34	22:49	08:13	20:50	09:54	-52%
General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	Eastbound	06:11	08:43	05:40	09:26	05:36	-41%
	Westbound	06:31	10:08	15:22	07:01	16:04	129%
Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	Eastbound	06:38	16:26	11:50	13:02	11:06	-15%
	Westbound	11:03	07:43	07:10	09:47	10:32	8%
Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Road and Gardeners Road)	Eastbound	18:11	31:45	13:45	39:46	09:11	-77%
	Westbound	15:57	18:58	15:33	32:02	18:03	-44%
O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Road intersection (via Kent Road)	Northbound	08:29	23:33	08:39	25:06	06:21	-75%
	Southbound	NA	20:14	06:02	19:38	06:20	-68%
Coward Street – Bourke Road to Botany Road/Wentworth Avenue	Eastbound	18:22	30:21	11:10	28:58	09:40	-67%
	Westbound	08:14	13:18	10:02	16:46	11:25	-32%
Princes Highway – Sydney Park Road to Brodie Spark Drive	Northbound	13:29	16:46	10:08	16:40	08:04	-52%
	Southbound	17:37	37:07	24:20	40:51	31:43	-22%

Appendix D
Cumulative analysis

Table D-1 Intersection performance for 'cumulative' AM peak

Intersection	2036 'without project'		2036 'with project'		2036 'cumulative'		2036 change
	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	
West Botany Street/Marsh Street	88	F	56	D	63	E	13%
Marsh Street/M5	155	F	91	F	81	F	−11%
General Holmes Drive/Mill Pond Drive	319	F	164	F	156	F	−5%
Botany Road/Mill Pond Drive	324	F	95	F	99	F	4%
Joyce Drive/General Holmes Drive	205	F	244	F	219	F	−10%
Botany Road/General Holmes Drive	160	F	53	D	55	D	4%
Robey Street/O'Riordan Street	165	F	72	F	66	E	−8%
Joyce Drive/O'Riordan Street	267	F	163	F	165	F	1%
Seventh Street/Qantas Drive	311	F	136	F	150	F	10%
King Street/O'Riordan Street	295	F	116	F	101	F	−13%
O'Riordan Street/Bourke Road	170	F	96	F	84	F	−13%
Bourke Street/Coward Street	554	F	181	F	128	F	−29%
Coward Street/O'Riordan Street	347	F	180	F	207	F	15%
Gardeners Road/Bourke Street	244	F	148	F	151	F	2%
Kent Road/Ricketty Street	405	F	156	F	130	F	−17%
Botany Road/Gardeners Road	426	F	183	F	152	F	−17%
Kent Road/Coward Street	432	F	181	F	150	F	−17%
Canal Road/Burrows Road	186	F	42	D	39	C	−7%
Airport Drive/Link Road	62	E	19	B	18	B	−5%
O'Riordan Street/Gardeners Road	359	F	135	F	180	F	33%
Kent Street/Gardeners Road	171	F	128	F	111	F	−13%

Table D-2 Intersection performance for 'cumulative' PM peak

Intersection	2036 'without project'		2036 'with project'		2036 'cumulative'		2036 change
	Average delay (seconds)	LoS	Average delay (seconds)	LoS	Average delay (seconds)	LoS	
West Botany Street/Marsh Street	41	C	50	D	24	B	−52%
Marsh Street/M5	53	D	58	E	44	D	−24%
General Holmes Drive/Mill Pond Drive	100	F	35	C	31	C	−11%
Botany Road/Mill Pond Drive	117	F	70	F	69	E	−1%
Joyce Drive/General Holmes Drive	149	F	51	D	53	D	4%
Botany Road/General Holmes Drive	128	F	46	D	35	C	−24%
Robey Street/O'Riordan Street	182	F	120	F	107	F	−11%
Joyce Drive/O'Riordan Street	291	F	66	E	53	D	−20%
Seventh Street/Qantas Drive	178	F	41	C	26	B	−37%
King Street/O'Riordan Street	238	F	111	F	43	D	−61%
O'Riordan Street/Bourke Road	184	F	49	D	30	C	−39%
Bourke Street/Coward Street	335	F	99	F	91	F	−8%
Coward Street/O'Riordan Street	268	F	107	F	92	F	−14%
Gardeners Road/Bourke Street	113	F	65	E	91	F	40%
Kent Road/Ricketty Street	233	F	29	C	40	C	38%
Botany Road/Gardeners Road	550	F	245	F	215	F	−12%
Kent Road/Coward Street	200	F	86	F	84	F	−2%
Canal Road/Burrows Road	137	F	39	C	38	C	−3%
Airport Drive/Link Road	9	A	11	A	11	A	0%
O'Riordan Street/Gardeners Road	343	F	207	F	229	F	11%
Kent Street/Gardeners Road	174	F	116	F	126	F	9%

Table D-3 Travel times for 'cumulative' AM peak

Route	Direction	2036 'without project'	2036 'with project'	2036 'cumulative'	2036 change
Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	Northbound	29:38	19:04	18:39	-2%
	Southbound	43:00	38:02	38:12	0%
Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	Northbound	33:54	34:30	22:12	-36%
	Southbound	47:24	42:03	30:59	-26%
M5 East – Marsh Street to M1 at Southern Cross Drive	Eastbound	19:36	15:07	16:03	6%
	Westbound	14:41	10:39	08:20	-22%
M5 East – Marsh Street to Botany Road (Via M1)	Eastbound	27:41	17:23	19:08	10%
	Westbound	14:39	11:38	09:32	-18%
Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	Eastbound	27:22	17:17	16:21	-5%
	Westbound	18:51	14:05	17:26	24%
Canal Road – Princes Highway to Botany Road/Gardeners Road	Eastbound	18:31	14:27	14:55	3%
	Westbound	18:33	12:52	10:21	-20%
Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	Northbound	32:54	09:32	07:53	-17%
	Southbound	18:28	07:47	06:52	-12%
Robey Street/Qantas Drive/Botany Road	Eastbound	18:40	04:49	04:11	-13%
	Westbound	07:23	13:45	10:31	-24%
O'Riordan Street – Joyce Drive to Gardeners Road	Northbound	31:07	15:41	13:46	-12%
	Southbound	24:53	08:53	08:27	-5%
O'Riordan Street – Joyce Drive to Gardeners Road/Bourke Road/Bourke Street	Northbound	17:23	06:07	05:34	-9%
	Southbound	08:03	04:44	05:01	6%
Coward Street – Kent Road to Botany Road	Northbound	31:40	13:34	12:40	-7%
	Southbound	32:42	13:22	10:47	-19%
Unwins Bridge Road – May Street/ Princes Highway to Railway Road	Northbound	12:02	04:55	06:30	32%
	Southbound	27:07	13:32	14:52	10%

Table D-4 Travel times for 'cumulative' PM peak

Route	Direction	2036 'without project'	2036 'with project'	2036 'cumulative'	2036 change
Princes Highway – May Street (St Peters) to Wickham Street/Forest Road	Northbound	18:07	09:56	12:40	28%
	Southbound	48:22	31:45	27:03	-15%
Princes Highway – May Street (St Peters) to Bestic Street (West Botany Street)	Northbound	22:57	14:16	16:32	16%
	Southbound	51:19	32:56	35:09	7%
M5 East – Marsh Street to M1 at Southern Cross Drive	Eastbound	04:34	04:38	04:36	-1%
	Westbound	12:34	15:23	08:55	-42%
M5 East – Marsh Street to Botany Road (Via M1)	Eastbound	09:04	06:25	06:15	-3%
	Westbound	10:08	10:48	06:07	-43%
Marsh Street – M5 Intersection to Joyce Drive/General Holmes Drive	Eastbound	08:52	05:27	03:32	-35%
	Westbound	22:56	11:21	08:40	-24%
Canal Road – Princes Highway to Botany Road/Gardeners Road	Eastbound	24:05	08:05	07:54	-2%
	Westbound	19:48	13:10	10:40	-19%
Botany Road – Gardeners Road to Mill Pond Drive/Botany Road	Northbound	25:45	08:31	07:01	-18%
	Southbound	20:50	09:54	06:40	-33%
Robey Street/Qantas Drive/Botany Road	Eastbound	04:37	04:53	03:40	-25%
	Westbound	19:45	07:11	04:22	-39%
O'Riordan Street – Joyce Drive to Gardeners Road	Northbound	18:16	05:45	05:12	-10%
	Southbound	09:39	05:26	00:46	-86%
O'Riordan Street – Joyce Drive to Gardeners Road/Bourke Road/Bourke Street	Northbound	15:46	04:18	04:10	-3%
	Southbound	04:47	04:01	03:22	-16%
Coward Street – Kent Road to Botany Road	Northbound	10:19	06:16	03:58	-37%
	Southbound	23:42	07:27	07:57	7%
Unwins Bridge Road – May Street/ Princes Highway to Railway Road	Northbound	25:01	10:26	15:33	49%
	Southbound	23:21	19:31	26:58	38%

Table D-5 Bus travel times for 'cumulative' AM peak

Bus corridor	Direction	2036 'without project'	2036 'with project'	2036 'cumulative'	2036 change
Botany Road – Gardeners Road to Mill Pond Drive	Northbound	32:54	09:32	07:53	-17%
	Southbound	18:28	07:47	06:52	-12%
General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	Eastbound	28:50	12:41	13:08	4%
	Westbound	07:43	07:59	10:00	25%
Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	Eastbound	28:22	17:10	14:47	-14%
	Westbound	07:09	09:19	14:28	55%
Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Road and Gardeners Road)	Eastbound	39:17	23:57	24:05	1%
	Westbound	32:50	17:27	20:18	16%
O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Road intersection (via Kent Road)	Northbound	52:00	17:13	17:37	2%
	Southbound	25:42	14:17	14:14	0%
Coward Street – Bourke Road to Botany Road/Wentworth Avenue	Eastbound	36:42	13:58	10:37	-24%
	Westbound	34:37	15:52	11:19	-29%
Princes Highway – Sydney Park Road to Brodie Spark Drive	Northbound	21:34	14:59	14:09	-6%
	Southbound	39:54	32:20	32:11	0%

Table D-6 Bus travel times for 'cumulative' PM peak

Bus corridor	Direction	2036 'without project'	2036 'with project'	2036 'cumulative'	Change
Botany Road – Gardeners Road to Mill Pond Drive	Northbound	25:45	08:31	07:01	-18%
	Southbound	20:50	09:54	06:40	-33%
General Holmes Drive – Botany Road/Mill Pond Drive, Mascot to Kyeemagh	Eastbound	09:26	05:36	05:30	-2%
	Westbound	07:01	16:04	05:55	-63%
Airport Drive – Princes Highway to O'Riordan Street/Sir Reginald Ansett Drive	Eastbound	13:02	11:06	12:10	10%
	Westbound	09:47	10:32	08:04	-23%
Canal Road/Ricketty Street – Princes Highway to Botany Road (via Bourke Road and Gardeners Road)	Eastbound	39:46	09:11	09:46	6%
	Westbound	32:02	18:03	13:20	-26%
O'Riordan Street/Qantas Drive intersection to Gardeners Road/Bourke Road intersection (via Kent Road)	Northbound	25:06	06:21	07:55	25%
	Southbound	19:38	06:20	04:55	-22%
Coward Street – Bourke Road to Botany Road/Wentworth Avenue	Eastbound	28:58	09:40	08:13	-15%
	Westbound	16:46	11:25	03:15	-72%
Princes Highway – Sydney Park Road to Brodie Spark Drive	Northbound	16:40	08:04	10:31	30%
	Southbound	40:51	31:43	28:34	-10%

SG00-G2S-DM-TMP-0012-04

RMS.19.1443
ISBN 978-1-922338-10-5