# 8 Traffic and transport

This chapter outlines the potential traffic and transport impacts associated with the M4-M5 Link project (the project). A detailed traffic and transport assessment has been prepared for the project and is included in **Appendix H** (Technical working paper: Traffic and transport). This chapter provides a summary of the technical working paper and details:

- The assessment methodology and approach used to carry out the traffic and transport assessment
- The existing traffic and transport environment within the study area
- Future traffic and transport conditions without the project
- Potential impacts of the project on the road network during construction and operation
- Recommended safeguards and management measures to avoid, minimise and/or mitigate potential traffic and transport impacts.

The Secretary of the NSW Department of Planning and Environment (DP&E) has issued environmental assessment requirements for the project. These are referred to as Secretary's Environmental Assessment Requirements (SEARs). **Table 8-1** sets out these requirements and the associated desired performance outcomes as they relate to traffic and transport, and identifies where they have been addressed in this environmental impact statement (EIS).

**Table 8-1 SEARs – traffic and transport**

| Desired performance outcome | SEARs | Where addressed in the EIS |
|---|---|---|
| **1. Transport and traffic**<br>Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts.<br>The safety of transport system customers is maintained.<br>Impacts on network capacity and the level of service are effectively managed.<br>Works are compatible with existing infrastructure and future transport corridors. | 1. The Proponent must assess construction transport and traffic (vehicle, pedestrian and cyclists) impacts, including, but not necessarily limited to:<br>(a) a considered approach to route identification and scheduling of transport movements, particularly outside standard construction hours; | Construction haulage routes and the scheduling of transport movements are described in **section 8.3.1**. |
| | (b) the number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements); | Potential construction impacts are described in **section 8.3.1**. |
| | (c) construction worker parking; | Construction workforce parking is discussed in **section 8.3.1**. |
| | (d) the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times and sensitive road users and parking arrangements); | Potential construction impacts are described in **section 8.3.1**. |
| | (e) access constraints and impacts on public transport, pedestrians and cyclists; | Potential impacts on public and active transport are discussed in **section 8.3**. |

| Desired performance outcome | SEARs | Where addressed in the EIS |
|---|---|---|
| | (f) the need to close, divert or otherwise reconfigure elements of the road, cycle and pedestrian network associated with construction of the project. Where the closure, diversion or reconfiguration are temporary, provide an estimate of the duration of the altered access arrangements; and | Possible road closures and temporary changes to the active transport network are described in **section 8.3**. |
| | (g) the cumulative traffic impacts of other key infrastructure projects preparing for or commencing construction, including but not limited to other stages of WestConnex; | Construction traffic impacts are discussed in **Chapter 26** (Cumulative impacts). |
| | 2. The Proponent must model and/or the operational transport impacts of the project including, but not necessarily limited to:<br>(a) forecast travel demand and traffic volumes (expressed in terms of total numbers and heavy and light vehicle numbers) for the project and the surrounding road, cycle and public transport network, including potential shifts of traffic movements on alternate routes outside the proposal area (such as toll avoidance) and impact of permanent street closures directly attributable to the SSI; | Operational impacts are discussed in **section 8.3.3**. |
| | (b) travel time analysis; | Travel time analysis is discussed in **section 8.3.3**. |
| | (c) performance of key interchanges and intersections by undertaking a level of service analysis at key locations, for peak periods; | Operational impacts are discussed in **section 8.3.3**. |
| | (d) wider transport interactions (local and regional roads, cycling, public and freight transport), taking into account the Sydney City Centre Access Strategy and planned future urban release areas such as the Bays Precinct and planned future port activities and uses; | Operational impacts are discussed in **section 8.3.3**. |
| | (e) the redistribution of traffic and impacts on traffic volumes and levels of service on the road network resulting from changes to the design of the M4-M5 Link as modelled in the traffic assessments for the M4 East and New M5 projects; | Operational impacts are discussed in **section 8.3.3**. |
| | (f) induced traffic and operational implications for existing and proposed public transport (particularly with respect to strategic bus corridors and bus routes and permanent closure/relocation of bus stops) and consideration of opportunities to improve public transport; | Operational impacts are discussed in **section 8.3.3**. |
| | (g) impacts on cyclists and pedestrian access and safety, including on known routes and future proposals such as along Lilyfield Road; | Refer to **Appendix N** (Technical working paper: Active transport strategy). |

| Desired performance outcome | SEARs | Where addressed in the EIS |
|---|---|---|
| | (h) opportunities to integrate cycling and pedestrian elements with surrounding networks and within the project; and | Refer to **Appendix N** (Technical working paper: Active transport strategy). |
| | (i) property and business access and on street parking. | Operational impacts are discussed in **section 8.3.3**. |
| | The assessment must provide an explanation for the scope of the modelled area, including justification of the nominated boundaries. | A description of the assessment methodology is provided in **section 8.1.4**. |

## 8.1 Assessment methodology

### 8.1.1 Strategic transport context

The transport network in Sydney is expected to be put under increasing pressure over the next 20 years. *A Plan for Growing Sydney* (NSW Government 2014) indicated that from 2011 to 2031, Sydney's population is forecast to increase from 4.3 to 5.9 million, which equates to an average of around 80,000 additional residents per year. Moreover, by 2036, the number of trips made around Sydney each day is forecast to increase by 31 per cent from 16 to 21 million vehicle movements. This growth will place increasing pressure on the NSW transport network and the key travel demand corridors connecting regional cities and major centres across the greater Sydney metropolitan area, as shown in **Figure 8-1**.

Key corridors currently accommodate high levels of daily traffic including freight, commuter and leisure travel. Users of these corridors frequently experience congestion and delay, particularly during weekday and weekend peak periods. Both the *NSW Long Term Transport Master Plan* (Transport for NSW 2012) and the *State Infrastructure Strategy Update 2014* (*State Infrastructure Strategy*) (Infrastructure NSW 2014) identified the need to plan and invest in the future of Sydney's motorway network, which provides vital infrastructure connections within and between key travel demand corridors. Any investment in motorway infrastructure must be aligned with supporting public and active transport initiatives to achieve an increase in capacity, while aiming to reduce the reliance on and demand for private vehicles on the future road network.

The WestConnex project is one part of a broader solution to these growing pressures. While public transport is also part of the overall transport plan, it is recognised that not all trips across Sydney can be served by public transport, especially trips to dispersed destinations, commercial trips requiring the movement of large or heavy goods/materials or trade and service-related journeys. In addition, Sydney is home to two-thirds of NSW's manufacturing sector, with many of the state's major aviation, pharmaceutical, biotechnology, electronics and automotive industries based in western Sydney. These businesses rely heavily on the road network and its connectivity to the port and airport precincts.

A congested road network also affects public transport; with bus travel times experiencing the same delays as other road users. Providing new, tunnel alternatives to sections of the arterial road network will improve road-based public transport travel times and provide opportunities for new rapid transit options.

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

The key strategic traffic objectives of the project are to:

- Provide an efficient motorway link between the M4 and M5 motorways and improve traffic flow on the motorway network
- Enable long term motorway network development, including facilitating new cross-harbour capacity and connections to Sydney's south
- Improve accessibility and reliability of commercial vehicle movement in the M4 and M5 corridors to economic centres, including to Sydney Airport and Port Botany economic zone
- Improve traffic conditions and ease future congestion on the inner western and south-western network, including Parramatta Road, supporting urban regeneration and growth
- Improve overall network productivity.

A detailed discussion of the strategic context and justification for the project is provided in **Chapter 3** (Strategic context and project need). This includes a description of transport policies, strategies and plans that are relevant to the project and the WestConnex program of works. A description of the alternatives to the project, which explains how and why the project design was selected as the preferred option for assessment in this EIS is provided in **Chapter 4** (Project development and alternatives).


**Figure 8-1 Sydney travel demand corridors**

### 8.1.2 Traffic forecasting and modelling process

The Technical working paper: Traffic and transport (**Appendix H**) has assessed the potential impacts of the project during construction and operation, including cumulative impacts associated with the WestConnex program of works, as well as the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension projects.

The traffic and transport impact assessment undertaken for the project consisted of three key components:

- Characterising the existing traffic and transport environment within the study area using a combination of data from Transport for NSW Transport Performance and Analytics and Roads and Maritime, traffic counts and survey data. A description of the study area for the traffic and transport assessment is included in **section 8.1.4**
- The development and application of a regional strategic traffic model; the WestConnex Road Traffic Model (WRTM), to determine the anticipated future growth in traffic on the road network in the Sydney metropolitan area, based on planned and forecast changes in population and employment, and to understand the metropolitan-wide impacts of the project
- Operational modelling of the road network to determine the traffic and transport conditions in future years with and without the project on roads:
  - Around the Wattle Street interchange
  - On the M4-M5 Link Motorway
  - Around the Rozelle interchange
  - Around St Peters interchange
  - Around the construction ancillary facilities during construction of the project.

The study area for the traffic and transport assessment, as well as the methodology for undertaking these key traffic and transport assessments is discussed in **section 8.1.4** to **section 8.1.8**.

### 8.1.3 Relevant guidelines and policies

The following guidelines were followed in carrying out the traffic and transport assessment:

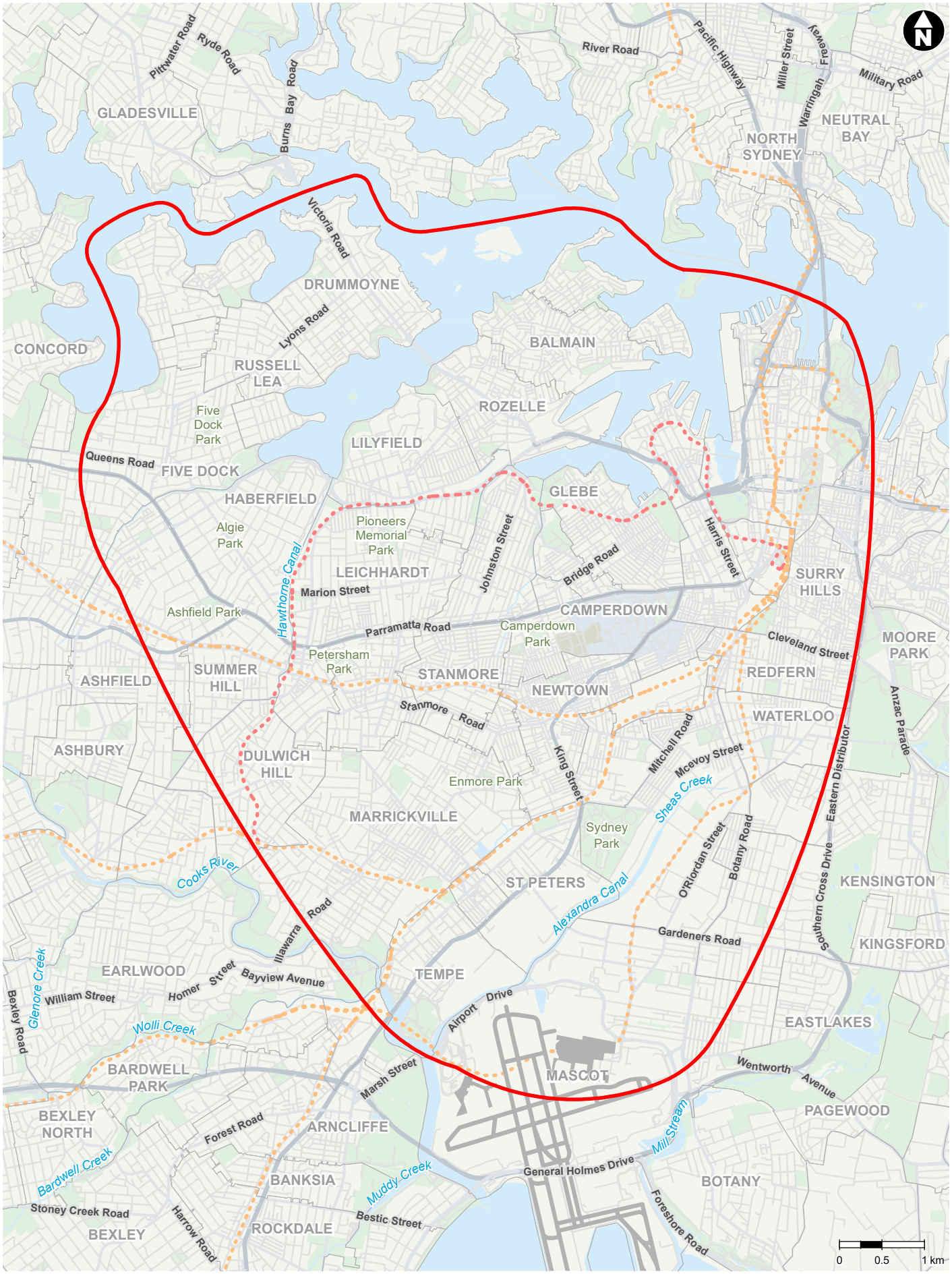
- *Guide to Traffic Management – Part 3 Traffic Studies and Analysis* (Austroads 2013)
- *Traffic Modelling Guidelines* (NSW Roads and Maritime Services (Roads and Maritime) 2013)
- *Guide to Traffic Generating Developments Version 2.2* (NSW Roads and Traffic Authority (RTA) 2002).

### 8.1.4 Study area

The study area for the traffic and transport assessment was informed by the forecast traffic and transport changes from the WRTM version 2.3 (WRTM v2.3), a strategic traffic model that covers the Sydney metropolitan area. The extent of the study area and the areas requiring operational modelling assessment were determined through analysis of forecast WRTM v2.3 traffic flow differences as a result of the project. This process allowed for identification of those areas of Sydney's road network where the project was forecast to have a substantial impact (adverse or beneficial).

The study area for the traffic and transport assessment is shown in **Figure 8-2** and broadly encompasses an area extending from the Parramatta River in the north to Sydney Airport in the south, and from the Eastern Distributor in the east to Haberfield and Marrickville in the west. The study area is predominantly focussed on the corridor between Haberfield and Rozelle, the corridor between Rozelle and St Peters, the corridor between Haberfield and St Peters, and the surface road networks around the Wattle Street, Rozelle and St Peters interchanges.

Changes on strategic roads outside of this study area are assessed in the Sydney metropolitan road network sections in this chapter, and those outside the operational model areas are assessed through a screenline analysis, presented in **section 8.3.3**. Further justification of the study area is contained in **Appendix H** (Technical working paper: Traffic and transport).




**LEGEND**

**Existing features**

- Waterway
- Railway
- Light rail
- Suburb boundary
- Arterial road
- Subarterial road
- Local road

**Traffic study area**

- Boundary

**Figure 8-2** Study area for the traffic and transport assessment

## 8.1.5 Approach to traffic modelling

### Overview of traffic modelling approach

Traffic modelling for the project aimed to make best use of available traffic count data and modelling software to determine base and future traffic conditions for the project and surrounding road network (in terms of estimating travel demand and traffic volumes). These traffic conditions were then used to assess the operational performance of the network, in scenarios with and without the project.

An overview of the traffic modelling approach is presented in **Figure 8-3**.

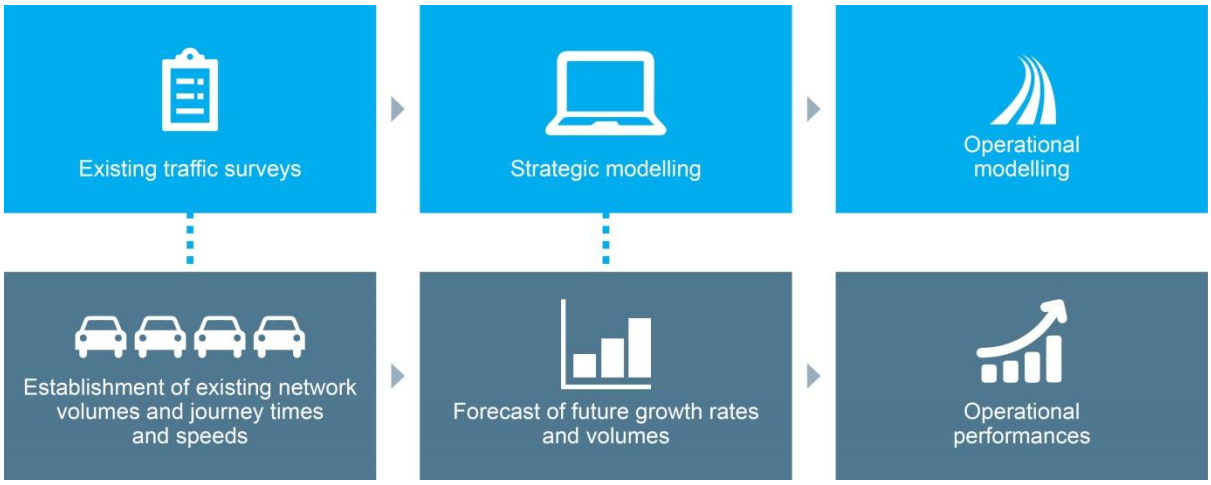



**Figure 8-3 Overview of traffic modelling approach**

### Traffic models

Traffic modelling for the project included metropolitan area network modelling (strategic modelling) and local level operational modelling, which enabled existing and future traffic and transport conditions and road network performance to be characterised, with and without the project. This approach includes:

- Strategic modelling – an analysis of changes to traffic that may occur at a metropolitan or 'strategic' level, including as a result of the project, the broader WestConnex program of works, other major road network and public transport developments, and factors such as major developments and changes in land use patterns
- Operational traffic network performance modelling – a more detailed, localised analysis of changes to traffic conditions that occur on individual roads and intersections.

These two types of models are described in more detail in **section 8.1.6** and **section 8.1.7** respectively.

### Traffic modelling scenarios

Traffic modelling for the project assessed eight scenarios:

- Three scenarios without the project:
  - The existing road network (2015)
  - The road network at the year of opening of the project (2023)
  - The road network 10 years after opening the project (2033)
- A construction scenario (2021)
- Two scenarios with the project:
  - At the year of opening of the project (2023)

- 10 years after opening the project (2033)

· Two cumulative scenarios:

- At the year of opening of the M4-M5 Link (2023) with NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5 and the proposed future Sydney Gateway and Western Harbour Tunnel operational. The proposed future Western Harbour Tunnel (a component of the proposed future Western Harbour Tunnel and Beaches Link project) has been tested without a surface connection at Rozelle
- 10 years after opening of the M4-M5 Link (2033), with NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5 and the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension operational.

All future scenarios (with and without the project) assume that other on-going improvements would be made to the broader transport network including some new infrastructure and intersection improvements to improve capacity and to cater for traffic growth.

The traffic modelling scenarios used to inform the assessment of the traffic and transport related impacts of the project are summarised in **Table 8-2**. An additional scenario incorporating the M4-M5 Link mainline tunnels only was strategically assessed to determine the potential impacts on traffic volumes and patterns along the M4-M5 Link corridor under a staged opening (see **section 8.3.3**).

### Changes from the M4 East and New M5 EIS assessments

While WRTM v2.3 was used for this EIS, WRTM v2.1 was used for the M4 East EIS and the New M5 EIS. Updates to the WRTM inputs have occurred, as well as enhancements to the WRTM zones and growth processing. These updates and enhancements include:

· Updated land use forecasts, including revised land use development along Parramatta Road, The Bays Precinct and in Mascot town centre

· Evolution and refinement of the M4-M5 Link design, with increases in the number of lanes in the mainline tunnels from three lanes to four lanes, revised layout for the refined Rozelle interchange, the addition of the Iron Cove Link and the removal of the previously proposed Camperdown interchange.

The future years assessed for the M4-M5 Link project are also different to those assessed for the M4 East and New M5 projects due to the delivery timeframe for the project. A direct comparison between the modelled results of the previous EIS and this EIS would therefore not be a like-for-like comparison.

**Table 8-2 Traffic modelling scenarios**

| Model year | Without project | With project | Modelling scenario | Description | Impact measured |
|---|---|---|---|---|---|
| 2015 | ü | | Base case | The existing road network with no new projects or upgrades. | N/A |
| 2021 | ü | | Construction | The current road network with no new projects or upgrades, with construction traffic movements for the project. This considers the worst case construction traffic generating scenario and includes traffic movements associated with spoil removal. | Construction impacts on the existing road network. |
| 2023 | ü | | Future case without the project | The future case 'without project' assumes the NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5 projects are complete and open to traffic, but the M4-M5 Link is not operational. | Consequence of not proceeding with the project on the existing network. |
| 2023 | | ü | Future case with the project | The future case 'with project' assumes the NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic. | Operational impacts associated with the completion of the project as described in **Chapter 5** (Project description). |
| 2023 | | ü | Cumulative case | Assumes NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic, and in addition, the proposed future Sydney Gateway and Western Harbour Tunnel are complete and open to traffic. | Operational impacts associated with the operation of the full WestConnex program of works as well as the proposed future Sydney Gateway and Western Harbour Tunnel projects. |
| 2033 | ü | | Future case without the project | The future case 'without project' assumes NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5 projects are complete and open to traffic, but the M4-M5 Link is not operational. | Consequence of not proceeding with the project on the existing network. |
| 2033 | | ü | Future case with the project | The future case 'with project' includes NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic, but the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension are not operational. | Operational impacts associated with the completion of the project as described in **Chapter 5** (Project description). |
| 2033 | | ü | Cumulative case | The future Cumulative scenario assumes NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and the M4-M5 Link are complete and open to traffic and also assumes proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension are complete and open to traffic. | Operational impacts associated with the operation of the full WestConnex program of works as well as the proposed future motorway projects. |

### 8.1.6 Strategic modelling

#### Strategic Travel Model

The key strategic transport planning model used in the Sydney greater metropolitan area is the Strategic Travel Model (STM), which is managed by Transport for NSW Transport Performance and Analytics.

The STM forecasts people's travel choices and behaviour under given land-use and transport infrastructure scenarios. It combines current understandings of travel behaviour with:

- Forecast population and employment size and distribution
- Forecast road and public transport networks and services.

This allows for an estimate of future travel patterns in Sydney under different strategic land use, transport and pricing scenarios. Inputs into the STM include:

- Household travel survey data
- Journey to work data
- Population and employment statistics (current and projected)
- Freight movement model data
- Parking survey data
- Road, rail, bus and ferry networks.

#### WestConnex Road Traffic Model

The STM was used as the basis for developing future growth in road traffic demands for a more detailed transport and pricing scenario traffic model specific to the WestConnex program of works. The WRTM was developed to simulate the route choices of anticipated future traffic volumes on the metropolitan road network. The model has been used to develop traffic forecasts and as the basis for the traffic impact assessment for the project.

The WRTM is not an operational model. Therefore, to assess detailed impacts of the project on the road network, further analysis using operational modelling software was carried out (see **section 8.1.7**). Traffic growth outputs extracted from the WRTM were applied to existing traffic counts (2015) for the traffic and transport study area to:

- Forecast future traffic volumes as a basis for the operational modelling
- Assess traffic impacts of the project during construction and operation.

The WRTM includes:

- Anticipated changes and upgrades to the road network
- Anticipated future land uses as a basis for estimating future travel demand for light and heavy vehicles
- Accommodation of different motorist behaviours, including willingness to pay a toll to save travel time
- Induced traffic.

Additional detail regarding induced traffic and land use projections incorporated into the WRTM is provided in the following section.

##### *Induced demand*

Traffic growth on new or upgraded roads is generally a result of:

- Regional increase in the number of trips due to population growth and increased economic activity

- Trips attracted from competing routes or modes as a result of improved travel times on the new or upgraded road
- Induced demand as a result of improved travel times between homes and destinations, such as workplaces, shopping centres and education facilities, which cause changes to region-wide trip patterns.

Even with no growth in regional population and/or economic activity, a new or substantially upgraded road has the potential to induce changes in travel patterns, which appear as induced traffic demand. The WRTM includes changes in traffic associated with all three abovementioned sources of traffic, with induced demand equating to about 0.3 per cent of additional daily trips in the Sydney metropolitan area in 2033.

*Land use projections*

Land use forecast data for use in modelling with the STM is developed by Transport for NSW Transport Performance and Analytics, based on population and employment forecasts produced by DP&E for greater Sydney.

These population and employment forecasts are based on land use data (version LU14v4), that has been projected from 2011 Census data and incorporates known major urban renewal projects and developments, including those around Green Square and Mascot town centres and the strategic directives contained in *A Plan for Growing Sydney* (NSW Government 2014). The resulting travel demand forecasts from STM are used as a basis for developing road traffic growth projections for the WRTM. The WRTM has also included planned future port activities and uses, for instance at Port Botany, Sydney Airport Freight terminal and intermodal terminals.

### 8.1.7 Operational modelling

#### M4-M5 Link motorway

The M4-M5 Link mainline tunnels between the M4 East at Haberfield and the New M5 at St Peters were modelled using microsimulation modelling software. The ability for this software to model individual vehicle behaviour and interaction with the road network and other road users enabled densities and level of service for the mainline tunnels to be reported. AM and PM peak period models were developed and the mainline tunnels divided into five sections:

- Section 1: Interface with M4 East, east of the Wattle Street interchange ramps
- Section 2: Wattle Street interchange ramps to Rozelle interchange ramps
- Section 3: Rozelle interchange bypass
- Section 4: Rozelle interchange ramps to the St Peters interchange ramps
- Section 5: Interface with the New M5, south of the St Peters interchange ramps.

Using future year travel demands, traffic density and levels of service were assessed at 200 metre intervals along the mainline for the 2023 and 2033 ‘with project’ and ‘cumulative’ scenarios. See **section 8.1.8** for a description of measures of operational traffic performance.

#### Interchanges and surrounding road network

Operational modelling is used to provide a more detailed representation of queueing, congestion and delays in urban networks. Traditional analytical intersection assessment tools, eg SIDRA, do not provide a whole of network assessment and tend to work best at evaluating individual, isolated intersections or small networks of intersections. Microsimulation modelling software, which models individual vehicle behaviour, such as weaves and merges and interactions with the network and other road users, are better tools for evaluating network operation particularly in congested networks with motorway entry and exit ramps that would have weaving and merging movements.

To fully evaluate operational impacts of the project on the road network around the Wattle Street, Rozelle and St Peters interchanges, micro-simulation models were developed to assess localised road network effects using Vissim (Wattle Street interchange and Rozelle interchange) and Paramics (St Peters interchange, the same software as used as for the New M5) software.

*Base year model development*

Base year models were developed for the AM and PM peak periods to simulate the operation of the existing road network under present day traffic demands. The base year models were calibrated and validated as per Roads and Maritime modelling guidelines, to align with existing traffic conditions.

The areas modelled around each interchange were informed by the WRTM v2.3, which allows for analysis of changes to future traffic growth conditions around the interchanges as a result of the project. The base year model extents at each of the interchange locations are indicated in **Figure 8-4** to **Figure 8-6**.

*Future year model development*

Following the calibration and validation of the AM and PM peak period base year simulation models, future year networks and traffic demands were developed for 2023 and 2033 to assess the future performance of the study area.

The growth in WRTM forecasts was used to grow the demands from the base year to the relevant future year models. The forecast one hour volumes from WRTM were extrapolated across the full two to four hour simulation periods to reflect typical demand profiles on either side of the peak hours. This profile was based on observed count data across the relevant networks (eg the road networks surrounding the M4-M5 Link interchanges).

In some cases, the forecast one hour future demand would exceed the physical road capacity. Where this would be the case, calculated future excess demand was distributed into the hours before and after the peak hour to correspond with anticipated peak spreading.

### Modelling construction impacts

*Base year model development*

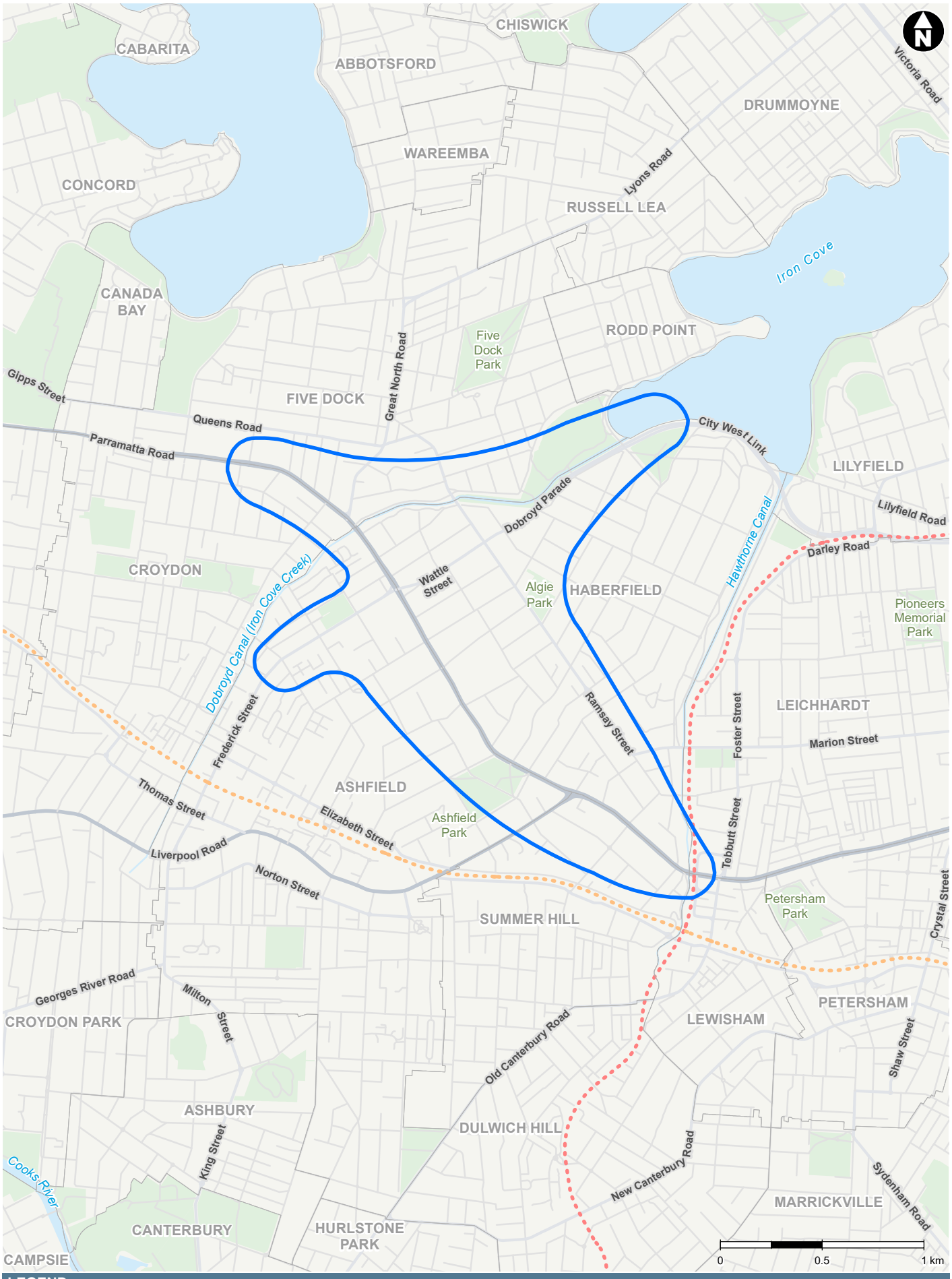
Similar to the operational assessment, the modelling methodology to assess the impact of construction related traffic included deriving base year traffic patterns and developing base and future year traffic models. To ensure an accurate representation of existing conditions, further network traffic counts were gathered across the study area in the locations of the proposed construction ancillary facilities.

Base year construction models were developed in LinSig as, unlike the interchanges assessed in the operational case, detailed interactions such as weaving and merging are not prevalent. The models were calibrated in a similar manner to that already described for the operational network models.

*Future year model development*

Based on the planned construction activities, a worst case construction traffic scenario was assumed to be the period of spoil removal from the tunnel construction during 2021. The current road network with the addition of the M4 East and New M5 was assumed for the road network in the construction scenario.

AM and PM peak hour models for 2021 were developed to assess the future performance of the road network during construction. In a similar way to the future operational demand volumes, the growth forecast by the WRTM was used to derive the background traffic demand for 2021. Construction traffic was then added to the background traffic. This was based on the proposed construction methodology as described in **Chapter 6** (Construction work) including vehicle types, volumes and construction traffic routes to and from the various construction ancillary facilities. The performances of the intersections in the vicinity of the constructions ancillary facilities were then calculated.




**LEGEND**

**Existing features**

- Waterway
- Railway
- Light rail
- Suburb boundary
- Arterial road
- Subarterial road
- Local road

**Model boundary**

- Microsimulation area

**Figure 8-4** Wattle Street interchange operational model boundary

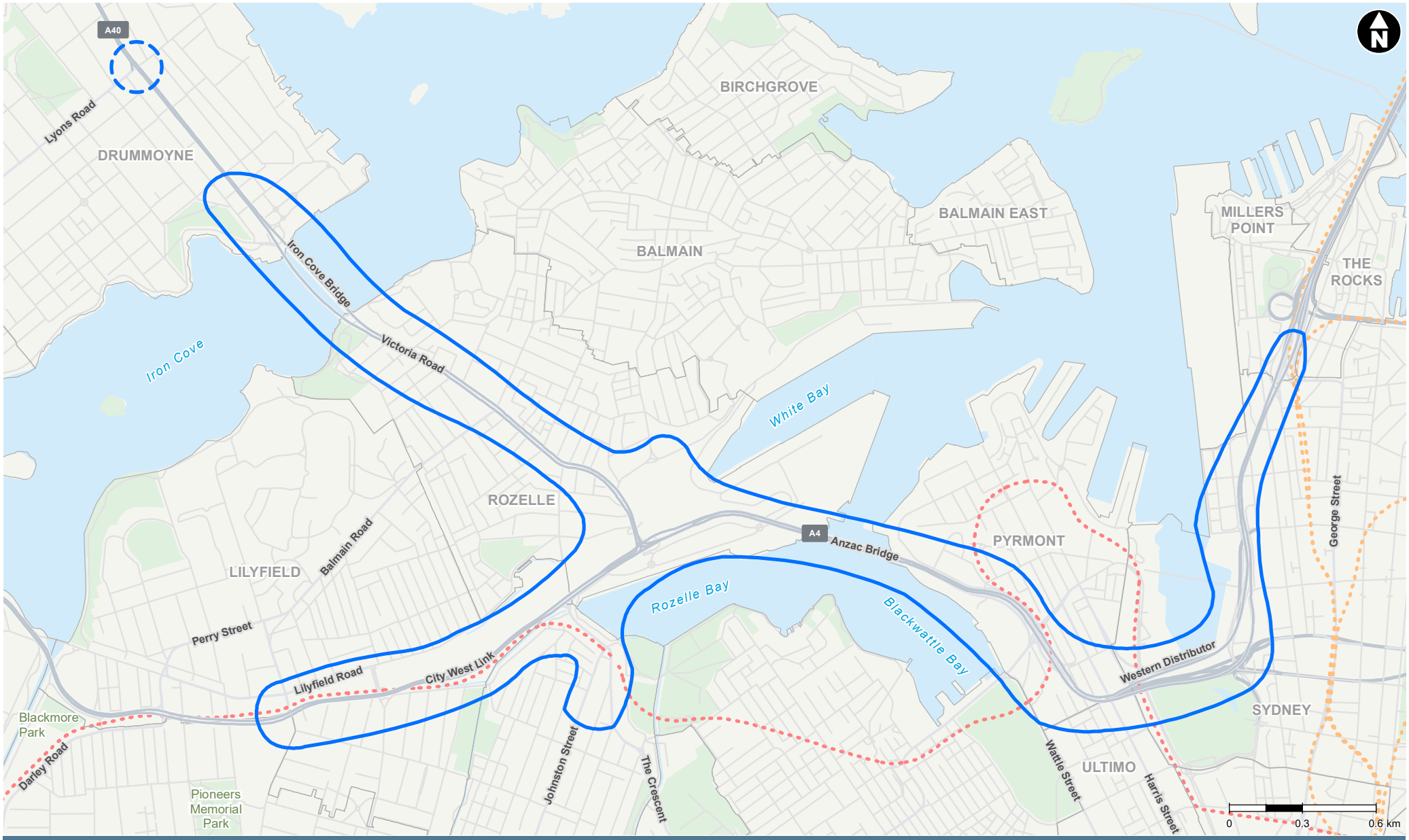
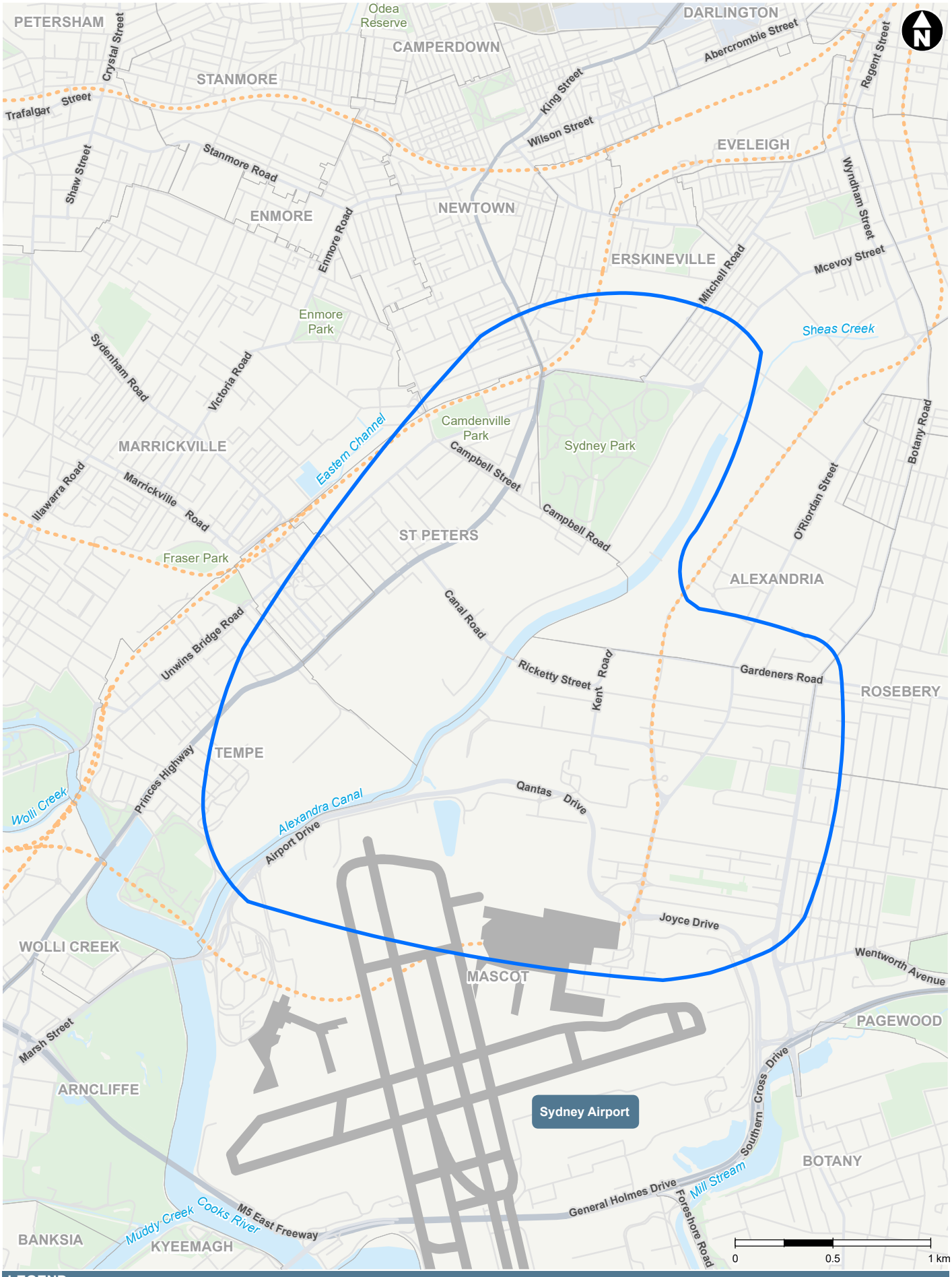



**Figure 8-5** Rozelle interchange operational model boundary




**LEGEND**

**Existing features**

- Waterway
- Railway
- Suburb boundary
- Arterial road
- Subarterial road
- Local road

**Model boundary**

- Microsimulation area

**Figure 8-6** St Peters interchange operational model boundary

### 8.1.8 Measures of network performance

#### Network performance

Given the congested nature of many of the main roads within the study area during peak periods, single-point assessment criteria do not present a complete picture of road network traffic operations. Traditional mid-block and intersection levels of service do not recognise that traffic is often constrained upstream, thus vehicles cannot get to the evaluation point giving an unrealistically low level of demand. Similarly, they do not recognise that traffic is constrained downstream; meaning vehicles are queued through the evaluation point. The measurements therefore reveal only throughput at that point, not realistic network performance.

The operation of the modelled road network is regarded as being of prime importance, recognising that there may be single locations where there may be improvement, while at others some deterioration. These should therefore not be considered in isolation but seen in the light of the total demand volumes in each scenario. The critical evaluation is that the project provides more efficient network operations as a whole.

From the microsimulation models, parameters collected and reported for the AM and PM peak hours in each scenario modelled were:

- Total vehicle demand – number of vehicles wanting to use the modelled network
- Vehicle kilometres travelled (VKT) – total distance travelled by vehicles travelling through the modelled network
- Vehicle time travelled approaching and in network – the total time taken by vehicles to enter and drive through the modelled network
- Total vehicles arrived – the number of vehicles completing their journey on the network
- Total stops made by vehicles in the network, either due to intersection controls or congestion – the number of stops that vehicles make while travelling through the modelled network. Generally, the fewer stops, the less congested the network is
- Average speed of vehicles – the average speed at which vehicles travel through the network. Calculated by dividing the VKT by the vehicle time travelled. Generally, the higher the speed, the better the network operates
- Travel time for typical cross-network trips – the time taken by vehicles to travel between two points in the network. Used as a comparison of how the network is performing, although with changes in the network, vehicles can take different routes between points
- Unreleased demand at the end of peak hour – the number of vehicles unable to enter the model due to congestion extending back to model entry points. The number of 'unreleased' vehicles is an indication of the effectiveness of the network. Generally, the lower the number of unreleased vehicles, the better the network is able to accommodate travel demand.

#### Levels of service

Level of service (LoS) is a measure to describe the operational conditions and efficiency of a road 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, and road safety. It is a qualitative measure describing operational conditions within a roadway or intersection, as perceived by motorists and/or passengers.

There are six levels of service; LoS A to LoS F. LoS A represents the best operating conditions and LoS F the poorest operating conditions. When the level of service of a road or intersection falls below LoS D, investigations are generally carried out to identify suitable remediation. However, constraints in built up urban areas mean that LoS E and LoS F are regularly experienced by motorists on the Sydney road network during traffic peak periods.

*Intersection performance and level of service*

Average delay is often used to assess the operational performance of intersections, with level of service used as an index. An assessment of performance of the intersection is undertaken to determine the average delay times experienced by traffic at the intersection. The intersection is then characterised into its corresponding level of service 'band' based on these delay times.

A description of the level of service scale for reporting intersection performance is provided in **Table 8-3**. For the purpose of analysing intersection performance in this traffic and transport assessment, all exit blocking constraints, applied in the microsimulation models to reflect network congestion beyond the modelled network extents, were removed. This allows for an assessment of the intersections within the modelled network, irrespective of any downstream queueing that would mask the actual operation of the intersection.

**Table 8-3 Level of service criteria for intersections**

| LoS | Average delay per vehicle (seconds) | Traffic signal / roundabouts | Give way and stop signs |
|---|---|---|---|
| A | Less than 14 | Good operation | Good operation |
| B | 15 to 28 | Good with acceptable delays and spare capacity | Acceptable delays and spare capacity |
| C | 29 to 42 | Satisfactory | Satisfactory, but crash study required |
| D | 43 to 56 | Operating near capacity | Near capacity and crash study required |
| E | 57 to 70 | At capacity; at signals incidents would cause excessive delays | At capacity; requires other control mode |
| F | More than 70 | Roundabouts require other control mode | At capacity; requires other control mode |

Source: Guide to Traffic Generating Developments (RTA, 2002)

## Mid-block performance and level of service

Mid-block volume/capacity (v/c) ratios provide an indication of the saturation level of a segment of road, based on the theoretical design capacity of the road. Volume/capacity ratios can be used to provide a corresponding level of service for road operation, as detailed in *Guide to Traffic Management – Part 3 Traffic Studies and Analysis* (Austroads, 2013).

The level of service for freeways or motorways is calculated from the vehicle density, which is the traffic volume divided by the average passenger vehicle speed. Density is measured in passenger car units (PCU[1]) per kilometre per lane (PCU/km/ln). The assessment of level of service for the M4-M5 Link mainline tunnels uses these density measurements.

The definitions and criteria for the six levels of service for mid-blocks are provided in **Table 8-4**.

[1] PCU = passenger car unit. This accounts for the amount of road space differing types of vehicles use, with heavy vehicles or buses taking up more space than cars or light commercial vehicles.

**Table 8-4 Mid-block level of service definitions and criteria – multi-lane roads and freeways**

| 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. | Less than or equal to 0.26 | Less than or equal to 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 level of service 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. | Greater than 1.00 | Greater than 28.0 |

Notes:

1 Where free flow speed is taken as 70 kilometres per hour

2 Where free flow speed is taken as 90 kilometres per hour

Source: *Austroads, Guide to Traffic Management – Part 3 Traffic Studies and Analysis*, Second Edition 2013

## 8.2 Existing environment

This section outlines the existing traffic and transport environment within the study area, including:

- The area around the Wattle Street and St Peters interchanges and the proposed Rozelle interchange
- The corridors between the:
  - Wattle Street and Rozelle interchanges
  - Rozelle and St Peters interchanges
  - Wattle Street and St Peters interchanges.

The existing traffic and transport environments of the areas around the Wattle Street and St Peters interchanges are derived from the Traffic and transport assessment of the M4 East EIS (AECOM 2015a) and the Technical working paper: Traffic and transport of the New M5 EIS (AECOM 2015b). Therefore, the existing conditions at the Wattle Street and St Peters interchanges reflect conditions prior to the commencement of construction of the M4 East and the New M5 projects.

### 8.2.1 Summary

The road network in the study area currently functions under high levels of traffic demand, which often exceeds the operational capacity, especially citybound during the AM peak period. The four main travel demand corridors shown in **Figure 8-1** include some of the most highly congested road corridors in Sydney, with demand already exceeding capacity during peak periods. This congestion increases travel time and variability and can cause typical morning and evening peak hours to spread over longer periods.

Major routes in the study area, such as Parramatta Road, City West Link, Victoria Road, Anzac Bridge/Western Distributor, Southern Cross Drive, Princes Highway and King Street all experience significant congestion with resultant increase in travel time and variability. Over the past five years, the majority of crashes on the major roads in the study area were rear-end crashes, which is consistent with roadways operating at or beyond capacity and on which significant queuing occurs.

### 8.2.2 Wattle Street interchange and surrounds

The existing travel behaviours and volumes in the study area are influenced by the function of Parramatta Road as a major east-west Sydney metropolitan road corridor.

Alternative east-west arterial roads within the study area include Frederick Street/Wattle Street/Dobroyd Parade/City West Link, Queens Road/Gipps Street/Patterson Street, Ramsay Street and the Hume Highway. The Frederick Street/Wattle Street/Dobroyd Parade/City West Link corridor is a major connector between Sydney's western and south-western suburbs and the Sydney central business district (CBD) as well as carrying high volumes of local traffic. The corridor is part of a north-east link which extends for about 13 kilometres from the intersection of Punchbowl Road and King Georges Road in Punchbowl, to join the Western Distributor at its intersection with Victoria Road. It provides an alternative route to Parramatta Road into the Sydney CBD from inner southern and inner western Sydney.

The Hume Highway, to the south of Parramatta Road, is an important metropolitan connection for both local and regional traffic. It extends from Liverpool in south western Sydney to join Parramatta Road near Summer Hill in the east.

#### Modes of travel

The Wattle Street interchange is within the Inner West local government area (LGA). Travel mode share for the Inner West LGA in comparison with the Sydney Greater Metropolitan Area (GMA) is shown in **Table 8-5**.

**Table 8-5** shows that 49 per cent of trips (driver and passenger combined) on a typical weekday in the study area are car based compared to 69 per cent in the Sydney GMA. The lower proportion of residents who are dependent on car travel can be partly attributed to good public transport options in the Wattle Street interchange area and surrounds (shown in the slightly higher dependence on bus and rail travel) and the proximity of activities which are accessible by walking (32 per cent of trips in the Inner West LGA are walk only, compared to 18 per cent in the Sydney GMA).

**Table 8-5 Average weekday travel mode share for Inner West LGA and the Sydney GMA**

| LGA | Private vehicles | | | Rail | Bus | Walk only | Other modes |
|---|---|---|---|---|---|---|---|
| | Driver | Passenger | Total | | | | |
| Inner West LGA | 36% | 13% | 49% | 7% | 8% | 32% | 5% |
| Sydney GMA | 47% | 22% | 69% | 5% | 6% | 18% | 2% |

Note:

Inner West Council data has been derived by combining data from the former Leichhardt, Ashfield and Marrickville LGA's

Source: NSW Bureau of Transport Statistics (BTS), Household Travel Survey Report: Sydney 2012/13, Nov 2014 Release

## Public transport services

### *Rail services*

The Wattle Street interchange area and surrounding suburbs are serviced by the Northern, Western, Inner West and South Rail Lines. Ashfield Station is the closest rail station and is around 1.5 kilometres to the south.

To the north, North Strathfield Station is serviced by the Northern Line which provides limited stops services to the Sydney CBD. To the south, up to 10 stations are serviced by one or more of the Inner West, South, Western or Northern Lines. Additionally, limited stop express services to the Sydney CBD can be boarded at Flemington, Strathfield, Burwood, and Ashfield stations. Homebush and Croydon stations are served exclusively by Inner West Line all stops services.

### *Bus services*

The bus network close to the Wattle Street interchange and surrounds includes Metrobus M41: Hurstville to Macquarie Park strategic north–south bus corridor and Route 461: Burwood to the Sydney CBD strategic east–west bus route, which runs along Parramatta Road. There are several bus routes that operate within particular sections of the Wattle Street interchange and surrounds area via train station hubs, such as Strathfield, Burwood and Ashfield. Specifically, the following bus routes utilise sections of Parramatta Road between Homebush Bay Drive and Wattle Street:

- Routes 525 and 526 travel along Parramatta Road between Underwood Road and Concord Road
- Route 461, Burwood to The Domain, operates along Parramatta Road from Burwood Road to Broadway
- Route 415, Chiswick to Burwood, which runs along Parramatta Road between Burwood Road and Harris Road
- Routes 490 and 492, Drummoyne to Hurstville and Rockdale, utilises the section of Parramatta Road between Arlington Street and Great North Road
- Route 491, Five Dock to Hurstville, utilises the section of Parramatta Road between Great North Road and Frederick Street.

In addition, there are a further six Sydney metropolitan bus region routes that intersect Parramatta Road between Homebush Bay Drive and Wattle Street during peak periods.

### *Walking and cycling facilities*

Details of existing walking and cycling facilities can be found in **Appendix N** (Technical working paper: Active transport strategy).

## Existing traffic volumes and patterns

Automatic traffic count (ATC) surveys were completed between 2012 and 2014 to understand and analyse existing traffic volumes and patterns at the Wattle Street interchange and surrounds. Specifically, classified hourly traffic volumes at the following roadway locations were recorded over a one-week period:

- Parramatta Road west of Wattle Street
- Ramsay Road between Henley Marine Drive and Wolseley Street
- Dobroyd Parade east of Timbrell Drive
- Parramatta Road at Hawthorne Canal.

The AM peak hour, PM peak hour and average weekday traffic (AWT) volumes at each of these survey locations are summarised in **Table 8-6**.

**Table 8-6 Average peak mid-block traffic volumes at key locations around the Wattle Street interchange and surrounds (2014 count data)**

| Location | Direction | AM peak hour | | PM peak hour | | AWT | |
|---|---|---|---|---|---|---|---|
| | | veh/hr | HCV% | veh/hr | HCV% | veh/hr | HCV% |
| Parramatta Road, west of Wattle Street | Eastbound | 2,530 | 6% | 2,370 | 4% | 43,500 | 7% |
| | Westbound | 2,640 | 11% | 2,790 | 2% | 46,000 | 7% |
| Ramsay Road, between Henley Marine Drive and Wolseley Street | Eastbound | 930 | 6% | 840 | 2% | 13,000 | 4% |
| | Westbound | 830 | 3% | 990 | 3% | 13,000 | 3% |
| Dobroyd Parade, east of Timbrell Drive | Eastbound | 1,670 | 9% | 2,120 | 3% | 32,500 | 7% |
| | Westbound | 1,630 | 7% | 1,820 | 5% | 30,500 | 7% |
| Parramatta Road, at the Hawthorne Canal | Eastbound | 2,380 | 10% | 1,880 | 2% | 33,000 | 7% |
| | Westbound | 1,620 | 6% | 2,280 | 5% | 32,000 | 7% |

Source: WestConnex Delivery Authority traffic surveys (2012 – 2014)

On Parramatta Road, peak period traffic volumes show similar trends to daily figures with a fairly 'flat' profile of traffic throughout the day between the AM peak and PM peak periods. At the Hawthorne Canal, there are clear changes in peak direction between the AM peak hour and the PM peak hour, with more vehicles travelling towards the city in the AM peak hour, and more vehicles travelling away from the city in the PM peak hour.

During the AM peak hour, the traffic volume on Dobroyd Parade is similar in both directions, while during the PM peak hour, the eastbound volume is indicated as higher. This was due to congested traffic conditions. The surveyed volumes therefore only represent the satisfied demand and, due to downstream congestion and queueing at this location, underestimate the actual demand.

## Existing road network performance

### *Network performance*

**Table 8-7** presents the performance of the modelled road network for Wattle Street and surrounds during the AM and PM peak hours. The Parramatta Road corridor currently functions under high levels of traffic demand, with the demand often exceeding the capacity of the road, especially eastbound during the AM peak period. This results in congested conditions and long queues and delays during peak periods.

An exception is east of Bland Street, where citybound Parramatta Road volumes in the AM peak are lower due to congestion at the Wattle Street intersection holding back traffic flow. Northbound congestion is also evident on Dobroyd Parade, reflecting citybound demand in the AM peak.

A similar pattern is evidenced in the PM peak although congestion is recorded in both directions. East of Bland Street, westbound traffic flows relatively well due to an extra lane on Parramatta Road (west of Dalhousie Street), and congestion at the Hume Highway intersection that holds back westbound traffic.

**Table 8-7 Wattle Street interchange modelled network performance – 2015 AM and PM peak hour**

| Network measure | AM peak hour | PM peak hour |
|---|---|---|
| **All vehicles** | | |
| Total traffic demand (veh) | 13,233 | 13,559 |
| Total vehicle kilometres travelled in network (km) | 25,663 | 27,377 |
| Total time travelled approaching and in network (hr) | 1,731 | 1,504 |
| Total vehicles arrived | 13,191 | 13,559 |
| Total number of stops | 244,016 | 183,725 |

| Network measure | AM peak hour | PM peak hour |
|---|---|---|
| **Average per vehicle** | | |
| Average vehicle kilometres travelled in network (km) | 1.7 | 1.8 |
| Average time travelled in network (mins) | 7.0 | 5.9 |
| Average number of stops | 14.8 | 11.0 |
| Average speed (km/h) | 14.9 | 18.3 |
| **Unreleased vehicles** | | |
| Unreleased demand (veh) | 41 | 0 |
| % of total traffic demand | 0% | 0% |

*Intersection performance*

For the purpose of assessing intersection performance, all exit blocking constraints, applied in the microsimulation models to reflect network congestion beyond the modelled network extents, were removed. This allows for an assessment of intersections within the modelled network, irrespective of downstream queueing that masks the actual operation of the intersection. The assessment undertaken in the M4 East EIS used a different methodology; therefore intersection results at the Wattle Street interchange are not directly comparable.

**Table 8-8** presents the modelled AM and PM peak hour LoS for key intersections in the vicinity of the Wattle Street interchange. The intersection performance analysis demonstrates that most of the key intersections perform acceptably in the AM peak hour, with the exception of the Parramatta Road and Wattle Street intersection. In the PM peak hour, results indicate that key intersections operate to an acceptable level under existing demand.

**Table 8-8 Wattle Street interchange: key intersection performance (LOS) – 2015 AM and PM peak hour**

| Key intersections | AM peak hour | PM peak hour |
|---|---|---|
| Parramatta Road/Sloane Street | B | B |
| Parramatta Road/Liverpool Road | C | B |
| Parramatta Road/Dalhousie Street | B | B |
| Parramatta Road/Bland Street | B | B |
| Parramatta Road/Wattle Street | E | D |
| Parramatta Road/Great North Road | B | B |
| Parramatta Road/Arlington Street | B | B |
| Frederick Street/Church Street | B | B |
| Wattle Street/Ramsay Street | C | C |
| Dobroyd Parade/Waratah Street | A | A |
| City West Link/Timbrell Drive | C | D |

*Traffic crashes*

An analysis of traffic crashes was carried out for Parramatta Road between Wattle Street and City Road. The crash analysis considered relies on data recorded, with all crashes conforming to the national guidelines for reporting and classifying road vehicle crashes. The main criteria for these crashes are:

- The crash was reported to police
- The crash occurred on a public road

- The crash involved at least one moving vehicle
- The crash involved at least one person being killed or injured or at least one motor vehicle being towed away.

**Table 8-9** summarises the crash history for the past five years (01 January 2012 – 31 December 2016) on Parramatta Road between Wattle Street and City Road.

**Table 8-9 Parramatta Road from Wattle Street to City Road: crash statistics (Jan 2012 to Dec 2016)**

| Road | Section from | Section to | Crashes | | | |
|---|---|---|---|---|---|---|
| | | | Total | Fatal | Injury | Tow-away |
| Parramatta Road | Wattle Street | Broadway | 539 | 0 | 404 | 135 |

Source: Summarised from crash reports, 2017

The average crash severity index on Parramatta Road between Wattle Street and City Road is about 1.37, which is above the average for NSW (1.24) and the Sydney Metropolitan Area (1.22), as presented in **Table 8-10**.

**Table 8-10 Parramatta Road from Wattle Street to City Road: crash severity indices (Jan 2012 to Dec 2016)**

| Road | Section from | Section to | Crash severity index |
|---|---|---|---|
| Parramatta Road | Wattle Street | City Road | 1.37 |
| **NSW \| Sydney Metropolitan Averages – all roads (2010–2014)** | | | |
| NSW | | | 1.24 |
| Sydney Metropolitan Area | | | 1.22 |

Source: Summarised from crash reports, 2017

The latest available data (for the 12 month period ending December 2013) show average fatality and injury rates across the Sydney Metropolitan Area of 0.2 and 29.4 per 100 million vehicle kilometres travelled (MVKT) respectively.

**Table 8-11** indicates that the occurrence of injury crashes is higher on Parramatta Road from Wattle Street to City Road, compared to the Sydney Metropolitan Area average, while fatal and tow-away crashes are lower. In particular, tow-away crash rates are significantly lower, with a tow-away crash rate of about 18 crashes per 100 MVKT compared with about 39 crashes per 100 MVKT for the Sydney Metropolitan Area.

**Table 8-11 Parramatta Road from Wattle Street to City Road: crash rates per 100 MVKT (Jan 2012 to Dec 2016)**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Crash rates per 100 MVKT | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Total | Fatal | Injury | Tow-away |
| Parramatta Road | Wattle Street | City Road | 6.6 | 61,517 | 72.74 | - | 54.5 | 18.2 |
| Sydney Metropolitan Area (1 Jan 2013 to 31 Dec 2013) | | | | | 68.8 | 0.2 | 29.4 | 39.2 |

Source: Summarised from crash reports, 2017

**Table 8-12** provides details of the crash costs for Parramatta Road between Wattle Street and City Road. Average crash costs based on crash severity have been calculated using the Roads and Maritime Economic Analysis Manual (Economic Parameters for 2009). The crash costs presented in this report are based on a 'willingness to pay' approach. Willingness to pay values for road safety reflect the accumulated value the NSW community is willing to pay or forgo in exchange for a reduction in the probability of crash related injuries and deaths on NSW roads.

**Table 8-12 Parramatta Road from Wattle Street to City Road: crash costs (Jan 2012 to Dec 2016)**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Total cost | Crash cost Average annual cost | Cost per 100 MVKT |
|---|---|---|---|---|---|---|---|
| Parramatta Road | Wattle Street | City Road | 6.6 | 61,517 | $58,207,728 | $11,641,546 | $7,891,440 |

Source: Summarised from crash reports, 2017

### 8.2.3 Wattle Street interchange to Rozelle interchange corridor

The Wattle Street interchange to Rozelle interchange corridor connects the M4 Motorway to the Sydney CBD and the north. East of the Wattle Street interchange, east–west traffic movement is focused on Dobroyd Parade/City West Link and Parramatta Road. City West Link then combines with Victoria Road and links to Anzac Bridge/Western Distributor to provide the main east-west movement to the east of the Rozelle interchange. Other routes from the Wattle Street interchange area to the Sydney CBD include along Great North Road/Lyons Road, Victoria Road and then Anzac Bridge.

Parramatta Road, as part of the corridor between the proposed Wattle Street interchange and the Sydney CBD, forms part of the Parramatta to Sydney CBD via Strathfield travel demand corridor.

#### Existing traffic volumes and patterns

*Mid-block traffic volumes*

ATC surveys presented in **Table 8-6** included locations on Parramatta Road within the Wattle Street interchange to Rozelle interchange corridor. The Parramatta Road corridor accommodates consistently high volumes of travel demand, with volumes consistent through an average weekday, both during and between the AM and PM peak periods. Victoria Road, in this area, also forms part of the Parramatta to Sydney CBD via Ryde travel demand corridor. This corridor is also one of the most congested road corridors in Sydney and one of Sydney's busiest bus corridors.

**Table 8-13** provides the AM peak hour, PM peak hour and AWT flows for the key roads within the Wattle Street interchange to Rozelle interchange corridor. Count data was taken from 2014 to 2016 surveys. At some locations, only peak hour volumes were available.

**Table 8-13 Average peak mid-block traffic volumes at key locations within the Wattle Street interchange to Rozelle interchange corridor (2014–2016 count data)**

| Location | Direction | AM peak hour | | PM peak hour | | AWT | |
|---|---|---|---|---|---|---|---|
| | | veh/hr | HCV% | veh/hr | HCV% | veh/hr | HCV% |
| City West Link, west of The Crescent | Eastbound | 2,470 | 8% | 2,370 | 3% | 36,000 | 6% |
| | Westbound | 1,640 | 5% | 1,930 | 3% | 32,000 | 6% |
| Lyons Road, west of Victoria Road | Eastbound | 390 | 12% | 390 | 8% | – | – |
| | Westbound | 200 | 12% | 450 | 6% | – | – |
| Victoria Road, north of Wellington Street | Northbound | 2,080 | 5% | 3,230 | 3% | – | – |
| | Southbound | 3,340 | 4% | 2,440 | 3% | – | – |
| Parramatta Road, east of Mallet Street | Eastbound | 2,320 | 7% | 1,530 | 3% | 25,500 | 7% |
| | Westbound | 1,230 | 8% | 1,920 | 5% | 25,500 | 6% |

Source: Roads and Maritime traffic surveys (2014 – 2016)

#### Existing road network performance

Average speed and travel times on Wattle Street/City West Link, Parramatta Road and Victoria Road are shown in **Table 8-14**. The low speeds and long travel times across both AM and PM peaks indicate the peak hour congestion currently experienced along the Wattle Street interchange to Rozelle interchange corridor.

**Table 8-14 Average speed and travel times along key roads within the Wattle Street interchange to Rozelle interchange corridor (2016 survey data)**

| Location | Direction | Average speed (km/hr) | | Average travel time (min:sec) | |
|---|---|---|---|---|---|
| | | AM peak | PM peak | AM peak | PM peak |
| Wattle Street/City West Link (Parramatta Road – Victoria Road) | Eastbound | 22 | 36 | 13:30 | 8:20 |
| | Westbound | 27 | 32 | 8:10 | 9:20 |
| Parramatta Road (Wattle Street – City Road) | Eastbound | 24 | 28 | 19:10 | 16:30 |
| | Westbound | 31 | 26 | 15:00 | 17:30 |
| Victoria Road (Lyons Road – Anzac Bridge) | Eastbound | 23 | 27 | 11:40 | 7:10 |
| | Westbound | 27 | 29 | 10:00 | 9:00 |

### 8.2.4 Rozelle interchange and surrounds

The proposed Rozelle interchange would be located in the vicinity of the Rozelle Rail Yards to the north of City West Link. Details on land use in the vicinity of the proposed Rozelle interchange are provided in **Chapter 12** (Land use and property) of this EIS. The key roads in the vicinity of the Rozelle interchange are shown in **Figure 8-7** and include (but are not limited to):

- City West Link (A4)
- Victoria Road (A40)
- Western Distributor/Anzac Bridge
- Lilyfield Road
- Catherine Street
- The Crescent/Minogue Crescent/Ross Street
- Johnston Street
- James Craig Road
- Robert Street
- Terry Street.

Detailed descriptions of these key roads are provided in **Appendix H** (Technical working paper: Traffic and transport).

#### Modes of travel

The Rozelle interchange is located primarily within the Inner West LGA. A small area within the City of Sydney is also located on the eastern side of The Crescent. Travel mode share for the Inner West LGA in comparison with the Sydney GMA is shown in **Table 8-15**.

The Inner West LGA has a higher share of public transport due to the area's proximity to the Sydney CBD and frequent bus, heavy and light rail services. The largest difference to the Sydney GMA data is in 'walk only' trips, which account for 32 per cent of all trips in the Inner West LGA compared to 18 per cent in the Sydney GMA. This could be attributed to factors including the walkability of many neighbourhoods in the area.

**Table 8-15 Average weekday travel mode share for Inner West LGA**

| Area | Private vehicles | | | Rail | Bus | Walk only | Other modes |
|---|---|---|---|---|---|---|---|
| | Driver | Passenger | Total | | | | |
| Inner West LGA | 36% | 13% | 49% | 7% | 8% | 32% | 5% |
| Sydney GMA | 47% | 22% | 69% | 5% | 6% | 18% | 2% |

Note:

Inner West Council data has been derived by combining data from the former Leichhardt, Ashfield and Marrickville LGAs

Source: NSW Bureau of Transport Statistics (BTS), Household Travel Survey Report: Sydney 2012/13, Nov 2014 Release.

## Public transport services

The Rozelle area has access to light rail and bus services that provide frequent connections to key centres and transport nodes, but does not have access to the heavy rail network.

### *Light rail services*

The L1 Dulwich Hill line runs from Central to Dulwich Hill via Pyrmont, Glebe, Lilyfield and Leichhardt. The closest stops are at Rozelle Bay and Lilyfield. The light rail line runs along a former freight railway corridor for most of its length, with a short on-street section in the southern part of the Sydney CBD between Darling Drive and Castlereagh Street. **Table 8-16** shows the existing service frequency on the Dulwich Hill line, with services every eight to 10 minutes during peak periods.

**Table 8-16 Weekday light rail service frequency**

| Line | Early AM (6.00 – 7.00 am) | AM Peak (7.00 – 10.00 am) | Off-peak (10.00 am – 3.00 pm) | PM peak (3.00 – 7.00 pm) | Late PM (7.00 – 11.00 pm) |
|---|---|---|---|---|---|
| L1 Dulwich Hill Line | 15 min | 8–10 min | 15 min | 8–10 min | 15 min |

Source: Transport for NSW 2016

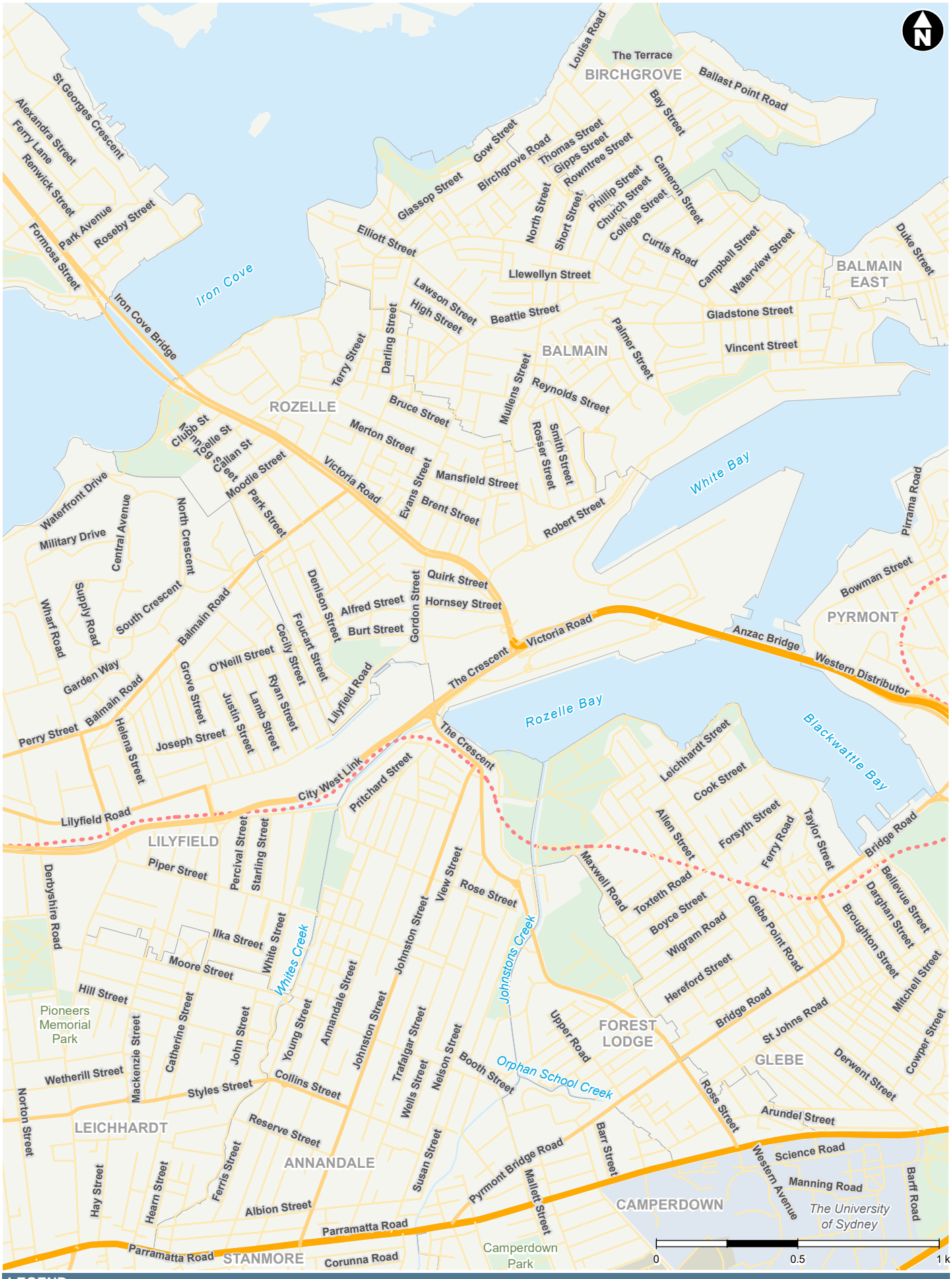



**Figure 8-7** Road network around the Rozelle interchange

*Bus services*

**Table 8-17** presents the bus services and frequencies at Rozelle (all operated by Sydney Buses). Victoria Road serves as a major transit corridor between Sydney's north-western suburbs and the Sydney CBD. Balmain Road is also a key cross-regional bus corridor linking Balmain with Rozelle and Leichhardt.

**Table 8-17 Bus services around Rozelle and surrounds**

| Route | AM peak[1] services | AM peak frequency | PM peak[2] services | PM peak frequency |
|---|---|---|---|---|
| 502 Bayview Park to City | 5 | 10–15 min | 8 | 10–20 min |
| 504 Chiswick to City | 16 | 5 min | 11 | 7–20 min |
| X04 City to Chiswick | – | – | 4 | 15–20 min |
| M50 Drummoyne to Coogee via City | 12 | 10 min | 12 | 10 min |
| M52 Parramatta to City | 24 | 5 min | 15 | 8 min |
| 431 Glebe Point to City | 25 | 3–7 min | 19 | 4–10 min |
| 433 Balmain to Railway Square | 18 | 9–12 min | 13 | 5–12 min |
| 444 Campsie to Balmain East | 10 | 10 min | 7 | 15 min |
| 445 Campsie to Balmain East via Lilyfield Light Rail station | 1 | – | – | – |
| L37 Haberfield to City | 5 | 11–20 min | 4 | 25 min |
| 441 Birchgrove to Art Gallery NSW | 6 | 12–35 mi | 6 | 15–25 min |
| 442 Balmain East to City | 29 | 4 min | 24 | 5 min |
| 440 Bronte to Rozelle via Central Station | 21 | 3–10 min | 14 | 6–10 min |
| 500 Ryde to City | 4 | 30 min | 0 | – |
| 501 West Ryde to Central via Pyrmont and Ultimo | 14 | 9 min | 12 | 10 min |
| 506 Macquarie University to City via East Ryde | 18 | 7 min | 9 | 13 min |
| 507 Macquarie University to City via Putney | 6 | 20 min | 5 | 24 min |
| 510 Ryde to City | 15 | 8 min | 3 | 40 min |
| 515 Eastwood to City | 5 | 24 min | 1 | – |
| 518 Macquarie University to City | 7 | 17 min | 5 | 24 min |
| 520 Parramatta to City via West Ryde (out of peak hours service) | 1 | – | – | – |
| X00 City to Ryde (Limited Stops) | – | – | 5 | 24 min |
| X06 City to East Ryde (Express) | – | – | 5 | 24 min |
| X15 City to Eastwood | – | – | 3 | 40 min |
| X18 City to Denistone East (Express) | – | – | 3 | 40 min |

Notes:

[1]7.00 am–9.00 am (higher frequency direction)

[2]4.00 pm–6.00 pm (higher frequency direction)

Source: Sydney Buses 2016

## Walking and cycling facilities

Details of existing walking and cycling infrastructure and facilities can be found in **Appendix N** (Technical working paper: Active transport strategy).

## Existing traffic volumes and patterns

*Mid-block traffic volumes*

**Table 8-18** provides the 2016 AM peak hour, PM peak hour and AWT flows for key roads in the vicinity of the Rozelle interchange. Count data was taken from 2014 and 2016 surveys. The table indicates higher traffic flows in the southbound and eastbound (citybound) directions during the AM peak and in the opposite directions during the PM peak. The proportion of heavy vehicles is not significantly high in this area compared to other arterial routes in Sydney.

**Table 8-18 Average peak mid-block traffic volumes at key locations around Rozelle and surrounds (2014 and 2016 count data)**

| Location | Direction | AM peak hour | | PM peak hour | | AWT | |
|---|---|---|---|---|---|---|---|
| | | veh/hr | HCV % | veh/hr | HCV % | veh/day | HCV % |
| City West Link, between The Crescent and James Craig Road | Eastbound | 3,520 | 6% | 3,080 | 3% | 38,500 | 5% |
| | Westbound | 2,260 | 5% | 2,940 | 2% | 36,000 | 5% |
| The Crescent, between City West Link and Johnston Street | Northbound | 1,040 | 3% | 870 | 2% | 11,500 | 4% |
| | Southbound | 880 | 5% | 950 | 1% | 12,500 | 4% |
| Victoria Road, north of The Crescent | Northbound | 1,660 | 8% | 2,790 | 4% | 34,500 | 5% |
| | Southbound | 3,400 | 5% | 2,390 | 3% | 38,500 | 5% |
| Victoria Road, south of Gordon Street | Northbound | 1,250 | 7% | 2,060 | 4% | 25,000 | 5% |
| | Southbound | 2,820 | 4% | 1,920 | 3% | 30,500 | 4% |
| Victoria Road, north of Gordon Street | Northbound | 1,890 | 5% | 2,040 | 4% | 27,000 | 5% |
| | Southbound | 2,660 | 5% | 1,840 | 3% | 28,000 | 4% |
| Anzac Bridge | Eastbound | 5,890 | – | 4,400 | – | 71,500 | – |
| | Westbound | 2,900 | – | 4,950 | – | 63,500 | – |

Source: Roads and Maritime traffic surveys (2014 – 2016)

## Rozelle interchange and surrounds existing performance

*Network performance*

**Table 8-19** presents the performance of the modelled road network for Rozelle and surrounds in the 2015 base scenario for the AM and PM peak hours. The results indicate a similar level of demand in each peak hour. However, the AM peak hour results show longer average travel time, more stops and lower average speed per vehicle through the modelled network. This reflects more congestion in the AM peak hour compared to the PM peak hour.

During the AM peak hour, the capacity constraints at Bathurst Street and Sydney Harbour Bridge have the most significant impacts on the eastbound movement on the Western Distributor with extensive congestion extending back to or across Anzac Bridge.

**Table 8-19 Rozelle interchange network performance – 2015 AM and PM peak hour**

| Network measure | AM peak hour | PM peak hour |
|---|---|---|
| **All vehicles** | | |
| Total traffic demand (vehicles) | 19,969 | 22,148 |
| Total vehicle kilometres travelled in network (kilometre) | 54,959 | 61,980 |
| Total time travelled in network (hours) | 4,016 | 3,276 |
| Total vehicles arrived | 20,298 | 20,714 |
| Total number of stops | 267,250 | 133,380 |
| **Average per vehicle in network** | | |
| Average vehicle kilometres travelled in network (kilometre) | 2.7 | 3.0 |
| Average time travelled in network (minutes) | 9.6 | 8.2 |
| Average number of stops | 11.5 | 5.6 |
| Average speed (kilometres per hour) | 16.9 | 21.9 |
| **Unreleased vehicles** | | |
| Unreleased demand (vehicles) | 357 | 823 |
| % of total traffic demand | 2% | 4% |

### *Intersection performance*

**Table 8-20** presents the modelled AM and PM peak hour LoS for key intersections in the existing situation at Rozelle. The intersection performance analysis demonstrates several intersections along Victoria Road at Rozelle experience poor levels of service during the PM peak hour. The poor level of service indicates that the intersections are at or close to capacity.

**Table 8-20 Rozelle interchange: key intersection performance (LOS) – 2015 AM and PM peak hour**

| Key intersections | AM peak hour | PM peak hour |
|---|---|---|
| Victoria Road/Lyons Road | D | D |
| Victoria Road/Wellington Street | D | B |
| Victoria Road/Darling Street | F | F |
| Victoria Road/Robert Street | D | F |
| Victoria Road/The Crescent | B | F |
| The Crescent/James Craig Road | A | B |
| City West Link/The Crescent | B | D |
| The Crescent/Johnston Street | C | F |

### *Travel times and speeds*

**Table 8-21** shows the average travel time on Victoria Road and Anzac Bridge between Darling Street at Rozelle and the Pyrmont Bridge ramps at Pyrmont, in the AM and PM peak periods. In the peak directions, eastbound travel time in the AM peak averages about six minutes with an average speed of about 21 kilometres per hour on a typical weekday; while the westbound travel time in the PM peak averages about eight minutes with an average speed of about 18 kilometres per hour. The speed limit on these roads is 60 kilometres per hour.

The eastbound direction in the AM peak and the westbound direction in the PM peak experience the most congested conditions. This is illustrated in the longer travel times and slower speeds compared

to the reverse direction in these same peak periods. Notwithstanding this, average speed in the eastbound direction in the PM peak is also slow.

**Table 8-21 Travel speed and travel time on Victoria Road and Anzac Bridge between Darling Street, Rozelle and Pyrmont Bridge entry/exit ramp at Pyrmont**

| Location | Direction | Average speed (km/hr) | | Average travel time (min:sec) | |
|---|---|---|---|---|---|
| | | AM peak | PM peak | AM peak | PM peak |
| Victoria Road/Anzac Bridge (Darling Street – Pyrmont Bridge entry and exit ramp) | Eastbound | 21 | 23 | 6:20 | 5:40 |
| | Westbound | 35 | 18 | 3:50 | 7:40 |

Source: Based on Matrix survey data, AECOM 2016

**Table 8-22** shows the average travel time on City West Link and Anzac Bridge between Catherine Street at Lilyfield and Pyrmont Bridge ramps at Pyrmont in the AM and PM peak periods. In the peak directions, eastbound travel time in the AM peak averages about 10 minutes, with an average speed of about 16 kilometres per hour on a typical weekday. The westbound travel time in the PM peak averages six minutes with an average speed of about 26 kilometres per hour. The speed limit on the road is 60 kilometres per hour.

The eastbound direction in the AM peak and the westbound direction in the PM peak show longer travel times and slower speeds compared to the reverse direction in these same peak periods. Compared to the Victoria Road surveys, the eastbound direction in the PM peak is less congested.

**Table 8-22 Travel speed and travel time on City West Link and Anzac Bridge between Catherine Street, Lilyfield and Pyrmont Bridge on/off ramp at Pyrmont**

| Location | Direction | Average speed (km/hr) | | Average travel time (min:sec) | |
|---|---|---|---|---|---|
| | | AM peak | PM peak | AM peak | PM peak |
| City West Link/Anzac Bridge (Catherine Street – Pyrmont Bridge entry and exit ramp) | Eastbound | 16 | 44 | 10:00 | 3:30 |
| | Westbound | 35 | 26 | 4:30 | 6:00 |

Source: Based on Matrix survey data, 2014

### *Traffic crashes*

**Table 8-23** summarises the crash history for five years (1 January 2011 – 31 December 2015) on the key roads around the Rozelle interchange. On key arterial roads, including Anzac Bridge and City West Link, about 60 per cent of crashes were rear-end, which is consistent with roadways approaching capacity and on which a high level of queuing occurs.

**Table 8-23 Rozelle and surrounds: crash statistics (Jan 2011 to Dec 2015)**

| Road | Section from | Section to | Crashes | | | |
|---|---|---|---|---|---|---|
| | | | Total | Fatal | Injury | Tow-away |
| Anzac Bridge | Miller Street | Victoria Road | 108 | 0 | 66 | 42 |
| City West Link | James Street | Victoria Road | 171 | 1 | 87 | 83 |
| Victoria Road | Darling Street | The Crescent | 95 | 1 | 51 | 43 |
| Lilyfield Road | Victoria Road | Canal Road | 41 | 0 | 28 | 13 |
| The Crescent | City West Link | Wigram Road | 62 | 0 | 35 | 27 |
| Johnston Street | The Crescent | Parramatta Road | 62 | 0 | 40 | 22 |

Source: Summarised from crash reports, 2016

The average crash severity index on key roads in Rozelle and surrounds is about 1.29 – above the average for NSW (1.24) and the Sydney Metropolitan Area (1.22), as presented in **Table 8-24**.

**Table 8-24 Rozelle and surrounds: crash severity indices (Jan 2011 to Dec 2015)**

| Road | Section from | Section to | Crash Severity Index |
|---|---|---|---|
| Anzac Bridge | Victoria Road | Miller Street | 1.31 |
| City West Link | James Street | Victoria Road | 1.27 |
| Victoria Road | Darling Street | The Crescent | 1.29 |
| Lilyfield Road | Victoria Road | Canal Road | 1.38 |
| The Crescent | City West Link | Wigram Road | 1.28 |
| Johnston Street | The Crescent | Parramatta Road | 1.32 |
| **NSW \| Sydney Metropolitan averages – all roads (2010–2014)** | | | |
| NSW | | | 1.24 |
| Sydney Metropolitan Area | | | 1.22 |

Source: Summarised from crash reports, 2016 & 2014

**Table 8-25** indicates that the occurrence of fatal crashes is higher on City West Link and Victoria Road compared to the Sydney Metropolitan Area average, while crashes causing injury on Victoria Road, Lilyfield Road, The Crescent and Johnston Street are higher than the Sydney Metropolitan Area average. Injury crashes on Anzac Bridge and City West Link are lower than the Sydney Metropolitan Area average.

**Table 8-25 Rozelle and surrounds: crash rates per 100MVKT (Jan 2011 to Dec 2015)**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Crash rates per 100MVKT | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Total | Fatal | Injury | Tow-away |
| Anzac Bridge | Victoria Road | Miller Street | 0.99 | 134,000 | 44.6 | - | 27.3 | 17.3 |
| City West Link | James Street | Victoria Road | 2.13 | 86,991 | 50.6 | 0.3 | 25.7 | 24.5 |
| Victoria Road | Darling Street | The Crescent | 0.85 | 83,648 | 73.2 | 0.8 | 39.3 | 33.1 |
| Lilyfield Road | Victoria Road | Canal Road | 2.48 | 4,301 | 205.5 | - | 143.8 | 66.8 |
| The Crescent | City West Link | Wigram Road | 1.32 | 28,010 | 91.9 | - | 51.9 | 40.0 |
| Johnston Street | The Crescent | Parramatta Road | 1.8 | 15,869 | 118.9 | - | 76.7 | 42.2 |
| Sydney Metropolitan Area (1 Jan 2013 to 31 Dec 2013) | | | | | 68.8 | 0.2 | 29.4 | 39.2 |

Source: Summarised from crash reports, 2016

**Table 8-26** provides details of the crash costs for the key roads surrounding the Rozelle interchange. Average crash costs based on crash severity have been calculated using Roads and Maritime's Economic Analysis Manual (Economic Parameters for 2009).

**Table 8-26 Rozelle and surrounds: crash costs (Jan 2011 to Dec 2015)**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Total cost | Crash cost Average annual cost | Cost per 100MVKT |
|---|---|---|---|---|---|---|---|
| Anzac Bridge | Victoria Road | Miller Street | 0.99 | 134,000 | $27,402,300 | $5,480,460 | $11,318,380 |
| City West Link | James Street | Victoria Road | 2.13 | 86,991 | $41,928,450 | $8,385,690 | $12,399,150 |
| Victoria Road | Darling Street | The Crescent | 0.85 | 83,648 | $26,842,450 | $5,368,490 | $20,686,390 |
| Lilyfield Road | Victoria Road | Canal Road | 2.48 | 4,301 | $11,585,950 | $2,317,190 | $59,517,910 |
| The Crescent | City West Link | Wigram Road | 1.32 | 28,010 | $14,570,050 | $2,914,010 | $21,592,910 |
| Johnston Street | The Crescent | Parramatta Road | 1.8 | 15,869 | $16,579,300 | $3,315,860 | $31,803,960 |

Source: Summarised from crash reports, 2016

### 8.2.5 Rozelle to St Peters interchange corridor

The Rozelle interchange to St Peters interchange corridor connects the Sydney CBD with the M5 motorway corridor. Southeast of the Rozelle interchange, north–south traffic movement is focused on the Eastern Distributor, with Abercrombie Street, Regent Street, Chalmers Street and Elizabeth Street providing supporting north–south routes. North of the St Peters interchange, north–south traffic is mainly focused on the Princes Highway and King Street, while traffic from the Sydney Airport and Port Botany precinct also uses O'Riordan Street and Botany Road.

Several of the roads identified above are within the Sydney Airport to Sydney CBD travel demand corridor, which experiences high levels of transport congestion. There are also heavy vehicle routes along this corridor, extending from the Sydney Airport and Port Botany precinct, through the city, to areas north of Sydney Harbour.

#### Existing traffic volumes and patterns

**Table 8-27** provides 2014 AM peak hour, PM peak hour and AWT flows at key locations within the Rozelle to St Peters interchange corridor.

South-east of the Rozelle interchange, the main north–south movement is focused on the Eastern Distributor, with surrounding north–south links playing a supporting role. North of the St Peters interchange, traffic is mainly focused on Princes Highway and, to a lesser degree King Street, while O'Riordan Street and Botany Road also carry a significant amount of north–south traffic.

**Table 8-27 Average peak mid-block traffic volumes at key locations within the Rozelle interchange to St Peters interchange corridor (2014 count data)**

| Location | Direction | AM peak hour | | PM peak hour | | AWT | |
|---|---|---|---|---|---|---|---|
| | | veh/hr | HCV% | veh/hr | HCV% | veh/hr | HCV% |
| **Southeast of Rozelle interchange** | | | | | | | |
| Eastern Distributor, north of Cleveland Street | Northbound | 3,230 | 6% | 2,820 | 4% | 41,500 | 5% |
| | Southbound | 3,300 | 4% | 3,310 | 4% | 52,500 | 5% |
| Abercrombie Street, north of Cleveland Street | One-way northbound | 1,560 | 7% | 1,430 | 4% | 21,000 | 7% |
| Regent Street, north of | Northbound | 930 | 7% | 740 | 2% | 12,000 | 5% |

| Location | Direction | AM peak hour | | PM peak hour | | AWT | |
|---|---|---|---|---|---|---|---|
| | | veh/hr | HCV% | veh/hr | HCV% | veh/hr | HCV% |
| Cleveland Street | Southbound | 1,670 | 5% | 1,930 | 3% | 27,000 | 5% |
| Chalmers Street, north of Cleveland Street | One-way northbound | 1,340 | 9% | 1,100 | 7% | 17,000 | 9% |
| Elizabeth Street, north of Cleveland Street | One-way southbound | 980 | 11% | 1,440 | 8% | 18,500 | 9% |
| **North of St Peters interchange** | | | | | | | |
| Princes Highway, south of Railway Road | Northbound | 3,500 | 5% | 1,970 | 4% | 37,500 | 8% |
| | Southbound | 1,590 | 13% | 3,680 | 6% | 40,000 | 10% |
| King Street, south of Missenden Road | Eastbound | 1,410 | 13% | 890 | 8% | 17,500 | 9% |
| | Westbound | 610 | 11% | 1,050 | 9% | 16,000 | 9% |
| O'Riordan Street, north of Gardeners Road | Northbound | 1,210 | 8% | 1,040 | 6% | 16,000 | 8% |
| | Southbound | 890 | 8% | 1,160 | 6% | 15,000 | 8% |
| Botany Road, north of Gardeners Road | Northbound | 1,380 | 11% | 880 | 7% | 14,000 | 13% |
| | Southbound | 750 | 11% | 1,180 | 10% | 13,500 | 11% |

Source: WDA traffic surveys (2014)

### Existing road network performance

Average speeds and travel times on key roads within the Rozelle interchange to St Peters interchange corridor are shown in **Table 8-28**. Southern Cross Drive, posted at 80 kilometres per hour, exhibits slow speeds, especially in the peak directions. Traffic conditions on Botany Road and Princes Highway/King Street, posted at 50 or 60 kilometres per hour on different sections, indicate the congestion on the surface road network in this corridor.

**Table 8-28 Average speed and travel times along key roads within the Rozelle to St Peters interchange corridor (2016 survey data)**

| Location | Direction | Average speed (km/hr) | | Average travel time (min:sec) | |
|---|---|---|---|---|---|
| | | AM peak | PM peak | AM peak | PM peak |
| Southern Cross Drive (Gardeners Road – Cleveland Street) | Northbound | 28 | 39 | 8:00 | 5:40 |
| | Southbound | 50 | 32 | 4:30 | 7:00 |
| Botany Road (Gardeners Road – Raglan Street) | Northbound | 28 | 23 | 6:20 | 7:40 |
| | Southbound | 24 | 25 | 7:10 | 7:10 |
| Princes Highway/King Street (Canal Road to Broadway) | Northbound | 24 | 22 | 11:10 | 12:00 |
| | Southbound | 25 | 24 | 10:50 | 11:30 |

## 8.2.6 St Peters interchange and surrounds

Existing land uses in the vicinity of the St Peters interchange include an enterprise corridor along the Princes Highway, warehouses, limited residential lands, and Sydney Park to the north and Alexandra Canal to the east. Surrounding land uses include the residential neighbourhoods of St Peters, Sydenham and Newtown, as well as general residential and industrial areas of Alexandria to the east. Other significant areas include commercial activity around the Bourke Road/Bourke Street/Gardeners Road intersection associated with Sydney Airport, and residential development associated with Mascot Town Centre.

### Modes of travel

The area around the St Peters interchange is located in parts of the Sydney, Inner West and Bayside LGAs. Travel mode shares for Sydney, Inner West and Bayside LGAs in comparison with the Sydney GMA are shown in **Table 8-29**.

As the Sydney LGA includes the Sydney CBD, and the Inner West LGA is located close to the Sydney CBD, these two LGAs have a significantly different mode share compared to the GMA, characterised by an extensive public transport network and a land use mix where residential developments are located closer to employment areas, thereby reducing the need for car travel. These two LGAs have a much lower mode share for private vehicles (30 and 49 per cent) and a high mode share for walking (49 and 30 per cent) compared to 69 per cent for private vehicles and 18 per cent for walk trips in the Sydney GMA.

The Bayside LGA, which is farther away from the Sydney CBD and where a number of industrial sites such as Sydney Airport and Port Botany are located, has more reliance on private vehicles compared to the Sydney and Inner West LGAs and a lower rail mode share of two per cent compared to the Sydney and Inner West LGAs.

**Table 8-29 AWT mode share for Sydney, Inner West and Bayside LGAs and the Sydney GMA[1]**

| Area | Private Vehicles | | | Rail | Bus | Walk only | Other modes |
|---|---|---|---|---|---|---|---|
| | Driver | Passenger | Total | | | | |
| Sydney LGA | 21% | 9% | 30% | 8% | 9% | 49% | 4% |
| Inner West LGA | 36% | 13% | 49% | 7% | 8% | 32% | 5% |
| Bayside LGA | 46% | 21% | 67% | 2% | 11% | 19% | 1% |
| Sydney GMA | 47% | 22% | 69% | 5% | 6% | 18% | 2% |

Note:

Inner West Council LGA data has been derived by combining data from the former Leichhardt, Ashfield and Marrickville LGA's, while Bayside LGA data has been derived from data for the former Botany Bay LGA

Source: NSW Bureau of Transport Statistics (BTS), Household Travel Survey Report: Sydney 2012/13, Nov 2014 Release

## Public transport services

### *Rail services*

Sydney and Inner West LGAs are served by several rail services, while Bayside LGA has limited rail coverage. The closest stations to the St Peters interchange are Mascot Station on the T2 Airport Line and St Peters Station on the T3 Bankstown Line, located one kilometre to the south and 750 metres to the north of the St Peters interchange respectively.

**Table 8-30** shows the train services at Mascot and St Peters stations. In the AM peak, there are 18 trains from Mascot Station and 14 trains from St Peters Station travelling to the Sydney CBD. In the PM peak, the train services from the city to Mascot Station and St Peters Station are 16 and 18 respectively. The duration between trains at Mascot Station is less than ten minutes at all times on a weekday including inter peak, AM and PM peak while the duration between trains at St Peters Station is six to 15 minutes and seven to 15 minutes during the AM and PM peak respectively. Outside of the peak periods, trains stop at St Peters Station at a frequency of 15 minutes.

**Table 8-30 Weekday heavy rail service frequency**

| Station | Line | AM Peak[1] services | AM peak frequency | PM peak[2] services | PM peak frequency |
|---|---|---|---|---|---|
| Mascot | T2 Airport Line | 18 | 6-9 min | 16 | 6-9 min |
| St Peters | T3 Bankstown Line | 14 | 6-15 min | 18 | 7-15 min |

Notes:

[1]7:00–9:00 am to city

[2]4:00–6:00 pm from city

Source: New M5 Technical working paper: Traffic and transport, AECOM 2015b

### *Bus services*

The St Peters interchange and surrounds has a comprehensive bus network providing access to its surrounding activity and employment centres. The bus routes operating around the St Peters interchange (operated by Sydney Buses) are summarised in **Table 8-31**.

**Table 8-31 Bus services around St Peters and surrounds**

| Route | AM Peak[1] services | AM peak frequency | PM peak[2] services | PM peak frequency |
|---|---|---|---|---|
| 305 Stamford Plaza Hotel to Railway Square | 5 | 20 min | 5 | 20 min |
| 308 Marrickville to City | 8 | 20 min | 4 | 30 min |
| 309 Port Botany to City | 13 | 7–14 min | 18 | 2–14 min |
| 348 Wolli Creek to Bondi Junction | 4 | 30 min | 4 | 30 min |
| 370 Leichhardt to Coogee | 14 | 8–9 min | 11 | 10–11 min |
| 400 Burwood to Bondi Junction | 7 | 17–18 min | 8 | 15 min |
| 410 Burwood to Bondi Junction | 4 | 30 min | 7 | 17–18 min |
| 418 Burwood to Bondi Junction | 6 | 20 min | 8 | 20 min |
| 422 Kogarah to City | 9 | 13–14 min | 9 | 13–14 min |
| M20 Gore Hill to Botany Shops via City | 12–17 | 7–10 min | 12–17 | 7–10 min |

Notes:

[1]7.00–9.00 am (higher frequency direction)

[2]4.00–6.00 pm (higher frequency direction)

Source: New M5 Technical working paper: Traffic and transport, AECOM 2015b

### *Walking and cycling facilities*

Details of existing walking and cycling facilities can be found in **Appendix N** (Technical working paper: Active transport strategy).

## Existing traffic volumes and performance

### *Mid-block traffic volumes*

**Table 8-32** provides the 2014 AM peak hour, PM peak hour and AWT flows for the key road corridors in the vicinity of the St Peters interchange. The shading in the table groups the locations into the King Street/Princes Highway corridor, the Euston Road corridor, the Campbell Street corridor and the Ricketty Street/Gardeners Road corridor. At some locations, only peak hour volumes were available.

The table indicates that roads running east-west experience higher traffic flows in the eastbound direction during the AM peak and in the westbound direction during the PM peak. The Princes Highway experiences higher traffic flows in the northbound direction during the AM peak and southbound direction during the PM peak. A number of locations have a high proportion of heavy vehicles including the Princes Highway south of Railway Road and Euston Road north of Campbell Road.

**Table 8-32 Average peak mid-block traffic volumes at key locations around St Peters and surrounds (2014 count data)**

| Location | Direction | AM peak hour | | PM peak hour | | AWT | |
|---|---|---|---|---|---|---|---|
| | | veh/hr | HCV% | veh/hr | HCV% | veh/day | HCV% |
| King Street, south of Alice Street | Northbound | 1,020 | 5% | 950 | 2% | – | – |
| | Southbound | 780 | 7% | 940 | 3% | – | – |
| Princes Highway, north of Campbell Street | Northbound | 1,660 | 5% | 980 | 3% | 19,000 | 6% |
| | Southbound | 560 | 9% | 1,600 | 4% | 17,500 | 7% |
| Princes Highway, south of Campbell Street | Northbound | 1,720 | 11% | 1,040 | 6% | 19,500 | 9% |
| | Southbound | 610 | 10% | 1,550 | 9% | 18,000 | 10% |
| Railway Road, west of Princes Highway | Eastbound | 630 | 12% | 640 | 4% | – | – |
| | Westbound | 390 | 17% | 550 | 5% | – | – |
| Princes Highway, south of Railway Road | Northbound | 3,370 | 5% | 1,590 | 5% | 27,000 | 15% |
| | Southbound | 780 | 10% | 2,610 | 2% | 25,500 | 17% |
| Euston Road, north of Campbell Road | Northbound | 410 | 13% | 190 | 7% | 3,000 | 13% |
| | Southbound | 200 | 23% | 190 | 7% | 2,500 | 16% |
| Euston Road, north of Sydney Park Road | Northbound | 1,220 | 7% | 600 | 5% | – | – |
| | Southbound | 500 | 15% | 1,330 | 5% | – | – |
| Campbell Road, west of Euston Road | Eastbound | 860 | 9% | 410 | 12% | 7,500 | 11% |
| | Westbound | 160 | 21% | 320 | 13% | 3,500 | 14% |
| Campbell Street, east of May Street | Eastbound | 360 | 8% | 320 | 8% | 5,000 | 8% |
| | Westbound | 140 | 16% | 280 | 11% | 3,000 | 12% |
| Edgeware Road, west of Edinburgh Road | Northbound | 670 | 8% | 810 | 3% | – | – |
| | Southbound | 730 | 7% | 780 | 1% | – | – |
| Ricketty Street | Eastbound | 2,290 | 7% | 1,160 | 9% | 22,000 | 11% |
| | Westbound | 960 | 17% | 1,830 | 7% | 20,500 | 12% |
| Gardeners Road, west of O'Riordan Street | Eastbound | 1,090 | 13% | 920 | 15% | 14,000 | 14% |
| | Westbound | 1,000 | 11% | 1,120 | 12% | 15,000 | 11% |

Source: WDA traffic surveys (2014)

## St Peters interchange existing performance

### *Network performance*

Traffic conditions around the St Peters interchange are altered due to the construction of the New M5 project, which commenced construction in late 2016 and is expected to be open to motorists in 2020. The road network performance reported is for the situation prior to construction of the New M5 commencing to allow an assessment that reflects the unaltered road network.

**Table 8-33** presents the performance of the modelled road network for St Peters and surrounds in the 2015 base scenario modelled for the AM and PM peak hours. The results indicate a similar level of demand and network performance in each peak hour.

**Table 8-33 St Peters interchange network performance – 2015 AM and PM peak hour**

| Network measure | AM peak hour | PM peak hour |
|---|---|---|
| **All vehicles** | | |
| Total traffic demand (veh) | 22,080 | 21,390 |
| Total vehicle kilometres travelled in network (km) | 62,220 | 59,650 |
| Total time travelled in network (hr) | 2,350 | 2,370 |
| Total vehicles arrived | 21,840 | 21,160 |
| Total number of stops | 105,830 | 101,670 |
| **Average per vehicle** | | |
| Average vehicle kilometres travelled in network (km) | 2.6 | 2.6 |
| Average time travelled in network (mins) | 5.8 | 5.9 |
| Average number of stops | 4.8 | 4.8 |
| Average speed (km/h) | 26.8 | 26.1 |
| **Unreleased vehicles** | | |
| Unreleased demand (veh) | 90 | 250 |
| % of total traffic demand | 0% | 1% |

*Intersection performance*

**Table 8-34** presents the AM and PM peak hour intersection average delays and LoS for the existing situation at St Peters. The intersection performance analysis demonstrates several intersections in the vicinity of the St Peters interchange experience congestion during the AM and PM peak hours.

Roads and Maritime is carrying out improvement works at the Princes Highway/Railway Road intersection as part of the Pinch Point Program. These works would be expected to improve the LoS of this intersection during the AM and PM peak periods.

**Table 8-34 St Peters interchange: key intersection performance (LoS) – 2015 AM and PM peak hour**

| Key intersections | AM peak hour | PM peak hour |
|---|---|---|
| Princes Highway/Sydney Park Road | C | D |
| Princes Highway/May Street | D | F |
| Princes Highway/Canal Road | D | D |
| Princes Highway/Railway Road | F | D |
| Sydney Park Rd/Mitchell Road | C | D |
| Euston Road/Sydney Park Road | A | B |
| Unwins Bridge Road/Campbell Street | C | D |
| Campbell Road/Euston Road | A | A |
| Campbell Road/Bourke Road | C | D |
| Princes Highway/Campbell Street | C | C |
| Ricketty Street/Kent Road | A | A |
| Gardeners Road/Kent Road | C | D |
| Gardeners Road/Bourke Road | D | E |

*Traffic crashes*

**Table 8-35** summarises the crash history for a five year period (1 January 2009 to 31 December 2013) for key roads around the St Peters interchange.

**Table 8-35 St Peters and surrounds: crash statistics (Jan 2009 to Dec 2013)**

| Road | Section from | Section to | Crashes | | | |
|---|---|---|---|---|---|---|
| | | | Total | Fatal | Injury | Tow-away |
| Princes Highway | Enmore Road | Gannon Street | 407 | 2 | 189 | 216 |
| Canal Road/ Ricketty Street/ Gardeners Road | Princes Highway | Botany Road | 248 | 1 | 100 | 147 |
| Euston Road | Sydney Park Road | Campbell Road | 21 | 0 | 13 | 12 |
| Bourke Road | Wyndham Street | Gardeners Road | 69 | 0 | 35 | 34 |

Source: New M5 Technical working paper: Traffic and transport, AECOM 2015b

The average crash severity indices in the St Peters area range from 1.21 to 1.50. The Princes Highway, Bourke Road and especially Euston Road have averages higher than the NSW and Sydney Metropolitan Area average, as presented in **Table 8-36**.

**Table 8-36 St Peters and surrounds: crash severity indices (Jan 2009 to Dec 2013)**

| Road | Section from | Section to | Crash Severity index |
|---|---|---|---|
| Princes Highway | Enmore Road | Gannon Street | 1.24 |
| Canal Road/ Ricketty Street/ Gardeners Road | Princes Highway | Botany Road | 1.21 |
| Euston Road | Sydney Park Road | Campbell Road | 1.50 |
| Bourke Road | Wyndham Street | Gardeners Road | 1.25 |
| **NSW \| Sydney Metropolitan Averages – all roads (2010–2014)** | | | |
| NSW (2008-2012) | | | 1.24 |
| Sydney Metropolitan Area (2008–2012) | | | 1.22 |

Source: New M5 Technical working paper: Traffic and transport, AECOM 2015b

**Table 8-37** indicates the occurrence of fatal crashes and crashes causing injury on the Princes Highway, Canal Road, Ricketty Street and Gardeners Road is higher than the Sydney Metropolitan Area average, but the occurrence of crashes causing injury or tow-away on Euston Road is significantly higher than the Sydney Metropolitan Area average. Euston Road also has a very high crash rate compared to other roads in the area.

**Table 8-37 St Peters and surrounds: crash rates per 100 MVKT (Jan 2009 to Dec 2013)**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Crash rates per 100 MVKT | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Total | Fatal | Injury | Tow-away |
| Princes Highway | Enmore Road | Gannon Street | 3.8 | 50,981 | 115.1 | 0.6 | 53.5 | 61.1 |
| Canal Road/ Ricketty Street/ Gardeners Road | Princes Highway | Botany Road | 2.4 | 39,599 | 143.0 | 0.6 | 57.7 | 84.8 |
| Euston Road | Sydney Park | Campbell Road | 0.9 | 4,810 | 265.8 | - | 164.5 | 151.9 |

| Road | Section from | Section to | Section length | ADT (veh) | Crash rates per 100 MVKT | | | |
|---|---|---|---|---|---|---|---|---|
| | Road | | | | | | | |
| Bourke Road | Wyndham Street | Gardeners Road | 2.1 | 11,430 | 157.5 | - | 79.9 | 77.6 |
| Sydney Metropolitan Area (1 Jan 2013 to 31 Dec 2013) | | | | | 68.8 | 0.2 | 29.4 | 39.2 |

Source: New M5 Technical working paper: Traffic and transport, AECOM 2015b

**Table 8-38** provides details of the crash costs for roads in and around St Peters. Average crash costs, based on crash severity, have been calculated using Roads and Maritime's Economic Analysis Manual (Economic Parameters for 2009). Again, Euston Road stands out as a section of road with a very high crash cost compared to other roads in the area.

**Table 8-38 St Peters and surrounds: crash costs (Jan 2009 to Dec 2013)**

| Road section | Section length (km) | ADT (veh) | Total cost | Crash cost Average annual cost | Cost per 100 MVKT |
|---|---|---|---|---|---|
| Princes Highway (Enmore Road – Gannon Street) | 3.8 | 50,981 | $90,414,400 | $18,082,880 | $25,573,070 |
| Canal Road/ Ricketty Street/ Gardeners Road (Princes Highway – Botany Road) | 2.4 | 39,599 | $47,780,050 | $9,556,010 | $27,547,890 |
| Euston Road (Sydney Park Road – Campbell Road) | 0.9 | 4,810 | $5,427,800 | $1,085,560 | $68,702,630 |
| Bourke Road (Wyndham Street – Gardeners Road) | 2.1 | 11,430 | $14,627,100 | $2,925,420 | $33,391,030 |

Source: New M5 Technical working paper: Traffic and transport, AECOM 2015b

## 8.2.7 Wattle Street interchange to St Peters interchange corridor

The Wattle Street interchange to St Peters interchange corridor connects the M4 and M5 motorways. There is a primary freight route between these interchange sites that extends along Parramatta Road, Old Canterbury Road, Railway Terrace, Gordon Street, Livingstone Road, Sydenham Road, Gleeson Avenue and Railway Road before connecting to Princes Highway. While this classified as a primary freight route, its use is restricted to heavy vehicles under 19 metres. An alternative route runs along Parramatta Road, Stanmore Road and Edgeware Road.

### Existing traffic volumes and patterns

**Table 8-39** provides 2012 AM peak hour, PM peak hour and AWT flows on Sydenham Road in Marrickville, along the primary freight route. The table indicates clear changes in peak direction between the AM peak hour and the PM peak hour, with more vehicles travelling eastbound in the AM peak hour, and more vehicles travelling westbound in the PM peak hour. The survey data also indicates a high heavy vehicle percentage, which is high through the day. This is consistent with the use of this route by freight vehicles, which may try and travel outside of peak traffic periods.

**Table 8-39 Average peak mid-block traffic volumes at key locations within the Wattle Street interchange to St Peters interchange corridor (2012 count data)**

| Location | Direction | AM peak hour | | PM peak hour | | AWT | |
|---|---|---|---|---|---|---|---|
| | | veh/hr | HCV% | veh/hr | HCV% | veh/hr | HCV% |
| Sydenham Road, west of Victoria Road (Marrickville) | Westbound | 390 | 12% | 920 | 4% | 9,500 | 8% |
| | Eastbound | 840 | 7% | 500 | 3% | 10,000 | 7% |

Source: Roads and Maritime traffic survey (2012)

### Existing road network performance

Average speeds and travel times on the primary freight route, described above, within the Wattle Street interchange to St Peters interchange corridor are shown in **Table 8-40**. The low speeds and long travel times indicate the peak hour congestion currently experienced along this route.

**Table 8-40 Average speed and average travel time along key roads within the Wattle Street interchange to St Peters interchange corridor (2016 survey data)**

| Location | Direction | Average speed (km/hr) | | Average travel time (min:sec) | |
|---|---|---|---|---|---|
| | | AM peak | PM peak | AM peak | PM peak |
| Railway Terrace/Livingstone Road/Sydenham Road/Railway Road (Old Canterbury Rd – Princes Highway) | Northbound | 18 | 19 | 13:10 | 12:40 |
| | Southbound | 22 | 23 | 11:20 | 11:10 |

## 8.3 Assessment of potential impacts

### 8.3.1 Construction

During construction, the project may affect the surrounding road network as a result of:

- Construction vehicles using the surface road network, especially heavy vehicles transporting spoil
- Surface road works, requiring temporary traffic, cyclist and/or pedestrian diversions, road occupation and temporary road closures
- Temporary changes to speed limits.

### Overview of construction traffic and vehicle routes

Construction of the project would result in additional heavy and light vehicle movements on the road network in three broad categories:

- Removal of spoil generated by construction activities
- Heavy vehicle deliveries and other heavy vehicles involved in construction activities
- Light vehicle movements associated with construction of the project.

Construction traffic routes for the project would use the existing motorway and arterial road network as much as possible, reducing traffic related impacts on local roads.

Spoil would be transported from construction ancillary facilities to spoil management locations, generally along arterial roads and the M4 East Motorway, the New M5 Motorway, the M5 East Motorway and the M5 South West Motorway.

## Construction traffic management and access

*Construction traffic generation and distribution*

The project would generate around four million cubic metres of spoil, the majority of which would be generated from excavation of the tunnels. As such, the primary facilities for receipt and dispatch of spoil would be the tunnel construction sites.

The project would seek to reuse at least 95 per cent of uncontaminated spoil, either within the project or at other locations. Where reasonable and practicable, spoil would be managed according to the following hierarchy:

- Minimisation of spoil generation through design and management
- Reuse of spoil within the project
- Beneficial reuse of spoil outside the project
- Where reuse is not possible, disposal of spoil would be the last resort.

Five potential sites have been identified for receiving excess spoil from the project, as summarised in **Table 8-41**. Negotiations for the final destination(s) for excess spoil would be carried out during detailed design, and may include one or more of the sites listed in **Table 8-41** or other alternatives.

**Table 8-41 Potential spoil management sites**

| Spoil management site | Location | Distance from the project (kilometres) | Capacity for site to accept spoil ($m^3$) |
|---|---|---|---|
| Horsley Park (manufacturing facility) | Wallgrove Road at Horsley Park | About 40 | Capacity for all project spoil |
| Blacktown Waste Services (landfill) | 920 Richmond Road at Marsden Park | About 45 | 250,000 |
| Sakkara Development (industrial estate) | Riverstone Parade at Riverstone | About 45 | 3,500,00 |
| Kurnell Landfill | 330 Captain Cook Drive at Kurnell | About 20 | 7,000,000 |
| Moorebank Intermodal Terminal Precinct | Moorebank Avenue, Moorebank | About 30 | 2,500,000 |

Note: The Horsley Park spoil management site is a manufacturing facility and currently does not have a definitive limit for the amount of spoil it can receive.

Indicative haulage routes from the construction ancillary facilities are shown in **Chapter 6** (Construction work) and in **Appendix H** (Technical working paper: Traffic and transport). Spoil haulage routes would be confirmed during detailed design. Delivery of concrete to support tunnel construction would originate from batching plants close to the project footprint, although other sources may also be required. Other materials required for construction would, where available, originate from within the Sydney region and surrounds and would be delivered by vehicles using the arterial road network to access the various construction sites.

**Table 8-42** provides details of light and heavy vehicle volumes predicted to arrive and depart from construction ancillary facilities during a typical AM peak hour, PM peak hour and daily period. Light vehicles are comprised of passenger and commercial vehicles. The table shows that the highest volumes of heavy and light construction vehicles are forecast at the Rozelle civil and tunnel site (C5). Construction vehicles would use the M4 East and New M5 tunnels at Haberfield and St Peters rather than the surface road network, wherever possible.

The daily and peak hour volumes shown in **Table 8-42** are based around targeted spoil haulage between 7.00 am and 6.00 pm. However, 24 hour spoil haulage would be required during tunnelling at five construction ancillary facilities, and the table shows indicative heavy vehicle volumes for these sites. Spoil haulage would only occur during standard daytime construction hours at the Darley Road civil and tunnel site to minimise heavy vehicle movements at night at this location. The peak hour

identified is representative of highest estimated construction volumes and falls within the broader peak periods experienced on the network.

### *Construction workforce parking*

A number of the project's staff and labour force would be expected to drive to construction sites and would therefore require car parking. The number of construction personnel requiring parking would vary over the duration of the construction program.

It is anticipated that construction workforce parking would be primarily provided at the following sites:

- Northcote Street civil site (C3a) – around 150 car parking spaces (Option A)
- Parramatta Road East civil site (C3b) – around 140 car parking spaces (Option B)
- Rozelle civil and tunnel site (C5) – around 400 car parking spaces
- Campbell Road civil and tunnel site (C10) – around 150 car parking spaces.

These facilities would be used to provide worker parking and shuttle bus transfers to other nearby construction sites.

Due to the generally constrained nature of the other construction sites, only minimal car parking for construction workers would be provided at these locations. Typically, these sites would provide between four to 20 parking spaces intended to be used by engineers and other construction management staff. Parking of construction-related vehicles in adjacent local roads would occur, particularly during site establishment.

The construction workforce would be encouraged to use public transport. Victoria Road and Parramatta Road are major transport corridors that have multiple bus routes. The Inner West Light Rail Line runs along the southern side of City West Link with stops near the Rozelle Rail Yards at Rozelle Bay and Lilyfield; and at the Darley Road civil and tunnel site (Leichhardt North light rail stop). The T3 Bankstown Line stops at St Peters Station around 800 metres north of the Campbell Road civil and tunnel site. However, workers starting or ending shifts very early or very late would be more likely to use private vehicles.

A car parking strategy would be developed as part of the Construction Traffic and Access Management Plan (CTAMP) to limit impacts on parking for the surrounding communities. The strategy would be developed in consultation with local councils and stakeholders associated with public facilities adjacent to project sites, as well as with the M4 East and New M5 contractors (where relevant) to identify opportunities to access parking during their respective construction periods and once those periods are completed.

The car parking strategy would include items such as forecasting of construction parking demand, review of existing parking supply and use on local streets in the area, impact on existing parking, consultation activities and proposed mitigation measures, such as management of workforce parking and transport, alternative parking arrangements and communication and engagement. This would include the identification of areas where there are high levels of existing parking demand around the construction ancillary facilities and works sites and identifying alternative car parking sites for use by the construction workforce. Processes for monitoring, reporting and corrective actions would also be part of the strategy.

**Table 8-42 Indicative daily and peak period construction traffic volumes**

| Location | | Daily vehicles (one way) | | AM peak hour (7.30–8.30 am) | | | | PM peak hour (4:15–5:15 pm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Heavy vehicles | Light vehicles | Heavy vehicles | | Light vehicles | | Heavy vehicles | | Light vehicles | |
| | | | | Arrive | Depart | Arrive | Depart | Arrive | Depart | Arrive | Depart |
| **Option A** | | | | | | | | | | | |
| C1a | Wattle Street civil and tunnel site[1] | 133 | 50 | 7 | 7 | 10 | - | 7 | 7 | - | 50 |
| C2a | Haberfield civil and tunnel site[1] | 136 | 90 | 7 | 7 | 30 | - | 7 | 7 | - | 90 |
| C3a | Northcote Street civil site | 100 | 150 | 5 | 5 | 50 | - | 5 | 5 | - | 150 |
| **Option B** | | | | | | | | | | | |
| C1b | Parramatta Road West civil and tunnel site[1] | 140 | 10 | 7 | 7 | 10 | - | 7 | 7 | - | 10 |
| C2b | Haberfield civil site | 10 | 20 | 2 | 2 | 10 | - | 2 | 2 | - | 10 |
| C3b | Parramatta Road East civil site | 30 | 150 | 3 | 3 | 50 | - | 3 | 3 | - | 150 |
| **All options** | | | | | | | | | | | |
| C4 | Darley Road civil and tunnel site | 100 | 70 | 7 | 7 | 10 | - | 7 | 7 | - | 70 |
| C5 | Rozelle civil and tunnel site[1] | 517 | 350 | 23 | 23 | 100 | - | 23 | 23 | - | 350 |
| C6 | The Crescent civil site | 10 | 20 | 2 | 2 | 0 | | 2 | 2 | | 5 |
| C7 | Victoria Road civil site | 42 | 140 | 2 | 2 | 0 | - | 2 | 2 | - | 0 |
| C8 | Iron Cove Link civil site | 42 | 140 | 2 | 2 | 15 | - | 2 | 2 | - | 140 |
| C9 | Pyrmont Bridge Road tunnel site[1] | 133 | 70 | 7 | 7 | 20 | - | 7 | 7 | - | 70 |
| C10 | Campbell Road civil and tunnel site[1] | 133 | 70 | 7 | 7 | 20 | - | 7 | 7 | - | 70 |
| WHT[2] | Proposed future Western Harbour tunnel site[1] (cumulative impact assessment scenario only) | 200 | 24 | 10 | 10 | 24 | - | 10 | 10 | - | 24 |

Notes:
1: Spoil haulage would occur 24 hours per day, seven days per week
2: Indicative daily, AM and PM peak hour construction traffic volumes for a cumulative impact scenario where a section of the Rozelle civil and tunnel site (C5) is handed over for use for construction of the proposed future Western Harbour Tunnel and Beaches Link project are included in **Table 8-42**. These indicative construction traffic volumes have been used to carry out the cumulative construction traffic impact assessment in **Chapter 26** (Cumulative impacts)

*Access routes*

The proposed access routes to the construction ancillary facilities are summarised in **Table 8-43** and shown in **Chapter 6** (Construction work). Wherever possible, access is proposed to be gained directly from major arterial roads. The project is also investigating the use of a marshalling area for spoil trucks to further assist in staggering the arrival of vehicles to site. This would be located in a non-residential area and in close proximity to the arterial road network and construction ancillary facilities where tunnelling would occur. This measure would assist in preventing queuing and parking of heavy vehicles on local roads in the vicinity of the project.

The distribution of light vehicles across the road network would be more varied. For the purposes of this assessment, light vehicle trips have been considered on top of background traffic and distributed accordingly. For all sites, except for the Campbell Road civil and tunnel site (C10), the distribution of access is assumed to be via the M4 Motorway, Victoria Road, Anzac Bridge and Parramatta Road, with the proportion via each varying for each site. For the Campbell Road civil and tunnel site (C10), access for light vehicles is assumed to be divided equally between access from the Princes Highway from the north and the south.

**Table 8-43 Indicative access routes to and from construction ancillary facilities**

| Site | Access and egress points | |
|---|---|---|
| | Heavy vehicles[1] | Light vehicles |
| Wattle Street civil and tunnel site (C1a) | · Parramatta Road then Wattle Street via M4-M5 Link entry and exit ramps | · Parramatta Road then Wattle Street northern (eastbound) carriageway (right in, right out) |
| Haberfield civil and tunnel site (C2a) | · Below ground: via the WestConnex M4 East tunnels<br>· Above ground: Wattle Street (left-in, left-out) | · Wattle Street southern westbound) carriageway (left-in, left-out)<br>· Walker Avenue<br>· Parramatta Road |
| Northcote Street civil site (C3a) | · Parramatta Road (left-in, left-out) | · Wolseley Street<br>· Wattle Street (left-out) |
| Parramatta Road West civil and tunnel site (C1b) | · Parramatta Road (left-in, left-out)<br>· Alt Street (crossover between sites only) | · Parramatta Road (left-in, left-out)<br>· Alt Street |
| Haberfield civil site (C2b) | · Wattle Street (left-in, left-out)<br>· Parramatta Road (left-in, left-out) | · Wattle Street (left-in, left-out)<br>· Parramatta Road (left-in, left-out)<br>· Walker Avenue (left-in, left-out) |
| Parramatta Road East civil site (C3b) | · Parramatta Road (left-in, left-out) | · Parramatta Road (left-in, left-out)<br>· Alt Street<br>· Bland Street |
| Darley Road civil and tunnel site (C4) | · City West Link then Darley Road[2] | · City West Link then Darley Road |
| Rozelle civil and tunnel site (C5) | · City West Link (left-in from eastbound carriageway, right-out to westbound carriageway) | · Lilyfield Road |
| The Crescent civil site (C6) | · The Crescent (left-in, right-out) | · The Crescent |
| Victoria Road civil site (C7) | · Victoria Road (left-in, left-out) | · Victoria Road (left in, left out)<br>· Hornsey Street |

| Site | Access and egress points | |
|---|---|---|
| | Heavy vehicles[1] | Light vehicles |
| Iron Cove Link civil site (C8) | · Victoria Road (left-in, left-out) | · Victoria Road (left-in, left-out) |
| Pyrmont Bridge Road tunnel site (C9) | · Parramatta Road (left-in)<br>· Pyrmont Bridge Road (left-out) | · Pyrmont Bridge Road |
| Campbell Road civil and tunnel site (C10) | · Albert Street via Campbell Road and Princes Highway | · Albert Street via Campbell Road |

Notes:

1 Some use of local roads by heavy vehicles delivering materials and/or equipment may also be required, however this would be minimised as far as practicable.

2 Spoil haulage vehicles would enter and exit the Darley Road civil and tunnel site (C4) via City West Link.

## Construction ancillary facilities

Twelve construction ancillary facilities are described and assessed in this EIS (see **Table 8-44**). The construction ancillary facilities would be used for a combination of civil surface works, tunnelling and tunnelling support, construction workforce parking and administrative purposes.

The number, location and layout of construction ancillary facilities would be finalised as part of detailed construction planning during detailed design and would meet the environmental performance outcomes stated in the EIS and the Submissions and Preferred Infrastructure Report and satisfy criteria identified in any relevant conditions of approval.

To assist in informing the development of a construction methodology that would manage constructability constraints and the need for construction to occur in a safe and efficient manner, while minimising impacts on local communities, the environment, and users of the surrounding road and other transport networks, two possible combinations of construction ancillary facilities at Haberfield and Ashfield have been assessed in this EIS. The construction ancillary facilities that comprise these options have been grouped together in this EIS and are denoted by the suffix *a* (for Option A) or *b* (for Option B) eg C1a Wattle Street civil and tunnel site. Although both of these options have been assessed in this EIS, only one of these options would be used during construction.

**Table 8-44 Proposed construction ancillary facilities**

| Construction ancillary facility | |
|---|---|
| **Option A** | |
| C1a | Wattle Street civil and tunnel site |
| C2a | Haberfield civil and tunnel site* |
| C3a | Northcote Street civil site |
| **Option B** | |
| C1b | Parramatta Road West civil and tunnel site |
| C2b | Haberfield civil site* |
| C3b | Parramatta Road West civil and tunnel site |
| **Both options** | |
| C4 | Darley Road civil and tunnel site |
| C5 | Rozelle civil and tunnel site |
| C6 | The Crescent civil site |
| C7 | Victoria Road civil site |
| C8 | Iron Cove Link civil site |

| | |
|---|---|
| C9 | Pyrmont Bridge Road tunnel site |
| C10 | Campbell Road civil and tunnel site |

Surface construction, including road works, and the establishment of construction ancillary facilities may result in traffic related impacts, including:

- Alterations to:
  - Existing property access
  - Existing pedestrian and cyclist access and movements
  - Location of existing bus stops
  - Local traffic environment
- Temporary road closures
- Temporary impacts on bus stop locations
- Temporary changes to pedestrian and cyclist access and movements.

Where applicable, these impacts have been assessed for each of the areas where surface construction, including road works, would occur. Construction ancillary facility locations are shown in **Figure 8-8**.

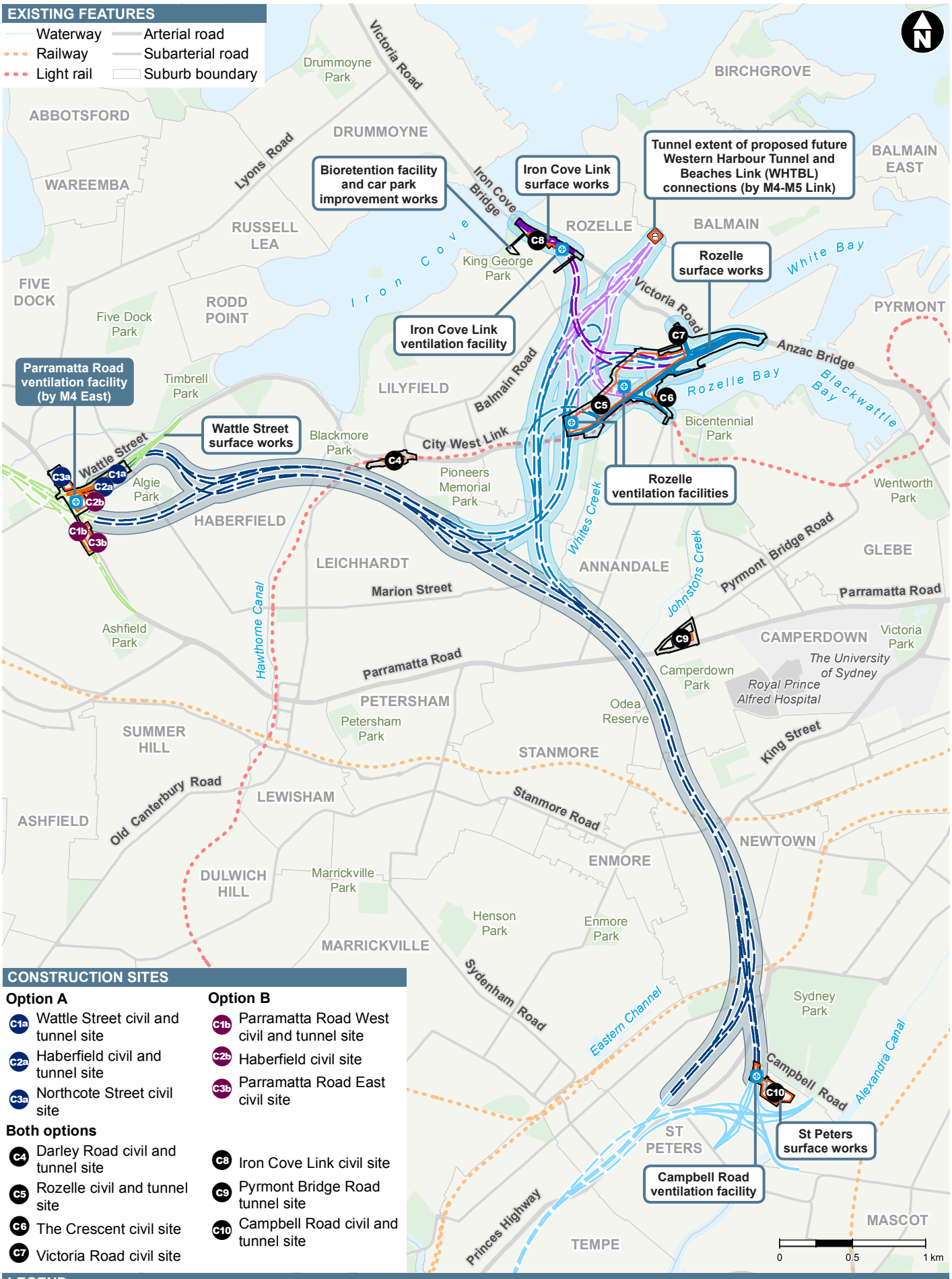



**Figure 8-8** Location of the construction ancillary facilities

### *Haberfield Option A – Wattle Street civil and tunnel site (C1a)*

**Location and construction activities**

The Wattle Street civil and tunnel site (C1a) would be located above and below ground along Wattle Street at Haberfield between Parramatta Road and Ramsay Street. This construction ancillary facility would use land above ground that is currently being used as a construction site for the M4 East project.

Roadheaders would be launched below ground from the Wattle Street entry and exit ramps to excavate the tunnels that would connect the Wattle Street entry and exit ramps with the M4-M5 Link mainline tunnels. Works at this site would also be supported by the facilities at Haberfield civil and tunnel site (C2a) and car parking and laydown at Northcote Street civil site (C3a).

Spoil handling on the site would occur 24 hours a day, seven days a week. Where practical, spoil would be removed during the day, outside of peak periods. Reasonable and practicable management strategies would be investigated to minimise the volume of heavy vehicle movements at night. The construction activities at this location are expected to occur between 2019 and 2022.

**Entry and exit**

The Wattle Street interchange entry and exit ramps that will be constructed as part of the M4 East project would be used for spoil removal. Heavy vehicles would enter the site via the eastbound entry ramp, be loaded with spoil underground within the tunnels, and then exit the site to Wattle Street via the westbound exit ramp. Light vehicles would enter and exit the site via a left-in/left-out arrangement off the eastbound Wattle Street carriageway.

**Local road impacts**

No traffic or access impacts are expected on surrounding local roads with heavy and light vehicle access and egress taken directly to and from Wattle Street.

### *Haberfield Option A – Haberfield civil and tunnel site (C2a)*

**Location and construction activities**

The Haberfield civil and tunnel site (C2a) would be located above and below ground around the south-eastern corner of the Parramatta Road and Wattle Street intersection, extending along Parramatta Road between Wattle Street and Walker Avenue. This construction ancillary facility would use land above ground that is currently being used as a construction ancillary facility for the M4 East project.

The below ground section of the Haberfield civil and tunnel site would be within the M4 East tunnel stubs being built by the M4 East project and would support tunnelling of the mainline tunnels. The above ground section of the site would be used to support civil construction of a substation, and fitout of permanent operational infrastructure including the Parramatta Road ventilation facility (being constructed as part of the M4 East project).

Roadheaders would be launched from this site below ground to excavate the mainline tunnels. Spoil handling on the site would occur 24 hours a day, seven days a week. Excavated spoil from tunnelling would only be stockpiled within the tunnels. The construction activities at this location are expected to occur between 2019 and 2022.

**Entry and exit**

Trucks would enter the eastbound stub tunnel from the M4 East mainline tunnels, be loaded with spoil, and exit to the westbound M4 East mainline tunnels. No tunnel spoil would be removed to the surface via the Haberfield civil and tunnel site – all spoil would be transported below ground via the M4 East mainline tunnels.

Heavy vehicles delivering materials and equipment would enter and exit the surface section of the Haberfield civil and tunnel site via the westbound Wattle Street carriageways. Light vehicles would enter and exit the site via the westbound Wattle Street carriageways, the southbound Parramatta Road carriageways, and via Walker Avenue.

**Local road impacts**

About 90 daily light vehicle trips are expected to access the site distributed between three access points. The impact on Walker Avenue is expected to be minor given light vehicle trips would be dispersed between the access points, and the alternative access points from this site are from the arterial road network. Workforce car parking for this site would also be located at the Northcote Street civil site (C3a).

### *Haberfield Option A – Northcote Street civil site (C3a)*

**Location and construction activities**

The Northcote Street civil site (C3a) at Haberfield would be located between Wattle Street and Wolseley Street at Haberfield. This construction ancillary facility would use land that is currently being used as a construction ancillary facility for the M4 East project. The site would be used for construction workforce parking and to support construction activities at the nearby civil and tunnel sites, including laydown and storage of materials.

The use of the laydown area and light vehicle parking would occur 24 hours a day, seven days a week. Reasonable and practicable management strategies would be investigated to minimise the volume of heavy vehicles using the laydown area at night. The construction activities at this location are expected to occur between 2019 and 2022.

**Entry and exit**

Heavy vehicles would enter and exit the site to and from Parramatta Road. Light vehicles would enter the site via Wolseley Street and an egress only point for light vehicles would be provided on to Wattle Street. During construction, Northcote Street would be closed at the intersection with Parramatta Road and the site would occupy around 100 metres of Northcote Street east of Parramatta Road. Northcote Street would be reopened to Parramatta Road when construction is complete.

**Local road impacts**

Wolseley Street is a local road and around 150 daily light vehicle trips are expected to access the site. While these trips would only access the site from Wolseley Street with egress onto Wattle Street, there is likely to be a minor impact on Wolseley Street during construction as these trips would be dispersed to correspond with shift start and end times. No heavy vehicle impacts are expected on local roads with heavy vehicle access and egress taken directly to and from Parramatta Road.

### *Haberfield and Ashfield Option B – Parramatta Road West civil and tunnel site (C1b)*

**Location and construction activities**

The Parramatta Road West civil and tunnel site (C1b) would be located west of Parramatta Road from around Alt Street to Bland Street at Ashfield. The site would be used for tunnelling support during construction and would include temporary site offices, a workshop and storage facilities, a laydown area, entry and exit points for construction traffic, a temporary substation, temporary ventilation for the tunnels, a temporary water treatment plant and sediment pond, workforce amenities and car parking. A construction site for the M4 East project is located south of Bland Street on the western side of Parramatta Road. The construction activities at this location are expected to occur between 2018 and 2022.

**Entry and exit**

Construction traffic would enter and exit the site to and from the western (northbound) carriageway of Parramatta Road via new driveways. There would also be a vehicle cross-over point on Alt Street to allow construction vehicles to move between the parts of this site that are on the northern and southern sides of Alt Street.

**Local road impacts**

Heavy vehicle impacts on local roads would be minimised with heavy vehicle access and egress taken directly to and from Parramatta Road. The cross-over on Alt Street is likely to cause minor impacts on motorists and pedestrians using Alt Street when construction vehicles are moving

between the sites. These minor impacts would be minimised through construction traffic management measures (see **section 8.5**). Due to existing property driveways being able to be augmented for use during construction, there would be no loss of on-street parking on Alt Street or Bland Street, west of Parramatta Road.

### *Haberfield and Ashfield Option B – Haberfield civil site (C2b)*

**Location and construction activities**

The Haberfield civil site would be located around the south-eastern corner of the Parramatta Road and Wattle Street intersection, extending along Parramatta Road between Wattle Street and Walker Avenue. This construction ancillary facility would use land that is currently being used as a construction ancillary facility for the M4 East project. The Haberfield civil site (C2b) would be used to support civil construction of a substation, and fitout of permanent operational infrastructure including the Parramatta Road ventilation facility (being constructed as part of the M4 East project). The site would include temporary site offices, workshop and storage facilities, laydown areas, ingress and egress for heavy and light vehicles, workforce amenities and car parking. The construction activities at this location are expected to occur between 2018 and 2022.

**Entry and exit**

Heavy vehicles delivering materials and equipment would enter and exit the site via the westbound Wattle Street carriageways. Light vehicles would enter and exit the site via Wattle Street and Walker Avenue.

**Local road impacts**

While Walker Avenue is a local road, around 90 daily light vehicle trips are expected to be accessing the site, and these trips are distributed between three access points. Therefore, the impact on Walker Avenue would be minor. The majority of workforce car parking for this area would be located at the Parramatta Road East civil site (C3b).

### *Haberfield and Ashfield Option B – Parramatta Road East civil site (C3b)*

**Location and construction activities**

The Parramatta Road East civil site (C3b) would be located east of Parramatta Road at Haberfield between Alt Street and Bland Street. The Parramatta Road East civil site (C3b) would be used to support tunnelling construction activities that would occur at the Parramatta Road West civil site (C1b), and to provide construction workforce parking. The site would include temporary site offices, ingress and egress for light vehicles, workforce amenities and car parking. The construction activities at this location are expected to occur between 2018 and 2022.

**Entry and exit**

Heavy vehicles delivering materials and equipment would enter and exit via the southbound Parramatta Road carriageways. In addition to using the Parramatta Road access, light vehicles would also be able to enter and exit the site using the Alt Street and Bland Street access points.

**Local road impacts**

With about 150 daily light vehicle trips expected, split between the three access points, the potential impact on Alt Street and Bland Street would be minor. Due to existing property driveways, there would be no loss of on-street parking on Alt Street or Bland Street, east of Parramatta Road.

### *Darley Road civil and tunnel site (C4)*

**Location and construction activities**

The Darley Road civil and tunnel site would be located between the Inner West Light Rail line corridor to the north and Darley Road to the south. The site is currently occupied by a commercial premise. Immediately adjacent in the northeast corner of the site is the Leichhardt North light rail stop.

Spoil handling on the site would occur 24 hours a day, seven days a week, within an acoustic shed. Spoil removal would occur between 7.00 am and 6.00 pm Monday to Friday, and between 8.00 am

and 1.00 pm on Saturdays. Where practical, spoil would be removed during the day, outside of peak periods. Construction activities at this location are expected to occur between 2018 and 2022.

**Entry and exit**

It is anticipated that the majority of construction traffic would enter the site from the southern (westbound) carriageway of Darley Road via new driveways. Heavy vehicles associated with spoil haulage would travel eastbound on City West Link and turn right into Darley Road. A temporary right turn lane at the intersection of City West Link and Darley Road would be provided for use by construction vehicles. Heavy vehicles would exit the site by turning left onto Darley Road before turning left onto City West Link.

The southern approach of the City West Link/James Street intersection has a blind corner and a steep approach, which could cause difficulties for trucks departing the Darley Road civil and tunnel site and turning left onto City West Link westbound. Traffic signal phasing and timing to allow loaded trucks to safely traverse the intersection has been considered in the construction impact assessment. This includes consideration of changes to traffic signal and phasing on the operation of the intersection of City West Link and James Street/Darley Road at Leichhardt. Signal phasing and timing changes were included in the construction assessment.

**Impacts on the surrounding road network**

Temporary changes to Darley Road to enable access to and from the ancillary facility would likely be required, including changes to lane marking to provide a temporary turning lane for construction traffic and temporary diversions to the pedestrian path on the northern side of Darley Road. These would be confirmed following the appointment of a design and construction contractor.

Heavy vehicle movements associated with the removal of spoil from tunnelling would occur via access and egress directly to and from Darley Road and City West Link. Reasonable and practicable management strategies would be investigated to minimise the volume of heavy vehicle movements during peak periods.

On-street parking along the eastbound carriageway of Darley Road between around Francis Street and Charles Street would be removed (about 20 spaces) during construction. Impacts on the kiss and ride parking for the light rail stop will be considered in the Construction Traffic Access and Management Plan.

### *Rozelle civil and tunnel site (C5)*

**Location and construction activities**

The Rozelle civil and tunnel site (C5) would be located within the Rozelle Rail Yards between Lilyfield Road to the north, City West Link to the south, Victoria Road to the east and the CBD and South East Light Rail Rozelle maintenance depot to the west.

Roadheaders would be launched from this site to excavate the Rozelle interchange, the Iron Cove Link and the stub tunnels that would enable connections to the proposed future Western Harbour Tunnel and Beaches Link project. Acoustic sheds would be built to minimise noise from out-of-hours tunnelling and spoil handling.

Tunnelling and spoil management would also be carried out within the cut-and-cover sections of the tunnels at the eastern end of the site. Tunnel spoil would be transported to a stockpile within the cut-and-cover structures, with sufficient space for about two heavy vehicles to be loaded with spoil.

Spoil handling on the site would occur 24 hours a day, seven days a week. The construction activities at this location are expected to occur between 2018 and 2023.

**Entry and exit**

Heavy vehicle access would be via City West Link. Vehicles would enter the site from the eastbound carriageway of City West Link via slip lanes and new driveways. A new temporary signalised intersection would be built along City West Link and a new northern leg added to the intersection with The Crescent to enable vehicles to exit the site and turn right at both these locations, to head

westbound on City West Link. Around five light vehicle access points would be constructed along Lilyfield Road to enable light vehicle access and egress.

**Local road impacts**

The main local road impacts would be on Lilyfield Road. While 350 daily light vehicle trips are expected to access the site, the impact would be spread out through the use of five access and egress points along Lilyfield Road, depending on where the vehicles are required and where they are coming from. As a worst case, this would equate to an increase in two-way weekday daily vehicles of around 10 to 15 per cent depending on the location on Lilyfield Road.

### *The Crescent civil site (C6)*

**Location and construction activities**

The Crescent civil site (C6) would be located between The Crescent and Rozelle Bay on land owned by Roads and Maritime. The site would be used to support the realignment of The Crescent, including the construction of a new bridge over Whites Creek, widening and improvement works to Whites Creek, and construction of the drainage outfall and culvert that would direct flows through and from the Rozelle Rail Yards to Rozelle Bay. The construction activities at this location are expected to occur between 2019 and 2021.

**Entry and exit**

It is anticipated that heavy vehicles would enter the site via a left-in from The Crescent (southbound). They would then travel through the site, turn around and exit back onto The Crescent northbound via a right hand turn. Temporary traffic management measures would be established to enable access and egress arrangements.

Heavy vehicle movements would be carried out during non-peak periods where feasible and reasonable. Light vehicles would enter via the same arrangement, but may also exit southbound along The Crescent towards Johnston Street.

**Local road impacts**

No impacts from construction vehicles are expected on local roads with heavy and light vehicle access and egress directly to and from The Crescent.

### *Victoria Road civil site (C7)*

**Location and construction activities**

The Victoria Road civil site (C7) would be located on the western side of Victoria Road between Quirk Street and Lilyfield Road on land currently occupied by commercial and residential properties. The existing buildings and other structures on the site would be demolished to facilitate establishment of temporary site offices, a laydown area, workforce amenities and car parking. A portion of this site would be occupied by operational road infrastructure during operation. The construction activities at this location are expected to occur between 2019 and 2022.

**Entry and exit**

Heavy vehicles would enter and exit the site via left-in/left-out access points off the westbound Victoria Road carriageway.

**Local road impacts**

Minor impacts from construction vehicles are expected to the eastern end of Hornsey Street. On street parking along the eastbound carriageway would be removed (about four spaces) during construction, although this would be lessened by the removal of the traffic to and from the commercial properties that would be replaced by the Victoria Road civil site.

### *Iron Cove Link civil site (C8)*

**Location and construction activities**

The Iron Cove Link civil site (C8) would be located along the southern side of Victoria Road at Rozelle between Byrnes Street and Springside Street. The site would be located on land currently occupied by Victoria Road and residential and commercial properties that are being acquired.

The site would be mainly used to support construction of the Iron Cove Link surface works, including tunnel entry and exit ramps and upgrades and modifications to the eastbound and westbound carriageways of Victoria Road. There is no provision at this site to operate roadheaders, however the site may be used to support limited excavation of the initial sections of the Iron Cove Link tunnels.

During operation, a portion of the site would be occupied by the Iron Cove Link motorway operations complex (MOC4) including the Iron Cove Link ventilation facility. The construction activities at this location are expected to occur between 2018 and 2023.

**Entry and exit**

Heavy and light vehicles would enter and exit the site via left-in/left-out accesses off the northbound Victoria Road carriageway.

**Local road impacts**

Temporary changes to the local road network would be required to enable construction of the permanent design and the operation of the Iron Cove Link civil and tunnel site during construction. The Clubb Street/Victoria Road intersection would also be permanently closed before the start of construction.

The Toelle Street and Callan Street intersections with Victoria Road would generally remain open during construction. There would be instances where one of these intersections would be closed temporarily to construct the permanent design, however these works would be short term and conducted during non-peak times, where practical, especially as these roads would be carrying additional traffic form the closure of Clubb Street. Regard would also be given to the peak periods of use of King George Park when considering temporary closures. When construction is complete, these intersections would be reopened in the same arrangement as existing (ie left-in, left-out).

There would be loss of limited on-street parking spaces on Clubb Street, Toelle Street and Callan Street, west of Victoria Road. This would be confirmed following the appointment of a design and construction contractor. These parking spaces are adjacent to properties being acquired and so the impact of their loss would be reduced.

Further detail on the temporary and permanent changes to the surface road network around the Iron Cove Link civil site are provided in **Chapter 5** (Project description) and **Chapter 6** (Construction work).

### *Pyrmont Bridge Road tunnel site (C9)*

**Location and construction activities**

The Pyrmont Bridge Road tunnel site (C9) would be located between Parramatta Road and Pyrmont Bridge Road at Annandale on land currently occupied by commercial and light industrial premises. The construction ancillary facility would be mainly used to support tunnelling construction activities.

Roadheaders would be launched from this site and would excavate the temporary access tunnel and the mainline tunnels. Spoil handling on the site would occur 24 hours a day, seven days a week. Where practical, spoil would be removed during the day, outside of peak periods. Reasonable and practicable management strategies would be investigated to minimise the volume of heavy vehicle movements at night. The construction activities at this location are expected to occur between 2018 and 2022.

**Entry and exit**

Heavy vehicle access to the site would be from the northern (eastbound) carriageway of Parramatta Road. Vehicles would enter via a new driveway, travel in an anti-clockwise direction via an internal access road and exit onto Pyrmont Bridge Road via a new temporary signalised intersection. Light vehicle access would be from Pyrmont Bridge Road, either via the temporary signalised intersection or a separate give-way access.

**Local road impacts**

No impacts from construction vehicles are expected on local roads with heavy and light vehicle access and egress directly to and from Parramatta Road and Pyrmont Bridge Road.

Works would be carried out to realign Bignell Lane between Mallett Street and Pyrmont Bridge Road. Short-term, temporary closure of Bignell Lane would be required during construction to allow for the realignment works, but rear-access to commercial properties along Bignell Lane would be maintained during construction.

### *Campbell Road civil and tunnel site (C10)*

**Location and construction activities**

The Campbell Road civil and tunnel site (C10) would be located within the St Peters interchange site on the southern side of Albert Street and Campbell Road at St Peters. The site would be used to support tunnelling of the mainline tunnels and the entry and exit ramps that would connect the St Peters interchange with the M4-M5 Link mainline tunnels. A portion of the site would be used for the Campbell Road motorway operations complex (MOC5) during operation, including the Campbell Road ventilation facility.

Roadheaders would be launched from this site and would excavate the entry and exit ramps and mainline tunnels, travelling in a northerly direction. Spoil handling would occur within the cut-and-cover structure below Campbell Road being built as part of the New M5 project and within an acoustic shed. Spoil handling on the site would occur 24 hours a day, seven days a week. Where practical, spoil would be removed during the day, outside of peak periods. Reasonable and practicable management strategies would be investigated to minimise the volume of heavy vehicle movements at night. Heavy vehicle movements outside of standard construction hours associated with the removal of spoil from tunnelling would only occur via access and egress directly to and from Campbell Road. The construction activities at this location are expected to occur between 2018 and 2022.

**Entry and exit**

Vehicles would enter and exit the site from Albert Street via the signalised intersection on Campbell Road that is being built as part of the New M5 project. Within the site, an access driveway would provide access between Albert Street and the acoustic shed and cut-and-cover structure.

**Local road impacts**

Negligible impacts on local roads are expected. Heavy and light vehicles would need to cross over Albert Street to access Campbell Road, however traffic volumes along this section of Albert Street are expected to be low, and standard construction traffic management and measures would be used to minimise potential disruptions.

**Background traffic volumes and patterns**

Based on the construction program, 2021 has been used as the assessment year for construction impacts, as this is when peak construction traffic volumes are expected. The M4 East and New M5 projects are expected to be operational by 2019 and 2020 respectively; hence their construction would not overlap in the 2021 assessment year. In overlapping years prior to this, it is expected that the main construction works for the M4 East and the New M5 projects would be completed and the main construction works for the M4-M5 Link project would not have commenced. Potential cumulative construction traffic impacts are assessed in **Chapter 26** (Cumulative impacts).

The background traffic used in the construction impact assessment is shown in **Table 8-45**. Between the 2015 base case and 2021 there are significant changes to forecast traffic volumes on some key arterial roads close to the construction ancillary facilities.

Close to the intersection of Parramatta Road and Wattle Street, traffic decreases by about 40 per cent in both the AM and PM peak periods as traffic shifts from Parramatta Road onto the M4 East. There are substantial increases in background traffic on Parramatta Road, east of the Wattle Street interchange. This increase reflects both the increase in background traffic growth from 2015 to 2021, and the increase in vehicles using the M4 East at Haberfield.

There are also substantial increases in forecast traffic near the St Peters interchange. These forecast changes are reflective of the increase in traffic accessing or exiting the operational New M5 as well as the forecast population and land use changes in the area.

**Table 8-45 Construction year (2021) background traffic growth**

| Roadway location and direction | | AM peak hour (veh/hr)[1] | | | PM peak hour (veh/hr)[1] | | |
|---|---|---|---|---|---|---|---|
| | | 2015 Base | 2021 | % Change | 2015 Base | 2021 | % Change |
| Parramatta Road north of Wattle Street – Haberfield | Eastbound | 2,670 | 1,840 | -31% | 3,170 | 2,080 | -34% |
| | Westbound | 2,410 | 1,310 | -46% | 2,440 | 1,310 | -46% |
| Wattle Street east of Parramatta Road – Haberfield | Eastbound | 1,260 | 740 | -41% | 1,610 | 1,110 | -31% |
| | Westbound | 1,280 | 860 | -33% | 1,380 | 730 | -47% |
| City West Link west of Darley Road – Rozelle | Eastbound | 2,090 | 2,120 | 1% | 2,170 | 2,230 | 3% |
| | Westbound | 1,810 | 1,940 | 7% | 2,040 | 2,110 | 3% |
| Darley Road west of James Street – Haberfield | Eastbound | 670 | 680 | 1% | 530 | 540 | 1% |
| | Westbound | 350 | 480 | 37% | 650 | 660 | 0% |
| City West Link west of The Crescent – Rozelle | Eastbound | 2,470 | 2,520 | 2% | 2,340 | 2,440 | 4% |
| | Westbound | 1,640 | 1,800 | 10% | 1,930 | 1,850 | -4% |
| City West Link east of The Crescent – Rozelle | Eastbound | 3,520 | 3,520 | 0% | 3,080 | 3,210 | 4% |
| | Westbound | 2,260 | 2,560 | 13% | 2,940 | 3,000 | 2% |
| Victoria Road east of Darling Street – Rozelle | Eastbound | 3,260 | 3,570 | 10% | 2,420 | 2,470 | 2% |
| | Westbound | 1,580 | 1,740 | 10% | 2,770 | 3,010 | 9% |
| Parramatta Road west of Pyrmont Bridge Road – Camperdown | Eastbound | 2,720 | 2,860 | 5% | 1,740 | 2,060 | 18% |
| | Westbound | 1,490 | 1,800 | 21% | 2,470 | 2,670 | 8% |
| Pyrmont Bridge Road, east of Parramatta Road – Camperdown | Eastbound | 490 | 540 | 10% | 280 | 310 | 9% |
| | Westbound | 290 | 360 | 24% | 660 | 730 | 11% |
| Princes Highway south of Campbell Street – St Peters | Northbound | 1,800 | 2,270 | 26% | 1,050 | 1,100 | 5% |
| | Southbound | 570 | 890 | 56% | 1,750 | 1,890 | 8% |

Notes:

[1] Traffic volume rounded to nearest 10

Source: Based on WRTM v2.3 outputs

## Construction impact assessment - Option A

*Road level of service*

An analysis of roadway service levels was carried out to determine the impact of construction traffic in 2021, and includes consideration of the spoil reuse sites. Theoretical mid-block roadway capacities were based on Austroads *Guide to Traffic Management* and these capacities and assessment results are shown in **Table 8-46** for the AM peak and PM peak hours. In reality, some roads may carry more traffic than the theoretical capacity. If a link is over capacity, this would result in queueing further back in the network, reducing the capacity of the links. However, this assessment provides a high level indication of the level of impact of the construction vehicles compared to the background traffic.

Mid-block traffic level of service demonstrates the impact of construction traffic in 2021 for all construction activities (see **section 8.1.8** for further details on measures of network performance).

Several locations on arterial roads connecting to the construction ancillary facilities are forecast to exceed the theoretical roadway capacity with the increased background traffic and construction traffic in the 2021 AM and PM peak hours. However, the majority of these would exceed their theoretical capacity due to forecast growth in background traffic.

Construction traffic is forecast to change the mid-block level of service at four locations:

- At two locations – Wattle Street, east of Parramatta Road, and Darley Road, west of James Street – the mid-block level of service drops but remains at an acceptable LoS C or LoS D
- On City West Link, west of Darley Road, the eastbound mid-block level of service is forecast to decrease from LoS E to LoS F in the PM peak hour
- On City West Link, west of The Crescent, the westbound mid-block level of service is forecast to decrease from LoS D to LoS E in the PM peak hour.

A CTAMP will be prepared as part of the Construction Environmental Management Plan (CEMP). The CTAMP will include the guidelines, general requirements and principles of traffic management to be implemented during construction and will seek to minimise delays and disruptions and identify and respond to any changes in road safety as a result of highway construction works. Further details on the management of construction impacts are provided in **section 8.5**.

**Table 8-46 Option A – Construction year (2021) mid-block operational performance summary**

| Location and direction | | Mid-block capacity | 2021 AM peak hour (veh/hr)[1] | | | | | | 2021 PM peak hour (veh/hr)[1] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Without construction | | | With construction | | | Without construction | | | With construction | | |
| | | | Flow | V/C | LoS | Flow | V/C | LoS | Flow | V/C | LoS | Flow | V/C | LoS |
| Parramatta Road north of Wattle Street – Haberfield | EB | 3,300 | 1,840 | 0.56 | C | 1,890 | 0.57 | C | 2,080 | 0.63 | D | 2,240 | 0.68 | D |
| | WB | 3,300 | 1,310 | 0.40 | C | 1,330 | 0.40 | C | 1,310 | 0.40 | C | 1,370 | 0.41 | C |
| Wattle Street east of Parramatta Road – Haberfield | EB | 2,000 | 740 | 0.37 | B | 760 | 0.38 | B | 1,110 | 0.55 | C | 1,260 | 0.63 | D |
| | WB | 2,000 | 860 | 0.43 | C | 880 | 0.44 | C | 730 | 0.37 | B | 790 | 0.39 | C |
| City West Link west of Darley Road – Rozelle | EB | 2,300 | 2,120 | 0.92 | E | 2,180 | 0.95 | E | 2,230 | 0.97 | E | 2,320 | 1.01 | F |
| | WB | 2,300 | 1,940 | 0.84 | E | 1,990 | 0.86 | E | 2,110 | 0.92 | E | 2,240 | 0.97 | E |
| Darley Road west of James Street – Haberfield | EB | 1,000 | 680 | 0.68 | D | 680 | 0.68 | D | 540 | 0.54 | C | 610 | 0.61 | D |
| | WB | 1,000 | 480 | 0.48 | C | 490 | 0.49 | C | 660 | 0.66 | D | 660 | 0.66 | D |
| City West Link west of The Crescent – Rozelle | EB | 2,300 | 2,520 | 1.10 | F | 2,560 | 1.11 | F | 2,440 | 1.06 | F | 2,460 | 1.07 | F |
| | WB | 2,300 | 1,800 | 0.78 | D | 1,810 | 0.79 | D | 1,850 | 0.80 | D | 2,030 | 0.88 | E |
| City West Link east of The Crescent – Rozelle | EB | 3,400 | 3,520 | 1.04 | F | 3,530 | 1.04 | F | 3,210 | 0.94 | E | 3,210 | 0.95 | E |
| | WB | 3,400 | 2,560 | 0.75 | D | 2,580 | 0.76 | D | 3,000 | 0.88 | E | 3,010 | 0.89 | E |
| Victoria Road east of Darling Street – Rozelle | EB | 3,250 | 3,570 | 1.10 | F | 3,570 | 1.10 | F | 2,470 | 0.76 | D | 2,510 | 0.77 | D |
| | WB | 3,200 | 1,740 | 0.54 | C | 1,740 | 0.54 | C | 3,010 | 0.94 | E | 3,040 | 0.95 | E |
| Parramatta Road west of Pyrmont Bridge Road – Camperdown | EB | 2,300 | 2,860 | >1.2 | F | 2,870 | >1.2 | F | 2,060 | 0.90 | E | 2,070 | 0.90 | E |
| | WB | 2,300 | 1,800 | 0.78 | E | 1,810 | 0.78 | E | 2,670 | 1.16 | F | 2,710 | 1.18 | F |
| Pyrmont Bridge Road, east of Parramatta Road – Camperdown | EB | 1,800 | 540 | 0.30 | B | 550 | 0.31 | B | 310 | 0.17 | A | 310 | 0.17 | A |
| | WB | 1,800 | 360 | 0.20 | A | 370 | 0.21 | A | 730 | 0.41 | C | 780 | 0.43 | C |
| Princes Highway south of Campbell Street – St Peters | EB | 2,200 | 2,270 | 1.03 | F | 2,290 | 1.04 | F | 1,100 | 0.50 | C | 1,100 | 0.50 | C |
| | WB | 3,300 | 890 | 0.27 | B | 890 | 0.27 | B | 1,890 | 0.57 | D | 1,930 | 0.59 | D |

Notes: [1]Rounded to nearest 10, [2] V/C is an abbreviation for volume to capacity ratio, [3] EB is an abbreviation for eastbound, [4] WB is an abbreviation for westbound

*Intersection level of service*

The intersection performance results for the road network under the 2021 'without construction' and 'with construction' forecast traffic volumes for the AM and PM peak are summarised in **Table 8-47** and **Table 8-48**. These intersection levels of service are not directly comparable to those presented in the operational modelling results, as those had exit blocking constraints, applied in the microsimulation models to reflect network congestion beyond the modelled network extents, removed.

The intersections assessed were grouped into six corridors (or clusters). A summary of the construction traffic impacts within each of these clusters is provided in the following sections. Detailed discussion on the potential impacts within each cluster is provided in **Appendix H** (Technical working paper: Traffic and transport).

**Cluster 1: Parramatta Road and Wattle Street corridors at Haberfield**

Cluster 1 consists of the following intersections:

- Parramatta Road/Harris Road
- Parramatta Road/Croydon Road/Arlington Street
- Parramatta Road/Great North Road
- Parramatta Road/Frederick Street/Wattle Street
- Parramatta Road/Bland Street
- Wattle Street/Ramsay Street
- Dobroyd Parade/Waratah Street
- Dobroyd Parade/Timbrell Drive/Mortley Avenue.

The construction modelling forecasts a number of intersections to operate with high levels of delay (LoS E or F) in the 'without construction' scenario. In the 'with construction' scenario, the performance at most intersections along Parramatta Road is impacted, with larger impacts forecast to occur at the intersections along Wattle Street and Dobroyd Parade. Management and mitigation measures for construction traffic impacts are outlined in **section 8.5**.

**Cluster 2: City West Link at Leichhardt**

Cluster 2 consists of the following intersections:

- City West Link/James Street
- City West Link/Norton Street
- Darley Road/ Darley Road civil and tunnel site (C4) access.

The modelling indicates that City West Link/James Street intersection is forecast to operate at LoS F in the 'without construction' scenario and City West Link Road/Norton Street intersection is forecast to operate at LoS C during both peaks.

In the 'with construction' scenario, the rightmost through lane from City West Link eastbound would be temporarily converted into a turning lane to allow construction vehicles to turn right into James Street. A new traffic signal phase is required to operate this movement safely, which would impact the performance of this intersection. This phase would only be required to run once every two cycles. The level of service is forecast to remain at LoS F and average delays at the intersection are expected to increase during the AM and PM peak hours in the 'with construction' scenario.

The left turn movement from James Street into City West Link westbound is allocated a green time of at least 30 seconds in each cycle in both peaks, to accommodate what may be a difficult turn for construction heavy vehicles to make, given the obscured corner and steep approach on James Street (as noted in **section 8.2.4**).

**Cluster 3: City West Link and The Crescent at Lilyfield**

Cluster 3 consists of the following intersections:

- City West Link/The Crescent
- The Crescent/James Craig Road
- City West Link/Rozelle civil and tunnel site (C5) western access.

The construction modelling indicates that in the 'without construction' scenario, City West Link/The Crescent and The Crescent/James Craig Road intersections are forecast to operate satisfactorily at LoS D or better in both peaks. With about 135 PCU and 325 PCU added to the network in the AM and PM peaks respectively in the 'with construction' scenario, the operational performance at the intersections is forecast to worsen.

In the 'with construction' scenario, the new eastern access road to the Rozelle civil and tunnel site (C5) is accommodated as the northern approach to City West Link/The Crescent intersection. Construction vehicles are only permitted to turn right out of this access road onto City West Link westbound. However, safe operation requires a new traffic signal phase. It is expected that this phase would only be required to run once every three cycles. In the AM peak, City West Link/The Crescent intersection level of service is forecast to drop from LoS D to LoS E with an increase in average delay of about 15 seconds. In the PM peak, the level of service is forecast to remain at LoS C.

A new temporary signalised intersection is also proposed on City West Link about 400 metres west of The Crescent, accommodating a second (western) site access to the Rozelle civil and tunnel site (C5). Construction vehicles are similarly only permitted to turn right out of this access road, with a traffic signal phase required to safely accommodate this movement. This intersection is forecast to operate at LoS A in both AM and PM peak hours.

There is no adverse impact expected on The Crescent/James Craig Road intersection, with LoS B forecast in both 'without construction' and 'with construction' scenarios in both peaks.

**Cluster 4: Victoria Road at Rozelle**

Cluster 4 consists of the following intersections:

- Victoria Road/Wellington Street
- Victoria Road/Darling Street
- Victoria Road/Evans Street.

The modelling indicates the Victoria Road/Wellington Street intersection in the AM peak and the Victoria Road/Darling Street intersection in the PM peak are forecast to operate at LoS F in the 'without construction' scenario.

About 60 PCU and 200 PCU are added to the networks in the AM and PM peak hours respectively in the 'with construction' scenario. The performance of the intersections would be impacted in Cluster 4, however levels of service are expected to remain at the same level as in the 'without construction' scenario, except for the Victoria Road/Wellington Street intersection, which is forecast to worsen slightly from LoS B to LoS C in the PM peak hour. The impact on the Victoria Road/Evans Street intersection is expected to be minimal in the AM peak hour; however, the level of service is forecast to worsen from LoS C to LoS E in the PM peak hour.

**Cluster 5: Parramatta Road at Camperdown**

Cluster 5 consists of the following intersections:

- Parramatta Road/Pyrmont Bridge Road
- Pyrmont Bridge Road/ Pyrmont Bridge Road tunnel site (C9) access
- Pyrmont Bridge Road/Booth Street/Mallett Street.

About 60 PCU and 100 PCU are added to the network in the AM and PM peaks respectively in the 'with construction' scenario. This is shown to have minimal impact on the operation of the intersections, with levels of service at both the Parramatta Road/Pyrmont Bridge Road and Pyrmont Bridge Road/Booth Street/Mallett Street intersections forecast to operate at the same level of service as the 'without construction' scenario.

The Pyrmont Bridge Road/C8 site access intersection is forecast to operate at LoS A in both peaks.

**Cluster 6: Princes Highway at St Peters**

Cluster 6 consists of the following intersections:

- Princes Highway/Campbell Street
- Princes Highway/Mary Street/Canal Road
- Princes Highway/Railway Road
- Campbell Street/Albert Street.

The analysis is based on the upgrade of the Princes Highway/Campbell Street intersection, as part of the New M5 project. The upgrade involves widening the Campbell Street south-east leg to three lanes in each direction and the Campbell Street north-west leg to two lanes in each direction, as well as localised widening to accommodate turn pockets. The upgrade will be operational by 2021.

The modelling shows significant congestion on the Princes Highway corridor with all three Princes Highway intersections forecast to operate at LoS F in the 'without construction' scenario during the AM and PM peak hours.

In the 'with construction' scenario, 50 PCU and 75 PCU are added to the network in the AM and PM peaks respectively. The average level of delay at the intersections is forecast to increase, but the level of service is forecast to remain the same as in the 'without construction' scenario, except at the Princes Highway/Mary Street/Canal Road intersection in the PM peak, which would operate at LoS F in the AM peak 'with construction' scenario.

At some intersections, stable or minor improvements in performance (with the addition of construction volumes) can occur as a result of upstream intersections operating over capacity and/or cluster optimisation effects which distribute delay. When capacity is reached, upstream intersections can behave as bottlenecks, reducing traffic flow at downstream intersections, though delays are increased at the upstream intersections.

**Summary**

The construction impact assessment found that the most substantial impacts are forecast to be at the western end of the project footprint, as spoil trucks travel to the potential spoil management sites to the west of the project from the construction ancillary facilities and back. Light construction vehicle traffic would also contribute to these impacts, although these would use more dispersed routes.

Mitigation measures to manage these impacts would be developed as part of the CTAMP, and could include:

- Restriction of heavy vehicle right turns at City West Link/James Street and City West Link/The Crescent intersections during peak hours
- Staggering or rescheduling shift times to avoid a large generation of light vehicles during peak hours.

The assessment of potential construction traffic and transport impacts is a worst-case assessment based on peak construction traffic levels. Adverse impacts would be expected to reduce once peak construction is complete. A CTAMP will be prepared as part of the CEMP. The CTAMP will include the guidelines, general requirements and principles of traffic management to be implemented during construction and will seek to minimise delays and disruptions and identify and respond to any changes in road safety as a result of highway construction works. Further details on the management of construction impacts are provided in **section 8.5**.

**Table 8-47 Option A – 2021 AM peak hour intersection operational performance summary**

| Cluster | Intersection | Without construction | | With construction | |
|---|---|---|---|---|---|
| | | Volume (PCU)[1] | LoS | Volume (PCU)[1] | LoS |
| 1 | Parramatta Road \| Harris Road | 2,550 | B | 2,650 | C |
| | Parramatta Road \| Croydon Road \| Arlington Street | 3,280 | B | 3,370 | B |
| | Parramatta Road \| Great North Road | 3,810 | C | 3,940 | C |
| | Parramatta Road \| Frederick Street \| Wattle Street | 4,880 | D | 4,940 | D |
| | Parramatta Road \| Bland Street | 2,870 | F | 2,870 | F |
| | Wattle Street \| Ramsay Street | 3,260 | C | 3,280 | C |
| | Dobroyd Parade \| Waratah Street | 3,470 | B | 3,650 | B |
| | Dobroyd Parade \| Timbrell Drive \| Mortley Avenue | 5,530 | F | 5,720 | F |
| 2 | City West Link \| James Street | 5,530 | F | 5,720 | F |
| | City West Link \| Norton Street | 5,290 | C | 5,450 | C |
| | Darley Road \| C4 site access | – | – | 1,200 | A |
| 3 | The Crescent \| James Craig Road | 6,730 | B | 6,760 | B |
| | City West Link \| The Crescent | 6,800 | D | 6,880 | E |
| | City West Link \| C5 site access | – | – | 4,780 | A |
| 4 | Victoria Road \| Wellington Street | 6,510 | F | 6,600 | F |
| | Victoria Road \| Darling Street | 6,980 | E | 7,030 | E |
| | Victoria Road \| Evans Street | 5,850 | B | 5,870 | B |
| 5 | Parramatta Road \| Pyrmont Bridge Road | 5,050 | C | 5,090 | C |
| | Pyrmont Bridge Road \| Booth Street \| Mallett Street | 1,970 | B | 1,990 | B |
| | Pyrmont Bridge Road \| C9 site access | – | – | 950 | A |
| 6 | Princes Highway \| Railway Road | 5,370 | F | 5,400 | F |
| | Princes Highway \| Mary Street \| Canal Road | 4,910 | F | 4,940 | F |
| | Princes Highway \| Campbell Street | 5,260 | F | 5,290 | F |
| | Campbell Street \| Albert Street | 5,090 | A | 5,130 | A |

Notes: [1]Traffic volume rounded to nearest 10

**Table 8-48 Option A – 2021 PM peak hour intersection operational performance summary**

| Cluster | Intersection | Without construction | | With construction | |
|---|---|---|---|---|---|
| | | Volume (PCU)[1] | LoS | Volume (PCU)[1] | LoS |
| 1 | Parramatta Road \| Harris Road | 3,040 | B | 3,240 | C |
| | Parramatta Road \| Croydon Road \| Arlington Street | 3,610 | D | 3,710 | E |
| | Parramatta Road \| Great North Road | 3,820 | F | 3,920 | F |
| | Parramatta Road \| Frederick Street \| Wattle Street | 4,950 | E | 5,200 | E |
| | Parramatta Road \| Bland Street | 2,500 | B | 2,520 | B |
| | Wattle Street \| Ramsay Street | 3,080 | D | 3,330 | E |
| | Dobroyd Parade \| Waratah Street | 2,960 | B | 3,240 | B |
| | Dobroyd Parade \| Timbrell Drive \| Mortley Avenue | 5,450 | F | 5,770 | F |
| 2 | City West Link \| James Street | 5,640 | F | 5,990 | F |
| | City West Link \| Norton Street | 5,700 | C | 5,970 | C |
| | Darley Road \| C4 site access | – | – | 1,210 | A |
| 3 | The Crescent \| James Craig Road | 6,500 | B | 6,720 | B |
| | City West Link \| The Crescent | 6,690 | C | 6,970 | C |
| | City West Link \| C5 site access | – | – | 4,740 | A |
| 4 | Victoria Road \| Wellington Street | 6,780 | B | 6,980 | C |
| | Victoria Road \| Darling Street | 7,180 | F | 7,380 | F |
| | Victoria Road \| Evans Street | 6,210 | C | 6,280 | E |
| 5 | Parramatta Road \| Pyrmont Bridge Road | 4,970 | F | 5,040 | F |
| | Pyrmont Bridge Road \| Booth Street \| Mallett Street | 2,110 | B | 2,150 | B |
| | Pyrmont Bridge Road \| C9 site access | – | – | 1,120 | A |
| 6 | Princes Highway \| Railway Road | 5,730 | F | 5,780 | F |
| | Princes Highway \| Mary Street \| Canal Road | 5,090 | E | 5,140 | F |
| | Princes Highway \| Campbell Street | 5,510 | F | 5,590 | F |
| | Campbell Street \| Albert Street | 5,110 | A | 5,100 | A |

Notes: [1]Traffic volume rounded to nearest 10

### *Temporary road network changes, closures and diversions*

It is anticipated that road network modifications would be required to facilitate construction of the project. Indicative modifications are outlined in **Table 8-49**.

Road network modifications and traffic staging would be reviewed during the preparation of CTAMP, with the objective of minimising disruptions to the road network. At all locations where road closures would be required, access to properties would be maintained during construction. Appropriate signage for road closures or detours would be installed.

**Table 8-49 Indicative temporary road network modifications during construction – Option A**

| Location | Indicative road network modifications | Indicative duration | Road reinstatement |
|---|---|---|---|
| Wattle Street interchange | · Northcote Street would be closed at the intersection with Parramatta Road for the duration of construction. This would be a continuation of the current closure of this section of Northcote Street to facilitate construction of the M4 East project | · Until completion of tunnel works in 2022 | Once construction is complete, the Northcote Street/Parramatta Road intersection would be reinstated |
| Darley Road civil and tunnel site (C4) | · Works would be carried out to facilitate access to the Darley Road civil and tunnel site (C4) including establishment of a temporary right hand turn lane for construction traffic to access Darley Road from City West Link<br>· Temporary diversions along Darley Road may be required during construction (to enable establishment of construction vehicle access provisions)<br>· One lane in each direction along Darley Road (between around Francis Street and Charles Street at Leichhardt) would generally be maintained, with temporary closures of one lane required for establishment of construction vehicle access provisions including installation of driveways and associated construction activities. Traffic management, that could include temporary diversions, would be implemented during temporary closures<br>· Kerbside parking along the northern (eastbound) carriageway of Darley Road between around Francis Street and Charles Street would be removed (around 20 spaces) during construction | · Q3 2018 to Q1 2019 to complete road modifications<br>· Q3 2018 to Q4 2022 including construction duration and reinstatement of roads | Once road modification works are complete, Darley Road would be reopened in line with temporary design. When construction is complete, the road would be reinstated as per the existing arrangement<br><br>Kerbside parking along Darley Road would be reinstated at the end of construction |
| City West Link and The Crescent at Lilyfield and Rozelle | · Works would be carried out to facilitate ingress and egress for the Rozelle civil and tunnel site (C5) including establishment temporary intersections, slip lanes and driveways<br>· Works would be carried out to upgrade and improve the eastbound and westbound carriageways of City West Link and The Crescent<br>· Temporary diversions would be put in place to allow for construction along the existing alignment<br>· Under existing and diverted | · Q4 2018 to Q2 2019 to complete road modifications<br>· Q4 2018 to Q3 2023 including construction duration staging, temporary roads and reinstatement of roads | When construction is complete, the road would be reinstated as per the permanent design shown in **Chapter 5** (Project description) |

| Location | Indicative road network modifications | Indicative duration | Road reinstatement |
|---|---|---|---|
| | arrangements, all traffic lanes in each direction would generally be maintained with some short-term lane closures (outside of peak periods where feasible and reasonable) subject to road occupancy licences | | |
| The Crescent at Annandale and Rozelle | · Works would be carried out to establish a new driveway for ingress and egress for The Crescent civil site (C6)<br>· Works would be carried out to realign The Crescent and reconstruct the intersection with City West Link<br>· The new alignment of The Crescent would be constructed 'offline' (that is, next to the existing alignment). Traffic would be switched onto the new alignment when ready, and the old alignment of The Crescent would be demolished<br>· All traffic lanes in each direction would generally be maintained with some short-term lane closures (outside of peak periods where feasible and reasonable) subject to road occupancy licences<br>· Temporary changes to the intersection of The Crescent/Chapman Road may be required. Access to the commercial premises, including the Multihull Central Marina, that use Chapman Road as well as the Glebe Foreshore Parklands would be protected and maintained at all times<br>· Traffic signal modifications at the intersection with City West Link in line with the temporary and permanent design | · Q4 2018 to Q2 2019 to complete road modifications<br>· Q4 2018 to Q3 2023 including construction duration staging, temporary roads and reinstatement of roads | Once road modification works are complete, the road would be reopened in line with temporary design. When construction is complete, the road would be reinstated as per the permanent design |
| Victoria Road at Rozelle | · All traffic lanes in each direction would generally be maintained with some short-term lane closures (outside of peak periods where feasible and reasonable) subject to road occupancy licences<br>· Traffic signal modifications at the intersection with The Crescent in line with the permanent design<br>· Temporary diversions would be put in place at the intersection with The Crescent to allow for construction of the new bridge in line with the | · Q4 2018 to Q2 2019 to complete road modifications<br>· Q4 2018 to Q3 2023 including construction duration staging, temporary roads and reinstatement of roads | Once road modification works are complete, the road would be reopened in line with temporary design. When construction is complete, the road would be reinstated as per the permanent design |

| Location | Indicative road network modifications | Indicative duration | Road reinstatement |
|---|---|---|---|
| | permanent design. This could include the construction a temporary bridge next to the existing bridge, onto which traffic would be switched during construction of the new bridge. When complete, traffic would be switched onto the new bridge and the temporary bridge would be removed | | |
| Gordon Street south of Lilyfield Road at Rozelle | · Gordon Street between Lilyfield Road and the Rozelle Rail Yards would be permanently closed as part of the project | · N/A | Gordon Street would be permanently closed. |
| Lilyfield Road at Rozelle | · Temporary closures to one lane would be required for short periods of time to allow for construction of the construction access driveways, utility works and construction of the cut-and-cover structures<br>· Access to Lilyfield Road from Victoria Road may be temporarily restricted to allow for integration with the revised Victoria Road alignment. Closures would be outside of peak periods where feasible and reasonable. During these periods, alternative access to Lilyfield Road would be available from Hornsey Street and Gordon Street | · Q4 2018 to Q2 2019 to complete road modifications<br>· Q2 2019 to Q4 2019 for utility relocations<br>· Q4 2018 to Q3 2023 including construction duration staging and reinstatement of roads | Once works are completed, the road would be reopened in line with permanent design |
| Hornsey Street at Rozelle | · One lane in each direction would generally be maintained during construction<br>· Access to Hornsey Street from Victoria Road would require full closure for short periods of time during realignment and upgrade works to Victoria Road<br>· Alternative access to Hornsey Street would be available from Lilyfield Road and Gordon Street | · Q4 2018 to Q2 2019 to complete road modification<br>· Q4 2018 to Q3 2023 including construction duration staging and reinstatement of roads | Once works during the stage are completed, the road would be reopened in line with permanent design |
| Quirk Street at Rozelle | · One lane in each direction would generally be maintained during construction<br>· Access to Quirk Street from Victoria Road would require full closure for short periods of time during realignment and upgrade works to Victoria Road<br>· Alternative access to Quirk Street would be available from Hornsey Street and Gordon Street | · Q4 2018 to Q2 2019 to complete road modifications<br>· Q4 2018 to Q3 2023 including construction duration staging and reinstatement of roads | Once works during the stage are completed, the road would be reopened in line with permanent design |
| Iron Cove Link civil site (C8) and Victoria Road | · Works would be carried out along Victoria Road to facilitate ingress and egress for the Iron Cove Link civil site (C8) | · Q4 2018 to Q2 2019 to complete road modifications for | Once works are complete, the road would be reopened in line with |

| Location | Indicative road network modifications | Indicative duration | Road reinstatement |
|---|---|---|---|
| | · All traffic lanes in each direction would generally be maintained with some short-term lanes closures (outside of peak periods where feasible and reasonable) subject to road occupancy licences<br>· Temporary diversions would be put in place to allow for construction along the existing alignment | ingress and egress<br>· Q4 2018 to Q3 2023 including construction duration staging, temporary roads and reinstatement of roads | temporary design. When construction is complete, the road would be reinstated as per the permanent design |
| Moodie Street at Rozelle | · Short-term, temporary closure of one lane of Moodie Street may be required during construction to facilitate utility works | · Q4 2018 to Q3 2023 | Once construction is completed, Moodie Street would be reopened as per the existing design |
| Callan Street at Rozelle | · Access to Callan Street from Victoria Road would generally remain open during construction<br>· Temporary closures at the intersection with Victoria Road to allow for integration with the revised Victoria Road alignment may occur. Closures would be outside of peak periods where feasible and reasonable subject to road occupancy licences<br>· During these periods, alternative access to Callan Street would be available from Springside Street and McCleer Street at Rozelle | · Q4 2018 to Q3 2023 | Once works are completed, the road would be reopened in line with permanent design |
| Toelle Street at Rozelle | · Access to Toelle Street from Victoria Road would generally remain open during construction<br>· Temporary closures at the intersection with Victoria Road to allow for integration with the revised Victoria Road alignment may occur. Closures would be outside of peak periods where feasible and reasonable subject to road occupancy licences<br>· During these periods, alternative access to Toelle Street would be available from Springside Street, McCleer Street, Callan Street and Manning Street at Rozelle | · Q4 2018 to Q3 2023 | Once works are completed, the road would be reopened in line with permanent design |
| Clubb Street at Rozelle | · Access between Clubb Street and Victoria Road would be permanently closed and a cul de sac established to accommodate the revised alignment of Victoria Road<br>· Access to Clubb Street would be available from Springside Street, McCleer Street, Callan Street and Manning Street | · N/A (closed at the start of construction) | Access to Clubb Street from Victoria Road would be permanently closed |

| Location | Indicative road network modifications | Indicative duration | Road reinstatement |
|---|---|---|---|
| Byrnes Street at Rozelle | · Short-term, temporary closure of one lane of Byrnes Street may be required during construction to facilitate utility works<br>· Works would also be carried out to move the terminus near Victoria Road south to accommodate the revised design | · Q1 2019 to Q4 2019 | Once utility works are completed, Byrnes Street would be reopened as per the existing layout.<br><br>Once works on the cul de sac of Byrnes Street are complete, this section of the road would be reopened in line with the permanent design |
| Pyrmont Bridge Road tunnel site (C9) | · Works would be carried out along Parramatta Road and Pyrmont Bridge Road to facilitate ingress and egress for construction traffic<br>· Works would be carried out to realign Bignell Lane between Mallett Street and Pyrmont Bridge Road at Annandale<br>· Short-term, temporary closure of Bignell Lane would be required during construction to allow for the realignment works<br>· Rear-access to commercial properties along Bignell Lane would be maintained during construction | · Q3 2018 to Q4 2018 to complete road modifications<br>· Q3 2018 to Q3 2022 including construction duration and reinstatement of roads | Once construction is completed, roads would be reopened in line with the permanent design (ie realigned Bignell Lane) |

The construction of major infrastructure in constrained urban environments requires detailed consideration of the staging of construction works. There are three key areas of the project which will require the preparation of detailed traffic staging plans during construction:

- **Victoria Road/City West Link/Anzac Bridge approach intersection** – reconstructing the intersection to accommodate existing connectivity, the new M4 East Motorway/Iron Cove Link to Anzac Bridge connections and construction of a new bridge at Victoria Road
- **City West Link/The Crescent intersection** – realigning The Crescent to the west, building a new bridge over Whites Creek and modifying the intersection
- **Victoria Road at Iron Cove** – realigning the westbound (southern) carriageway of Victoria Road to create sufficient space to build new tunnel portals and entry and exit ramps for the Iron Cove Link.

These works would be undertaken on parts of the arterial road network that are heavily trafficked and which provide important network connectivity. To construct these works would require the implementation of multiple traffic stages that meet the requirements of the construction contractor, Roads and Maritime, Transport Management Centre (TMC) and other key stakeholders. The traffic staging would likely require the creation of temporary carriageways, intersections and bridges offline from the existing road infrastructure to enable the construction of the new works and the switching of traffic.

Temporary closures and diversions, outside of peak hours would be required and would be undertaken following consultation with the TMC. Staging arrangements would be confirmed by the construction contractor during detailed design.

In preparing the traffic staging plans during construction the key considerations would include:

- Maintaining a safe environment for the public and the construction workforce
- Maintaining traffic and lane capacity, including bus or transit lane capacity, on the arterial road network particularly during peak periods
- Minimising delays to motorists utilising the affected parts of the arterial road network
- Undertaking the works efficiently to minimise the duration of traffic impacts
- Maintaining the safety of motorists, members of the public and construction personnel
- Minimising impacts on public transport services and providing alternative arrangements where necessary
- Minimising impacts on key active transport links and providing alternative arrangements where necessary.

### *Traffic crashes*

Construction traffic volumes are expected to be low when compared to existing traffic volumes on key arterial roads connecting to the construction ancillary facility locations. The greatest increase is forecast to occur on City West Link west of the City West Link/James Street intersection where, as a worst-case scenario, construction would generate around 110 vehicles during the AM peak hour and around 220 vehicles in the PM peak hour. Compared to existing traffic volumes, total construction traffic would be the equivalent of around three per cent of peak hour traffic on City West Link at this location during the AM peak hour and five per cent of existing peak hour volumes in the PM peak hour.

The volume of traffic generated by construction is expected to be low compared to existing traffic. The effects of this short-term increase on the existing road network is not expected to substantially impact road safety in and around the study area, although there is still a risk with construction traffic interacting with general traffic, with elevated risk when construction-related vehicles are entering and leaving construction sites.

Foreseen impacts on road safety for all users during construction would be mitigated as much as possible through the provision of a CTAMP and would include the development of construction staging and temporary works that minimises conflicts with the existing road network and maximises spatial separation between work areas and travel lanes. Further management measures that would be incorporated in the CTAMP are detailed in **section 8.5.3**.

### *Public transport services*

An increase in vehicles on the road network during the construction period is forecast to result in some increased delays at certain intersections. Heavy vehicle volumes would increase along major roads. The following impacts on public transport services in these areas would potentially be experienced:

**Buses:**

- Similar to general traffic, there would be an increase in bus travel times due to slower travel speeds and increased intersection delays. This would be partially mitigated by the presence of bus lanes along Victoria Road and Parramatta Road to be installed as part of the M4 East project (refer to condition of approval B34 for the M4 East project for details on the provision of bus lanes along Parramatta Road)
- Longer travel times to and from bus stops by supplementary travel modes (eg car passenger, walking to/from bus stops) due to an increase in traffic volumes, slower travel speeds and increased intersection delays
- Reduced amenity for bus users waiting at stops.

The traffic assessment has identified bus stops that would require relocation during construction for safety reasons, comprising

- The bus stops on The Crescent (northbound and southbound) at Annandale near the intersection with City West Link would be moved south towards Johnston Street to allow for construction along The Crescent. The northbound bus stop would be permanently moved south to accommodate the new alignment. The southbound bus stop would be reinstated in generally the same location. Alternative access from The Crescent to the Rozelle Bay light rail stop would also be provided during construction
- Three bus stops on Victoria Road (two on the northbound side and one on the southbound side) near the intersection with The Crescent would be relocated north to accommodate the reconstruction of Victoria Road. These bus stops would be reinstated in generally the same location at the completion of construction
- Two bus stops on Victoria Road near Iron Cove Bridge would be temporarily relocated (further east of the bridge) to allow for the widening works along Victoria Road. These bus stops would be reinstated in generally the same location at the completion of construction.

The modifications to bus stops would be reviewed during detailed design with the objective of minimising disruptions to public transport services. Bus stop relocations would be agreed with Transport for NSW and all affected bus operators.

**Rail services**

Bus service connections to railway stations may be affected due to a reduction in the reliability of bus services during the construction period. The project would have no direct impact on heavy rail services.

**Light rail**

Bus service connections to light rail stops may be affected due to a reduction in the reliability of bus services during the construction period. Pedestrian access to the Leichhardt North light rail stop adjacent to the Darley Road civil and tunnel site (C4) and the Rozelle Bay light rail stop next to The Crescent, would be maintained during construction. The project would not directly impact on operation of light rail services.

### *Walking and cycling*

The construction impacts on pedestrians and cyclists have been assessed using the criteria outlined in **Table 8-50**. An increase in the number of vehicles during the construction period would potentially impact walking and cycling amenity. Pedestrian footways and cycle paths would also need to be diverted during construction.

**Table 8-50 Active transport – impact severity criteria**

| Severity | Impact criteria |
|---|---|
| Negligible | · The impacts result in an imperceptible change (ie a very minor increase in traffic volumes) and do not require any mitigation |
| Minor | · Diversion of less than 200 metres on key routes and no new at-grade crossing<br>· Negligible safety impact |
| Moderate | · Diversion of more than 200 metres but less than 500 metres on key routes<br>· Negligible safety impact |
| High | · Diversion of more than 500 metres on key routes<br>· Potential safety impact |

Construction activities would be carried out in stages resulting in changing impacts over the course of the construction program. Further information on the staged construction of the project is provided in **Chapter 6** (Construction work). A key objective of the construction program would be to minimise disruption to pedestrians and cyclists and enable the use of the active transport links that would be provided as part of the project as soon as possible. Details about the active transport infrastructure that would be provided by the project are included in **Appendix N** (Technical working paper: Active transport strategy).

**Wattle Street interchange construction ancillary facilities (C1a, C2a and C3a)**

Construction is planned between 2018 and 2022 at these sites. There are limited changes to the surface network proposed at the Wattle Street interchange. Construction-related activity at the interchange would include civil and tunnelling work associated with the mainline tunnel and the Wattle Street entry and exit ramps, fit-out of the Parramatta Road ventilation facility that is being constructed as part of the M4 East project, and provision of parking for construction workers.

The east-facing portals to the M4 East tunnels would also provide an effective bypass of the Wattle Street/Parramatta Road intersection for construction vehicles from other construction sites (such as the Rozelle civil and tunnel site (C5)).

These factors, combined with relatively limited use of the interchange by cyclists due to it not being part of key commuter routes (refer to **Appendix N** (Technical working paper: Active transport strategy)), and no required diversions would mean that impacts on active transport would be negligible.

**Darley Road civil and tunnel site (C4)**

Temporary closure of the footpath on the northern side of Darley Road at Leichhardt, between around Canal Road and Darley Road, may be required. This would be most likely to occur during site establishment, when access to the Darley Road civil and tunnel site (C4) is being established. The footpath along the southern side of Darley Road would remain open at all times, and would act as an alternative to the northern footpath during temporary closures.

There is an on-road cyclist route on Darley Road at Leichhardt that connects to the Lilyfield Road commuter route via the City West Link/James Street intersection. No diversions of this on-road cyclist route would be required. However, traffic management measures would be implemented at the entry and exit driveways to manage potential interactions between construction traffic and pedestrians and cyclists.

The project would not affect the existing pedestrian path that runs along the southern side of City West Link and connects the Leichhardt North light rail stop with Charles Street at Lilyfield (via the bridge over City West Link).

**Rozelle interchange construction ancillary facilities (C5, C6 and C7)**

Construction at these sites is planned to occur between 2018 and 2023. Key regional active transport routes pass through the Rozelle interchange area.

Anticipated temporary pedestrian and cyclist diversions around the Rozelle interchange during construction are shown in **Table 8-9**. The permanent pedestrian and cyclist infrastructure that would be provided around the Rozelle interchange is described in **Chapter 5** (Project description) and **Appendix N** (Technical working paper: Active transport strategy).

Lilyfield Road to Anzac Bridge (east–west)

This route provides an east-west active transport link for pedestrians and cyclists between Lilyfield Road and Anzac Bridge including a crossing over Victoria Road at Rozelle via the existing Victoria Road pedestrian bridge. This bridge has limited width relative to demand and steep gradients with sharp 180 degree bends. It is therefore of low quality relative to its use and importance.

The Victoria Road pedestrian bridge would be demolished and removed at the start of construction. Prior to this occurring, an alternative connection to the western side of Victoria Road and the Lilyfield Road commuter route would be established via an underpass below Victoria Road into the Rozelle Rail Yards, and a ramp connection to Victoria Road and Lilyfield Road. This underpass would enable east-west trips to continue and it is anticipated that it will be converted into a portion of the permanent connection at the completion of construction. Although this would mean a permanent change to the alignment of this route, the impact of this alignment change would be negligible as the distance of the route would be similar and the quality of the connection would be equivalent to the existing route.

Temporary realignment of the section of this connection between Anzac Bridge and the western side of Victoria Road may also be required. Connections to the shared path on either side of Victoria Road

would be retained. Temporary closures of the shared path along Victoria Road may be periodically required. Works would be staged so that the shared path on either the eastern or western side of Victoria Road at Rozelle would remain open at all times.

Johnston Street to Victoria Road and Anzac Bridge

The pedestrian and cycle bridge that spans City West Link and connects Anzac Bridge and Victoria Road with The Crescent and Johnston Street would be removed at the start of construction. Potential alternatives and diversions being considered for implementation include:

- The existing at-grade crossing between The Crescent and the western side of Victoria Road. This route would also allow for onward connection to the eastern side of Victoria Road and Anzac Bridge via the new pedestrian and cyclist underpass that would be provided below Victoria Road (see description of this underpass above). The diversion would be less than 200 metres and there would be negligible safety impact. However, there could be a minor increase in travel times due to delays waiting for the traffic signals to change. The impact of this change would therefore be Minor
- From Anzac Bridge to Somerville Road at Rozelle via the existing pedestrian and cycle ramp, then south west along Somerville Road and James Craig Road (using the shared path) towards the footpath on the southern side of The Crescent. This would result in a similar travel distance to the current route and would be a negligible impact.

Periodic, short-term closures of the footpath on one side of James Craig Road at Rozelle may be required during construction. During these instances, the footpath on the other side of James Craig Road would be used as an alternative route. Periodic, temporary closures of the footpath on the eastern and western side of The Crescent at Annandale between City West Link and Johnston Street at Annandale would also be required during construction. Works would be staged so that the shared path on one side of The Crescent would remain open at all times.

The project would also require permanent closure of the shared path through Buruwan Park connecting The Crescent with Bayview Crescent at Annandale (see **Table 8-9**). Alternative access for pedestrians to the Rozelle Bay light rail stop from The Crescent, Johnston Street and Bayview Crescent at Annandale would be provided at all times during construction. Cyclists travelling between The Crescent and Bayview Crescent/Railway Parade at Annandale would be diverted via Johnston Street.

**Iron Cove Link civil site (C8)**

Key temporary pedestrian and cyclist diversions around the Iron Cove Link civil site (C8) during construction are shown in **Figure 8-10**. The permanent pedestrian and cyclist infrastructure that would be provided around the Iron Cove Link tunnel portals is shown in **Chapter 5** (Project description) and **Appendix N** (Technical working paper: Active transport strategy).

Construction at this site is planned between 2018 and 2023. The key pedestrian and cycle route in this area connects Iron Cove Bridge shared path (on the southern side of Victoria Road), the shared paths on either side of Victoria Road and the Bay Run south of Victoria Road, which extends around Iron Cove.

A detour route would be provided for cyclists on the southern side of Victoria Road via Springside Street, McCleer Street, Callan Street, Manning Street and Byrnes Street. This would represent a travel distance of about 700 metres, 400 metres longer than the existing 300 metre section along Victoria Road. Given the length of the diversion and the corresponding increase in travel times for pedestrians and cyclists, the impact would be classed as Moderate.

A temporary link would be provided that would connect the Bay Run and Iron Cove Bridge. To minimise potential disruption to pedestrians and cyclists that use this link, a temporary ramp to Iron Cove Bridge shared path would be provided, to connect the Bay Run and Iron Cove Bridge (westbound) and Byrnes Street (eastbound, to connect with the diversion described above). This temporary diversion would not change the distance or travel times for users of the Bay Run and Iron Cove Bridge and would not result in additional safety impacts, and would therefore have a negligible impact.

**Pyrmont Bridge Road civil and tunnel site (C9)**

Construction at this site is planned for 2018–2022. The Pyrmont Bridge tunnel site is generally bound by Parramatta Road to the south, Pyrmont Bridge Road to the north and Mallett Street to the east. No significant changes to the surrounding road network are proposed with heavy vehicle ingress via Parramatta Road and egress via Pyrmont Bridge Road, and all light vehicle ingress and egress via Pyrmont Bridge Road.

The Inner City Regional Route for cyclists runs along Pyrmont Bridge Road at this location (identified as a 'bicycle friendly road') with connections via Parramatta Road (west) and Booth Street (northern continuation of Mallett Street). There are pedestrian footpaths on both sides of Parramatta Road and Pyrmont Bridge Road.

Minor impact is anticipated for pedestrians and cyclists at this location. Although there would be no requirement for diversions, there is the potential for interactions with construction vehicles, particularly where heavy vehicles enter the site from Parramatta Road and leave the site on to Pyrmont Bridge Road. Traffic management measures would be implemented at the entry and exit driveways on Parramatta Road and Pyrmont Bridge Road to manage potential interactions between construction traffic and pedestrians and cyclists.

**Campbell Road civil and tunnel site (C10)**

Construction at this site is planned for 2018–2023. The Campbell Road civil and tunnel site would be accessed from Albert Street, via the new signalised intersection on Campbell Road near Barwon Park Road (being constructed as part of the New M5 project). This intersection would provide signalised crossing for pedestrians and cyclists using the pedestrian and cycle paths along the southern side of Campbell Road at St Peters.

Campbell Road is currently used as a local route by cyclists due to low traffic volumes. The New M5 project would upgrade Campbell Road, and there is a forecast increase in traffic volumes. Delivery of the New M5 project would also include construction of a separated cycle path along Campbell Road (forming part of the Bourke Street Link), connecting Newtown to the Bourke Street Cycleway, Green Square and the Sydney CBD.

For pedestrians and cyclists using the new separated cycle path along Campbell Road, there would be the potential for interactions with construction vehicles entering and leaving the Campbell Road civil and tunnel site (C10). However, as part of the New M5 project, the Campbell Road/Albert Street intersection would be upgraded to a signalised intersection to cater for M4-M5 Link construction traffic entering and leaving the Campbell Road civil and tunnel site (C10), This signalised intersection would provide signalised crossing for pedestrians and cyclists using the new pedestrian and cyclist paths along the southern side of Campbell Road at St Peters. No diversions would be required. The impact on pedestrians and cyclists at this location would therefore be negligible.

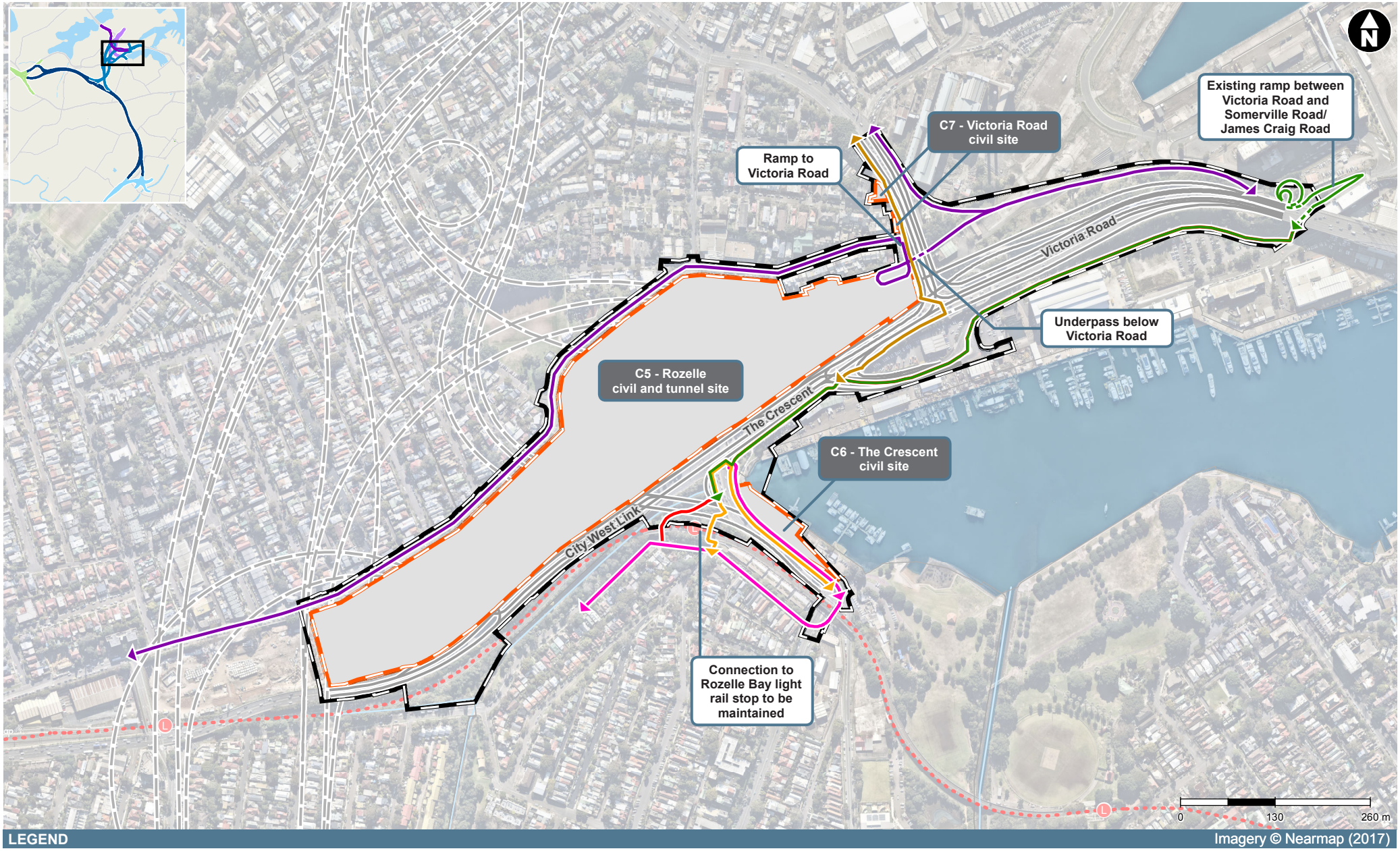



**Figure 8-9** Pedestrian and cycle diversions at Rozelle

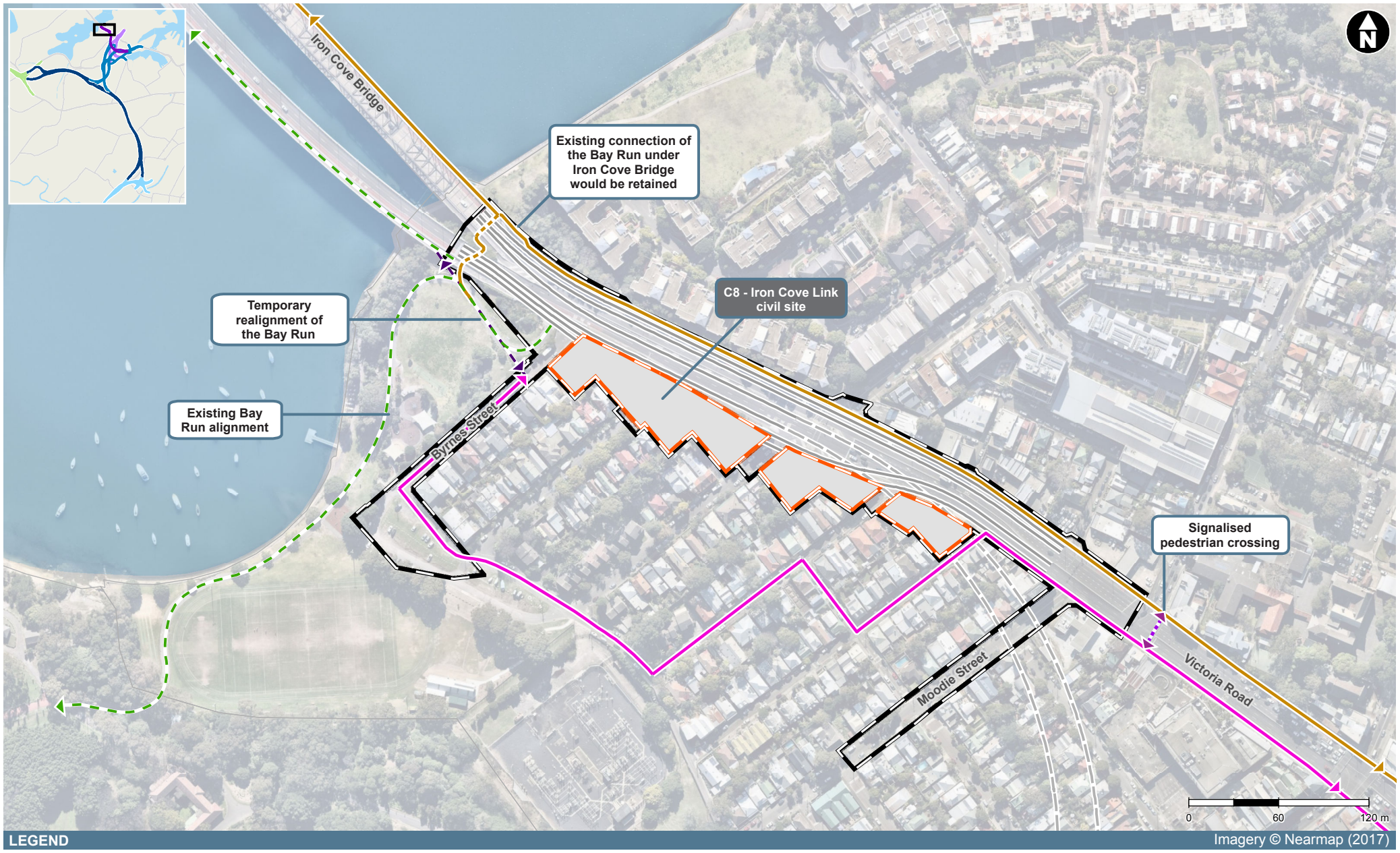



**Figure 8-10** Pedestrian and cycle diversion at Iron Cove

## Construction impact assessment - Option B

The results of the construction impact assessment for Option B presented in this section refer to impacts around the Parramatta Road and Wattle Street corridors at Haberfield, the City West Link corridor at Leichhardt and City West Link and The Crescent at Lilyfield. The construction impacts at other locations assessed as part of the Option A assessment would also apply (including impacts on public and active transport).

### *Road level of service*

An analysis of roadway service levels was carried out to determine the impact of construction traffic in 2021, and includes consideration of the spoil reuse sites.

Mid-block traffic level of service demonstrates the impact of construction traffic in 2021 for all construction activities (see **section 8.1.8** for further details on measures of network performance). Theoretical mid-block roadway capacities were based on Austroads *Guide to Traffic Management* and these capacities and assessment results are shown in **Table 8-51** for the AM peak and PM peak hours. In reality, if a link is over capacity, this would result in queueing further back in the network. However, this assessment provides a high level indication of the level of impact of the construction vehicles compared to the background traffic.

The analysis shows that construction traffic generated by Option B has a minimal impact on roadway service levels, with one change in the mid-block level of service between the 'without construction' and 'with construction' scenarios to less than LoS D, with City West Link, west of The Crescent, forecast to decrease from LoS D to LoS E in the westbound direction in the PM peak hour.

As previously noted, in highly congested networks, singe-point assessment criteria, such as mid-block levels of service, do not present a complete picture of traffic operations. In reality, if a link is over capacity, this would result in queueing further back in the network. However, this assessment provides a high-level indication of the level of impact of the construction vehicles compared to the background traffic.

**Table 8-51 Option B – 2021 mid-block operational performance summary**

| Location and direction | | Mid-block capacity | 2021 AM peak hour (veh/hr)[1] | | | | | | 2021 PM peak hour (veh/hr)[1] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Without construction | | | With construction | | | Without construction | | | With construction | | |
| | | | Flow | V/C | LoS | Flow | V/C | LoS | Flow | V/C | LoS | Flow | V/C | LoS |
| Parramatta Road north of Wattle Street – Haberfield | EB | 3,300 | 1,840 | 0.56 | C | 1,890 | 0.57 | D | 2,080 | 0.63 | D | 2,090 | 0.63 | D |
| | WB | 3,300 | 1,310 | 0.40 | C | 1,330 | 0.40 | C | 1,310 | 0.40 | C | 1,410 | 0.43 | C |
| Wattle Street east of Parramatta Road – Haberfield | EB | 2,000 | 740 | 0.37 | B | 740 | 0.37 | B | 1,110 | 0.55 | C | 1,110 | 0.56 | C |
| | WB | 2,000 | 860 | 0.43 | C | 870 | 0.43 | C | 730 | 0.37 | B | 740 | 0.37 | B |
| City West Link west of Darley Road – Rozelle | EB | 2,300 | 2,120 | 0.92 | E | 2,180 | 0.95 | E | 2,230 | 0.97 | E | 2,300 | 1.00 | E |
| | WB | 2,300 | 1,940 | 0.84 | E | 1,980 | 0.86 | E | 2,110 | 0.92 | E | 2,240 | 0.97 | E |
| City West Link west of The Crescent – Rozelle | EB | 2,300 | 2,520 | 1.10 | F | 2,550 | 1.11 | F | 2,440 | 1.06 | F | 2,460 | 1.07 | F |
| | WB | 2,300 | 1,800 | 0.78 | D | 1,810 | 0.79 | D | 1,850 | 0.80 | D | 2,000 | 0.87 | E |
| City West Link east of The Crescent – Rozelle | EB | 3,400 | 3,520 | 1.04 | F | 3,530 | 1.04 | F | 3,210 | 0.94 | E | 3,210 | 0.95 | E |
| | WB | 3,400 | 2,560 | 0.75 | D | 2,570 | 0.76 | D | 3,000 | 0.88 | E | 3,010 | 0.89 | E |

Notes: [1]Rounded to nearest 10

*Intersection level of service*

The Option B construction impact assessment is the same as Option A for Cluster 4: Victoria Road in Rozelle, Cluster 5: Parramatta Road in Camperdown, and Cluster 6: Princes Highway in St Peters. The analysis for the Option B construction impact assessment is therefore only Cluster 1: Parramatta Road and Wattle Street corridors in Haberfield, Cluster 2: City West Link corridor in Leichhardt, and Cluster 3: City West Link and The Crescent in Lilyfield.

**Cluster 1**

Cluster 1 consists of the following intersections:

- Parramatta Road/Harris Road
- Parramatta Road/Croydon Road/Arlington Street
- Parramatta Road/Great North Road
- Parramatta Road/Frederick Street/Wattle Street
- Parramatta Road/Bland Street
- Wattle Street/Ramsay Street
- Dobroyd Parade/Waratah Street
- Dobroyd Parade/Timbrell Drive/Mortley Avenue.

During the AM peak hour, the Parramatta Road/Bland Street and Dobroyd Parade/Timbrell Drive intersections are forecast to both operate at LoS F. High levels of delay at the Parramatta Road/Bland Street intersection can be attributed to the downstream exit blocking along Parramatta Road, resulting in significant exit blocking for the southbound movement. During the PM peak hour, the Parramatta Road/Frederick Street/Wattle Street intersection is forecast to operate at LoS E, while the Parramatta Road/Great North Road and Dobroyd Parade/Timbrell Drive intersections are forecast to operate at LoS F.

In the 'with construction' scenario, about 320 PCU and 510 PCU would be added to the network in the AM and PM peaks respectively. During both the AM and PM peak hours, about 50 per cent of this additional traffic is via the M4 East tunnels east of Ramsay Street, to access construction sites along City West Link and Victoria Road. The additional traffic due to construction is predominantly eastbound in the AM peak hour and westbound in the PM peak hour. As a result, the performance at most intersections along Parramatta Road would likely be impacted, with larger impacts at the intersections along Wattle Street and Dobroyd Parade.

During the AM peak hour, there would be an increase in traffic of up to about 105 PCU along Parramatta Road, resulting in relatively small impacts – the level of service is not forecast to worsen at modelled intersections in Cluster 1 for this option. At the eastern end of Cluster 1, it is estimated that an additional 100 PCU would emerge from the M4 East eastbound tunnels, and 65 PCU would enter the M4 East westbound tunnels. This would impact mostly on the Dobroyd Parade/Timbrell Drive intersection, which is already forecast to operate at LoS F in the 'without construction' scenario.

During the PM peak hour, there would be an increase in traffic of up to about 145 PCU along Parramatta Road. However, the impacts on intersections along Parramatta Road are forecast to be small. The level of service at two intersections are forecast to worsen compared to the 'without construction' scenario – the Parramatta Road/Harris Road intersection is forecast to worsen slightly from LoS B to LoS C and the Parramatta Road/Croydon Road/Arlington Street intersection from LoS D to LoS E.

The M4 East tunnels are forecast to accommodate an additional 75 PCU eastbound and 185 PCU westbound. This would subsequently impact on the Dobroyd Parade/Timbrell Drive intersection, however this intersection is forecast to operate at LoS F in the 'without construction' scenario.

**Cluster 2**

Cluster 2 consists of the following intersections:

- City West Link/James Street
- City West Link/Norton Street
- Darley Road/C4 site access.

The construction traffic modelling indicates City West Link/James Street intersection is forecast to operate at LoS F in the 'without construction' scenario and City West Link Road/Norton Street intersection is forecast to operate at LoS C during both peaks.

In the 'with construction' scenario, in addition to about 190 PCU and 320 PCU being added to the network in the AM and PM peak hours respectively, the rightmost through lane from City West Link eastbound would be temporarily converted into a turning lane to allow construction vehicles to turn right into James Street. A new traffic signal phase would be required to operate this movement safely, which would impact the performance of this intersection. The forecast volume is not large therefore this phase will only be required to run once every two cycles. The level of service is forecast to remain at LoS F, and average delays at the intersection are forecast to increase in the AM and PM peak hours in the 'with construction' scenario.

The left turn movement from James Street into City West Link westbound is allocated a green time of at least 30 seconds in each cycle in both peaks, to accommodate what may be a difficult turn for construction heavy vehicles to make, given the blind corner and steep approach on James Street. The impact on City West Link Road/Norton Street intersection is not forecast to be significant, with the level of service forecast to remain at LoS C in both peaks in both 'without construction' and 'with construction' scenarios.

The Darley Road/Charles Street intersection located on the southwest corner of the Darley Road tunnel site (C4) construction ancillary facility is proposed to be upgraded to a signalised intersection. It is also proposed to signalise the right turn for heavy vehicles entering the site off Darley Road about 30 metres east of this intersection. The phasing and timing of this signalised right turn would be coordinated with the corresponding right turn at the Darley Road/Charles Street intersection, to minimise delays to eastbound through traffic on Darley Road. This intersection is forecast to operate satisfactorily at LoS A in both AM and PM peak hours.

**Cluster 3**

Cluster 3 consists of the following intersections:

- City West Link/The Crescent
- The Crescent/James Craig Road
- City West Link/Rozelle civil and tunnel site (C5) western access.

The modelling indicates that in the 'without construction' scenario, City West Link/The Crescent and The Crescent/James Craig Road intersections are forecast to operate satisfactorily at LoS D or better in both AM and PM peak hours.

With about 130 PCU and 300 PCU added to the network in the AM and PM peak hours respectively in the 'with construction' scenario, the operational performance at the intersections is forecast to worsen.

In the 'with construction' scenario, the new eastern access road to the Rozelle civil and tunnel site (C5) would be accommodated as the northern approach to City West Link/The Crescent intersection. Construction vehicles would only be permitted to turn right out of this access road onto City West Link westbound; however safe operation would require a new traffic signal phase. It is forecast that this phase will only be required to run once every three cycles.

During the AM peak hour, City West Link/The Crescent intersection level of service is forecast to deteriorate from LoS D to LoS E with an increase in average delay of about 15 seconds. It is noted

that the forecast increase in traffic due to construction is only about one per cent. During the PM peak hour, the level of service is forecast to remain at LoS C.

A new temporary signalised intersection is also proposed on City West Link about 400 metres west of The Crescent, accommodating a second (western) site access to the Rozelle civil and tunnel site (C5). Construction vehicles would similarly only be permitted to turn right out of this access road, with a traffic signal phase required to safely accommodate this movement. This intersection is forecast to operate at LoS A in both peaks.

There is no adverse impact expected on The Crescent/James Craig Road intersection, with LoS B forecast in both 'without construction' and 'with construction' scenarios in both peaks.

The intersection performance results for the road network under the 2021 'without construction' and 'with construction' forecast volumes for the Option B scenario at Haberfield are summarised in **Table 8-52** and **Table 8-53** for the AM peak and PM peak respectively.

**Table 8-52 Option B – 2021 AM peak hour intersection operational performance summary**

| Cluster | Intersection | Without construction | | With construction | |
|---|---|---|---|---|---|
| | | Volume (PCU)[1] | LoS | Volume (PCU)[1] | LoS |
| 1 | Parramatta Road \| Harris Road | 2,550 | B | 2,640 | B |
| | Parramatta Road \| Croydon Road \| Arlington Street | 3,280 | B | 3,360 | B |
| | Parramatta Road \| Great North Road | 3,810 | C | 3,900 | C |
| | Parramatta Road \| Frederick Street \| Wattle Street | 4,880 | D | 4,970 | D |
| | Parramatta Road \| Bland Street | 2,870 | F | 2,930 | F |
| | Wattle Street \| Ramsay Street | 3,260 | C | 3,300 | C |
| | Dobroyd Parade \| Waratah Street | 3,470 | B | 3,650 | B |
| | Dobroyd Parade \| Timbrell Drive \| Mortley Avenue | 5,530 | F | 5,720 | F |
| 2 | City West Link \| James Street | 5,530 | F | 5,720 | F |
| | City West Link \| Norton Street | 5,290 | C | 5,440 | C |
| | Darley Road \| C4 site access | – | – | 1,200 | A |
| 3 | The Crescent \| James Craig Road | 6,730 | B | 6,760 | B |
| | City West Link \| The Crescent | 6,800 | D | 6,880 | E |
| | City West Link \| C5 site access | – | – | 4,770 | A |

Notes:

[1] Rounded to nearest 10

**Table 8-53 Option B – 2021 PM peak hour intersection operational performance summary**

| Cluster | Intersection | Without construction | | With construction | |
|---|---|---|---|---|---|
| | | Volume (PCU)[1] | LoS | Volume (PCU)[1] | LoS |
| 1 | Parramatta Road \| Harris Road | 3,040 | B | 3,180 | C |
| | Parramatta Road \| Croydon Road \| Arlington Street | 3,610 | D | 3,750 | E |
| | Parramatta Road \| Great North Road | 3,820 | F | 3,960 | F |
| | Parramatta Road \| Frederick Street \| Wattle Street | 4,950 | E | 5,090 | E |
| | Parramatta Road \| Bland Street | 2,500 | B | 2,640 | B |
| | Wattle Street \| Ramsay Street | 3,080 | D | 3,120 | D |

| Cluster | Intersection | Without construction | | With construction | |
|---|---|---|---|---|---|
| | | Volume (PCU)[1] | LoS | Volume (PCU)[1] | LoS |
| | Dobroyd Parade \| Waratah Street | 2,960 | B | 3,260 | B |
| | Dobroyd Parade \| Timbrell Drive \| Mortley Avenue | 5,450 | F | 5,750 | F |
| 2 | City West Link \| James Street | 5,640 | F | 5,960 | F |
| | City West Link \| Norton Street | 5,700 | C | 5,940 | C |
| | Darley Road \| C4 site access | – | – | 1,210 | A |
| 3 | The Crescent \| James Craig Road | 6,500 | B | 6,700 | B |
| | City West Link \| The Crescent | 6,690 | C | 6,950 | C |
| | City West Link \| C5 site access | – | – | 4,710 | A |

Notes:

[1] Rounded to nearest 10

### *Temporary closures and diversions during construction*

In addition to the temporary road network modifications outlined in **Table 8-49**, additional modifications outlined in **Table 8-54** would be required as part of construction option B. Impacts from construction traffic and associated temporary network changes are considered above.

**Table 8-54 Indicative temporary road network modifications during construction – Option B**

| Location | Indicative road network modifications | Indicative duration | Road reinstatement |
|---|---|---|---|
| Parramatta Road West civil and tunnel site (C1b) and Parramatta Road East civil site (C3b) | · Works would be carried out on Alt Street and Bland Street to facilitate access via new driveways to the Parramatta Road West civil and tunnel site (C1b) and the Parramatta Road East civil site (C3b)<br>· Temporary closures of one lane of Alt Street and Bland Street (either side of Parramatta Road) may be required for establishment of construction vehicle access provisions including installation of driveways and associated construction activities. Traffic management, that could include temporary diversions, would be implemented during temporary closures<br>· Due to existing property driveways, there would be no loss of on-street parking on Alt Street or Bland Street | Q3 2018 to Q1 2019 to complete road modification.<br>Q3 2018 to Q4 2022 including construction duration and reinstatement of roads | Once road modification works are complete, both lanes along Alt Street and/or Bland Street would be reopened in line with temporary design. When construction is complete, the road would be reinstated as per the existing arrangement |

### *Traffic crashes*

Construction traffic volumes are expected to be low when compared to existing traffic volumes on key arterial roads connecting to the construction ancillary facility locations. The greatest increase occurs on City West Link west of City West Link/James Street intersection where, as a worst-case scenario, construction generates around 110 vehicles in the AM peak and around 190 vehicles in the PM peak. When compared to existing traffic volumes, total construction traffic would be the equivalent of around four per cent of peak hour traffic on City West Link at this location in the AM peak and six per cent of existing peak hour volumes in the PM peak.

As the volume of traffic generated by construction is expected to be low compared to existing traffic, the effects of this short-term increase on the existing road network is not expected to significantly

impact road safety in and around the project footprint. There is still a risk with construction traffic interacting with general traffic, with elevated risk when construction-related vehicles are entering and leaving construction sites. Foreseen impacts on road safety for all users during construction would be mitigated as much as possible through tailored provisions in the CTAMP and other measures detailed in **section 8.5**.

*Public transport services*

As for the Option A construction scenario at Haberfield, an increase in vehicles on the existing road network during the construction period using the Option B sites would likely result in increased delays at certain intersections along the Parramatta Road corridor and in surrounding areas. Heavy vehicle volumes would increase along major roads. The same impacts on public transport services in these areas would potentially be experienced. Any bus stop relocations would be agreed with Transport for NSW and all affected bus operators, and would need to consider proposed pedestrian diversions during construction.

**Walking and cycling**

An increase in heavy vehicle volumes during the construction period in the project footprint and surrounding areas would potentially impact walking and cycling amenity. There are no planned diversions to pedestrian footways and cycling paths during construction for the three Option B construction sites.

The Parramatta Road West civil and tunnel site (C1b) has a proposed heavy and light vehicle cross-over on Alt Street and the Parramatta Road East civil site (3b) has proposed light vehicle entries and exits on Alt Street and Bland Street. Although this section of Alt Street is not a designated on-road cycle route, cycle logos are painted on Alt Street close to Parramatta Road.

Periodic, short-term closures of footpaths on both sides of Alt Street on the eastern and western sides of Parramatta Road may be required. These would be most likely to occur during site establishment, when access to these sites is being established. Where a footpath is temporarily closed, the corresponding footpath on the other side of the road would remain open.

While the volume of vehicles forecast to use these are low, minor impacts are anticipated during construction at these two sites as, while no diversions are required, there may be a safety impact. Traffic management measures would be implemented at the entry and exit driveways on Parramatta Road, Alt Street and Bland Street to manage potential interactions between construction traffic and pedestrians and cyclists.

### 8.3.2 Operational impacts without the project

In the future, there is a forecast growth in travel demand for both traffic and public transport, due to a forecast increase in population and employment. This causes increased congestion levels on the road network.

This section details the forecast traffic changes and performance in a ‘without project’ (or ‘do minimum’) scenario using forecast AM and PM peak traffic volumes for 2023 and 2033. Full details of this assessment can be found in **Appendix H** (Technical working paper: Traffic and transport).

#### Sydney metropolitan road network

*‘Do minimum’ (2023)*

The 2023 ‘do minimum’ scenario is described in **Table 8-2**. It is called ‘do minimum’ rather than ‘do nothing’ as it assumes on-going improvements would be made to the broader transport network, including some new infrastructure and intersection improvements to improve capacity and cater for traffic growth.

**Figure 8-11** shows the forecast change in daily traffic volumes between the 2023 ‘do minimum’ and the 2015 ‘base’ scenarios. The changes shown represent differences in the forecast AWT between the modelled scenarios. Roads that are expected to carry less traffic in the future 2023 ‘do minimum’ scenario are shown in green and roads where volumes are predicted to increase are shown in red. The line thickness is indicative of the magnitude of this change.

### General traffic

A reduction in daily traffic is forecast along Parramatta Road (west of the M4 East Parramatta Road ramps) as a result of the M4 East project, and along the M5 East Motorway, as a result of the New M5 project. Forecast traffic on the M4 East and the New M5 Motorway corridors, which will open to traffic in the period between the base year (2015) and 2023, are illustrated by the red bands on these links (as shown in **Figure 8-11**).

Increased daily traffic is forecast along Parramatta Road (east of the M4 East Parramatta Road ramps), Southern Cross Drive, Sydney Harbour Tunnel, Sydney Harbour Bridge and Anzac Bridge, as well as other urban arterials in the study area including Victoria Road, City West Link, Hume Highway, Canterbury Road, Stoney Creek Road, Olympic Drive, Centennial Drive and Anzac Parade approaching the Sydney CBD. The main cause of this is increased traffic as a result of population and employment growth from areas accessing these roads.

**Table 8-55** compares the 2023 'do minimum' scenario with the 2015 'base case' scenario (which represents road conditions prior to the commencement of the M4 East and New M5), an increase in both VKT and vehicle hours travelled (VHT) on an average weekday on the Sydney road network is forecast.

**Table 8-55 Comparison of daily VKT and VHT for metropolitan Sydney in 2023 'without project' and 2015 'base case' scenarios**

| Scenario | Year | Daily VKT ('000 km) | | | Daily VHT ('000 hours) | | |
|---|---|---|---|---|---|---|---|
| | | Motorway | Other | Total | Motorway | Other | Total |
| Base case | 2015 | 23,940 | 74,810 | 98,750 | 400 | 2,520 | 2,920 |
| Do minimum (without project) | 2023 | 26,880 | 86,520 | 113,400 | 470 | 3,160 | 3,630 |

Source: WRTM v2.3, 2017

### On-road freight

Forecast changes in daily road-based freight or heavy vehicle movements predominantly follow the same pattern as the general traffic movements, with more pronounced reductions in daily heavy vehicle movements on Parramatta Road (west of the M4 East Parramatta Road ramps) and the M5 East, as a result of heavy vehicles shifting to the M4 East and the New M5 projects.

### On-road public transport

The increases in traffic volumes and congestion on roads that are also key bus corridors would impact negatively on the reliability and the trip times of on-road public transport. These include Parramatta Road (east of the M4 East Parramatta ramps), which is a key bus corridor for services running between the inner west and the Sydney CBD, Sydney Harbour Bridge, which allows buses north of the harbour to access the Sydney CBD, Anzac Bridge and Victoria Road, which links northwest bus services with the Sydney CBD, and Anzac Parade, which is a key corridor for bus services from the southeast to the Sydney CBD and beyond.


**Figure 8-11 Difference in AWT between 2023 'do minimum' and 2015 base year scenarios**

Source: WRTM v2.3, 2017

*'Do minimum' (2033)*

A description of the 2033 'do minimum' scenario is provided in **Table 8-2**. **Figure 8-12** shows the forecast change in daily traffic volumes between the 2033 'do minimum' and the 2015 'base' scenarios. As with the 2023 'do minimum' scenario, roads that are expected to carry less traffic in the future 2033 'do minimum' scenario are shown in green and roads where traffic volumes are predicted to increase are shown in red.

**General traffic**

Reductions in daily traffic are forecast along Parramatta Road (west of the M4 East Parramatta ramps) and the M5 East, as a result of the M4 East and the New M5 projects. Increases in daily traffic movements in 2033 follow a similar pattern forecast for 2023 but with larger volumes. As in 2023, changes in population and employment distribution are the main cause of the forecast traffic increases. Traffic increases are forecast along Parramatta Road (east of the M4 East Parramatta ramps), Southern Cross Drive, Sydney Harbour Tunnel, Sydney Harbour Bridge and Anzac Bridge, as well as most other urban arterials.

**Figure 8-12** shows the forecast change in daily traffic volumes between the 2033 'do minimum' and the 2015 'base case' scenarios. Roads that are expected to carry less traffic in the future 2033 'do minimum' scenario are shown in green and roads where traffic volumes are predicted to increase are shown in red.

**Table 8-56** compares the 2033 'do minimum' scenario with the 2015 base scenario (which represents road conditions prior to the commencement of the M4 East and New M5). A further increase in both VKT and VHT on an average weekday on the Sydney road network would be experienced. This indicates that the network is becoming so congested that an increase in traffic on the network is causing substantial increases in travel time.

**Table 8-56 Comparison of daily VKT and VHT for metropolitan Sydney in 2033 'without project' and 2015 'base case' scenarios**

| Scenario | Year | Daily VKT ('000 km) | | | Daily VHT ('000 hours) | | |
|---|---|---|---|---|---|---|---|
| | | Motorway | Other | Total | Motorway | Other | Total |
| Base case | 2015 | 23,940 | 74,810 | 98,750 | 400 | 2,520 | 2,920 |
| Do minimum (without project) | 2033 | 31,030 | 101,900 | 132,930 | 590 | 4,670 | 5,560 |

Source: WRTM v2.3, 2017

**On-road freight**

As in 2023, forecast changes in daily road-based freight or heavy vehicle movements follow the same pattern as the general traffic movements, with more pronounced reductions in daily heavy vehicle movements on Parramatta Road (west of the M4 East Parramatta ramps) and the M5 East, as a result of the M4 East and the New M5 projects respectively.

**On-road public transport**

In accordance with the changes forecast for traffic volumes in 2033 compared with 2023, trip times would increase and the reliability of bus services would decrease in 2033 due to larger increases in general traffic. Similar to the 2023 'do minimum' case, key bus corridors where service reliability would be impacted would include Parramatta Road (east of the M4 East Parramatta Road ramps), Sydney Harbour Bridge, Anzac Bridge and Victoria Road, as well as Anzac Parade.


**Figure 8-12 Difference in AWT between 2033 'do minimum' and 2015 base year scenarios**

Source: WRTM v2.3, 2017

## Operational performance – Wattle Street interchange

*Changes to the road network in 'do minimum' scenario*

The Wattle Street interchange is at the eastern end of the M4 East project and, as such, associated M4 East road network infrastructure was included in the 'do minimum' or 'without project' scenario models, including:

- M4 East entry and exit ramps to accommodate at-grade network access and egress at two locations:
  - Wattle Street (between the intersections of Ramsay Street and Waratah Street)
  - Parramatta Road (between the intersections of Bland Street and Dalhousie Street)
- Adjustments to the at-grade network to facilitate the entry and exit ramp infrastructure
- A second right turn bay on Parramatta Road northbound approach to Great North Road in accordance with planned Pinch Point works by Roads and Maritime
- Parramatta Road kerbside lanes converted to bus lanes between the western end of the modelled network (west of Arlington Street) and east of Bland Street. This is consistent with Condition B34 of the M4 East Conditions of Approval, which requires at least two lanes of Parramatta Road, from Burwood Road to Haberfield, to be solely dedicated for the use of public transport. In the model, vehicles turning left are allowed to enter kerbside lanes about 100 metres in advance of intersections to accommodate left turns.

A more detailed description of these inclusions from the M4 East project is provided in **Appendix H** (Technical working paper: Traffic and transport).

*Network performance*

**2015 base and 2023 'do minimum' scenario**

**Table 8-57** and **Table 8-58** present a comparison of the performance of the modelled road network between the 2015 base scenario and 2023 'without project' scenario for the AM and PM peak periods.

During the AM peak hour, the average travel time per vehicle through the modelled road network around the Wattle Street interchange shows a moderate increase compared to the 2015 base year. However, average speeds would be similar. Substantial delays are also observed at the M4 East Parramatta Road exit ramp, south of Bland Street. This results from the merge upstream of the Dalhousie Street intersection, existing congestion at Liverpool Road and the merge from three lanes to two lanes downstream of Sloane Street. Queuing is forecast to extend along the M4 East Parramatta Road exit ramp, reaching the M4 East Wattle Street exit ramp diverge.

During the PM peak hour, average time travelled per vehicle in the core modelled road network would increase by around 38 per cent compared with the 2015 base year and average speed would decrease (by around 26 per cent). The increase in average travel time and decrease in average speeds during the PM peak indicates an increase in congestion during this peak period.

**Table 8-57 Wattle Street interchange network performance – AM peak hour (2015 Base vs 2023 'without project' scenario)**

| Network measure | 2015 base case | 2023 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 13,233 | 15,279 | 15% |
| Total vehicle kilometres travelled in network (km) | 25,663 | 31,474 | 23% |
| Total time travelled approaching and in network (hr) | 1,732 | 2,153 | 23% |
| Total vehicles arrived | 13,191 | 14,483 | 10% |
| Total number of stops | 244,016 | 242,127 | -1% |

| Network measure | 2015 base case | 2023 'without project' | Percentage change |
|---|---|---|---|
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 1.7 | 2.0 | 14% |
| Average time travelled in network (mins) | 7.0 | 8.0 | 15% |
| Average number of stops | 14.8 | 13.4 | -9% |
| Average speed (km/h) | 14.9 | 14.8 | -1% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 41 | 796 | – |
| % of total traffic demand | 0% | 5% | – |

**Table 8-58 Wattle Street interchange network performance – PM peak hour (2015 Base vs 2023 'without project' scenario)**

| Network measure | 2015 base case | 2023 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 13,559 | 15,209 | 12% |
| Total vehicle kilometres travelled in network (km) | 27,377 | 29,075 | 6% |
| Total time travelled approaching and in network (hr) | 1,504 | 2,176 | 44% |
| Total vehicles arrived | 13,559 | 14,702 | 8% |
| Total number of stops | 183,725 | 318,512 | 73% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 1.8 | 1.8 | 2% |
| Average time travelled in network (mins) | 5.9 | 8.1 | 38% |
| Average number of stops | 11.0 | 17.4 | 59% |
| Average speed (km/h) | 18.3 | 13.5 | -26% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 0 | 507 | – |
| % of total traffic demand | 0% | 3% | – |

**2023 'do minimum' and 2033 'do minimum' scenario**

**Table 8-59** and **Table 8-60** present a comparison of the performance of the modelled road network between the 2023 and 2033 'without project' scenarios for the AM and PM peak hours.

Road network traffic performance is forecast to deteriorate by 2033 compared to 2023 as a result of increased demand. Congestion from both the M4 East Wattle Street and Parramatta Road portals blocks past the M4 East exit ramp diverge, resulting in large delays to vehicles from the M4 accessing the surface road network in the peak hour. Average network conditions experienced by vehicles in the network are similar in 2033 to those in 2023, however more vehicles are not able to enter the modelled network in the peak hour.

**Table 8-59 Wattle Street interchange network performance – AM peak hour (2023 'without project' vs 2033 'without project' scenario)**

| Network measure | 2023 'without project' | 2033 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 15,279 | 16,553 | 8% |
| Total vehicle kilometres travelled in network (km) | 31,506 | 32,470 | 3% |
| Total time travelled approaching and in network (hr) | 2,143 | 2,316 | 7% |
| Total vehicles arrived | 14,497 | 15,505 | 7% |
| Total number of stops | 236,008 | 272,807 | 13% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.0 | 2.0 | -1% |
| Average time travelled in network (mins) | 8.0 | 8.3 | 3% |
| Average number of stops | 13.1 | 14.5 | 8% |
| Average speed (km/h) | 14.9 | 14.2 | -4% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 782 | 1,048 | – |
| % of total traffic demand | 5% | 6% | – |

**Table 8-60 Wattle Street interchange network performance – PM peak hour (2023 'without project' vs 2033 'without project' scenario)**

| Network measure | 2023 'without project' | 2033 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 15,209 | 16,665 | 10% |
| Total vehicle kilometres travelled in network (km) | 29,171 | 29,461 | 1% |
| Total time travelled approaching and in network (hr) | 2,157 | 2,557 | 17% |
| Total vehicles arrived | 14,726 | 15,451 | 5% |
| Total number of stops | 320,111 | 387,426 | 22% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 1.8 | 1.8 | -4% |
| Average time travelled in network (mins) | 8.1 | 9.0 | 11% |
| Average number of stops | 17.4 | 20.0 | 15% |
| Average speed (km/h) | 13.6 | 11.7 | -13% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 483 | 1,214 | – |
| % of total traffic demand | 3% | 7% | – |

*Intersection performance*

**Table 8-61** presents a comparison of intersection performance between the 2015 base scenario and 2023 and 2033 'without project' scenarios for the AM and PM peak periods.

The AM peak comparison suggests that under 'without project' conditions, the intersection performance in the future years is forecast to be similar to the base scenario; with the exception of the intersections of Parramatta Road/Wattle Street, at which performance is forecast to improve from LoS E to LoS C. The performance of the City West Link/Timbrell Drive intersection is forecast to worsen over time, given the increased eastbound demand for City West Link that causes queuing along Wattle Street, with minor impacts at the upstream intersection of Waratah Street as a result.

In the PM peak hour, Sloane Street and Liverpool Road intersection performances are predicted to worsen as a result of increased demand for Liverpool Road from Parramatta Road eastbound, causing congestion on all approaches, with queues in 2033 extending back along the M4 Parramatta Road ramps. City West Link/Timbrell Drive intersection is unable to accommodate the forecast increased demand along City West Link and Timbrell Drive in the future years, performing at LoS F in both 2023 and 2033.

**Table 8-61 Wattle Street interchange: key intersection performance – 2023 and 2033 'without project' scenarios**

| Key intersections | 2015 base case | 2023 'without project ' | 2033 'without project ' |
|---|---|---|---|
| **AM peak hour** | | | |
| Parramatta Road/Sloane Street | B | B | B |
| Parramatta Road/Liverpool Road | C | C | C |
| Parramatta Road/Dalhousie Street | B | B | C |
| Parramatta Road/Bland Street | B | B | C |
| Parramatta Road/Wattle Street | E | C | C |
| Parramatta Road/Great North Road | B | B | B |
| Parramatta Road/Arlington Street | B | C | C |
| Frederick Street/Church Street | B | B | B |
| Wattle Street/Ramsay Street | C | C | C |
| Dobroyd Parade/Waratah Street | A | A | B |
| City West Link/Timbrell Drive | C | D | F |
| **PM peak hour** | | | |
| Parramatta Road/Sloane Street | B | B | F |
| Parramatta Road/Liverpool Road | B | F | F |
| Parramatta Road/Dalhousie Street | B | B | B |
| Parramatta Road/Bland Street | B | B | B |
| Parramatta Road/Wattle Street | D | D | D |
| Parramatta Road/Great North Road | B | B | B |
| Parramatta Road/Arlington Street | B | C | C |
| Frederick Street/Church Street | B | B | B |
| Wattle Street/Ramsay Street | C | C | C |
| Dobroyd Parade/Waratah Street | A | B | B |
| City West Link/Timbrell Drive | D | F | F |

### *Travel times*

During the AM peak, forecast 2033 travel times generally remain consistent with 2023 forecast conditions. This is predominantly because a substantial amount of the increased demand is on roads which are either relatively free flowing in both scenarios (therefore volume increases do not result in significant travel time differences) or are already over capacity in the 2023 scenario (therefore additional demand is unreleased, with little impact on the travel times of vehicles within the network). The consistent travel times align with the network performance metrics, which forecast average speed in the network is relatively consistent between the 2023 and 2033 'without project' scenarios.

Travel times also remain generally similar in the PM peak, with minor increases in travel times across the network, in line with the forecast increased demand. A substantial amount of the additional demand in the 2033 scenario is unreleased and so impacts on travel times for vehicles that are able to enter the network are reduced.

### *Traffic crashes*

Traffic crash analysis comparing existing traffic conditions to 2033 'without project' conditions suggests that by 2033, an increase in traffic volumes would create a proportional increase in crash frequencies and costs along Parramatta Road in the vicinity of the Wattle Street interchange.

On Parramatta Road (Wattle Street to City Road) crashes would be expected to increase from an average of 108 to 130 per annum. The corresponding cost of crashes would rise from $11.6 million to $14.1 million per annum.

### *Public transport services*

As part of Condition B34 of the M4 East Conditions of Approval, at least two lanes of Parramatta Road from Burwood Road to Haberfield are to be solely dedicated for the use of public transport.

Because the details of these planned bus lanes (eg kerbside or centre-running) were unknown at the time of carrying out the traffic and transport assessment for the project, Parramatta Road kerbside lanes were converted to bus lanes in the modelled network from the western model extent to east of Bland Street. Vehicles turning left were allowed to enter kerbside lanes 100 metres in advance of intersections to accommodate left turns.

Future year bus frequencies were supplied by Transport for NSW and consist of an additional 40 buses per hour in each direction along Parramatta Road.

### *Active transport facilities*

Details of planned walking and cycling facilities in the absence of the project can be found in **Appendix N** (Technical working paper: Active transport strategy).

## Operational performance - Rozelle interchange

### *Changes to the road network in 'do minimum' scenario*

The road network within the Rozelle interchange operational model would not change from existing conditions in the 'do minimum' or 'without project' scenario.

### *Network performance*

#### 2015 base and 2023 'do minimum' scenario

In the 2023 AM and PM peak hour periods, total traffic demand would increase by around 11 per cent. Average time travelled in the network per vehicle is the same or similar to the 2015 base scenario, however average speed per vehicle would decrease by around nine per cent in the PM peak period.

In terms of the overall network performance, there would be a minor improvement in flow on the Western Distributor. However, there would be increased congestion on Victoria Road. The overall network performance in 2023 'do minimum' scenario would be slightly worse compared to the 2015 base scenario in terms of average travel times, number of stops and vehicle speeds.

**Table 8-62** and **Table 8-63** present a comparison of the performance of the modelled road network around the Rozelle interchange between the 2015 base scenario and 2023 'do minimum' scenario for the AM and PM peak periods. The benefits of the slight improvement in flow on Western Distributor are more or less negated by the increased congestion on Victoria Road, which means that the overall network performance in 2023 'without project' is slightly worse compared to the 2015 'base case' scenario in terms of average travel times, number of stops and vehicle speeds.

In the 2023 AM and PM peak hour periods, total traffic demand would increase by around 11 per cent. Average time travelled in the network per vehicle is the same or similar to the 2015 base scenario, however average speed per vehicle would decrease by around nine per cent in the PM peak period.

In terms of the overall network performance, there would be a minor improvement in flow on the Western Distributor. However, there would be increased congestion on Victoria Road. The overall network performance in 2023 'do minimum' scenario would be slightly worse compared to the 2015 base scenario in terms of average travel times, number of stops and vehicle speeds.

**Table 8-62 Rozelle interchange network performance – AM peak hour (2015 Base vs 2023 'without project' scenario)**

| Network measure | 2015 'base case' | 2023 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 19,969 | 22,087 | 11% |
| Total vehicle kilometres travelled in network (km) | 54,959 | 57,775 | 5% |
| Total time travelled approaching and in network (hr) | 4,016 | 5,355 | 33% |
| Total vehicles arrived | 20,298 | 21,621 | 7% |
| Total number of stops | 267,250 | 302,654 | 13% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.7 | 2.7 | 0% |
| Average time travelled in network (mins) | 9.6 | 10.1 | 5% |
| Average number of stops | 11.5 | 12.3 | 7% |
| Average speed (km/h) | 16.9 | 15.9 | -6% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 357 | 1,278 | – |
| % of total traffic demand | 2% | 6% | – |

**Table 8-63 Rozelle interchange network performance – PM peak hour (2015 Base vs 2023 'without project' scenario)**

| Network measure | 2015 Base | 2023 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 22,148 | 24,694 | 11% |
| Total vehicle kilometres travelled in network (km) | 61,980 | 61,136 | -1% |
| Total time travelled approaching and in network (hr) | 3,276 | 4,896 | 49% |
| Total vehicles arrived | 20,714 | 21,854 | 6% |
| Total number of stops | 133,380 | 146,986 | 10% |

| Network measure | 2015 Base | 2023 'without project' | Percentage change |
|---|---|---|---|
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 3.0 | 2.8 | -7% |
| Average time travelled in network (mins) | 8.2 | 8.3 | 1% |
| Average number of stops | 5.6 | 5.9 | 5% |
| Average speed (km/h) | 21.9 | 20.3 | -7% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 823 | 2,684 | – |
| % of total traffic demand | 4% | 11% | – |

**2023 'do minimum' and 2033 'do minimum' scenario**

**Table 8-64** and **Table 8-65** present a comparison of the performance of the modelled road network between the 2023 and 2033 'do minimum' (or 'without project') scenarios for the AM and PM peak hours. Total traffic demand would increase by around 10 per cent and seven per cent during the AM and PM peak periods respectively. The overall performance is forecast to deteriorate between 2023 and 2033, with longer travel times, lower average speeds and higher average number of stops. The number of unreleased vehicles would also increase, indicating increasing congestion in the network.

**Table 8-64 Rozelle interchange network performance – AM peak hour (2023 'without project' vs 2033 'without project' scenario)**

| Network measure | 2023 'without project' | 2033 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 22,087 | 24,307 | 10% |
| Total vehicle kilometres travelled in network (km) | 57,775 | 59,866 | 4% |
| Total time travelled approaching and in network (hr) | 5,355 | 7,041 | 31% |
| Total vehicles arrived | 21,621 | 22,682 | 5% |
| Total number of stops | 302,654 | 314,527 | 4% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.7 | 2.6 | -4% |
| Average time travelled in network (mins) | 10.1 | 10.3 | 2% |
| Average number of stops | 12.3 | 12.0 | -2% |
| Average speed (km/h) | 15.9 | 15.4 | -3% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 1,278 | 2,233 | – |
| % of total traffic demand | 6% | 9% | – |

**Table 8-65 Rozelle interchange network performance – PM peak hour (2023 'without project' vs 2033 'without project' scenario)**

| Network measure | 2023 'without project' | 2033 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 24,694 | 26,528 | 7% |
| Total vehicle kilometres travelled in network (km) | 61,136 | 60,908 | 0% |
| Total time travelled approaching and in network (hr) | 4,896 | 6,146 | 26% |
| Total vehicles arrived | 21,854 | 22,679 | 4% |
| Total number of stops | 146,986 | 151,862 | 3% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.8 | 2.7 | -4% |
| Average time travelled in network (mins) | 8.3 | 8.2 | -1% |
| Average number of stops | 5.9 | 5.9 | 0% |
| Average speed (km/h) | 20.3 | 19.7 | -3% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 2,684 | 3,591 | – |
| % of total traffic demand | 11% | 14% | – |

*Intersection performance*

**Table 8-66** presents a comparison of intersection performance between the 2015 base scenario and 2023 and 2033 'without project' scenarios for the AM and PM peak periods.

The intersection performance results demonstrate the following intersections would experience significant congestion during the AM and PM peak hours in the 'without project' case by 2033:

- Victoria Road/Lyons Road
- Victoria Road/Darling Street
- Victoria Road/Robert Street
- Victoria Road/The Crescent
- The Crescent/Johnston Street.

**Table 8-66 Rozelle interchange: key intersection performance (LoS) – 2023 and 2033 'without project' scenarios**

| Key intersections | 2015 'base case ' | 2023 'without project ' | 2033 'without project ' |
|---|---|---|---|
| **AM peak hour** | | | |
| Victoria Road/Lyons Road | D | F | F |
| Victoria Road/Wellington Street | D | D | D |
| Victoria Road/Darling Street | F | F | F |
| Victoria Road/Robert Street | D | D | D |

| Key intersections | 2015 'base case ' | 2023 'without project ' | 2033 'without project ' |
|---|---|---|---|
| Victoria Road/The Crescent | B | B | C |
| The Crescent/James Craig Road | A | A | B |
| City West Link/The Crescent | B | B | B |
| The Crescent/Johnston Street | C | C | D |
| **PM peak hour** | | | |
| Victoria Road/Lyons Road | D | F | F |
| Victoria Road/Wellington Street | B | D | D |
| Victoria Road/Darling Street | F | F | F |
| Victoria Road/Robert Street | F | F | F |
| Victoria Road/The Crescent | F | F | E |
| The Crescent/James Craig Road | B | C | B |
| City West Link/The Crescent | D | F | D |
| The Crescent/Johnston Street | F | F | E |

Higher traffic demands in the 2033 'without project' PM peak hour would mean that westbound traffic would be constrained by the capacity of Anzac Bridge, which limits the flows that reach Victoria Road, The Crescent and City West Link. Therefore, improved levels of service at Victoria Road/The Crescent, City West Link/James Craig Road, City West Link/The Crescent and The Crescent/Johnston Street intersections are forecast in the 2033 PM peak hour.

### *Travel times*

Due to the difference in trip distribution with fewer vehicles heading to Bathurst Street and more to Sussex Street in the AM peak hour, traffic flow on the Western Distributor is forecast to improve, resulting in less queueing back on Anzac Bridge. Therefore, slightly better travel times are forecast to be achieved in the eastbound direction. In the westbound direction, especially towards Iron Cove Bridge, travel times worsened due to increases in both the forecast demands and number of bus movements.

In the PM peak hour, differences in trip distribution at different times resulted in travel time changes along each route. In 2023, northbound bus volumes on Victoria Road increase, which worsens congestion and northbound travel times. However, by 2033 increased congestion on Anzac Bridge due to forecast growth in traffic to The Crescent results in fewer vehicles northbound on Victoria Road and faster journey times on this route.

### *Traffic crashes*

The frequency of crashes on the roads in the vicinity of the Rozelle interchange would be expected to increase in proportion to forecast traffic growth in the future. By 2033, the growth in traffic volumes would create a proportional rise in crash frequencies and costs. On this basis the forecast growth in traffic would be expected to result in both the total number and cost of crashes increasing.

### *Public transport services*

Increased bus frequencies are planned along Victoria Road. Bus movement and frequency forecasts have been provided by Transport for NSW, which indicate more than two buses per minute in the peak direction along most of Victoria Road and more than three buses per minute on the southern section of Victoria Road. They would continue to run in kerbside bus lanes as currently demarcated.

### *Active transport facilities*

Details of planned walking and cycling facilities in the absence of the project can be found in the **Appendix N** (Technical working paper: Active transport strategy).

## Operational performance – St Peters interchange

*Changes to the road network in 'do minimum' scenario*

The St Peters interchange is at the eastern end of the New M5 project and, as such, associated New M5 road network infrastructure was included in the 'do minimum' or 'without project' scenario models. Since the New M5 EIS assessment, changes to the road network have been planned and have also been included in the 'do minimum' or 'without project' scenario, including:

- Improvements to the intersection of the Princes Highway and Railway Road in accordance with the Pinch Point Program being carried out by Roads and Maritime
- The Airport North Precinct project
- Changes to the layout of the Gardeners Road/Kent Road intersection
- Changes to the layout of the Campbell Road/Bourke Road intersection.

The King Street Gateway project has not been included in the operational modelling around the St Peters interchange. The King Street Gateway project is not impeded by the M4-M5 Link project.

Further detail about these changes to the road network is included in **Appendix H** (Technical working paper: Traffic and transport).

*Network performance*

**2015 base and 2023 'without project' scenario**

**Table 8-67** and **Table 8-68** present a comparison of the performance of the modelled road network around the St Peters interchange between the 2015 base scenario and 2023 'without project' scenario for the AM and PM peak periods.

In the AM peak periods, there would be an overall decrease in performance, which is reflected in higher total time travelled in the network and higher number of stops. There is a 19 per cent increase in forecast total traffic demand which results in more vehicles arriving at their destination, but this also affects all average measures per vehicle, which are worse in the 2023 'without project' scenario. Average speed in the network drops by 34 per cent and there are noticeably more unreleased vehicles (eight per cent of total peak hour demand).

In the PM peak periods, despite 18 per cent more demand in the 2023 'without project' scenario, the modelled network performs similarly to the base case in the PM peak. The number of vehicles arriving at their destination increased by the same proportion as the total demand and average speed in the network is comparable with the base case. The increase in average speed in the 'without project' is due to the ramps leading to and from the New M5 project. These ramps allow vehicles to travel faster, which increase the overall average speed in the network, and also remove a proportion of traffic from the surface network freeing up some capacity for the remaining surface traffic. The result is that despite higher overall demands, the overall network performance is similar to the 2015 base network performance.

**Table 8-67 St Peters interchange network performance – AM peak hour (2015 Base vs 2023 'without project' scenario)**

| Network measure | 2015 'base case' | 2023 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 22,080 | 26,060 | 18% |
| Total vehicle kilometres travelled in network (km) | 62,220 | 77,500 | 25% |
| Total time travelled approaching and in network (hr) | 2,350 | 5,150 | 119% |
| Total vehicles arrived | 21,840 | 23,710 | 9% |
| Total number of stops | 105,830 | 201,290 | 90% |

| Network measure | 2015 'base case' | 2023 'without project' | Percentage change |
|---|---|---|---|
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.6 | 2.8 | 7% |
| Average time travelled in network (mins) | 5.8 | 9.5 | 63% |
| Average number of stops | 4.8 | 8.5 | 75% |
| Average speed (km/h) | 26.8 | 17.6 | -34% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 90 | 2,120 | – |
| % of total traffic demand | 0% | 8% | – |
| Demand reduction to/from Sydney Airport precinct (veh) | – | 640 | – |

**Table 8-68 St Peters interchange network performance – PM peak hour (2015 Base vs 2023 'without project' scenario)**

| Network measure | 2015 'base case' | 2023 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 21,390 | 25,210 | 18% |
| Total vehicle kilometres travelled in network (km) | 59,650 | 78,920 | 32% |
| Total time travelled approaching and in network (hr) | 2,370 | 2,850 | 20% |
| Total vehicles arrived | 21,160 | 24,960 | 18% |
| Total number of stops | 101,670 | 127,390 | 25% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.6 | 2.9 | 10% |
| Average time travelled in network (mins) | 5.9 | 6.1 | 2% |
| Average number of stops | 4.8 | 5.1 | 6% |
| Average speed (km/h) | 26.1 | 28.2 | 8% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 250 | 220 | – |
| % of total traffic demand | 1% | 1% | – |
| Demand reduction to/from Sydney Airport precinct (veh) | – | 230 | – |

**2023 'do minimum' and 2033 'do minimum' scenario**

**Table 8-69** and **Table 8-70** present a comparison of the performance of the modelled road network between the 2023 and 2033 'without project' scenarios for the AM and PM peak hours.

The AM peak hour network performance indicates an increase in demand in the 2033 'without project' scenario compared to the 2023 'without project' scenario, with corresponding declines in network performance. With 12 per cent higher demand than the 2023 'without project' scenario, the number of vehicles arriving at their destination drops by 13 per cent and total time travelled in the network more than doubles. All average vehicle performance metrics worsen. Average speed in the network

decreases to nine kilometres per hour and the number of unreleased vehicles increases to 24 per cent of the total demand. This indicates that by 2033 the network is performing inefficiently.

The PM peak hour network performance results show that, similar to the AM peak hour, the network is forecast to be more congested by 2033. All average vehicle performance indicators deteriorate and the average speed of around 18 kilometres per hour indicates a road network with decreased performance.

**Table 8-69 St Peters interchange network performance – AM peak hour (2023 'without project' vs 2033 'without project' scenario)**

| Network measure | 2023 'without project' | 2033 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 26,060 | 29,160 | 12% |
| Total vehicle kilometres travelled in network (km) | 77,500 | 72,830 | -6% |
| Total time travelled approaching and in network (hr) | 5,150 | 12,360 | 140% |
| Total vehicles arrived | 23,710 | 20,720 | -13% |
| Total number of stops | 201,290 | 274,310 | 36% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.8 | 2.6 | -8% |
| Average time travelled in network (mins) | 9.5 | 17.0 | 80% |
| Average number of stops | 8.5 | 13.2 | 56% |
| Average speed (km/h) | 17.6 | 9.0 | -49% |
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 2,120 | 6,950 | – |
| % of total traffic demand | 8% | 24% | – |
| Demand reduction to/from Sydney Airport precinct (veh) | 640 | 690 | – |

**Table 8-70 St Peters interchange network performance – PM peak hour (2023 'without project' vs 2033 'without project' scenario)**

| Network measure | 2023 'without project' | 2033 'without project' | Percentage change |
|---|---|---|---|
| **All vehicles** | | | |
| Total traffic demand (veh) | 25,210 | 27,610 | 10% |
| Total vehicle kilometres travelled in network (km) | 78,920 | 84,570 | 7% |
| Total time travelled approaching and in network (hr) | 2,850 | 4,970 | 74% |
| Total vehicles arrived | 24,960 | 26,350 | 6% |
| Total number of stops | 127,390 | 195,250 | 53% |
| **Average per vehicle in network** | | | |
| Average vehicle kilometres travelled in network (km) | 2.9 | 2.8 | -3% |
| Average time travelled in network (mins) | 6.1 | 9.2 | 51% |
| Average number of stops | 5.1 | 7.4 | 45% |
| Average speed (km/h) | 28.2 | 18.0 | -36% |

| Network measure | 2023 'without project' | 2033 'without project' | Percentage change |
|---|---|---|---|
| **Unreleased vehicles** | | | |
| Unreleased demand (veh) | 220 | 1,150 | – |
| % of total traffic demand | 1% | 4% | – |
| Unreleased demand (demand reduction) (veh) | 230 | 320 | – |

*Intersection performance*

**Table 8-71** presents the modelled AM and PM peak hour LoS for key intersections at St Peters. The level of service for each intersection is forecast to consistently worsen when compared with the 2015 'base case' scenario. By 2033, the network is forecast to not be able to accommodate the forecast traffic demand, especially in the AM peak hour.

**Table 8-71 St Peters interchange: key intersection performance (LoS) – 2023 and 2033 'without project' scenarios**

| Key intersections | 2015 'base case' | 2023 'without project' | 2033 'without project ' |
|---|---|---|---|
| **AM peak hour** | | | |
| Princes Highway/Sydney Park Road | C | C | F |
| Princes Highway/May Street | D | C | F |
| Princes Highway/Canal Road | D | F | F |
| Princes Highway/Railway Road | F | F | F |
| Sydney Park Rd/Mitchell Road | C | B | F |
| Euston Road/Sydney Park Road | A | C | F |
| Unwins Bridge Road/Campbell Street | C | D | F |
| Campbell Road/Euston Road | A | C | F |
| Campbell Road/Bourke Road | - | B | B |
| Princes Highway/Campbell Street | C | F | F |
| Ricketty Street/Kent Road | C | E | F |
| Gardeners Road/Kent Road | A | C | F |
| Gardeners Road/Bourke Road | C | F | F |
| Gardeners Rd/O'Riordan Street | D | F | F |
| **PM peak hour** | | | |
| Princes Highway/Sydney Park Road | D | B | D |
| Princes Highway/May Street | F | C | B |
| Princes Highway/Canal Road | D | D | F |
| Princes Highway/Railway Road | D | D | F |
| Sydney Park Rd/Mitchell Road | D | C | D |
| Euston Road/Sydney Park Road | B | D | D |
| Unwins Bridge Road/Campbell Street | D | E | F |

| Key intersections | 2015 'base case' | 2023 'without project' | 2033 'without project ' |
|---|---|---|---|
| Campbell Road/Euston Road | A | E | E |
| Campbell Road/Bourke Road | - | B | B |
| Princes Highway/Campbell Street | D | F | F |
| Ricketty Street/Kent Road | C | C | F |
| Gardeners Road/Kent Road | A | B | D |
| Gardeners Road/Bourke Road | D | D | F |
| Gardeners Rd/O'Riordan Street | E | F | F |

### *Travel times*

In addition to network performance statistics, travel times for selected routes within the modelled area were compared for the 2023 and 2033 'without project' scenarios. Travel times were measured for the following routes:

- Princes Highway, near Bellevue Street, to Euston Road, north of Maddox Street (and in the opposite direction)
- WestConnex South (New M5 northbound exit ramp) to Euston Road, north of Maddox Street (and in the opposite direction)
- King Street, north of Sydney Park Road, to Domestic Airport Terminals (and in the opposite direction)
- Railway Road, near Unwins Bridge Road, to Gardeners Road, east of Botany Road (and in the opposite direction).

In both peak hours, each section has consistently longer travel times in 2033, with the highest increase in travel time on the route between King Street and the Sydney Airport Domestic Terminals.

### *Traffic crashes*

The frequency of crashes on surface roads in the St Peters area would be expected to change relative to the forecast traffic changes, as well as the intersection upgrades planned as part of the New M5 project. This is described in detail in the Traffic and Transport Technical working paper of the New M5 EIS (AECOM 2015b).

Traffic crash analysis comparing existing traffic conditions to 2033 'without project' conditions suggests that by 2033, the growth in traffic volumes would create a proportional change in crash frequencies and costs in the vicinity of the St Peters area.

The frequency of crashes on the combined M5 East and New M5 Motorways would also be expected to increase in proportion to forecast traffic growth on these roads in the future. The potential for crashes on the M5 East Motorway has been assumed to remain at the crash rates per vehicle kilometre travelled as calculated from data recorded during the period from January 2009 to December 2013. The potential for crashes in the New M5 tunnel has been undertaken using the crash rates on the existing Sydney motorway tunnels (Lane Cove, Eastern Distributor, Cross City and Sydney Harbour tunnels).

Traffic crash analysis of the M5 Motorway corridor, comparing existing traffic conditions, to 2033 'without project' conditions, suggests that in 2033, there would be a small decrease in the total number and cost of crashes on the M5 Motorway corridor despite a large increase in traffic volumes.

### *Public transport services*

*Sydney's Bus Future* (Transport for NSW 2013) was developed to complement the *Transport Master Plan* by redesigning the city's bus network to meet current and future customer needs through

identifying short and longer term priorities for bus services across Sydney. Transport for NSW has identified the following planned suburban routes, which have target average speeds, including dwell times, of 18–25 kilometres per hour (Transport for NSW 2013), that would travel through the St Peters interchange area:

- Chatswood to Sydney Airport via Sydney CBD and Botany Road (new route replacing the M20)
- Lane Cove to Eastgardens via Sydney CBD, Surry Hills and Botany Rd (new route)
- Hurstville to Sydney CBD via Earlwood and Newtown (current route 423)
- Bondi Junction to Miranda via Airport and Eastgardens (new route)
- Bondi Junction to Burwood via Airport and Eastgardens (current route 400)
- Bondi Junction to Burwood via Sydenham (current route 418).

*Sydney's Rail Future: Modernising Sydney's Trains* (Transport for NSW 2012) was developed to complement the Transport Master Plan with a particular focus on improving Sydney's rail system. In particular, *Sydney's Rail Future* highlighted the need to improve the East Hills, Airport and Inner West railway line, which runs generally parallel to the project, and also highlights the introduction of a Rapid Transit line, as an extension of the North West Rail Link. Now called Sydney Metro, this rapid transit line would primarily serve north-western Sydney and the Lower North Shore through the Sydney CBD to Bankstown, via Sydenham.

Sydney Metro Northwest is programmed to open in 2019, while Sydney Metro City and South West (the extension through the Sydney CBD to Bankstown) is programmed to open from 2024. Sydney Metro would not serve the two closest stations to the study area – St Peters and Mascot stations. The closest Metro station would be Sydenham Station.

#### *Active transport facilities*

Details of planned walking and cycling facilities in the absence of the project can be found in the **Appendix N** (Technical working paper: Active transport strategy) and includes the network of shared paths that would be provided around the St Peters interchange as part of the New M5 project.

### 8.3.3 Assessment of operational impacts of the project

This section details the forecast traffic performance during the 'with project' scenarios carried out using forecast traffic volumes for the following scenarios:

- **'With project' (2023)**: including NorthConnex, M4 Widening, M4 East, New M5 and the M4-M5 Link are complete and open to traffic
- **'With project' (2033)**: including the same road network as the 'with project' (2023) scenario is and assumes no proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link or F6 Extension.

#### Summary

A number of key benefits and improvements are forecast as a result of the project:

- Non-motorway roads in the Inner West LGA are forecast to experience faster trips with the daily average speed increasing by about 10 per cent. Similarly, the vehicle distance travelled on non-motorway roads is forecast to reduce by about 12 per cent. This indicates that on average, these trips are fewer in number and faster
- Improved network productivity on the metropolitan network, with more trips forecast to be made or longer distances travelled on the network in a shorter time. The forecast increase in VKT and reduction in vehicle hours travelled (VHT) is mainly due to traffic using the new motorway, with reductions in daily VKT and VHT forecast on non-motorway roads
- The project, along with investment in other road, public transport and active transport projects, would help to accommodate the forecast growth in population and travel demand in the Sydney metropolitan area

- Reduced travel times are forecast on key corridors, such as between the M4 Motorway corridor and the Sydney Airport/Port Botany precinct
- Reduced traffic forecast on sections of major arterial roads including City West Link, Parramatta Road, Victoria Road, King Street, Princes Highway, Southern Cross Drive and Sydenham Road
- Almost 2,000 heavy vehicles are forecast to be removed from Parramatta Road, east of the M4 East Parramatta Road ramps, each weekday.

Where the project would connect to the existing road network, increased congestion is forecast in parts of Mascot, along Frederick Street at Haberfield, Victoria Road north of Iron Cove Bridge, Johnston Street at Annandale and on the Western Distributor. The performance of the road network at a number of these areas would be improved when the proposed future Sydney Gateway and Western Harbour Tunnel and Beaches Link projects are completed.

### Sydney metropolitan road network

*'With project' (2023)*

**Figure 8-13** shows the forecast change in daily traffic volumes between the 2023 'with project' and 'without project' scenarios. The changes shown represent differences in the forecast AWT between the modelled scenarios. Roads that are expected to carry less traffic in the future 2023 'with project' scenario are shown in green and roads where traffic volumes are predicted to increase are shown in red. The band thickness is indicative of the magnitude of this change. These forecast traffic volumes include both fixed and induced traffic demand.

The project provides a key link in the Sydney motorway network, connecting the M4 East Motorway to the New M5 Motorway, as well as to the Western Distributor, Cross City Tunnel and the M1 Motorway. With the inclusion of the project, a large volume of traffic is forecast to shift to the M4-M5 Link, including the Iron Cove Link, with significant reductions in daily traffic volumes forecast on Parramatta Road (east of the M4 East Parramatta Road ramps), City West Link and Victoria Road (east of Iron Cove Bridge).

Increases in daily traffic are forecast on the M4 East Motorway and Anzac Bridge/Western Distributor, as traffic accesses the M4-M5 Link. This is shown by the thick red lines on the motorway network and the corresponding reduction in traffic on the surface network as illustrated by the green lines.

As a consequence of traffic using the project, reductions in daily traffic are forecast for the existing M5 East Motorway, Southern Cross Drive and King Georges Road, north of the existing M5 East Motorway. Traffic reductions are also forecast on roads through the Inner West, such as Stanmore Road and Sydenham Road, which link Parramatta Road to the St Peters and Mascot areas, as traffic shifts to the M4-M5 Link instead.

Increases in daily traffic on surface roads between the St Peters interchange and Sydney Airport are forecast. Reductions are forecast on sections of Princes Highway and Canal Road. With the inclusion of the M4-M5 Link, reductions in peak period travel times between the M4 corridor and the Sydney Airport/Port Botany precinct in 2023, with traffic shifting from the A3 (King Georges Road) corridor to the M4-M5 Link. Changes in peak period travel times as a result of the project include:

- Between Parramatta and Sydney Airport, average peak period travel times are forecast to reduce by about 10 minutes. This saving is part of a 25 minute saving comparing the 2023 'with project' scenario to a scenario without WestConnex
- Between Burwood and Sydney Airport, average peak period travel times are forecast to reduce by about five minutes. This saving is part of a 15 minute saving comparing the 2023 'with project' scenario to a scenario without WestConnex
- Between Silverwater and Port Botany, average peak period travel times are forecast to reduce by about 10 minutes. This saving is part of a 15 minute saving comparing the 2023 'with project' scenario to a scenario without WestConnex.

In 2023, with the inclusion of the project, road network productivity would improve as indicated by a drop in daily VKT and VHT on the arterial (non-motorway) network, with an increase in kilometres and hours travelled along the motorway and highway routes. Overall, the road network would

accommodate more or longer trips in a shorter time. As shown in **Table 8-72**, the increase in daily VKT and drop in VHT is mainly due to traffic using the new motorway, with reductions in daily VKT and VHT forecast on non-motorway roads.

**Table 8-72 Comparison of daily 2023 VKT and VHT for metropolitan Sydney in the 'without project' and 'with project' scenarios**

| Scenario | Daily VKT ('000 km) | | | Daily VHT ('000 hours) | | |
|---|---|---|---|---|---|---|
| | Motorway | Other | Total | Motorway | Other | Total |
| Do minimum (without project) | 26,880 | 86,520 | 113,400 | 470 | 3,160 | 3,630 |
| With project | 27,730 | 86,050 | 113,780 | 480 | 3,120 | 3,600 |

Source: WRTM v2.3, 2017

### On-road freight

Forecast changes in daily road-based freight or heavy vehicle movements follow the same pattern as the general traffic movements, with significant reductions in daily heavy vehicle traffic volumes focused on Parramatta Road (east of the M4 East Parramatta Road ramps), City West Link, Victoria Road (east of Iron Cove Bridge), King Georges Road and the existing M5 East Motorway. There are also reductions forecast along Stanmore Road and Sydenham Road in the inner west.

Increases in daily heavy vehicle traffic on surface roads between the St Peters interchange and Sydney Airport are forecast, with reductions in daily heavy vehicle volumes forecast on sections of Princes Highway and Canal Road.

### On-road public transport

Changes in traffic volumes on roads that are also key bus corridors would be expected to impact on the reliability and the journey times of on-road public transport. Reduced traffic volumes on key bus corridors would improve public transport journey times and reliability. While bus journey times would benefit from reduced traffic on Victoria Road (east of Iron Cove Bridge), this would be offset by the forecast increase in traffic and congestion on Anzac Bridge/Western Distributor.

A large forecast decrease in traffic on Parramatta Road, east of the M4 East Parramatta Road ramps, would improve reliability and trip times of bus services on Parramatta Road.

### Changes by LGA on non-motorway links

**Table 8-73** presents the percentage changes in daily VKT, VHT and average speed in 2023 with the project on non-motorway links in the LGAs closest to the project. The average speed would vary by time of day and by road type. The forecast percentage changes indicate that, apart from Bayside, all other LGAs either benefit from reduced traffic on surface roads or there is no forecast change. The increase in VKT and VHT in Bayside LGA is due to forecast increases in daily traffic on surface roads between the St Peters interchange and Sydney Airport, in the absence of Sydney Gateway.

**Table 8-73 Percentage change in daily travel distance, time and average speed on non-motorway links by LGA in 2023**

| Local Government Area | Daily VKT | Daily VHT | Daily average speed |
|---|---|---|---|
| Bayside | 1% | 3% | -2% |
| Burwood | -2% | -2% | 0% |
| Canada Bay | 0% | 0% | 0% |
| Canterbury-Bankstown | -1% | -3% | 2% |
| Inner West | -12% | -20% | 10% |
| Strathfield | -2% | -4% | 2% |
| Sydney | -2% | -2% | 0% |

Source: WRTM v2.3, 2017

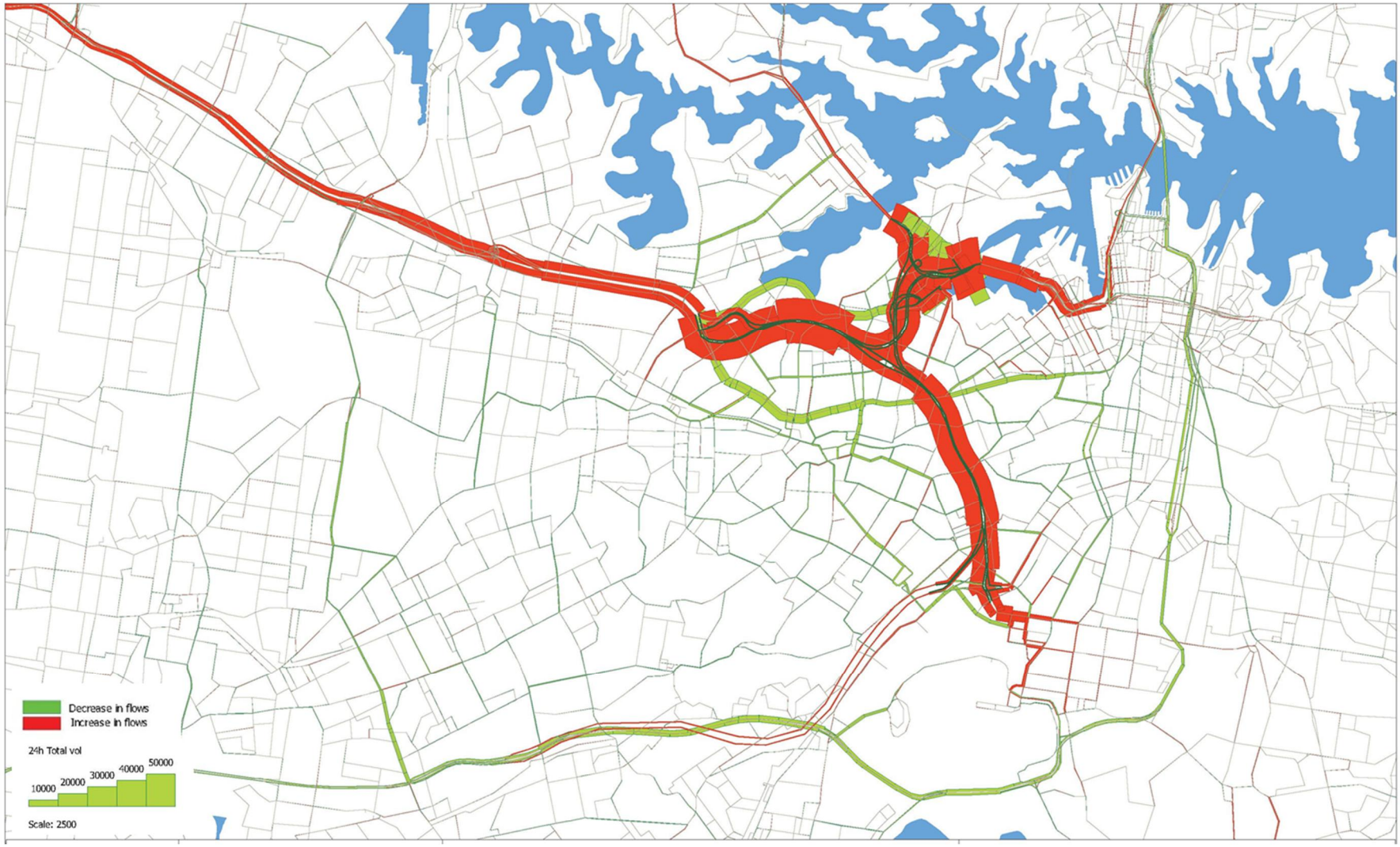



**Figure 8-13 Difference in AWT between 2023 'with project' and 'without project' scenarios**

Source: WRTM v2.3, 2016

*'With project' (2033)*

**Figure 8-14** shows bandwidth plots illustrating the forecast change in daily traffic volumes between the 2033 'with project' and 'without project' scenarios.

**General traffic**

The pattern of change in the 2033 comparison is generally the same as in the 2023 comparison, however, on some roads the forecast increases in daily traffic volumes are less pronounced due to the growth in background traffic by 2033.

With the inclusion of the M4-M5 Link, the WRTM is forecasting reductions in peak period travel times between the M4 corridor and the Sydney Airport/Port Botany precinct in 2033, with traffic shifting from the A3 (King Georges Road) corridor to the M4-M5 Link. For example:

- Between Parramatta and Sydney Airport, average peak period travel times are forecast to reduce by about 10 minutes. This saving is part of a 30 minute saving comparing the 2033 'with project' scenario to a scenario without WestConnex
- Between Burwood and Sydney Airport, average peak period travel times are forecast to reduce by about five minutes. This saving is part of a 20 minute saving comparing the 2033 'with project' scenario to a scenario without WestConnex
- Between Silverwater and Port Botany, average peak period travel times are forecast to reduce by about 10 minutes. This saving is part of a 20 minute saving comparing the 2033 'with project' scenario to a scenario without WestConnex.

With the inclusion of the project there is a drop in the daily VKT and VHT on the arterial (non-motorway) network and a corresponding increase in kilometres and hours travelled along the motorway and highway routes. The addition of the M4-M5 Link provides a substantial overall benefit to the network where more or longer trips could be made on the road network in a shorter time.

**Table 8-74 Comparison of daily 2033 VKT and VHT for metropolitan Sydney in 'without project' and 'with project' scenarios**

| Scenario | Daily VKT ('000 km) | | | Daily VHT ('000 hours) | | |
|---|---|---|---|---|---|---|
| | Motorway | Other | Total | Motorway | Other | Total |
| Do minimum (without project) | 31,030 | 101,900 | 132,930 | 590 | 4,670 | 5,560 |
| With project | 32,010 | 101,410 | 133,430 | 600 | 4,610 | 5,220 |

Source: WRTM v2.3, 2017

**On-road freight**

Forecast changes in daily road-based freight or heavy vehicle movements would generally follow the same pattern as the 2023 comparison. Significant reductions in daily heavy vehicle traffic are forecast on Parramatta Road (east of the M4 East Parramatta Road ramps), City West Link, Victoria Road (east of Iron Cove Bridge), King Georges Road and the M5 East Motorway.

**On-road public transport**

The anticipated impacts of the project on on-road public transport in 2023 and 2033 are similar. Changes in traffic volumes on roads that are also key bus corridors would be expected to impact on the reliability and the trip times of on-road public transport. Reduced traffic on key bus corridors would improve journey times and reliability. Reduced traffic is forecast on Victoria Road (east of Iron Cove Bridge), however this is offset by the forecast increase on Anzac Bridge/Western Distributor. A large forecast decrease in traffic on Parramatta Road, east of the M4 East Parramatta Road ramps, would improve reliability and trip times of bus services on Parramatta Road.

### Changes by LGA on non-motorway links

**Table 8-75** presents the percentage changes in daily VKT, VHT and average speed in 2033 with the project on non-motorway links in the LGAs that are closest to the project. The average speed would vary by time of day and by road type. The changes are similar to the 2023 comparison. Apart from Bayside, all other LGAs benefit from reduced traffic on surface roads. Again, the increase in VKT and VHT in Bayside LGA is due to forecast increases in daily traffic on surface roads between the St Peters interchange and Sydney Airport, in the absence of Sydney Gateway.

**Table 8-75 Percentage change in daily travel distance, time and average speed by LGA in 2033**

| Local Government Area | Daily VKT | Daily VHT | Daily average speed |
|---|---|---|---|
| Bayside | 1% | 4% | -3% |
| Burwood | -2% | -3% | 1% |
| Canada Bay | -1% | -1% | 0% |
| Canterbury-Bankstown | -1% | -4% | 3% |
| Inner West | -11% | -21% | 14% |
| Strathfield | -1% | -4% | 3% |
| Sydney | -2% | -2% | 0% |

Source: WRTM v2.3, 2017

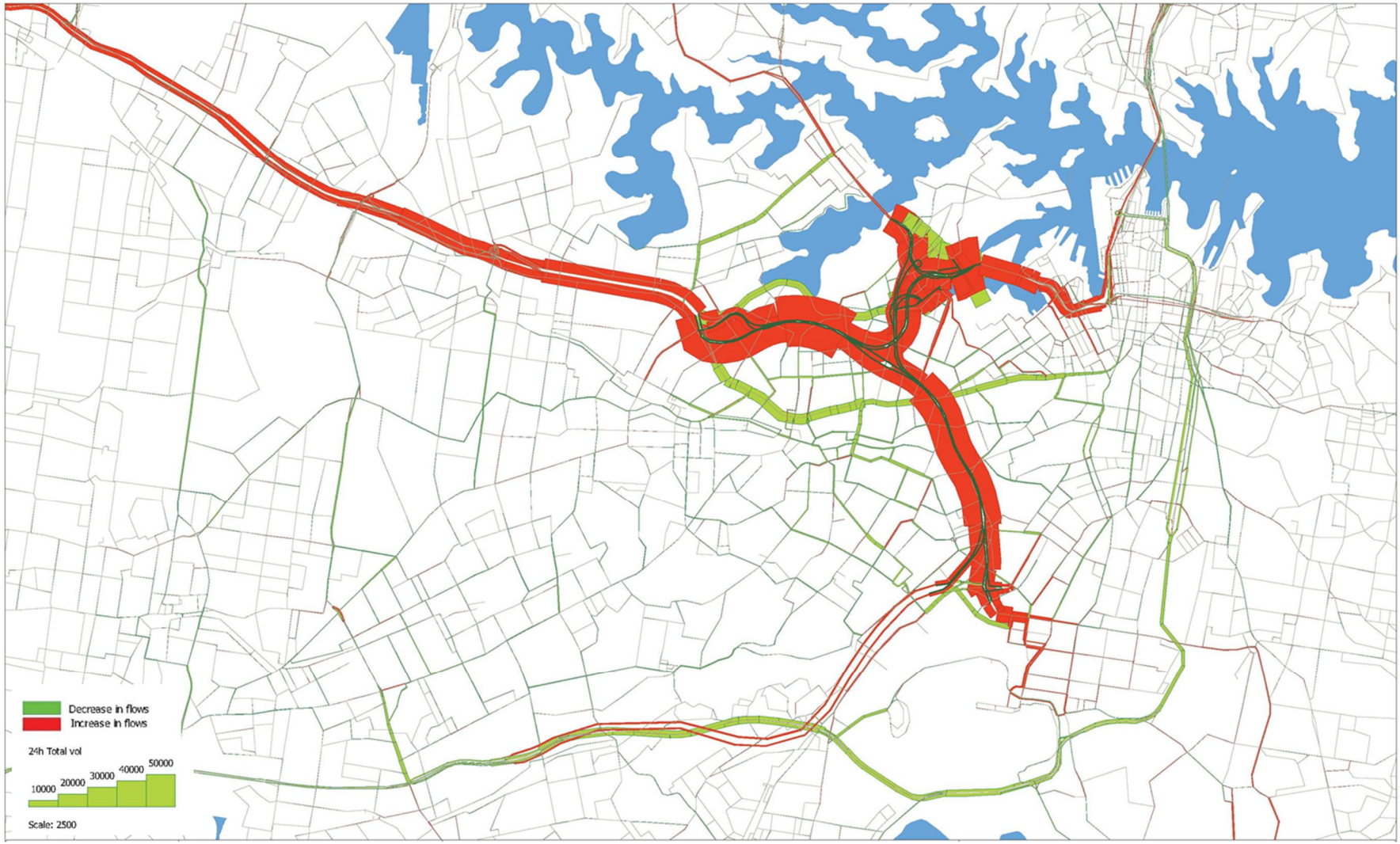



**Figure 8-14 Difference in AWT between 2033 'with project' and 'without project' scenarios**

Source: WRTM v2.3, 2016

### Screenline/parallel route analysis

A screenline analysis has been carried out to examine how traffic patterns along and adjacent to the arterial road network may change as a result of the operation of the project (in 2023 and 2033). Analysis of the operation of the WestConnex program of works, as well as the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension projects was also undertaken.

Four screenlines, which represent theoretical boundaries specifically designed to collectively analyse directional and two-way traffic volume outputs from the different modelling scenarios have been established:

- The east–west screenline captures changes in east–west traffic movement and includes a location on the M4-M5 Link mainline tunnels between the Wattle Street and Rozelle interchanges, as well as on four parallel corridors (City West Link, Darley Road, Marion Street and Parramatta Road). This screenline also includes a location on Lyons Road, which would reflect any changes in traffic using Lyons Road to travel to and from Victoria Road
- The upper north–south screenline captures changes in vehicle travel patterns on north–south links north of Parramatta Road, including Norton Street, Balmain Road, Catherine Street, Johnston Street, Booth Street (north of Pyrmont Bridge Road) and Ross Street (north of Bridge Road). These roads are close to the Rozelle interchange and would display changes in traffic on surface roads as a result of the new road connections at the Rozelle interchange
- The lower north–south screenline includes a location on the M4-M5 Link mainline tunnels between the Rozelle interchange and the St Peters interchange, as well as locations on 10 north–south regional connector roads (Stanmore Road, Addison Road, Sydenham Road, Marrickville Road, King Street, Wyndham Street, Botany Road, Elizabeth Street, South Dowling Street and the Southern Cross Drive)
- The cross-harbour screenline looks at changes in cross-harbour traffic flow on the Sydney Harbour Bridge, Sydney Harbour Tunnel and the Gladesville Bridge. It also includes a location on the proposed future Western Harbour Tunnel in the 2023 and 2033 ‘cumulative’ scenarios.

The screenline analysis also included an analysis of impacts during peak hours to see how the M4-M5 Link may impact on the wider road network during these periods. A summary of the screenline and peak hour analyses is provided in the following sections. Screenline locations are shown in **Figure 8-15**.

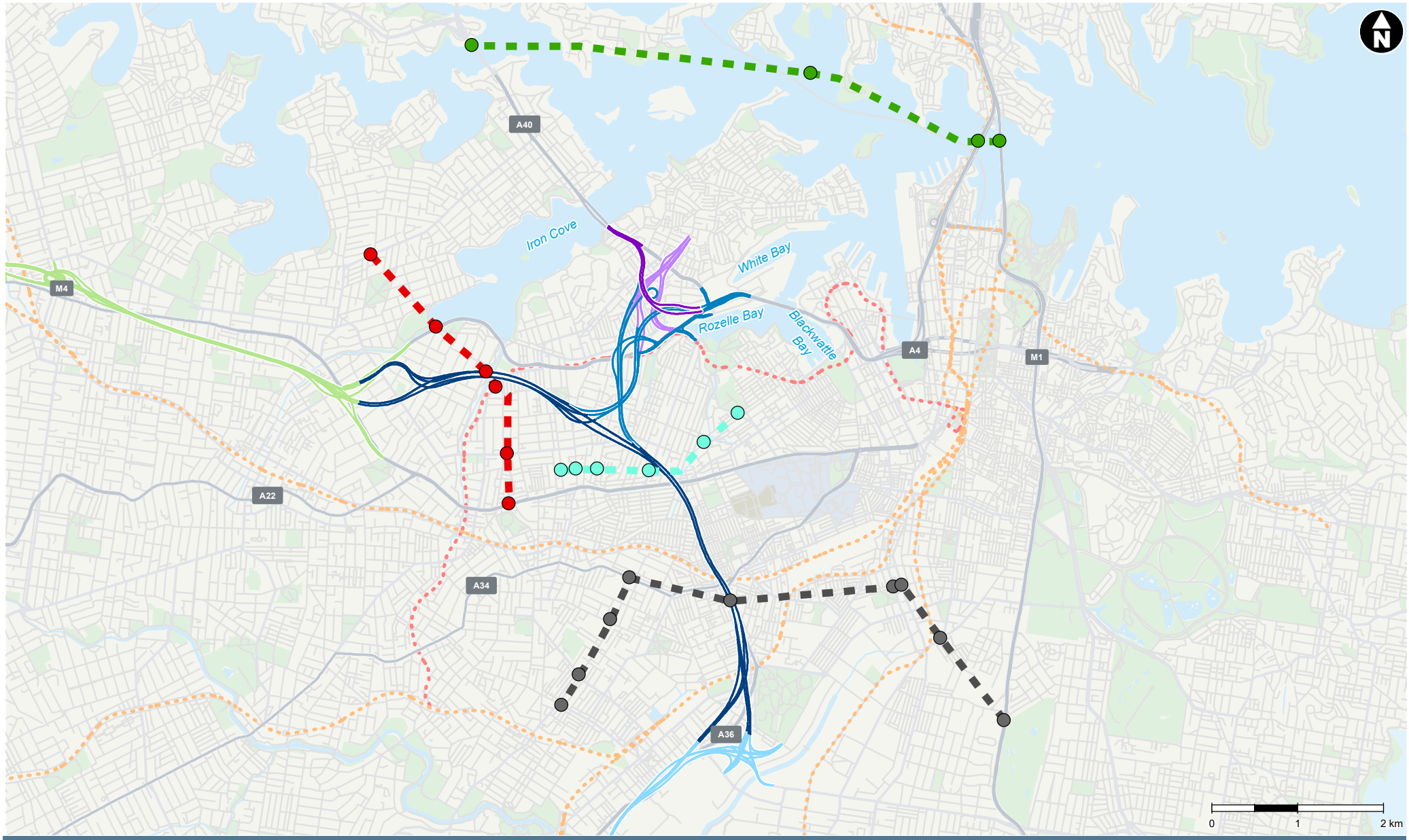



**Figure 8-15** Screenline locations

## Summary

As a result of the new roadway links provided by the project, the two-way future year AWT traffic demand compared to a 'without project' scenario is predicted to significantly decrease on:

- City West Link and Parramatta Road, east of the M4 East Wattle Street and Parramatta Road ramps respectively, by about 25 per cent in 2023 and 2033 'with project' and 'cumulative' scenarios
- King Street in St Peters by about 20 per cent in the 2023 and 2033 'with project' scenarios
- Stanmore Road in Stanmore by about 15 per cent in 2023 and 2033 'with project' and 'cumulative' scenarios
- Lyons Road in Russell Lea by about 15 per cent in the 2023 and 2033 'with project' scenarios, and about 20 per cent in the 2023 and 2033 'cumulative' scenarios
- Southern Cross Drive and the Sydney Harbour Tunnel by about 20 per cent and 25 per cent respectively in the 2023 and 2033 'cumulative' scenarios.

The reduction in traffic demand on these major traffic routes is likely to improve speed, journey reliability and safety on these corridors compared to a 'without project' scenario.

The following sections provide additional detail on the key observations for each of the screenlines. Further detail is provided in **Appendix H** (Technical working paper: Traffic and transport).

*East-west screenline*

**Average weekday traffic analysis**

- Key observations comparing the 2023 'without project' and 'with project' scenarios are:
  - The average weekday traffic volumes would increase by about 28 per cent in the 'with project' scenario
  - The average weekday traffic volumes on surface arterial roads is forecast to decrease by around 20 per cent in the 'with project' scenario
  - The largest decreases in average weekday traffic occur on Parramatta Road (about 25 per cent or more than 15,000 vehicles), on Marion Street at Leichhardt (around 40 per cent or more than 2,000 vehicles) and on City West Link (about 23 per cent or more than 14,000 vehicles)
  - The average weekday traffic volumes on Lyons Road would fall by around 14 per cent as a result of the Iron Cove Link and the M4-M5 Link providing an alternative route
- Key observations comparing the 2033 'without project' and 'with project' scenarios are:
  - The average weekday traffic volumes on surface roads and in the tunnels would increase by around 30 per cent in the 'with project' scenario
  - A substantial shift in traffic away from surface roads and onto the M4-M5 mainline tunnels between the Wattle Street and Rozelle interchanges, with almost 40 per cent of the average weekday traffic volumes forecast to use the M4-M5 Link in 2033
- Key observations comparing the 'cumulative' to the 'without project' scenarios for 2023 and 2033 are:
  - The average weekday traffic volumes crossing the east-west screenline would increase by around 36 per cent in 2023 and 41 per cent in 2033
  - Average weekday traffic volumes on surface roads would decrease by about 22 per cent in both 2023 and 2033.

**Peak hour analysis**

The forecasts indicate that the impact of the project on two-way peak hour traffic volumes are similar to the impacts forecast for average weekday traffic volumes, with traffic shifting off surface roads and

onto the M4-M5 Link. However, traffic volume decreases on City West Link and Parramatta Road are much smaller in the peak hours compared to the total daily decrease.

*Upper north–south screenline*

**Average weekday traffic analysis**

- Key observations comparing the 2023 'without project' and 'with project' scenarios are:
  - Decreases on Parramatta Road results in average weekday traffic decreases on some north-south roads connecting to Parramatta Road, including Norton Street (southbound) and Balmain Road (northbound)
  - Increase in average weekday traffic volumes (around four per cent) on Johnston Street and Ross Street as traffic moves between the surface road network and the M4-M5 Link
- Key observations comparing the 2033 'without project' and 'with project' scenarios are:
  - Decreases on Parramatta Road results in further average weekday traffic decreases on some north-south roads connecting to Parramatta Road, including Norton Street (southbound) and Balmain Road (northbound)
  - Again, an increase in average weekday traffic volumes is forecast for Johnston Street and Ross Street, as traffic moves between the surface road network and new road links at the Rozelle interchange
- Key observations comparing the 'cumulative' to the 'without project' scenarios for 2023 and 2033 are:
  - Forecast decreases on some north-south roads connecting to Parramatta Road, with large decreases forecast for southbound average weekday traffic on Norton Street (around 25 per cent in 2023 and about 28 per cent in 2033) and for northbound average weekday traffic volumes on Balmain Road (around 17 per cent in 2023 and about 19 per cent in 2033)
  - An increase in average weekday traffic volumes on Johnston Street (around 15 per cent in 2023 and around 12 per cent in 2033), and Ross Street (around 16 per cent in 2023 and about 20 per cent in 2033). As a percentage of traffic crossing the screenline, this represents an increase of about three per cent or less.

**Peak hour analysis**

Similar to the AWT forecasts, the AM peak and PM peak forecasts show changes in traffic volumes on north-south links, with increases on some roads and decreases on others as vehicles shift from Parramatta Road to use the M4-M5 Link.

*Lower north–south screenline*

**Average weekday traffic analysis**

- Key observations comparing the 2023 'without project' and 'with project' scenarios are:
  - Two-way average weekday traffic volumes on the M4-M5 Link is forecast to be around 16 per cent of total two-way average weekday traffic volumes crossing the screenline, with average weekday traffic crossing the screenline on existing surface roads forecast to decrease by around seven per cent
  - The greatest forecast reductions in traffic volume occur on Stanmore Road and Southern Cross Drive. Total two-way average weekday traffic is forecast to fall by around 16 per cent on Stanmore Road and by about three per cent on Southern Cross Drive
  - There are also forecast reductions on King Street, where two-way average weekday traffic volumes decreases by around 19 per cent (around 4,000 vehicles per day), and on Sydenham Road where two-way average weekday traffic volumes decrease by about 10 per cent (about 3,000 vehicles per day).
- Key observations comparing the 2033 'without project' and 'with project' scenarios are:
  - Two-way traffic on the M4-M5 Link is forecast to be around 17 per cent of total two-way

average weekday traffic crossing the screenline, while average weekday traffic crossing the screenline on existing surface roads is forecast to decrease by about seven per cent

- Forecast average weekday traffic reductions on Southern Cross Drive and Stanmore Road, with reductions also forecast for King Street and Sydenham Road

· Key observations comparing the 'cumulative' to 'without project' scenarios for 2023 and 2033 are:

- In the 2023 and 2033 'cumulative' scenarios, two-way average weekday traffic volumes crossing the screenline are forecast to increase. Traffic on the M4-M5 Link is forecast to be about 24 per cent and around 27 per cent of total two-way average weekday traffic crossing the screenline in 2023 and 2033 respectively
- Two-way average weekday traffic on Southern Cross Drive is forecast to fall by about 14 per cent in 2023, and by about 16 per cent in 2033. This is due to vehicles travelling from areas north of Sydney Harbour to areas around Sydney Airport, or to the M5 Motorway, with the M4-M5 Link and proposed future Western Harbour Tunnel and Sydney Gateway projects providing a new parallel route
- As in the 'with project' scenario, there are significant forecast reductions on Stanmore Road, King Street, and Sydenham Road. Under the 'cumulative' scenario, there is also a significant forecast reduction in northbound average weekday traffic on Botany Road of about 3,000 vehicles daily or about nine per cent, due to the presence of Sydney Gateway providing an alternative route from the Sydney Airport and Port Botany precinct to the St Peters interchange
- There are slight forecast increases in southbound average weekday traffic volumes on Wyndham Street, Botany Road, Elizabeth Street and King Street in the 'cumulative' scenario. However, in terms of total southbound average weekday traffic crossing the screenline, the forecast increase of traffic on these roads in 2023 and 2033 represents an increase of about two per cent.

**Peak hour analysis**

The peak hour forecasts indicate traffic volume changes are similar to those in the average weekday traffic forecasts, with traffic shifting from surface roads onto the M4-M5 Link. However, road network capacity constraints limit the shifts in traffic in the peak hours, and hence reductions in traffic on surface roads crossing the screenline are not as high in the peak hours compared to across the day.

### *Cross-harbour screenline*

**Average weekday traffic analysis**

· Key observations comparing the 2023 'without project' and 'with project' scenarios are:

- Minimal forecast changes to total daily traffic crossing Sydney Harbour on the Gladesville Bridge, the Sydney Harbour Bridge and the Sydney Harbour Tunnel in the 'with project' scenario
- Two-way average weekday traffic is forecast to increase by around six per cent in the 'with project' scenario on the Gladesville Bridge. This reflects the increase in traffic along Victoria Road due to vehicles using the Iron Cove Link and the M4-M5 Link mainline tunnels, via the Rozelle interchange

· Key observations comparing the 2033 'without project' and 'with project' scenarios are:

- Minimal forecast changes in two-way average weekday traffic volumes crossing the screenline in the 'with project' scenario
- Two-way average weekday traffic on the Gladesville Bridge is forecast to increase by about seven per cent in the 'with project' scenario due to vehicles using the Iron Cove Link and the M4-M5 Link mainline tunnels, via the Rozelle interchange

- Key observations comparing the 2023 'without project and 'cumulative' scenarios are:
  - Forecast two-way average weekday traffic crossing the screenline increases by about three per cent in the 'cumulative' scenario due in part to traffic induced by the proposed future Western Harbour Tunnel and Beaches Link project connection
  - A forecast shift in traffic from the Sydney Harbour Bridge and the Sydney Harbour Tunnel onto the proposed future Western Harbour Tunnel tunnels. Two-way average weekday traffic is forecast to decrease by around six per cent on the Sydney Harbour Bridge and by around 23 per cent in the Sydney Harbour Tunnel under the 'cumulative' scenario
  - Two-way average weekday traffic is forecast to increase by around 13 per cent on the Gladesville Bridge in the 'cumulative' scenario, reflecting the increase in traffic forecast to access the M4-M5 Link mainline tunnels and the Iron Cove Link
- Key observations comparing the 2033 'without project' and 'cumulative' scenarios are:
  - Forecast two-way average weekday traffic crossing the screenline increases by about seven per cent in the 'cumulative' scenario due in part to traffic induced by the proposed future Western Harbour Tunnel and Beaches Link connection. The Western Harbour Tunnel and Beaches Link is forecast to carry about 12 per cent of two-way average weekday traffic crossing the screenline (without a surface connection at Rozelle)
  - The forecast changes in two-way average weekday traffic on the Sydney Harbour Bridge, Sydney Harbour Tunnel and on Gladesville Bridge are similar to that forecast in 2023.

**Peak hour analysis**

The changes in peak hour volumes at the cross-harbour screenline indicate project impacts on peak hour traffic volumes similar to those forecast for AWT, with only minor changes in traffic volume crossing the harbour on the Gladesville Bridge, the Sydney Harbour Bridge and the Sydney Harbour Tunnel in the 'with project' scenario.

*Heavy vehicle analysis*

A separate analysis of only heavy vehicles was carried out for the east–west, upper north–south and lower north–south screenlines to confirm if there were any different traffic pattern shifts forecast for heavy vehicles. The results of this analysis indicate:

- A decrease in the daily volume of heavy vehicles on surface roads is generally forecast across all screenlines, as heavy vehicles shift onto the M4-M5 Link
- Daily heavy vehicle volumes on Parramatta Road and City West Link are forecast to drop by around 40–50 per cent
- Daily heavy vehicle volumes on roads in the inner west, such as Stanmore Road, Sydenham Road, Marrickville Road and King Street, are forecast to drop by about 20–50 per cent
- Forecast increases on Johnston Street and Ross Street as heavy vehicles move between the surface road network and the M4-M5 Link tunnels. However, in the peak hours, these increases are generally less than around 80 heavy vehicle movements per hour, and in some cases are directional, with an increase in one peak hour forecast changing to a decrease in the other peak hour.

## Operational performance – M4-M5 Link Motorway

*Forecast traffic in the mainline tunnels* **Table 8-76** presents the two-way daily AWT volumes that are forecast on the mainline tunnel sections of the project.

**Table 8-76 Two-way daily AWT forecast in the M4-M5 Link mainline tunnels**

| Scenario | Year | Location | |
|---|---|---|---|
| | | Between Wattle Street interchange and Rozelle interchange | Between Rozelle interchange and St Peters interchange |
| With project | 2023 | 89,000 | 61,500 |
| Cumulative | | 107,000 | 96,000 |
| With project | 2033 | 99,500 | 70,000 |
| Cumulative | | 126,000 | 119,500 |

Source: WRTM v2.3, 2017

*Mid-block level of service*

**Table 8-77** and **Table 8-78** presents peak hour mid-block traffic volumes and levels of service under the 'with project' scenarios for 2023 and 2033. The results indicate that the new M4-M5 Link motorway would operate at a good level of service in the 2023 and 2033 'with project' scenarios.

**Table 8-77 M4-M5 Link motorway mid-block LoS – 2023 'with project' scenario**

| Section | Location and direction | No. of lanes | Modelled flow (PCU) | Speed (km/h) | Density (PCU/km/ln) | LOS |
|---|---|---|---|---|---|---|
| **Southbound – AM peak** | | | | | | |
| 1 | Interface with M4 East | 3 | 3,470 | 80 | 14.5 | C |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 4,340 | 80 | 13.6 | C |
| 3 | Rozelle interchange bypass | 2 | 1,970 | 80 | 12.3 | C |
| 4 | Rozelle interchange to St Peters interchange | 4 | 2,950 | 80 | 9.2 | B |
| 5 | Interface with New M5 | 2 | 340 | 80 | 2.1 | A |
| **Southbound – PM peak** | | | | | | |
| 1 | Interface with M4 East | 3 | 2,610 | 80 | 10.9 | B |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 3,190 | 80 | 10.0 | B |
| 3 | Rozelle interchange bypass | 2 | 1,750 | 80 | 10.9 | B |
| 4 | Rozelle interchange to St Peters interchange | 4 | 2,550 | 80 | 8.0 | B |
| 5 | Interface with New M5 | 2 | 750 | 80 | 4.7 | A |
| **Northbound – AM peak** | | | | | | |
| 1 | Interface with New M5 | 2 | 1,180 | 80 | 7.4 | B |
| 2 | St Peters interchange to Rozelle interchange | 4 | 3,230 | 80 | 10.1 | B |
| 3 | Rozelle interchange bypass | 2 | 2,460 | 80 | 15.4 | C |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 4,060 | 80 | 12.7 | C |
| 5 | Interface with M4 East | 3 | 3,560 | 77 | 14.8 | C |
| **Northbound – PM peak** | | | | | | |
| 1 | Interface with New M5 | 2 | 410 | 80 | 2.6 | A |
| 2 | St Peters interchange to Rozelle interchange | 4 | 3,490 | 80 | 10.9 | B |
| 3 | Rozelle interchange bypass | 2 | 2,380 | 80 | 14.8 | C |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 4,810 | 80 | 15.0 | C |
| 5 | Interface with M4 East | 3 | 4,100 | 77 | 17.1 | D |

**Table 8-78 M4-M5 Link motorway LoS – 2033 'with project' scenario**

| Section | Location and direction | No. of lanes | Modelled flow (PCU) | Speed (km/h) | Density (PCU/km/ln) | LOS |
|---|---|---|---|---|---|---|
| **Southbound – AM peak** | | | | | | |
| 1 | Interface with M4 East | 3 | 3,760 | 80 | 15.7 | C |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 4,750 | 80 | 14.8 | C |
| 3 | Rozelle interchange bypass | 2 | 1,940 | 80 | 12.2 | C |
| 4 | Rozelle interchange to St Peters interchange | 4 | 3,060 | 80 | 9.6 | B |
| 5 | Interface with New M5 | 2 | 450 | 80 | 2.8 | A |
| **Southbound – PM peak** | | | | | | |
| 1 | Interface with M4 East | 3 | 3,150 | 80 | 13.1 | C |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 3,840 | 80 | 12.0 | C |
| 3 | Rozelle interchange bypass | 2 | 2,250 | 80 | 14.0 | C |
| 4 | Rozelle interchange to St Peters interchange | 4 | 3,290 | 80 | 10.3 | B |
| 5 | Interface with New M5 | 2 | 1,110 | 80 | 6.9 | A |
| **Northbound – AM peak** | | | | | | |
| 1 | Interface with New M5 | 2 | 1,740 | 80 | 10.9 | B |
| 2 | St Peters interchange to Rozelle interchange | 4 | 3,920 | 80 | 12.3 | C |
| 3 | Rozelle interchange bypass | 2 | 3,010 | 80 | 18.8 | D |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 4,700 | 75 | 15.7 | C |
| 5 | Interface with M4 East | 3 | 4,150 | 80 | 17.3 | D |
| **Northbound – PM peak** | | | | | | |
| 1 | Interface with New M5 | 2 | 560 | 80 | 3.5 | A |
| 2 | St Peters interchange to Rozelle interchange | 4 | 3,950 | 80 | 12.3 | C |
| 3 | Rozelle interchange bypass | 2 | 2,730 | 80 | 17.1 | D |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 5,200 | 79 | 16.5 | D |
| 5 | Interface with M4 East | 3 | 4,450 | 80 | 18.5 | D |

Note:

The reported speed has been capped at the posted 80 kilometres per hour. The microsimulation models allow vehicle speeds slightly higher than the posted speed, which models reality, especially in uncongested, free flow conditions.

### *Traffic crashes*

**Table 8-79** presents the crash analysis for the M4-M5 Link. The analysis has been carried out using crash rates from existing motorway tunnels in Sydney (Lane Cove, Eastern Distributor, Cross City and Sydney Harbour tunnels). These crashes would be balanced against the reduction in crashes forecast by the reduction in traffic volumes on the surface roads. Crash rates on motorways are much lower than on surface arterial roads and there would therefore be expected to be a reduction in the number of accidents.

**Table 8-79 M4-M5 Link: Crash analysis for 2023 and 2033 'with project' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2023 'with project'** | | | | | | |
| M4-M5 Link | Wattle Street interchange | Rozelle interchange | 1.25 | 87,470 | 23 | $264,300 |
| M4-M5 Link | Rozelle interchange bypass | | 1.36 | 39,620 | 11 | $130,300 |
| M4-M5 Link | Rozelle interchange | St Peters interchange | 2.24 | 60,500 | 29 | $327,600 |
| **2033 'with project'** | | | | | | |
| M4-M5 Link | Wattle Street interchange | Rozelle interchange | 1.25 | 97,910 | 26 | $295,900 |
| M4-M5 Link | Rozelle interchange bypass | | 1.36 | 45,370 | 13 | $149,200 |
| M4-M5 Link | Rozelle interchange | St Peters interchange | 2.24 | 68,910 | 33 | $373,200 |

## Operational performance – Wattle Street interchange

*Changes to the road network in 'with project' scenario*

Under the 'with project' scenario, traffic can travel between the M4 East and M4-M5 Link as well as use the M4-M5 Link entry and exit ramps to and from Wattle Street (between Parramatta Road and Ramsay Street).

*Network performance*

The performance of roads around the Wattle Street interchange in 2023 and 2033 with and without the project were modelled and the results are presented in **Table 8-80**.

The 'with project' scenario introduces more tunnelled motorway links, and while the forecast traffic demand significantly increases after the opening of the M4-M5 Link, the new links contribute to a substantial increase in the average vehicle speed. In 2023, a substantial increase in traffic is accommodated through the network in the 'with project' scenario, and overall average speeds increase due to the new M4-M5 Link reducing congestion on the surface road network. These improvements would be experienced during the AM and PM peak periods.

In the 2023 'with project' scenario in the AM peak, congestion is forecast along Wattle Street northbound, with queues extending through the Ramsay Street intersection, as a result of increases in surface network traffic demand to City West Link between the two scenarios. Queueing is not forecast to prevent entry to or exit from the project.

In the 2023 PM peak for the 'with project' scenario, the introduction of the project Wattle Street exit ramp requires a change in layout at the Wattle Street approach to the Parramatta Road/Wattle Street intersection, which reduces the number of surface through lanes from two to one, with the second through lane used by the M4-M5 Link exit ramp. Westbound queues extending along Wattle Street/Dobroyd Parade are therefore forecast to increase in the 'with project' scenario, despite a slight reduction in surface demand from City West Link. This results in forecast queueing back and unreleased demand at the westbound City West Link network entry. The westbound queueing is also forecast to cause side road queueing at the Ramsay Street intersection with Wattle Street, resulting in unreleased demand on the Ramsay Street westbound approach. The westbound queueing is also forecast to inhibit access into the M4 East Wattle Street entry ramp.

Increased demand to Frederick Street is forecast to cause queueing back along Frederick Street and inhibit the Parramatta Road eastbound right turn movement into Frederick Street, which in turn is

forecast to cause delay to the Parramatta Road left turn movement into Wattle Street and into the project Wattle Street entry ramp.

Forecast demand along Parramatta Road is reduced following the M4-M5 Link opening, with fewer vehicles resulting in improved performance of the 'with project' scenario along this corridor when compared to 'without project' conditions.

In the 'with project' scenario in 2033, total traffic demand would increase by around 43 per cent in the AM peak periods and about 37 per cent in the PM peak period compared to the 2033 'without project' scenario. Average time travelled per vehicle in the network would decrease by around 46 per cent and 33 per cent and average speeds per vehicle would increase by around 47 per cent and 38 per cent respectively during the AM and PM peak periods.

In the AM peak, as per the 2023 scenario, forecast traffic demand to City West Link and Parramatta Road eastbound from the M4 East is lower than the 'without project' scenario, with much shorter queues on the M4 East exit ramp and on Wattle Street, due to the availability of the M4-M5 Link. This in turn accounts for the large increase in average speed within the network. Queueing is still observed to extend from the eastern end of the modelled road network; with queuing blocking through the Liverpool Road intersection. However, this is not forecast to extend beyond the Dalhousie Street intersection or to the M4 East Parramatta Road exit ramp. Queueing is not forecast to prevent entry to or exit from the project.

In the PM peak, the 2033 'with project' scenario results show an increase in average speed as a result of significantly reduced delay on the M4 East Parramatta Road exit ramp. This exit ramp was heavily congested in the 2033 'without project' scenario, with queueing back that extends to the M4 East mainline. The reduction in delay to this movement is greater than the increase in delay on the Wattle Street approach to Parramatta Road (caused by increased demand to Frederick Street), and therefore average speeds increase.

Increased demand to Frederick Street is forecast to cause queueing back along Frederick Street and inhibit the Parramatta Road eastbound right turn movement into Frederick Street. This is forecast to cause delay to the Parramatta Road left turn movement into Wattle Street and into the project Wattle Street entry ramp. Eastbound queueing is forecast from the City West Link/Timbrell Drive intersection back to the Parramatta Road/Wattle Street intersection.

**Table 8-80 Wattle Street interchange network performance – AM and PM peak hours (2023 'without project' scenario vs 2023 'with project' scenario and 2033 'without project' scenario vs 2033 'with project' scenario)**

| Network measure | 2023 'without project' | 2023 'with project' | Percentage change | 2033 'without project' | 2033 'with project' | Percentage change |
|---|---|---|---|---|---|---|
| **AM peak** | | | | | | |
| **All vehicles** | | | | | | |
| Total traffic demand (veh) | 15,279 | 21,410 | 40% | 16,553 | 23,609 | 43% |
| Total vehicle kilometres travelled in network (km) | 31,474 | 34,696 | 10% | 32,470 | 37,632 | 16% |
| Total time travelled approaching and in network (hr) | 2,153 | 1,667 | -22% | 2,316 | 1,821 | -21% |
| Total vehicles arrived | 14,483 | 21,113 | 46% | 15,505 | 23,114 | 49% |
| Total number of stops | 242,127 | 166,849 | -31% | 272,807 | 213,460 | -22% |
| **Average per vehicle in network** | | | | | | |
| Average vehicle kilometres travelled in network (km) | 2.0 | 1.6 | -20% | 2.0 | 1.6 | -20% |
| Average time travelled in network (mins) | 8.0 | 4.5 | -44% | 8.3 | 4.5 | -46% |
| Average number of stops | 13.4 | 7.1 | -48% | 14.5 | 8.3 | -43% |
| Average speed (km/h) | 14.8 | 21.0 | 42% | 14.2 | 20.9 | 47% |
| **Unreleased vehicles** | | | | | | |
| Unreleased demand (veh) | 796 | 297 | – | 1,048 | 495 | – |
| % of total traffic demand | 5% | 1% | – | 6% | 2% | – |
| **PM peak** | | | | | | |
| **All vehicles** | | | | | | |
| Total traffic demand (veh) | 15,209 | 20,825 | 37% | 16,665 | 22,866 | 37% |

| Network measure | 2023 'without project' | 2023 'with project' | Percentage change | 2033 'without project' | 2033 'with project' | Percentage change |
|---|---|---|---|---|---|---|
| Total vehicle kilometres travelled in network (km) | 29,075 | 33,968 | 17% | 29,461 | 36,878 | 25% |
| Total time travelled approaching and in network (hr) | 2,176 | 1,907 | -13% | 2,557 | 2,316 | -9% |
| Total vehicles arrived | 14,702 | 20,049 | 36% | 15,451 | 21,917 | 42% |
| Total number of stops | 318,512 | 201,602 | -37% | 387,426 | 265,136 | -32% |
| **Average per vehicle in network** | | | | | | |
| Average vehicle kilometres travelled in network (km) | 1.8 | 1.6 | -12% | 1.8 | 1.6 | -8% |
| Average time travelled in network (mins) | 8.1 | 5.3 | -34% | 9.0 | 6.0 | -33% |
| Average number of stops | 17.4 | 8.7 | -50% | 20.0 | 10.5 | -47% |
| Average speed (km/h) | 13.5 | 18.0 | 34% | 11.7 | 16.1 | 38% |
| **Unreleased vehicles** | | | | | | |
| Unreleased demand (veh) | 507 | 776 | – | 1,214 | 949 | – |
| % of total traffic demand | 3% | 4% | – | 7% | 4% | – |

*Intersection performance*

A summary of the modelled intersection performance on roads around the Wattle Street interchange in 2023 and 2033 'with project' and 'without project' scenarios is shown in **Table 8-81**.

During the 2023 and 2033 AM peak hour, the performance at the Parramatta Road/Wattle Street intersection is forecast to worsen in the 'with project' scenario, despite vehicle volumes using the surface road network reducing. The reduction in through lanes for surface traffic from Wattle Street to Frederick Street causes queuing on the southbound approach and increases the overall intersection delay. Elsewhere, intersection performance is forecast to be similar to the 'without project' scenario.

During the 2033 AM peak, the City West Link/Timbrell Drive intersection is forecast to improve in 'with project' scenario as a result of reduced demand for City West Link from the M4 East Wattle Street exit ramp (with corresponding increased demand for the M4-M5 Link Motorway). During the 2023 PM peak hour, the performance of the Parramatta Road/Liverpool Road intersection is forecast to improve in the 'with project' scenario, as a result of reduced demand for the intersection as traffic shifts to the M4-M5 Link. Elsewhere, performance remains similar to the 'without project' scenario.

**Table 8-81 Wattle Street interchange: key intersection performance (LoS) – 2015 Base, 2023 and 2033 'without project' and 'with project' scenarios**

| Key intersections | 2015 'base case' | 2023 'without project' | 2023 'with project' | 2033 'without project' | 2033 'with project' |
|---|---|---|---|---|---|
| **AM peak hour** | | | | | |
| Parramatta Road/Sloane Street | B | B | B | B | C |
| Parramatta Road/Liverpool Road | C | C | C | C | C |
| Parramatta Road/Dalhousie Street | B | B | B | C | B |
| Parramatta Road/Bland Street | B | B | B | C | B |
| Parramatta Road/Wattle Street | E | C | E | C | E |
| Parramatta Road/Great North Road | B | B | B | B | B |
| Parramatta Road/Arlington Street | B | C | C | C | D |
| Frederick Street/Church Street | B | B | C | B | C |
| Wattle Street/Ramsay Street | C | C | C | C | C |
| Dobroyd Parade/Waratah Street | A | A | A | B | B |
| City West Link/Timbrell Drive | C | D | D | F | D |
| **PM peak hour** | | | | | |
| Parramatta Road/Sloane Street | B | B | B | F | C |
| Parramatta Road/Liverpool Road | B | F | C | F | E |
| Parramatta Road/Dalhousie Street | B | B | B | B | B |
| Parramatta Road/Bland Street | B | B | B | B | B |
| Parramatta Road/Wattle Street | D | D | D | D | D |
| Parramatta Road/Great North Road | B | B | B | B | B |
| Parramatta Road/Arlington Street | B | C | C | C | D |
| Frederick Street/Church Street | B | B | B | B | B |
| Wattle Street/Ramsay Street | C | C | C | C | C |
| Dobroyd Parade/Waratah Street | A | B | A | B | A |
| City West Link/Timbrell Drive | D | F | E | F | F |

*Travel times*

**Figure 8-16** and **Figure 8-17** provide a comparison of travel times through the network modelled around the Wattle Street interchange in 2023 and 2033 'without project' and 'with project' scenarios.

In the AM peak hour, Parramatta Road eastbound travel times reduce slightly as a result of forecast reductions in the surface road network traffic. Westbound travel times in the AM peak hour remain fairly constant due to forecast decreased congestion in that direction. While total demand for City West Link reduces or remains at a similar level with the project, the forecast increase in surface traffic demand to City West Link and northbound demand from Frederick Street causes congestion northbound/eastbound along Wattle Street and City West Link, resulting in increased travel times on the Frederick Street to City West Link movement. Large reductions in travel time are forecast between the M4 East and Parramatta Road (E), as fewer vehicles make this movement, with traffic shifting to the M4-M5 Link.

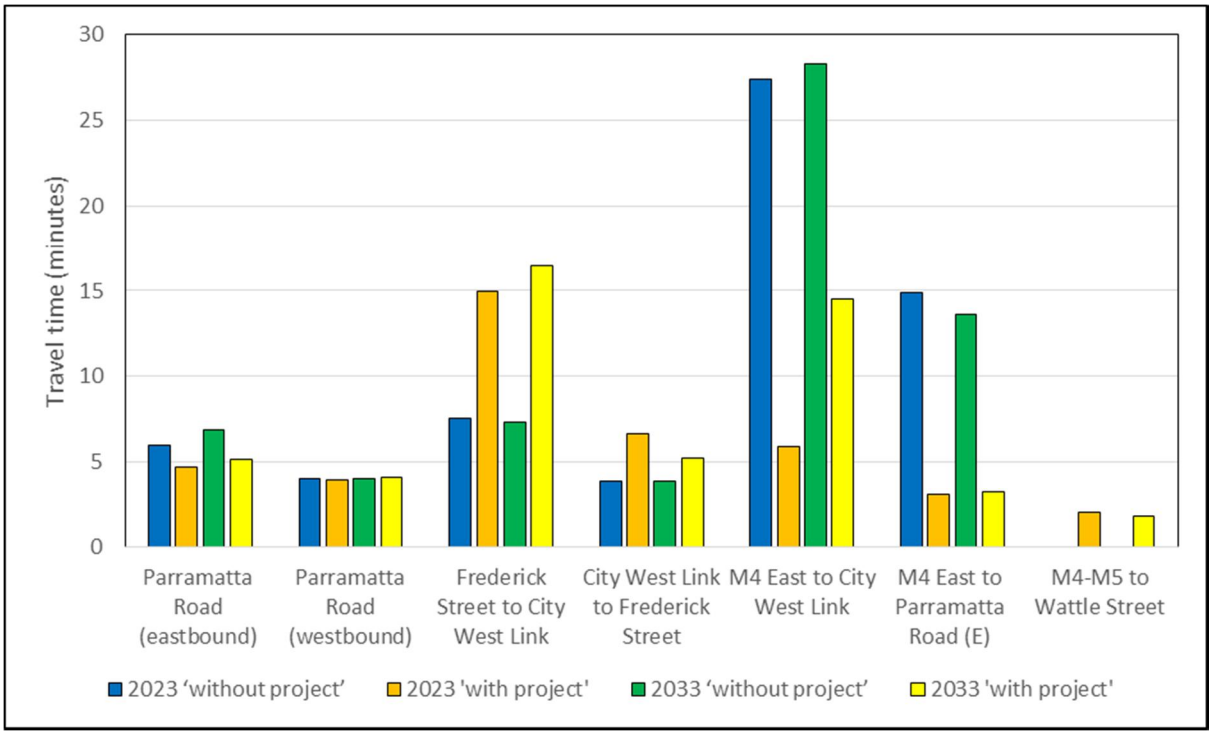



**Figure 8-16 Wattle Street interchange: Average travel time (mins) – AM peak hour 'with project' scenarios**

**Figure 8-16** presents the travel times in the PM peak hour 'with project' scenarios, which demonstrates that the project would result in reduced travel times along Parramatta Road eastbound, as a result of the forecast reduction in traffic demand. Travel time benefits are also seen in travelling from Frederick Street to City West Link; however this is attributed more to traffic signal phasing changes, where this approach receives more green time in the 'with project' scenario.

Travel time benefits are also seen in the M4 East exit ramp movements to both City West Link and Parramatta Road, as a result of a forecast reduction in traffic as traffic shifts onto the M4-M5 Link.

Travel time increases are predicted along City West Link on the southbound approach to Parramatta Road, mainly as a result of the reduction in through lanes for surface traffic to Frederick Street.

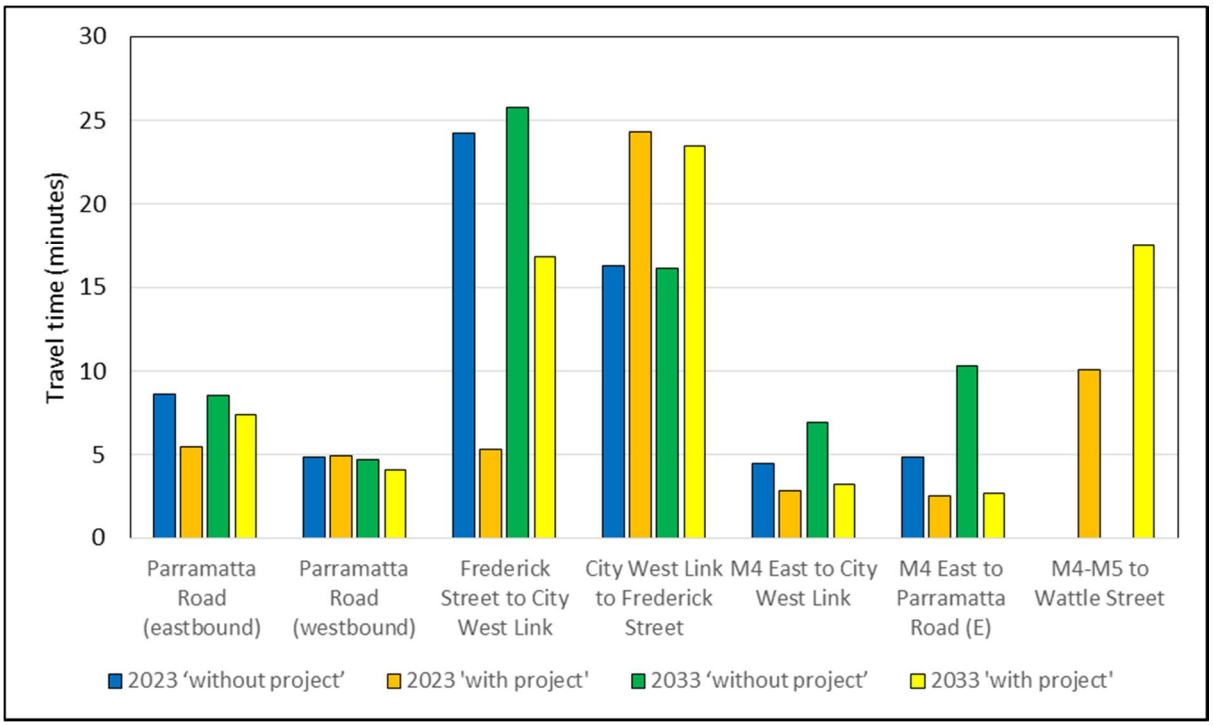



**Figure 8-17 Wattle Street interchange: Average travel time (mins) – PM peak hour 'with project' scenarios**

*Traffic crashes*

**Table 8-82** and **Table 8-83** present the crash forecast under the 2023 and 2033 'with project' scenarios compared to the 'without project' scenarios.

Daily traffic on Parramatta Road is forecast to decrease in the 2023 'with project' scenario compared to the 'without project' scenario, resulting in a decrease in the total number and cost of crashes. Average annual crashes are forecast to decrease from 120 to 96, with the average annual cost of crashes falling from $12.9 million to $10.4 million.

Similarly, in 2033, forecasts indicate that a decrease in daily traffic on Parramatta Road between Wattle Street and City Road in the 2033 'with project' scenario compared to the 'without project' scenario would result in a decrease in the total number and cost of crashes. Average annual crashes decrease from 130 to 104 and the average annual cost of crashes decreases from $14.1 million to $11.2 million.

**Table 8-82 Parramatta Road between Wattle Street and City Road: Crash comparison between 2023 'with project' and 'without project' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2023 'without project'** | | | | | | |
| Parramatta Road | Wattle Street | City Road | 6.6 | 68,200 | 120 | $12,905,600 |
| **2023 'with project'** | | | | | | |
| Parramatta Road | Wattle Street | City Road | 6.6 | 54,760 | 96 | $10,363,200 |

**Table 8-83 Parramatta Road between Wattle Street and City Road: Crash comparison between 2033 'with project' and 'without project' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2033 'without project'** | | | | | | |
| Parramatta Road | Wattle Street | City Road | 6.6 | 74,340 | 130 | $14,068,700 |
| **2033 'with project'** | | | | | | |
| Parramatta Road | Wattle Street | City Road | 6.6 | 59,100 | 104 | $11,184,200 |

*Public transport services*

**Table 8-18** and **Figure 8-19** shows the comparison in travel times for buses between the 2023 and 2033 'without project' and 'with project' scenarios for the AM and PM peak.

Eastbound Parramatta Road bus travel times during the AM peak and PM peak hours are forecast to improve. This is primarily due to the reduction in general traffic demand along this same section. The westbound direction is less congested in the modelled scenarios, and so bus travel times remain relatively unchanged from the 'without project' scenario.

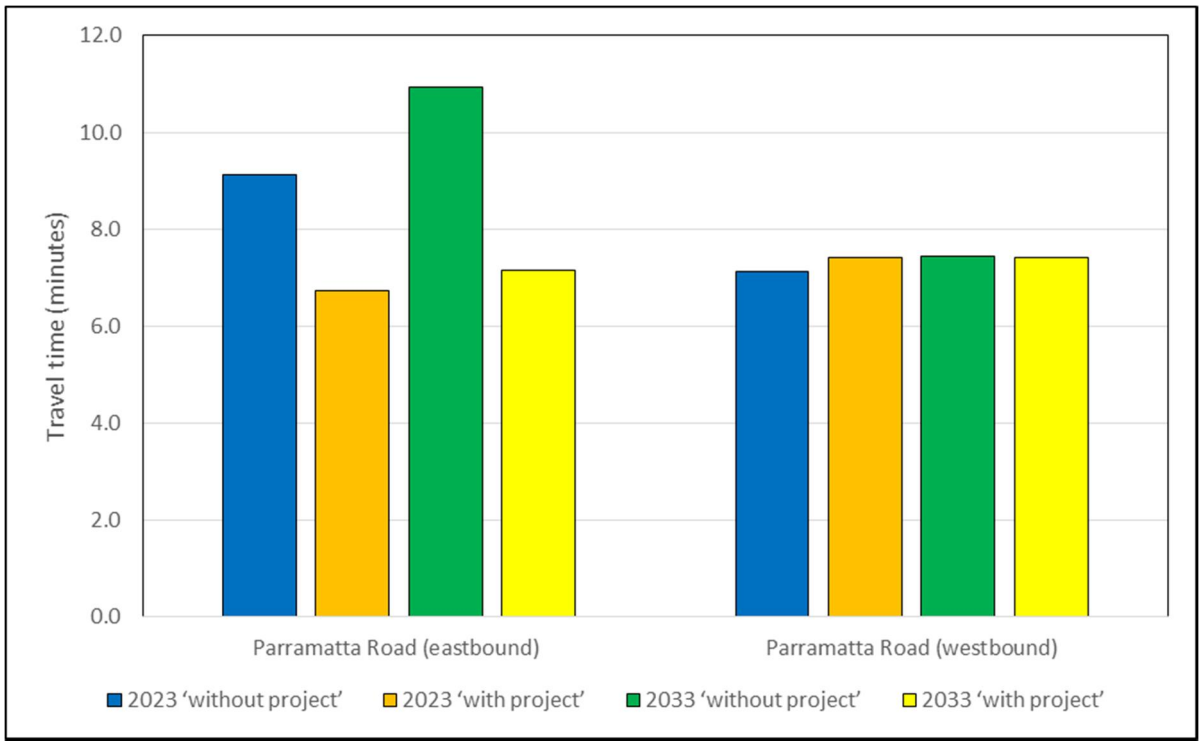



**Figure 8-18 Wattle Street interchange: AM peak hour average travel time for buses – 'with project' comparison**

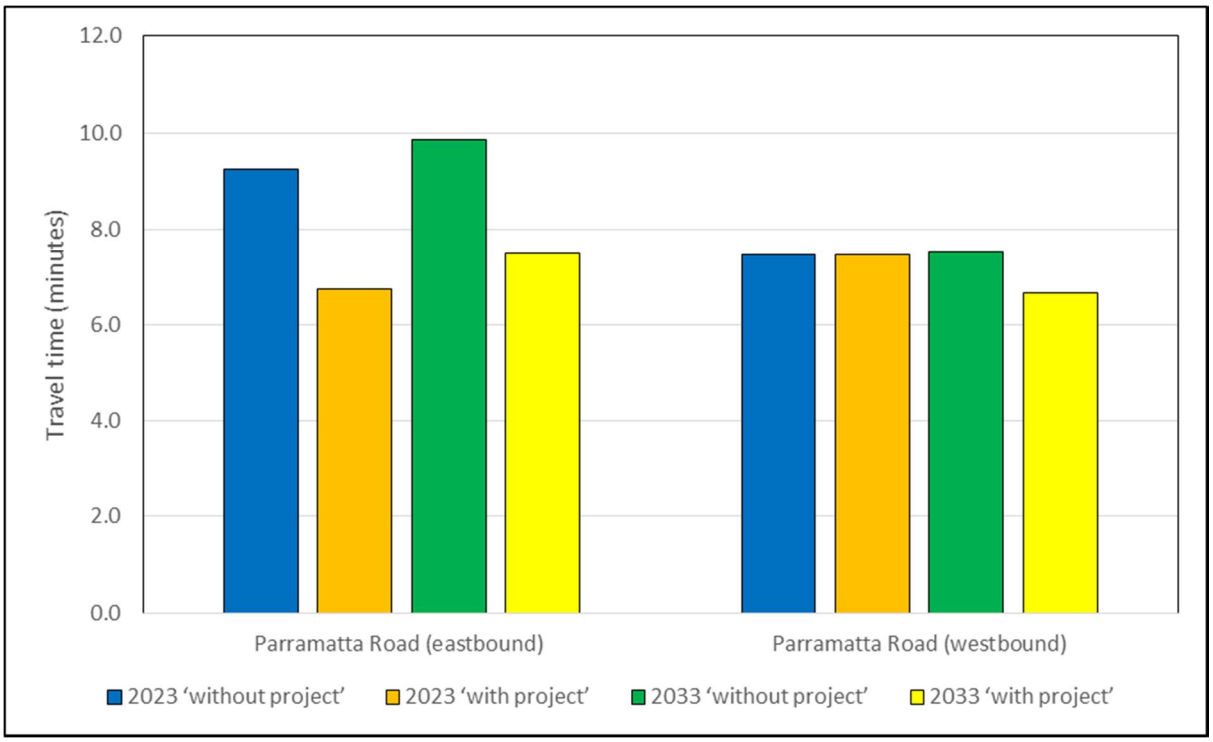



**Figure 8-19 Wattle Street interchange: PM peak hour average travel time for buses – 'with project' comparison**

### *Active transport facilities*

Details of planned walking and cycling facilities can be found in **Annexure N** (Technical working paper: Active transport).

### *Impact on local property access and on-street parking*

There is no planned impact on local property access or on-street residential or business parking in the Wattle Street interchange area as part of the M4-M5 Link project. The southern end of Northcote Street is to remain closed during construction as per the existing arrangement for construction of the M4 East project. Once construction of the M4-M5 Link is completed, this would be permanently re-opened.

## Operational performance – Rozelle interchange

### *Changes to road network in 'with project' scenario*

In addition to the Rozelle surface works, the 'with project' scenario includes the following new links added to the road network for the Rozelle interchange:

- Iron Cove Link, which provides a direct link between Victoria Road just east of Iron Cove Bridge and Anzac Bridge via a tunnel under Rozelle
- A new tunnel link between the M4 in the west and Anzac Bridge in the east. This link merges with the Iron Cove Link before connecting with Anzac Bridge
- A new tunnel link between the M5 and City West Link at a new intersection, west of the City West Link/The Crescent intersection
- A new tunnel link between M5 and Victoria Road, just east of Iron Cove Bridge. This link joins the Iron Cove Link to/from Anzac Bridge.

### *Network performance*

The performance of the modelled road network around the Rozelle interchange in 2023 and 2033 with and without the project is presented in **Table 8-84**.

A 15 per cent increase in traffic demand is forecast in the 2023 AM peak 'with project' scenario compared to the 'without project' scenario. However, improved network performance metrics are forecast with decreased average vehicle travel times, fewer stops and increased average speeds, with ten per cent more vehicles arriving at their destination. This improvement is primarily due to the 'with project' network changes and a shift in traffic to the new motorways, which provide higher speeds and less congestion compared to the surface road network.

The AM peak citybound movements are forecast to continue to be affected by the queues back from the Bathurst Street/Cross City Tunnel off-ramp. In addition, the downstream exit blocking from Sydney Harbour Bridge on the Western Distributor also contributes to decreased performance and increased eastbound congestion on the Western Distributor. As a result, in spite of the improvement in network performance metrics, the number of unreleased vehicles almost doubles when compared with the 2023 'without project' network. The congestion on the Western Distributor and Anzac Bridge is forecast to cause some queueing in the Iron Cove Link, and to a lesser extent on the M4 exit ramp. This is not forecast to extend back to the M4-M5 Link mainline tunnels.

With the forecast traffic demand, the merge of two lanes from City West Link and two lanes from Victoria Road into two lanes on the eastbound approach to Anzac Bridge is forecast to cause significant queuing on City West Link.

In the PM peak hour, the overall network performance of the 'with project' scenario shows a significant improvement compared to the 2023 'without project' network, in spite of a forecast 15 per cent increase in demand. This improvement is partially attributed to the changed road network and a shift in traffic to the motorway. This is particularly true for the peak traffic direction, (outbound or westbound direction leaving the city). Once these vehicles reach the ramp entries to the M4 East and to the Iron Cove Link, they are forecast to operate in free flow conditions.

However, in the eastbound direction, the forecast demands increase significantly compared to the 'without project' scenario. As a result, the downstream capacity constraint at Sydney Harbour Bridge would cause eastbound congestion on Western Distributor and Anzac Bridge. This is expected to cause significant delays across Anzac Bridge, with queuing extending back onto Victoria Road and City West Link. This eastbound congestion partially offsets the improvements in the westbound direction; however, the overall network performance is expected to improve in the 'with project' scenario.

Similar to the 2023 'with project' scenario, the 2033 'with project' scenario is expected to provide significant improvements to overall road network performance when compared to the 'without project' scenario, with shorter average travel times, fewer number of stops and higher average speed, even with the forecast 15 per cent increase in demand. As before this can be attributed to the introduction of the project, and the significant demand shifting to motorway links with higher speeds and less congestion.

In the 'with project' scenario, the Western Distributor would be more congested compared to the 'without project' scenario due to the increase in forecast traffic demand. The citybound movements are likely to be affected by the queues from the Bathurst Street/Cross City Tunnel exit ramp and the downstream exit blocking from the Sydney Harbour Bridge, which cause congestion on Anzac Bridge and Western Distributor. This congestion is forecast to cause queueing in the Iron Cove Link, and to a lesser extent on the M4 exit ramp. This queuing is not forecast to extend back to the M4-M5 Link mainline tunnels.

While the eastbound direction is more congested, with a resultant increase in unreleased vehicles, the westbound traffic movement is forecast to improve significantly, primarily due to the additional westbound capacity provided by the M4 and the Iron Cove Link. As in 2023, with the forecast traffic demand the merge of two lanes from City West Link and two lanes from Victoria Road into two lanes on the eastbound approach to Anzac Bridge causes queuing along City West Link.

Roads and Maritime will develop a strategy to ensure appropriate network integration in the areas surrounding the Rozelle interchange. The strategy will include a review of:

- Capacity improvement measures
- Project staging options

- Demand management measures.

Further details about measures to manage traffic and transport impacts from the project are provided in **section 8.5**.

**Table 8-84 Rozelle interchange network performance – AM and PM peak hours (2023 'without project' scenario vs 2023 'with project' scenario and 2033 'without project' scenario vs 2033 'with project' scenario)**

| Network measure | 2023 'without project' | 2023 'with project' | Percentage change | 2033 'without project' | 2033 'with project' | Percentage change |
|---|---|---|---|---|---|---|
| **AM peak** | | | | | | |
| All vehicles | | | | | | |
| Total traffic demand (veh) | 22,087 | 25,327 | 15% | 24,307 | 28,023 | 15% |
| Total vehicle kilometres travelled in network (km) | 57,775 | 73,188 | 27% | 59,866 | 77,690 | 30% |
| Total time travelled approaching and in network (hr) | 5,355 | 6,308 | 18% | 7,041 | 7,221 | 3% |
| Total vehicles arrived | 21,621 | 23,799 | 10% | 22,682 | 25,794 | 14% |
| Total number of stops | 302,654 | 274,030 | -9% | 314,527 | 272,544 | -13% |
| **Average per vehicle in network** | | | | | | |
| Average vehicle kilometres travelled in network (km) | 2.7 | 3.1 | 15% | 2.6 | 3.0 | 14% |
| Average time travelled in network (mins) | 10.1 | 9.8 | -2% | 10.3 | 9.3 | -9% |
| Average number of stops | 12.3 | 10.1 | -18% | 12.0 | 9.2 | -23% |
| Average speed (km/h) | 15.9 | 18,8 | 18% | 15.4 | 19.4 | 26% |
| **Unreleased vehicles** | | | | | | |
| Unreleased demand (veh) | 1,278 | 2,309 | – | 2,233 | 2,719 | – |
| % of total traffic demand | 6% | 9% | – | 9% | 10% | – |

| Network measure | 2023 'without project' | 2023 'with project' | Percentage change | 2033 'without project' | 2033 'with project' | Percentage change |
|---|---|---|---|---|---|---|
| **PM peak** | | | | | | |
| All vehicles | | | | | | |
| Total traffic demand (veh) | 24,694 | 28,109 | 14% | 26,528 | 30,259 | 14% |
| Total vehicle kilometres travelled in network (km) | 61,136 | 80,108 | 31% | 60,908 | 86,924 | 43% |
| Total time travelled approaching and in network (hr) | 4,896 | 5,091 | 4% | 6,146 | 5,286 | -14% |
| Total vehicles arrived | 21,854 | 24,261 | 11% | 22,679 | 27,082 | 19% |
| Total number of stops | 146,986 | 179,138 | 22% | 151,862 | 92,817 | -39% |
| **Average per vehicle in network** | | | | | | |
| Average vehicle kilometres travelled in network (km) | 2.8 | 3.3 | 18% | 2.7 | 3.2 | 20% |
| Average time travelled in network (mins) | 8.3 | 7.9 | -4% | 8.2 | 6.1 | -25% |
| Average number of stops | 5.9 | 6.4 | 8% | 5.9 | 3.1 | -47% |
| Average speed (km/h) | 20.3 | 25.1 | 23% | 19.7 | 31.3 | 59% |
| **Unreleased vehicles** | | | | | | |
| Unreleased demand (veh) | 2,684 | 2,655 | – | 3,591 | 2,974 | – |
| % of total traffic demand | 11% | 9% | – | 14% | 10% | – |

*Intersection performance*

A summary of the modelled intersection performance on roads around the Rozelle interchange in 2023 and 2033 with and without the project is shown in **Table 8-85**. In the 2023 AM peak hour, the forecast intersection performances are similar in the 'without project' and 'with project' scenarios. However, in the 2033 AM peak hour, due to forecast demand from Victoria Road to The Crescent, delays are forecast at the Victoria Road/The Crescent intersection in the 'with project' scenario. The southbound queuing at this intersection is forecast to also result in a poor level of service at the Victoria Road/Robert Street intersection.

In the PM peak hour 'with project' scenario, the intersections along Victoria Road and City West Link are forecast to operate at an improved level of service compared to the 'without project' scenario, due to the direct link from Anzac Bridge to the M4 and Iron Cove Link.

The Victoria Road/Lyons Road intersection in both peak hours, the Victoria Road/Darling Street and Victoria Road/Robert Street intersections in the AM peak hour and The Crescent/Johnston Street intersection in the PM peak hour remain at or over capacity due to the forecast demands. Upgrades are proposed as part of the project at The Crescent/Johnston Street intersection (see **section 8.5.1**), however further upgrades at this intersection to improve performance are constrained by the existing light rail bridge.

**Table 8-85 Rozelle interchange: key intersection performance (LoS) – 2015 Base, 2023 and 2033 'without project' and 'with project' scenarios**

| Key intersections | 2015 Base | 2023 'without project' | 2023 'with project' | 2033 'without project' | 2033 'with project' |
|---|---|---|---|---|---|
| **AM peak hour** | | | | | |
| Victoria Road/Lyons Road | D | F | F | F | F |
| Victoria Road/Wellington Street | D | D | C | D | D |
| Victoria Road/Darling Street | F | F | F | F | F |
| Victoria Road/Robert Street | D | D | C | D | F |
| Victoria Road/The Crescent | B | B | C | C | D |
| The Crescent/James Craig Road | A | A | B | B | B |
| City West Link/The Crescent | B | B | C | B | D |
| The Crescent/Johnston Street | C | C | C | D | C |
| The Crescent/M5 ramps | – | – | B | – | B |
| **PM peak hour** | | | | | |
| Victoria Road/Lyons Road | D | F | F | F | F |
| Victoria Road/Wellington Street | B | D | B | D | C |
| Victoria Road/Darling Street | F | F | D | F | D |
| Victoria Road/Robert Street | F | F | C | F | C |
| Victoria Road/The Crescent | F | F | C | E | C |
| The Crescent/James Craig Road | B | C | A | B | A |
| City West Link/The Crescent | D | F | B | D | C |
| The Crescent/Johnston Street | F | F | F | E | F |
| The Crescent/M5 ramps | – | – | B | – | B |

*Travel times*

**Figure 8-20** and **Figure 8-21** provide a comparison of travel times for journeys through the modelled network around the Rozelle interchange in the 2023 and 2033 'without project' and 'with project' scenarios.

In the AM peak in the 'with project' scenario, increased travel times in the peak direction (inbound to the city) would occur on Victoria Road and City West Link due primarily to congestion on the Western Distributor and Anzac Bridge, which causes queuing back onto City West Link, the Iron Cove Link and Victoria Road. Significant improvement is reported in the westbound direction due to the direct link provided by the project from Anzac Bridge to the M4 and Iron Cove Link.

In the PM peak travel times would decrease in the peak direction (westbound out of the city) compared to the 'without project' scenario. The average travel time from Anzac Bridge to Iron Cove Bridge is forecast to reduce by about six minutes in the 'with project' scenario, from about 10 minutes via Victoria Road to about four minutes via the Iron Cove link. However, the eastbound journey time is forecast to increase due to increased demand and capacity constraints at Sydney Harbour Bridge, resulting in queuing back along Western Distributor and Anzac Bridge.

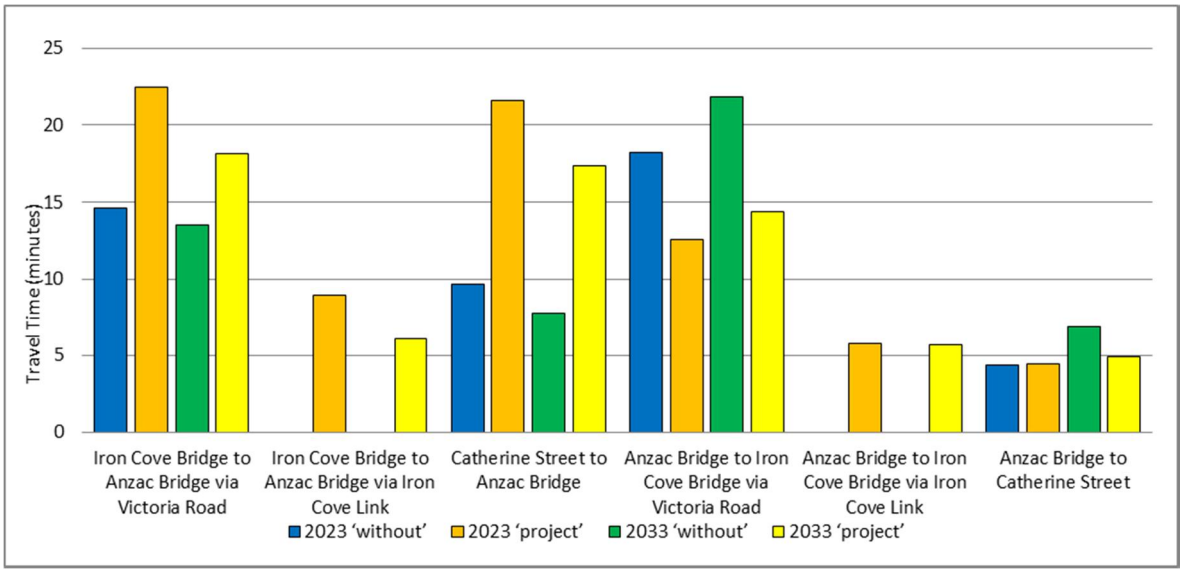



**Figure 8-20 Rozelle interchange: Average travel time (mins) – AM peak hour 'with project' scenarios**

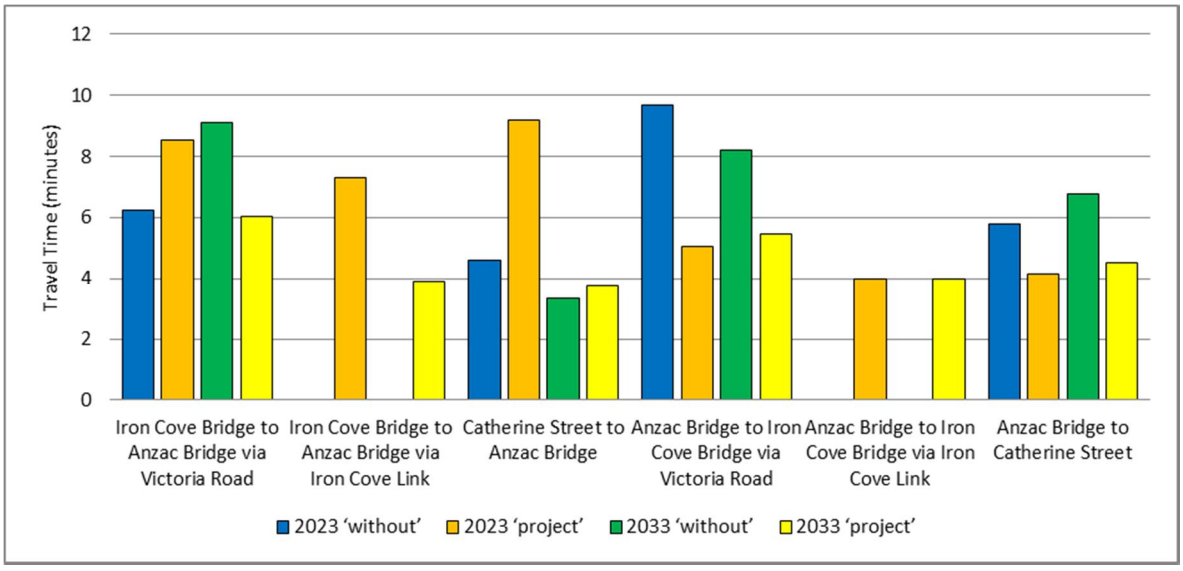



**Figure 8-21 Rozelle interchange: Average travel time (mins) – PM peak hour 'with project' scenarios**

*Traffic crashes*

**Table 8-86** presents the crash forecast under the 2023 'with project' scenario compared to the 'without project' scenario. Daily traffic on Anzac Bridge is forecast to increase in the 2023 'with project' scenario compared to the 'without project' scenario, resulting in an increase in the total number and cost of crashes. However, forecast decreases in daily traffic on other roads in the vicinity, especially City West Link and Victoria Road, result in a decrease in the total number and cost of crashes at these locations compared to the 'with project' scenario.

**Table 8-86 Rozelle and surrounds: Crash comparison between 2023 'with project' and 'without project' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2023 'without project'** | | | | | | |
| Anzac Bridge | Miller Street | Victoria Road | 0.99 | 157,170 | 25 | $6,428,100 |
| City West Link | James Street | Victoria Road | 2.13 | 89,390 | 35 | $8,616,900 |
| Victoria Road | Darling Street | The Crescent | 0.85 | 100,520 | 23 | $6,451,300 |
| Lilyfield Road | Victoria Road | Canal Road | 2.48 | 9,202 | 18 | $4,957,700 |
| The Crescent | City West Link | Wigram Road | 1.32 | 26,960 | 12 | $2,804,800 |
| Johnston Street | The Crescent | Parramatta Road | 1.80 | 18,311 | 14 | $3,826,100 |
| **2023 'with project'** | | | | | | |
| Anzac Bridge | Miller Street | Victoria Road | 0.99 | 193,310 | 31 | $7,906,200 |
| City West Link | James Street | Victoria Road | 2.13 | 69,810 | 27 | $6,729,500 |
| Victoria Road | Darling Street | The Crescent | 0.85 | 61,640 | 14 | $3,956,000 |
| Lilyfield Road | Victoria Road | Canal Road | 2.48 | 9,644 | 18 | $5,196,000 |
| The Crescent | City West Link | Wigram Road | 1.32 | 32,600 | 14 | $3,391,500 |
| Johnston Street | The Crescent | Parramatta Road | 1.80 | 20,621 | 16 | $4,308,800 |

**Table 8-87** compares the crashes forecast under the 2033 scenarios. Similar to 2023, forecast decreases in daily traffic in the 2033 'with project' scenario compared to the 'without project' scenario on roads such as City West Link and Victoria Road result in a decrease in the total number and cost of crashes at these locations, but daily traffic on Anzac Bridge, The Crescent and Johnston Street is forecast to increase, resulting in an increase in total number and cost of crashes.

Compared to the 2033 'without project' scenario, there is a small change in the forecast number and cost of annual crashes at these locations.

**Table 8-87 Rozelle and surrounds: Crash comparison between 2033 'with project' and 'without project' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2033 'without project'** | | | | | | |
| Anzac Bridge | Miller Street | Victoria Road | 0.99 | 167,260 | 27 | $6,840,800 |
| City West Link | James Street | Victoria Road | 2.13 | 100,440 | 39 | $9,682,100 |
| Victoria Road | Darling Street | The Crescent | 0.85 | 106,730 | 24 | $6,849,900 |
| Lilyfield Road | Victoria Road | Canal Road | 2.48 | 11,743 | 22 | $6,326,700 |
| The Crescent | City West Link | Wigram Road | 1.32 | 29,230 | 13 | $3,040,900 |
| Johnston Street | The Crescent | Parramatta Road | 1.80 | 20,545 | 16 | $4,293,000 |
| **2033 'with project'** | | | | | | |
| Anzac Bridge | Miller Street | Victoria Road | 0.99 | 210,110 | 34 | $8,593,300 |
| City West Link | James Street | Victoria Road | 2.13 | 88,450 | 35 | $8,526,300 |
| Victoria Road | Darling Street | The Crescent | 0.85 | 72,340 | 16 | $4,642,700 |
| Lilyfield Road | Victoria Road | Canal Road | 2.48 | 10,855 | 21 | $5,848,100 |
| The Crescent | City West Link | Wigram Road | 1.32 | 40,650 | 18 | $4,229,000 |
| Johnston Street | The Crescent | Parramatta Road | 1.80 | 24,716 | 19 | $5,164,400 |

*Public transport services*

**Figure 8-22** and **Figure 8-23** show the comparison in travel times for buses between the 'without project' and 'with project' scenarios for the AM peak hour. A representative assessment has been carried out for the main bus route along Victoria Road and over Anzac Bridge to the city-bound bus-only lane on the Druitt Street ramp.

The results show longer city-bound bus journey times in the AM peak, due to the congested traffic conditions on Western Distributor and Anzac Bridge combined with the increased demands to Bathurst Street and Sydney Harbour Bridge, compared to the 'without project' case.

In the outbound direction, the Iron Cove Link significantly improves the congestion over Anzac Bridge. As a result, bus journey times reduce in the 'with project' scenario. The forecast reduction in general traffic demand on Victoria Road between Iron Cove Link and Anzac Bridge would provide the opportunity to investigate improving public transport operations, such as extending the existing bus lanes on Victoria Road.

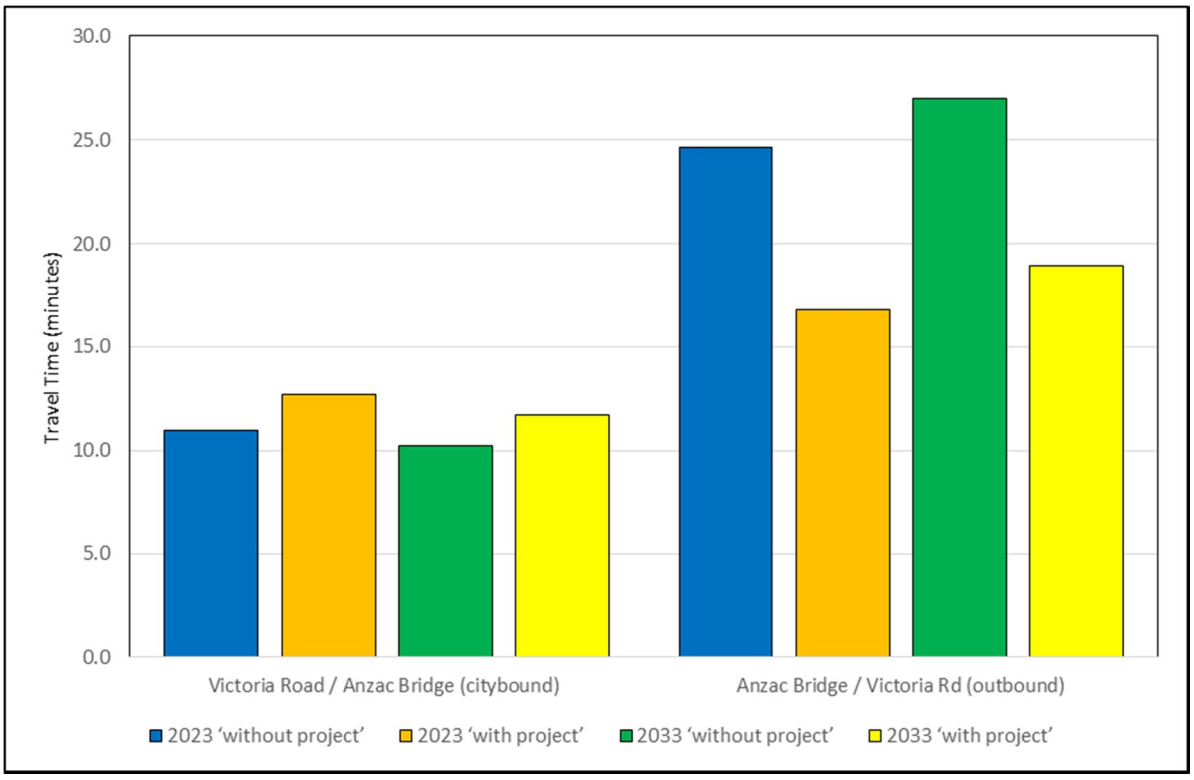



**Figure 8-22 Rozelle interchange: Average travel time for buses – AM peak hour 'with project' comparison**

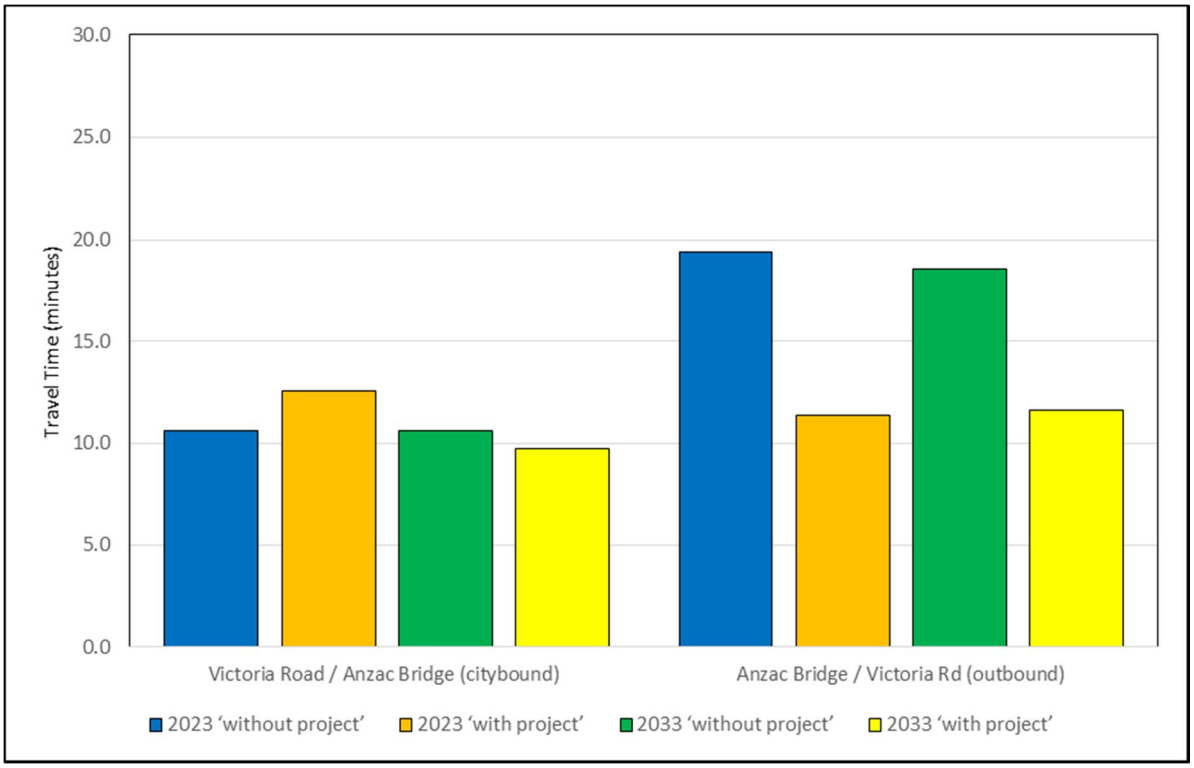



**Figure 8-23 Rozelle interchange: Average travel time for buses – PM peak hour 'with project' comparison**

### *Active transport facilities*

The project would deliver new pedestrian and cycle infrastructure in Lilyfield and Rozelle. This infrastructure has been designed to maintain and enhance pedestrian and cyclist accessibility and

connectivity, providing new and upgraded east–west connections linking Lilyfield and Rozelle with Anzac Bridge, the future Bays Precinct and Balmain, and north–south connections linking Lilyfield and Rozelle with Annandale and Glebe. Details of planned walking and cycling facilities can be found in **Annexure N** (Technical working paper: Active transport).

### *Impacts on local property access and on-street parking*

As part of the Iron Cove Link surface works, modifications to the intersections between Victoria Road and Clubb Street, Toelle Street and Callan Street would be carried out associated with widening of Victoria Road to accommodate the Iron Cove Link tunnel portals. Toelle Street and Callan Street would be reopened in the same traffic operational arrangement as existing. Clubb Street would be converted into a permanent cul-de-sac. Residents accessing Clubb Street could use Toelle Street or Callan Street via Manning Street to access from Victoria Road. The Byrnes Street cul-de-sac would also move south-west.

As a result of these road layout changes, there would be permanent impacts on residential and business on-street parking provision. This is shown in **Table 8-88.** Most of these parking spaces are adjacent to properties being acquired. The final numbers would be confirmed during detailed design.

**Table 8-88 Indicative permanent impact on on-street parking spaces**

| Road section | Indicative impact |
|---|---|
| Byrnes Street, at the northeast end | Loss of around five spaces |
| Clubb Street, at the northeast end | Loss of around nine spaces |
| Toelle Street, at the northeast end | Loss of around seven spaces |
| Callan Street, at the northeast end | Loss of around two spaces |

## Operational performance – St Peters interchange

### *Changes to the road network in the 'with project' scenario*

In the 'with project' scenario, ramps providing connectivity to the M4-M5 Link are introduced to the modelled road network. Not all of the forecast demand to and from the Sydney Airport precinct could be accommodated in the peak hour without the proposed future Sydney Gateway project. This reduction in forecast demand is reported in the network performance tables.

Even with this demand reduction, the surface road network in the model is unable to accommodate the forecast peak hour demands without the additional road capacity provided by the proposed future Sydney Gateway. The proposed future Sydney Gateway introduces a bypass to Mascot town centre and, in its absence, it would be necessary to introduce a number of upgrades at the following intersections to accommodate the forecast traffic:

- Gardeners Road/Kent Road
- Gardeners Road/O'Riordan Street
- Kent Road/Coward Street
- Bourke Road/Coward Street
- Kent Road/Ricketty Street.

These upgrades would not be required once the proposed future Sydney Gateway is operational, but have been included in the 'with project' scenario to enable network performance statistics to be generated.

### *Network performance*

The performance of the modelled road network around the St Peters interchange, in the 2023 and 2033 'with project' and 'without project' scenarios, is presented in **Table 8-89**. The surface network in the 'without project' and 'with project' scenarios is not the same. The additions in the 'with project'

scenario are the M4-M5 Link entry and exit ramps at St Peters interchange and the surface road intersection upgrades required to accommodate the additional forecast traffic demand, in the absence of the proposed future Sydney Gateway.

**2023 'with project' scenario**

In the AM peak hour, the 2023 'with project' scenario network performance is similar to the 'without project' scenario performance. The average vehicle performance metrics are slightly improved compared to the 'without project' scenario, but there is a slight increase in the number of unreleased vehicles. The 'with project' scenario shows that trips are forecast to take less time, with vehicles travelling slightly more quickly due to less congestion than the 'without project' scenario. Queuing in the network is not forecast to prevent entry to or from the project.

In the PM peak hour, the network performance measures suggest that the 2023 'with project' case is more congested, which is reflected in longer average trip times, and average speed in the network dropping by about 28 per cent. Queueing in the network is not forecast to prevent entry to or exit from the project. However, congestion in the Mascot area limits vehicles able to travel through the network in the peak hour to enter the motorway.

**2033 'with project' scenario**

The 2033 AM peak hour network performance results show that the 'with project' scenario is forecast to provide improved network operation when compared to the 'without project' scenario. The 'with project' scenario introduces more tunnelled motorway links, and while there is a ten per cent increase in forecast traffic demand after the opening of the project, the new links contribute to a substantial increase in the average vehicle speed.

In the 2033 PM peak hour, the network performance results show that the 'with project' scenario is more congested than the 'without project' scenario. Demand was reduced by about 400 trips to and from Sydney Airport, with those trips not being served by the network in the peak hour. However, the total demand still increases by 12 per cent and all indicators show that the network is performing inefficiently.

Queueing in the network is not forecast to prevent entry to or exit from the project. However, congestion in the Mascot area limits vehicles able to travel through the network in the peak hour to enter the motorway.

Even with a reduction in forecast demand to and from the Sydney Airport precinct, a number of intersection upgrades were required in the absence of the proposed future Sydney Gateway to accommodate the forecast growth in traffic demand in the 'with project' scenarios. This indicates that the proposed future Sydney Gateway project is required to accommodate the forecast traffic demands at the St Peters interchange and surrounds.

**Table 8-89 St Peters interchange network performance – AM and PM peak hours (2023 'without project' scenario vs 2023 'with project' scenario and 2033 'without project' scenario vs 2033 'with project' scenario)**

| Network measure | 2023 'without project' | 2023 'with project' | Percentage change | 2033 'without project' | 2033 'with project' | Percentage change |
|---|---|---|---|---|---|---|
| **AM peak** | | | | | | |
| **All vehicles** | | | | | | |
| Total traffic demand (veh) | 26,060 | 28,470 | 9% | 29,160 | 30,990 | 10% |
| Total vehicle kilometres travelled in network (km) | 77,500 | 89,120 | 15% | 72,830 | 92,690 | 27% |
| Total time travelled approaching and in network (hr) | 5,150 | 5,350 | 4% | 12,360 | 7,890 | -36% |
| Total vehicles arrived | 23,710 | 26,190 | 10% | 20,720 | 27,130 | 31% |
| Total number of stops | 201,290 | 205,570 | 2% | 274,310 | 250,290 | -9% |
| **Average per vehicle in network** | | | | | | |
| Average vehicle kilometres travelled in network (km) | 2.8 | 2.9 | 6% | 2.6 | 2.8 | 11% |
| Average time travelled in network (mins) | 9.5 | 8.9 | -6% | 17.0 | 10.9 | -36% |
| Average number of stops | 8.5 | 7.9 | -8% | 13.2 | 9.2 | -30% |
| Average speed (km/h) | 17.6 | 19.9 | 13% | 9.0 | 15.7 | 73% |
| **Unreleased vehicles** | | | | | | |
| Unreleased demand | 2,120 | 2,470 | – | 6,950 | 4,310 | – |

| Network measure | 2023 'without project' | 2023 'with project' | Percentage change | 2033 'without project' | 2033 'with project' | Percentage change |
|---|---|---|---|---|---|---|
| (veh) | | | | | | |
| % of total traffic demand | 8% | 9% | – | 24% | 13% | – |
| Unreleased demand (demand reduction) (veh) | 640 | 720 | – | 690 | 830 | – |
| **PM peak** | | | | | | |
| Total traffic demand (veh) | 25,210 | 27,920 | 11% | 27,610 | 31,040 | 12% |
| Total vehicle kilometres travelled in network (km) | 78,920 | 90,610 | 15% | 84,570 | 84,000 | -1% |
| Total time travelled approaching and in network (hr) | 2,850 | 4,710 | 65% | 4,970 | 9,700 | 95% |
| Total vehicles arrived | 24,960 | 26,600 | 7% | 26,350 | 24,120 | -8% |
| Total number of stops | 127,390 | 186,400 | 46% | 195,250 | 248,790 | 27% |
| **Average per vehicle in network** | | | | | | |
| Average vehicle kilometres travelled in network (km) | 2.9 | 2.9 | 3% | 2.8 | 2.7 | -1% |
| Average time travelled in network (mins) | 6.1 | 8.6 | 42% | 9.2 | 14.5 | 58% |
| Average number of stops | 5.1 | 7.0 | 37% | 7.4 | 10.3 | 39% |
| Average speed (km/h) | 28.2 | 20.4 | -28% | 18.0 | 11.2 | -38% |

| Network measure | 2023 'without project' | 2023 'with project' | Percentage change | 2033 'without project' | 2033 'with project' | Percentage change |
|---|---|---|---|---|---|---|
| **Unreleased vehicles** | | | | | | |
| Unreleased demand (veh) | 220 | 1,030 | – | 1,150 | 6,340 | – |
| % of total traffic demand | 1% | 4% | – | 4% | 20% | – |
| Unreleased demand (demand reduction) (veh) | 230 | 360 | – | 320 | 420 | – |

*Intersection performance*

**Table 8-90** shows the modelled AM and PM peak hour LoS for key intersections at St Peters area in the 2023 and 2033 'with project' scenarios compared to the 'without project' scenarios.

**Table 8-90 St Peters interchange: key intersection performance (LoS) – 2023 and 2033 'with project' scenarios**

| Key intersections | 2015 Base | 2023 'without project' | 2023 'with project' | 2033 'without project' | 2033 'with project' |
|---|---|---|---|---|---|
| AM peak hour | | | | | |
| Princes Highway/Sydney Park Road | C | C | C | F | C |
| Princes Highway/May Street | D | C | C | F | D |
| Princes Highway/Canal Road | D | F | F | F | F |
| Princes Highway/Railway Road | F | F | F | F | F |
| Sydney Park Rd/Mitchell Road | C | B | C | F | C |
| Euston Road/Sydney Park Road | A | C | C | F | D |
| Unwins Bridge Road/Campbell Street | C | D | D | F | F |
| Campbell Road/Euston Road | A | C | C | F | D |
| Campbell Road/Bourke Road | - | B | D | B | F |
| Princes Highway/Campbell Street | C | F | F | F | F |
| Ricketty Street/Kent Road* | C | E | D | F | F |
| Gardeners Road/Kent Road* | A | C | D | F | F |
| Gardeners Road/Bourke Road | C | F | E | F | F |
| Gardeners Rd/O'Riordan Street* | D | F | F | F | F |
| PM peak hour | | | | | |
| Princes Highway/Sydney Park Road | D | B | B | C | C |
| Princes Highway/May Street | F | C | C | B | B |
| Princes Highway/Canal Road | D | D | C | F | E |
| Princes Highway/Railway Road | D | D | F | F | F |
| Sydney Park Rd/Mitchell Road | D | C | C | D | D |
| Euston Road/Sydney Park Road | B | D | D | D | D |
| Unwins Bridge Road/Campbell Street | D | E | E | F | F |
| Campbell Road/Euston Road | A | E | D | E | F |
| Campbell Road/Bourke Road | - | B | C | B | F |
| Princes Highway/Campbell Street | D | F | E | F | E |
| Ricketty Street/Kent Road* | C | C | D | F | F |
| Gardeners Road/Kent Road* | A | B | D | D | F |
| Gardeners Road/Bourke Road | D | D | F | F | F |
| Gardeners Rd/O'Riordan Street* | E | F | F | F | F |

Note: *These intersections have upgrades in the 'with project' scenarios

In the AM peak hour, under the 2023 'with project' scenario, the intersections generally forecast similar LoS compared with the 'without project' scenario, except for the Campbell Road/Bourke Road, Ricketty Street/Kent Road and Gardeners Road/Kent Road intersections. In 2033, most of the intersections perform similar or better in the 'with project' scenario, with the exception of the Campbell Road/Bourke Road intersection.

In the 2023 PM peak hour, the intersections generally forecast similar LoS compared with the 'without project' scenario, except for the Campbell Road/Euston Road, Princes Highway/Campbell Street and Gardeners Road/Bourke Road intersections. In the 2033 PM peak hour, most intersections are forecast to operate poorly.

### *Travel times*

**Figure 8-24** and **Figure 8-25** show a comparison of travel times in 2023 and 2033 under the 'without project' and 'with project' scenarios in the AM and PM peak hours.

In the AM peak hour, 2023 travel times for all journeys assessed are similar between the two scenarios. In the 2033 'without project' scenario, the AM peak hour network is very congested and all travel time journeys assessed increase. Travel times show considerable improvement in the 2033 'with project' scenario.

In the PM peak hour, routes that do not run through Mascot, such as Princes Highway to Euston Road, have comparable travel times between scenarios. However, the Railway Road to Gardeners Road and King Street to Sydney Airport Domestic Terminals routes are affected by Mascot congestion and travel times recorded in the 'with project' scenarios are consistently longer than the ones recorded in 'without project' scenarios.

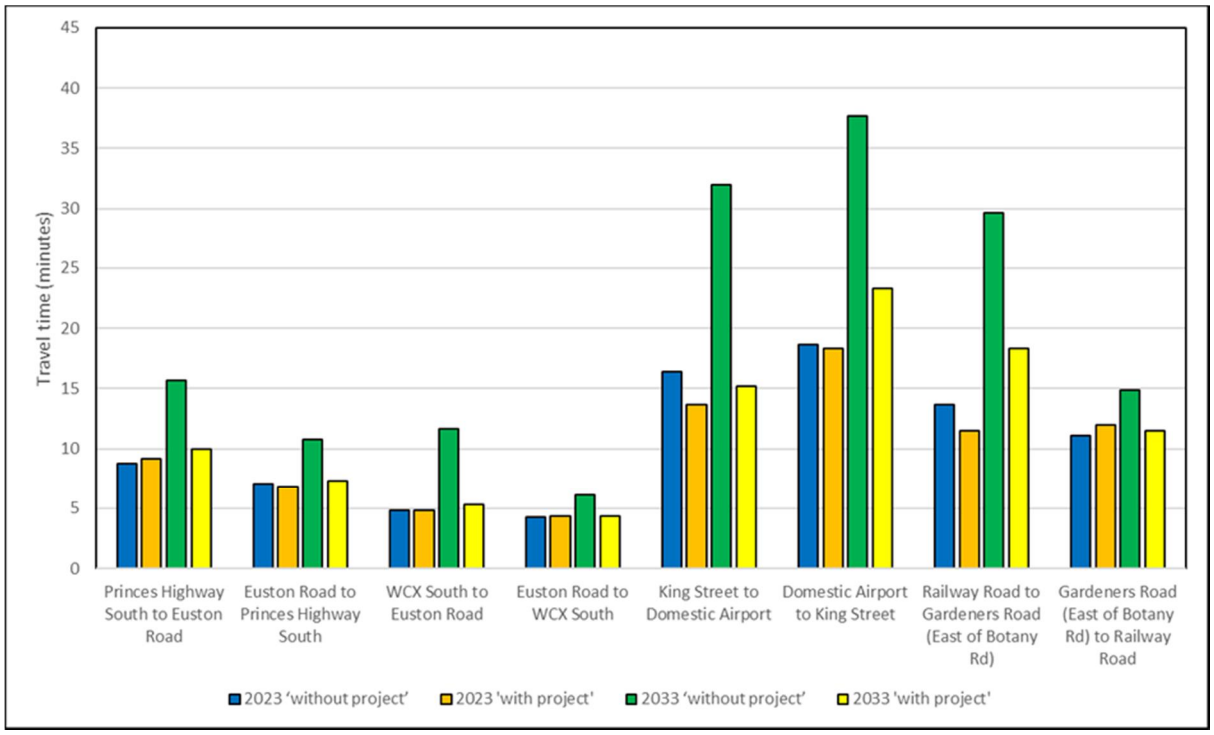



**Figure 8-24 St Peters interchange: Average travel time (mins) – AM peak hour 'with project' scenarios**

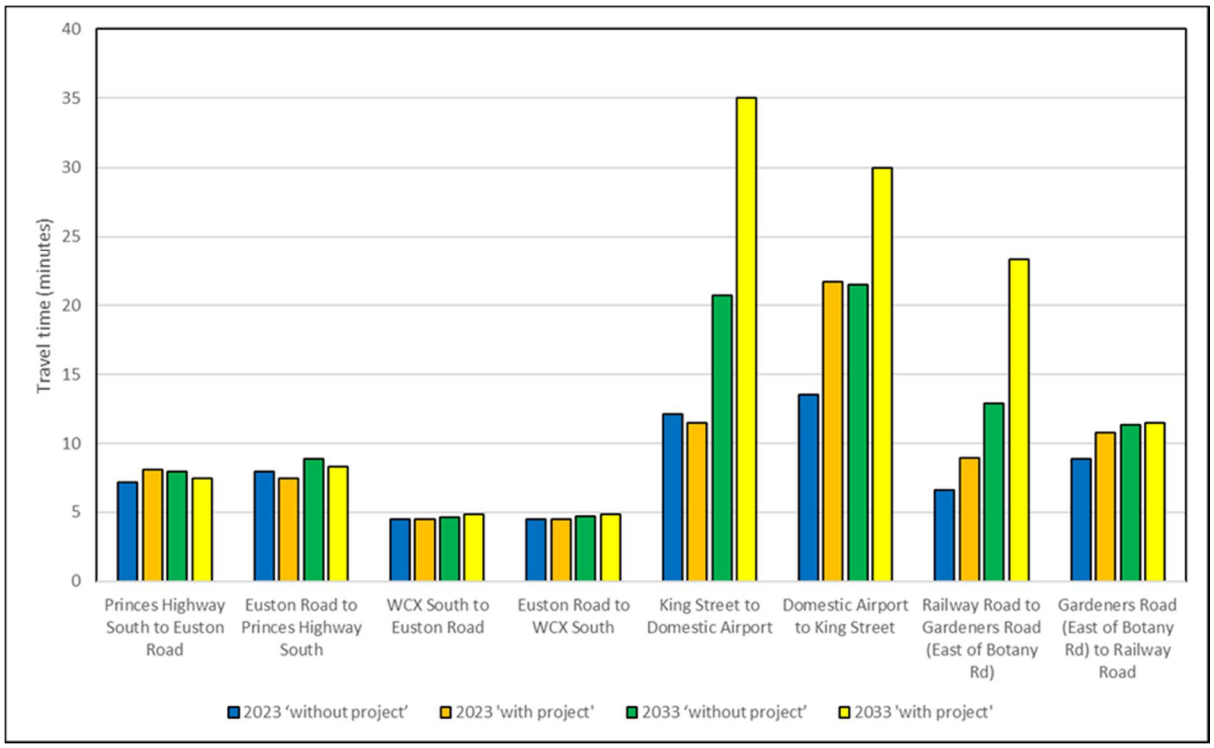



**Figure 8-25 St Peters interchange: Average travel time (mins) – PM peak hour 'with project' scenarios**

### *Traffic crashes*

The frequency of crashes on surface roads in the vicinity of the St Peters area, on the M5 East and on the New M5 forecast under the 'with project' scenarios would change relative to forecast traffic changes and historical crash rates for these roads. Traffic crash analysis on surface roads in the vicinity of the St Peters area have also taken into account crash reductions resultant from intersection upgrades planned as part of the New M5 project.

**Table 8-91** presents the crashes forecast under the 2023 'with project' scenario compared to the 'without project' scenario. The forecast change in daily traffic on the surface roads in the vicinity of the St Peters area varies. There are increases of less than 10 per cent forecast for Princes Highway and Euston Road, a decrease of just over 10 per cent forecast for Bourke Road, and a more significant decrease of about 25 per cent forecast for Canal Road/Ricketty Street/Gardeners Road.

**Table 8-91** shows that there is an overall decrease in the number of cost of annual crashes on surface roads in the vicinity of the St Peters area with the project.

**Table 8-91 St Peters and surrounds: Crash comparison between 2023 'without project' and 'with project' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2023 'without project'** | | | | | | |
| Princes Highway | Enmore Road | Gannon Street | 3.8 | 54,630 | 87 | $9,013,400 |
| Canal Road / Ricketty Street / Gardeners Road | Princes Highway | Botany Road | 2.4 | 28,150 | 34 | $3,075,200 |
| Euston Road | Sydney Park Road | Campbell Road | 0.9 | 42,490 | 31 | $2,447,600 |

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| Bourke Road | Wyndham Street | Gardeners Road | 2.1 | 28,340 | 31 | $2,326,600 |
| **2023 'with project'** | | | | | | |
| Princes Highway | Enmore Road | Gannon Street | 3.8 | 57,230 | 91 | $9,442,400 |
| Canal Road/ Ricketty Street/ Gardeners Road | Princes Highway | Botany Road | 2.4 | 21,820 | 27 | $2,383,700 |
| Euston Road | Sydney Park Road | Campbell Road | 0.9 | 45,330 | 34 | $2,611,200 |
| Bourke Road | Wyndham Street | Gardeners Road | 2.1 | 25,250 | 27 | $2,072,900 |

**Table 8-92** compares the crashes forecast under the 2033 scenarios. In the 2033 'with project' scenario, the forecast increase in traffic on Euston Road would cause an increase in the total number and cost of crashes on Euston Road, south of Sydney Park Road. A forecast increase in traffic on Princes Highway between Enmore Road and Gannon Street also causes an increase in the number and cost of crashes at this location. However, the significant decrease in daily traffic forecast on the Canal Road/Ricketty Street/Gardeners Road, and Bourke Road between Wyndham Street and Gardeners Road, in combination with the intersection upgrades, would result in a reduction in the total number and cost of crashes on these roads. **Table 8-92** shows that there is a benefit in the reduction in number and cost of crashes at these locations of about four per cent compared to the 'without project' scenario.

**Table 8-92 St Peters and surrounds: Crash comparison between 2033 'without project' and 'with project' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2033 'without project'** | | | | | | |
| Princes Highway | Enmore Road | Gannon Street | 3.8 | 59,220 | 95 | $9,770,700 |
| Canal Road/Ricketty Street/Gardeners Road | Princes Highway | Botany Road | 2.4 | 32,230 | 39 | $3,520,900 |
| Euston Road | Sydney Park Road | Campbell Road | 0.9 | 47,120 | 35 | $2,714,300 |
| Bourke Road | Wyndham Street | Gardeners Road | 2.1 | 29,460 | 32 | $2,418,600 |
| **2033 'with project'** | | | | | | |
| Princes Highway | Enmore Road | Gannon Street | 3.8 | 61,780 | 99 | $10,193,100 |
| Canal Road/Ricketty Street/Gardeners Road | Princes Highway | Botany Road | 2.4 | 24,000 | 29 | $2,621,900 |
| Euston Road | Sydney Park Road | Campbell Road | 0.9 | 49,540 | 37 | $2,853,700 |
| Bourke Road | Wyndham Street | Gardeners Road | 2.1 | 26,450 | 29 | $2,171,500 |

*Public transport services*

**Table 8-26** shows the comparison in average bus travel time across the St Peters modelled road network between the 'without project' and 'with project' scenarios for the AM and PM peak hours. As there are not one or two dominant bus corridors in the modelled network, an average of all bus travel times has been reported.

In the AM peak hour, the average bus travel time is similar across the scenarios, with small increases in the 2023 'with project' scenario compared to the 2023 'without project' scenario, and similar times in the 2033 comparison. In the PM peak hour, there is an increase in the average bus travel time in the 2023 'with project' scenarios compared to the 2023 'without project' scenario, and again in the 2033 comparison.

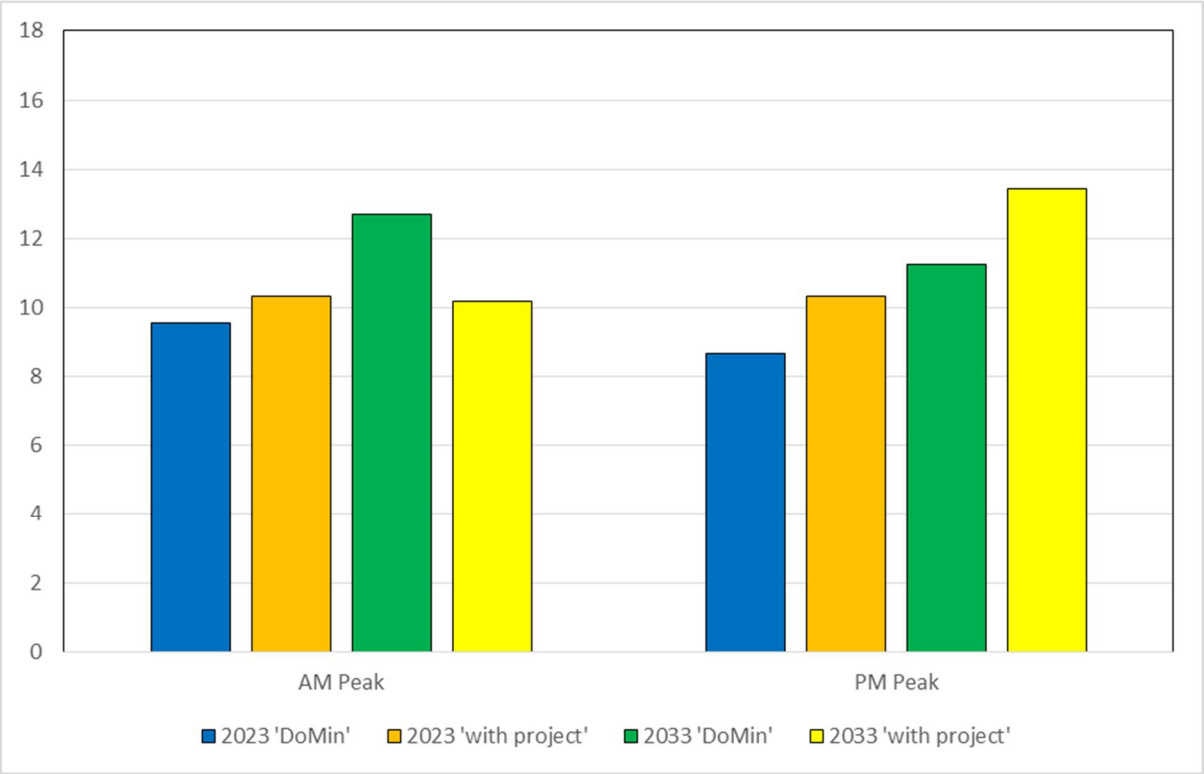



**Figure 8-26 St Peters interchange: Average travel time for buses – 'with project' comparison**

*Active transport facilities*

Details of planned walking and cycling facilities can be found in in **Annexure N** (Technical working paper: Active transport).

*Impact on local property access and on-street parking*

There is no planned impact on local property access or on-street residential or business parking in the St Peters interchange area as part of the project.

## Operations under staged opening

The mainline tunnels between the M4 East at Haberfield and the New M5 at St Peters are planned for completion in 2022, while the Rozelle interchange is planned for completion in 2023.There is a period of around 12 months during which the mainline tunnels would be operational without the Rozelle interchange, although at a reduced lane capacity of only two lanes in each direction in the mainline. Constructing the project in two stages would allow the mainline tunnels to operate independently before the completion of the Rozelle interchange and the Iron Cove Link and allow the benefits to the Sydney metropolitan road network of linking the M4 East and the New M5 component projects to be realised as soon as possible.

Under the staged opening, a two-way AWT of about 49,500 vehicles per day is forecast to use the mainline tunnels. Operational modelling indicates that the forecast peak hour volumes would be within the capacity of the two lanes and LoS D or better is forecast.

**Table 8-93** compares the AM peak, PM peak and 24 hour two-way traffic volumes in a 2023 'mainline only' scenario to the corresponding traffic volumes in the 2023 and 2033 'with project' scenario around the Wattle Street and St Peters interchanges.

In a 'mainline only' scenario, the Wattle Street and St Peters interchanges are the only entry and exit points for M4-M5 Link traffic. A comparison was made of the forecast traffic volumes at the Wattle Street interchange area and the St Peters interchange area in this 'mainline only' scenario with the other scenarios tested in this EIS. This comparison found that the forecast two-way traffic in a 'mainline only' scenario for the AM peak, PM peak and daily time periods was less than forecast traffic in at least one of the other scenarios tested in the EIS. Therefore, it is not considered necessary to model the temporary 'mainline only' scenario as the impact of higher forecast traffic volumes was tested in other scenarios in this EIS.

**Table 8-93 Comparison of two-way traffic under a 2023 'mainline only' scenario**

| Key criteria locations | 2023 'mainline only' | | | 2023 'with project' (mainline, Rozelle interchange and Iron Cove Link) | | | 2033 'with project' (mainline, Rozelle interchange and Iron Cove Link) | | |
|---|---|---|---|---|---|---|---|---|---|
| | AM | PM | AWT | AM | PM | AWT | AM | PM | AWT |
| **Wattle Street interchange and surrounds** | | | | | | | | | |
| Wattle Street M4-M5 Link entry and exit ramps | 920 | 950 | 9,500 | 1,560 | 1,360 | 19,000 | 1,770 | 1,540 | 21,000 |
| Parramatta Road (west of Wattle St) | 2,860 | 3,330 | 44,500 | 3,180 | 3,520 | 47,500 | 3,380 | 3,820 | 52,000 |
| **St Peters interchange and surrounds** | | | | | | | | | |
| St Peters M4-M5 Link entry and exit ramps | 5,450 | 5,800 | 66,500 | 5,290 | 5,640 | 70,000 | 5,700 | 6,230 | 76,500 |
| Euston Road (south of Sydney Park Rd) | 4,140 | 3,530 | 56,000 | 3,940 | 3,410 | 54,500 | 4,470 | 3,740 | 59,500 |
| Gardeners Road (east of Bourke St) | 4,270 | 3,950 | 46,000 | 4,280 | 3,950 | 47,000 | 4,340 | 4,150 | 48,500 |
| Campbell Street (west of Princes Highway) | 1,530 | 1,550 | 24,500 | 1,550 | 1,530 | 24,500 | 1,570 | 1,580 | 25,000 |

## 8.3.4 Assessment of cumulative impacts

### Cumulative projects

This section details the forecast traffic performance of the study area during the following 'cumulative' scenarios:

- **Operation 'cumulative' (2023)**: With the 2023 'do minimum' projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway and Western Harbour Tunnel operational
- **Operation 'cumulative' (2033)**: With the 2033 'do minimum' projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension operational.

The proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension projects would be subject to separate assessment and do not form part of this project.

## Sydney metropolitan road network

*2023 'Cumulative' scenario*

### General traffic

In the 2023 'cumulative' scenario, the project enables the development of the future Sydney motorway network, connecting the proposed future Western Harbour Tunnel to the M5 Motorway corridor, creating a western bypass of the Sydney CBD. With the inclusion of the proposed future Sydney Gateway and Western Harbour Tunnel, increases in traffic on the M4-M5 Link are forecast, particularly between the Rozelle and St Peters interchanges due to the extended motorway network. A decrease in daily traffic is forecast on the M4 exit ramp to Anzac Bridge, Anzac Bridge/Western Distributor and the Sydney Harbour Bridge due to the inclusion of the proposed future Western Harbour Tunnel.

Decreased traffic is forecast on the Sydney Harbour Bridge, Sydney Harbour Tunnel, Southern Cross Drive and the existing M5 East due to the introduction of the proposed future Sydney Gateway and Western Harbour Tunnel.

With the inclusion of the proposed future Sydney Gateway, decreases in daily traffic on surface roads between the St Peters interchange and Sydney Airport and the Princes Highway are forecast. Further reductions in peak period travel times compared to the 'with project' scenario are also forecast between the M4 corridor and the Sydney Airport/Port Botany.

Road network productivity is forecast to improve in the 2023 'cumulative' scenario compared to the 2023 'with project' scenario with the inclusion of the proposed future Sydney Gateway and Western Harbour Tunnel. There is a drop in the VKT and VHT on the arterial (non-motorway) network with an increase in kilometres and hours travelled along the motorway routes, as shown in **Table 8-94**. Therefore, greater distance could be travelled on the road network in a shorter time.

**Table 8-94 Comparison of daily 2023 VKT and VHT for metropolitan Sydney in 2023 'with project' and 'cumulative' scenarios**

| Scenario | Daily VKT ('000 km) | | | Daily VHT ('000 hours) | | |
|---|---|---|---|---|---|---|
| | Motorway | Other | Total | Motorway | Other | Total |
| With project | 27,730 | 86,050 | 113,780 | 480 | 3,120 | 3,600 |
| Cumulative | 27,980 | 85,970 | 113,950 | 470 | 3,110 | 3,570 |

### On-road freight

Forecast changes in daily road-based freight or heavy vehicle movements generally follow the same pattern as the general traffic movements. There are significant reductions in daily heavy vehicle traffic focused on the new M4 East exit ramp to Anzac Bridge, Anzac Bridge/Western Distributor and the Sydney Harbour Bridge (especially northbound), and on Southern Cross Drive and Sydney Harbour Tunnel (especially southbound). Decreases in daily heavy vehicle traffic on surface roads between the St Peters interchange and Sydney Airport are also forecast due to the proposed future Sydney Gateway.

### On-road public transport

Reductions in forecast traffic volume changes as a result of the inclusion of the proposed future Sydney Gateway and the Western Harbour Tunnel would be expected to improve the reliability and trip times for public transport bus services on those roads. The decrease in daily traffic forecast for Anzac Bridge/Western Distributor could improve reliability and trip times for bus services travelling between the north-west and the Sydney CBD via Victoria Road. Forecast decreases in traffic for the

Sydney Harbour Bridge could improve trip times and reliability for bus services travelling between the north and the Sydney CBD on the Warringah Freeway and Pacific Highway.

*2033 'Cumulative' scenario*

Analysis was undertaken of the impact of the project under the cumulative 2033 scenario.

**General traffic**

In a 2033 'cumulative' scenario, the project enables the further development of the future Sydney motorway network, connecting the proposed future Beaches Link (a component of the proposed future Western Harbour Tunnel and Beaches Link) and the F6 Extension, creating a north–south motorway link. The pattern of change highlighted in 2023 is generally the same for 2033, with the scale of increases or decreases larger due to the growth in forecast traffic. However, with the inclusion of the F6 Extension, decreases in daily traffic on the Princes Highway (especially south of the M5 East) are forecast due to traffic switching to use the motorway links.

With the inclusion of the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension, reductions in peak period travel times are forecast between the M4 corridor and the Sydney Airport/Port Botany precinct in 2033.

Road network productivity is forecast to improve in the 2033 'cumulative' scenario with the inclusion of the proposed future Western Harbour Tunnel, Sydney Gateway, Beaches Link and the F6 Extension. There is a forecast drop in VKT and VHT on the arterial (non-motorway) network, and an increase in kilometres travelled along the motorway routes, as shown in **Table 8-95**. Overall, a greater distance could be travelled on the road network in a shorter time.

**Table 8-95 Comparison of daily 2033 VKT and VHT for metropolitan Sydney in 2033 'with project' and 'cumulative' scenarios**

| Scenario | Daily VKT ('000 km) | | | Daily VHT ('000 hours) | | |
|---|---|---|---|---|---|---|
| | Motorway | Other | Total | Motorway | Other | Total |
| With project | 32,010 | 101,410 | 133,430 | 600 | 4,610 | 5,220 |
| Cumulative | 33,780 | 100,650 | 134,420 | 600 | 4,500 | 5,100 |

**On-road freight**

Forecast changes in daily road-based freight or heavy vehicle movements would generally follow the same pattern as 2023 cumulative scenarios, with a larger decrease on General Holmes Drive (south of the M5 East) forecast due to the inclusion of the F6 Extension.

**On-road public transport**

The impacts for on-road public transport in 2033 are similar to those forecast in 2023. Reductions in traffic on Anzac Bridge/Western Distributor would be expected to improve the reliability and trip times of bus services that travel between the north-west and the Sydney CBD via Victoria Road. Reductions in forecast traffic volumes on the Sydney Harbour Bridge would be expected to improve the reliability and trip times of buses travelling between the north and the Sydney CBD via the Pacific Highway and Warringah Freeway.

## Operational performance – M4-M5 Link Motorway

*Mid-block level of service*

The mid-block levels of service on the M4-M5 Link motorway under the 2023 'cumulative' and 2033 'cumulative' scenarios in peak hours are provided in **Table 8-96** and **Table 8-97** respectively. Compared to the 2023 'with project' scenario, the 2023 'cumulative' scenario analysis indicates traffic flows on the motorway would generally be denser with a corresponding reduction in level of service in the peak hours. However, it is still forecast to generally operate at an acceptable level of service.

The 2033 'cumulative' scenario analysis indicates forecast traffic flows on the motorway would be denser compared to the 2033 'with project' scenario, with a corresponding reduction in level of service in the peak hours. This is due to the additional motorway links in the 'cumulative' scenario (the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and the F6 Extension), resulting in more traffic on the M4-M5 Link. There are sections of the motorway forecast to operate at LoS E in the peak hours, particularly around the merge and diverge locations on the M4-M5 Link, such as where the Wattle Street interchange ramps and the mainline connect. Even with this increased density, average motorway speeds are still forecast to be 60 km/h or above.

Provision has been made for ramp signalling and Smart (or Managed) Motorway infrastructure in the M4-M5 Link design. A Smart Motorway uses technology to monitor, provide intelligence and control the motorway to ease congestion and keep traffic flowing more effectively. Technology, including lane use management signs, vehicle detection equipment, closed-circuit television (CCTV) cameras and on-ramp signals, allows road operators to manage, in real-time, traffic entering, exiting and traversing the motorway. A comprehensive network-wide strategy could have significant benefits in maintaining acceptable operating conditions on the motorway in the future.

**Table 8-96 M4-M5 Link motorway LOS – 2023 'cumulative' scenario**

| Section | Location and direction | No. of lanes | Modelled flow (PCU) | Speed (km/h) | Density (PCU/km/ln) | LOS |
|---|---|---|---|---|---|---|
| **Southbound – AM peak hour** | | | | | | |
| 1 | Interface with M4 East | 3 | 4,920 | 76 | 21.7 | D |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 6,110 | 70 | 21.9 | D |
| 3 | Rozelle interchange bypass | 2 | 2,580 | 80 | 16.1 | D |
| 4 | Rozelle interchange to St Peters interchange | 4 | 5,660 | 80 | 17.7 | D |
| 5 | Interface with New M5 | 2 | 380 | 80 | 2.4 | A |
| **Southbound – PM peak hour** | | | | | | |
| 1 | Interface with M4 East | 3 | 3,020 | 80 | 12.6 | C |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 3,660 | 80 | 11.4 | C |
| 3 | Rozelle interchange bypass | 2 | 2,100 | 80 | 13.1 | C |
| 4 | Rozelle interchange to St Peters interchange | 4 | 4,190 | 80 | 13.1 | C |
| 5 | Interface with New M5 | 2 | 990 | 80 | 6.2 | A |
| **Northbound – AM peak hour** | | | | | | |
| 1 | Interface with New M5 | 2 | 1,190 | 80 | 7.4 | B |
| 2 | St Peters interchange to Rozelle interchange | 4 | 5,050 | 80 | 15.8 | C |
| 3 | Rozelle interchange bypass | 2 | 2,680 | 80 | 16.7 | D |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 4,850 | 80 | 15.2 | C |
| 5 | Interface with M4 East | 3 | 4,310 | 80 | 17.9 | D |
| **Northbound – PM peak hour** | | | | | | |
| 1 | Interface with New M5 | 2 | 330 | 80 | 2.1 | A |
| 2 | St Peters interchange to Rozelle interchange | 4 | 4,620 | 80 | 14.5 | C |
| 3 | Rozelle interchange bypass | 2 | 2,550 | 80 | 16.0 | C |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 6,350 | 80 | 19.8 | D |
| 5 | Interface with M4 East | 3 | 5,600 | 80 | 23.3 | E |

Note:

The reported speed has been capped at the posted 80 kilometres per hour. The microsimulation models allow vehicle speeds slightly higher than the posted speed, which models reality, especially in uncongested, free flow conditions.

**Table 8-97 M4-M5 Link motorway LOS – 2033 'cumulative' scenario**

| Section | Location and direction | No. of lanes | Modelled flow (PCU) | Speed (km/h) | Density (PCU/km/ln) | LOS |
|---|---|---|---|---|---|---|
| **Southbound – AM peak hour** | | | | | | |
| 1 | Interface with M4 East | 3 | 5,310 | 71 | 25.0 | E |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 6,830 | 63 | 27.0 | E |
| 3 | Rozelle interchange bypass | 2 | 2,400 | 80 | 15.0 | C |
| 4 | Rozelle interchange to St Peters interchange | 4 | 6,520 | 77 | 21.1 | D |
| 5 | Interface with New M5 | 2 | 880 | 80 | 5.5 | A |
| **Southbound – PM peak hour** | | | | | | |
| 1 | Interface with M4 East | 3 | 4,160 | 78 | 17.7 | D |
| 2 | Wattle Street interchange to Rozelle interchange | 4 | 5,030 | 76 | 16.5 | D |
| 3 | Rozelle interchange bypass | 2 | 3,050 | 79 | 19.2 | D |
| 4 | Rozelle interchange to St Peters interchange | 4 | 6,030 | 75 | 20.0 | D |
| 5 | Interface with New M5 | 2 | 2,340 | 80 | 14.7 | C |
| **Northbound – AM peak hour** | | | | | | |
| 1 | Interface with New M5 | 2 | 2,600 | 75 | 17.2 | D |
| 2 | St Peters interchange to Rozelle interchange | 4 | 7,080 | 69 | 25.5 | E |
| 3 | Rozelle interchange bypass | 2 | 3,320 | 78 | 21.4 | D |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 5,930 | 70 | 21.1 | D |
| 5 | Interface with M4 East | 3 | 5,360 | 80 | 22.3 | E |
| **Northbound – PM peak hour** | | | | | | |
| 1 | Interface with New M5 | 2 | 780 | 80 | 4.9 | A |
| 2 | St Peters interchange to Rozelle interchange | 4 | 5,530 | 77 | 18.0 | D |
| 3 | Rozelle interchange bypass | 2 | 2,780 | 80 | 17.4 | D |
| 4 | Rozelle interchange to Wattle Street interchange | 4 | 6,720 | 75 | 22.3 | E |
| 5 | Interface with M4 East | 3 | 5,920 | 80 | 24.7 | E |

Note:

The reported speed has been capped at the posted 80 kilometres per hour. The microsimulation models allow vehicle speeds slightly higher than the posted speed, which models reality, especially in uncongested, free flow conditions.

### *Traffic crashes*

A comparison between the crash forecast under the 2023 'cumulative' scenario was undertaken against the 'with project' scenario and is shown in **Table 8-98**. The increase in forecast traffic in the cumulative scenario is reflected in an increase in forecast crashes, especially on the section between the Rozelle and St Peters interchanges. Once again, these crashes would be balanced against the reduction in crashes forecast by the reduction in traffic volumes on the surface roads. With crash rates on motorways much lower than on surface arterial roads, a general reduction in accidents would be expected.

**Table 8-98 M4-M5 Link: Crash comparison between 2023 'with project' and 'cumulative' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2023 'with project'** | | | | | | |
| M4-M5 Link | Wattle Street interchange | Rozelle interchange | 1.25 | 87,470 | 23 | $264,300 |
| M4-M5 Link | Rozelle interchange bypass | | 1.36 | 39,620 | 11 | $130,300 |
| M4-M5 Link | Rozelle interchange | St Peters interchange | 2.24 | 60,500 | 29 | $327,600 |
| **2023 'cumulative'** | | | | | | |
| M4-M5 Link | Wattle Street interchange | Rozelle interchange | 1.25 | 105,600 | 28 | $319,100 |
| M4-M5 Link | Rozelle interchange bypass | | 1.36 | 47,690 | 14 | $156,800 |
| M4-M5 Link | Rozelle interchange | St Peters interchange | 2.24 | 94,510 | 45 | $511,800 |

A comparison between the crash forecast under the 2033 'cumulative' scenario was undertaken against the 'with project' scenario and is shown in **Table 8-99**. The comparison is similar to the 2023 comparison. The increase in forecast traffic in the cumulative scenario, especially on the section between the Rozelle and St Peters interchanges, is reflected in an increase in forecast crashes.

**Table 8-99 M4-M5 Link: Crash comparison between 2033 'with project' and 'cumulative' scenarios**

| Road | Section from | Section to | Section length (km) | ADT (veh) | Average annual crashes | Average annual cost |
|---|---|---|---|---|---|---|
| **2033 'with project'** | | | | | | |
| M4-M5 Link | Wattle Street interchange | Rozelle interchange | 1.25 | 97,910 | 26 | $295,900 |
| M4-M5 Link | Rozelle interchange bypass | | 1.36 | 45,370 | 13 | $149,200 |
| M4-M5 Link | Rozelle interchange | St Peters interchange | 2.24 | 68,910 | 33 | $373,200 |
| **2033 'cumulative'** | | | | | | |
| M4-M5 Link | Wattle Street interchange | Rozelle interchange | 1.25 | 124,190 | 33 | $375,300 |
| M4-M5 Link | Rozelle interchange bypass | | 1.36 | 56,870 | 16 | $187,000 |
| M4-M5 Link | Rozelle interchange | St Peters interchange | 2.24 | 117,530 | 56 | $636,400 |

## Operational performance - Wattle Street Interchange

*Changes to road network in 'cumulative' scenarios*

There are no road network differences between 'with project' and 'cumulative' scenarios at the Wattle Street interchange.

*Network performance*

**2023 'cumulative' scenario**

A comparison of the performance of the modelled road network between the 2023 'with project' and 'cumulative' scenarios for the AM and PM peak hours was undertaken.

AM peak hour

The 2023 AM peak hour 'cumulative' scenario network performance are similar to the 'with project' scenario performance, with the main cause of congestion being excess demand for City West Link which is forecast to occasionally block back beyond the Ramsay Street intersection. This impacts Ramsay Street (W), Waratah Street and Timbrell Drive, which are forecast to all experience heavy queueing. Queuing at the eastbound M4 East Parramatta Road ramps merge is minimal, however the models forecast extensive queuing at Liverpool Road. There is an increase in average speed due to the higher proportion of vehicles using the M4-M5 Link in the 'cumulative' scenario.

PM peak hour

The 2023 PM peak hour 'cumulative' scenario network performance is similar to the 'with project' scenario performance, with the main cause of congestion remaining the increased forecast demand to Frederick Street. This traffic cannot be accommodated because of downstream congestion blocking back from south west of the modelled network extents. As with the 'with project' scenario, significant queues are predicted to occur on the Parramatta Road eastbound approach to Wattle Street and on Wattle Street. The forecast increase in total demand in the 'cumulative' scenario results in an increase in average speed, as much of this additional demand is along the M4-M5 Link, which is free flowing at relatively high speeds.

**2033 'cumulative' scenario**

A comparison of the network performance of the modelled road network between the 2033 'with project' and 'cumulative' scenarios for the AM and PM peak hours was undertaken.

AM peak hour

The 2033 AM peak hour 'cumulative' scenario forecasts a minor increase in overall average speed due to an increase in forecast demand for the M4-M5 Link mainline when compared to the 'with project'; similar to the 2023 comparisons. The same issues as in the 'with project' scenario remain, with there still being significant Wattle Street/Dobroyd Parade congestion impacting side road approaches. One notable difference is that forecast demand from the M4 Motorway to City West Link reduces in the 'cumulative' scenario and thus blocking from the Wattle Street merge does not extend as far back along Wattle Street to Parramatta Road, as it does in the 2033 'with project' scenario.

In the 'cumulative' scenario, the modelling forecasts a significant increase in demand to and from the surface road network from M4-M5 Link ramps, and reduced demand to and from the M4 East ramps.

PM peak hour

The 2033 PM peak hour 'cumulative' network performance are similar to the 2023 'with project' conditions, with the forecast demand for Frederick Street remaining the main cause of congestion. As in the 'with project' scenario, with the capacity constraints at the Wattle Street intersection and the increase in westbound demand, queuing on the Parramatta Road westbound approach to Wattle Street extends through the Bland Street intersection. Minor road approaches within the network are seen to have large queues as a result of congestion on Parramatta Road and Wattle Street. This occurs at Bland Street, Great North Road, Croydon Road, Liverpool Road and Sloane Street.

### *Intersection performance*

Performance across the majority of the network is consistent between 'with project' and 'cumulative' scenarios, with intersections performing at the same or better levels of service. Performance improvements are noted in the 2033 PM peak hour 'cumulative' scenario when compared to the 'with project' scenario, as a result of reduced demand to and from Parramatta Road to the east.

### *Travel times*

The difference in network travel times between 'with project' and 'cumulative' scenarios was assessed for the AM and PM peak hours.

In the AM peak hour, delay of vehicles destined for City West Link is reduced in the 'cumulative' scenario as a result of reduced forecast demand, particularly from the M4 East Wattle Street exit ramp Elsewhere, travel times remain relatively consistent between 'with project' and 'cumulative' scenarios.

Travel times in the PM peak hour also remain similar to the 'with project' scenario outputs, highlighting the relatively minor difference in traffic flow patterns within the network between the two scenarios. The impact of Frederick Street blocking back is again prevalent, with significant travel times on the City West Link to Frederick Street and M4-M5 Link to Wattle Street sections.

### *Traffic crashes*

Daily traffic on Parramatta Road is forecast to increase slightly in the 2023 'cumulative' scenario compared to the 'with project' scenario, resulting in no change to the total number of crashes, and a minimal increase in the cost of crashes of less than one per cent.

Similar to the 2023 comparison, daily traffic on Parramatta Road in the 2033 'cumulative' scenario is forecast to increase slightly, resulting in no change to the total number of crashes, and a minimal increase in cost of crashes of less than one per cent.

### *Public transport services*

There is no change to public transport provision in the 'cumulative' scenario compared to the 'with project' scenario in 2033. A comparison in bus journey times between 'with project' and 'cumulative' scenarios indicates that the travel times are similar between the two scenarios.

## Operational performance – Rozelle interchange

### *Changes to road network in 'cumulative' scenarios*

The 'cumulative' scenarios include the proposed future Western Harbour Tunnel (a component of the proposed future Western Harbour Tunnel and Beaches Link project) in the 2023 'cumulative' scenario, and the addition of the Beaches Link component in the 2033 'cumulative' scenario. The 'cumulative' models include the following links which were added to the 'with project' networks:

- The proposed future Western Harbour Tunnel and Beaches Link, which connects to the M5 Motorway to the south providing a north-south through route
- A new link joining the proposed future Western Harbour Tunnel and Beaches Link to the M4 to the west.

The operational assessment does not assume there are surface ramps between the proposed future Western Harbour Tunnel and Beaches Link and City West Link at Rozelle.

### *Network performance*

#### 2023 'cumulative' scenario

A comparison of the performance of the modelled road network was undertaken, between the 2023 'with project' and 'cumulative' scenarios for the AM and PM peak hours. The 'cumulative scenario introduces more tunnelled motorway links in the modelled area, and while the forecast traffic demand significantly increases after the opening of the proposed future Western Harbour Tunnel, the new links result in a substantial increase in the average vehicle speed in the network.

AM peak hour

In the AM peak hour, a 17 per cent increase is demand is forecast for the 'cumulative' scenario compared to the 'with project' scenario. In spite of this increase, compared with the 'with project' scenario, the 'cumulative' network is forecast to provide benefits to the Western Distributor and Anzac Bridge operation. This is primarily because of the reassignment of traffic from the Sydney Harbour Bridge to the proposed future Western Harbour Tunnel that results in a significant improvement in overall network performance, with higher average speed, fewer stops and fewer unreleased vehicles. However, without mitigation, queueing from the Bathurst Street exit ramp is forecast to remain an issue and is likely to extend up the exit ramp and impact eastbound flow on the Western Distributor and Anzac Bridge.

PM peak hour

In the PM peak hour, the forecast demand for the cumulative scenario increases by about 10 per cent more than the 'with project' scenario. In spite of this increase, the modelled network is forecast to perform better in the 'cumulative' case compared to the 'with project' case. This is due to less traffic forecast to use the Western Distributor to head west across Anzac Bridge.

**2033 'cumulative' scenario**

A comparison of the performance of the modelled road network between the 2033 'with project' and 'cumulative' scenarios for the AM and PM peak hours was undertaken.

AM peak hour

As in the 2023 'cumulative' scenario, the 2033 'cumulative' scenario provides some benefit to the Western Distributor and Anzac Bridge compared to the 'with project case', due to the shift in traffic to the proposed future Western Harbour Tunnel instead of Anzac Bridge and Sydney Harbour Bridge. This reassignment results in better flow for northbound traffic on Western Distributor towards Sydney Harbour Bridge in the AM peak. The result is that the network performance indicators all show significant improvements, despite a 24 per cent increase in forecast demand. However, the queue from the Bathurst Street off-ramp still has the potential to queue back to the Western Distributor and negatively impact eastbound traffic on Anzac Bridge.

PM peak hour

As in 2023, the 2033 'cumulative' network is forecast to perform better compared to the 'with project' case, despite a 15 per cent increase in forecast demand. Again, this is due to lower forecast volumes on the Western Distributor heading west across Anzac Bridge. As a result, the network performance is slightly better than the 'with project' network.

### *Intersection performance*

The forecast intersection performances in the 'cumulative' scenario are similar to the 'with project' scenario at most intersections in both peak hours. Improved performance is forecast at the critical Victoria Road/The Crescent intersection, as a result of traffic forecast to reassign to Western Harbour Tunnel.

However, as in the 'with project' scenario, the Victoria Road/Lyons Road intersection in both peak hours, the Victoria Road / Darling Street and Victoria Road – Robert Street intersections in the AM peak hour and The Crescent/Johnston Street intersection in both peak hours remain at or over capacity due to the forecast demands.

### *Travel times*

Travel times on Victoria Road/Iron Cove Link and City West Link, including Anzac Bridge in the AM and PM peak periods were assessed.

In the AM peak hour, travel times in the peak eastbound direction are forecast to reduce in the cumulative case for both 2023 and 2033. In the westbound direction, there are forecast increases in travel times to Iron Cove Bridge via Victoria Road due to the combination of forecast increase in demand to Victoria Road and the congestion on Victoria Road to the north (through Drummoyne) causing traffic to queue back on Victoria Road.

In the PM peak hour, the westbound travel time is forecast to remain similar between the 'project' and 'cumulative' scenarios.

### *Traffic crashes*

Daily traffic on Anzac Bridge is forecast to decrease in the 2023 'cumulative' scenario compared to the 'with project' scenario, resulting in a decrease in total number and cost of crashes. However, forecast increases in daily traffic on other roads in the vicinity, especially The Crescent and Johnston Street, result in an increase in the total number and cost of crashes at these locations compared to the 'with project' scenario of about six per cent.

Compared to the 2023 'without project' scenario, there is a small change in the forecast number and cost of annual crashes at these locations (with less than one per cent increase).

Similar to the 2023 comparison, daily traffic on Anzac Bridge is forecast to decrease, resulting in a decrease in total number and cost of crashes, while forecast increases in daily traffic on other roads in the vicinity, especially The Crescent and Johnston Street, result in an increase in the total number and cost of crashes at these locations.

### *Public transport services*

A comparison in travel times for buses between the 'cumulative' and 'with project' scenarios for the AM and PM peak was undertaken. The main bus route along Victoria Road and over Anzac Bridge to the citybound bus-only lane on the Druitt Street ramp was the assessed route.

With the reduction in demand over Anzac Bridge, citybound bus journey times are forecast to improve in AM and PM peak hours. However, with the combination of the increase in demand to Victoria Road and the congestion on Victoria Road to the north causing traffic to queue back along Victoria Road, outbound bus journey times are forecast to increase during the AM peak hour. During the PM peak hour, the outbound bus journey times remain similar to the 'with project' scenario.

### *Cumulative scenario with proposed future Western Harbour Tunnel surface ramps at City West Link*

While the construction impact of the proposed future Western Harbour Tunnel and Beaches Link entry and exit ramps connecting to City West Link is included in this EIS, the operational traffic impact of these ramps have not been included in this EIS. A preliminary assessment with these ramps operational has been carried out. This assessment identified that there is likely to be some reduction in traffic on the Western Distributor and Sydney Harbour Bridge, as more traffic would be able to access the proposed future Western Harbour Tunnel, but there is likely to be increased traffic on City West Link, The Crescent and Johnston Street. The impacts of these surface ramps would be assessed in detail as part of future environmental assessment for the proposed future Western Harbour Tunnel and Beaches Link to be carried out by others.

## Operational performance – St Peters interchange

### *Changes to road network in 'cumulative' scenarios*

In the 2023 and 2033 'cumulative' scenarios, the proposed future Sydney Gateway is included in the St Peters modelled road network. This provides a new link from the St Peters interchange to the Sydney Airport/Port Botany precinct. The proposed future Sydney Gateway also connects to a realigned Airport Drive and Coward Street extension. The realigned Airport Drive connects to Princes Highway via existing Bellevue Street. The full forecast demand to and from the Sydney Airport precinct is used in the models of the 'cumulative' scenarios.

As part of the proposed future Sydney Gateway project, in the vicinity of the Domestic Airport, a new fly-over bypasses Airport Drive intersections with Robey Street and O'Riordan Street. This new fly-over means Airport Drive/Robey Street and Airport Drive/O'Riordan Street intersection layout adjustments, as follows:

- Airport Drive/Robey Street intersection: westbound through movement removed as a result of the fly-over and a free flow left turn from Domestic Airport

- Airport Drive/O'Riordan Street intersection: due to reduced demand for right turn, lane configuration on O'Riordan Street southbound changed to provide three through lanes for Domestic Airport access, one bus lane and one right turn lane.

While investigations into the King Street Gateway project are underway, no confirmed road layout changes are available, and so this project has not been included in the operational modelling around the St Peters interchange.

*Network performance*

**2023 'cumulative' scenario**

A comparison of the performance of the modelled road network, between the 2023 'with project' and 'cumulative' scenarios for the AM and PM peak hours was undertaken. This network performance improvement is mainly attributable to improved connectivity between the airport area and St Peters Interchange, with vehicles not having to travel through the Mascot area, thereby bypassing a number of signalised intersections with limited capacity.

AM peak hour

The AM peak hour network performance results for the 2023 'cumulative scenario' show an overall improvement compared to the 'with project' scenario. Despite the total demand being eight per cent higher, total travel time is shorter and more vehicles are able to reach their destination. In addition, vehicles experience fewer stops on average. There is also a significant improvement in network speed. The 'cumulative' scenario network is able to manage more demand, which is reflected in fewer unreleased vehicles, without the need to cap demand.

PM peak hour

The PM peak hour network performance results for the 2023 'cumulative scenario' show a similar trend to the AM peak hour. When compared to the 'with project' scenario total demand increases but total travel time drops, with more vehicles reaching their destination. All measures per vehicle indicate improved network operation with average speed in the network increasing by almost 30 per cent. In addition, the number of unreleased vehicles is comparable to the 'with project' scenario without the need to cap growth.

**2033 'cumulative' scenario**

A comparison of the performance of the modelled road network between the 2033 'with project' and 'cumulative' scenarios for the AM and PM peak hours was undertaken.

AM peak hour

The 2033 AM peak network performance for the 2033 'cumulative' scenario results show an overall improvement, although not as significant as in 2023. Even though the total forecast demand is higher than the 'with project' forecast demand, more vehicles would reach their destination. Average measures per vehicle show improvement and there are fewer unreleased vehicles.

PM peak hour

The 2033 PM peak network performance for the 2033 'cumulative' scenario results show a significantly better network operation in 'cumulative' scenario. With total forecast demand increasing there is a shorter total travel time and the number of vehicles arriving at their destination increased by more than 35 per cent. In the 'with project' scenario, the network performs poorly, with an average speed of about 11 kilometres per hour. In the 'cumulative' scenario, the average speed in the network is forecast to improve significantly. In addition, the number of unreleased vehicles is substantially reduced without the need to cap demand.

Overall, the network around St Peters in the 'cumulative' scenario performs better in both future forecast years during both peak hours, with the most improvement occurring in the 2033 PM peak hour 'cumulative' scenario. Despite higher total demand, each 'cumulative' scenario records higher average vehicle speed in the network and has more vehicles arriving at their destination than the corresponding 'with project' case. The proposed future Sydney Gateway connection to and from the

St Peters interchange takes a considerable amount of traffic from the Mascot area, contributing to the better operation of the network.

### *Intersection performance*

AM and PM peak hour LoS for key intersections was modelled at St Peters in the 2023 and 2033 'cumulative' scenarios compared to the 'with project' scenarios.

The results show that in both future forecast years in both peak hours, many intersections operate at similar or better LoS in the 'cumulative' scenario' compared to the 'with project' scenario, mainly as a result of the proposed future Sydney Gateway.

### *Travel times*

A comparison of travel times on routes in 2023 and 2033 under 'with project' and 'cumulative' scenarios was undertaken.

In the 2023 AM peak hour, travel times for routes that do not run through Mascot are very comparable between scenarios. However, the Domestic Airport to King Street and Railway Road to Gardeners Road routes are forecast to have reductions in travel times in the 'cumulative' scenario. The 2033 AM peak hour travel times show a similar trend, with the exception of Gardeners Road to Railway Road route.

The PM peak hour travel times generally follow the same trend as the AM peak hour. In both forecast years, travel times on routes not running through Mascot are comparable. The Domestic Airport to King Street (and reverse) and Railway Road to Gardeners Road routes are forecast to benefit from the proposed future Sydney Gateway and are forecast to have large reductions in travel times in the 'cumulative' scenario.

The 'cumulative' scenario takes a considerable amount of traffic from the Mascot area, which generally cases results in travel time reduction for corresponding travel time routes.

### *Traffic crashes*

An assessment was made of crashes forecast under the 2023 and 2033 'cumulative' scenarios compared to the 'with project' scenario.

In the 2023 'cumulative' scenario, there are increases of around five per cent forecast for Euston Road and Bourke Road. A significant decrease of almost 60 per cent is forecast for Prince Highway between Enmore Road and Gannon Street, and for Canal Road/Ricketty Street/Gardeners Road. The comparison shows that there is an overall decrease in the number of cost of annual crashes on surface roads in the vicinity of the St Peters area in the 'cumulative' scenario. The forecast traffic on the M5 corridor is similar to those forecast for the 'with project' scenario, and there are no changes forecast regarding the number of crashes on the M5 corridor

In the 2033 'cumulative' scenario, the forecast increase in traffic flow on Euston Road would cause an increase in the total number and cost of crashes on Euston Road, south of Sydney Park Road. However, the significant decrease in daily traffic forecast on Princes Highway, between Gannon Street and Enmore Road, and on Canal Road/Ricketty Street/Gardeners Road, would result in a reduction in the total number and cost of crashes on these roads. This assessment shows that there is a significant reduction in number and cost of crashes at these locations of about 37 per cent compared to the 'with project' scenario.

In the 2033 'cumulative' scenario, while there is a forecast shift in traffic to use the F6 Extension, overall, the volume of vehicles on the M5 corridor is similar when compared to the 2033 'with project' scenario. As a result, there is no change in traffic accidents forecast for the M5 corridor in the 'cumulative' scenario.

### *Public transport services*

A comparison was made in average bus travel time across the St Peters modelled road network between the 'cumulative' and 'with project' scenarios for the AM and PM peak hours. In the AM peak hour, the average bus travel time is similar across the scenarios. In the PM peak hour, the average bus travel times increase slightly in 2023 and 2033 in the 'cumulative' scenarios.

## 8.4 Road network optimisation

Management of network assets is a key function of Roads and Maritime, which uses network and corridor planning strategies to best manage and enhance these assets to maximise community benefits.

The process to prepare network and corridor planning strategies includes:

- Setting network and corridor objectives in line with NSW and Australian Government strategies and community expectations
- Analysing anticipated performance against appropriate safety, traffic and asset measures
- Identifying strategic priorities to achieve appropriate safety, traffic and asset performance over the longer term within the context of limited funding.

Together with the ongoing delivery of the Pinch Point Program through Roads and Maritime's Easing Sydney's Congestion office, which targets peak hour traffic hotspots, network optimisation facilitates the management of impacts identified to ensure travel time savings are maintained to the greatest possible extent by minimising congestion.

In addition to an optimisation strategy and potential infrastructure provision, the maintenance of the existing traffic control system is a key ingredient in providing Roads and Maritime with the tools to appropriately manage congestion on the network. A review of existing Sydney coordinated adaptive traffic system (SCATS) infrastructure at key intersections in the study area, including detectors, would be undertaken and upgrades implemented where appropriate.

## 8.5 Management of impacts

### 8.5.1 Project design features that would manage impacts

Changes to the surface road network are proposed within the M4-M5 Link project design to complement and/or mitigate the impacts of the project. These include:

- Minor physical integration works with the surface road network at the Wattle Street interchange including road pavement and line marking
- Minor physical integration works with the surface road network at the St Peters interchange including road pavement and line marking
- The Rozelle interchange surface works, including:
  - Widening and realignment of City West Link, The Crescent and Victoria Road at Lilyfield and Rozelle
  - Realigning The Crescent at Annandale, including a new bridge for The Crescent to pass over Whites Creek and modifications to the intersections with City West Link and Johnston Street
  - Reconstructing the intersection of The Crescent and Victoria Road at Rozelle, including construction of a new bridge at Victoria Road. The eastbound through movement along City West Link/The Crescent to Anzac Bridge would also be maintained
  - New active transport network infrastructure connecting the Rozelle Rail Yards with the wider pedestrian and cyclist network, including two north–south pedestrian and cycle bridges over City West Link, and an east – west underpass below Victoria Road
- The Iron Cove Link surface works, including:
  - Realignment of the westbound (southern) carriageway of Victoria Road between Springside Street and the eastern abutment of Iron Cove Bridge
  - Permanent closure of Clubb Street south of Victoria Road at the start of construction
  - Minor modifications to other intersections along the southern side of Victoria Road including Toelle Street, Callan Street and Springside Street. These streets would generally remain open during construction and would provide the same turning movements as the existing arrangement once works are complete

- Minor changes to the right hand turn movement from Victoria Road into Terry Street in line with the permanent design

- Upgrades and modifications to the shared pedestrian and cycle paths along the westbound (southern) carriageway of Victoria Road.

### 8.5.2 Cumulative scenario mitigation

While specific mitigation measures for the cumulative scenarios assessed in this report are beyond the scope of this EIS, the issues identified would be examined as part of the design development for the proposed future Western Harbour Tunnel and Beaches Link and the proposed future Sydney Gateway projects, and as part of Roads and Maritime network mitigation strategies.

On-going consultation with the design teams for these projects is occurring with the objective of minimising cumulative traffic impacts.

### 8.5.3 Environmental management measures

Where possible, the project has planned to avoid and minimise traffic and transport impacts during the construction (includes detailed design and pre-construction) and operational phases. Despite this, the project will result in impacts on the road network during construction and operation. Mitigation and management measures will be implemented to avoid, minimise and/or manage these impacts on the road network. These environmental management measures are outlined in **Table 8-100**.

**Table 8-100 Environmental management measures – traffic and transport**

| Impact | No. | Environmental management measure | Timing |
|---|---|---|---|
| **Construction** | | | |
| Delays and disruptions to the road network during construction | TT01 | A CTAMP will be prepared as part of the CEMP. The CTAMP will include the guidelines, general requirements and principles of traffic management to be implemented during construction. It will be prepared in accordance with *Austroads Guide to Road Design* (with appropriate Roads and Maritime supplements), the RTA 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.<br><br>The overarching strategy of the CTAMP will be to:<br><br>· Ensure all stakeholders are considered during all stages of the project<br>· Provide safe routes for pedestrians and cyclists during construction<br>· Design the permanent works and develop construction methodologies so that interaction with existing road users is minimised thereby creating a safer work and road user environment<br>· Plan and stage works to minimise the need for road occupancy, where possible<br>· Develop project staging plans in consultation with relevant traffic and transport stakeholders<br>· 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 | Construction |

| Impact | No. | Environmental management measure | Timing |
|---|---|---|---|
| | | guide. This would minimise confusion by providing clear and concise traffic management schemes<br>· Comprehensively communicate changes to roads or paths to emergency services, public transport operators, other road user groups and any other affected stakeholders<br>· Identify measures to manage the movements of construction-related traffic to minimise traffic and access disruptions in the public road network<br>· Propose a car parking strategy for construction staff at the various worksites, in consultation with local councils and stakeholders associated with any facilities adjacent to the project site. This would include the promotion of public transport and carpooling to reduce worksite-related vehicle movements. The strategy will be developed to limit impacts on the surrounding communities and would include the parking management measures that would be implemented on adjacent local streets. The strategy will also be developed in consultation with the M4 East and New M5 contractors to identify opportunities to use existing parking arrangements associated with those projects during their respective construction periods and once those periods are completed. | |
| Delays and disruptions to the road network during construction | TT02 | Identify potential road user delays during the planning and consultation phases. | Construction |
| Impacts on road network performance (delays) and safety | TT03 | Develop construction staging and temporary works that minimises conflicts with the existing road network and maximises spatial separation between work areas and travel lanes. | Construction |
| Parking on local streets around construction sites | TT04 | Investigate potential offsite areas that could be used for construction workforce parking, including government owned land and other potential areas near to the construction ancillary facilities, and secure them for use during construction where required and possible. | Construction |
| Impacts on road network performance (delays) and safety | TT05 | Isolate work areas from general traffic. | Construction |
| Impacts on road network performance (delays) and safety | TT06 | Develop alternative work methods to minimise delays and road user impacts, for example utilising more efficient plant and equipment, and applying different design solutions. | Construction |
| Impacts on road network performance | TT07 | Provide temporary CCTV and Variable Message Signs (VMS) to link with the existing Transport Management Centre network to | Construction |

| Impact | No. | Environmental management measure | Timing |
|---|---|---|---|
| (delays) and safety | | facilitate monitoring and management of impacts and traffic safety. | |
| Impacts on road network performance (delays) and safety | TT08 | During construction, work with the TMC to observe traffic flows and incidents from CCTV footage and modify sites and activities where possible to address any identified issues. | Construction |
| Impacts on road network performance (delays) and safety | TT09 | Provide a mechanism for the community to report incidents and delays, for example a project phone number. Advertise details along the construction site's interface with the road network. | Construction |
| Impacts on road network performance (delays) and safety | TT10 | Schedule construction-related transport movements to avoid peak traffic periods and adversely affecting congestion, where possible. | Construction |
| Impacts on road network performance (delays) and safety | TT11 | Develop and adopt robust community and stakeholder communication protocols regarding altered traffic conditions. | Construction |
| Impacts on pedestrian and cycle paths | TT12 | Minimise impacts on the pedestrian paths and cycle lanes, and provide timely alternatives during construction where practical and safe to do so. | Construction |
| Impacts on public transport | TT13 | Identify impacts on bus stops and provide alternative locations and access in consultation with Transport for NSW. | Construction |
| Impact on property access | TT14 | Manage local road closures and maintain adequate property access. This will be undertaken in consultation with Roads and Maritime, local councils and property owners likely to be impacted. | Construction |
| Impacts on road network from spoil transport | TT15 | Identify haulage routes and communicate, along with site access requirements and restrictions, to all relevant drivers. | Construction |
| Impacts on road network from spoil transport | TT16 | Identify potential truck marshalling areas and use where possible, to minimise potential queueing and traffic and access disruptions in the local area. | Construction |
| Impacts on receivers from spoil transport during night time periods | TT17 | Monitor heavy vehicle movements to and from sites to ensure compliance with road traffic noise criteria at night. | Construction |
| Impacts on road infrastructure | TT18 | Prepare a road dilapidation report, in consultation with relevant councils and road owners, identifying existing conditions of local roads and mechanisms to repair damage to the road network caused by heavy vehicle movements associated with the project. | Construction |

| Impact | No. | Environmental management measure | Timing |
|---|---|---|---|
| **Operation** | | | |
| Confirmation of assessed impacts | OTT1 | A review of operational network performance will be undertaken 12 months and five years from the opening of the project to confirm the operational impacts of the project on surrounding arterial roads and major intersections in proximity to the Wattle Street interchange, Rozelle interchange and St Peters interchange. The assessment will be based on updated traffic surveys at the time and the methodology used will be comparable with that used in this assessment. | Operation |
| Road network performance constraints | OTT2 | To manage potential performance constraints at the Wattle Street interchange, Roads and Maritime will investigate the implementation of the following in consultation with local councils:<br>· Queuing and capacity monitoring and management on the Frederick Street/Milton Street corridor<br>· Managing lane use and utilisation to improve the operation of the corridor. | Operation |
| Road network performance constraints | OTT3 | Roads and Maritime will develop a strategy to ensure appropriate network integration in the areas surrounding the Rozelle interchange. The strategy will include a review of:<br>· Capacity improvement measures<br>· Project staging options<br>· Demand management measures. | Operation |