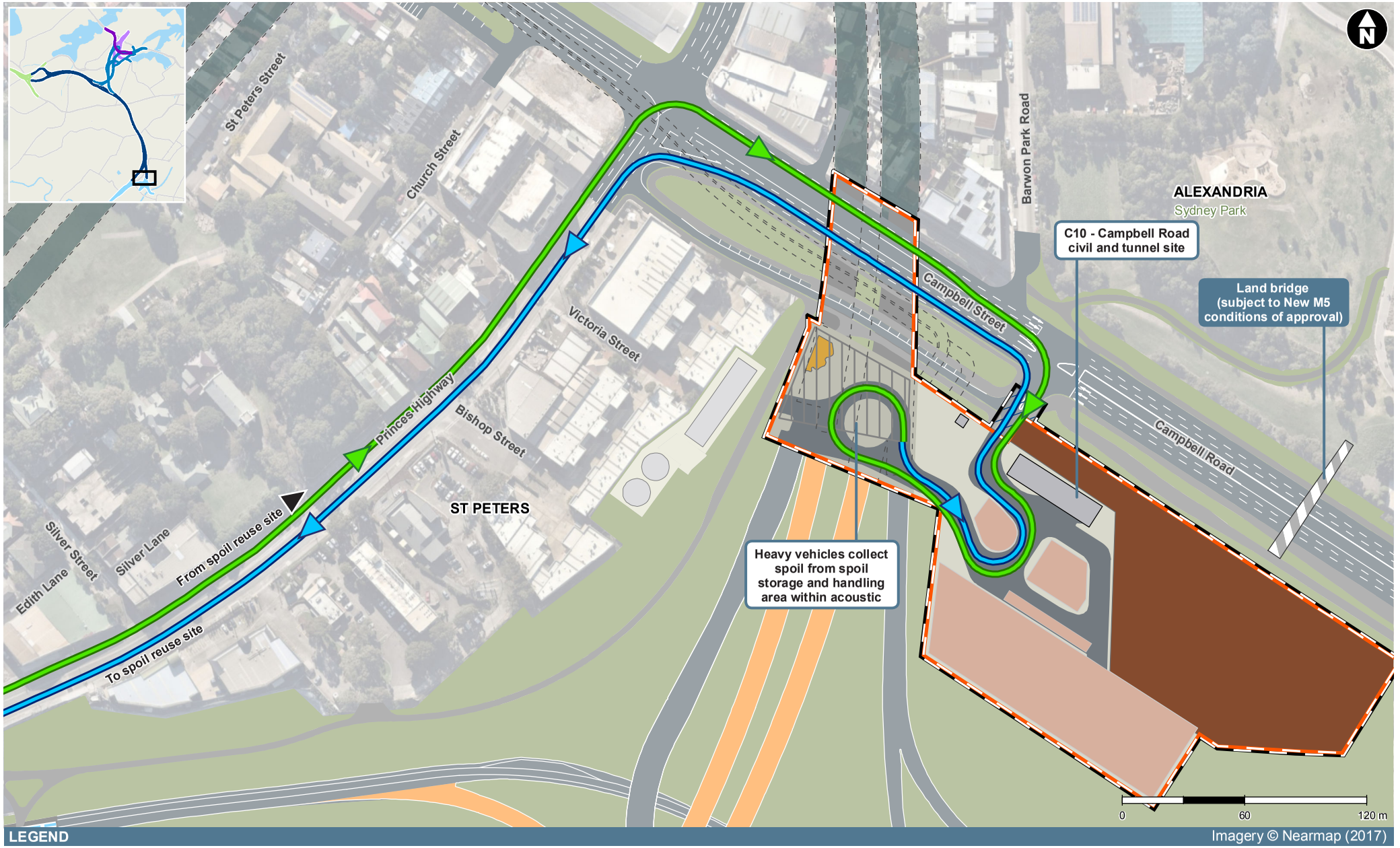


Figure 7-18 Indicative spoil haulage route – Campbell Road civil and tunnel site (C10)

The daily and peak hour volumes shown in **Table 7-15** are based on 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. The peak hour identified is representative of highest estimated construction volumes and falls within the broader peak periods experienced on the network. Spoil haulage from the Darley Road construction facility would be limited to occurring between 7.00 am and 6.00 pm Monday to Friday, and between 8.00 am and 1.00 pm on Saturdays.

Where spoil haulage is carried out outside of the standard daytime construction hours, reasonable and feasible work practices and mitigation measures would be implemented to manage potential noise impacts, especially late night vehicle movements, to be less than significant. This is discussed further in **Chapter 10** (Noise and vibration) of the EIS.

The construction ancillary facilities are located to allow vehicles (heavy vehicles in particular) to access and egress via the arterial road network to avoid or minimise the impacts on the local road network. Light vehicles (predominantly workers accessing car parking areas on site) would distribute across the road network at their discretion.

Table 7-16 provides details of indicative heavy vehicle construction volumes on key roads during the AM peak and PM peak hours. The table shows that 24 construction heavy vehicles per hour are predicted to travel on Parramatta Road, north of Wattle Street (two-way) during the AM and PM peak hours. Additionally, it is anticipated that volumes on City West Link, west of James Street (two-way) would increase by a maximum of about 68 construction heavy vehicles during the AM and PM peak hours. Less heavy construction vehicles are expected on other roads.

Table 7-16 Indicative peak period distribution of heavy vehicle construction vehicles (two-way)

Road location	AM peak hour	PM peak hour
Parramatta Road, north of Wattle Street	24	24
City West Link, west of James Street	68	68
City West Link, west of The Crescent	32	32
Victoria Road, east of Darling Street	4	4
Pyrmont Bridge Road, east of Parramatta Road	7	7
Princes Highway, south of Campbell Street	14	14

7.3.2 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 be required, particularly during site establishment.

The construction workforce would be encouraged to use public transport, where appropriate. Victoria Road and Parramatta Road are major transport corridors that have multiple bus routes. The Inner West Light Rail 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 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.

7.3.3 Access routes

The proposed access routes to the construction ancillary facilities are summarised in **Table 7-17**. These would be confirmed through the CTAMP, in consultation with the relevant road authorities.

Heavy vehicle access is proposed to be gained from the motorway network (M4 and M5 motorways) and major arterial roads (Parramatta Road, Wattle Street, City West Link, Victoria Road, Princes Highway). Most construction ancillary facilities are accessible from these roads.

The distribution of light vehicles across the road network is more varied. These vehicles are generally dispersed through the network, and could be considered to replace existing trips. However, for the purposes of this assessment, light vehicles have been considered on top of background traffic and distributed accordingly. For all sites, except the Campbell Road civil and tunnel site (C10), the distribution of access is assumed to be via the M4 Motorway, City West Link, 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 7-15 sets out estimated daily vehicle numbers in the peak construction period at each site, ie a worst case scenario. Construction traffic management plans for each site would be submitted to the relevant roads authority for review before work starts.

Table 7-17 Indicative access routes to and from construction ancillary facilities

Site	Access and egress points (heavy vehicles)[1]	Access and egress points (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 • Above ground: Wattle Street (left-in, left-out)	• Wattle Street southern westbound) carriageway (left-in, left-out) • Walker Avenue • Parramatta Road
Northcote Street civil	• Parramatta Road (left-in, left-out)	• Wolseley Street

Site	Access and egress points (heavy vehicles)[1]	Access and egress points (light vehicles)
site (C3a)		• Wattle Street (left-out)
Parramatta Road West civil and tunnel site (C1b)	• Parramatta Road (left-in, left-out) • Alt Street (crossover between sites only)	• Parramatta Road (left-in, left-out) • Alt Street
Haberfield civil site (C2b)	• Wattle Street (left-in, left-out) • Parramatta Road (left-in, left-out)	• Wattle Street (left-in, left-out) • Parramatta Road (left-in, left-out) • Walker Avenue (left-in, left-out)
Parramatta Road East civil site (C3b)	• Parramatta Road (left-in, left-out)	• Parramatta Road (left-in, left-out) • Alt Street • 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) • Hornsey Street
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) • Pyrmont Bridge Road (left-out)	• Pyrmont Bridge Road
Campbell Road civil and tunnel site (C10)	• Albert Road via Campbell Road and Princes Highway	• Albert Road 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

7.4 Construction impact assessment – Option A

This section presents the impact assessment of the construction activities on proposed access routes, public transport, pedestrians and cyclists for the Option A construction scenario. An indication of the need to close, divert or otherwise reconfigure elements of the road, cycle and pedestrian network is also presented and assessed. An assessment of the cumulative traffic impact of other key infrastructure projects is discussed.

7.4.1 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. M4 East and New M5 are expected to be operational by 2019/20. Therefore their construction would not overlap in the 2021 assessment year. In the overlapping years prior to this, it is expected that the main construction works for the M4 East and the New M5 would be completed and the main construction works for the M4-M5 Link would not have commenced. Therefore, the impact is not expected to be as large.

As shown in **Table 7-18**, 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 hours as traffic shifts off Parramatta Road and onto the M4 East. There are also substantial increases in background traffic on Parramatta Road, east of the Haberfield 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 substantial increases in forecast traffic near the St Peters interchange. These forecast changes are reflective of the increase in traffic accessing or exiting the New M5 and the forecast land use changes in the area.

Table 7-18 Construction year (2021) background traffic growth^

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

^Traffic volume rounded to nearest 10

Source: Based on WRTM v2.3 outputs, 2017

7.4.2 Roadway level of service

An analysis of the existing roadway levels of service was undertaken to determine the impact of construction traffic in 2021. The assessment considers the spoil reuse sites shown in **Table 7-14**.

Mid-block traffic level of service demonstrates the impact of construction traffic in 2021 for construction activities. Theoretical mid-block roadway capacities were based on Austroads *Guide to Traffic Management* and these capacities and assessment results are shown in **Table 7-19** for the AM peak and PM peak hours. In highly congested networks, single-point assessment criteria, such as mid-block levels of service, do not present a complete picture of traffic operations. In reality, some roads may carry more traffic than the theoretical capacity or, if a link is over capacity, this would result in queuing further back in the network, reducing the capacity of the links. However, this assessment provides a high level indication of the effect construction vehicles would have on roadway levels of service, compared to the background traffic.

Table 7-19 shows that several locations 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, traffic on the majority of these roads would exceed their theoretical capacity even without the construction traffic, simply due to forecast growth in background traffic.

The 2021 without construction traffic demand is forecast to exceed capacity on:

- City West Link in the eastbound direction during both the AM and PM peak hour
- Victoria Road in the eastbound direction during the AM peak hour
- Parramatta Road at Camperdown in the peak direction during the AM and PM peak hours
- Princes Highway at St Peters in the eastbound direction in the AM peak hour.

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.

Mitigation measures for construction impacts are discussed in **section 11.1**. It is noted that this is a worst-case assessment, based on peak construction traffic levels, and adverse mid-block impacts would be expected to reduce once peak construction is complete.

Table 7-19 Option A – 2021 mid-block operational performance summary^

Location and direction		Mid-block capacity	2021 AM peak hour (veh/hr)						2021 PM peak hour (veh/hr)					
			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

^Traffic volume rounded to nearest 10

7.4.3 Intersection level of service

The intersection performance results for the road network under the 2021 'without construction' and 'with construction' forecast volumes are summarised in **Table 7-20** and **Table 7-21** for the AM and PM peak hours respectively. 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 (see **section 4.3.2**).

The construction impact assessment was undertaken where construction traffic is passing through the network in significant volumes. The intersections assessed were grouped into six corridors or clusters:

- Cluster 1: Parramatta Road and Wattle Street corridors in Haberfield
- Cluster 2: City West Link in Leichhardt
- Cluster 3: City West Link and The Crescent in Lilyfield
- Cluster 4: Victoria Road in Rozelle
- Cluster 5: Parramatta Road in Camperdown
- Cluster 6: Princes Highway in St Peters.

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.

The construction modelling forecasts a number of intersections to operate with high levels of delay (LoS E or F) in the 'without construction' scenario. 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 (represented as reduced saturation flows in the model). In the PM peak, 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 is forecast to operate at LoS F.

In the 'with construction' scenario, about 335 passenger car units (PCU) and 715 PCU are added to the network in the AM and PM peaks respectively. It is noted that in the AM peak, 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. In the PM peak, this proportion is about 35 per cent. The additional traffic due to construction is predominantly eastbound in the AM peak and westbound in the PM peak.

As a result, 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. Mitigation measures for construction impacts are discussed in **section 11.1**.

During the AM peak hour, there is an increase in traffic of up to 130 PCU along Parramatta Road, resulting in relatively small impacts – the level of service is forecast to worsen slightly at the Parramatta Road/Harris Road intersection, from LoS B to LoS C. At the eastern end of Cluster 1, it is

estimated that an additional 100 PCU emerge from the M4 East eastbound tunnels, and 65 PCU enter the M4 East westbound tunnels. This additional traffic impacts mostly on the Dobroyd Parade/Timbrell Drive intersection, which already operates at LoS F in the 'without construction' scenario.

During the PM peak hour, there is an increase in traffic of up to about 250 PCU along Parramatta Road, however the impacts on intersections along Parramatta Road are again relatively small – the level of service is forecast to worsen from LoS B to LoS C at the Parramatta Road/Harris Road intersection, and from LoS D to LoS Eat the Parramatta Road/Croydon Road/Arlington Street intersection.

The M4 East tunnels are expected to accommodate an additional 75 PCU eastbound and 185 PCU westbound. This subsequently impacts on the Wattle Street/Ramsay Street and the Dobroyd Parade/Timbrell Drive intersection. The level of service at Wattle Street/Ramsay Street is forecast to worsen from LoS D to LoS E, while the level of service at the Dobroyd Parade/Timbrell Drive intersection is forecast to remain at LoS F.

Cluster 2

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, in addition to about 195 PCU and 340 PCU being added to the network in the AM and PM peak hour 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 is required to operate this movement safely, which would impact the performance of this intersection. The forecast volume is not large and so 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 blind corner and steep approach on James Street (see **section 7.2.7**).

The impact on City West Link Road/Norton Street intersection is not expected to be significant, with level of service forecast to remaining at LoS C in both AM and PM peak hours in both 'without construction' and 'with construction' scenarios.

The Darley Road/Charles Street intersection located on the southwest corner of the Darley Road civil and 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 delay to eastbound through traffic on Darley Road. This intersection is forecast to operate satisfactorily at LoS A in both peaks.

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 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

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, however the 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

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/Pyrmont Bridge Road tunnel site (C9) access intersection is forecast to operate at LoS A in both peaks.

Cluster 6

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 southeast leg to three lanes in each direction and the Campbell Street northwest 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 both AM and PM peak hours.

In the 'with construction' scenario, 50 PCU and 75 PCU are added to the network during 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.

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 biggest impacts are forecast to be at the western end of the project, as spoil trucks travel to the potential spoil management sites to the west of the project from the construction facilities and back, along with light construction vehicle traffic, although these use more dispersed routes. Intersections that are most impacted include the Wattle Street intersections at Ramsay Street and Timbrell Drive, City West Link/James Street intersection, which includes the introduction of the right-hand-turn from City West Link, and the City West Link/The Crescent intersection, due to the additional site entry/exit added to the intersection.

Traffic impacts on City West Link during construction could be mitigated or managed to some degree through corridor management of City West Link traffic. Mitigation measures will 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 re-timing shift times to avoid a large generation of light vehicles in the peak hours.

More detail on potential construction mitigation is provided in **section 11.1**. It is noted that this is a worst-case assessment, based on peak construction traffic levels, and adverse mid-block impacts would be expected to reduce once peak construction is complete.

Table 7-20 Option A – 2021 AM peak hour intersection operational performance summary^

Cluster	Intersection	Without construction		With construction	
		Volume (PCU)	LoS	Volume (PCU)	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	4,960	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

^Traffic volume rounded to nearest 10

Table 7-21 Option A – 2021 PM peak hour intersection operational performance summary^

Cluster	Intersection	Without construction		With construction	
		Volume (PCU)	LoS	Volume (PCU)	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

^Traffic volume rounded to nearest 10

7.4.4 Temporary road network changes, closures and diversions

Certain road network modifications would be required to facilitate construction of the project. These modifications are outlined in **Table 7-22**. Impacts from construction traffic and associated temporary network changes are considered above.

Indicative traffic staging plans to facilitate the Rozelle and Iron Cove Link surface works are described in **Table 7-23**. Road network modifications and traffic staging would be reviewed by the construction contractor during preparation of the CTAMP, with the objective of minimising disruptions to the road network. At locations where road closures are required, access to retained properties would be maintained throughout the construction period. Appropriate signage for road closures or detours would be installed.

Table 7-22 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 • Temporary diversions along Darley Road may be required during construction (to enable establishment of construction vehicle access provisions) • 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 • On-street parking along the northern (eastbound) carriageway of Darley Road between around Francis Street and Charles Street would be removed (around 20 spaces) during construction. Impacts on the kiss and ride parking for the Leichhardt North Light Rail stop would need to be considered in the CTAMP	• Q3 2018 to Q1 2019 to complete road modifications • 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 Kerbside parking along Darley Road would be reinstated at the end of construction

Location	Indicative road network modifications	Indicative duration	Road reinstatement
City West Link at Lilyfield and Rozelle) (also refer to indicative staging plans in **Table 7-23**)	• 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 • Works would be carried out to upgrade and improve the eastbound and westbound carriageways of City West Link and The Crescent • Temporary diversions would be put in place to allow for construction along the existing alignment • Under existing and diverted 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	• Q4 2018 to Q2 2019 to complete road modifications • 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
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) • Works would be carried out to realign The Crescent and reconstruct the intersection with City West Link • 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 • 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 • 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 • Traffic signal modifications at the intersection with City West Link in line with the temporary and permanent design	• Q1 2019 to Q2 2019 to complete road modifications • Q1 2019 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 (also see	• All traffic lanes in each direction would generally be maintained with some short-term lane closures (outside of peak periods where feasible and	• Q4 2018 to Q2 2019 to complete road modifications	Once road modification works are complete, the road would be

Location	Indicative road network modifications	Indicative duration	Road reinstatement
indicative staging plans in **Table 7-23**)	reasonable) subject to road occupancy licences • Traffic signal modifications at the intersection with The Crescent in line with the permanent design • 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 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	• Q4 2018 to Q3 2023 including construction duration staging, temporary roads and reinstatement of roads	reopened in line with temporary design. When construction is complete, the road would be reinstated as per the permanent design
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 • 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, alternate access to Lilyfield Road would be available from Hornsey Street and Gordon Street	• Q4 2018 to Q2 2019 to complete road modifications • Q2 2019 to Q4 2019 for utility relocations • Q4 2018 to Q3 2023 including construction duration staging and reinstatement of roads	Once works during this stage is 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 • Access to Hornsey Street from Victoria Road would require full closure for short periods of time during realignment and upgrade works to Victoria Road • Alternate access to Hornsey Street would be available from Lilyfield Road and Gordon Street • On-street parking along the eastbound carriageway west of Victoria Road would be removed (about four spaces) during construction	• Q4 2018 to Q2 2019 to complete road modification • Q4 2018 to Q3 2023 including construction duration staging and reinstatement of roads	Once works during this stage is completed, the road would be reopened in line with permanent design
Quirk Street	• One lane in each direction would generally be maintained during	• Q4 2018 to Q2 2019 to	Once works during this stage is

Location	Indicative road network modifications	Indicative duration	Road reinstatement
at Rozelle	construction • Access to Quirk Street from Victoria Road would require full closure for short periods of time during realignment and upgrade works to Victoria Road • Alternate access to Quirk Street would be available from Hornsey Street and Gordon Street	complete road modifications • Q4 2018 to Q3 2023 including construction duration staging and reinstatement of roads	completed, the road would be reopened in line with permanent design
Iron Cove Link civil site (C8) and Victoria Road (also refer to indicative staging plans in **Table 7-23**)	• Works would be carried out along Victoria Road to facilitate ingress and egress for the Iron Cove Link civil site (C8) • 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 • Temporary diversions would be put in place to allow for construction along the existing alignment	• Q4 2018 to Q2 2019 to complete road modifications for ingress and egress • Q4 2018 to Q3 2023 including construction duration staging, temporary roads and reinstatement of roads	Once works are complete, the road would be reopened in line with temporary construction 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 • 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 • During these periods, alternative access to Callan Street would be available from Springside Street and McCleer Street at Rozelle. Regard would also be given to the days/times of use of King George Park when considering temporary closures • Limited on-street parking, west of Victoria Road, would be removed during construction. These are adjacent to properties being acquired and so the impact of their loss would be reduced.	• Q4 2018 to Q3 2023	Once works are completed, the road would be reopened in line with permanent design
Toelle Street	• Access to Toelle Street from Victoria	• Q4 2018 to	Once works are

Location	Indicative road network modifications	Indicative duration	Road reinstatement
at Rozelle	Road would generally remain open during construction • 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 • During these periods, alternative access to Toelle Street would be available from Springside Street, McCleer Street, Callan Street and Manning Street at Rozelle. Regard would also be given to the days/times of use of King George Park when considering temporary closures • Limited on-street parking, west of Victoria Road, would be removed during construction. These are adjacent to properties being acquired and so the impact of their loss would be reduced.	Q3 2023	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 • Alternate access to Clubb Street would be available from Manning Street via Toelle Street or from Callan Street and McCleer Street via Springside Street • Limited on-street parking, west of Victoria Road, would be removed during construction. These are adjacent to properties being acquired and so the impact of their loss would be reduced.	• N/A (closed at the start of construction)	Access to Clubb Street from Victoria Road would be permanently closed
Byrnes Street at Rozelle	• Short-term, temporary closure of one lane of Byrnes Street may be required during construction to facilitate utility works • 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. 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

Location	Indicative road network modifications	Indicative duration	Road reinstatement
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 • Works would be carried out to realign Bignell Lane between Mallett Street and Pyrmont Bridge Road at Annandale • Short-term, temporary closure of Bignell Lane would be required during construction to allow for the realignment works • Rear-access to commercial properties along Bignell Lane would be maintained during construction	• Q3 2018 to Q4 2018 to complete road modifications • Q3 2018 to Q4 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 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.

Indicative staging is summarised in **Table 7-23**. Detailed traffic staging plans along key roads would be developed during detailed design, in consultation with relevant traffic and transport stakeholders (eg the Transport Management Centre), and in accordance with the following principles:

- Provision of early notifications via Variable Message Signs or media announcements
- Undertaking the works in a staged manner to reduce traffic impacts
- Implementation of temporary speed restrictions within construction work zones
- Reduced shoulder widths and erection of traffic barriers along construction work zones, ensuring that any impacted pedestrian and cyclist facilities are adequately and safely replaced, and other road user facilities, such as bus stops and loading zones are adequately and safely relocated
- Provision of appropriate warning and advisory signposting
- Provision of temporary access arrangements with private landowners whose property is adjacent to construction activities
- Provision for public transport and emergency services to ensure disruption is minimised.

Table 7-23 Indicative traffic staging

Stage	Indicative traffic staging
City West Link and Victoria Road at Rozelle	
1	• Construct a temporary deviation for the existing City West Link to Anzac Bridge bypass and underpass. This includes a portion of the permanent M4 citybound off ramp approaching Anzac Bridge • Commence construction of temporary Victoria Road bridge and approach earthworks • Switch City West Link to Anzac Bridge bypass traffic to temporary deviation • Complete construction of temporary bridge • Demolish existing Victoria Road pedestrian overpasses (may require night closures). See **section 7.4.7** for provision for active transport during this period • Construct a temporary deviation for traffic from City West Link to Victoria Road to tie into the deviation on Victoria Road to Anzac Bridge • Construct a temporary signalised intersection for City West Link/James Craig Road intersection.
2	• Switch Victoria Road to Anzac Bridge traffic onto the temporary deviation constructed in the previous stage • Switch City West Link to Victoria Road traffic onto the temporary deviation constructed in the previous stage • Demolish the existing Victoria Road bridge • Construct a temporary deviation for traffic from Anzac Bridge to City West Link and Victoria Road.
3	• Switch westbound traffic from Anzac Bridge to City West Link onto the deviation constructed in the previous stage • Start construction of the new Victoria Road bridge • Construct the permanent roadway for traffic westbound from Anzac Bridge to Victoria Road • Construct the permanent roadway for traffic between Victoria Road and City West Link.
4	• Realign the western end of the deviation for City West Link to Anzac Bridge bypass intersection between City West Link and James Craig Road • Switch traffic westbound from Anzac Bridge to Victoria Road onto the permanent roadway • Switch traffic from City West Link to Victoria Road onto the permanent roadway • Demolish the temporary deviation for traffic from City West Link to Victoria Road • Continue with the construction of the new Victoria Road bridge, roadway, traffic islands and road furniture • Clear and rehabilitate the entry to the existing City West Link to Anzac Bridge underpass • Construct the permanent roadway for traffic eastbound from Victoria Road to Anzac Bridge.
5	• Switch the northbound traffic on Victoria Road onto the permanent roadway • Complete all island and road furniture works connecting southbound traffic on Victoria Road to City West Link east and westbound at the Victoria Road intersection • Switch the south and eastbound traffic on Victoria Road to Anzac Bridge onto the permanent alignment • Clear, realign and rehabilitate the exit from the existing City West Link to Anzac Bridge underpass • Start demolition of the temporary deviation for Victoria Road north • Construct Anzac Bridge to Victoria Road shared path bridge structure and approaches.
6	• Switch the eastbound bypass traffic from City West Link to Anzac Bridge onto the permanent roadway • Complete demolition of the temporary deviation and bridge for Victoria Road • Complete the M4 eastbound exit ramp tunnel connection though beneath the new Victoria Road bridge • Complete the M4 westbound entry ramp tunnel connection to the new cut-and-cover underpass.

Stage	Indicative traffic staging
Iron Cove Link connections at Victoria Road	
1	• Construct a temporary deviation for the existing northbound lanes on Victoria Road • Switch northbound traffic on Victoria Road to the temporary deviation constructed in the previous stage • Construct a temporary deviation for the existing southbound lanes on Victoria Road and a deviation for northbound turning traffic crossing the future construction area to Terry Street.
2	• Switch southbound traffic on Victoria Road to the temporary deviation constructed in the previous stage • Install sewer submain diversion • Construct the Iron Cove Link southbound entry retaining and upper barrier • Construct the southern end of the Iron Cove Link northbound exit right hand side retaining and upper barrier • Construct permanent southbound traffic lanes • Construct the permanent bus lanes north of Terry Street between the new barriers • Construct a temporary deviation between the new barriers over the proposed M5 southbound entry slot for a single lane southbound • Construct a temporary link northbound to the permanent bus lane southbound south of Terry Street • Sites for micro tunnelling of the sewer main diversion on Moodie Street at the intersections of Victoria Road and McCleer Street would require closures on Moodie Street.
3	• Switch southbound traffic onto the permanent southbound lanes and the temporary alignment over the Iron Cove Link southbound slot • Switch one lane northbound onto a temporary alignment using the southbound permanent bus lane north of Terry Street and link to turning lane to Terry Street • Construct the Iron Cove Link northbound exit left hand side retaining and upper barrier • Construct a temporary deviation between the new barriers over the proposed M5 northbound exit slot for two lanes southbound.
4	• Switch the northbound lane switched in the last stage back to the three lane northbound diversion and reconnect the turning lane to Terry Street • Switch two lanes of southbound traffic on Victoria Road onto the deviation constructed in the previous stage • Excavate the Iron Cove Link southbound exit slot and start the cut-and-cover tunnel • Construct a temporary deviation from the temporary northbound lanes on Victoria Road to Terry Street over the new cut-and-cover tunnel.
5	• Switch turning traffic from Victoria Road to Terry Street to the deviation constructed in the previous stage • Complete the Iron Cove Link southbound slot and cut-and-cover tunnel • Construct a temporary connection from the bus lanes south of Terry Street • Construct a temporary two lane deviation over the new cut-and-cover tunnel on Victoria Road southbound from the existing Victoria Road to the temporary deviation in place • Reconfigure the deviation for turning traffic from Victoria Road to Terry Street.
6	• Switch northbound traffic on Victoria Road onto the deviations constructed in the previous stage • Switch one lane of southbound traffic on Victoria Road onto the permanent southbound bus lane and temporary bus lane deviation constructed in the previous stage • Switch one lane of southbound traffic back to the permanent southbound lane • Sever the connection to Callan Street • Start the Iron Cove Link northbound cut-and-cover tunnel from the southern (driven tunnel portal) end • Reinstate the northbound deviation constructed over the new cut-and-cover tunnel.

Stage	Indicative traffic staging
7	• Switch two lanes of the northbound traffic on Victoria Road back to the northbound deviation previously constructed • Construct another section of Iron Cove Link northbound cut-and-cover tunnel • Construct permanent pavement on Victoria Road northbound to the new cut-and-cover tunnel • Start excavation of the Iron Cove Link northbound exit slot.
8	• Switch the northbound lane on the permanent bus lane temporary alignment back to the northbound deviation previously constructed • Reconfigure the northbound right hand turn from Victoria Road to Terry Street. • Complete the Iron Cove Link northbound exit right hand side retaining and upper barrier • Complete excavation of the Iron Cove Link northbound exit slot • Complete the Iron Cove Link northbound slot and cut-and-cover tunnel.
9	• Switch one lane of northbound traffic on Victoria Road to the permanent roadway • Switch one lane of northbound traffic onto the permanent northbound bus lane and temporary link south of Terry Street • Open the Iron Cove Link entry and exit • Construct the permanent left hand side kerb and channel and shared path on Victoria Road northbound • Reconfigure the permanent intersections with Toelle and Callan streets • Construct cul-de-sacs on Byrnes and Clubb streets • Construct the permanent right hand turning lane from Victoria Road to Terry Street.
10	• Switch northbound traffic on Victoria Road to the permanent roadway • Close the new bus lanes north of Terry Street • Complete the transitway station and bus lanes south of Terry Street • Complete the permanent bus lane pavement and barrier approaching Iron Cove Bridge.

7.4.5 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 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 during 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 during the PM peak hour.

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 substantially impact road safety in the study area. 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. Any foreseen impacts on road safety for all users during construction would be mitigated as much as possible through the provision of tailored traffic management plans and other measures detailed in **section 11.1**.

7.4.6 Public transport services

An increase in vehicles on the road network during the construction period would 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

- As with general traffic, an increase in bus travel times due to slower travel speeds and increased intersection delays. This would be somewhat mitigated by the presence of bus lanes along Parramatta Road to be installed as part of 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

- 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
- Initial assessments have identified that seven bus stops would require relocation during construction for safety. As the detailed design develops, additional bus stops requiring relocation may be identified
- Local residents, business owners and bus passengers would be notified of traffic management procedures and ongoing consultation would be undertaken to provide information on planned construction activities and changes to any bus stop or access arrangements.

Table 7-24 outlines the indicative changes to bus stop locations during construction. The modifications and proposed temporary locations of the bus stops would be reviewed during detailed design with the objective of minimising disruptions to public transport services. 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.

Table 7-24 Indicative bus stop relocations

Location	Details of relocation
Rozelle surface works	Relocation of the bus stop at The Crescent northbound carriageway at Annandale around 150 metres north of Johnston Street.
	Relocation of the bus stop at The Crescent southbound carriageway at Annandale around 100 metres north of Johnston Street.
	Relocation of the bus stop at Victoria Road northbound carriageway at Rozelle around 20 metres south of Lilyfield Road.
	Relocation of the bus stop at Victoria Road northbound carriageway at Rozelle between Lilyfield Road and Hornsey Street.
	Relocation of the bus stop at Victoria Road southbound carriageway at Rozelle around 100 metres south of Robert Street.
Iron Cove Link surface works	Relocation of the bus stop at Victoria Road westbound carriageway at Rozelle between Toelle Street and Clubb Street.
	Relocation of the bus stop at Victoria Road eastbound carriageway at Rozelle between Terry Street and Crystal Lane.

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, but there would generally be minimal impacts on 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. Access to the Leichhardt North light rail stop at Leichhardt and the Rozelle Bay light rail stop at Annandale would be maintained during construction. Temporary impacts to the operation or access to Leichhardt North light rail stop, due to the Darley Road civil and tunnel site (C4), or to the Rozelle Bay light rail stop, due to the construction of Rozelle surface works or the Rozelle civil and tunnel site (C5) and The Crescent civil site (C6), would be managed through the CTAMP.

7.4.7 Walking and cycling

An increase in the number of heavy vehicles during the construction period would potentially impact walking and cycling amenity. Pedestrian footways and cycling paths would also need to be closed or diverted during construction. The impacts on pedestrians and cyclists were assessed based on broad criteria outlined in **Table 7-25**, which were developed to determine the potential impact and corresponding management and mitigation measures.

Construction would be carried out in stages resulting in changing impacts over the course of the construction program. A key objective of the construction program would be to minimise disruption to pedestrians and cyclists and enable the use of the final active transport links as soon as possible.

Table 7-25 Active transport – impact severity

Severity	Impact
Negligible	• The impacts result in an undetectable change (other than very minor increase in traffic volumes) and do not require any mitigation.
Minor	• Diversion of less than 200 metres on key routes • Negligible safety impact.
Moderate	• Diversion of more than 200 metres but less than 500 metres on key routes • Negligible safety impact.
High	• Diversion of more than 500 metres on key routes • Potential safety impact.

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

Construction is planned for between 2019 and 2022 at these sites. There are limited changes to the surface network proposed at the Wattle Street interchange other than some local restrictions described in **section 7.4.4**. The key effects of construction on pedestrians and cyclists around the Wattle Street interchange would be:

- The provision of new footpaths along the revised Wattle Street alignment (being delivered as part of the M4 East project)
- Interactions between construction vehicles and pedestrians using footpaths, particularly along Parramatta Road near the Northcote Street civil site (C3a), where heavy and light vehicles would be moving in and out of the site, and along Walker Avenue at Haberfield, where light vehicles would be using the construction driveway to enter and exit the site.

The generation of heavy and light vehicles associated with construction would be limited to those associated with the adjacent sites (C1a, C2a and C3a), as the east-facing portals to the M4 East would provide a bypass of the Wattle Street/Parramatta Road intersection for construction vehicles from other construction sites, such as the Rozelle civil and tunnel site to the east.

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

Darley Road civil and tunnel site (C4)

Construction is planned for between 2018 and 2022 at this site. Changes to the surface road network as a result of the Darley Road site would be restricted to local roads on the southern side of City West Link, with the exception of a temporary right turn lane for heavy vehicles from City West Link to James Street and then Darley Road.

There is an on-road cycle route on Darley Road that connects to the Lilyfield Road commuter route via the City West Link/James Street intersection (shown on **Figure 7-19**). A separated cycle path connection along this section of City West Link between the Bay Run at Canal Street and the Lilyfield Light Rail Depot is also proposed. This proposed cycle link does not form part of the project.

An existing pedestrian overpass links Charles Street, north of City West Link, with Canal Road, south of City West Link. This overpass also connects to a pedestrian path that runs along the southern side of City West Link, connecting with the Leichhardt North light rail stop at the corner of City West Link and Darley Road.

The key effects on pedestrians and cyclists as a result of construction at the Darley Road civil and tunnel site would be interactions between construction vehicles entering and exiting the site and:

- Pedestrians using the northern footpath along Darley Road between Charles Street and City West Link
- Cyclists using the on-road cycle route along Darley Road.

Traffic management measures would be implemented at the entry and exit driveways to manage potential interactions between construction traffic and pedestrians and cyclists.

Minor impacts are anticipated during construction as, while no diversions are required, there may be a safety impact and turning lanes would be provided for heavy vehicles to improve safety. The project would not affect the pedestrian overpass and/or path linking the northern side of City West Link with the Leichhardt North light rail stop.

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. These are shown on **Figure 7-20** and include:

- Lilyfield Road to Anzac Bridge (east–west)
- Johnston Street to Victoria Road and Anzac Bridge.

Construction activities associated with the Rozelle interchange would result in temporary diversions and permanent realignment of parts of these routes. These temporary and permanent changes are described and assessed in the following sections.

Lilyfield Road to Anzac Bridge (east–west)

This route provides a key east–west link for cyclists and pedestrians from Lilyfield Road to Anzac Bridge via the existing Victoria Road pedestrian bridge. The Victoria Road pedestrian bridge is narrow and has steep gradients with sharp 180 degree bends. It is therefore of low quality from a cycling perspective relative to its use and importance.

The Victoria Road pedestrian bridge would be replaced at the start of construction with an underpass below Victoria Road. The new pedestrian and cyclist route would connect to the existing Lilyfield Road commuter link and Anzac Bridge shared path. As part of the project, a shared cycle and pedestrian path would also be provided on the western side of Victoria Road that would link the Rozelle Rail Yards to Victoria Road.

During construction, the section of this path between Victoria Road and Anzac Bridge would be temporarily diverted to the north (by around 50 metres) to travel around the northern boundary of the construction area. This path would be reinstated at the completion of construction in generally the same alignment as existing.

Impacts on pedestrians and cyclists using the Lilyfield Road to Anzac Bridge route would be avoided through the provision of the new connection below Victoria Road as a replacement to the existing Victoria Road pedestrian bridge prior to it being removed. This would enable east–west trips to continue without disruption. Although this would mean a permanent change to the alignment of this route, the impact of this alignment change would be negligible and likely beneficial, as the distance of the route would be similar and the quality of the connection would be improved compared to the existing condition.

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 early in the construction program.

The existing at-grade connection between the western side of Victoria Road and The Crescent would be retained.

The removal of the bridge that spans City West Link would potentially affect pedestrians and cyclists travelling between Johnston Street, Victoria Road and Anzac Bridge. Potential alternatives and diversions being considered for implementation during construction are shown in **Figure 7-21** and 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 southwest 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 **Figure 7-21**). 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.

The Johnston Street to Victoria Road and Anzac Bridge connection would be permanently upgraded as part of the project through the provision of a new pedestrian and cycle bridge that would connect Victoria Road and the Rozelle Rail Yards with The Crescent, as well as the Rozelle Bay light rail stop and Bayview Crescent at Annandale. Further details on the permanent walking and cycling connections that would be provided at the Rozelle interchange are provided in **Chapter 5** (Project description) and **Appendix N** (Technical working paper: Active transport strategy) of the EIS.

Iron Cove Link civil site (C8)

Construction at this site is planned for between 2018 and 2023. The key pedestrian and cycle route in this area connects Iron Cove Bridge shared path (southern side), 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 route is shown on **Figure 7-22** and would represent a travel distance of about 700 metres, about 400 metres longer than the existing 300 metre section along Victoria Road. The diversion route would be primarily on local roads with low traffic volumes, however 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 link is shown indicatively on **Figure 7-22**. 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.

The existing link underneath Iron Cove Bridge that connects Iron Cove Bridge southern shared path with the Victoria Road northern shared path would not be impacted by the project.

Pyrmont Bridge Road tunnel site (C9)

Construction at this site is planned for between 2018 and 2022. The Pyrmont Bridge Road 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 onto 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 between 2018 and 2022. 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 signalised intersection would provide signalised crossing for pedestrians and cyclists using the new 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 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, as shown in **Figure 7-23**.

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, these would be minimised through the implementation of traffic management measures. No diversions would be required and the impact on pedestrians and cyclists at this location is therefore Negligible.

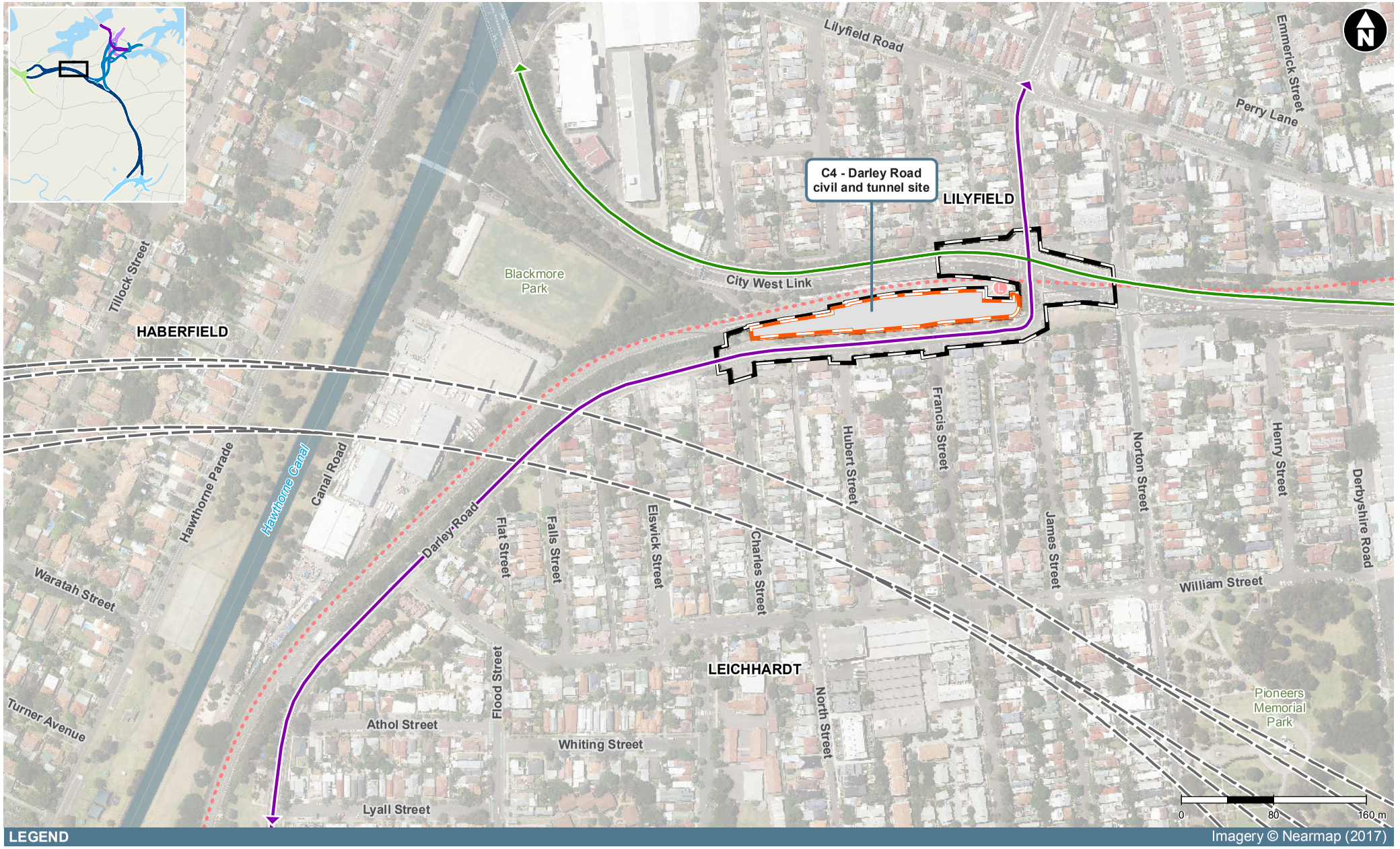


Figure 7-19 Active transport impacts: Darley Road civil and tunnel site (C4)

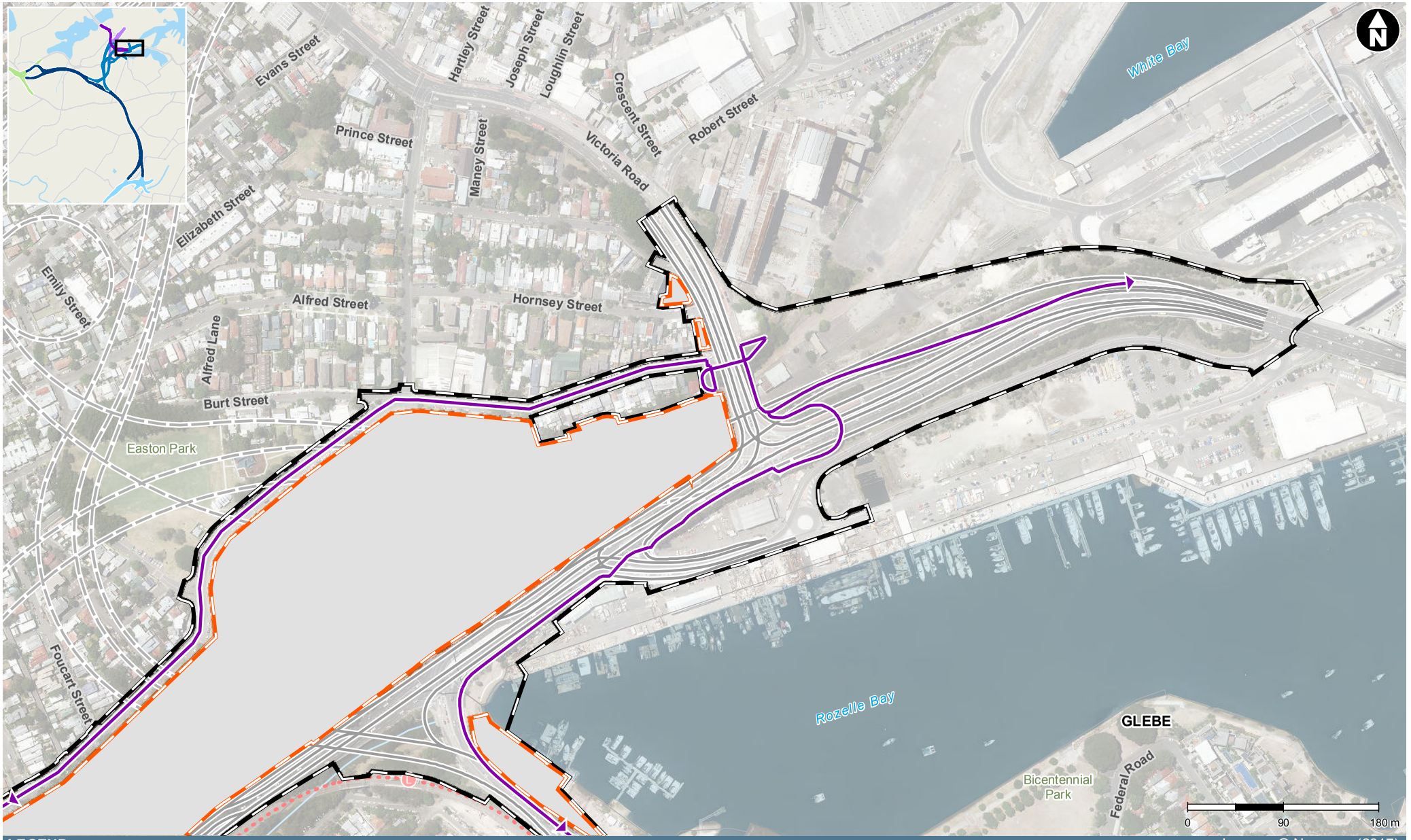


Figure 7-20 Existing active transport links in the vicinity of the Rozelle interchange construction compounds (C5, C6 & C7)

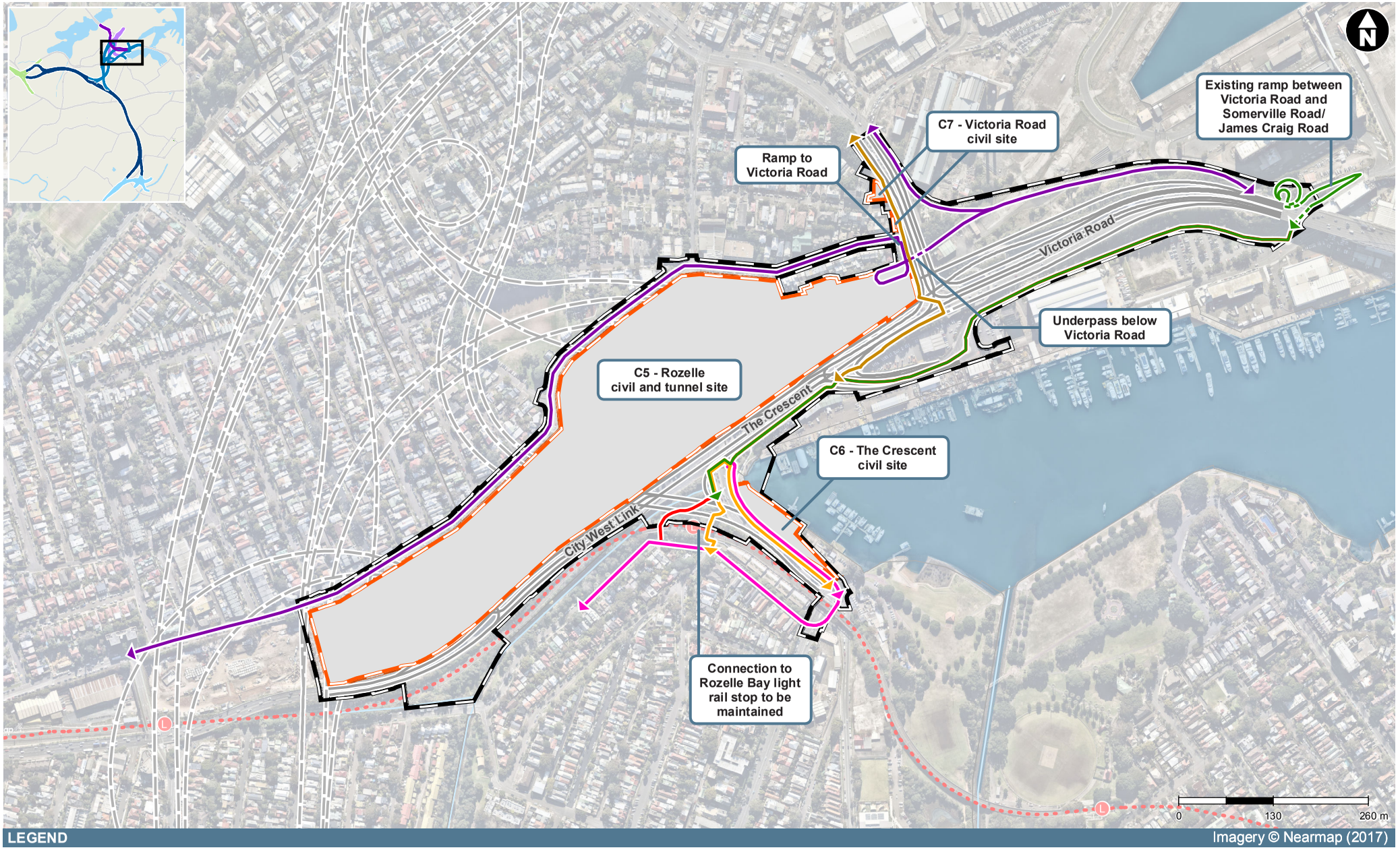


Figure 7-21 Active transport impacts: Rozelle interchange construction ancillary facilities (C5, C6 & C7)

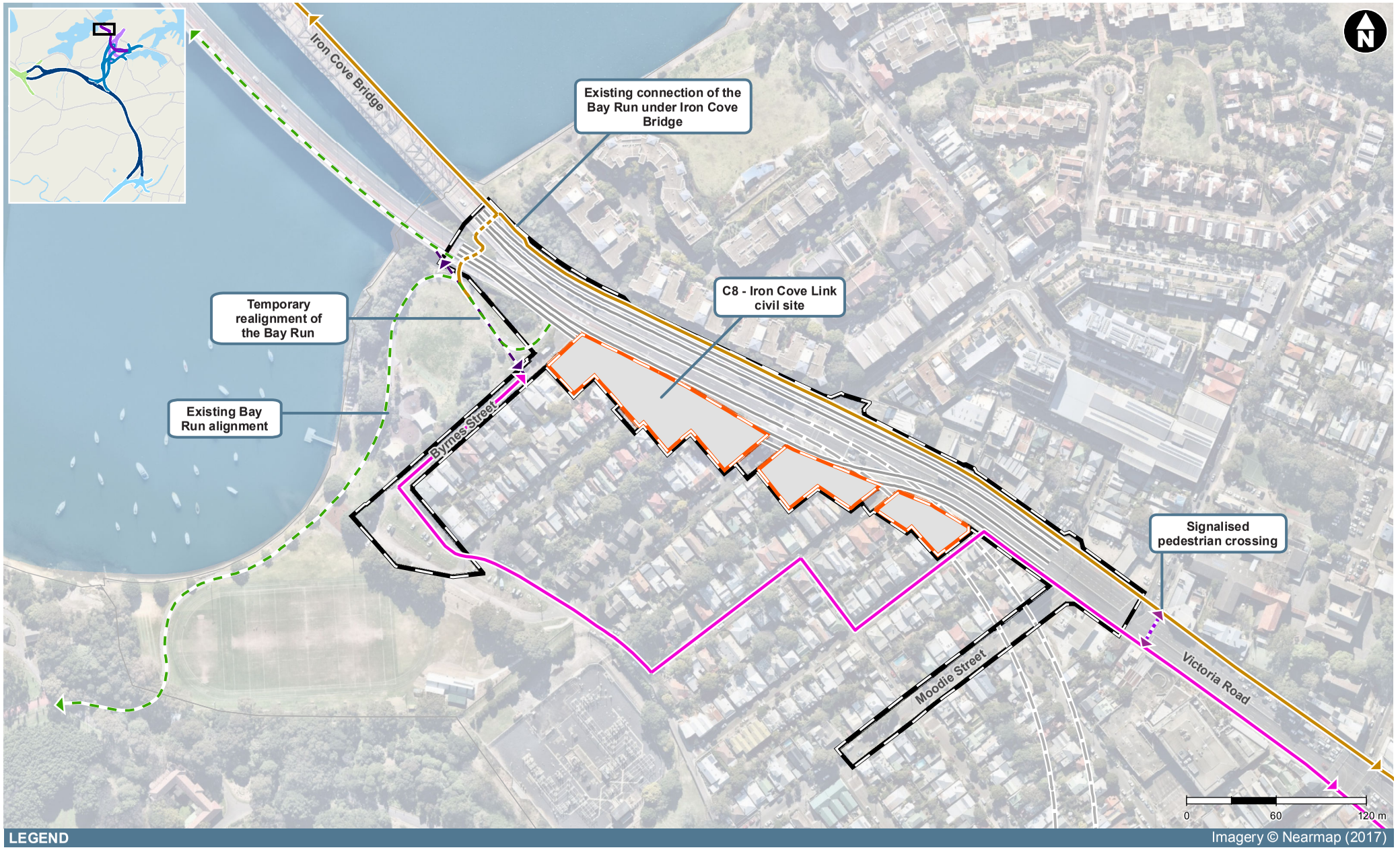


Figure 7-22 Active transport impacts: Iron Cove Link civil site (C8)

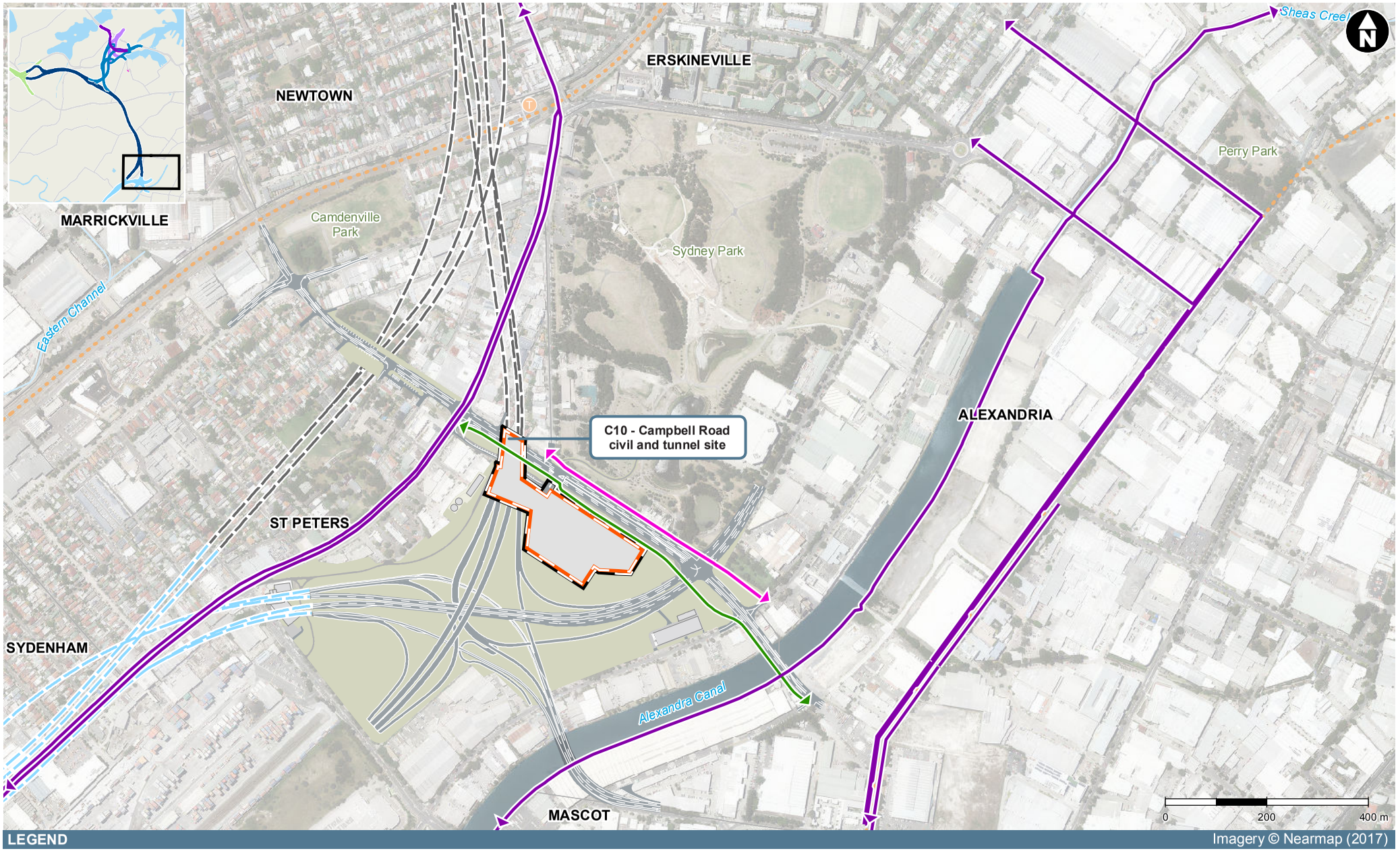


Figure 7-23 Active transport impacts: Campbell Road civil and tunnel site (C10)

7.5 Construction impact assessment – Option B

This section presents the impact assessment of the construction activities on proposed access routes, public transport, pedestrians and cyclists for the Option B construction scenario at Haberfield.

The results 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).

7.5.1 Roadway level of service

An analysis of roadway service levels was undertaken to determine the impact of the Option B construction traffic in 2021. The assessment considers the spoil reuse sites shown in **Table 7-14**.

Theoretical mid-block roadway capacities were based on Austroads *Guide to Traffic Management* and these capacities and assessment results are shown in **Table 7-26** for the AM peak and PM peak hours. The assessment results are shown only for the mid-block locations where Option B mid-block volumes differ to the Option A mid-block volumes. All other mid-block locations can be referred to in **section 7.4.2**.

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.

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 queuing further back in the network. However, this assessment provides a high level indication of the effect of construction vehicles on roadway service levels compared to the background traffic.

7.5.2 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.

Table 7-26 Option B – 2021 mid-block operational performance summary^

Location and direction		Mid-block capacity	2021 AM peak hour (veh/hr)						2021 PM peak hour (veh/hr)					
			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

^Traffic volume rounded to nearest 10

As previously noted, the construction modelling forecasts a number of intersections operating with high levels of delay (LoS E or F) in the 'without construction' scenario. 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 (represented as reduced saturation flows in the modelling). 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 any of the intersections. 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 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 relatively 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 in particular, however this intersection is forecast to already 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/ Darley Road civil and tunnel site (C4) access.

The 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 (see **section 7.2.7**).

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 civil and 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 delay 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 7-27** and **Table 7-28** for the AM peak and PM peak respectively.

Table 7-27 Option B – 2021 AM peak hour intersection operational performance summary^

Cluster	Intersection	Without construction		With construction	
		Volume (PCU)	LoS	Volume (PCU)	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

^Traffic volume rounded to nearest 10

Table 7-28 Option B – 2021 PM peak hour intersection operational performance summary^

Cluster	Intersection	Without construction		With construction	
		Volume (PCU)	LoS	Volume (PCU)	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
	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

^Traffic volume rounded to nearest 10

7.5.3 Temporary closures and diversions during construction

In addition to the temporary road network modifications outlined in **Table 7-22**, additional modifications outlined in **Table 7-29** would be required as part of construction option B. Impacts from construction traffic and associated temporary network changes are considered above.

Road network modifications and traffic staging would be reviewed by the construction contractor during the development of the detailed design and detailed construction methodology, with the objective of minimising disruptions to the road network. At all locations where road closures are required, access to properties would be maintained throughout the construction period. Appropriate signage for road closures or detours would be installed.

Table 7-29 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) • 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 • Due to existing property driveways, there would be no loss of on-street parking on Alt Street or Bland Street	• Q4 2018 to Q1 2019 to complete road modification. • Q4 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

7.5.4 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 hour and around 190 vehicles in the PM peak hour. 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 the project area. 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. Any foreseen impacts to road safety for all users during construction would be mitigated as much as possible through the provision of tailored traffic management plans and other measures detailed in **section 11.1**.

7.5.5 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.

7.5.6 Walking and cycling

An increase in heavy vehicle volumes during the construction period in the project area and surrounding areas would potentially impact walking and cycling amenity. There 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. Bland Street is an existing local cycle route and, 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.

7.6 Cumulative construction impacts

The construction of the proposed future Western Harbour Tunnel may overlap with this project (subject to approval). The Western Harbour Tunnel construction site would add about 66 PCU to the road network in the AM and PM peak hours, with construction vehicles travelling through Clusters 1, 2, 3 and 4.

Analysis indicates that the impact from additional Western Harbour Tunnel construction traffic on the clusters would be minimal, with most intersections operating at the same LoS as without Western Harbour Tunnel traffic. A few intersections within Cluster 1 are forecast to experience a slight worsening in level of service with the cumulative construction impact of the Western Harbour Tunnel construction site. The Parramatta Road/Wattle Street intersection level of service is forecast to worsen from LoS D to LoS E in the AM peak hour in both Option A and Option B. The Parramatta Road/Harris Road and the Parramatta Road/Croyden Road/Arlington Street intersections are forecast to worsen from LoS B to LoS C in the AM peak hour in Option B only. In the PM peak hour, the level of service at the Wattle Street/Ramsay Street intersection is forecast to worsen from LoS E to LoS F in Option A only.

The M4 East and New M5 are expected to be operational by 2019/20; hence their construction would not overlap in the 2021 assessment year. The construction of the M4-M5 Link mainline tunnels is indicatively programmed to start in late 2018, by which stage the M4 East and New M5 tunnel construction will either be complete or almost complete. Therefore, the overlap of tunnelling construction, the largest generator of heavy vehicle traffic, would not cause a substantial cumulative impact. The assessment has assumed that M4 East would be operational in 2021 and is used by construction vehicles accessing the construction sites for the project during the assessment year.

Elements of the construction program for the project may occur simultaneously with the construction of Sydney Gateway (subject to approval). However, no details of the construction of the Sydney Gateway project is yet available. The CTAMP would need to consider any overlap in heavy vehicle and other access routes, once this information becomes available.

Elements of the construction program may also occur simultaneously with the construction of Stage 2 of the Sydney Metro – Sydney Metro City and Southwest (Sydenham to Bankstown). The current indicative timeline for Sydney Metro City and Southwest indicates that several construction activities including tunnel fitout, station construction and fitout, and services facility construction and fitout will begin in 2021. However, no detail of the construction of the Sydney Metro City and Southwest is yet

available. The CTAMP would need to consider any overlap in heavy vehicle and other access routes, once this information becomes available.

There may be some overlap between the construction of this project and the construction of components of the Green Square Town Centre project, as it is noted that the Green Square Town Centre project currently has a delivery timing of 5–8 years. Current construction timelines for the project indicate that many of the Green Square Town Centre development lots and streets are to be delivered prior to 2019. There are currently few components which have been identified as to be delivered after 2019, although several lots and streets are yet to have a construction period confirmed. Any quantifiable cumulative construction impacts which might result from this project would need to be considered in the CTAMP, if details become available.

At present, there are no other major projects whose construction would significantly increase traffic volumes and patterns along the key arterial roads within the project area during the construction period. Construction volumes associated with minor works are anticipated to have a negligible impact similar to that of daily or seasonal variations in traffic volumes and patterns. Notwithstanding, any scheduled construction activities would be taken into account during construction of the project.

Site management works would occur within the Rozelle Rail Yards at Rozelle before the commencement of construction of the M4-M5 Link. Site management works are planned to commence in 2017, with completion planned for 2018 and would be carried out in accordance with a separate planning approval issued in April 2017. There would be no cumulative impacts with the project.

8 Assessment of operational impacts without the project

8.1 Sydney metropolitan road network

This section details the traffic demand changes forecast by the WRTM and performance in a 'without project' scenario using forecast AM and PM peak hour traffic volumes for 2023 and 2033.

8.1.1 'Do minimum' (2023)

The 2023 'do minimum' case assumes NorthConnex, M4 Widening, M4 East, and New M5 are complete, but that the M4-M5 Link has not been built. It is called 'do minimum' rather than 'do nothing' as it assumes ongoing 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 8-1 shows bandwidth plots illustrating the forecast change in daily traffic volumes between the 2023 'do minimum' and the 2015 'base case' 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 band thickness is indicative of the magnitude of this change.

General traffic

Based on WRTM outputs, 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, and along the M5 East, as a result of the New M5. The forecast traffic on the M4 East and the New M5, which open between 2015 and 2023, are illustrated by the red bands on these links.

However, 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 most other urban arterial roads in the study area, such as Victoria Road, City West Link, Hume Highway, Canterbury Road, Stoney Creek Road, Olympic Drive, Centennial Drive and Anzac Parade approaching the Sydney CBD. The increase in daily traffic is mainly due to the forecast increase in population and changes to employment distribution across Sydney. The amount of red on **Figure 8-1** represents this background increase in traffic.

Table 8-1 compares the 2023 'do minimum' scenario with the 2015 'base case' scenario (which represents road conditions prior to the construction of M4 Widening, M4 East, KGRIU and New M5). An increase in VKT – 14.6 million daily vehicle kilometres, about 15 per cent more – and VHT – 706,000 daily vehicle hours, about 25 per cent more – is forecast on an average weekday on the Sydney road network compared to the 2015 base case scenario. The forecast indicates declining productivity of the road network.

Table 8-1 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

On-road freight

Forecast changes in daily road-based freight or heavy vehicle movements largely 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 the presence of the M4 East and the New M5.

On-road public transport

The increases in traffic volumes and congestion on roads that are also key bus corridors would be expected to impact negatively on the reliability and the trip times of on-road public transport. These include Parramatta Road (east of the M4 East Parramatta Road 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 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.

Source: WRTM v2.3, 2017

Figure 8-1 Difference in AWT between 2023 'do minimum' and base year scenarios

8.1.2 'Do minimum' (2033)

This case assumes a future road network including NorthConnex, M4 Widening, M4 East, and New M5 and some upgrades to the broader road and public transport network over time to improve capacity and cater for traffic growth, but does not include the M4-M5 Link or other planned motorway projects, such as the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and F6 Extension.

Figure 8-2 shows bandwidth plots illustrating the forecast change in daily traffic volumes between the 2033 'do minimum' and the 2015 'base case' scenarios. As before, 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

Based on WRTM outputs, reductions in daily traffic are still forecast along Parramatta Road (west of the M4 East Parramatta Road 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 is the main cause of the forecast traffic increases 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 most other urban arterial roads.

The amount of red shown on **Figure 8-2** is representative of the background increase in traffic due to the forecast growth in population and employment across the Sydney metropolitan area.

Table 8-2 compares the 2033 'do minimum' scenario with the 2015 'base case' scenario (which represents road conditions prior to the construction of M4 Widening, the M4 East and the New M5). An increase in VKT – 34.2 million daily vehicle kilometres, about 35 per cent more – and VHT – 2.3 million daily vehicle hours, about 80 per cent more – is forecast on an average weekday on the Sydney road network compared to the 2015 base case scenario. While the increase in VKT by 2033 is about double the increase by 2023, the increase in VHT by 2033 is more than 2.5 times the increase by 2023. This indicates that the network is becoming so congested that an increase in traffic on the network is causing an exponential increase in travel time.

Table 8-2 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 largely 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 the M4 East and the New M5.

On-road public transport

It would be expected that, in line with the changes forecast for traffic volumes in 2033 compared with 2023, there would be a greater impact on trip times and reliability of bus services in 2033 due to larger increases in general traffic. Again, 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, and Anzac Parade.

Source: WRTM v2.3, 2017

Figure 8-2 Difference in AWT between 2033 'do minimum' and base year scenarios

8.2 Operational performance – Wattle Street interchange

8.2.1 Changes to 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, as summarised below:

- M4 East entry and exit ramps to accommodate surface road 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)
- To facilitate the entry and exit ramp infrastructure, a number of adjustments to the surface road network were included:
  - Wattle Street realigned and lanes reconfigured between Parramatta Road and Waratah Street intersections
  - Wattle Street/Ramsay Street intersection reconfigured, including the provision of:
    - A new northbound right turn bay from Wattle Street
    - A left turn bay provided from Wattle Street northbound to Ramsay Street westbound
    - Additional right turn lane from Dobroyd Parade southbound to Ramsay Street westbound
  - A third lane provided on Dobroyd Parade southbound approach to Waratah Street intersection
  - Dedicated right turn bay from the M4 East exit ramp to Waratah Street
  - Parramatta Road realigned and lanes reconfigured between Bland Street and Dalhousie Street, with Chandos Street, Rogers Avenue and Orpington Street approaches to Parramatta Road realigned accordingly as left-in left-out intersections
- 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 (where the lane drop (eastbound) and lane gain (westbound) occur. 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. Left turning vehicles are allowed to enter kerbside lanes about 100 metres in advance of intersections to accommodate left turns.

8.2.2 Network performance

2023 'Do minimum' scenario

Table 8-3 and **Table 8-4** present a comparison of the performance of the modelled road network between the 2015 'base case' scenario and 2023 'do minimum' or 'without project' scenario for the AM and PM peak hours.

AM peak hour

The major road improvements included in the 'do minimum' scenario introduce more tunnelled motorway and remove traffic from parts of the surface road network. The subsequent improvement in vehicle travel times is offset by congestion originating to the east of City West Link/Timbrell Drive intersection. This downstream congestion for eastbound vehicles on City West Link blocks the exit of the Timbrell Drive intersection, and combined with the capacity restriction at the merge from two lanes to one lane east of the Waratah Street intersection, causes congestion issues at City West Link/Timbrell Drive intersection.

For eastbound City West Link vehicles, delays in the 2015 'base case' scenario, which are a result of downstream queuing from further east along City West Link, are spread over a large number of surface road intersections. A significant portion of this demand switches to the M4 East in the 'without project' scenario, resulting in reduced surface traffic volumes at key intersections along Parramatta Road and Wattle Street. This would result in an improvement in overall network performance, with an overall reduction in the number of stops and retention of average speed, despite the significant increase in demand entering the network.

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 where there is existing congestion at Liverpool Road and also from 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.

Table 8-3 Wattle Street interchange network performance – AM peak hour (2015 'base case' 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%
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%	-

PM peak hour

In the PM peak hour, average speeds reduce in the 2023 'without project' scenario compared with the 2015 'base case' scenario. This is predominantly a result of forecast increased traffic demand to Frederick Street, which leads to a substantial increase in exit blocking at the Parramatta Road and Wattle Street intersection. This results in increased delays for other movements, particularly for Parramatta Road eastbound vehicles wanting to turn right to Frederick Street.

A substantial increase in traffic demand for Parramatta Road eastbound to 2023 is also forecast, which results in congestion on the M4 East Parramatta Road exit ramp. However, queuing on the exit ramp is not forecast to extend to the M4 East Wattle Street exit ramp diverge.

Table 8-4 Wattle Street interchange network performance – PM peak hour (2015 'base case' 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%	–

2033 'Do minimum' scenario

Table 8-5 and **Table 8-6** 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 produced using a microsimulation operational model.

AM peak hour

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 unreleased, ie cannot enter the network in the peak hour.

Table 8-5 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%

Network measure	2023 'without project'	2033 'without project'	Percentage change
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%	-

PM peak hour

The number of unreleased vehicles unable to enter the modelled network in the peak hour significantly increases in 2033 compared to 2023, as congestion worsens in response to the forecast increase in demand. As in 2023, forecast growth in traffic demand for Frederick Street is the main cause of increased congestion, with Parramatta Road eastbound right turners to Frederick Street impeded by exit blocking leading to queues along Parramatta Road.

In 2033, the Frederick Street exit blocking also impacts the Wattle Street southbound through movement with congestion ultimately blocking through City West Link/Timbrell Drive intersection and leading to unreleased vehicles on City West Link.

Congestion, as a result of increased forecast demand along Parramatta Road eastbound, is also seen to deteriorate, with M4 East Parramatta Road exit ramp queues often extending beyond the M4 East exit ramp diverge, with long queues along the M4 East.

Table 8-6 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			

Network measure	2023 'without project'	2033 'without project'	Percentage change
Unreleased demand (veh)	483	1,214	-
% of total traffic demand	3%	7%	-

8.2.3 Intersection performance

Table 8-7 presents the modelled AM and PM peak hour LoS for key intersections at the Wattle Street interchange. The AM peak comparison suggest that in the 'without project' scenario, the intersection performance in the future years is forecast to be similar to the 2015 'base case' 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 as a result of reduced demand on the surface road network, and City West Link/Timbrell Drive.

The performance of City West Link/Timbrell Drive intersection is seen to worsen over time, given the increased eastbound demand for City West Link that causes queuing along Wattle Street, with minor impacts noted at the upstream intersection of Waratah Street as a result.

In the PM peak hour, Sloane Street and Liverpool Road intersection performances are seen 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 East 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 8-7 Wattle Street 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			
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

Key intersections	2015 'base case'	2023 'without project'	2033 'without project'
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

8.2.4 Travel times

For the purpose of assessing travel times through the network, exit blocking constraints, applied to reflect network congestion at intersections beyond the modelled network extents, were retained.

Average travel times were extracted from the model along the following routes:

- Parramatta Road – from Arlington Street to Liverpool Road (and in the opposite direction)
- Frederick Street to City West Link – from John Street to Timbrell Drive (and in the opposite direction)
- M4 East to City West Link – from start of M4 East exit ramp to Timbrell Drive
- M4 East to Parramatta Road (E) – from start of M4 East exit ramp to Liverpool Road.

Travel times, presented in **Figure 8-3** and **Figure 8-4**, are seen to generally increase between 2023 and 2033 'without project' scenarios as a result of increased demand and consequent congestion. The speed limit on the road network in the modelled area is 60 kilometres per hour.

During the AM peak, 2033 travel times generally remain consistent with 2023 conditions, which is predominantly due to much of the increased traffic being on links which are either:

- Relatively free flowing in both scenarios (therefore volume increases do not result in significant travel time differences)
- Are already over capacity in the 2023 scenario (therefore additional demand is simply supressed, with little impact on the travel times of vehicles within the network).

The consistent travel times in the AM peak hour align with the network performance, which forecast average speed in the network is relatively consistent between the two 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. It is however noted that much of the additional demand in the 2033 scenario is supressed/unreleased and so impacts on travel times for vehicles that are able to enter the network are reduced.

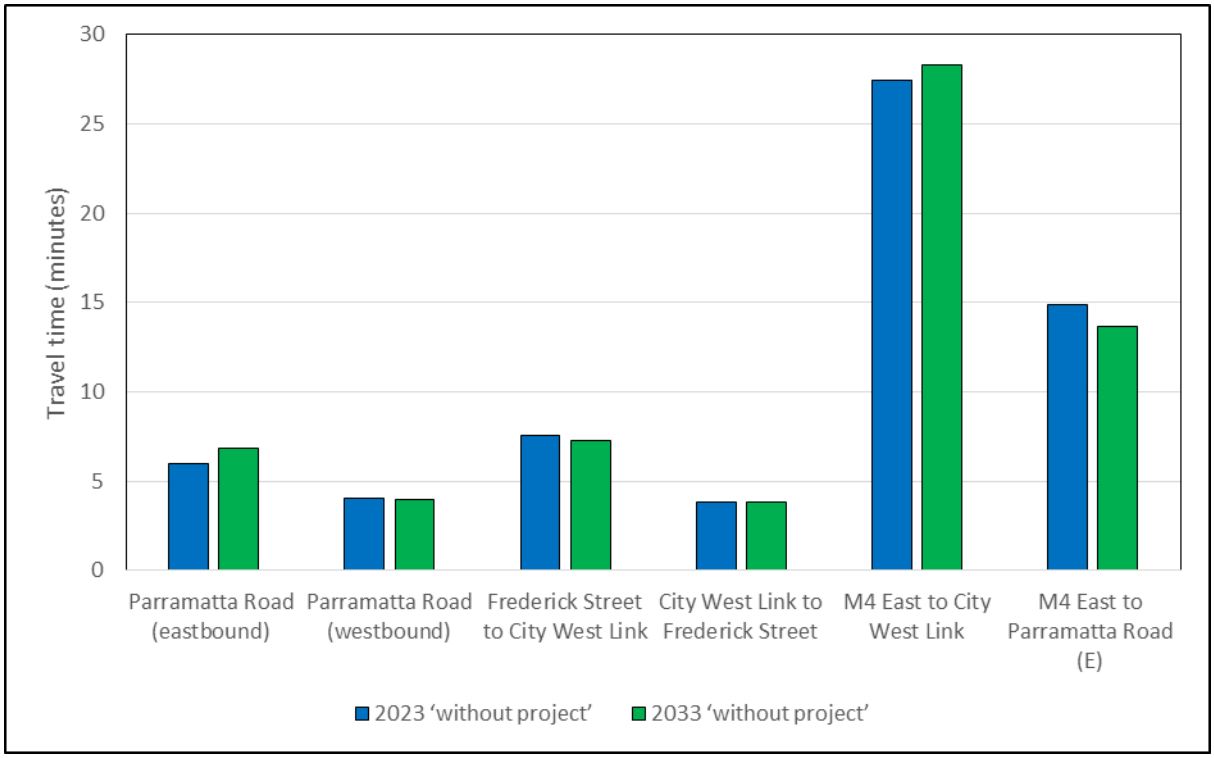


Figure 8-3 Wattle Street interchange: average travel time (mins) – AM peak hour 'without project' scenarios

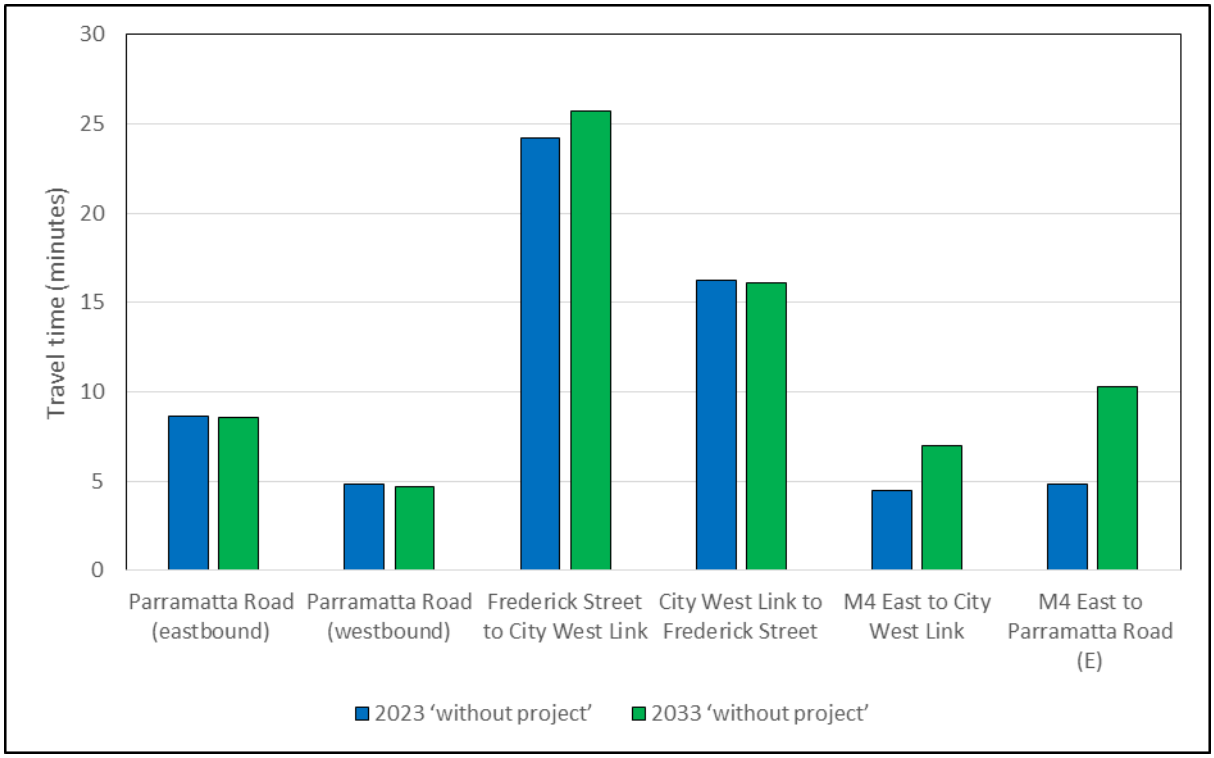


Figure 8-4 Wattle Street interchange: average travel time (mins) – PM peak hour 'without project' scenarios

8.2.5 Traffic crashes

The frequency of crashes on surface roads in the vicinity of the Wattle Street interchange would be expected to change relative to the forecast traffic volume changes. The potential future crashes were calculated using the historical crash rates from data recorded during the period from January 2012 to December 2016, and applied to the forecast traffic flows.

Traffic crash analysis comparing 2015 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:

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

The above analysis has been undertaken assuming the future frequency, type, and severity of crashes would be consistent with historic trends. On this basis the forecast growth in traffic would be expected to result in both the total number and cost of crashes increasing.

8.2.6 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.

As the details of these planned bus lanes (eg kerbside or centre-running) are unknown, Parramatta Road kerbside lanes were converted to bus only lanes in the modelled network from the western model extent to east of Bland Street. Left turners 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.

8.2.7 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) of the EIS.

8.3 Operational performance – Rozelle interchange

8.3.1 Changes to 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.

8.3.2 Network performance

2023 'do minimum' scenario

Table 8-8 and **Table 8-9** present a comparison of the performance of the modelled road network between the 2015 'base case' scenario and 2023 'without project' scenario for the AM and PM peak hours.

AM peak hour

There is a forecast increase in demand of about 11 per cent, primarily due to changes in population and employment distribution. The 2023 forecast demands have a reduction in traffic to Bathurst Street and an increase to the Sussex Street exit ramp. As a result, there is a slight improvement in the Western Distributor eastbound operation. However, the forecast northbound demands on Victoria Road increase. As a result, due to insufficient capacity along Victoria Road further to the north, congestion on Victoria Road northbound is forecast to increase.

In terms of the overall network performance, 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.

Table 8-8 Rozelle interchange network performance – AM peak hour (2015 'base case' 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%	–

PM peak hour

Compared to the 2015 'base case' scenario, the 2023 'with project' scenario has a forecast 11 per cent increase in demand caused by changes in population and employment distribution. The increased demand causes a deterioration in network performance, with a lower average network speed and higher average number of stops per vehicle. A significant increase in the number of unreleased vehicles indicating increased congestion and deteriorating network performance is forecast.

The Victoria Road/The Crescent intersection continues to be the pinch point in the network for outbound (westbound) traffic, causing delays and queuing on Anzac Bridge and an increase in unreleased vehicles on Western Distributor (westbound).

Traffic over Sydney Harbour Bridge is forecast to increase. This would cause longer eastbound queuing on Western Distributor, which would extend further back onto Anzac Bridge, City West Link and Victoria Road.

Table 8-9 Rozelle interchange network performance – PM peak hour (2015 'base case' vs 2023 'without project' scenario)

Network measure	2015 'base case'	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%
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%	–

2033 'Do minimum' scenario

Table 8-10 and **Table 8-11** 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.

AM peak hour

With a forecast 10 per cent increase in total demand from 2023 to 2033, the overall performance is forecast to deteriorate with longer average travel times, lower average speeds and higher average number of stops. The number of unreleased vehicles also increases, indicating growing congestion in the network.

Similar to the 2023 traffic pattern, the 2033 forecast demands show a reduction in demand to Bathurst Street and an increase in demand to Sussex Street. The Sussex Street exit ramp is not as constrained, and so this change in traffic patterns results in an improved northbound flow on the Western Distributor between Sussex Street and Sydney Harbour Bridge and a corresponding improvement in eastbound flow over Anzac Bridge.

Notwithstanding this improvement, the increase in overall demands and general network congestion result in a drop in the overall network performance.

Table 8-10 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%	–

PM peak hour

In the PM peak hour, the forecast percentage increase in total demand is about seven per cent compared to 2023. However, there is a forecast reduction in eastbound traffic (about 200 vehicles per hour) to Sydney Harbour Bridge. As a result of this reduction, northbound queuing on Western Distributor and eastbound queuing on Anzac Bridge improves.

However, Victoria Road is forecast to be more congested, partly due to a significant increase in bus volumes, but also due to forecast increases in general traffic to both The Bays Precinct and to Johnston Street. These increases impact the Victoria Road/The Crescent intersection, which in turn has knock-on effects to westbound traffic over Anzac Bridge, particularly to the right-turn to Victoria Road. The westbound through movement is also impacted with long queues expected on the east approach to the intersection.

Table 8-11 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%

Network measure	2023 'without project'	2033 'without project'	Percentage change
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%	–

8.3.3 Intersection performance

Table 8-12 presents the modelled AM and PM peak hour LoS for key intersections at Rozelle. The intersection performance results demonstrate the following intersections are forecast to 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 8-12 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
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

Key intersections	2015 'base case'	2023 'without project'	2033 'without project'
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

With higher 2033 traffic demands in the PM peak hour, the westbound traffic is 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.

8.3.4 Travel times

For the purpose of assessing travel times through the network, exit blocking constraints, applied to reflect network congestion at intersections beyond the modelled network extents, were retained. In addition to network performance statistics, average travel times were extracted from the model along Victoria Road and City West Link onto Anzac Bridge and were compared for the modelled years under the 'without project' scenario. Travel times for two 'inbound' and 'outbound' routes were measured:

Inbound

- From the northern end of Iron Cove Bridge to the eastern edge of Anzac Bridge via Victoria Road
- From City West Link/Catherine Street intersection to the eastern edge of Anzac Bridge via City West Link.

Outbound

- From the eastern edge of Anzac Bridge to the northern end of Iron Cove Bridge via Victoria Road
- From the eastern edge of Anzac Bridge to City West Link/Catherine Street intersection via City West Link.

Figure 8-5 and **Figure 8-6** shows the travel times for these routes in the AM and PM peak hours. The speed limit on the road network in the modelled area is 60 kilometres per hour.

In the AM peak hour, due to the difference in trip distribution with fewer vehicles heading to Bathurst Street and more to Sussex Street, traffic flow on the Western Distributor is forecast to improve, resulting in less queuing 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 correspondingly better journey times on this route.

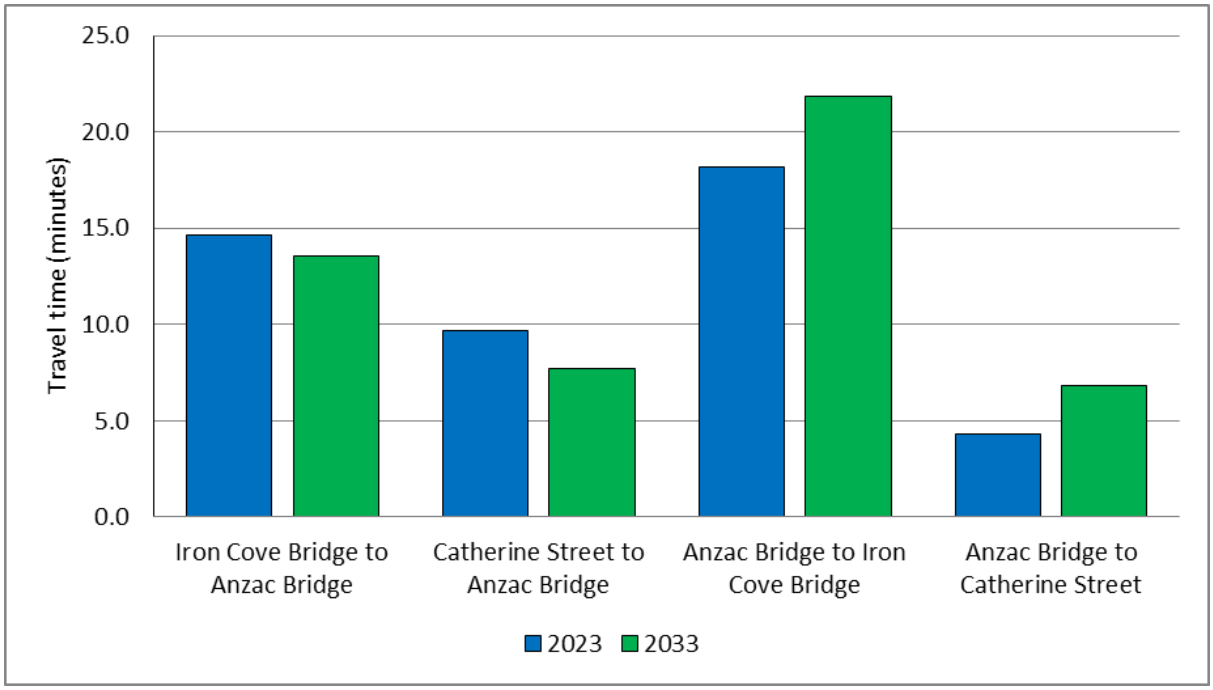


Figure 8-5 Rozelle interchange: average travel time (mins) – AM peak hour 'without project' scenarios

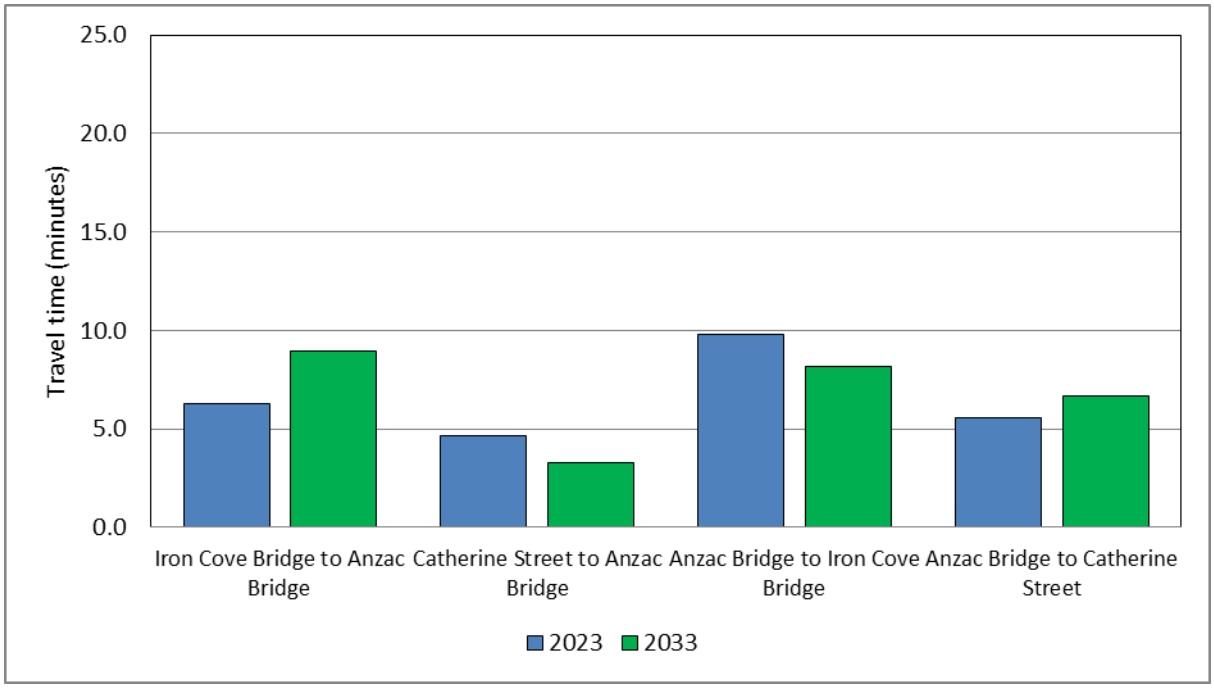


Figure 8-6 Rozelle interchange: average travel time (mins) – PM peak hour 'without project' scenarios

8.3.5 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 volume growth in the future. The potential for crashes – indicated by the crash rates per vehicle kilometre travelled in **section 6.4.4** – would remain.

By 2033, the growth in traffic volumes would create a proportional rise in crash frequencies and costs along the following road sections:

- Anzac Bridge (Victoria Road to Miller Street)
  - Crashes would be expected to increase from an average of 22 to 27 per annum
  - The corresponding annual cost of crashes would rise from $5.5 million to $6.8 million per annum
- City West Link (James Street to Victoria Road)
  - Crashes would be expected to increase from an average of 34 to 39 per annum
  - The corresponding annual cost of crashes would rise from $8.4 million to $9.7 million per annum
- Victoria Road (Darling Street to The Crescent)
  - Crashes would be expected to increase from an average of 19 to 24 per annum
  - The corresponding annual cost of crashes would rise from $5.4 million to $6.8 million per annum
- Lilyfield Road (Victoria Road to Canal Road)
  - Crashes would be expected to increase from an average of eight to 22 per annum
  - The corresponding annual cost of crashes would rise from $2.3 million to $6.3 million per annum
- The Crescent (City West Link to Wigram Road)
  - Crashes would be expected to increase from an average of 12 to 13 per annum
  - The corresponding annual cost of crashes would rise from $2.9 million to $3.0 million per annum
- Johnston Street (The Crescent to Parramatta Road)
  - Crashes would be expected to increase from an average of 12 to 16 per annum
  - The corresponding annual cost of crashes would rise from $3.3 million to $4.3 million per annum.

The above analysis has been undertaken assuming the future frequency, type, and severity of crashes would be consistent with historic trends. On this basis the forecast growth in traffic would be expected to result in both the total number and cost of crashes increasing.

8.3.6 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.

8.3.7 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) of the EIS.

8.4 Operational performance – St Peters interchange

8.4.1 Changes to 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, the following changes to the road network have been planned and have also been included in the 'do minimum' or 'without project' scenario:

- In accordance with planned Pinch Point works by Roads and Maritime at the Princes Highway/Railway Road intersection – Railway Road approach changed to a left lane marked for left turning traffic only, which joins Princes Highway at a give-way slip lane, and a right lane marked for right turning traffic only at the signals. The two lane section develops about 70 metres before the stop line. The Princes Highway northbound approach has three through lanes with the left-hand lane shared with left turning traffic. The Princes Highway southbound approach consists of two through lanes and a single right turn lane
- The Airport North Precinct project was included in the model – this project consists of improvements to Robey Street, Qantas Drive and O'Riordan Street, as follows:
  - Provision of a third lane in both directions on O'Riordan Street between Robey Street and Bourke Road
  - At the O'Riordan Street/King Street intersection, provision of new southbound dedicated right turn lane, about 75 metres long
  - At the O'Riordan Street/Robey Street intersection, the Robey Street eastbound approach is signalised to provide a crossing for pedestrians, the O'Riordan Street southbound approach has four through lanes and a signalised slip lane for left turning traffic
  - At the Qantas Drive/Robey Street intersection, the eastbound left turn is converted from free flowing to signalised with the provision of pedestrian crossing
  - At the O'Riordan Street/Bourke Road intersection, the northbound left turn into Bourke Road is converted from a single lane to two lanes
- Gardeners Road/Kent Road intersection – layout changed from T-junction to four-legged intersection. The northern leg is to provide access to local businesses and is accessible from Gardeners Road west and from Kent Street with only left turn exit permitted. The west approach has three through lanes and a single right turn lane about 90 metres long. The east approach is similar to the previous design, with three through lanes, but the left turn bay is converted to a signalised slip lane with a pedestrian crossing. The southbound exit is a single lane with slip lane joining it as an added lane, which then flares to three lanes
- Campbell Road/Bourke Road intersection – layout changed to match new design of four-legged intersection at this location to provide a signalised access at the access easement, which currently exists for the Goodman's site.

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. The King Street Gateway project is not impeded by the M4-M5 Link project.

Not all of the forecast demand to and from the Sydney Airport precinct could be accommodated in the peak hour without the Sydney Gateway project. This change in forecast demand is reported in the network performance tables.

8.4.2 Network performance

2023 'Do minimum' scenario

Table 8-13 and Table 8-14 present a comparison of the performance of the modelled road network between the 2015 'base case' scenario and 2023 'without project' scenario for the AM and PM peak hours.

AM peak hour

The comparison shows an overall decrease in performance, which is reflected in increased total time travelled in the network and increased number of stops. There is a 18 per cent increase in total traffic demand which results in more vehicles arriving at their destination, but this also affects all average measures per vehicle, which are considerably 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).

Table 8-13 St Peters interchange network performance – AM peak hour (2015 'base case' 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%
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	–

PM peak hour

The comparison shows that, despite 18 per cent more demand in the 2023 'without project' scenario, the modelled network performs similarly to the 2015 'base case' scenario 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 2015 'base case'. The increase in average speed in the 'without project' scenario is due to the ramps leading to and from the New M5. These ramps not only allow vehicles to travel faster, which increase the overall average speed in the network, but 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 case' network performance.

Table 8-14 St Peters interchange network performance – PM peak hour (2015 'base case' 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	–

2033 'Do minimum' scenario

Table 8-15 and **Table 8-16** 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.

AM peak hour

The AM peak hour network performance indicates a further increase in demand in the 2033 'without project' scenario and the overall network performance declines without the project. 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 decrease, with average speed in the network dropping to eight kilometres per hour and the number of unreleased vehicles increasing to 24 per cent of the total demand. This indicates that by 2033 the network struggles to cope with the forecast traffic demand.

Table 8-15 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	–

PM peak hour

The PM peak hour network performance results show that, similar to the AM peak hour, the network suffers from increased congestion by 2033 without the project. All performance indicators deteriorate and the average speed of around 18 kilometres per hour indicates a road network with decreased performance and a greater number of vehicles failing to enter the modelled network.

Table 8-16 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%
Unreleased vehicles			
Unreleased demand (veh)	220	1,150	–
% of total traffic demand	1%	4%	–
Demand reduction to/from Sydney Airport precinct (veh)	230	320	–

8.4.3 Intersection performance

Table 8-17 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 8-17 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	C
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

8.4.4 Travel times

For the purpose of assessing travel times through the network, exit blocking constraints, applied to reflect network congestion at intersections beyond the modelled network extents, were retained.

In addition to network performance statistics, travel times for selected routes within the modelled area were extracted and 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).

Figure 8-7 and **Figure 8-8** show a comparison of travel times recorded on these routes in the 2023 and 2033 'without project' conditions. In both peak hours, each route has consistently longer travel times in 2033, with the highest increase on the route between King Street and the Domestic Terminals.

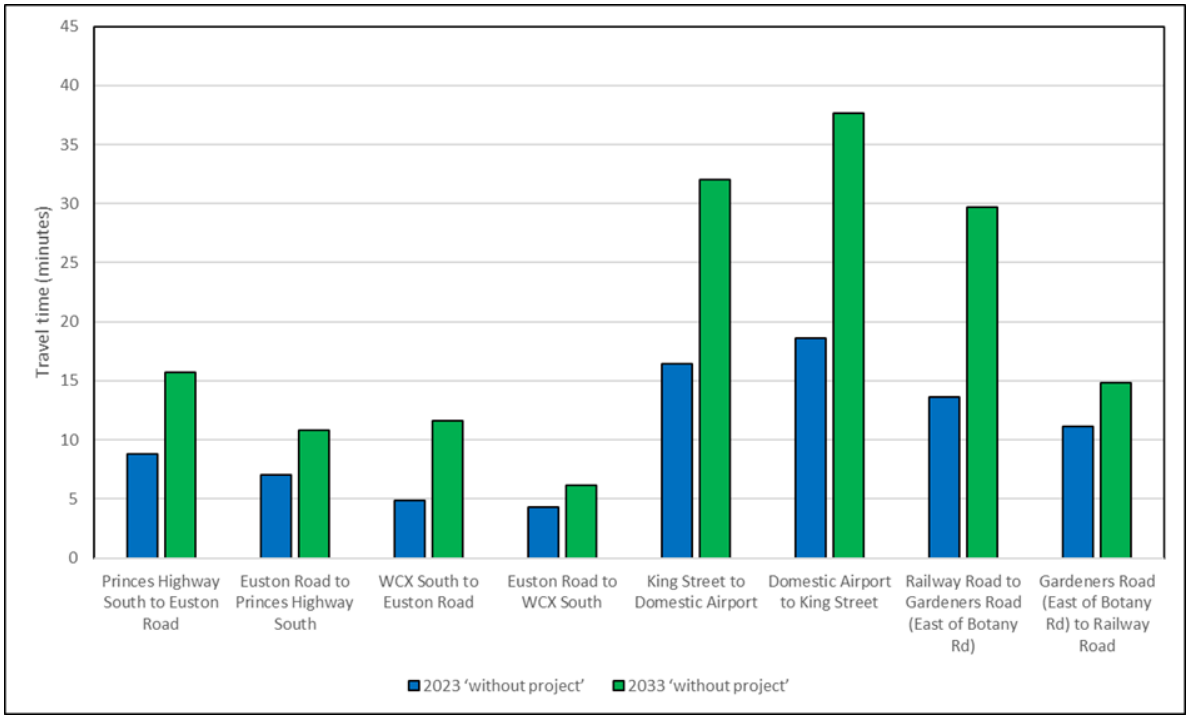


Figure 8-7 St Peters interchange: average travel time (mins) – AM peak hour 'without project' scenarios

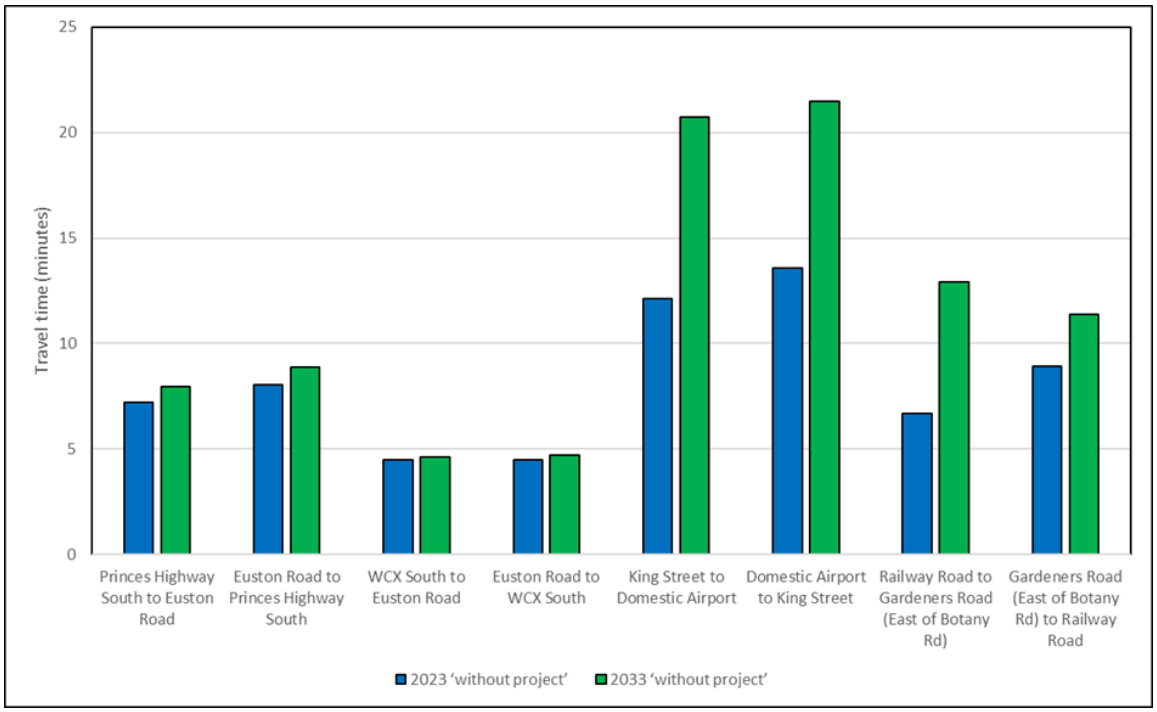


Figure 8-8 St Peters interchange: average travel time (mins) – PM peak hour 'without project' scenarios

8.4.5 Traffic crashes

The frequency of crashes on surface roads in the St Peters area would be expected to change relative to the forecast traffic volume 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 2015).

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 along the following road sections in the vicinity of the St Peters area:

- Princes Highway (Enmore Road to Gannon Street)
  - Crashes would be expected to increase from an average of 81 to 95 per annum
  - The corresponding cost of crashes would rise from $8.4 million to $9.8 million per annum
- Canal Road/ Ricketty Street/ Gardeners Road (Princes Highway to Botany Road)
  - Crashes would be expected to decrease from an average of 50 to 39 per annum, due to a reduction in forecast traffic using these roads
  - The corresponding cost of crashes would decrease from $4.4 million to $3.5 million per annum
- Euston Road (Sydney Park Road to Campbell Road)
  - Crashes would be expected to increase from an average of four to 35 per annum
  - The corresponding cost of crashes would rise from $0.4 million to $2.7 million per annum
- Bourke Road (Wyndham Street to Gardeners Road)
  - Crashes would be expected to increase from an average of 14 to 32 per annum
  - The corresponding cost of crashes would rise from $1.1 million to $2.4 million per annum.

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:

- Crashes would be expected to decrease slightly, from an average of 96 per annum on the M5 East, to a total of 94 per annum across the M5 East and the New M5
- The corresponding annual cost of crashes would fall from $5.9 million on the M5 East to a total of $5.7 million per annum on the M5 East and the New M5.

The above analysis has been undertaken assuming the future frequency, type, and severity of crashes would be consistent with historic trends. On this basis the forecast growth in traffic would be expected to result in both the total number and cost of crashes increasing.

8.4.6 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 to 25 kilometres per hour[14], that would travel through the St Peters interchange area:

- Chatswood to 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)

[14] Transport for NSW, *Sydney's Bus Future*, 2013

- 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.

8.4.7 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) of the EIS.

9 Future year traffic volumes and patterns with the project

9.1 Introduction

Chapter 4 provides details of the modelling approach used to derive future year traffic demand for road and intersection locations within the project area. As previously discussed, the WRTM underpins all future year traffic forecasts, as it has been specifically developed to assess infrastructure improvements associated with the WestConnex component projects individually and in combination.

Specifically, the objective of the WRTM demand modelling was to forecast use of the project and traffic on the metropolitan road network of Sydney, estimating traffic volumes for different periods of the day based on expected land use changes, as well as proposed road network improvements for six key scenarios. For the purpose of assessing the impacts of the project on surrounding roads, with an exclusive focus on the study area rather the wider Sydney road network, the adopted three stage approach: forecasting, rebasing and operational traffic modelling, provides a more accurate representation of how future year traffic growth would affect observed traffic demands than direct output from the WRTM.

However, a wider assessment can also be undertaken using only traffic forecasting data as this provides evidence of high level patterns across parallel strategic corridors within and external to the study area for peak and daily time periods. Consequently, traffic volumes were directly sourced from the WRTM for key roads in the study area, with the results documented in subsequent sections, based on the following modelling characteristics and scenarios:

- Time periods:
  - AWT
  - One hour AM peak
  - One hour PM peak
- Modelled scenarios:
  - Operation ‘do minimum’ or ‘without project’ (2023): with M4 Widening and KGRIU operational and assumes that NorthConnex, M4 East, and New M5 are complete, but that the M4-M5 Link has not been built. It is called ‘do minimum’ rather than ‘do nothing’ as it assumes ongoing improvements would be made to the broader road and public transport network over time including some new infrastructure and intersection enhancements to improve capacity and cater for traffic growth
  - Operation ‘with project’ (2023): with the 2023 ‘do minimum’ projects completed and the M4-M5 Link complete and open to traffic
  - Operation ‘cumulative’ (2023): with 2023 ‘do minimum’ projects and M4-M5 Link completed, and in addition, the proposed future Sydney Gateway and Western Harbour Tunnel projects operational.
  - Operation ‘do minimum’ or ‘without project’ (2033): with the same 2023 ‘do minimum‘ projects complete and some upgrades to the broader road and public transport network over time to improve capacity and cater for traffic growth but does not include the M4-M5 Link
  - Operation ‘with project’ (2033): with the 2033 ‘do minimum’ projects completed and the M4-M5 Link complete and open to traffic
  - Operation ‘cumulative’ (2033): with the 2033 ‘do minimum’ projects and M4-M5 Link completed, and in addition, the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link, and the F6 Extension projects complete and operational.

9.2 Screenline/parallel routes analysis

The purpose of the screenline analysis is to examine how traffic may shift between alternative parallel routes or corridors through the study area. The analysis would also indicate if any toll avoidance behaviour is forecast.

Due to the geographic scale of the project, four screenlines were selected and their locations are indicated on **Figure 9-1**. They were placed to collectively analyse directional and two-way traffic volume outputs from the different modelling scenarios for each common future year.

- The east–west screenline captures changes in east–west traffic movement and includes a location on the M4-M5 Link mainline 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 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 and Beaches Link in the 2023 and 2033 ‘cumulative’ scenarios.

The results of the screenline assessment are provided in a series of analysis tables. These tables provide details of eastbound, westbound and two-way traffic volumes on each road, the screenline share (per cent) of each road and the total directional and two-way traffic volumes across the full screenline. Consequently, each table provides sufficient information to provide an understanding of:

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

It is noted that the screenline analysis presented is based on volumes taken directly from the WRTM for high level comparison, and have not been rebased as described in **section 4.2**. These forecast traffic volumes include both fixed and induced traffic demand.

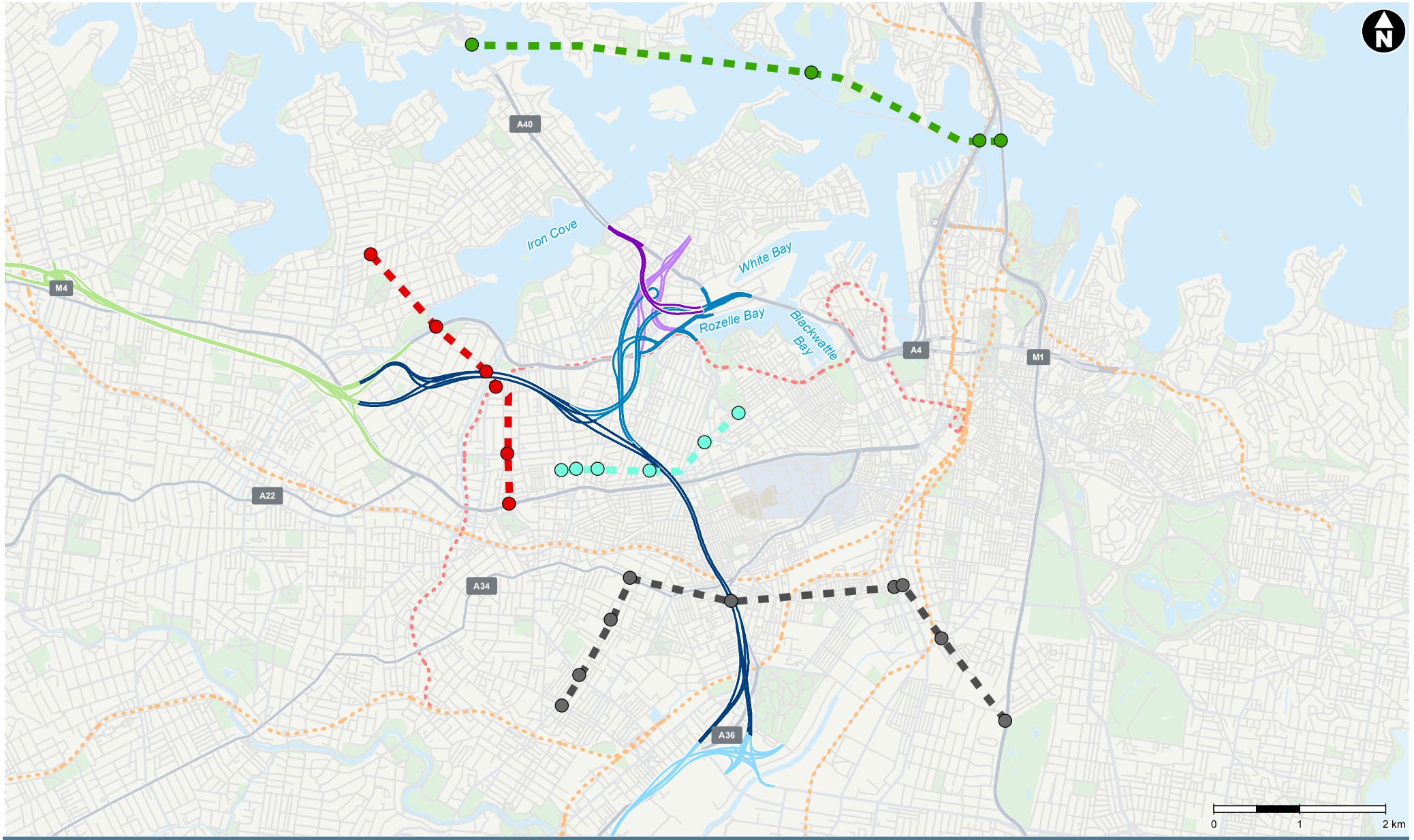


Figure 9-1 Screenline locations

9.3 East–west screenline

9.3.1 Average weekday traffic (AWT) analysis

Table 9-1 presents a comparison of the forecast AWT volumes from WRTM at the east–west screenline location under the 2023 and 2033 'without project' and 'with project' scenarios. The table also shows the change in traffic volumes with the project in place and the share of traffic movement on each link.

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

- Two-way AWT crossing the east–west screenline is forecast to increase by 28 per cent in the 'with project' scenario. This increase can partially be attributed to rerouting of vehicles that choose to use the M4-M5 Link to access the airport and Port Botany instead of using alternative routes not captured in the screenline, such as the M5 in combination with the M7, A3 or A6, or routes encompassing connector roads between the M4 and the M5. This increase occurs on the M4-M5 Link, with 38 per cent of two-way AWT crossing the screenline forecast to use the M4-M5 Link in 2023
- As a consequence of traffic using the M4-M5 Link, two-way AWT on surface roads is forecast to decrease by just over 20 per cent in the 'with project' scenario
- The largest decreases in two-way AWT occur on Parramatta Road, Marion Street and City West Link, which run parallel to the M4-M5 Link between the Wattle Street and Rozelle interchanges. Two-way AWT is forecast to decrease on Parramatta Road by 25 per cent (more than 15,000 vehicles), on Marion Street by 40 per cent (more than 2,000 vehicles) and on City West Link by 23 per cent (more than 14,000 vehicles)
- Without the project, vehicles travelling from north of the harbour, via the Gladesville Bridge, to the south, have the option of travelling via Lyons Road, or via Victoria Road and Iron Cove Bridge. With the project, the Iron Cove Link and the M4-M5 Link provide alternative routes to Lyons Road, contributing to a forecast 14 per cent fall in two-way AWT on Lyons Road
- There is a small forecast increase in daily southbound vehicles on Darley Road of four per cent (less than 500 vehicles). This is likely resultant from traffic moving between the surface road network and the M4-M5 Link and Iron Cove Link, via the interchange at Rozelle. This change is considered to be minimal and within daily traffic limits of traffic volume changes on the road network. Two-way AWT forecasts are the same with or without the project.

Key observations comparing the 2033 'without project' and 'with project' scenarios are that the patterns of change are the same as for the 2023 comparisons:

- Two-way AWT crossing the east–west screenline is forecast to increase by just over 30 per cent in the 'with project' scenario. This increase can be attributed to traffic shifting to the M4-M5 Link
- There is a significant shift in traffic away from surface roads, and onto the M4-M5 Link mainline between the Wattle Street and Rozelle interchanges, with almost 40 per cent of two-way AWT crossing the screenline forecast to use the M4-M5 Link in 2033
- There is also a small forecast increase in southbound vehicles on Darley Road, but is considered to be within daily limits of traffic volume changes on the road network. Two-way AWT forecasts are similar with or without the project.

Table 9-2 presents a comparison of the forecast AWT volumes from the WRTM at the east–west screenline location under the 2023 and 2033 'without project' and 'cumulative' scenarios.

Key observations comparing the 'cumulative' to the 'without project' scenarios for 2023 and 2033 are that the patterns of change are similar to those observed in the comparison of 'with project' to 'without project':

- Rerouting of traffic to the M4-M5 Link, away from roads not captured in the screenline, contributes to an increase in two-way AWT crossing the screenline of 36 per cent in 2023, and 41 per cent in 2033

- Two-way AWT on surface roads crossing the screenline is forecast to decrease by 22 per cent in both 2023 and 2033, as vehicles use the M4-M5 Link instead
- In both 2023 and 2033, traffic moving between the surface road network and the new links via the Wattle Street and Rozelle interchanges, contributes to an increase in forecast daily southbound traffic for Darley Road of about five per cent or less, which is within the typical daily traffic limits of traffic volume changes on the road network.

Table 9-1 East–west screenline: WRTM comparison for with and without project scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Eastbound	Lyons Rd	17,400	19%	14,800	13%	-15%	20,800	21%	16,800	13%	-19%
	City West Link	33,500	38%	25,500	22%	-24%	34,300	35%	28,100	22%	-18%
	M4-M5 Link	–	–	43,700	38%	–	–	–	49,600	39%	–
	Darley Rd	8,800	10%	8,500	7%	-3%	9,000	9%	8,700	7%	-3%
	Marion St	3,500	4%	1,600	1%	-54%	4,300	4%	2,000	2%	-53%
	Parramatta Rd	26,100	29%	20,400	18%	-22%	29,100	30%	22,300	17%	-23%
	Total	**89,300**		**114,500**		**28%**	**97,500**		**127,500**		**31%**
Westbound	Lyons Rd	18,600	20%	16,300	13%	-12%	20,300	20%	17,300	13%	-15%
	City West Link	30,300	32%	23,800	20%	-21%	31,700	31%	25,500	19%	-20%
	M4-M5 Link	–	–	45,100	37%	–	–	–	49,800	38%	–
	Darley Rd	9,200	10%	9,600	8%	4%	10,200	10%	10,700	8%	5%
	Marion St	2,800	3%	2,100	2%	-25%	3,400	3%	2,600	2%	-24%
	Parramatta Rd	34,400	36%	24,600	20%	-28%	37,000	36%	26,200	20%	-29%
	Total	**95,300**		**121,500**		**27%**	**102,600**		**132,100**		**29%**
Two-way	Lyons Rd	36,000	20%	31,100	13%	-14%	41,100	21%	34,100	13%	-17%
	City West Link	63,800	35%	49,300	21%	-23%	66,000	33%	53,600	21%	-19%
	M4-M5 Link	–	–	88,800	38%	–	–	–	99,400	38%	–
	Darley Rd	18,000	10%	18,100	8%	1%	19,200	10%	19,400	7%	1%
	Marion St	6,300	3%	3,700	2%	-41%	7,700	4%	4,600	2%	-40%
	Parramatta Rd	60,500	33%	45,000	19%	-26%	66,100	33%	48,500	19%	-27%
	Total	**184,600**		**236,000**		**28%**	**200,100**		**259,600**		**30%**

Source: WRTM v2.3, 2017

Table 9-2 East–west screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Eastbound	Lyons Rd	17,400	19%	14,500	12%	-17%	20,800	21%	16,000	12%	-23%
	City West Link	33,500	38%	23,900	20%	-29%	34,300	35%	26,400	19%	-23%
	M4-M5 Link	–	–	52,400	43%	–	–	–	63,800	46%	–
	Darley Rd	8,800	10%	8,400	7%	-5%	9,000	9%	8,600	6%	-4%
	Marion St	3,500	4%	1,500	1%	-57%	4,300	4%	1,900	1%	-56%
	Parramatta Rd	26,100	29%	20,200	17%	-23%	29,100	30%	22,200	16%	-24%
	Total	**89,300**		**120,900**		**35%**	**97,500**		**138,900**		**42%**
Westbound	Lyons Rd	18,600	20%	15,100	12%	-19%	20,300	20%	16,200	11%	-20%
	City West Link	30,300	32%	24,100	18%	-20%	31,700	31%	25,800	18%	-19%
	M4-M5 Link	–	–	54,800	42%	–	–	–	62,300	43%	–
	Darley Rd	9,200	10%	9,600	7%	4%	10,200	10%	10,700	7%	5%
	Marion St	2,800	3%	2,100	2%	-25%	3,400	3%	2,600	2%	-24%
	Parramatta Rd	34,400	36%	24,900	19%	-28%	37,000	36%	26,300	18%	-29%
	Total	**95,300**		**130,600**		**37%**	**102,600**		**143,900**		**40%**
Two-way	Lyons Rd	36,000	20%	29,600	12%	-18%	41,100	21%	32,200	11%	-22%
	City West Link	63,800	35%	48,000	19%	-25%	66,000	33%	52,200	18%	-21%
	M4-M5 Link	–	–	107,200	43%	–	–	–	126,100	45%	–
	Darley Rd	18,000	10%	18,000	7%	0%	19,200	10%	19,300	7%	1%
	Marion St	6,300	3%	3,600	1%	-43%	7,700	4%	4,500	2%	-42%
	Parramatta Rd	60,500	33%	45,100	18%	-25%	66,100	33%	48,500	17%	-27%
	Total	**184,600**		**251,500**		**36%**	**200,100**		**282,800**		**41%**

Source: WRTM v2.3, 2017

9.3.2 Peak hour analysis

Figure 9-2 and **Figure 9-3** illustrate the changes in the two-way peak hour volumes at the east–west screenline. The forecasts indicate that the impact of the project on peak hour traffic volumes are similar to the impacts forecast for AWT volumes, with traffic shifting off surface roads crossing the screenline, 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. This is likely because traffic volumes on the M4-M5 Link in the peak hour mean that a smaller proportion of vehicles using Parramatta Road and City West Link can shift to use the M4-M5 Link, resulting in a greater number of vehicles remaining on these roads during peak hours, compared to off-peak times.

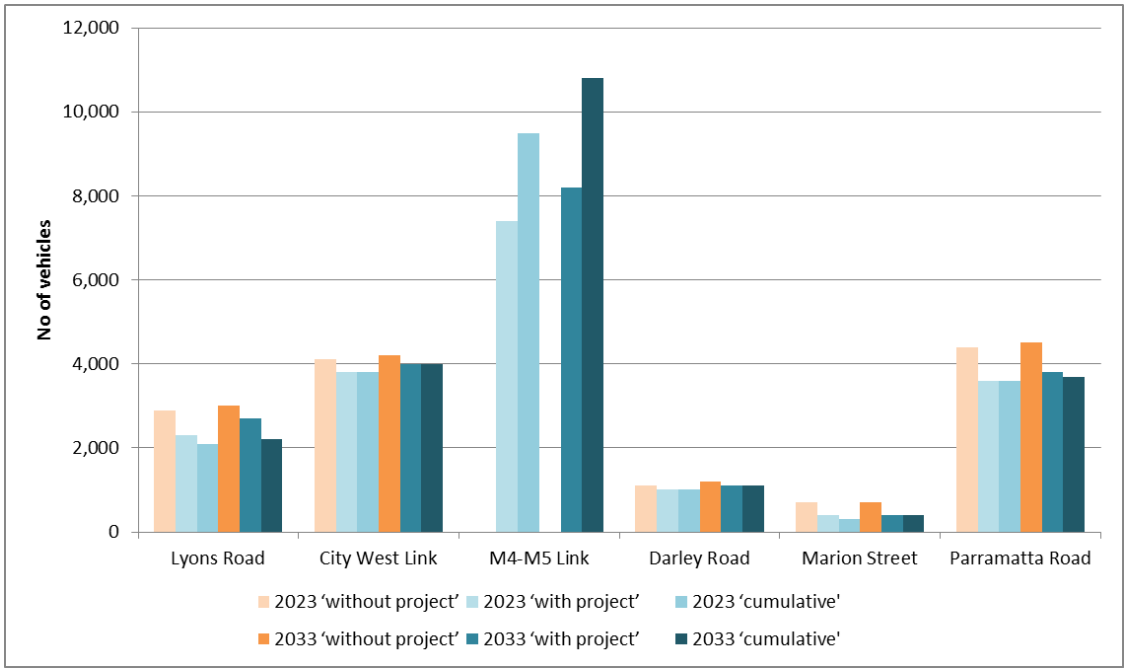


Figure 9-2 East–west screenline: comparison of two-way AM peak one hour volumes

Source: WRTM v2.3, 2017

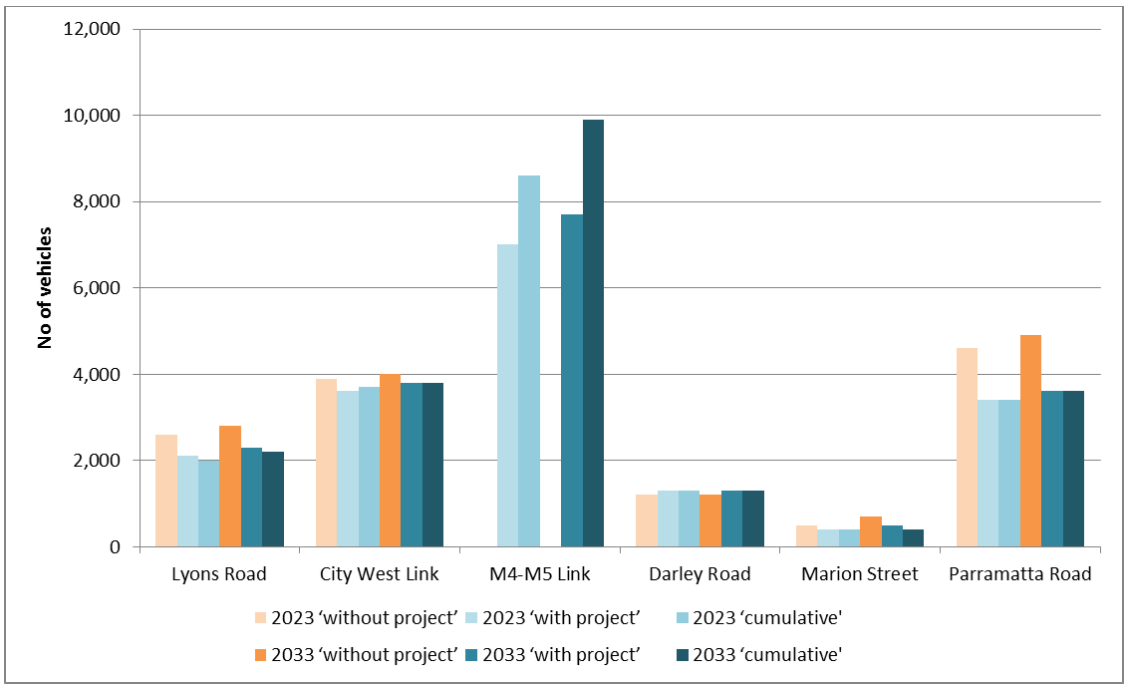


Figure 9-3 East–west screenline: comparison of two-way PM peak one hour volumes

Source: WRTM v2.3, 2017

9.4 Upper north–south screenline

9.4.1 Average weekday traffic (AWT) analysis

Table 9-3 presents a comparison of the forecast AWT volumes from the WRTM at the upper north–south screenline location under the 2023 and 2033 'without project' and 'with project' scenarios. The table also shows the change in traffic volumes with the project in place and the share of traffic movement on each link.

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

- A reduction in AWT on Parramatta Road results in reductions on some north–south roads connecting to Parramatta Road, including on Norton Street, where southbound AWT volumes decrease by about 25 per cent, and on Balmain Road, where northbound AWT volumes decrease by about 20 per cent
- The shift in vehicles onto the M4-M5 Link also results in an increase in traffic on some roads including 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 that the patterns of change are similar to those observed in the 2023 comparisons with:

- As forecast AWT on Parramatta Road decreases, reductions are also forecast for north–south connectors to Parramatta Road, in particular for southbound AWT on Norton Street and northbound AWT on Balmain Road
- Again, an increase in AWT is forecast for Johnston Street and Ross Street, as traffic moves between the surface road network and new road links at the Rozelle interchange.

Table 9-4 presents a comparison of the forecast AWT volumes from the WRTM at the upper north–south screenline location under the 2023 and 2033 'without project' and 'cumulative' scenarios.

Key observations comparing the 'cumulative' to the 'without project' scenarios for 2023 and 2033 are that the patterns of change are similar to those observed in the comparison of 'with project' to 'without project':

- There are forecast traffic flow reductions on some north–south roads connecting to Parramatta Road, as AWT on Parramatta Road decreases, with large forecast declines in southbound AWT on Norton Street, of 25 per cent in 2023 and 28 per cent in 2033, and in northbound AWT on Balmain Road of 17 per cent in 2023 and 19 per cent in 2033
- The movement of traffic, between the surface road network and new road links at the Rozelle interchange contribute to an increase in traffic on some roads including Johnston Street, where AWT is forecast to increase by 15 per cent in 2023 and by 12 per cent in 2033, and for Ross Street where traffic is forecast to increase by 16 per cent in 2023 and by 20 per cent in 2033. As a percentage of traffic crossing the screenline, this represents an increase of about three per cent or less.

Table 9-3 Upper north–south screenline: WRTM comparison for with and without project scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Norton Street	3,500	11%	3,600	12%	3%	4,100	11%	4,400	12%	7%
	Balmain Road	6,900	21%	5,600	18%	-19%	7,300	20%	5,900	16%	-19%
	Catherine Street	3,100	10%	3,000	10%	-3%	3,400	9%	3,400	9%	0%
	Johnston Street	7,800	24%	8,700	28%	12%	9,700	26%	10,100	28%	4%
	Booth Street	4,200	13%	3,600	12%	-14%	4,800	13%	4,200	12%	-13%
	Ross Street	7,000	22%	6,700	21%	-4%	8,000	21%	7,900	22%	-1%
	Total	**32,500**		**31,200**		**-4%**	**37,300**		**35,900**		**-4%**
Southbound	Norton Street	5,900	22%	4,500	17%	-24%	7,200	24%	5,200	17%	-28%
	Balmain Road[1]	–	–	–	–	–	–	–	–	–	–
	Catherine Street	6,100	23%	6,100	23%	0%	6,100	21%	6,600	22%	8%
	Johnston Street	5,300	20%	6,200	23%	17%	6,300	21%	7,100	23%	13%
	Booth Street	3,500	13%	3,600	14%	3%	3,700	13%	4,200	14%	14%
	Ross Street	5,500	21%	6,200	23%	13%	6,300	21%	7,500	25%	19%
	Total	**26,300**		**26,600**		**1%**	**29,600**		**30,600**		**3%**
Two-way	Norton Street	9,400	16%	8,100	14%	-14%	11,300	17%	9,600	14%	-15%
	Balmain Road	6,900	12%	5,600	10%	-19%	7,300	11%	5,900	9%	-19%
	Catherine Street	9,200	16%	9,100	16%	-1%	9,500	14%	10,000	15%	5%
	Johnston Street	13,100	22%	14,900	26%	14%	16,000	24%	17,200	26%	8%
	Booth Street	7,700	13%	7,200	12%	-6%	8,500	13%	8,400	13%	-1%
	Ross Street	12,500	21%	12,900	22%	3%	14,300	21%	15,400	23%	8%
	Total	**58,800**		**57,800**		**-2%**	**66,900**		**66,500**		**-1%**

Source: WRTM v2.3, 2017
Note: Balmain Road is northbound only between Parramatta Road and Leichhardt Street

Table 9-4 Upper north–south screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Norton Street	3,500	11%	3,900	12%	11%	4,100	11%	4,500	12%	10%
	Balmain Road	6,900	21%	5,700	17%	-17%	7,300	20%	5,900	16%	-19%
	Catherine Street	3,100	10%	3,000	9%	-3%	3,400	9%	3,500	9%	3%
	Johnston Street	7,800	24%	8,800	27%	13%	9,700	26%	10,700	28%	10%
	Booth Street	4,200	13%	3,600	11%	-14%	4,800	13%	4,100	11%	-15%
	Ross Street	7,000	22%	7,900	24%	13%	8,000	21%	9,200	24%	15%
	Total	**32,500**		**32,900**		**1%**	**37,300**		**37,900**		**2%**
Southbound	Norton Street	5,900	22%	4,400	16%	-25%	7,200	24%	5,200	17%	-28%
	Balmain Road[1]	–	–	–	–	–	–	–	–	–	–
	Catherine Street	6,100	23%	6,100	23%	0%	6,100	21%	6,700	21%	10%
	Johnston Street	5,300	20%	6,300	23%	19%	6,300	21%	7,200	23%	14%
	Booth Street	3,500	13%	3,600	13%	3%	3,700	13%	4,200	13%	14%
	Ross Street	5,500	21%	6,600	24%	20%	6,300	21%	7,900	25%	25%
	Total	**26,300**		**27,000**		**3%**	**29,600**		**31,200**		**5%**
Two-way	Norton Street	9,400	16%	8,300	14%	-12%	11,300	17%	9,700	14%	-14%
	Balmain Road	6,900	12%	5,700	10%	-17%	7,300	11%	5,900	9%	-19%
	Catherine Street	9,200	16%	9,100	15%	-1%	9,500	14%	10,200	15%	7%
	Johnston Street	13,100	22%	15,100	25%	15%	16,000	24%	17,900	26%	12%
	Booth Street	7,700	13%	7,200	12%	-6%	8,500	13%	8,300	12%	-2%
	Ross Street	12,500	21%	14,500	24%	16%	14,300	21%	17,100	25%	20%
	Total	**58,800**		**59,900**		**2%**	**66,900**		**69,100**		**3%**

Source: WRTM v2.3, 2017
Note: Balmain Road is northbound only between Parramatta Road and Leichhardt Street

9.4.2 Peak hour analysis

Figure 9-4 and **Figure 9-5** illustrate the changes in the peak hour volumes at the upper north–south screenline. Similar to the AWT forecasts, the AM peak and PM peak hour 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.

It was observed in **section 9.3.2**, that it is likely that traffic volumes on the M4-M5 Link in the peak hour mean that a smaller proportion of vehicles using Parramatta Road and City West Link would shift to using the M4-M5 Link, resulting in a greater number of vehicles remaining on these roads during peak hours compared to off-peak times. The impact of more vehicles remaining on Parramatta Road as a result can also be seen in the upper north–south screenline, where there is less of a decrease in traffic volumes on roads linking to Parramatta Road. This contributes to an increase in two-way AWT crossing the screenline, of up to six per cent in the AM peak, and up to nine per cent in the PM peak.

As was the case for the AWT forecasts, both the AM and PM peak forecasts show increases in traffic on Ross Street as vehicles access the M4-M5 Link, the Iron Cove Link in the 'with project' scenarios, and, in the 'cumulative' scenario, the proposed future Western Harbour Tunnel and Beaches Link.

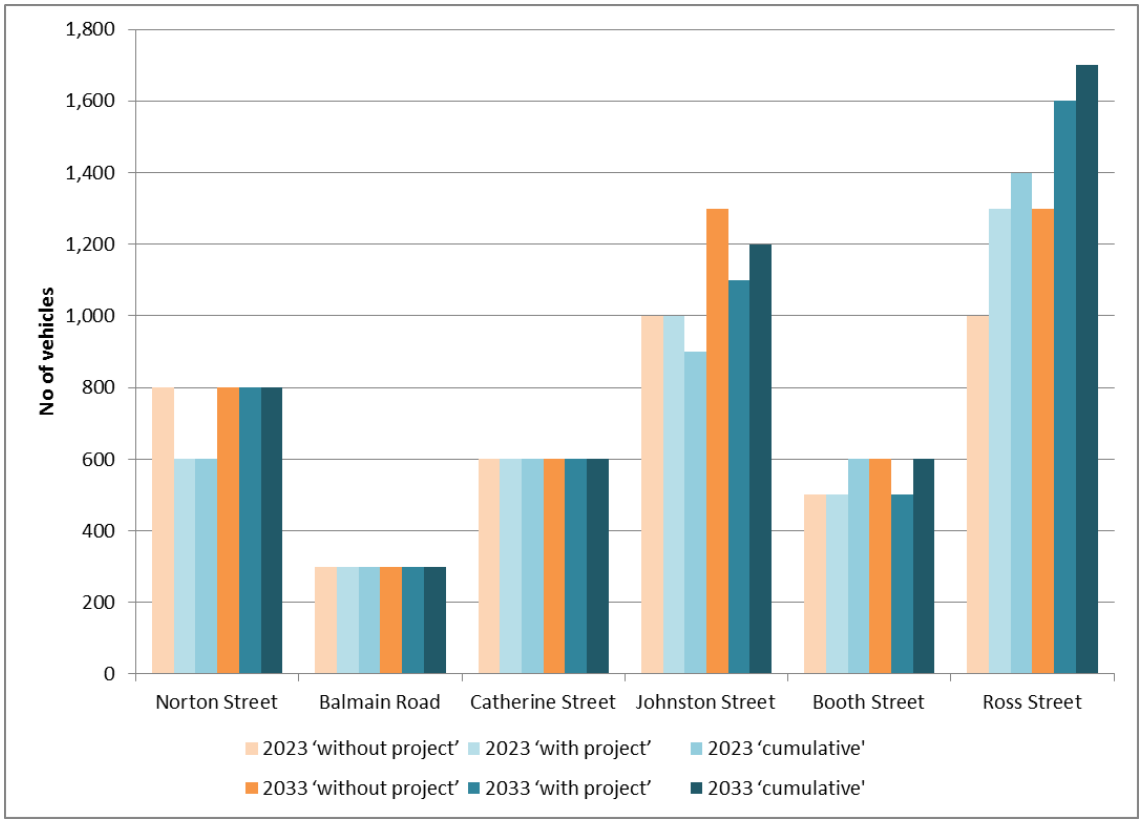


Figure 9-4 Upper north–south screenline: comparison of two-way AM peak one hour volumes

Source: WRTM v2.3, 2017

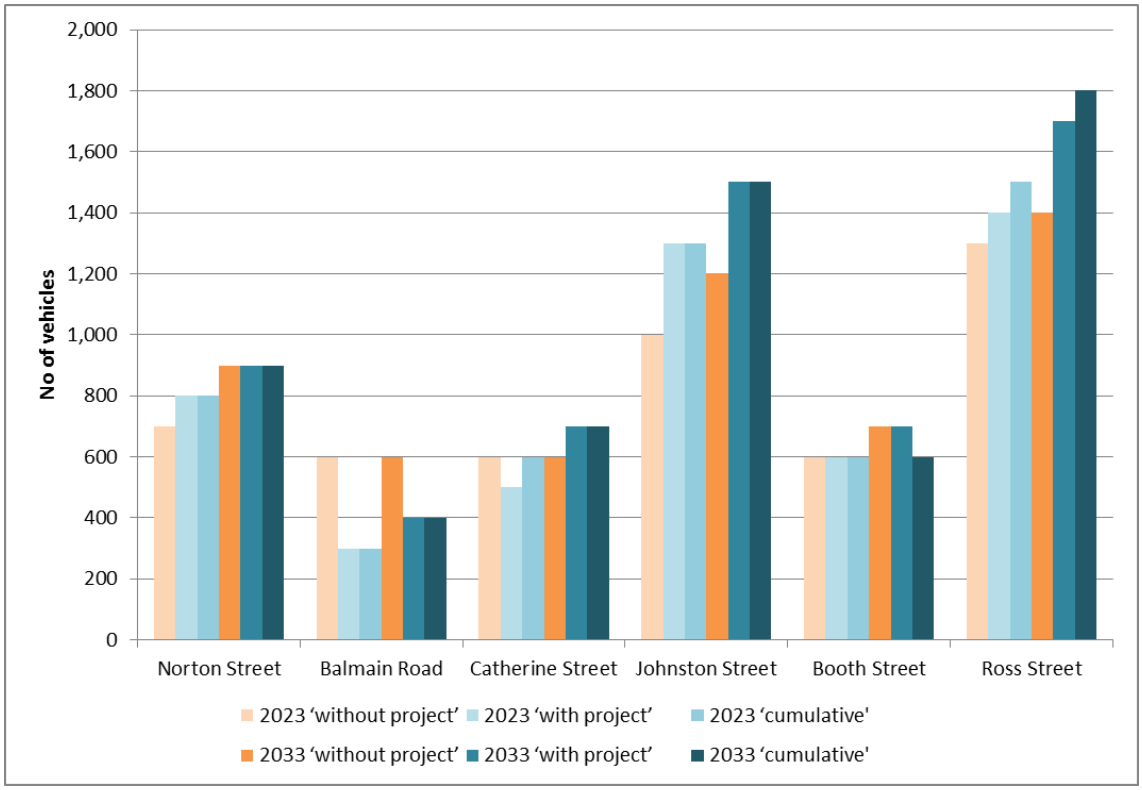


Figure 9-5 Upper north–south screenline: comparison of two-way PM peak one hour volumes

Source: WRTM v2.3, 2017

9.5 Lower north–south screenline

9.5.1 Average weekday traffic (AWT) analysis

Table 9-5 presents a comparison of the forecast AWT volumes from the WRTM at the lower north–south screenline location under the 2023 and 2033 'without project' and 'with project' scenarios. The table also shows the change in traffic volumes with the project in place and the share of traffic movement on each link.

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

- There is a 10 per cent increase in two-way AWT forecast to cross the screenline in the 'with project' scenario. However, this increase is entirely on the M4-M5 Link. Two-way traffic on the M4-M5 Link is forecast to be 16 per cent of total two-way AWT crossing the screenline, with AWT crossing the screenline on existing surface roads forecast to decrease by seven per cent
- The greatest forecast reductions in traffic volume occur on Stanmore Road and Southern Cross Drive. Total two-way AWT is forecast to fall by just under 6,000 vehicles daily or 16 per cent on Stanmore Road, and by about 5,500 vehicles daily, or three per cent, on Southern Cross Drive
- There are also significant forecast reductions on King Street, where two-way AWT traffic decreases by just under 4,000 vehicles daily (a drop of 19 per cent), and on Sydenham Road where two-way AWT traffic decreases by about 3,000 vehicles daily (a drop of 10 per cent).

Key observations comparing the 2033 'without project' and 'with project' scenarios are that the patterns of change are the same as for the 2023 comparisons:

- A 12 per cent increase in AWT crossing the screenline is forecast with the project, and is predominantly due to traffic using the M4-M5 Link, with two-way traffic on the M4-M5 Link forecast to be 17 per cent of total two-way AWT crossing the screenline, while AWT crossing the screenline on existing surface roads is forecast to decrease by seven per cent

- Again, the greatest forecast reductions in daily traffic volume occur on Southern Cross Drive and Stanmore Road, with significant reductions also forecast for King Street and Sydenham Road.

Table 9-6 presents a comparison of the forecast AWT volumes from the WRTM at the lower north–south screenline location under the 2023 and 2033 'without project' and 'cumulative' scenarios. Key observations comparing the 'cumulative' to 'without project' scenarios for 2023 and 2033 are that the patterns of change are similar to those observed in the comparison of 'with project' to 'without project':

- In both 2023 and 2033 'cumulative' scenarios, two-way AWT crossing the screenline is forecast to increase, predominantly due to traffic using the M4-M5 Link. Traffic on the M4-M5 Link is forecast to be 24 per cent in 2023, and 27 per cent in 2033, of total two-way AWT crossing the screenline. At the same time there is an overall decrease forecast in traffic on the surface roads included in the screenline
- The greatest forecast reduction in traffic volume in both 2023 and 2033 occurs on Southern Cross Drive. Two-way AWT on Southern Cross Drive is forecast to fall by about 14 per cent in 2023, and about 16 per cent in 2033. This is due to vehicles travelling from areas north of the harbour to areas around the airport, or to the M5, with the proposed future Western Harbour Tunnel and Beaches Link, M4-M5 Link and the proposed future Sydney Gateway providing a new parallel route
- As in the 'with project' scenario, there are significant forecast reductions on Stanmore Road and Sydenham Road. While in the 'cumulative' scenario, there is also a significant forecast reduction in northbound AWT on Botany Road of about 3,000 vehicles daily or nine per cent, due to the presence of Sydney Gateway providing an alternative, higher-order route from Sydney Airport and Port Botany precinct to the St Peters interchange
- There are slight forecast increases in southbound AWT on Wyndham Street, Botany Road, Elizabeth Street and King Street in the 'cumulative' scenario. However, in terms of total southbound AWT crossing the screenline, the forecast increase of traffic on these roads, in both 2023 and 2033, represents an increase of about two per cent.

Table 9-5 Lower north–south screenline: WRTM comparison for with and without project scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Stanmore Road	16,700	10%	13,800	7%	-17%	17,900	10%	14,900	7%	-17%
	Addison Road	4,200	2%	3,700	2%	-12%	4,500	2%	4,000	2%	-11%
	Sydenham Road	15,000	9%	13,500	7%	-10%	15,400	8%	14,200	7%	-8%
	Marrickville Road	7,600	5%	7,000	4%	-8%	8,400	5%	7,700	4%	-8%
	M4-M5 Link	–	–	32,900	17%	–	–	–	37,200	18%	–
	King Street	10,500	6%	8,600	5%	-18%	12,000	7%	9,600	5%	-20%
	Wyndham Street	16,500	10%	15,900	8%	-4%	17,900	10%	17,400	8%	-3%
	Botany Road	12,200	7%	11,700	6%	-4%	13,700	8%	13,400	6%	-2%
	Elizabeth Street	9,300	6%	9,000	5%	-3%	10,300	6%	9,900	5%	-4%
	Southern Cross Drive	76,700	45%	73,300	39%	-4%	81,800	45%	78,400	38%	-4%
	Total	**168,700**		**189,400**		**12%**	**181,900**		**206,700**		**14%**
Southbound	Stanmore Road	19,600	11%	16,600	8%	-15%	20,400	10%	17,800	8%	-13%
	Addison Road	3,600	2%	2,400	1%	-33%	4,200	2%	2,900	1%	-31%
	Sydenham Road	15,600	9%	14,100	7%	-10%	16,100	8%	14,800	7%	-8%
	Marrickville Road	8,800	5%	7,900	4%	-10%	9,700	5%	8,600	4%	-11%
	M4-M5 Link	-	-	28,500	14%	-	-	-	32,800	15%	-
	King Street	10,400	6%	8,400	4%	-19%	12,100	6%	9,900	5%	-18%
	Wyndham Street	7,300	4%	6,500	3%	-11%	7,700	4%	7,200	3%	-6%
	Botany Road	19,900	11%	19,500	10%	-2%	21,500	11%	21,400	10%	0%
	Elizabeth Street	12,200	7%	11,600	6%	-5%	13,700	7%	13,100	6%	-4%
	Southern Cross Drive	85,800	47%	83,700	42%	-2%	90,100	46%	87,200	40%	-3%
	Total	**183,200**		**199,200**		**9%**	**195,500**		**215,700**		**10%**
Two-way	Stanmore Road	36,300	10%	30,400	8%	-16%	38,300	10%	32,700	8%	-15%
	Addison Road	7,800	2%	6,100	2%	-22%	8,700	2%	6,900	2%	-21%
	Sydenham Road	30,600	9%	27,600	7%	-10%	31,500	8%	29,000	7%	-8%
	Marrickville Road	16,400	5%	14,900	4%	-9%	18,100	5%	16,300	4%	-10%
	M4-M5 Link	–	–	61,400	16%	–	–	–	70,000	17%	–
	King Street	20,900	6%	17,000	4%	-19%	24,100	6%	19,500	5%	-19%
	Wyndham Street	23,800	7%	22,400	6%	-6%	25,600	7%	24,600	6%	-4%
	Botany Road	32,100	9%	31,200	8%	-3%	35,200	9%	34,800	8%	-1%
	Elizabeth Street	21,500	6%	20,600	5%	-4%	24,000	6%	23,000	5%	-4%
	Southern Cross Drive	162,500	46%	157,000	40%	-3%	171,900	46%	165,600	39%	-4%
	Total	**351,900**		**388,600**		**10%**	**377,400**		**422,400**		**12%**

Source: WRTM v2.3, 2017

Table 9-6 Lower north–south screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Stanmore Road	16,700	10%	13,900	7%	-17%	17,900	10%	15,000	7%	-16%
	Addison Road	4,200	2%	3,800	2%	-10%	4,500	2%	4,100	2%	-9%
	Sydenham Road	15,000	9%	13,900	7%	-7%	15,400	8%	14,500	7%	-6%
	Marrickville Road	7,600	5%	7,500	4%	-1%	8,400	5%	8,500	4%	1%
	M4-M5 Link	–	–	47,200	24%	–	–	–	58,000	26%	–
	King Street	10,500	6%	9,100	5%	-13%	12,000	7%	11,200	5%	-7%
	Wyndham Street	16,500	10%	15,400	8%	-7%	17,900	10%	17,400	8%	-3%
	Botany Road	12,200	7%	9,000	5%	-26%	13,700	8%	10,500	5%	-23%
	Elizabeth Street	9,300	6%	8,900	4%	-4%	10,300	6%	9,800	4%	-5%
	Southern Cross Drive	76,700	45%	69,700	35%	-9%	81,800	45%	71,900	33%	-12%
	Total	**168,700**		**198,400**		**18%**	**181,900**		**220,900**		**21%**
Southbound	Stanmore Road	19,600	11%	16,700	8%	-15%	20,400	10%	17,800	8%	-13%
	Addison Road	3,600	2%	2,500	1%	-31%	4,200	2%	3,000	1%	-29%
	Sydenham Road	15,600	9%	14,500	7%	-7%	16,100	8%	15,000	7%	-7%
	Marrickville Road	8,800	5%	8,300	4%	-6%	9,700	5%	9,000	4%	-7%
	M4-M5 Link	–	–	48,800	24%	–	–	–	61,300	27%	-
	King Street	10,400	6%	10,600	5%	2%	12,100	6%	12,800	6%	6%
	Wyndham Street	7,300	4%	8,300	4%	14%	7,700	4%	8,900	4%	16%
	Botany Road	19,900	11%	20,300	10%	2%	21,500	11%	21,400	9%	0%
	Elizabeth Street	12,200	7%	13,000	6%	7%	13,700	7%	14,600	6%	7%
	Southern Cross Drive	85,800	47%	60,400	30%	-30%	90,100	46%	62,200	28%	-31%
	Total	**183,200**		**203,400**		**11%**	**195,500**		**226,000**		**16%**
Two-way	Stanmore Road	36,300	10%	30,600	8%	-16%	38,300	10%	32,800	7%	-14%
	Addison Road	7,800	2%	6,300	2%	-19%	8,700	2%	7,100	2%	-18%
	Sydenham Road	30,600	9%	28,400	7%	-7%	31,500	8%	29,500	7%	-6%
	Marrickville Road	16,400	5%	15,800	4%	-4%	18,100	5%	17,500	4%	-3%
	M4-M5 Link	–	–	96,000	24%	–	–	–	119,300	27%	–
	King Street	20,900	6%	19,700	5%	-6%	24,100	6%	24,000	5%	–
	Wyndham Street	23,800	7%	23,700	6%	0%	25,600	7%	26,300	6%	3%
	Botany Road	32,100	9%	29,300	7%	-9%	35,200	9%	31,900	7%	-9%
	Elizabeth Street	21,500	6%	21,900	5%	2%	24,000	6%	24,400	5%	2%
	Southern Cross Drive	162,500	46%	130,100	32%	-20%	171,900	46%	134,100	30%	-22%
	Total	**351,900**		**401,800**		**14%**	**377,400**		**446,900**		**18%**

Source: WRTM v2.3, 2017

9.5.2 Peak hour analysis

Figure 9-6 and **Figure 9-7** illustrate the changes in the peak hour volumes at the lower north–south screenline. The peak hour forecasts indicate traffic volume changes are similar to those in the daily forecasts, with traffic shifting from surface roads crossing the screenline and 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.

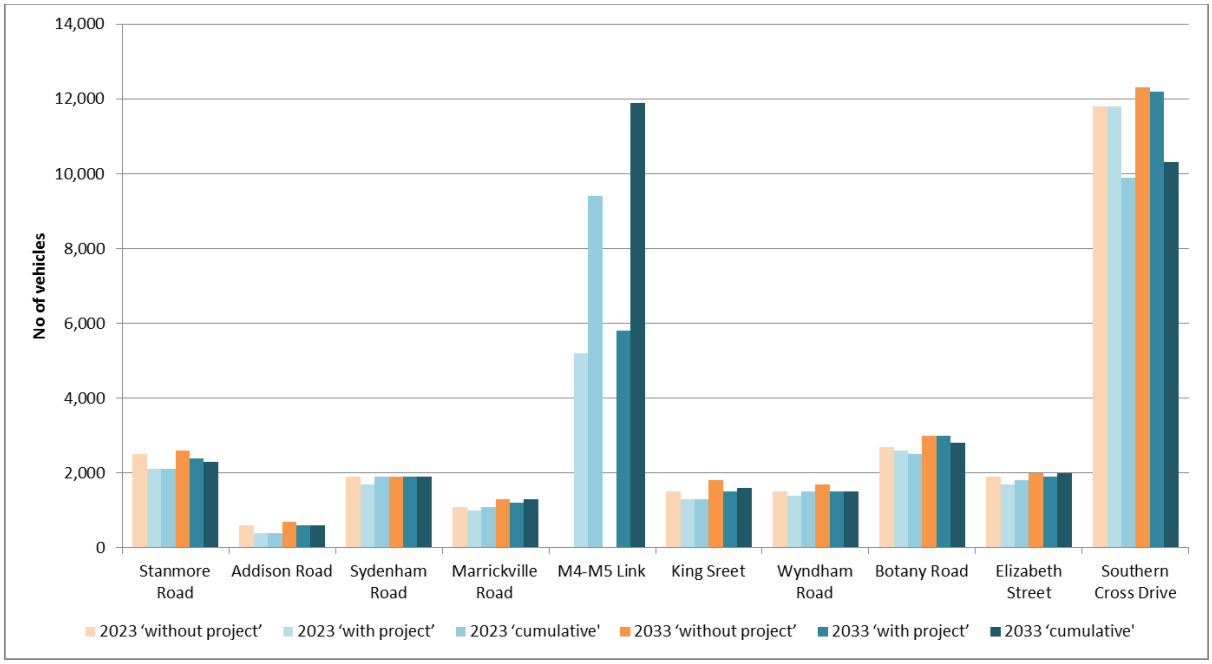


Figure 9-6 Lower north–south screenline: comparison of two-way AM peak one hour volumes

Source: WRTM v2.3, 2017

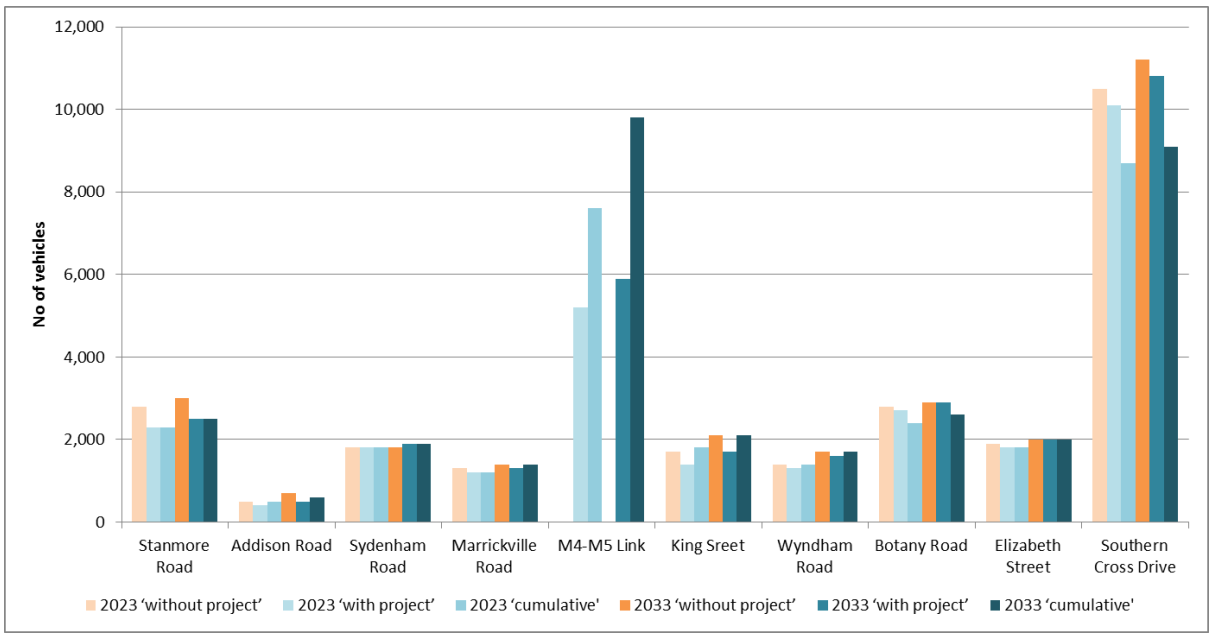


Figure 9-7 Lower north–south screenline: comparison of two-way PM peak one hour volumes

Source: WRTM v2.3, 2017

9.6 Cross-harbour screenline

9.6.1 Average weekday traffic (AWT) analysis

Table 9-7 presents a comparison of the forecast AWT volumes from the WRTM at the cross-harbour screenline location under the 2023 and 2033 'without project' and 'with project' scenarios. The table also shows the change in traffic volumes with the project in place and the share of traffic movement on each link.

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

- With no new alternative harbour crossing as part of the 'with project' scenario, there are minimal forecast changes to total daily traffic crossing the harbour on the Gladesville Bridge, the Sydney Harbour Bridge and the Sydney Harbour Tunnel in the 'with project' scenario
- On the Gladesville Bridge, two-way AWT is forecast to increase by six per cent in the 'with project' scenario. This reflects the increase in traffic along Victoria Road, as vehicles are attracted to use the Iron Cove Link and the M4-M5 Link via the Rozelle interchange.

Key observations comparing the 2033 'without project' and 'with project' scenarios are that the patterns of change are the same as for the 2023 comparisons:

- Again, there are minimal forecast changes in two-way AWT crossing the screenline in the 'with project' scenario and two-way AWT on the Gladesville Bridge is forecast to increase by seven per cent in the 'with project' scenario due to vehicles being attracted to use the Iron Cove Link and the M4-M5 Link via the Rozelle interchange.

Table 9-8 presents a comparison of the forecast AWT volumes from the WRTM at the cross-harbour screenline location under the 2023 and 2033 'without project' and 'cumulative' scenarios.

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

- In the 'cumulative' scenario, forecast two-way AWT crossing the screenline increases by three per cent, due in part to traffic induced by the proposed future Western Harbour Tunnel connection (a component of the proposed future Western Harbour Tunnel and Beaches Link project). The proposed future Western Harbour Tunnel component, without a surface connection at Rozelle, is forecast to carry nine per cent of two-way AWT crossing the screenline
- In the 'cumulative' scenario, there is a forecast shift in traffic from the Sydney Harbour Bridge and the Sydney Harbour Tunnel onto the proposed future Western Harbour Tunnel, with two-way AWT forecast to decrease by six per cent on the Sydney Harbour Bridge and by 23 per cent in the Sydney Harbour Tunnel
- On the Gladesville Bridge, two-way AWT is forecast to increase by 13 per cent in the 'cumulative' scenario, reflecting the increase in traffic forecast to access the M4-M5 Link including the Iron Cove Link.

Key observations comparing the 2033 'without project' and 'cumulative' scenarios are that the patterns of change of traffic demand are the same as for the 2023 comparisons:

- In the 2033 'cumulative' scenario, forecast two-way AWT crossing the screenline increases by seven per cent, due in part to traffic induced by the proposed future Western Harbour Tunnel and Beaches Link connection; with the proposed future Western Harbour Tunnel and Beaches Link, without a surface connection at Rozelle, forecast to carry 12 per cent of two-way AWT crossing the screenline
- The forecast changes in two-way AWT on the Sydney Harbour Bridge, Sydney Harbour Tunnel and on Gladesville Bridge are similar to that forecast in 2023.

Table 9-7 Cross-harbour screenline: WRTM comparison for with and without project scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Gladesville Bridge	41,700	21%	43,800	21%	5%	44,800	21%	46,500	22%	4%
	Western Harbour Tunnel	–	–	–	–	–	–	–	–	–	–
	Syd Harbour Bridge	106,400	52%	108,300	53%	2%	111,800	52%	114,300	53%	2%
	Syd Harbour Tunnel	54,800	27%	52,400	26%	-4%	56,500	27%	55,100	26%	-2%
	Total	**202,900**		**204,500**		**1%**	**213,100**		**215,900**		**1%**
Southbound	Gladesville Bridge	48,200	24%	51,600	26%	7%	49,000	23%	52,000	25%	6%
	Western Harbour Tunnel	–	–	–	–	–	–	–	–	–	–
	Syd Harbour Bridge	87,800	44%	87,100	43%	-1%	94,600	45%	93,800	44%	-1%
	Syd Harbour Tunnel	64,000	32%	63,100	31%	-1%	66,100	32%	65,300	31%	-1%
	Total	**200,000**		**201,800**		**1%**	**209,700**		**211,100**		**1%**
Two-way	Gladesville Bridge	89,900	22%	95,400	23%	6%	93,800	22%	98,500	23%	5%
	Western Harbour Tunnel	–	–	–	–	–	–	–	–	–	–
	Syd Harbour Bridge	194,200	48%	195,400	48%	1%	206,400	49%	208,100	49%	1%
	Syd Harbour Tunnel	118,800	29%	115,500	28%	-3%	122,600	29%	120,400	28%	-2%
	Total	**402,900**		**406,300**		**1%**	**422,800**		**427,000**		**1%**

Source: WRTM v2.3, 2017

Table 9-8 Cross-harbour screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Gladesville Bridge	41,700	21%	49,900	24%	20%	44,800	21%	50,400	22%	13%
	Western Harbour Tunnel	–	–	16,900	8%	–	–	–	25,600	11%	–
	Syd Harbour Bridge	106,400	52%	95,800	46%	-10%	111,800	52%	106,100	47%	-5%
	Syd Harbour Tunnel	54,800	27%	45,400	22%	-17%	56,500	27%	45,000	20%	-20%
	Total	**202,900**		**208,000**		**3%**	**213,100**		**227,100**		**7%**
Southbound	Gladesville Bridge	48,200	24%	51,900	25%	8%	49,000	23%	52,800	23%	8%
	Western Harbour Tunnel	–	–	22,400	11%	–	–	–	29,500	13%	–
	Syd Harbour Bridge	87,800	44%	86,600	42%	-1%	94,600	45%	92,200	41%	-3%
	Syd Harbour Tunnel	64,000	32%	46,400	22%	-28%	66,100	32%	50,500	22%	-24%
	Total	**200,000**		**207,300**		**4%**	**209,700**		**225,000**		**7%**
Two-way	Gladesville Bridge	89,900	22%	101,800	25%	13%	93,800	22%	103,200	23%	10%
	Western Harbour Tunnel	–	–	39,300	9%	–	–	–	55,100	12%	–
	Syd Harbour Bridge	194,200	48%	182,400	44%	-6%	206,400	49%	198,300	44%	-4%
	Syd Harbour Tunnel	118,800	29%	91,800	22%	-23%	122,600	29%	95,500	21%	-22%
	Total	**402,900**		**415,300**		**3%**	**422,800**		**452,100**		**7%**

Source: WRTM v2.3, 2017

9.6.2 Peak hour analysis

Figure 9-8 and **Figure 9-9** illustrate the changes in the peak hour volumes at the cross-harbour screenline. The forecasts 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.

As with the AWT forecasts, there are significant falls in peak hour traffic forecast on existing cross-harbour links with the introduction of the proposed future Western Harbour Tunnel and Beaches Link, without a surface connection at Rozelle, in the 'cumulative' scenario. In the 'cumulative' scenario, there is a small forecast increase in traffic on the Sydney Harbour Bridge in the PM peak hour. This increase, together with a greater decrease in traffic in the Sydney Harbour Tunnel and a smaller shift in traffic to the proposed future Western Harbour Tunnel and Beaches Link, indicates a slight preference for the Sydney Harbour Bridge in the PM peak hour compared to the AM peak hour.

The forecast increases in traffic on the Gladesville Bridge in the 'with project' scenario are much less in the peak hours compared to the daily (AWT) forecast increases, and would typically be considered to fall within daily traffic volume variation on the road network. This reflects the fact that peak hour spare capacity on this road is limited with any increase mainly occurring in off-peak periods. In the 'cumulative' scenario, there is a small forecast reduction in the peak hour volumes on Gladesville Bridge in the AM peak hour, reflecting some traffic shifting to the proposed future Western Harbour Tunnel and Beaches Link or other routes.

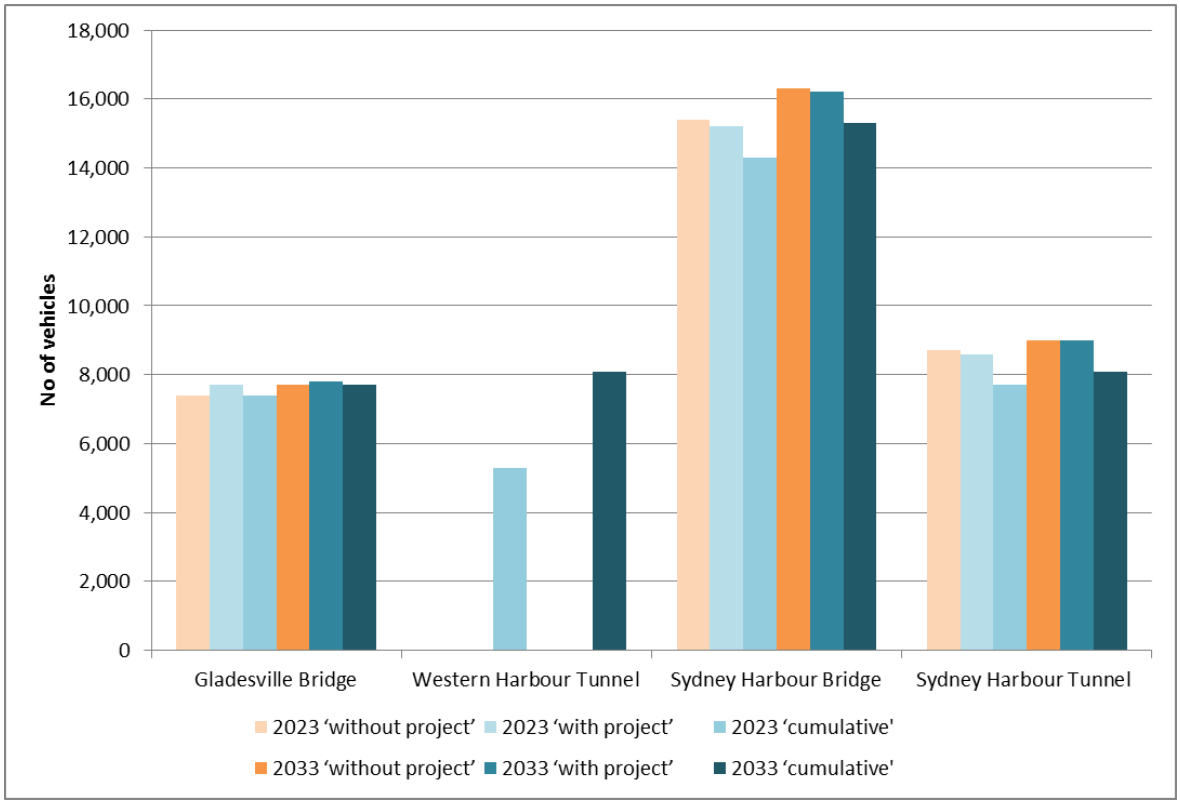


Figure 9-8 Cross-harbour screenline: comparison of two-way AM peak one hour volumes

Source: WRTM v2.3, 2017

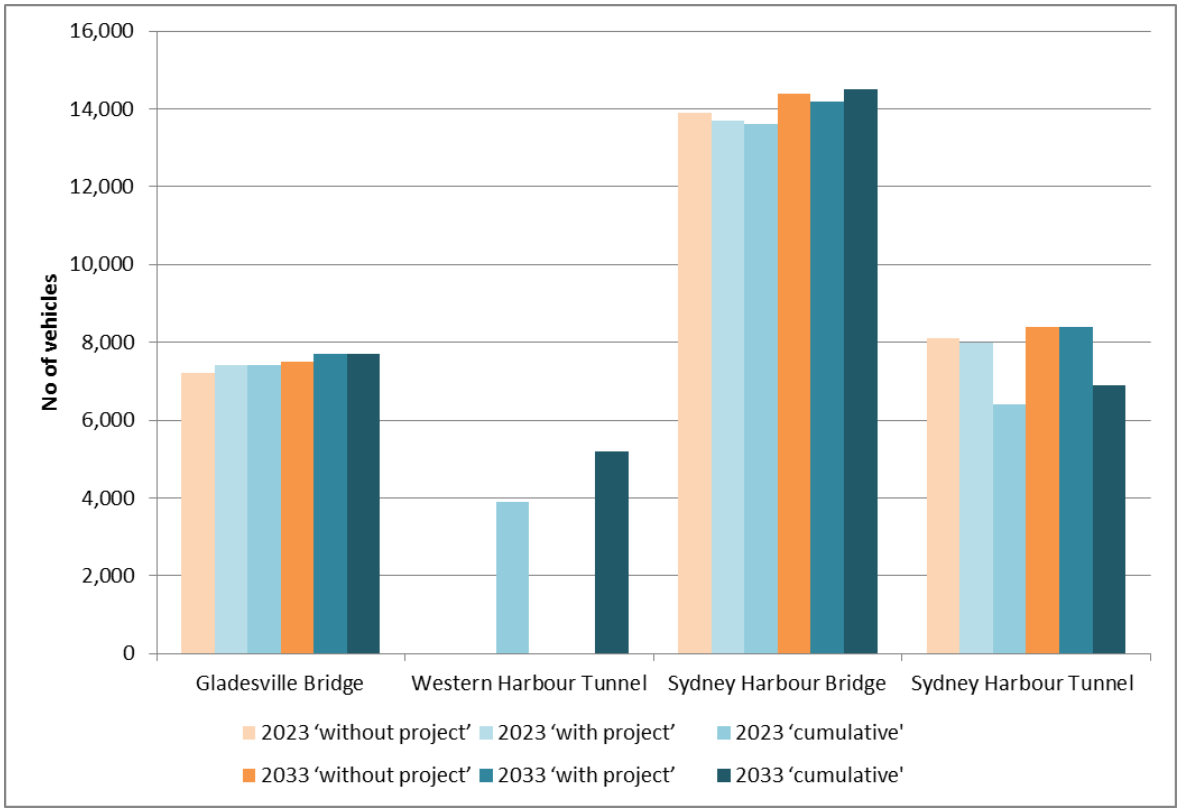


Figure 9-9 Cross-harbour screenline: comparison of two-way PM peak one hour volumes

Source: WRTM v2.3, 2017

9.7 Heavy vehicle analysis

Section 9.3 to **section 9.6** presented the results of screenline analysis for all vehicles – lights and heavies. 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 detailed analysis can be found in **Annexure D**, with a summary provided here.

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. This shift from surface roads onto the M4-M5 Link can be clearly seen in the east–west screenline, where daily heavy vehicle volumes on Parramatta Road and City West Link are forecast to drop by 40 tp 50 per cent, and in the lower north–south screenline, where daily heavy vehicles volumes on roads in the Inner West, such as Stanmore Road, Sydenham Road, Marrickville Road and King Street, are forecast to drop by 20 to 50 per cent.

The upper north–south screenline captures roads connecting City West Link and Parramatta Road. While there is an overall decrease in daily heavy vehicle volumes crossing this screenline, there are forecast increases on Johnston Street and Ross Street as vehicles move between the surface road network and the M4-M5 Link. However, in the peak hours, these increases are generally less than 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.

9.8 Toll avoidance

Preference surveys to understand the value people in Sydney place on travel time savings associated with major infrastructure improvements were undertaken as part of the development of the WRTM. The WRTM includes tolling and general cost parameters that reflect the findings from these surveys. The WRTM considers that different motorists place different values on paying tolls to make time savings, including heavy vehicle motorists.

The M4-M5 Link is a new piece of tolled infrastructure and so would not generate toll avoidance in the same way as, for example, the M4 Widening project that reinstated the toll back onto the existing M4 Motorway or the New M5 project that introduced a toll on the existing M5 East Motorway. Generally, the traffic using the new M4-M5 Link in the future would have been travelling on other roads. However, more traffic would use the project if it was untolled, so a form of toll avoidance would occur.

The screenline analysis presented in **Chapter 9** found no major shifts in daily forecast traffic onto alternative, parallel routes as a result of the project. Once the M4-M5 Link is operational, it is expected that there would be a period where drivers trial using their existing, toll-free routes or the new, tolled M4-M5 Link, before deciding on a regular route. Congestion in peak periods on existing, toll-free surface roads would provide an incentive to use the new, tolled road.

The proposed M4-M5 Link Road Network Performance Review Plan will require an Operational Traffic Performance Review at 12 months and at five years after the M4-M5 Link is open to traffic. This review would examine potential management measures following the collection of updated data that will facilitate an understanding of actual project outcomes. Roads and Maritime will, as part of the ongoing consultation with Councils, develop post-opening mitigation measures, if required.

10 Assessment of operational impacts with the project

This section details the forecast traffic performance during the 'with project' scenarios. The detailed assessments have been undertaken using forecast traffic volumes produced from the WRTM for the following scenarios:

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

10.1 Sydney metropolitan road network

10.1.1 'With project' (2023)

Figure 10-1 shows bandwidth plots illustrating the forecast change in daily traffic volumes between the 2023 'with project' and the 'without project' scenario. 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.

General traffic

The project provides a key link in the Sydney motorway network, connecting the M4 Motorway to the 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 (south of Iron Cove Bridge). Increases in daily traffic are also forecast on the M4 East and Anzac Bridge/Western Distributor, as traffic accesses the M4-M5 Link. This can be clearly seen 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.

Changes in operational performance on these surface roads are dealt with in **sections 10.3** and **10.4**.

As a consequence of traffic using the project, reductions in 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, with traffic reductions projected for sections of Princes Highway and Canal Road. Changes in operational performance on these surface roads close to the St Peters interchange are described in **section 10.5**.

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 2023, 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 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.

Some improvement in travel times between the Victoria Road corridor and the Sydney Airport/Port Botany precinct are also forecast in the 'with project' scenario.

In 2023, with the inclusion of the project, road network productivity is forecast to improve as indicated by a drop in the daily VKT and VHT on the arterial (non-motorway) network, with an increase in kilometres and hours travelled along the motorway routes. Overall, the road network would accommodate more or longer trips in a shorter time. As shown in **Table 10-1**, 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 10-1 Comparison of daily 2023 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)	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 generally 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 (south of Iron Cove Bridge), King Georges Road and the existing M5 East Motorway. There are also reductions along Stanmore Road and Sydenham Road in the Inner West.

Increases in daily heavy vehicle traffic are forecast on surface roads between the St Peters interchange and Sydney Airport. Reductions in daily heavy vehicle volumes are forecast on sections of Princes Highway and Canal Road. Changes in operational performance on these surface roads close to the St Peters interchange are described in **section 10.5**.

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 forecast reduced traffic on Victoria Road (south of Iron Cove Bridge), this would be offset by the forecast increased 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 Local Government Area (LGA) on non-motorway links

Table 10-2 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. This is also illustrated by the routes shown in green on **Figure 10.1**. 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 10-2 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

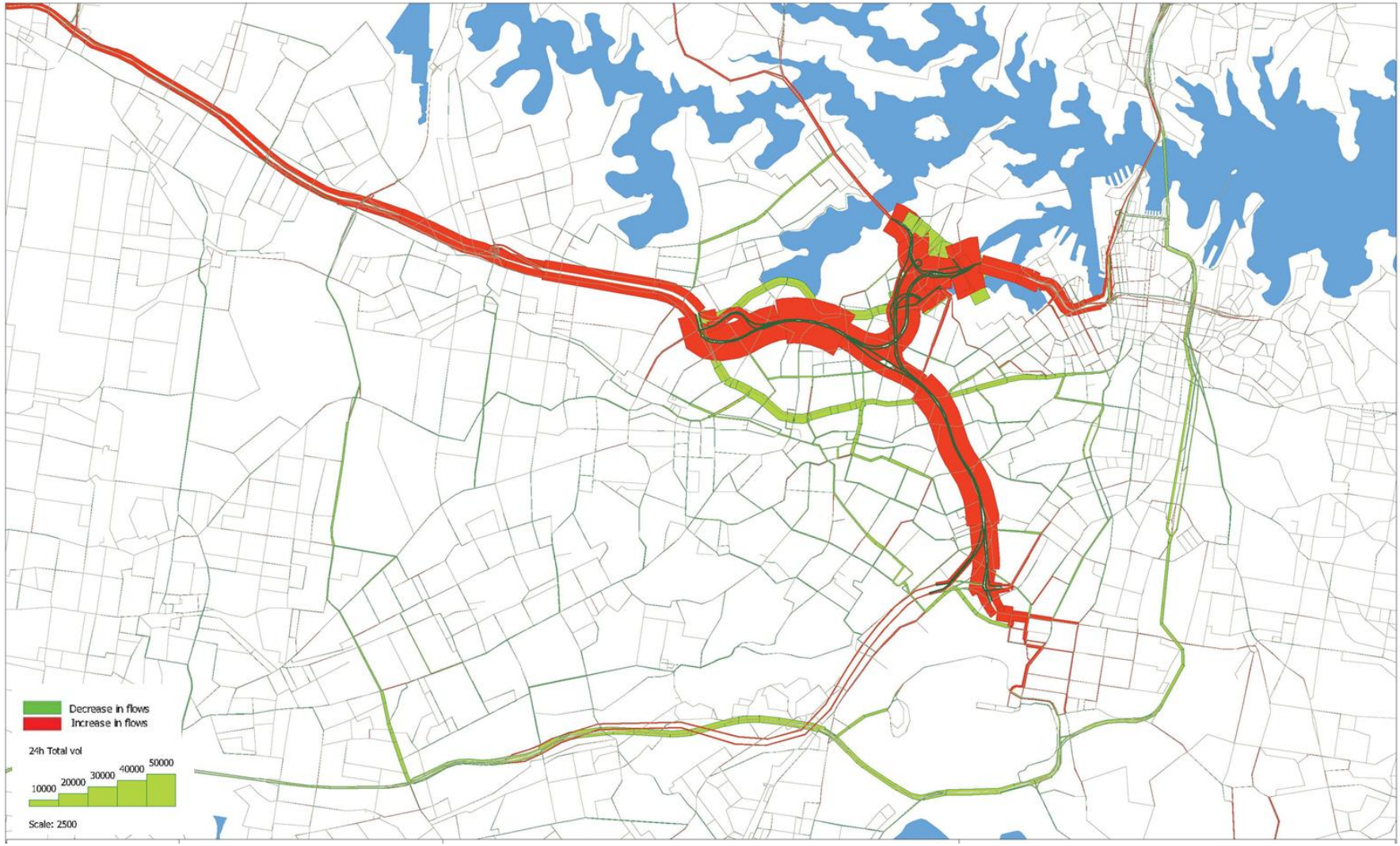


Figure 10-1 Difference in AWT between 2023 'with project' and 'without project' scenarios

Source: WRTM v2.3, 2017

10.1.2 'With project' (2033)

Figure 10-2 shows bandwidth plots illustrating the forecast change in daily traffic volumes between the 2033 'with project' and the '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 2033 'with project' scenario are shown in green and roads where volumes are forecast 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.

General traffic

The pattern of change highlighted in the 2023 comparison is generally the same as in the 2033 comparison. 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.

Road network productivity is forecast to improve in 2033, with the inclusion of the project. There is a drop in the daily VKT and VHT on the arterial (non-motorway) network with an increase in kilometres and hours travelled along the motorway routes, as seen in **Table 10-3**. The addition of the M4-M5 Link provides a significant overall benefit to the network where more or longer trips could be made on the road network in a shorter time.

Table 10-3 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 generally follow the same pattern as the 2023 comparison. Significant reductions in daily heavy vehicle traffic are focused on Parramatta Road (east of the M4 East Parramatta Road ramps), City West Link, Victoria Road (south of Iron Cove Bridge), King Georges Road and the existing M5 East Motorway.

On-road public transport

The anticipated impacts of the project upon on-road public transport in 2023 and 2033 are similar. Reduced traffic is forecast on Victoria Road (south of Iron Cove Bridge) in 2033, 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 Local Government Area (LGA) on non-motorway links

Table 10-4 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 or there is no forecast change. 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 10-4 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

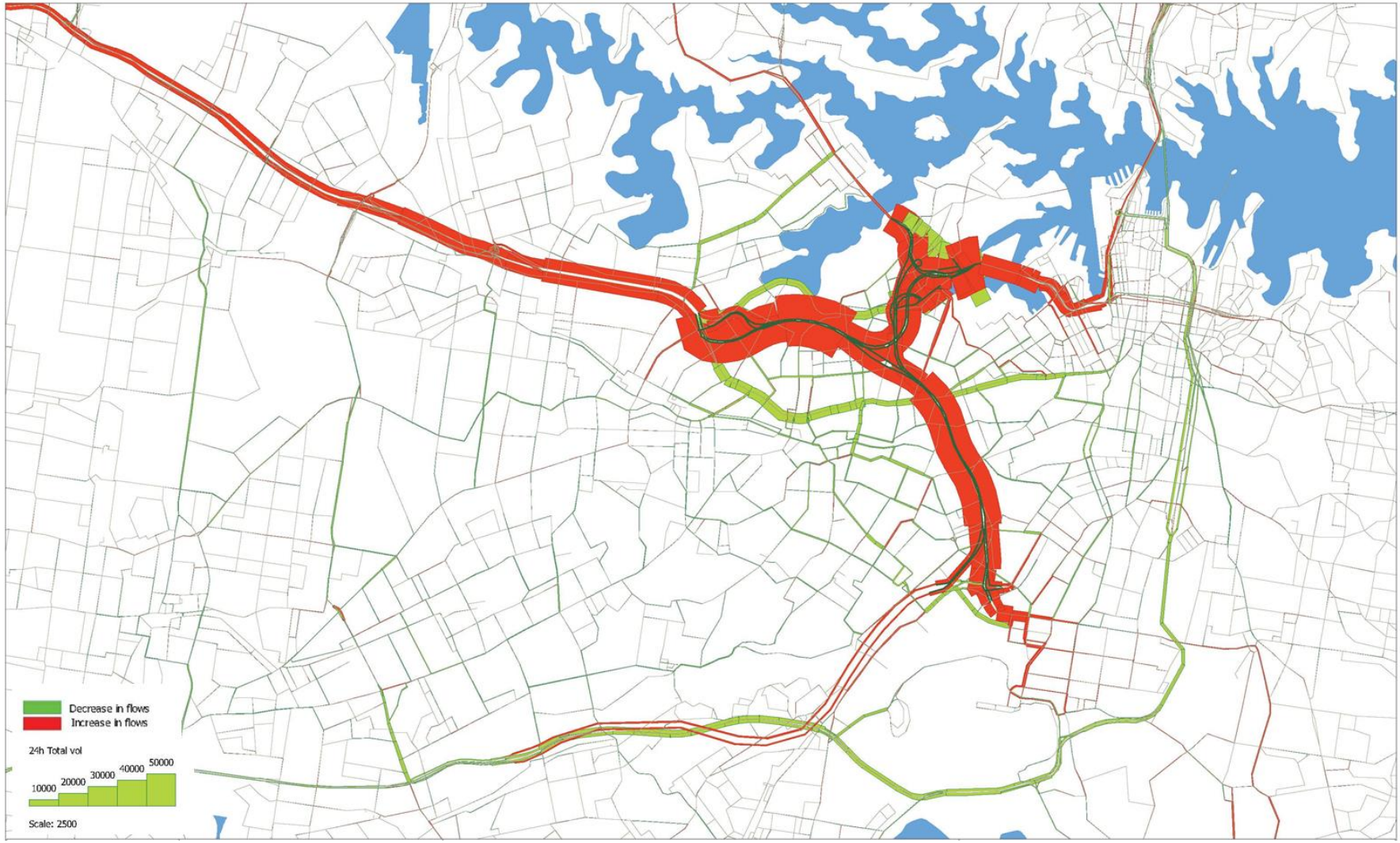


Figure 10-2 Difference in AWT between 2033 'with project' and 'without project' scenarios

Source: WRTM v2.3, 2017

10.2 Operational performance – M4-M5 Link Motorway

10.2.1 Mid-block level of service

Mid-block levels of service on the M4-M5 Link motorway under 2023 'with project' and 2033 'with project' scenarios in peak hours are provided in **Table 10-5** and **Table 10-6** using results determined from microsimulation models. The motorway was divided into five sections as follows:

- Interface with the M4 East, west of the Wattle Street interchange
- Wattle Street interchange to Rozelle interchange
- Rozelle interchange bypass
- Rozelle interchange to St Peters interchange
- Interface with the New M5, south of the St Peters interchange.

The results indicate that the new motorway is forecast to operate at a good level of service in both 2023 and 2033 'with project' scenarios.

Table 10-5 M4-M5 Link motorway 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

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 10-6 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.

10.2.2 Traffic crashes

Table 10-7 presents the crash analysis for the M4-M5 Link. The analysis has been undertaken based on crash rates on the existing Sydney motorway tunnels (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. With crash rates on motorways much lower than on surface arterial roads, a general reduction in accidents would be expected.

Table 10-7 M4-M5 Link: crash analysis for 2023 and 2033 'with project' scenarios

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

10.3 Operational performance – Wattle Street interchange

10.3.1 Changes to road network in 'with project' scenario

Road network changes additional to those discussed in **section 8.2.1** are relatively minor. Under the 'with project' scenario, the movement between the M4 East and M4-M5 Link is available as well as M4-M5 Link entry and exit ramp movements to Wattle Street between Parramatta Road and Ramsay Street. Activation of the latter ramps (the stubs are being built as part of M4 East) leads to line marking changes and lane designation changes on Wattle Street close to the Parramatta Road intersection with an additional right turn lane added to the Wattle Street southbound approach to Parramatta Road.

10.3.2 Network performance

2023 'with project' scenario

Table 10-8 and **Table 10-9** present a comparison of the performance of the road network between the 2023 'without project' and 'with project' scenarios for the AM and PM peak hours, produced using microsimulation modelling.

AM peak hour

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. Network conditions change compared to the 'without project' scenario as demand to the M4 exit ramps is much lower when the mainline 'through' movement is available to the M4-M5 Link. The number of vehicles on the surface network is reduced as a result of traffic shifting to the M4-M5 Link – in particular 'through' traffic demand along Parramatta Road (eastbound and westbound) – with subsequent benefits to the surface road network.

Forecast demand to City West Link and Parramatta Road eastbound from the M4 East is lower than the 'without project' scenario. However, 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. Queuing is not forecast to prevent entry to or exit from the project.

Table 10-8 Wattle Street interchange network performance – AM peak hour (2023 'without project' scenario vs 'with project' scenario)

Network measure	2023 'without project'	2023 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	15,279	21,410	40%
Total vehicle kilometres travelled in network (km)	31,474	34,696	10%
Total time travelled approaching and in network (hr)	2,153	1,667	-22%
Total vehicles arrived	14,483	21,113	46%
Total number of stops	242,127	166,849	-31%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.0	1.6	-20%
Average time travelled in network (mins)	8.0	4.5	-44%
Average number of stops	13.4	7.1	-48%
Average speed (km/h)	14.8	21.0	42%
Unreleased vehicles			
Unreleased demand (veh)	796	297	–
% of total traffic demand	5%	1%	–

PM peak hour

The 'with project' scenario introduces more tunnelled motorway links, and so a substantial increase in traffic is accommodated within the network, and overall average speeds increase due to the new M4-M5 Link reducing congestion on the surface road network.

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 queuing back and unreleased demand at the westbound City West Link network entry. The westbound queuing is also forecast to cause side road queuing at the Ramsay Street intersection with Wattle Street, resulting in unreleased demand on the Ramsay Street westbound approach. The westbound queuing is also forecast to inhibit access into the M4 East Wattle Street entry ramp.

Increased demand to Frederick Street is forecast to cause queuing 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.

Table 10-9 Wattle Street interchange network performance – PM peak hour (2023 'without project' scenario vs 'with project' scenario)

Network measure	2023 'without project'	2023 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	15,209	20,825	37%
Total vehicle kilometres travelled in network (km)	29,075	33,968	17%
Total time travelled approaching and in network (hr)	2,176	1,907	-13%
Total vehicles arrived	14,702	20,049	36%
Total number of stops	318,512	201,602	-37%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	1.8	1.6	-12%
Average time travelled in network (mins)	8.1	5.3	-34%
Average number of stops	17.4	8.7	-50%
Average speed (km/h)	13.5	18.0	34%
Unreleased vehicles			
Unreleased demand (veh)	507	776	–
% of total traffic demand	3%	4%	–

2033 'with project' scenario

Table 10-10 and **Table 10-11** present a comparison of the performance of the road network between the 2033 'without project' and 'with project' scenarios for the AM and PM peak hours, produced using microsimulation modelling.

AM peak hour

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. There are fewer unreleased vehicles in the 'with project' scenario, which is in line with the reduced demand for City West Link and subsequent reduced impact on vehicles originating from Frederick Street. Overall, the network performs better in the 'with project' scenario.

Queuing 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. Queuing is not forecast to prevent entry to or exit from the project.

Table 10-10 Wattle Street interchange network performance – AM peak hour (2033 'without project' scenario vs 'with project' scenario)

Network measure	2033 'without project'	2033 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	16,553	23,609	43%
Total vehicle kilometres travelled in network (km)	32,470	37,632	16%
Total time travelled approaching and in network (hr)	2,316	1,821	-21%
Total vehicles arrived	15,505	23,114	49%
Total number of stops	272,807	213,460	-22%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.0	1.6	-20%
Average time travelled in network (mins)	8.3	4.5	-46%
Average number of stops	14.5	8.3	-43%
Average speed (km/h)	14.2	20.9	47%
Unreleased vehicles			
Unreleased demand (veh)	1,048	495	-
% of total traffic demand	6%	2%	-

PM peak hour

Compared to the 2033 'without project' scenario, 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 queuing back that extends to the M4 East. 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.

The 2033 'with project' scenario is forecast to experience different traffic patterns compared to the 'without project' scenario with the surface road network forecast to experience more congestion. The number of through lanes for surface traffic for the Wattle Street to Frederick Street movement reduces and significant queuing is observed on the Wattle Street approach to Parramatta Road. This is forecast to result in unreleased demand at City West Link and Ramsay Street approaches and inhibit access into the M4 East Wattle Street entry ramp.

In addition, increased demand to Frederick Street is forecast to cause queuing 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.

Eastbound queuing is forecast from the City West Link/Timbrell Drive intersection back to the Parramatta Road/Wattle Street intersection, which is then forecast to inhibit access into the project Wattle Street entry ramp for the through movement from Frederick Street and the left turn movement from Parramatta Road.

While both 'without project' and 'with project' scenarios have capacity constraints by 2033, the 'with project' scenario is better able to accommodate future year traffic demand than the 'without project' scenario.

Table 10-11 Wattle Street interchange network performance – PM peak hour (2033 'without project' scenario vs 'with project' scenario)

Network measure	2033 'without project'	2033 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	16,665	22,866	37%
Total vehicle kilometres travelled in network (km)	29,461	36,878	25%
Total time travelled approaching and in network (hr)	2,557	2,316	-9%
Total vehicles arrived	15,451	21,917	42%
Total number of stops	387,426	265,136	-32%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	1.8	1.6	-8%
Average time travelled in network (mins)	9.0	6.0	-33%
Average number of stops	20.0	10.5	-47%
Average speed (km/h)	11.7	16.1	38%
Unreleased vehicles			
Unreleased demand (veh)	1,214	949	–
% of total traffic demand	7%	4%	–

10.3.3 Intersection performance

Table 10-12 presents the modelled AM and PM peak hour LoS for key intersections at the Wattle Street interchange.

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, as this demand remains on the 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 relatively consistent with the 'without project' scenario.

Table 10-12 Wattle Street 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					
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

10.3.4 Travel times

For the purpose of assessing travel times through the network, exit blocking constraints were retained to reflect network congestion at intersections beyond the modelled network extents.

Figure 10-3 demonstrates that 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 remain fairly constant given the lesser 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.

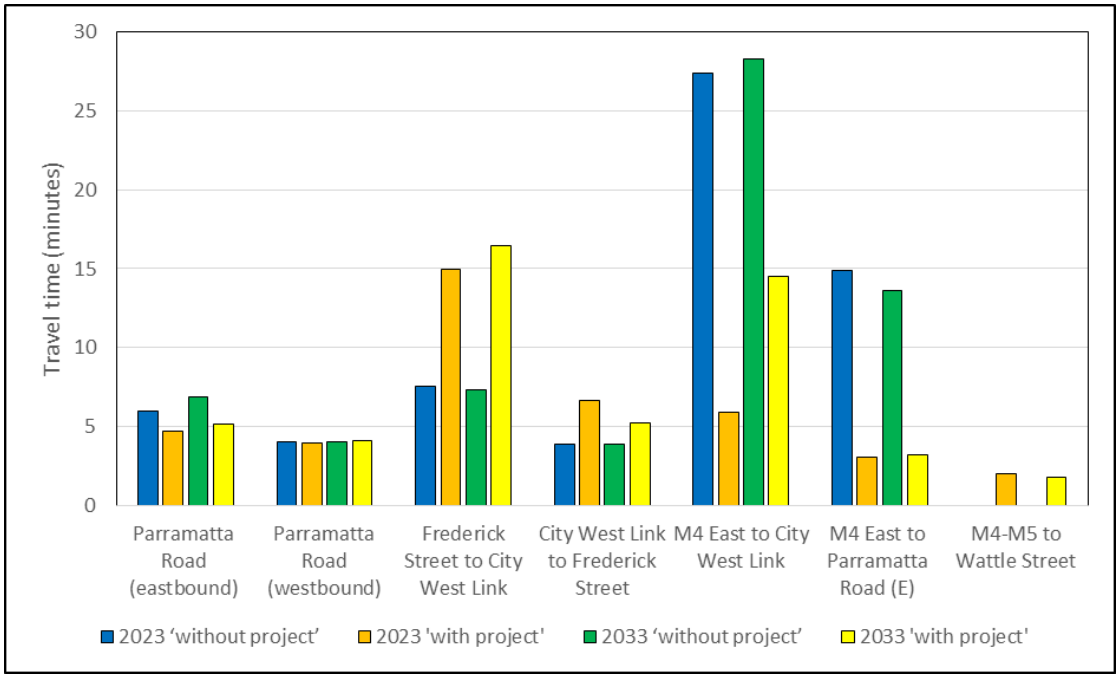


Figure 10-3 Wattle Street interchange: average travel time (mins) – AM peak hour 'with project' scenarios

Figure 10-4 presents the travel times in the PM peak hour 'with project' scenarios, which demonstrates that the project has a positive impact 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 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 seen 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.

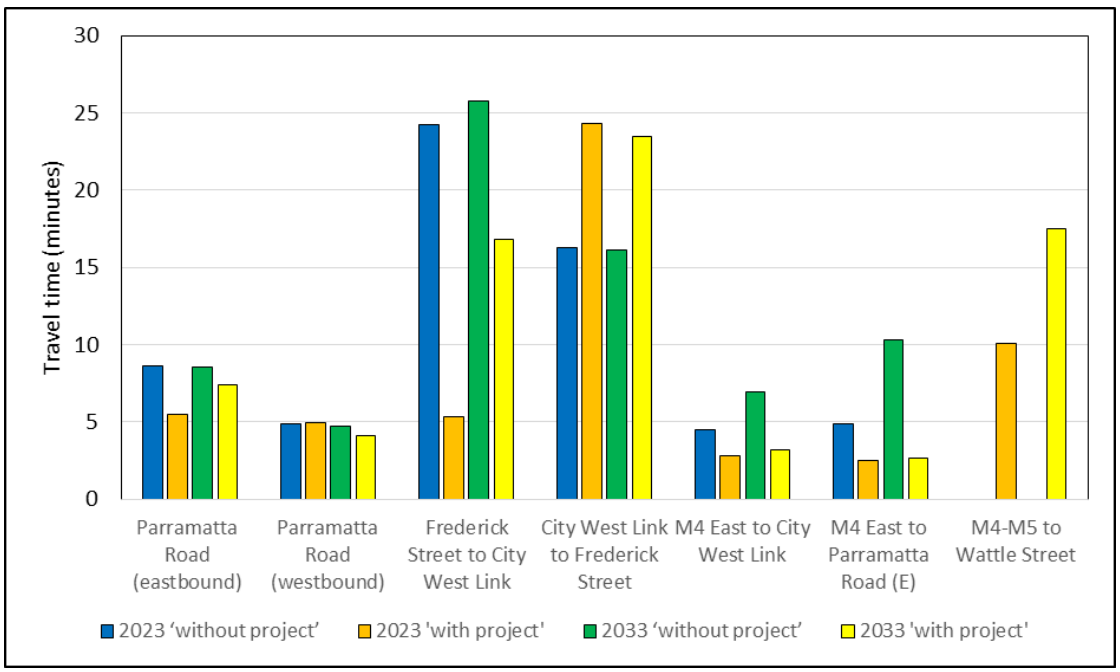


Figure 10-4 Wattle Street interchange: average travel time (mins) – PM peak hour 'with project' scenarios

10.3.5 Traffic crashes

Table 10-13 presents the crashes forecast under the 2023 'with project' scenario compared to the 'without project' scenario.

Daily traffic on the 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.

Table 10-13 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 10-14 compares the crashes forecast under the 2033 scenarios. Similarly, in 2033, forecasts indicate than a decrease in daily traffic in the 2033 'with project' scenario compared to the 'without project' scenario on Parramatta Road between Wattle Street and City Road, results 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 10-14 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

10.3.6 Public transport services

Bus lane infrastructure and service frequencies remain the same in the 'with project' and 'without project' scenarios. **Figure 10-5** and **Figure 10-6** show the comparison in travel times for buses between the 'without project' and 'with project' scenarios for the AM and PM peak hours. Only routes along Parramatta Road are presented as other bus routes in the area have minimal frequencies during the peak hours.

The project demonstrates improvements in Parramatta Road bus travel times during the AM peak hour, particularly the eastbound movement. This is primarily due to the reduction in general traffic demand. The westbound direction is less congested in the modelled scenarios, and so bus travel times remain relatively unchanged from the 'without project' scenario.

In the PM peak hour, bus travel times are seen to reduce in the 'with project' scenario when compared to the 'without project' scenario, especially for eastbound buses. Reductions in travel times are also seen for westbound buses due to forecast reduction in general traffic demand along Parramatta Road.

The forecast reduction in general traffic demand along Parramatta Road would provide the opportunity to investigate improving public transport operations, such as extending the planned kerbside bus lanes (part of the M4 East project) east of the M4 East entry and exit ramps on Parramatta Road.

10.3.7 Active transport facilities

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

10.3.8 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 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 reopened.

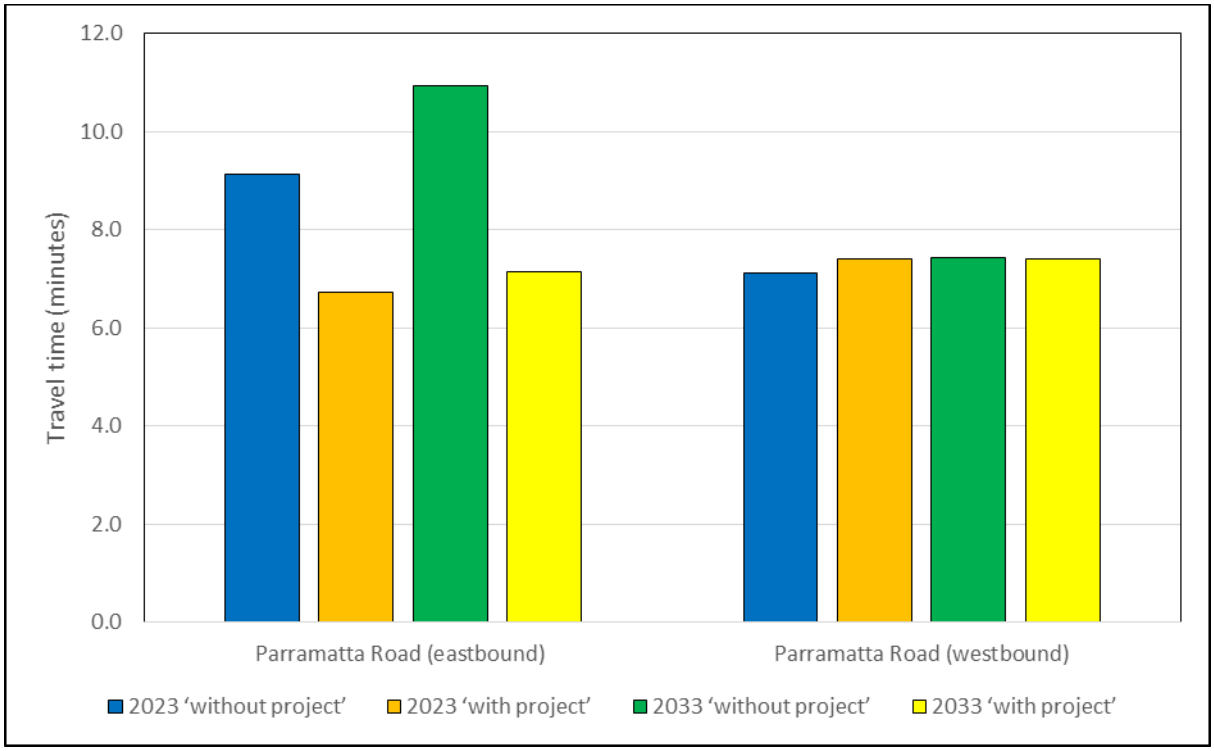


Figure 10-5 Wattle Street interchange: AM peak hour average travel time for buses – 'with project' comparison

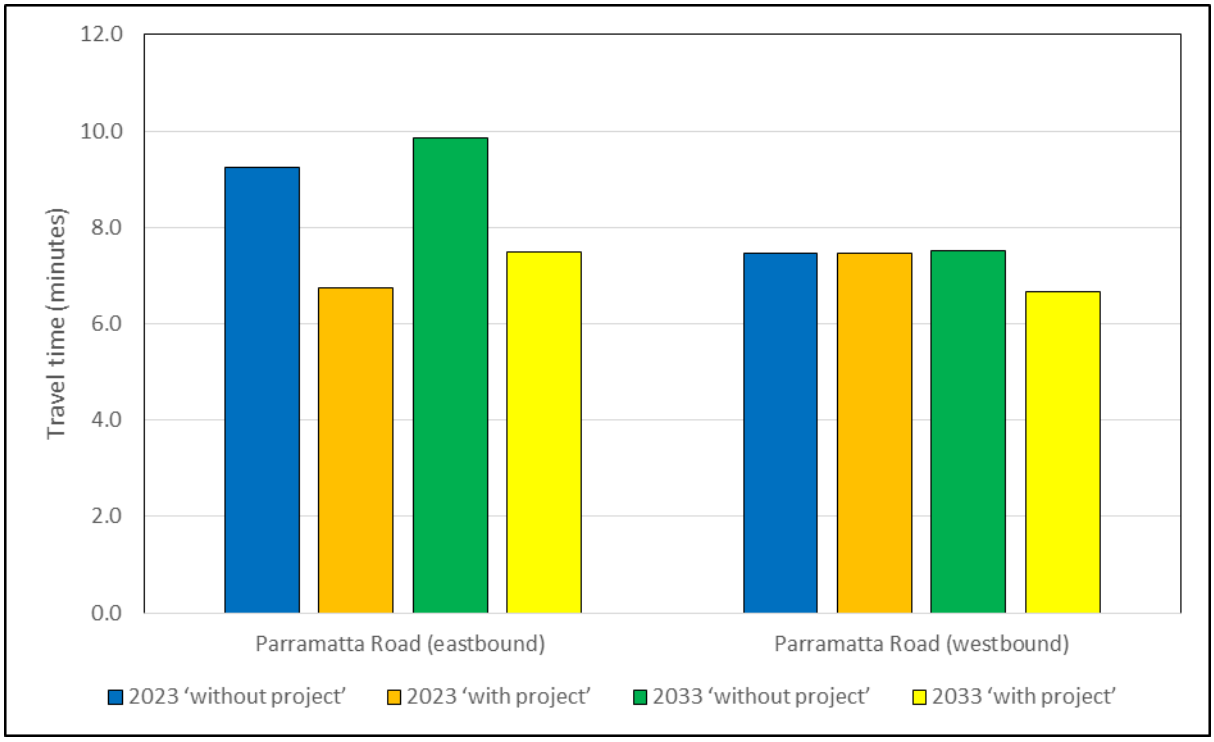


Figure 10-6 Wattle Street interchange: PM peak hour average travel time for buses – 'with project' comparison

10.4 Operational performance – Rozelle interchange

10.4.1 Changes to road network in 'with project' scenario

Figure 10-7 shows the 'with project' model network. In addition to the Rozelle surface works described in **section 2.2**, the 'with project' road network includes the following links added to the 'do minimum' or 'without project' scenario networks:

- Iron Cove Link, which provides a tunnel link between Victoria Road just south 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 the M5 and Victoria Road, just south of Iron Cove Bridge. This link joins the Iron Cove Link to/from Anzac Bridge.

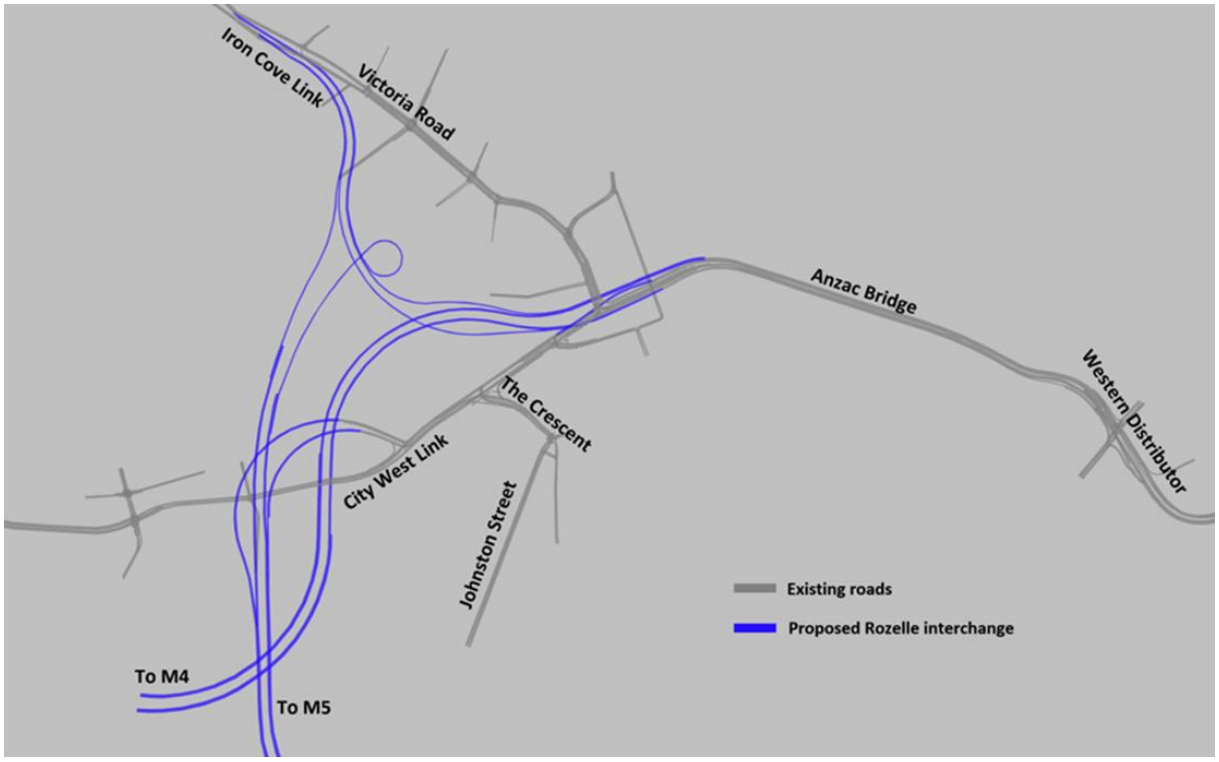


Figure 10-7 Rozelle interchange: 'with project' road network

10.4.2 Network performance

2023 'with project' scenario

Table 10-15 and **Table 10-16** present a comparison of the performance of the road network (as shown in **Figure 10-7**), between the 2023 'without project' and 'with project' scenarios for the AM and PM peak hours, produced using microsimulation modelling.

AM peak hour

The 2023 'with project' scenario is forecast to have a 15 per cent increase in traffic demand compared to the 'without project' scenario. However, improved network performance metrics are forecast with decreased travel times, fewer stops and increased average speeds, with 10 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 motorway links, which provide higher speeds and less congestion compared to the surface network.

However, the AM peak citybound movements remain affected by the queues back from the Bathurst Street/Cross City Tunnel exit ramp. In addition, the downstream exit blocking from Sydney Harbour Bridge on the Western Distributor (similar to the 2015 base congestion issues) 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 queuing 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. Mitigation measures to minimise these queues is discussed in **section 11.2.2**.

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.

Table 10-15 Rozelle interchange network performance – AM peak hour (2023 'without project' vs 'with project' scenario)

Network measure	2023 'without project'	2023 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	22,087	25,327	15%
Total vehicle kilometres travelled in network (km)	57,775	73,188	27%
Total time travelled approaching and in network (hr)	5,355	6,308	18%
Total vehicles arrived	21,621	23,799	10%
Total number of stops	302,654	274,030	-9%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.7	3.1	15%
Average time travelled in network (mins)	10.1	9.8	-2%
Average number of stops	12.3	10.1	-18%
Average speed (km/h)	15.9	18,8	18%
Unreleased vehicles			
Unreleased demand (veh)	1,278	2,309	-
% of total traffic demand	6%	9%	-

PM peak hour

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 14 per cent increase in demand. This improvement is partially attributed to the changed road network and a shift in traffic to the free flowing motorway links. This is particularly true for the peak traffic direction, namely the outbound or westbound direction leaving the city. Once these vehicles reach the ramp entries to the M4 and to 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 causing eastbound flow breakdown 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.

Table 10-16 Rozelle interchange network performance – PM peak hour (2023 'without project' vs 'with project' scenario)

Network measure	2023 'without project'	2023 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	24,694	28,109	14%
Total vehicle kilometres travelled in network (km)	61,136	80,108	31%
Total time travelled approaching and in network (hr)	4,896	5,091	4%
Total vehicles arrived	21,854	24,261	11%
Total number of stops	146,986	179,138	22%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.8	3.3	18%
Average time travelled in network (mins)	8.3	7.9	-4%
Average number of stops	5.9	6.4	8%
Average speed (km/h)	20.3	25.1	23%
Unreleased vehicles			
Unreleased demand (veh)	2,684	2,655	–
% of total traffic demand	11%	9%	–

2033 'with project' scenario

Table 10-17 and **Table 10-18** present a comparison of the performance of the road network between the 2033 'without project' and 'with project' scenarios for the AM and PM peak hours, produced using microsimulation modelling.

AM peak hour

Similar to the 2023 'with project' scenario, the 2033 'with project' network 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 is forecast to 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 flow breakdown on Anzac Bridge. This congestion on the Western Distributor and Anzac Bridge is forecast to cause queuing 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. Mitigation measures to minimise these queues is discussed in **section 11.2.2**.

While the eastbound direction is more congested, with a resultant increase in unreleased vehicles, 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.

Table 10-17 Rozelle interchange network performance – AM peak hour (2033 'without project' vs 'with project' scenario)

Network measure	2033 'without project'	2033 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	24,307	28,023	15%
Total vehicle kilometres travelled in network (km)	59,866	77,690	30%
Total time travelled approaching and in network (hr)	7,041	7,221	3%
Total vehicles arrived	22,682	25,794	14%
Total number of stops	314,527	272,544	-13%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.6	3.0	14%
Average time travelled in network (mins)	10.3	9.3	-9%
Average number of stops	12.0	9.2	-23%
Average speed (km/h)	15.4	19.4	26%
Unreleased vehicles			
Unreleased demand (veh)	2,233	2,719	–
% of total traffic demand	9%	10%	–

PM peak hour

As in the 2023 models, there is a significant improvement in the road network performance in the PM peak hour, due to the increased capacity provided by the direct link from Anzac Bridge to the M4 and Iron Cove Link. The overall network performance is forecast to improve compared to the 'without project' scenario, with average speed increasing and the number of vehicles arriving at their destination zones increasing by about 20 per cent.

Notwithstanding these improvements, eastbound traffic is forecast to still be affected by the queuing effects from the Sydney Harbour Bridge.

Table 10-18 Rozelle interchange network performance – PM peak hour (2033 'without project' vs 'with project' scenario)

Network measure	2033 'without project'	2033 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	26,528	30,259	14%
Total vehicle kilometres travelled in network (km)	60,908	86,924	43%
Total time travelled approaching and in network (hr)	6,146	5,286	-14%
Total vehicles arrived	22,679	27,082	19%
Total number of stops	151,862	92,817	-39%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.7	3.2	20%
Average time travelled in network (mins)	8.2	6.1	-25%
Average number of stops	5.9	3.1	-47%
Average speed (km/h)	19.7	31.3	59%
Unreleased vehicles			
Unreleased demand (veh)	3,591	2,974	–
% of total traffic demand	14%	10%	–

10.4.3 Intersection performance

Table 10-19 presents the modelled AM and PM peak hour LoS for key intersections at Rozelle. 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 with 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, but any further upgrades at this intersection to improve performance are constrained by the existing light rail bridge.

Table 10-19 Rozelle 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					
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

10.4.4 Travel times

For the purpose of assessing travel times through the network, exit blocking constraints were retained to reflect network congestion at intersections beyond the modelled network extents. Average travel times were extracted along both Victoria Road and City West Link onto Anzac Bridge, between the same extents as described in **section 8.3.4**, and are presented in **Figure 10-8** and **Figure 10-9**.

During the AM peak hour, the model shows increased travel times in the peak direction (inbound to the city) on Victoria Road and City West Link due primarily to flow breakdown on the Western Distributor, which causes queuing back onto City West Link, Iron Cove Link and Victoria Road. Mitigation for this is discussed in **section 11.2.2**. The Iron Cove Link would introduce a new link, which provides a faster travel time from Iron Cove Bridge to Anzac Bridge than via 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.

During the PM peak hour, the model results show a significant improvement in the peak direction travel times (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 project case, from about 10 minutes via Victoria Road to about four minutes via Iron Cove Link. However, the eastbound journey time is forecast to increase due to increased demand and capacity constraints at Sydney Harbour Bridge, resulted in queuing back along Western Distributor and Anzac Bridge.

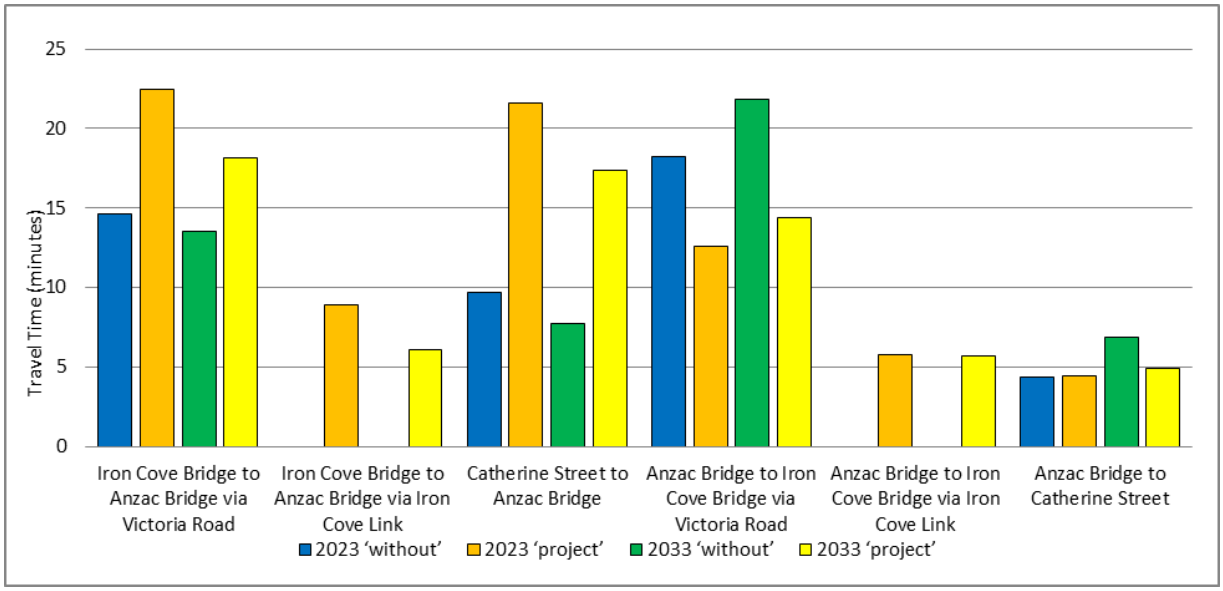


Figure 10-8 Rozelle interchange: average travel time (mins) – AM peak hour 'with project' scenarios

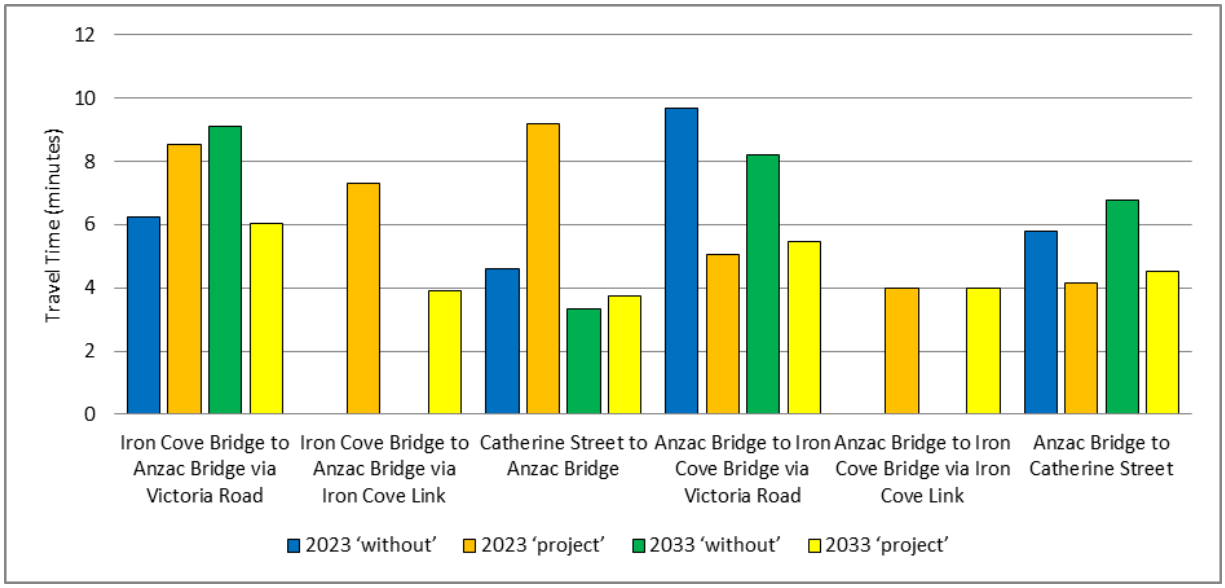


Figure 10-9 Rozelle interchange: average travel time (mins) – PM peak hour 'with project' scenarios

10.4.5 Traffic crashes

Table 10-20 presents the crashes 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 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 of about four per cent.

Table 10-20 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 10-21 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 (with less than one per cent increase).

Table 10-21 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

10.4.6 Public transport services

Figure 10-10 and **Figure 10-11** show the comparison in travel times for buses between the 'without project' and 'with project' scenarios for the AM and PM peak hours. The main bus route on Victoria Road, Anzac Bridge and the bus lanes to and from Druitt Street is presented.

The results show longer citybound 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. Mitigation for this is discussed in **section 11.2.2**.

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.

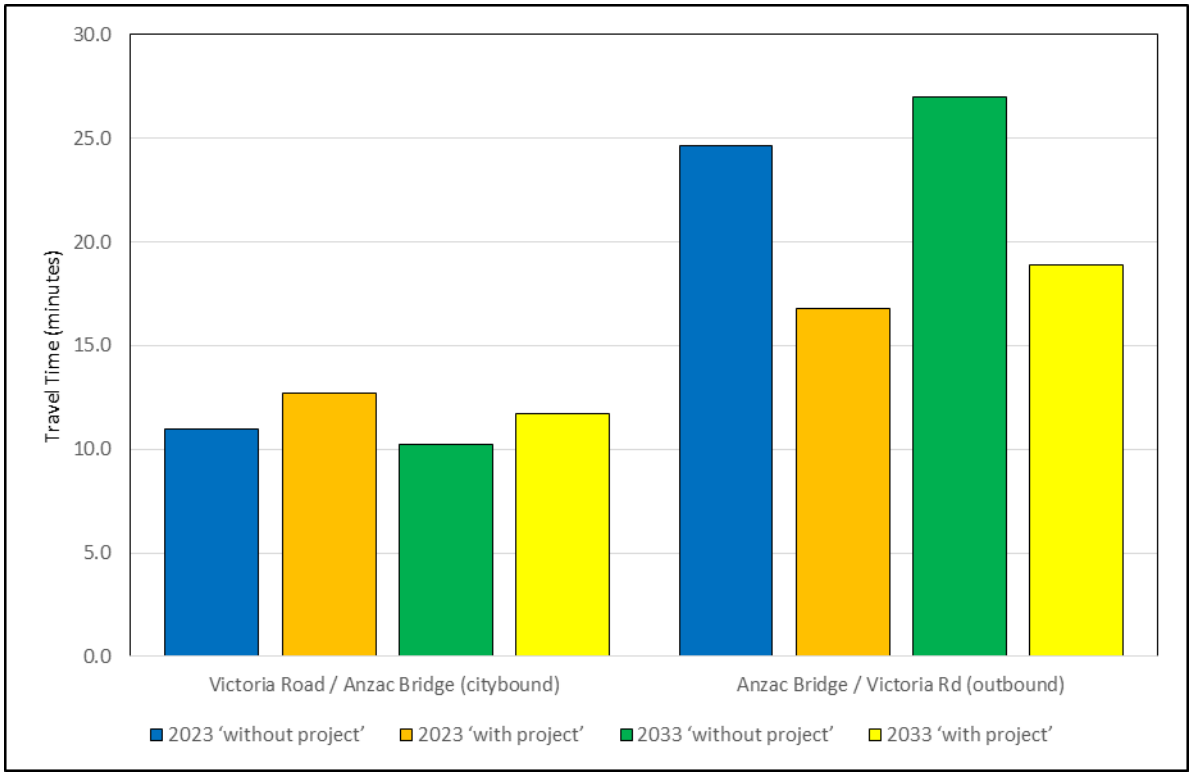


Figure 10-10 Rozelle interchange: average travel time for buses – AM peak hour 'with project' comparison

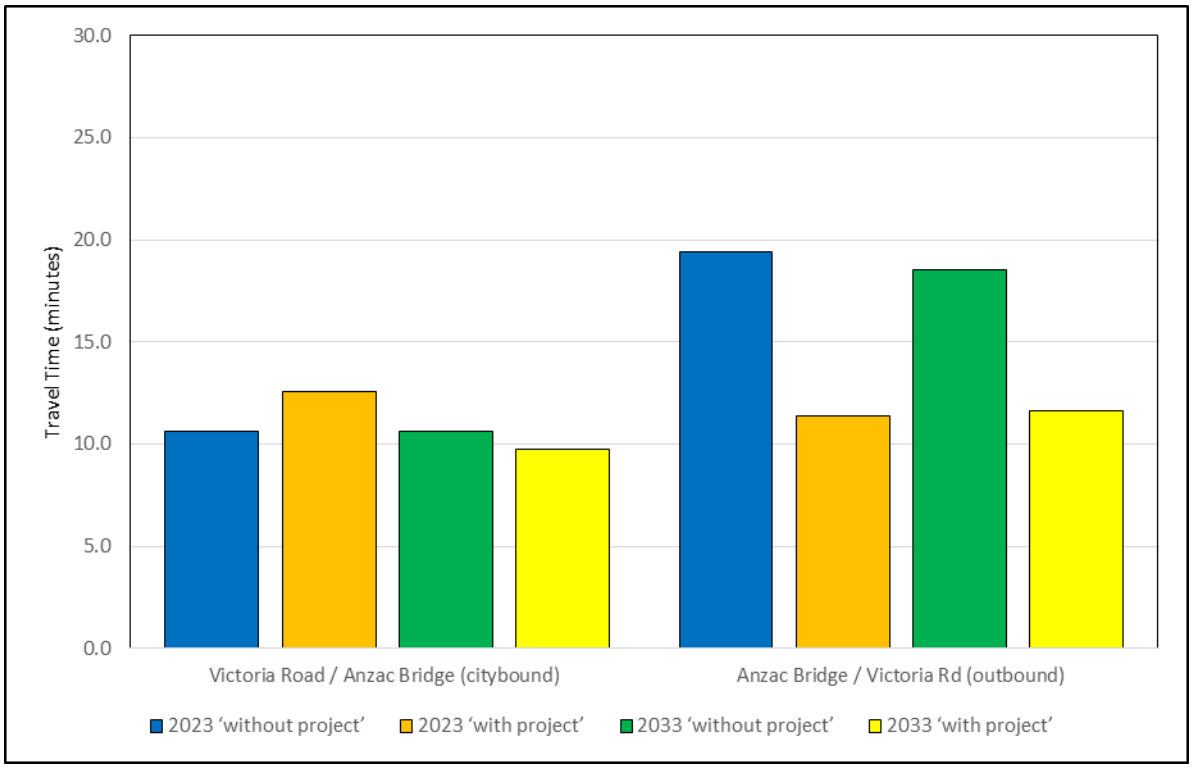


Figure 10-11 Rozelle interchange: average travel time for buses – PM peak hour 'with project' comparison

10.4.7 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 the 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 **Appendix N** (Technical working paper: Active transport strategy) of the EIS.

10.4.8 Impact 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, Callan Street and Byrnes Street would occur to allow the introduction of the Iron Cove Link portal.

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 be retained but would be moved a short distance to the southwest.

As a result of these road layout changes, there are permanent impacts on residential and business on-street parking provision. This is described in **Table 10-22**. Most of these parking spaces are adjacent to properties being acquired and so the impact of their loss is reduced. The final numbers would be confirmed during detailed design.

Table 10-22 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

10.5 Operational performance – St Peters interchange

10.5.1 Changes to road network in '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 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 Sydney Gateway. 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 Sydney Gateway was in place, but have been included in the 'with project' scenario to enable network performance statistics to be generated.

Should Sydney Gateway be delayed for a significant length of time, it is expected that both the New M5 Road Network Performance Review Plan (conditioned as part of the New M5 approval) and the proposed M4-M5 Link Road Network Performance Review would confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections. These reviews would examine potential management measures at the above intersections, and other locations as identified in the Road Network Performance Review, following the collection of data that would facilitate a clearer understanding of actual project impacts.

10.5.2 Network performance

2023 'with project' scenario

Table 10-23 and **Table 10-24** present a comparison of the performance of the road network between the 2023 'without project' and 'with project' scenarios for the AM and PM peak hours, produced using microsimulation modelling.

AM peak hour

In the AM peak hour, the 2023 'with project' scenario network performance is similar to the 'without project' scenario performance. Demand was reduced by about 700 trips, with those trips not being served by this network in the peak hour. Even with this reduction, total demand was nine per cent higher than the 'without project' scenario.

In the 'with project' scenario, 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. On average, the 'with project' scenario shows that trips are forecast to take less time, with vehicles travelling slightly more quickly and with less congestion than the 'without project' scenario. Queuing in the network is not forecast to prevent entry to or exit from the project.

Table 10-23 St Peters interchange network performance – AM peak hour (2023 'without project' vs 'with project' scenario)

Network measure	2023 'without project'	2023 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	26,060	28,470	9%
Total vehicle kilometres travelled in network (km)	77,500	89,120	15%
Total time travelled approaching and in network (hr)	5,150	5,350	4%
Total vehicles arrived	23,710	26,190	10%
Total number of stops	201,290	205,570	2%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.8	2.9	6%
Average time travelled in network (mins)	9.5	8.9	-6%
Average number of stops	8.5	7.9	-8%
Average speed (km/h)	17.6	19.9	13%
Unreleased vehicles			
Unreleased demand (veh)	2,120	2,470	–
% of total traffic demand	8%	9%	–
Demand reduction to/from Sydney Airport precinct (veh)	640	720	–

PM peak hour

In the PM peak hour, the network performance results show that with an 11 per cent increase in total demand, the number of kilometres travelled in the network is higher than in 2023 'without project' scenario and total time travelled in the network is almost twice as much. Even with the reduced Sydney Airport demand (about 350 trips), the network performance measures suggest that the 2023 'with project' case is more congested, which is reflected in longer average trip time and average speed in the network dropping by about 28 per cent.

Queuing 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.

Table 10-24 St Peters interchange network performance – PM peak hour (2023 'without project' vs 'with project' scenario)

Network measure	2023 'without project'	2023 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	25,210	27,920	11%
Total vehicle kilometres travelled in network (km)	78,920	90,610	15%
Total time travelled approaching and in network (hr)	2,850	4,710	65%
Total vehicles arrived	24,960	26,600	7%
Total number of stops	127,390	186,400	46%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.9	2.9	3%
Average time travelled in network (mins)	6.1	8.6	42%
Average number of stops	5.1	7.0	37%
Average speed (km/h)	28.2	20.4	-28%
Unreleased vehicles			
Unreleased demand (veh)	220	1,030	–
% of total traffic demand	1%	4%	–
Demand reduction to/from Sydney Airport precinct (veh)	230	360	–

2033 'with project' scenario

Table 10-25 and **Table 10-26** present a comparison of the performance of the road network between the 2033 'without project' and 'with project' scenarios for the AM and PM peak hours, produced using microsimulation modelling.

AM peak hour

The 2033 AM peak hour network performance results show that the 'with project' scenario is forecast to provide improved network operation when compared with the 'without project' scenario. The 'with project' scenario introduces more tunnelled motorway links, and while there is a 10 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. A higher number of vehicles reach their destination and spend less total time in the network. Average speed in the network almost doubles and the number of unreleased vehicles within peak hour is lower. Demand was reduced by about 800 trips to and from Sydney Airport, with those trips not being served by the network in the peak hour.

Despite better overall network performance, forecast queuing from the Euston Road/Campbell Road and Gardeners Road/Kent Road intersections eventually exceeds the capacity of the southbound exit ramp and reaches the mainline.

Table 10-25 St Peters interchange network performance – AM peak hour (2033 'without project' vs 'with project' scenario)

Network measure	2033 'without project'	2033 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	29,160	31,990	10%
Total vehicle kilometres travelled in network (km)	72,830	92,690	27%
Total time travelled approaching and in network (hr)	12,360	7,890	-36%
Total vehicles arrived	20,720	27,130	31%
Total number of stops	274,310	250,290	-9%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.6	2.8	11%
Average time travelled in network (mins)	17.0	10.9	-36%
Average number of stops	13.2	9.2	-30%
Average speed (km/h)	9.0	15.7	73%
Unreleased vehicles			
Unreleased demand (veh)	6,950	4,310	–
% of total traffic demand	24%	13%	–
Demand reduction to/from Sydney Airport precinct (veh)	690	830	–

PM peak hour

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.

Queuing 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.

Table 10-26 St Peters interchange network performance – PM peak hour (2033 'without project' vs 'with project' scenario)

Network measure	2033 'without project'	2033 'with project'	Percentage change
All vehicles			
Total traffic demand (veh)	27,610	30,990	12%
Total vehicle kilometres travelled in network (km)	84,570	84,000	-1%
Total time travelled approaching and in network (hr)	4,970	9,700	95%
Total vehicles arrived	26,350	24,120	-8%
Total number of stops	195,250	248,790	27%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.8	2.7	-1%
Average time travelled in network (mins)	9.2	14.5	58%
Average number of stops	7.4	10.3	39%
Average speed (km/h)	18.0	11.2	-38%
Unreleased vehicles			
Unreleased demand (veh)	1,150	6,340	–
% of total traffic demand	4%	20%	–
Demand reduction to/from Sydney Airport precinct (veh)	320	420	–

Even with a reduction in forecast demand to and from the Sydney Airport precinct, a number of intersection upgrades would be required in the absence of Sydney Gateway to accommodate the forecast growth in traffic demand in the 'with project' scenarios. These upgrades would enable the network to perform at a similar network performance to the 'without project' scenario in the AM peak, but at a reduced network performance in the PM peak hour. This illustrates that the Sydney Gateway project is required to accommodate the forecast traffic demands at the St Peters interchange and surrounds. This is presented in the 'cumulative' scenario network performance results in **section 12.6.2**, which includes Sydney Gateway as part of the road network.

10.5.3 Intersection performance

Table 10-27 presents the modelled AM and PM peak hour LoS for key intersections at St Peters in the 2023 and 2033 'with project' scenarios compared to the 'without project' scenarios.

Table 10-27 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

*These intersections have upgrades in the 'with project' scenarios

The modelling results show that in the AM peak hour, under the 2023 'with project' scenario, the intersections generally record similar LoS compared with the 'without project' scenario, except for the Campbell Road/Bourke Road and Gardeners Road/Bourke Road intersections, while by 2033, all 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, which corresponds to the poor network performance reported in **Table 10-26**.

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 Sydney Gateway. Mitigation for this is discussed in **section 11.2.2**.

10.5.4 Travel times

Figure 10-12 and **Figure 10-13** show a comparison of travel times recorded on travel time routes in 2023 and 2033 under 'without project' and 'with project' conditions in the AM and PM peak hours.

In the AM peak hour, 2023 travel times for all sections are similar between scenarios, with more considerable differences in 2033. In the 2033 'without project' scenario, the AM peak hour network is very congested and all travel time sections generate long delays. 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 Domestic Airport routes are affected by Mascot congestion and travel times forecast in the 'with project' scenarios are consistently longer than the ones forecast in 'without project' scenarios. Mitigation for this is discussed in **section 11.2.2**.

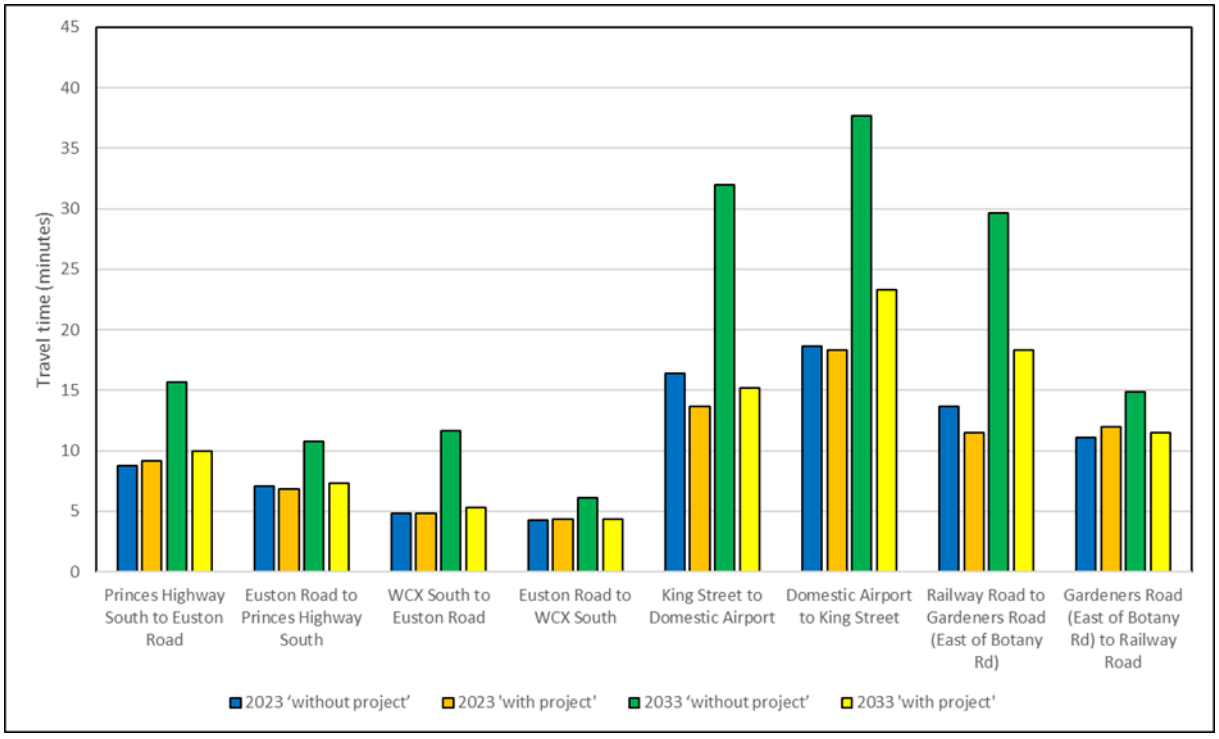


Figure 10-12 St Peters interchange: average travel time (mins) – AM peak hour 'with project' scenarios

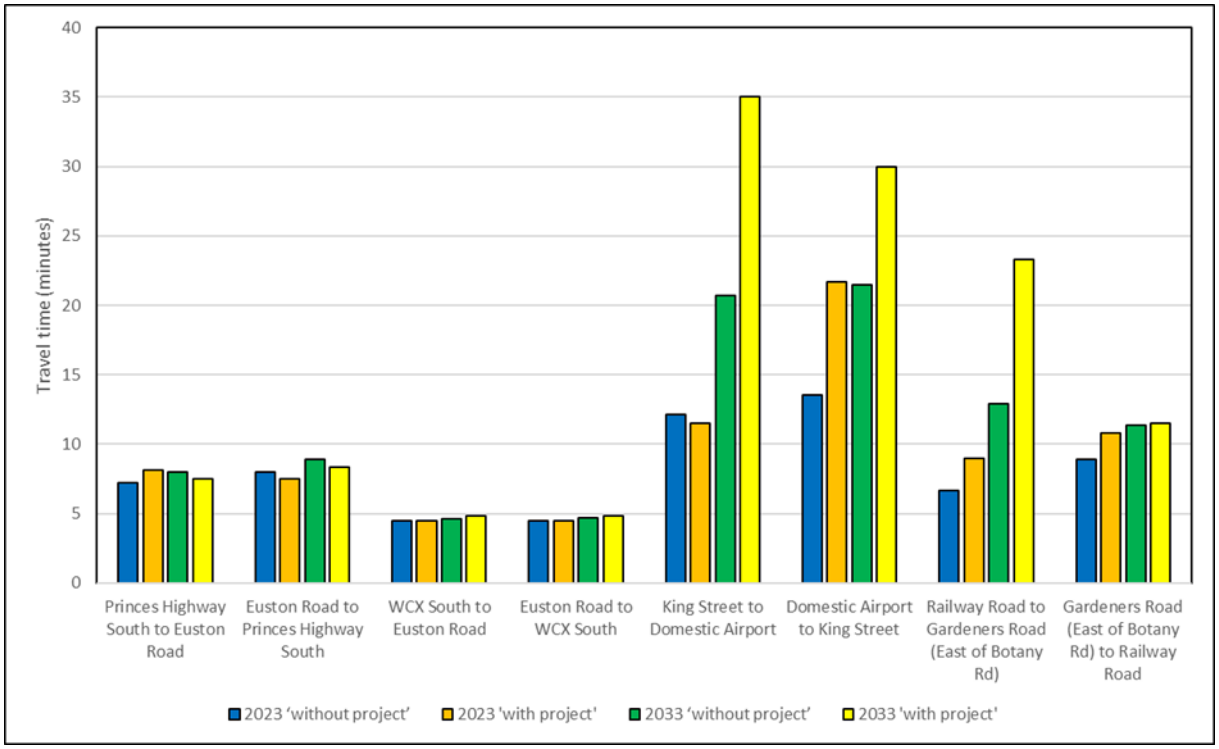


Figure 10-13 St Peters interchange: average travel time (mins) – PM peak hour 'with project' scenarios

10.5.5 Traffic crashes

It was assumed that the frequency of crashes on surface roads in the vicinity of the St Peters area, on the M5 East and 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. This approach is the same as that which was outlined for the 'without project' crash analysis undertaken in **section 6.6.3**.

Table 10-28 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 10-28 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 10-28 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
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 10-29 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 10-29 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 10-29 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

Table 10-30 presents the changes in crashes forecast under the 'with project' scenarios compared to the 'without project' scenarios on the M5 East Motorway and the New M5.

The analysis has been undertaken assuming the future frequency, type, and severity of crashes on the M5 East Motorway would be consistent with historic trends. This is a conservative estimate, as the crash rates are likely to improve with a reduction in congestion. The crash rates on the existing Sydney motorway tunnels (Lane Cove, Eastern Distributor, Cross City and Sydney Harbour tunnels) were used for the New M5.

On this basis, the shift in traffic from the M5 East Motorway to the New M5 would be expected to result in a reduction in both the total number and cost of crashes. In 2023, this results in a road safety benefit with a 10 per cent reduction in crash numbers and a reduction in crash costs from $4.9 million to $4.4 million. In 2033, the project would result in a road safety benefit with a 10 per cent reduction in crash numbers and a reduction in crash costs from $5.7 million to $5.2 million.

Table 10-30 M5 East Motorway: crash comparison between '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'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	58,080	71	$4,363,300
New M5	Western portal	St Peters portal	8.8	24,450	9	$520,100
Total					80	$4,883,400
2023 'with project'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	49,850	61	$3,745,000
New M5	Western portal	St Peters portal	8.8	29,450	11	$626,500
Total					72	$4,371,500
2033 'without project'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	67,930	83	$5,103,300
New M5	Western portal	St Peters portal	8.8	29,340	11	$624,200
Total					94	$5,727,500
2033 'with project'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	58,720	72	$4,411,400
New M5	Western portal	St Peters portal	8.8	35,820	13	$762,000
Total					85	$5,173,400

10.5.6 Public transport services

Figure 10-14 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 a small increase 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' compared to the 2023 'without project' scenario, and again in the 2033 comparison. This reflects the general network comparison and operation in the 2033 PM peak.

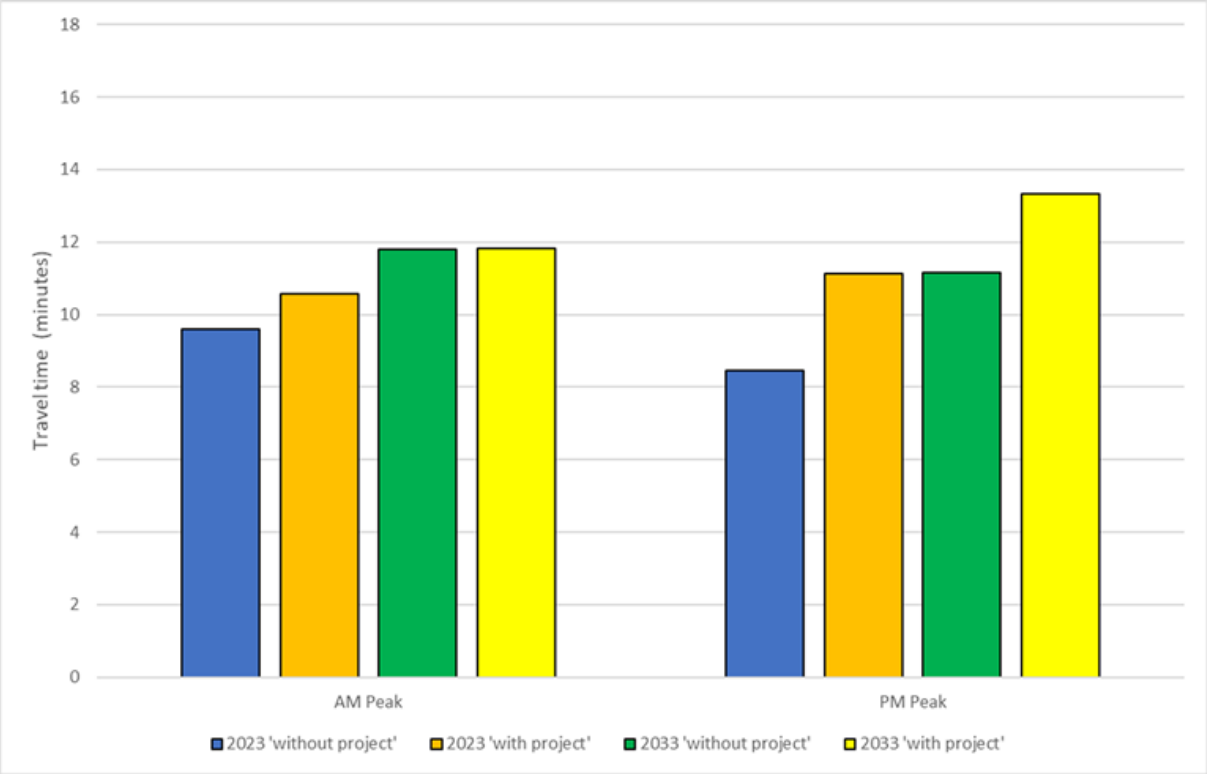


Figure 10-14 St Peters interchange: average travel time for buses – 'with project' comparison

10.5.7 Active transport facilities

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

10.5.8 Impact on local property access and on-street parking

There is no planned impact to local property access or on-street residential or business parking in the St Peters interchange area as part of the project.

10.6 Operations under staged opening

The mainline tunnels are planned for completion in 2022, while the Rozelle interchange is planned for completion in 2023. Therefore, there would be a period of around 12 months during which the mainline tunnels would be operational, without the Rozelle interchange and the Iron Cove Link. This would 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, the mainline tunnels would operate at a lane capacity of two lanes in each direction with forecast two-way AWT of about 49,500 vehicles per day. Operational modelling indicates that forecast peak hour volumes would be within the capacity of the two lanes and LoS D or better is forecast.

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.

As an example, **Table 10-31** compares the AM peak, PM peak and daily 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. As shown, all of the road links have more traffic in one of the other two scenarios. 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 10-31 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

11 Management of impacts with the project

11.1 Management of construction impacts

11.1.1 Construction Traffic and Access Management Plan

A CTAMP will be prepared as part of the Construction Environmental Management Plan. 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. It will seek to minimise delays and disruptions, and identify and respond to any changes in road safety as a result of highway construction works.

The overarching strategy of the CTAMP will be to:

- Ensure all stakeholders are considered during all stages of the project
- Provide safe routes for pedestrians and cyclists during construction
- 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
- Plan and stage works to minimise the need for road occupancy, where possible
- Develop project staging plans in consultation with relevant traffic and transport stakeholders
- Minimise the number of changes to the road users' travel paths and, where changes are required, implement a high standard of traffic controls which effectively warn, inform and guide. This would minimise confusion by providing clear and concise traffic management schemes
- Comprehensively communicate changes to roads or paths to emergency services, public transport operators, other road user groups and any other affected stakeholders
- Identify measures to manage the movements of construction-related traffic to minimise traffic and access disruptions in the public road network
- 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 would 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 would 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.

Staging the construction works on key parts of the network – such as City West Link, Victoria Road, The Crescent, Anzac Bridge – would be critical to enable these key roads to continue to function with as minimal impact as possible.

11.1.2 Other mitigation strategies during construction

It is expected that the construction contractor would take all reasonable measures to ensure that road user delays are kept to an absolute minimum and that safe access is maintained for all road users.

In addition to development of a CTAMP, the following mitigation strategies would be implemented to manage and control traffic during construction, in consultation with the CBD Coordination Office, if appropriate:

- Identify potential road user delays during the planning and consultation phases
- During detailed design and construction planning for the project, develop construction staging and temporary works that minimises conflicts with the existing road network and maximises spatial separation between work areas and travel lanes

- 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.
- Isolate work areas from general traffic
- Develop alternative work methods to minimise delays and road user impacts, for example utilising more efficient plant and equipment, and applying different design solutions
- Provide temporary closed-circuit television (CCTV) and Variable Message Signs at the outset of construction to link with the existing Transport Management Centre (TMC) network to facilitate monitoring and management of impacts and traffic safety
- 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
- Provide a mechanism for the community to report incidents and delays, for example a project phone number. This could be advertised along the construction site's interface with the road network
- Schedule construction-related transport movements to avoid peak traffic periods and adversely affecting congestion, where possible
- Develop and adopt robust community and stakeholder communication protocols regarding altered traffic conditions
- Minimise impacts on the pedestrian paths and cycle lanes, and provide timely alternatives during construction where practical and safe to do so
- Identify impacts on bus stops and provide alternative locations and access in consultation with Transport for NSW and the relevant bus service provider
- Manage local road closures and maintain adequate property access. This would be undertaken in consultation with Roads and Maritime, local councils and property owners likely to be impacted
- Identify haulage routes and communicate, along with site access requirements and restrictions, to all relevant drivers
- Identify potential truck marshalling areas and use where possible, to minimise potential queuing and traffic and access disruptions in the local area
- Monitor heavy vehicle movements to and from sites to ensure compliance with road traffic noise criteria at night
- 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.

11.2 Management of operational impacts

11.2.1 Network changes included in project design

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, while maintaining the eastbound through movement to Anzac Bridge under the intersection
- New active transport network infrastructure connecting the Rozelle Rail Yards with the wider pedestrian and cyclist network, including two north–south pedestrian and cyclist 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
  - Upgrades and modifications to the shared pedestrian and cycle paths along the westbound (southern) carriageway of Victoria Road.

11.2.2 Operational traffic review

The traffic assessment has identified intersections where the operational performance would significantly change under the future traffic demands as modelled. This assessment has been based on forecast traffic demands derived from the WRTM and, consequently, the outcome may be affected by the limitations of the modelling process as described in **section 4.2**.

By 2033, peak demand conditions with or without the project are likely to start earlier and finish later than today to accommodate greater forecast traffic demand arising from increased population and changes to land use. Due to forecast congestion, some of this traffic is predicted to not be able to start or finish their journey within the peak period. Some drivers will therefore choose to make their journey either earlier or later in the peak period to avoid delay. This behaviour called 'peak spreading' is consistent with what has occurred in Sydney and in other international cities.

As with the M4 East and New M5 projects, Roads and Maritime would undertake a review of network performance, in consultation with Transport for NSW and relevant councils, to confirm the operational traffic impacts of the M4-M5 Link on surrounding arterial roads and major intersections at both 12 months and at five years after the commencement of operation of the M4-M5 Link. The assessment would be based on updated traffic surveys at the time and the methodology used would be comparable with that used in this assessment.

Wattle Street interchange and surrounds

The analysis has identified key constraints impacting the performance of the network on Frederick Street (southbound), Parramatta Road (eastbound) and City West Link (northbound) in the 'without project' scenario. The capacity constraints on Parramatta Road and City West Link are generally reduced by the M4-M5 Link project, particularly in 2023. It is expected that the M4 East Road Network Performance Review Plan would examine potential management measures at these locations following the collection of updated data that would facilitate an understanding of actual project outcomes.

Notwithstanding the above, Roads and Maritime proposes the following opportunity to manage operational impacts:

- The identified exit blocking from Frederick Street through the Parramatta Road/Wattle Street intersection in the 'with project' scenario arises from forecast increase in southbound demand, combined with capacity restrictions at downstream intersections and limited storage space on Frederick Street. Management measures to be investigated by Roads and Maritime, in consultation with relevant local councils, could include:
  - Queuing and capacity monitoring and management on the Frederick Street/Milton Street

corridor

- Managing lane use and utilisation to improve the operation of the corridor.

Rozelle interchange and surrounds

The analysis has shown that the Anzac Bridge/Western Distributor is currently at or close to capacity and cannot accommodate more demand, especially in the eastbound AM peak hour, due to existing operational and geometric features of the road network. In all future scenarios, the forecast demand would exceed capacity and therefore management is required.

With the M4-M5 Link operational, there is an increase in the forecast eastbound AM peak hour demand, as the M4 exit ramp and the Iron Cove Link to Anzac Bridge/Western Distributor provide bypasses of City West Link and Victoria Road respectively. Once the proposed future Western Harbour Tunnel is operational, this forecast demand increase diminishes, but would still exceed the capacity of Anzac Bridge/Western Distributor.

Roads and Maritime is developing a strategy to ensure appropriate network integration in the areas surrounding the Rozelle interchange, including:

- Capacity improvement measures – a number of areas have been identified for investigation to improve capacity including the intersection of the Western Distributor and Pyrmont Bridge Road at Pyrmont, the merge and weave arrangements on the Western Distributor in close proximity to Darling Harbour, modifications through the use of moveable medians on the approaches to the Harbour Bridge and a review of kerbside use of the road network at the interfaces with the Western Distributor to remove key bottlenecks and allow additional capacity where appropriate
- Project staging options – effective staging of the opening of major projects would also keep forecast demands closer to capacity and key adjustments to current staging and program timelines for major projects with the surrounding network may be required. Investigations are underway by Roads and Maritime to determine the effect and viability of altering key project timelines to achieve the best road network performance.. This may include timing projects to reduce 'spikes' in the forecast demand that would exceed capacity operation and ensure effective control of traffic. As many of these projects are still in development, the requirements for staging are yet to be determined
- Demand management measures – demand management measures are being considered to effectively manage peak demand on critical links. These include the use of Smart Motorways (including ramp metering, variable speed limits and lane use management) and arterial management through the re-optimisation of the Sydney coordinated adaptive traffic system (SCATS)[15] to manage the altered traffic patterns that will occur with the introduction of the M4-M5 Link project.

Specific measures will be identified as investigations progress and their implementation will depend on their complexity and appropriate timing to minimise impact on the community. Roads and Maritime will carry out these investigations in consultation with SMC, councils and NSW DP&E to develop a program of works.

The Crescent, Johnston Street and Ross Street are forecast to experience increased levels of demand with the introduction of the project, with people travelling to and from the southern fringe of the Sydney CBD through the Annandale area. A strategy is being developed by Roads and Maritime to ensure the impacts of the project are minimised. The strategy will involve investigating and identifying capacity improvement and mitigation measures along The Crescent, Ross Street and Johnston Street. These measures will be implemented in a staged approach to accommodate forecast demand firstly for the M4-M5 Link and thereafter for the proposed future Western Harbour Tunnel. Implementation of these measures will depend on the complexity of the measure and will be implemented at an appropriate stage to minimise impact on the community.

[15] The Sydney coordinated adaptive traffic system (SCATS) is a traffic management system used to synchronise traffic signals to optimise traffic flow.

St Peters interchange and surrounds

The analysis has indicated a deteriorated network performance in the St Peters and Mascot area with the project. However, once Sydney Gateway is in place, a considerable amount of traffic would be removed from the St Peters and Mascot area and the network performance improved to a level generally better than in the 'without project' scenarios. Sydney Gateway is expected to be open at a similar time to the M4-M5 Link. Specific interim mitigation measures for the 'with project' scenario are therefore not proposed.

Should the Sydney Gateway project be delayed for a significant length of time, it is expected that both the New M5 Road Network Performance Review Plan (conditioned as part of the New M5 approval) and the proposed M4-M5 Link Road Network Performance Review would confirm the operational traffic impacts of the projects on surrounding arterial roads and major intersections. These reviews are scheduled at 12 months and five years after the commencement of operation of the New M5 and the M4-M5 Link respectively. Key intersections in the St Peters and Mascot areas are already identified for investigation as part of the New M5 conditions of approval and the following should be included in the M4-M5 Link Road Network Performance Review Plan:

- Gardeners Road/Kent Road
- Gardeners Road/O'Riordan Street
- Kent Road/Coward Street
- Bourke Road/Coward Street
- Kent Road/Ricketty Street.

These reviews would examine potential management measures at these locations, and other locations as identified in the Road Network Performance Review, following the collection of data that would facilitate a clearer understanding of actual project impacts.

11.2.3 Other management techniques and mitigation measures

Management of road 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. Network and corridor planning is a process aimed at enhancing the capacity to manage the road network performance to meet community expectations. Integrated network and corridor planning processes are critical to working towards the vision of 'a safe, sustainable and efficient road transport system'.

The process involves a few key elements including:

- 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.

As a key part of network management, network and/or corridor optimisation is a key tool in the management of project impacts. Together with the ongoing delivery of the Pinch Point Program through the Easing Sydney's Congestion office, which targets peak hour traffic hotspots, and other infrastructure measures previously discussed, network optimisation facilitates the management of impacts identified to ensure travel time savings are maintained to the greatest possible extent by minimising intersection and mid-block delays.

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 SCATS infrastructure at key intersections in the study area, including detectors, will be undertaken and upgrades implemented where appropriate.

12 Assessment of cumulative impacts

12.1 Cumulative projects

This section details the forecast traffic performance of the study area during the 'cumulative' scenarios. The detailed assessments have been undertaken using forecast traffic volumes produced using the WRTM for the following scenarios:

- **Operation 'cumulative' (2023)**: With the 'do minimum' projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway and the proposed future Western Harbour Tunnel (a component of the proposed future Western Harbour Tunnel and Beaches Link project) operational
- **Operation 'cumulative' (2033)**: With the '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 F6 Extension projects operational.

Three other major Roads and Maritime projects are currently in planning and have been included in the cumulative assessments:

- Proposed future Sydney Gateway – comprises a new road link between the St Peters interchange (which is being delivered as part of the New M5 project) and Sydney Airport, with connections towards Port Botany. The proposed future Sydney Gateway project would assist in addressing the high volumes of heavy vehicle traffic generated by the Sydney Airport and Port Botany precincts.
- Proposed future Western Harbour Tunnel and Beaches Link – the proposed future Western Harbour Tunnel and Beaches Link would provide a further tunnel crossing of Sydney Harbour to the west of Sydney Harbour Bridge which, together with WestConnex, would act as a western bypass of the Sydney CBD. It would connect to the M4-M5 Link at the Rozelle interchange, cross underneath Sydney Harbour between the Birchgrove and Waverton areas, and connect with the Warringah Freeway at North Sydney. The Beaches Link component comprises a tunnel that would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah. It would also involve the duplication of the Wakehurst Parkway between Seaforth and Frenchs Forest
- F6 Extension (previously referred to as South Link) – a proposed motorway link between the New M5 at Arncliffe and the existing M1 Princes Highway at Loftus, generally along the alignment known as the F6 corridor.

These projects are subject to separate environmental assessment and approval.

Sydney Metro Northwest (Rouse Hill to Chatswood) and Sydney Metro City and Southwest (Chatswood to Bankstown) are included in all future strategic modelling scenarios. Sydney Metro West was recently announced by NSW Government, is at the early stage of development and has not been included in the future strategic modelling scenarios.

12.2 Sydney metropolitan road network

12.2.1 'Cumulative' (2023)

Figure 12-1 shows bandwidth plots illustrating the forecast change in daily traffic volumes between the 2023 'cumulative' and the 'with 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 'cumulative' 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.

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. Changes in peak period operational performance on these roads are dealt with in **section 12.5**.

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 Sydney Gateway, decreases in daily traffic on surface roads between the St Peters interchange and Sydney Airport, and the Princes Highway, are forecast. Changes in peak period operational performance on these surface roads close to the St Peters interchange are dealt with in **section 12.6**.

As presented in **Chapter 9**, while a shift in daily traffic onto parallel routes as a result of the project is not forecast, increased use of The Crescent and Johnston Street is forecast. Changes in peak period operational performance on these roads are dealt with in **section** .

With the inclusion of the proposed future Western Harbour Tunnel and Sydney Gateway projects, further reductions in peak period travel times compared to the 'with project' scenario are forecast between the M4 corridor and the Sydney Airport/Port Botany precinct in 2023. For example:

- Between Parramatta and Sydney Airport, average peak period travel times are forecast to reduce by a further 10 minutes. This saving is part of a 35 minute saving comparing the 2023 'cumulative' scenario to a scenario without the M4 East and New M5
- Between Burwood and Sydney Airport, average peak period travel times are forecast to reduce by a further five minutes. This saving is part of a 20 minute saving comparing the 2023 'cumulative' scenario to a scenario without the M4 East and New M5
- Between Silverwater and Port Botany, average peak period travel times are forecast to reduce by a further five minutes. This saving is part of a 20 minute saving comparing the 2023 'cumulative' scenario to a scenario without the M4 East and New M5.

Road network productivity improves in 2023, with the inclusion of the proposed future Western Harbour Tunnel and Sydney Gateway. There is a drop in the daily VKT and VHT on the arterial network with an increase in kilometres travelled along the motorway routes, as shown in **Table 12-1**. Overall, a greater distance could be travelled on the road network in a shorter time.

Table 12-1 Comparison of daily 2023 VKT and VHT for metropolitan Sydney in the '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

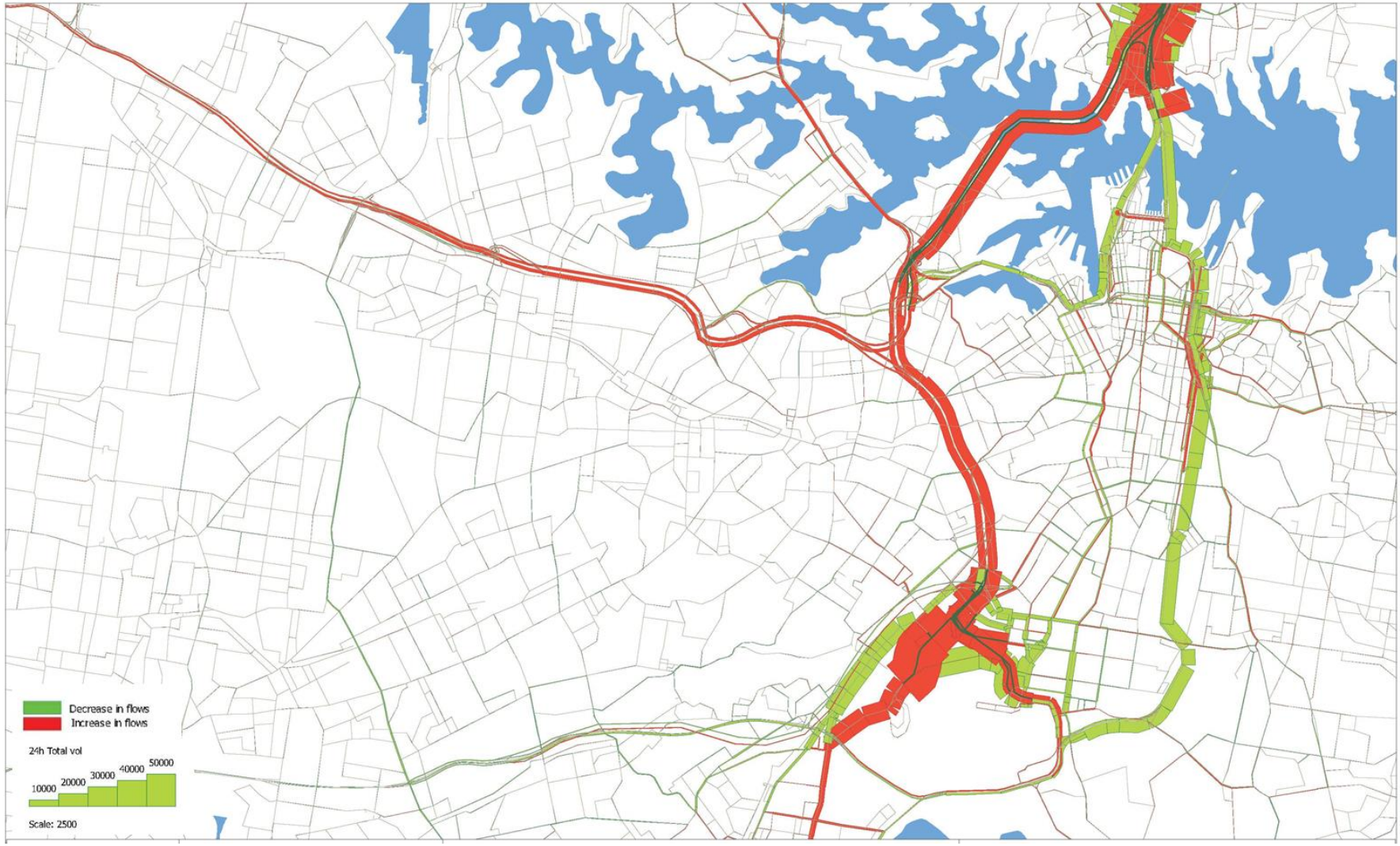
Source: WRTM v2.3, 2017

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 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 heavy vehicle traffic on surface roads between the St Peters interchange and Sydney Airport are also forecast due to Sydney Gateway.

On-road public transport

Reductions in forecast traffic volume as a result of the inclusion of the proposed future Sydney Gateway and Western Harbour Tunnel would be expected to improve the reliability and trip times for public transport bus services on those roads. Assuming the mitigation strategy discussed in **section 11.2.2**, the decrease in daily traffic forecast for Anzac Bridge/Western Distributor could improve reliability and trip times for bus services travelling between the northwest 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.



Source: WRTM v2.3, 2017

Figure 12-1 Difference in AWT between 2023 'cumulative' and 'with project' scenarios

12.2.2 'Cumulative' (2033)

Figure 12-2 shows bandwidth plots illustrating the forecast change in daily traffic volumes between the 2033 'cumulative' and the 'with 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 2033 'cumulative' 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.

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 F6 Extension, creating a major north–south motorway link. The pattern of change highlighted in 2023 is generally the same for 2033, with the scale of increases or decreases mainly 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 Western Harbour Tunnel and Beaches Link, Sydney Gateway and F6 Extension projects, reductions in peak period travel times are forecast between the M4 corridor and the Sydney Airport/Port Botany precinct, in the 2033 'cumulative' scenario. For example:

- Between Parramatta and Sydney Airport, average peak period travel times are forecast to reduce by a further five minutes. This saving is part of a 40 minute saving comparing the 2033 'cumulative' scenario to a scenario without previous WestConnex stages (M4 East and New M5)
- Between Burwood and Sydney Airport, average peak period travel times are forecast to reduce by a further 10 minutes. This saving is part of a 30 minute saving comparing the 2033 'cumulative' scenario to a scenario without the M4 East and New M5
- Between Silverwater and Port Botany, average peak period travel times are forecast to reduce by a further 10 minutes. This saving is part of a 30 minute saving comparing the 2033 'cumulative' scenario to a scenario without the M4 East and New M5.

Road network productivity improves in 2033, with the inclusion of the proposed future Western Harbour Tunnel and Beaches Link, Sydney Gateway and F6 Extension projects. There is a drop in the daily VKT and VHT on the arterial network with an increase in kilometres travelled along the motorway routes, as shown in **Table 12-2**. Overall, a greater distance could be travelled on the road network in a shorter time.

Table 12-2 Comparison of daily 2033 VKT and VHT for metropolitan Sydney in '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

Source: WRTM v2.3, 2017

On-road freight

Forecast changes in daily road-based freight or heavy vehicle movements generally follow the same pattern as 2023, 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 anticipated in 2023 in the 'cumulative' scenarios. Assuming the mitigation strategy discussed in **section 11.2.2**, 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 northwest 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.

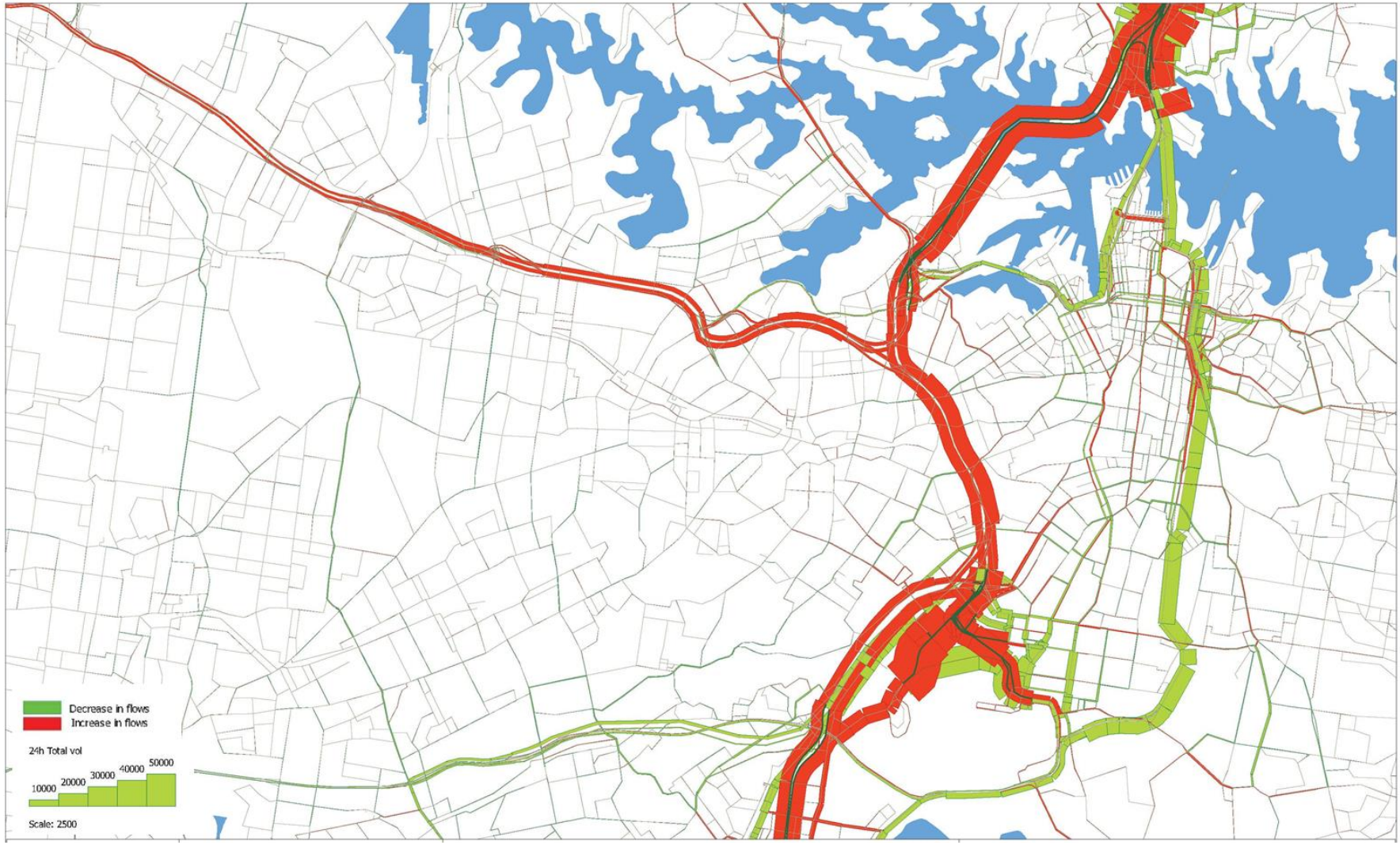


Figure 12-2 Difference in AWT between 2033 'cumulative' and 'with project' scenarios

Source: WRTM v2.3, 2017

12.3 Operational performance – M4-M5 Link motorway

12.3.1 Mid-block level of service

Analysis of 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 12-3** and **Table 12-4**. As noted in **section 10.2.1**, for the purposes of this analysis the motorway was divided into five sections.

Compared to the 2023 'with project' scenario, the 2023 'cumulative' scenario analysis of microsimulation modelling indicates that traffic flows on the motorway are forecast to generally be denser with a corresponding reduction in level of service in the peak hours. However, the motorway is forecast to still generally operate at an acceptable level of service.

Table 12-3 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.

The 2033 'cumulative' scenario analysis indicates traffic flows on the motorway are forecast to 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 (proposed future Western Harbour Tunnel and Beaches Link, Sydney Gateway, and F6 Extension projects), resulting in more traffic in the M4-M5 Link. Sections of the motorway are forecast to operate at LoS E

in the peak hours, particularly around the merge and diverge locations, eg where the Wattle Street interchange ramps and the mainline connect. Even with this increased density, average motorway speeds are still forecast to be 60 kilometres per hour or above in the peak hours.

Table 12-4 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.

Provision has been made for 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, CCTV cameras and entry 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.

12.3.2 Traffic crashes

Table 12-5 presents the comparison between the crash forecast under the 2023 'cumulative' scenario compared to the 'with project' scenario. 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 12-5 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

Table 12-6 presents the comparison between the 2033 'cumulative' scenario compared to the 'with project' scenario. 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 12-6 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

12.4 Operational performance – Wattle Street interchange

12.4.1 Changes to road network in 'cumulative' scenarios

There are no road network differences between 'with project' and 'cumulative' scenarios at the Wattle Street interchange.

12.4.2 Network performance

2023 'cumulative' scenario

Table 12-7 and **Table 12-8** present a comparison of the performance of the road network between the 2023 'with project' and 'cumulative' scenarios for the AM and PM peak hours using microsimulation modelling.

AM peak hour

The 2023 AM peak hour 'cumulative' network conditions are similar to the 'with project' network, 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, Waratah Street and Timbrell Drive, which are forecast to all experience queuing. 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.

Table 12-7 Wattle Street interchange network performance – AM peak hour (2023 'with project' scenario vs 'cumulative' scenario)

Network measure	2023 'with project'	2023 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	21,410	23,457	10%
Total vehicle kilometres travelled in network (km)	34,696	37,629	8%
Total time travelled approaching and in network (hr)	1,667	1,579	-5%
Total vehicles arrived	21,113	23,193	10%
Total number of stops	166,849	149,784	-10%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	1.6	1.6	0%
Average time travelled in network (mins)	4.5	3.9	-13%
Average number of stops	7.1	5.9	-17%
Average speed (km/h)	21.0	24.1	15%
Unreleased vehicles			
Unreleased demand (veh)	297	264	–
% of total traffic demand	1%	1%	–

PM peak hour

The 2023 'cumulative' conditions are similar to those for the 2023 'with project' scenario, with the main cause of congestion remaining the forecast demand to Frederick Street. This traffic cannot be accommodated because of downstream congestion blocking back from southwest of the modelled network extents. As with the 'with project' scenario, significant queues are forecast on Parramatta Road eastbound approach to Wattle Street and on Wattle Street itself. 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.

Table 12-8 Wattle Street interchange network performance – PM peak hour (2023 'with project' scenario vs 'cumulative' scenario)

Network measure	2023 'with project'	2023 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	20,825	22,365	7%
Total vehicle kilometres travelled in network (km)	33,968	35,981	6%
Total time travelled approaching and in network (hr)	1,907	1,801	-5%
Total vehicles arrived	20,049	21,879	9%
Total number of stops	201,602	174,221	-14%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	1.6	1.6	-1%
Average time travelled in network (mins)	5.3	4.7	-11%
Average number of stops	8.7	7.1	-19%
Average speed (km/h)	18.0	20.1	12%
Unreleased vehicles			
Unreleased demand (veh)	776	486	–
% of total traffic demand	4%	2%	–

2033 'cumulative' scenario

Table 12-9 and **Table 12-10** present a comparison of the performance of the road network between the 2033 'with project' and 'cumulative' scenarios for the AM and PM peak hours, using microsimulation modelling.

AM peak hour

The 2033 '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 to City West Link reduces in the 'cumulative' scenario and therefore 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.

Table 12-9 Wattle Street interchange network performance – AM peak hour (2033 'with project' scenario vs 'cumulative' scenario)

Network measure	2033 'with project'	2033 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	23,609	26,182	11%
Total vehicle kilometres travelled in network (km)	37,632	40,385	7%
Total time travelled approaching and in network (hr)	1,821	1,873	3%
Total vehicles arrived	23,114	25,752	11%
Total number of stops	213,460	205,145	-4%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	1.6	1.5	-2%
Average time travelled in network (mins)	4.5	4.2	-6%
Average number of stops	8.3	7.3	-12%
Average speed (km/h)	20.9	21.8	4%
Unreleased vehicles			
Unreleased demand (veh)	495	430	–
% of total traffic demand	2%	2%	–

PM peak hour

The 2033 'cumulative' conditions are similar to the 2033 '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.

Table 12-10 Wattle Street interchange network performance – PM peak hour (2033 'with project' scenario vs 'cumulative' scenario)

Network measure	2033 'with project'	2033 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	22,866	25,106	10%
Total vehicle kilometres travelled in network (km)	36,878	38,897	5%
Total time travelled approaching and in network (hr)	2,316	2,356	2%
Total vehicles arrived	21,917	24,301	11%
Total number of stops	265,136	280,891	6%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	1.6	1.6	-3%
Average time travelled in network (mins)	6.0	5.7	-6%
Average number of stops	10.5	10.3	-2%
Average speed (km/h)	16.1	16.7	3%
Unreleased vehicles			
Unreleased demand (veh)	949	805	–
% of total traffic demand	4%	3%	–

12.4.3 Intersection performance

Table 12-11 presents the modelled AM and PM peak hour LoS for key intersections at the Wattle Street interchange.

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.

Table 12-11 Wattle Street interchange: key intersection performance (LoS) – 2023 and 2033 'cumulative' scenarios

Key intersections	2015 'base case'	2023 'with project'	2023 'cumulative'	2033 'with project'	2033 'cumulative'
AM peak hour					
Parramatta Road/Sloane Street	B	B	B	C	C
Parramatta Road/Liverpool Road	C	C	C	C	C
Parramatta Road/Dalhousie Street	B	B	B	B	B
Parramatta Road/Bland Street	B	B	B	B	B
Parramatta Road/Wattle Street	E	E	D	E	E
Parramatta Road/Great North Road	B	B	B	B	B
Parramatta Road/Arlington Street	B	C	C	D	D
Frederick Street/Church Street	B	C	C	C	D
Wattle Street/Ramsay Street	C	C	C	C	C

Key intersections	2015 'base case'	2023 'with project'	2023 'cumulative'	2033 'with project'	2033 'cumulative'
Dobroyd Parade/Waratah Street	A	A	B	B	B
City West Link/Timbrell Drive	C	D	C	D	C
PM peak hour					
Parramatta Road/Sloane Street	B	B	B	C	B
Parramatta Road/Liverpool Road	B	C	B	E	C
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	D	D
Frederick Street/Church Street	B	B	B	B	B
Wattle Street/Ramsay Street	C	C	C	C	C
Dobroyd Parade/Waratah Street	A	A	A	A	A
City West Link/Timbrell Drive	D	E	D	F	F

12.4.4 Travel times

For the purpose of assessing travel times through the network, exit blocking constraints were retained to reflect network congestion at intersections beyond the modelled network extents.

Figure 12-3 and **Figure 12-4** highlight the difference in network travel times between 'with project' and 'cumulative' scenarios in the AM and PM peak hours, derived from microsimulation modelling.

In the AM peak hour, delay to 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 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 City West Link to Frederick Street and M4-M5 Link to Wattle Street sections.

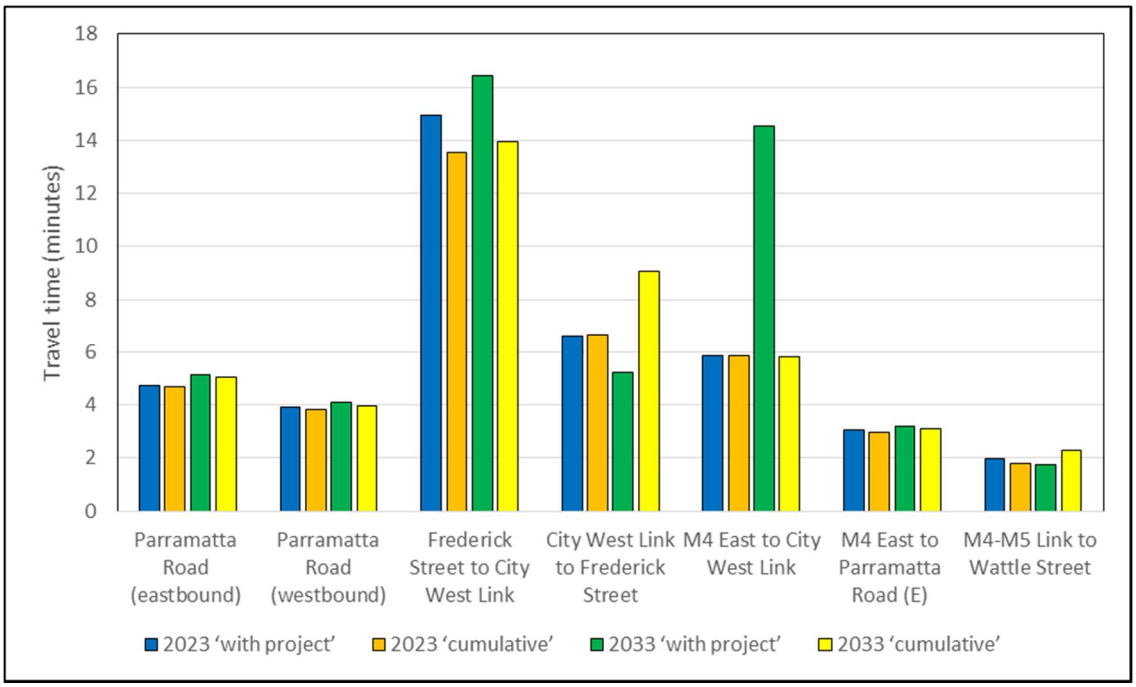


Figure 12-3 Wattle Street interchange: average travel time (mins) – AM peak hour 'cumulative' scenarios

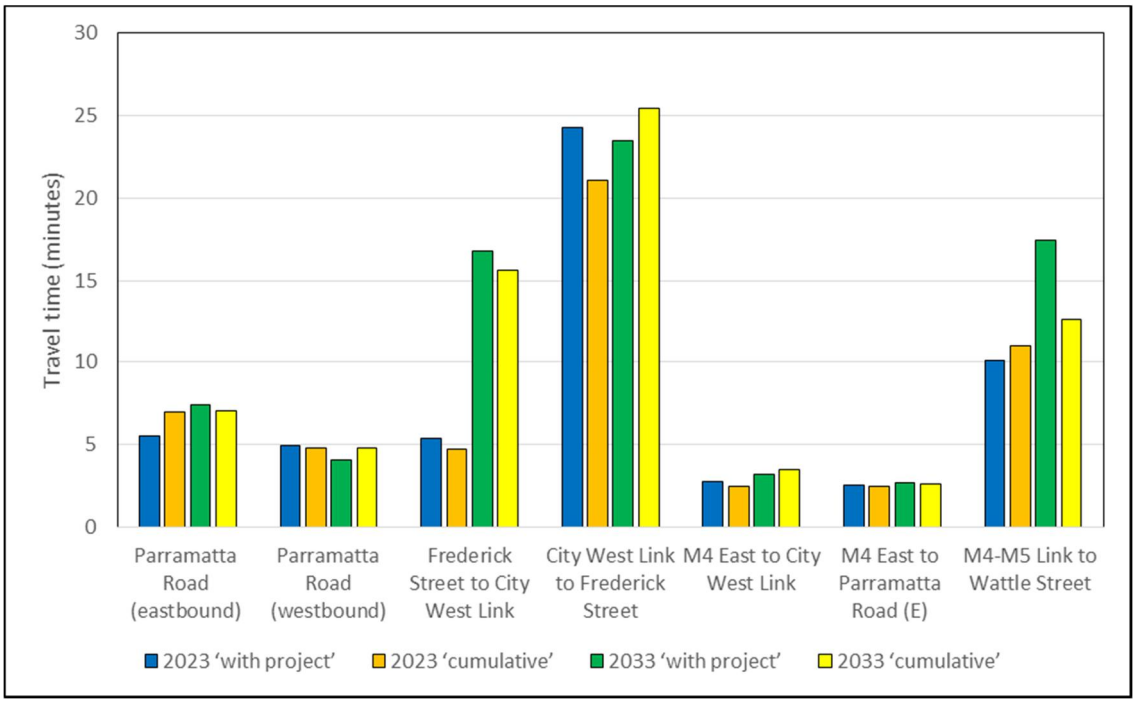


Figure 12-4 Wattle Street interchange: average travel time (mins) – PM peak hour 'cumulative' scenarios

12.4.5 Traffic crashes

Table 12-12 presents the crashes forecast under the 2023 'cumulative' scenario compared to the 'with project' scenario. 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.

Table 12-12 Wattle Street interchange and surrounds: crash comparison between 2023 'cumulative' and 'with project' scenarios

Road	Section from	Section to	Section length (km)	ADT (veh)	Average annual crashes	Average annual cost
2023 'with project'						
Parramatta Road	Wattle Street	City Road	6.6	54,760	96	$10,363,200
2023 'cumulative'						
Parramatta Road	Wattle Street	City Road	6.6	54,950	96	$10,398,400

Table 12-13 compares the crashes forecast under the 2033 scenarios. Similar to the 2023 comparison, daily traffic on Parramatta Road 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.

Table 12-13 Wattle Street interchange and surrounds: crash comparison between 2033 'cumulative' and 'with project' scenarios

Road	Section from	Section to	Section length (km)	ADT (veh)	Average annual crashes	Average annual cost
2033 'with project'						
Parramatta Road	Wattle Street	City Road	6.6	59,100	104	$11,184,200
2033 'cumulative'						
Parramatta Road	Wattle Street	City Road	6.6	59,150	104	$11,194,300

12.4.6 Public transport services

There is no change to public transport provision in the 'cumulative' scenario compared to the 'with project' scenario. **Figure 12-5** and **Figure 12-6** show a comparison in bus journey times between 'with project' and 'cumulative' scenarios in the AM and PM peak hours.

The results indicate that the travel times are similar between the two scenarios.

12.4.7 Active transport facilities

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

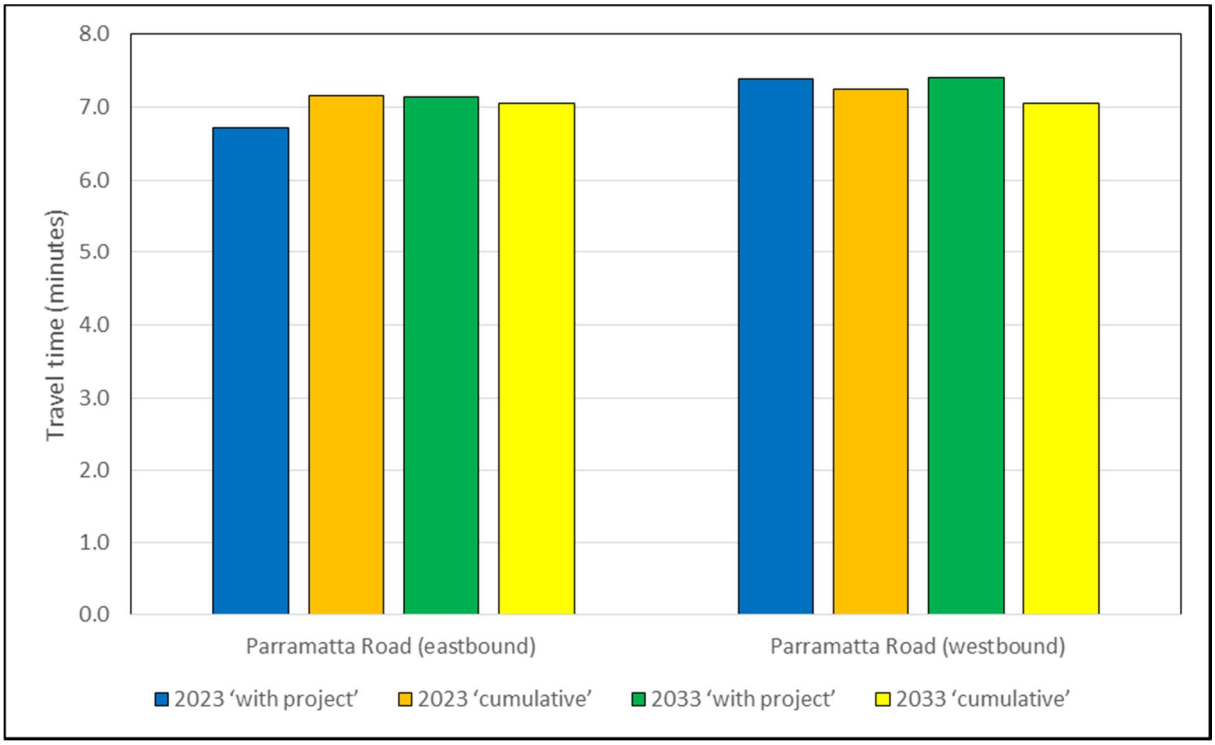


Figure 12-5 Wattle Street interchange: AM peak hour average bus travel time – 'cumulative' comparison

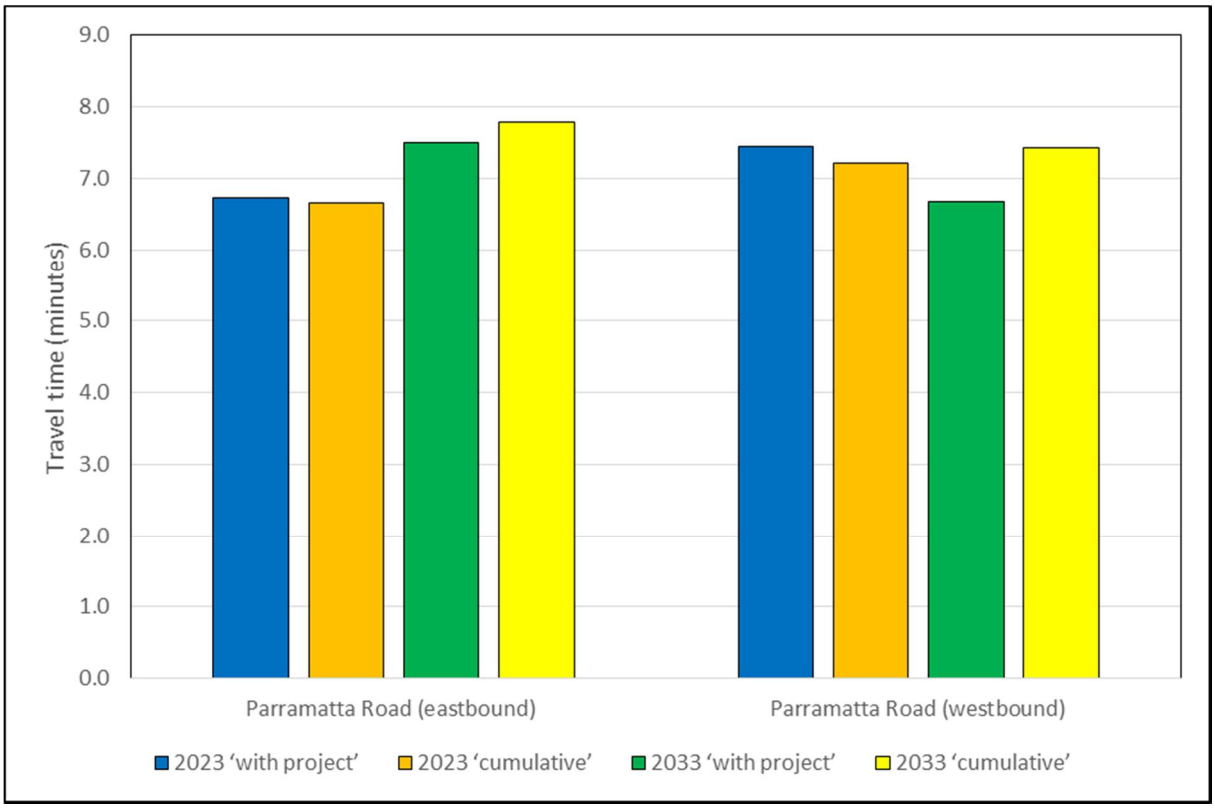


Figure 12-6 Wattle Street interchange: PM peak hour average bus travel time – 'cumulative' comparison

12.5 Operational performance – Rozelle interchange

12.5.1 Changes to road network in 'cumulative' scenario

Figure 12-7 shows the 'cumulative' road network. The 'cumulative' models include the proposed future Western Harbour Tunnel in the 2023 'cumulative' scenario, and the addition of the Beaches Link component in the 2033 'cumulative' scenario. The proposed future Western Harbour Tunnel and Beaches Link would connect to:

- The M5 to the south providing a north–south through route
- The M4 to the west providing an east–west through route.

This operational assessment does not assume there are surface connections between the proposed future Western Harbour Tunnel and Beaches Link and City West Link.

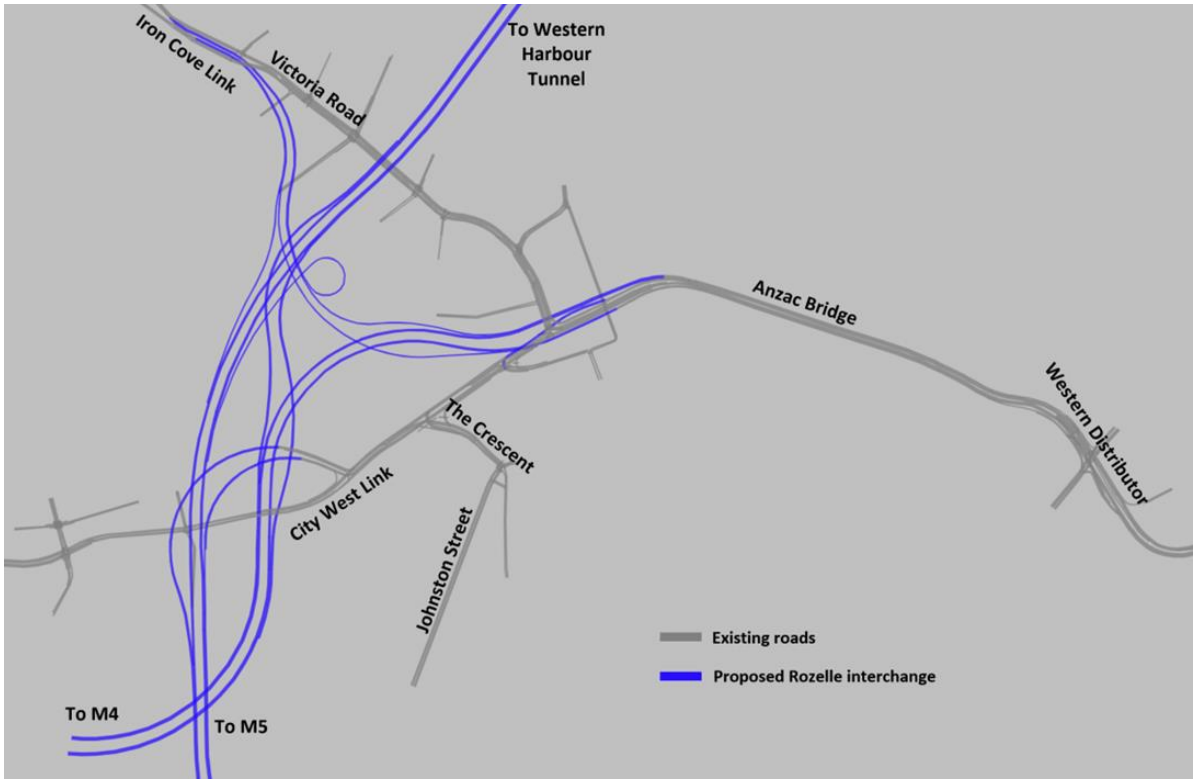


Figure 12-7 Rozelle interchange: 'cumulative' road network for operational traffic modelling

12.5.2 Network performance

2023 'cumulative' scenario

Table 12-14 and **Table 12-15** present a comparison of the performance of the road network as shown in **Figure 12-7**, between the 2023 'with project' and 'cumulative' scenarios for the AM and PM peak hours, using microsimulation modelling. 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 in 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 traffic shifting from the Sydney Harbour Bridge to the proposed future Western Harbour Tunnel. The results in **Table 12-14** show a significant improvement

in overall network performance with higher average speed, fewer stops and fewer unreleased vehicles. However, without mitigation, queuing 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.

Table 12-14 Rozelle interchange network performance – AM peak hour (2023 'with project' vs 'cumulative' scenario)

Network measure	2023 'with project'	2023 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	25,327	29,689	17%
Total vehicle kilometres travelled in network (km)	73,188	91,329	25%
Total time travelled approaching and in network (hr)	6,308	4,139	-34%
Total vehicles arrived	23,799	29,253	23%
Total number of stops	274,030	127,991	-53%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	3.1	3.1	2%
Average time travelled in network (mins)	9.8	5.9	-40%
Average number of stops	10.1	4.0	-60%
Average speed (km/h)	18.8	31.7	69%
Unreleased vehicles			
Unreleased demand (veh)	2,309	703	–
% of total traffic demand	9%	2%	–

PM peak hour

In the PM peak, 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 as traffic shifts to use the proposed future Western Harbour Tunnel.

Table 12-15 Rozelle interchange network performance – PM peak hour (2023 'with project' vs 'cumulative' scenario)

Network measure	2023 'with project'	2023 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	28,109	30,805	10%
Total vehicle kilometres travelled in network (km)	80,108	96,899	21%
Total time travelled approaching and in network (hr)	5,091	3,480	-32%
Total vehicles arrived	24,261	29,496	22%
Total number of stops	179,138	68,692	-62%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	3.3	3.3	-1%
Average time travelled in network (mins)	7.9	5.1	-36%
Average number of stops	6.4	2.1	-66%
Average speed (km/h)	25.1	39.0	56%
Unreleased vehicles			
Unreleased demand (veh)	2,655	1,351	–
% of total traffic demand	9%	4%	–

2033 'cumulative' scenario

Table 12-16 and **Table 12-17** present a comparison of the performance of the road network between the 2033 'with project' and 'cumulative' scenarios for the AM and PM peak hours, using microsimulation modelling.

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 exit ramp still has the potential to queue back to the Western Distributor and negatively impact eastbound traffic on Anzac Bridge.

Table 12-16 Rozelle interchange network performance – AM peak hour (2033 'with project' vs 'cumulative' scenario)

Network measure	2033 'with project'	2033 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	28,023	34,863	24%
Total vehicle kilometres travelled in network (km)	77,690	103,220	33%
Total time travelled approaching and in network (hr)	7,221	5,654	-22%
Total vehicles arrived	25,794	33,314	29%
Total number of stops	272,544	151,561	-44%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	3.0	3.1	3%
Average time travelled in network (mins)	9.3	6.0	-36%
Average number of stops	9.2	4.2	-55%
Average speed (km/h)	19.4	31.2	61%
Unreleased vehicles			
Unreleased demand (veh)	2,719	1,911	–
% of total traffic demand	10%	5%	–

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.

Table 12-17 Rozelle interchange network performance – PM peak hour (2033 'with project' vs 'cumulative' scenario)

Network measure	2033 'with project'	2033 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	30,259	34,705	15%
Total vehicle kilometres travelled in network (km)	86,924	102,632	18%
Total time travelled approaching and in network (hr)	5,286	4,820	-9%
Total vehicles arrived	27,082	32,230	19%
Total number of stops	92,817	81,682	-12%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	3.2	3.2	-1%
Average time travelled in network (mins)	6.1	5.2	-16%
Average number of stops	3.1	2.3	-25%
Average speed (km/h)	31.3	37.1	18%
Unreleased vehicles			

Network measure	2033 'with project'	2033 'cumulative'	Percentage change
Unreleased demand (veh)	2,974	2,537	–
% of total traffic demand	10%	7%	–

12.5.3 Intersection performance

Table 12-18 presents the modelled AM and PM peak hour LoS for key intersections at Rozelle in the 2023 and 2033 'cumulative' scenarios compared to the 'with project' scenarios.

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 Victoria Road/The Crescent intersection, as a result of traffic forecast to reassign to the proposed future Western Harbour Tunnel and Beaches Link project.

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.

Table 12-18 Rozelle interchange: key intersection performance (LoS) – 2023 and 2033 'cumulative' scenarios

Key intersections	2015 'base case'	2023 'with project'	2023 'cumulative'	2033 'with project'	2033 'cumulative'
AM peak hour					
Victoria Road/Lyons Road	D	F	F	F	F
Victoria Road/Wellington Street	D	C	C	D	C
Victoria Road/Darling Street	F	F	F	F	F
Victoria Road/Robert Street	D	C	C	F	E
Victoria Road/The Crescent	B	C	C	D	D
The Crescent/James Craig Road	A	B	A	B	B
City West Link/The Crescent	B	C	C	D	C
The Crescent/Johnston Street	C	C	C	C	F
The Crescent/M5 ramps	–	B	B	B	B
PM peak hour					
Victoria Road/Lyons Road	D	F	F	F	F
Victoria Road/Wellington Street	B	B	B	C	C
Victoria Road/Darling Street	F	D	D	D	D
Victoria Road/Robert Street	F	C	C	C	C
Victoria Road/The Crescent	F	C	C	C	C
The Crescent/James Craig Road	B	A	A	A	A
City West Link/The Crescent	D	B	C	C	C
The Crescent/Johnston Street	F	F	F	F	F
The Crescent/M5 ramps	–	B	B	B	C

12.5.4 Travel times

Figure 12-8 and **Figure 12-9** show the travel time on Victoria Road/Iron Cove Link and City West Link, including Anzac Bridge in the AM and PM peak hours derived from microsimulation modelling.

In the AM peak hour, travel times in the peak eastbound direction are forecast to significantly reduce in the 'cumulative' scenario in both 2023 and 2033. In the westbound direction, increases in travel times to Iron Cove Bridge via Victoria Road are forecast 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.

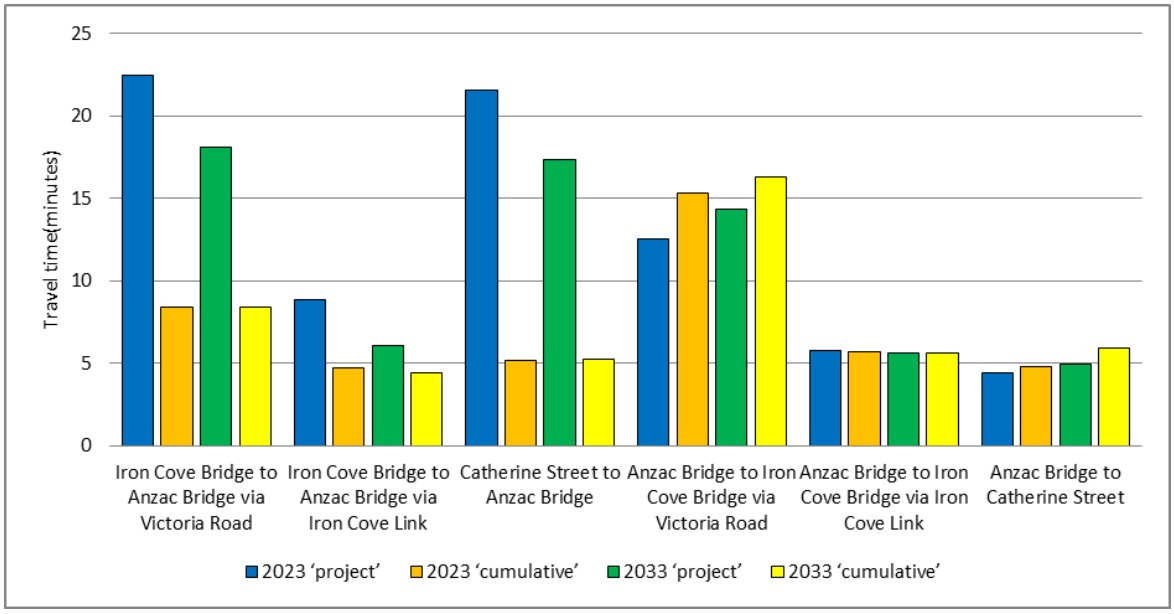


Figure 12-8 Rozelle interchange: average travel time (mins) – AM peak hour 'cumulative' scenarios

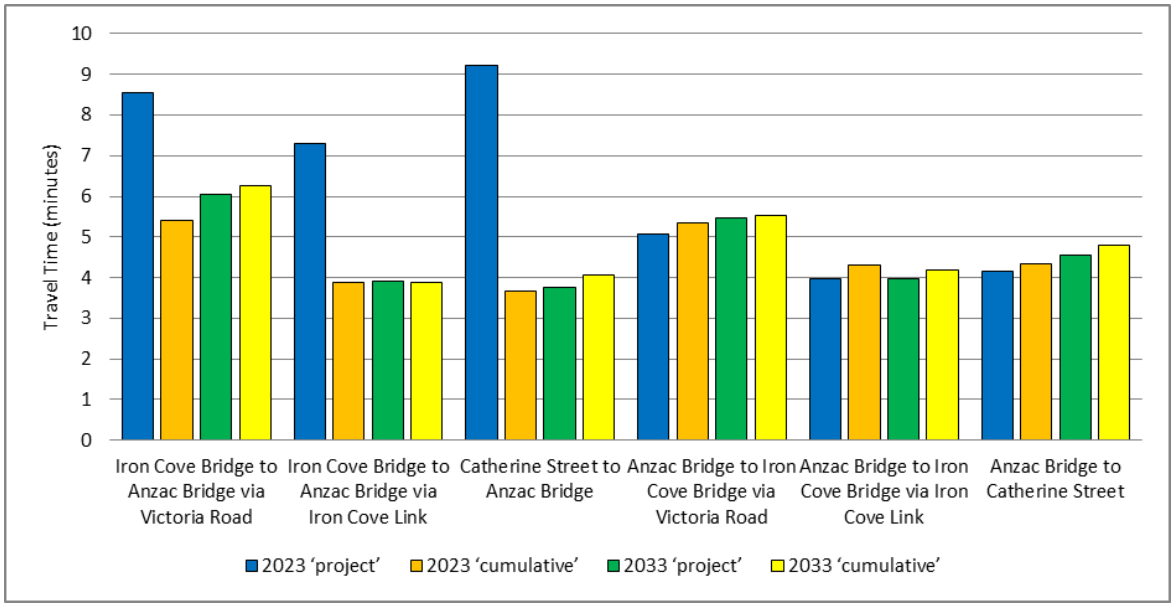


Figure 12-9 Rozelle interchange: average travel time (mins) – PM peak hour 'cumulative' scenarios

12.5.5 Traffic crashes

Table 12-19 presents the crashes forecast under the 2023 'cumulative' scenario compared to the 'with project' scenario.

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.

Table 12-19 Rozelle and surrounds: crash comparison between 2023 'cumulative' and 'with project' scenarios

Road	Section from	Section to	Section length (km)	ADT (veh)	Average annual crashes	Average annual cost
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
2023 'cumulative'						
Anzac Bridge	Miller Street	Victoria Road	0.99	181,440	29	$7,420,700
City West Link	James Street	Victoria Road	2.13	74,030	29	$7,136,300
Victoria Road	Darling Street	The Crescent	0.85	61,080	14	$3,920,100
Lilyfield Road	Victoria Road	Canal Road	2.48	8,361	16	$4,504,400
The Crescent	City West Link	Wigram Road	1.32	44,000	19	$4,577,500
Johnston Street	The Crescent	Parramatta Road	1.80	26,369	21	$5,509,900

Table 12-20 compares the crashes forecast under the 2033 scenarios. 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. Compared to the 2033 'with project' scenario, there is an overall increase of about three per cent.

Table 12-20 Rozelle and surrounds: crash comparison between 2033 'cumulative' and 'with project' scenarios

Road	Section from	Section to	Section length (km)	ADT (veh)	Average annual crashes	Average annual cost
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
2033 'cumulative'						
Anzac Bridge	Miller Street	Victoria Road	0.99	192,540	31	$7,874,700
City West Link	James Street	Victoria Road	2.13	90,360	36	$8,710,500
Victoria Road	Darling Street	The Crescent	0.85	71,090	16	$4,562,500
Lilyfield Road	Victoria Road	Canal Road	2.48	9,821	19	$5,291,100
The Crescent	City West Link	Wigram Road	1.32	50,970	23	$5,302,600
Johnston Street	The Crescent	Parramatta Road	1.80	29,871	23	$6,241,600

12.5.6 Public transport services

Figure 12-10 and **Figure 12-11** show the comparison in travel times for buses between the 'cumulative' and 'with project' scenarios for the AM and PM peak hours. The main bus route on Victoria Road, Anzac Bridge and the bus lanes to and from Druitt Street is presented.

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.

12.5.7 Active transport facilities

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

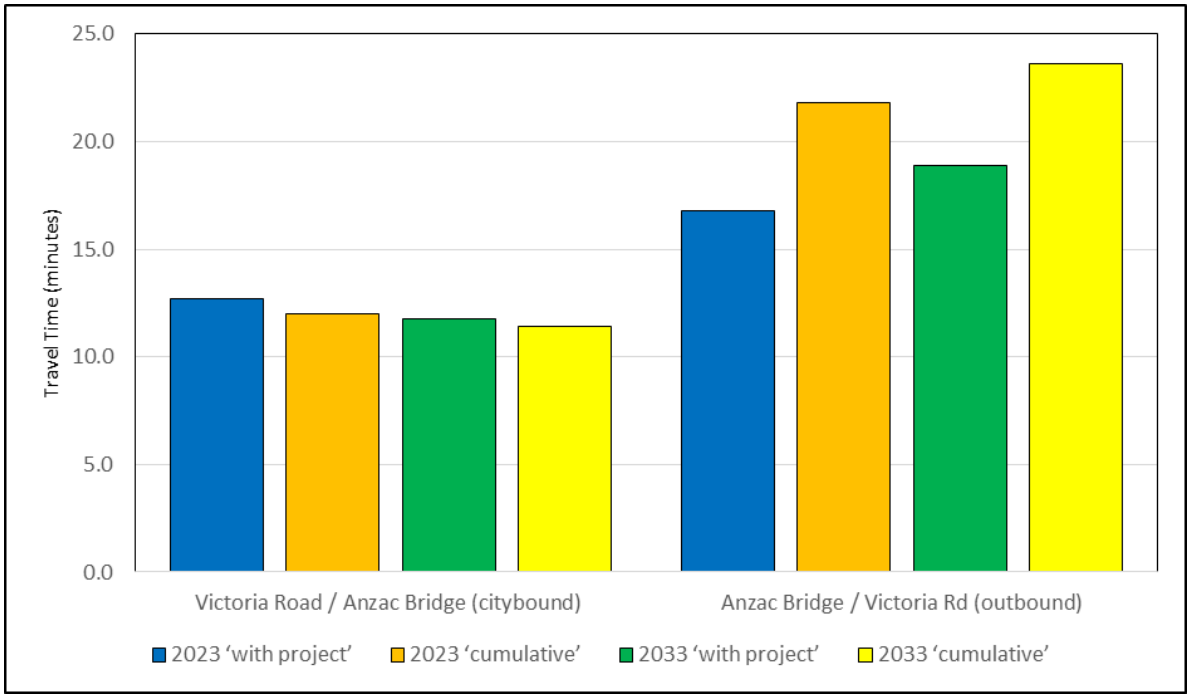


Figure 12-10 Rozelle interchange: average travel time for buses – AM peak hour 'cumulative' comparison

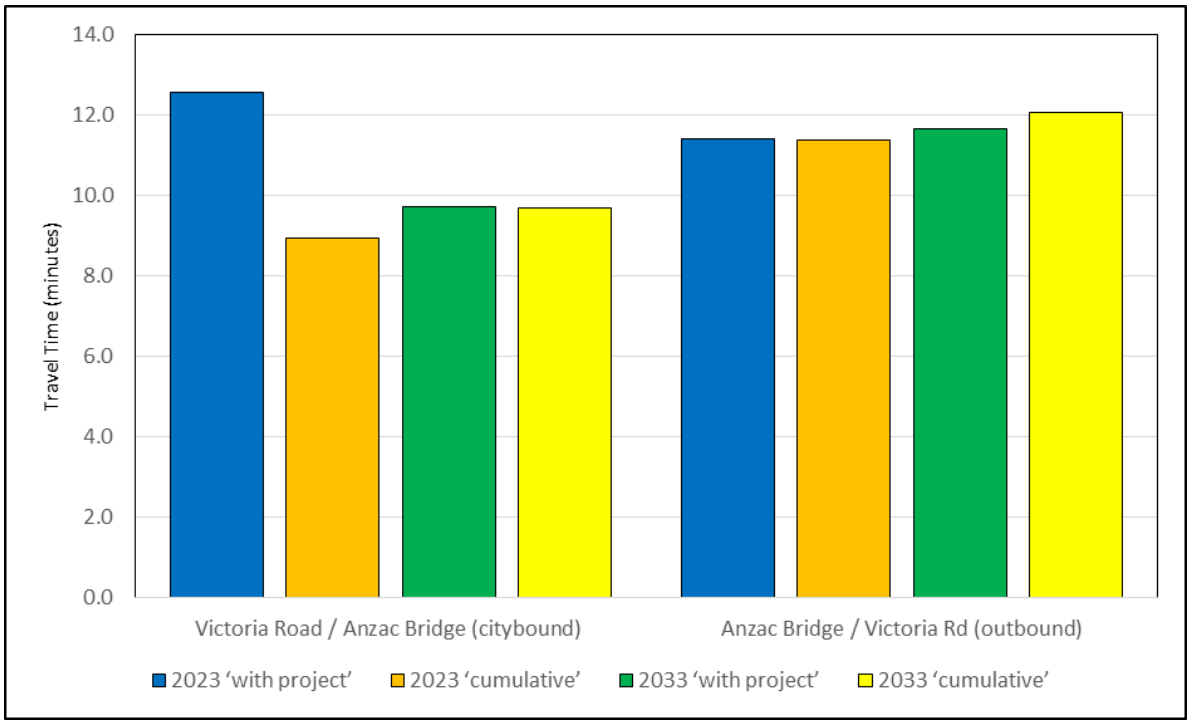


Figure 12-11 Rozelle interchange: average travel time for buses – PM peak hour 'cumulative' comparison

12.5.8 Cumulative scenario with proposed future Western Harbour Tunnel and Beaches Link 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 has not been included in this traffic assessment.

A preliminary assessment with these ramps operational has been carried out and indicates 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 and Beaches Link. However, 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.

12.6 Operational performance – St Peters interchange

12.6.1 Changes to road network in 'cumulative' scenario

In the 2023 and 2033 'cumulative' scenarios, Sydney Gateway is included in the St Peters interchange modelled road network. This provides a new link from the St Peters interchange to the Sydney Airport/Port Botany precinct. 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.

As part of the Sydney Gateway project, in the vicinity of the Sydney Airport Domestic Airport, a new flyover bypasses Airport Drive intersections with Robey Street and O'Riordan Street. This new flyover 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 flyover 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.

The full forecast demand to and from the Sydney Airport precinct is used in the models of the 'cumulative' scenarios.

12.6.2 Network performance

2023 'cumulative' scenario

Table 12-21 and **Table 12-22** present a comparison of the performance of the road network, between the 2023 'with project' and 'cumulative' scenarios for the AM and PM peak hours, using microsimulation modelling. The 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 show 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 and average speed in the network is forecast to significantly increase. The 'cumulative' scenario network is better able to cope with increased demand, which is reflected in fewer unreleased vehicles, without the need to cap demand.

Table 12-21 St Peters interchange network performance – AM peak hour (2023 'with project' vs 'cumulative' scenario)

Network measure	2023 'with project'	2023 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	28,470	30,710	8%
Total vehicle kilometres travelled in network (km)	89,120	108,010	21%
Total time travelled approaching and in network (hr)	5,350	4,110	-23%
Total vehicles arrived	26,190	29,490	13%
Total number of stops	205,570	147,220	-28%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.9	3.3	12%
Average time travelled in network (mins)	8.9	6.8	-24%
Average number of stops	7.9	5.0	-36%
Average speed (km/h)	19.9	29.1	46%
Unreleased vehicles			
Unreleased demand (veh)	2,470	1,390	–
% of total traffic demand	9%	5%	–
Demand reduction to/from Sydney Airport precinct (veh)	720	–	–

PM peak hour

The PM peak hour network performance results show a similar trend to the AM peak hour. 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 demand.

Table 12-22 St Peters interchange network performance – PM peak hour (2023 'with project' vs 'cumulative' scenario)

Network measure	2023 'with project'	2023 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	27,920	29,180	5%
Total vehicle kilometres travelled in network (km)	90,610	100,810	11%
Total time travelled approaching and in network (hr)	4,710	4,140	-12%
Total vehicles arrived	26,600	28,030	5%
Total number of stops	186,400	160,720	-14%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.9	3.2	8%
Average time travelled in network (mins)	8.6	7.3	-15%

Network measure	2023 'with project'	2023 'cumulative'	Percentage change
Average number of stops	7.0	5.7	-18%
Average speed (km/h)	20.4	26.0	27%
Unreleased vehicles			
Unreleased demand (veh)	1,030	1,040	–
% of total traffic demand	4%	4%	–
Demand reduction to/from Sydney Airport precinct (veh)	360	–	–

2033 'cumulative' scenario

Table 12-23 and **Table 12-24** present a comparison of the performance of the road network between the 2033 'with project' and 'cumulative' scenarios for the AM and PM peak hours, using microsimulation modelling.

AM peak hour

The 2033 AM peak network performance results show 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 are forecast to reach their destination. Average measures per vehicle show improvement and there are fewer unreleased vehicles.

Table 12-23 St Peters interchange network performance – AM peak hour (2033 'with project' vs 'cumulative' scenario)

Network measure	2033 'with project'	2033 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	31,990	36,820	15%
Total vehicle kilometres travelled in network (km)	92,690	131,490	42%
Total time travelled approaching and in network (hr)	7,890	7,470	-5%
Total vehicles arrived	27,130	32,980	22%
Total number of stops	250,290	253,840	1%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.8	3.3	17%
Average time travelled in network (mins)	10.9	10.0	-9%
Average number of stops	9.2	7.7	-17%
Average speed (km/h)	15.7	20.1	28%
Unreleased vehicles			
Unreleased demand (veh)	4,310	2,760	–
% of total traffic demand	13%	7%	–
Demand reduction to/from Sydney Airport precinct (veh)	830	–	–

PM peak hour

The 2033 PM peak network performance results show significantly better network operation in 'cumulative' scenario. Even with total forecast demand higher by 14 per cent, total travel time is shorter and the number of vehicles arriving at their destination increases. In the 'with project' scenario, the network performs poorly, with an average speed of about 11 kilometres per hour. In the 'cumulative' scenario, with higher demand, 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.

Table 12-24 St Peters interchange network performance – PM peak hour (2033 'with project' vs 'cumulative' scenario)

Network measure	2033 'with project'	2033 'cumulative'	Percentage change
All vehicles			
Total traffic demand (veh)	30,990	35,240	14%
Total vehicle kilometres travelled in network (km)	84,000	123,080	47%
Total time travelled approaching and in network (hr)	9,700	6,130	-37%
Total vehicles arrived	24,120	32,550	35%
Total number of stops	248,790	204,030	-18%
Average per vehicle in network			
Average vehicle kilometres travelled in network (km)	2.7	3.3	20%
Average time travelled in network (mins)	14.5	8.7	-40%
Average number of stops	10.3	6.3	-39%
Average speed (km/h)	11.2	22.6	101%
Unreleased vehicles			
Unreleased demand (veh)	6,340	2,370	–
% of total traffic demand	20%	7%	–
Demand reduction to/from Sydney Airport precinct (veh)	420	–	–

Overall, the network around St Peters in the 'cumulative' scenario performs better in both forecast years and both peak hours, with the most improvement occurring in the 2033 PM 'cumulative' scenario. Despite higher total demand, each 'cumulative' scenario records higher average speed in the network and has more vehicles arriving at their destination than the corresponding 'with project' case.

The 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 and accommodation of the full forecast traffic demand.

12.6.3 Intersection performance

Table 12-25 presents the modelled AM and PM peak hour LoS for key intersections at St Peters in the 2023 and 2033 'cumulative' scenarios compared to the 'with project' scenarios. The results show that in both forecast years and 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.

Table 12-25 St Peters interchange: key intersection performance (LoS) – 2023 and 2033 'cumulative' scenarios

Key intersections	2015 'base case'	2023 'with project'	2023 'cumulative'	2033 'with project'	2033 'cumulative'
AM peak hour					
Princes Highway/Sydney Park Road	C	C	C	C	C
Princes Highway/May Street	D	C	C	D	C
Princes Highway/Canal Road	D	F	E	F	F
Princes Highway/Railway Road	F	F	F	F	F
Sydney Park Rd/Mitchell Road	C	C	B	C	D
Euston Road/Sydney Park Road	A	C	C	D	E
Unwins Bridge Road/Campbell Street	C	D	D	F	E
Campbell Road/Euston Road	A	C	D	D	E
Campbell Road/Bourke Road	–	D	C	F	E
Princes Highway/Campbell Street	C	F	F	F	F
Ricketty Street/Kent Road*	C	D	D	F	F
Gardeners Road/Kent Road*	A	D	C	F	F
Gardeners Road/Bourke Road	C	E	C	F	F
Gardeners Rd/O'Riordan Street*	D	F	F	F	F
PM peak hour					
Princes Highway/Sydney Park Road	D	B	C	C	F
Princes Highway/May Street	F	C	B	B	C
Princes Highway/Canal Road	D	C	F	E	D
Princes Highway/Railway Road	D	F	F	F	F
Sydney Park Rd/Mitchell Road	D	C	C	D	C
Euston Road/Sydney Park Road	B	D	C	D	D
Unwins Bridge Road/Campbell Street	D	E	D	F	F
Campbell Road/Euston Road	A	D	D	F	F
Campbell Road/Bourke Road	–	C	D	F	D
Princes Highway/Campbell Street	D	E	E	E	F
Ricketty Street/Kent Road*	C	D	B	F	C
Gardeners Road/Kent Road*	A	D	B	F	C
Gardeners Road/Bourke Road	D	F	D	F	F
Gardeners Rd/O'Riordan Street*	E	F	F	F	F

*These intersections have upgrades in the 'with project' scenarios

12.6.4 Travel times

Figure 12-12 and **Figure 12-13** show a comparison of travel times on routes in 2023 and 2033 under 'with project' and 'cumulative' scenarios in the AM and PM peak hours, derived from microsimulation modelling.

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 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.

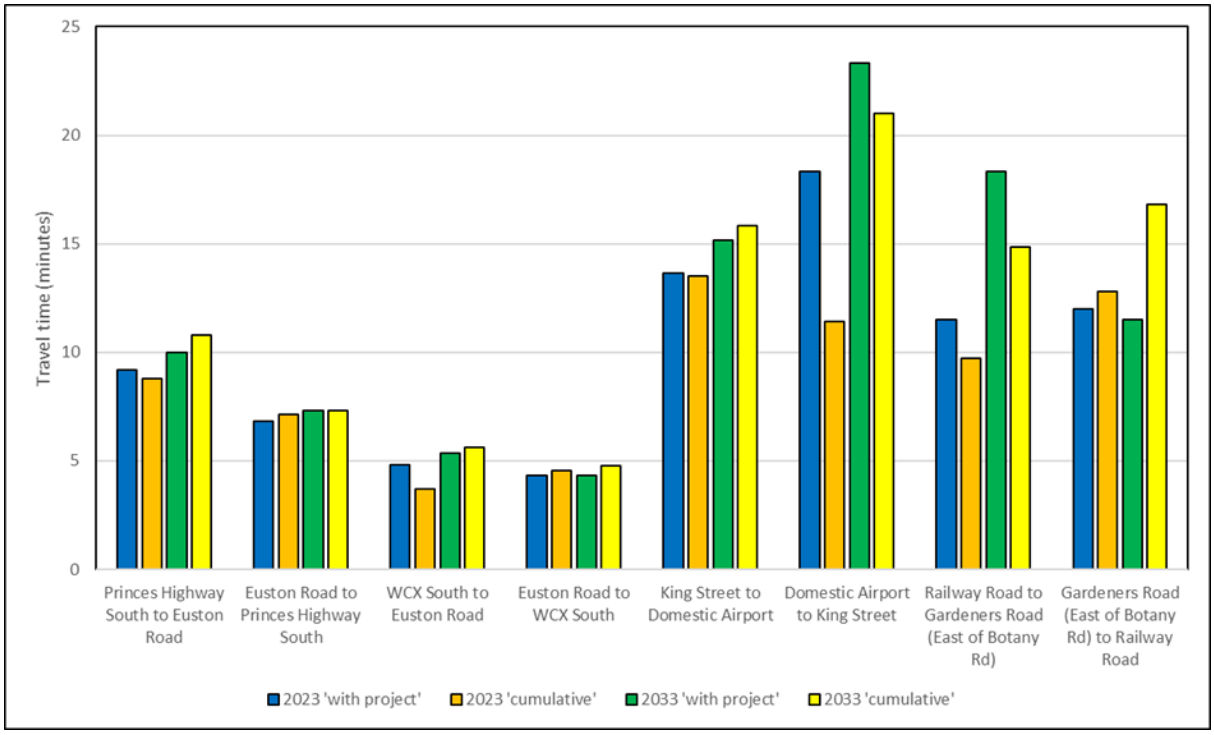


Figure 12-12 St Peters interchange: average travel time (mins) – AM peak hour 'cumulative' scenarios

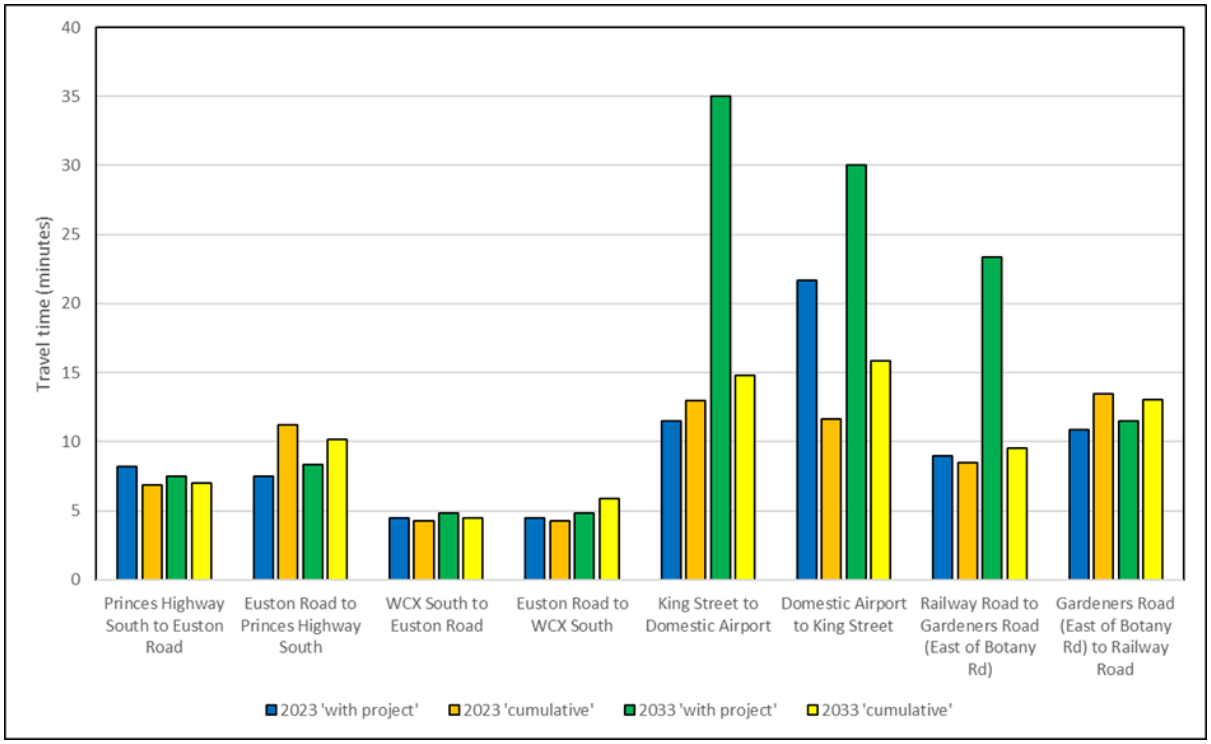


Figure 12-13 St Peters interchange: average travel time (mins) – PM peak hour 'cumulative' scenarios

12.6.5 Traffic crashes

As before, it was assumed that the frequency of crashes on surface roads in the vicinity of the St Peters area and on the M5 East and the New M5 motorways would change relative to forecast traffic changes and historical crash rates for these roads. This approach is the same as outlined for the 'without project' crash analysis undertaken in **section 6.6.3**.

Table 12-26 presents the crashes forecast under the 2023 'cumulative' scenario compared to the 'with 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 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.

Table 12-26 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.

Table 12-26 St Peters and surrounds: 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'						
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	2.1	25,250	27	$2,072,900

Road	Section from	Section to	Section length (km)	ADT (veh)	Average annual crashes	Average annual cost
		Road				
2023 'cumulative'						
Princes Highway	Enmore Road	Gannon Street	3.8	23,540	38	$3,883,900
Canal Road/ Ricketty Street/ Gardeners Road	Princes Highway	Botany Road	2.4	9,900	12	$1,081,500
Euston Road	Sydney Park Road	Campbell Road	0.9	47,660	35	$2,745,400
Bourke Road	Wyndham Street	Gardeners Road	2.1	26,810	29	$2,201,000

Table 12-27 compares the crashes forecast under the 2033 'with project' and 'cumulative' scenarios. In the 2033 'cumulative' 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. 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.

Table 12-27 shows that there is a significant reduction in the number and cost of crashes at these locations of about 37 per cent compared to the 'with project' scenario.

Table 12-27 St Peters and surrounds: 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'						
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
2033 'cumulative'						
Princes Highway	Enmore Road	Gannon Street	3.8	23,510	38	$3,878,900
Canal Road/ Ricketty Street/ Gardeners Road	Princes Highway	Botany Road	2.4	11,330	14	$1,237,700
Euston Road	Sydney Park Road	Campbell Road	0.9	54,230	40	$3,123,900
Bourke Road	Wyndham Street	Gardeners Road	2.1	27,200	29	$2,233,000

Table 12-28 presents the changes in crashes forecast under the 'with project' scenario compared to the 'cumulative' scenario on the M5 East Motorway and the New M5.

The analysis has been undertaken assuming the future frequency, type, and severity of crashes on the M5 East Motorway would be consistent with historic trends. This is a conservative estimate, as the crash rates are likely to improve with a reduction in congestion. The crash rates on the existing Sydney motorway tunnels (Lane Cove, Eastern Distributor, Cross City and Sydney Harbour tunnels) were used for the New M5.

In the 2023 'cumulative' scenario, the forecast traffic on the M5 corridor is similar to the 'with project' scenario, and there are no changes forecast regarding the number of crashes on the M5 corridor.

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.

Table 12-28 M5 East and New M5 Motorways: crash comparison between 'with project' and 'cumulative project' scenarios

Road	Section from	Section to	Section length (km)	ADT (veh)	Average annual crashes	Average annual cost
2023 'with project'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	49,850	61	$3,745,000
New M5	Western portal	St Peters portal	8.8	29,450	11	$626,500
Total					72	$4,371,500
2023 'cumulative'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	49,540	61	$3,721,700
New M5	Western portal	St Peters portal	8.8	29,600	11	$629,700
Total					72	$4,351,400
2033 'with project'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	58,720	72	$4,411,400
New M5	Western portal	St Peters portal	8.8	35,820	13	$762,000
Total					85	$5,173,400
2033 'cumulative'						
M5 East Motorway	King Georges Road	General Holmes Drive	9.5	55,820	69	$4,193,500
New M5	Western portal	F6 Extension	5.8	28,320	7	$393,700
New M5	F6 Extension	St Peters portal	3	77,260	10	$549,300
Total					85	$5,136,500

12.6.6 Public transport services

Figure 12-14 shows the comparison 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.

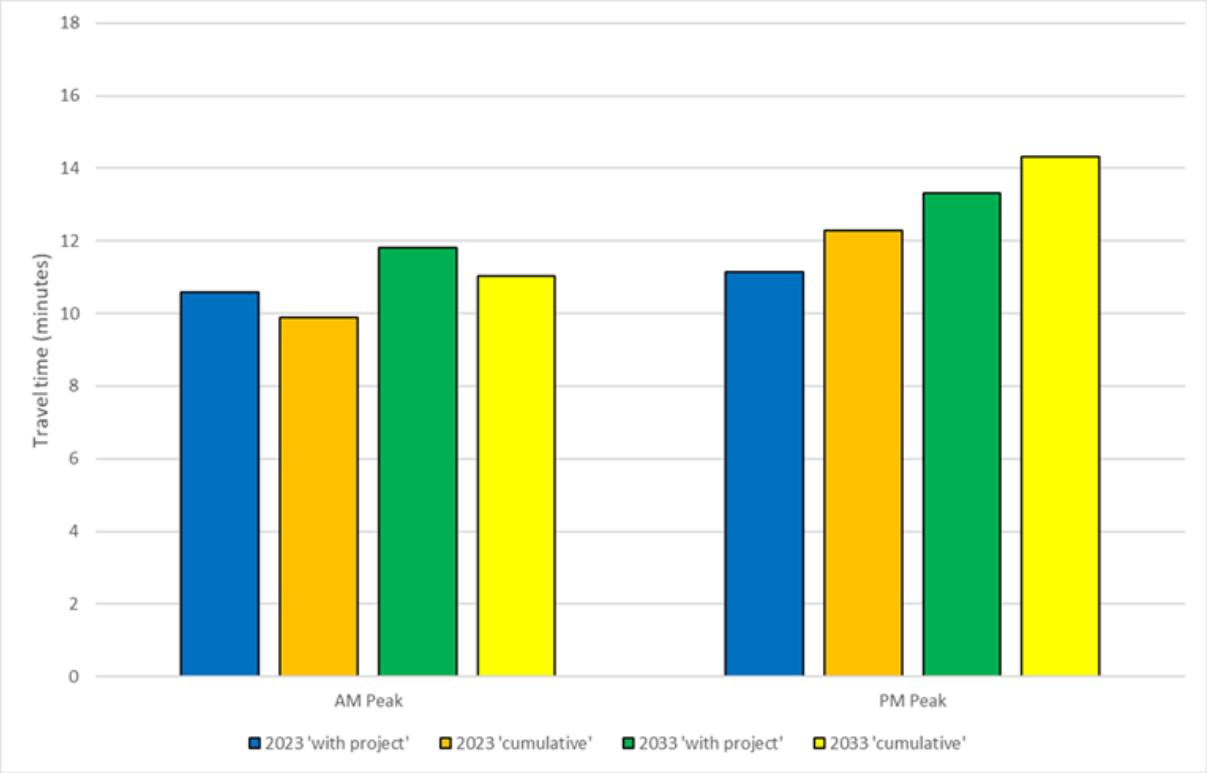


Figure 12-14 St Peters interchange: average travel time for buses – 'cumulative' comparison

12.6.7 Active transport facilities

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

12.7 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 Sydney Gateway projects and as part of Roads and Maritime network mitigation strategies.

Ongoing consultation with the design teams for these projects is occurring with the objective of minimising cumulative traffic impacts.

13 Conclusion

Strategic and operational traffic modelling has assessed the M4-M5 Link project, on its own and as part of the broader planned motorway network development. Key outcomes of the traffic operational modelling include:

- Sections of the Sydney surface road network are currently approaching or exceeding capacity in the peak periods. The predicted peak period traffic volumes on the surface road network show significant growth by 2033 with or without the M4-M5 Link. This forecast growth in traffic demand is consistent with the forecast growth in population in the Sydney Metropolitan Area. It is expected that, given the predicted growth in traffic volumes, future peak periods would become longer in both the AM and PM peaks, spreading congestion over longer periods of the day
- By 2033, the surface road network adjacent to the M4-M5 Link is forecast to be at or close to capacity in peak periods without the project. The completion of the M4-M5 Link, as well as the Sydney Gateway, is forecast to reduce vehicle distance travelled on non-motorway roads, such as in the Inner West. In the 'with project' scenarios, overall network productivity is improved, with longer or more trips able to take place in less time
- Reduced travel times are forecast on key corridors, such as between the M4 Motorway corridor and the Sydney Airport/Port Botany precinct, and reduced traffic is 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
- Reduced heavy vehicle volumes on non-motorway links is also forecast, as heavy vehicles are forecast to shift onto the M4-M5 Link. Daily heavy vehicle volumes on Parramatta Road and City West Link are forecast to drop by 40 to 50 per cent, and roads in the Inner West, such as Stanmore Road, Sydenham Road, Marrickville Road and King Street, are forecast to drop by 20 to 50 per cent. Almost 2,000 heavy vehicles are forecast to be removed from Parramatta Road, east of the M4 East Parramatta Road ramps, each weekday
- The provision of new connectivity at the Wattle Street, Rozelle and St Peters interchanges is forecast to increase congestion 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. A number of these areas are forecast to improve when the proposed future Sydney Gateway and Western Harbour Tunnel and Beaches Link projects are completed
- An implementation strategy to manage existing capacity constraints and to ensure appropriate network integration of the project is being developed. This strategy is likely to include active traffic management measures both on the motorway and arterial networks.

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.

Based on the assessments undertaken, the project would contribute to the overall WestConnex program of works by fulfilling these objectives.

References

- *Guide to Traffic Management – Part 3 Traffic Studies and Analysis* (Austroads 2013)
- *Traffic Modelling Guidelines* (Roads and Maritime 2013)
- *Guide to Traffic Generating Developments Version 2.2* (RTA 2002).
- *A Plan for Growing Sydney* (NSW Government 2015)
- *NSW Long Term Transport Master Plan* (Transport for NSW 2012)
- *NSW Freight and Ports Strategy* (Transport for NSW 2013)
- *State Infrastructure Strategy Update 2014* (Infrastructure NSW 2014)
- *Sydney Airport Master Plan 2033* (Sydney Airport Corporation Limited 2013)
- *Sydney City Centre Access Strategy* (Transport for NSW 2013)
- *Parramatta Road Corridor Urban Transformation Strategy* (UrbanGrowth NSW 2016)
- *Transformation Plan: The Bays Precinct, Sydney* (UrbanGrowth NSW 2015)
- *Principles and Procedures for Economic Appraisal of Transport Investment and Initiatives* (Transport for NSW 2013)
- *Metropolitan Road Freight Hierarchy on the State Road Network Practice Note* (Department of Transport 2011)

Annexures

Annexure A Response to Agency comments

Annexure Table 1 How agency comments have been addressed in this report

Agency letters	
Inner West Council	
Comment	**Section where addressed in EIS**
· Traffic impact assessment for the project should not be restricted to major roads – it should also address possible impacts on the adjacent road network.	· A traffic impact assessment was undertaken on the road network adjacent to the project and is presented through screenline analysis in **Chapter 9** and operational modelling in **Chapter 10**.
· Implications that freer flow on Victoria Road may have on: - Adjacent shopping areas including Rozelle and Drummoyne - Pedestrian safety - Induced demand for private car travel - The psychological and physical barrier presented by Victoria Road - Possible increases in the severity of accidents on Victoria Road, resulting from potentially higher speeds.	· While there may be a reduction in future forecast traffic on Victoria Road, south of the Iron Cove Link portals, the number of traffic signals on Victoria Road means that traffic would not be free flow. Accident and safety implications are presented in **Chapter 10**. Induced demand is included in the WRTM traffic forecasts, while other implications are assessed in **Appendix P** (Technical working paper: Social and economic) of the EIS.
· As hazardous vehicles would not be permitted in the tunnel, they are likely to use Victoria Road, consequently being exposed to higher vehicle speeds (resulting from freer flow). The possibility of these higher speeds leading to increased accident severity should be addressed (particularly in relation to hazardous goods vehicles).	· Hazardous vehicles would be on the surface roads if there was no M4-M5 Link tunnel. While there may be a reduction in future forecast traffic on Victoria Road, south of the Iron Cove Link portals, the number of traffic signals on Victoria Road means that traffic would not be free flow. The transport of dangerous goods is regulated by the *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW), *Dangerous Goods (Road and Rail Transport) Regulation 2014* (NSW) and the *Australian Code for the Transport of Dangerous Goods by Road and Rail* supported by relevant Australian Standards.
· Implications of surface road traffic on the adjacent active transport network, particularly in relation to increased conflict with motorised vehicles.	· Active transport is dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS.

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· Opportunities for improved public and active transport provision on Victoria Road, timed to coincide with the opening of the Iron Cove Link.	· The Victoria Road Bus Improvement Project was taken into account in the project design and active transport opportunities are dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS.
· Opportunities for place making and public domain improvements on Victoria Road, timed to coincide with opening of the Iron Cove Link.	· Urban design opportunities are dealt with in **Appendix L** (Technical working paper: Urban Design) of the EIS.
· Opportunities to rescind unused road widening reservations along Victoria Road.	· This outside the scope of this project and would be considered by Roads and Maritime as part of their network planning.
· Consideration of induced traffic including: - Quantum of induced traffic; - Number for trips converted from public transport; - CO2 and other GHG emissions created by the induced traffic and the environmental implication thereof.	· Induced demand is included in the WRTM traffic forecasts and equates to about 0.3 per cent additional daily trips in 2033. Implications of CO2 and GHG emissions are dealt with in **Appendix W** (Detailed greenhouse gas calculations).
· Implications on The Bays Precinct including the likely private car travel demand to be created by ease of access to WestConnex (in contrast to a less car dependent type of development that could be encouraged if no motorway direct access were provided to The Bays Precinct).	· The Bays Precinct traffic demand is included in the STM and WRTM forecasts. The type of development at The Bays Precinct would be shaped by the development and parking controls established for the precinct.
· Included in the above assessment should be consideration of the environmental/sustainability consequences (the difference in the environmental impact of a car dependent Bays Precinct in comparison to a sustainable transport oriented Bays Precinct).	· Assumptions on land use development at The Bays Precinct are included in the STM and WRTM forecasts and are not different between future scenarios.
· Impact on local access and internal circulation that may result from street closures associated with the project.	· The scope of operational modelling includes areas of the network that would be directly impacted by street closures.
· Pedestrian safety issues associated with freer flow/higher speeds on Victoria Road including: - The implications that freer flow on Victoria Road may have on pedestrian access across it, particularly in relation to Sydney Buses' proposed reduction in the number of bus stops and the potential for this to encourage pedestrians to attempt to cross Victoria Road mid-block; - The need to introduce a 40 kilometre per hour School Zone on Victoria Road near Rozelle Public School.	· While there may be a reduction in future forecast traffic on Victoria Road, south of the Iron Cove Link portals, the number of traffic signals on Victoria Road means that traffic would not be free flow. The Victoria Road Bus Improvement Project was taken into account in the project design and active transport opportunities are dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS.

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· Potential impact for easier access to Anzac Bridge (and freer flow on Victoria Road) to result in greater demand for private car travel to Sydney CBD.	· The WRTM traffic forecasts include any induced demand, such as to the Sydney CBD, due to the project, and therefore this is included in the assessment. While there may be a reduction in future forecast traffic on Victoria Road, south of the Iron Cove Link portals, the number of traffic signals on Victoria Road means that traffic will not be free flow.
· Detailed analysis of all intersections adjacent to the portals should include weekend, as well as weekday peak, operation.	· A comparison of weekday and weekend traffic volumes in the study area was undertaken that revealed the peak weekday hourly volumes are similar or higher than the peak weekend hourly volumes. Therefore, the weekday scenario is the worst traffic situation and is appropriate to be tested as such. This is also standard assessment methodology and consistent with all previous WestConnex assessments.
· Modelling should include heavy and hazardous goods vehicle forecasts for the surrounding surface road network. This should be examined for all phases of the project (including construction, early stages of operation and longer term operation – eg Western Harbour Crossing completed).	· Heavy vehicles are included in the WRTM and the construction traffic forecasts. Within WRTM, trucks are all vehicles of Austroads class 3 and higher. While trucks carrying hazardous materials would not be able use the tunnels, most of these restrictions apply to a subset of articulated vehicles and are not relevant to rigid vehicles, which are the majority of the truck class.
· Management of access to Iron Cove foreshore and The Bay Run, both during construction and once completed.	· This is dealt with in **Chapter 7** and in **Appendix N** (Technical working paper: Active transport strategy) of the EIS.
· Consideration of the impact of the Iron Cove Link on a possible future light rail line to the White Bay Power Station/Cruise Passenger Terminal portion of The Bays Precinct.	· There are no publicly available plans indicating light rail to service White Bay or The Bays Precinct, so this has not been assessed. The use of Glebe Island Bridge is not precluded by the project.
· Consideration of the impact of the Iron Cove Link on the (combined Council and RMS) proposal to create and enhanced local environment and separated cycleway along Lilyfield Road (between the Bay Run and Anzac Bridge).	· This is dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS.
· Consideration of the impact of the Iron Cove Link on the possible reinstatement of Glebe Island Bridge as an active transport link.	· This is dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS.

Agency letters	
Ashfield Council (received prior to the amalgamation of Ashfield Council into the Inner West Council)	
Comment	**Section where addressed in EIS**
· Traffic impacts on local streets during and after construction works: Detailed plans and traffic modelling must be provided showing how local, state and regional roads and streets in the Ashfield LGA would be affected during construction works, post and/or completion of Stage 3 works and how increased and changed traffic impacts would be managed.	· A traffic impact analysis has been undertaken to assess the impact of the project on the affected local road network. The construction impacts are included in **Chapter 7** and the operational impacts are presented in **Chapter 10**, with mitigation strategies provided in **Chapter 11**.
· The traffic modelling must be undertaken at a sufficient scale and level of detail (eg Nano Modelling) to describe the local impacts of the proposal compared with the current base situation. In addition, the modelling should be sufficiently fine grained to demonstrate the interactions between vehicles, pedestrians and cyclists at a local level on the hierarchy of the streets and roads outlined above. The modelling must also analyse the impact arising from any proposed road closures (whether temporary or permanent) along the corridor and particularly around tunnel portals. The boundary for this area and degree of traffic modelling must be sufficiently broad and go well beyond the immediate Parramatta Road/City West Link Road corridor. It is considered that as a minimum all state, regional and collector roads and local streets north of Parramatta Road within the Ashfield LGA be included in the traffic modelling. Works which are required in the future to be constructed to ameliorate the impacts of new additional regional traffic travelling through the Ashfield LGA would create a cost burden for Council. Therefore, the EIS must provide indicative examples and extent of the type of treatments required, make an estimate of their construction costs, and identify how the State Government intends to implement those works.	· Modelling has been undertaken using microsimulation modelling. This methodology is consistent with the approach used for similar projects. The modelling is sufficiently refined to address the interaction of road users at a micro-level. A detailed breakdown of the assessment methodology is provided in **Chapter 4**. The scope of the modelling was developed taking into consideration the secretaries requirements, agency letters and forecast project impacts. The resulting scope of assessment can be seen in **Chapter 4** and **Annexure B**. The results of the traffic impact assessment are reported in **Chapter 10**, with mitigation strategies provided in **Chapter 11**.
· Public transport impacts during and after construction works: The modelling must identify impacts on public transport operations both during construction and post construction of the Stage 3 works. Should any changes be proposed to existing public transport routes or new public transport routes/links be created the modelling must identify such changes and impacts arising from the changes.	· Future public transport performance and impacts during construction were assessed in this traffic impact assessment. The construction impacts are included in **Chapter 7** and the performance impacts on public transport are discussed in **Chapter 10**.
· Cumulative impacts during and after construction works: It remains unclear as to the timing of the commencement of construction of the Stage 3 M4-M5 Link works. While a notional 'opening year' of 2023 is noted in the SSI application, the EIS needs to consider cumulative impacts arising from all three sections of WestConnex being under construction concurrently. If this is not the intention then the EIS needs to examine all options for potential disposal of spoil arising from the M4-M5 Link – road, tunnel, water, etc or a combination of all options.	· The cumulative impacts from construction of all three sections of WestConnex were reviewed and discussed in **Chapter 7**.

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· It would be highly desirable from a local environmental and amenity perspective for spoil haulage routes for Stage 3 to be designed utilising the new tunnel links being created in Stages 1 and Stage 2, should these stages be or become operational during the Stage 3 construction phase. This would remove considerable heavy vehicular traffic from surface roads and needs to be addressed in the EIS.	· It is planned that trucks would use the M4 East and New M5 entry and exit ramps, once they are operational, to gain access to appropriate project construction ancillary facilities.
· The SEARs should also specify a requirement for the EIS to address cumulative impacts of the proposal across all major issues – traffic, noise, vibration, social, health, visual, heritage, biodiversity, environmental, climate change, flooding and water quality	· The traffic impacts in a cumulative scenario are presented in **Chapter 12**, while broader cumulative impacts are assessed in **Chapter 26** of the EIS.
Leichhardt Council (received prior to the amalgamation of Leichhardt Council into the Inner West Council)	
Comment	**Section where addressed in EIS**
· General Considerations: - The assessment should consider the short-term, medium term and ultimate configuration traffic projects for surface road network (including northern and southern extensions); - There should be full transparency of the impacts on the surface road network (particularly in relation to the feeder roads for the WestConnex portals).	· A traffic impact analysis has been undertaken to assess the impact of a project only scenario on the affected local road network in 2023 and 2033, which is presented in **Chapter 10**, and for an ultimate configuration scenario in the same years, which is presented in **Chapter 12**.
· Traffic impact assessment should not be restricted to major roads – it should also address possible impacts on collector roads and the possibility of the development of new bypass routes/'rat runs' in response to increased congestion, most particularly: - Lilyfield Road - Balmain Road - Tebbutt Street - Flood Street - Darley Road - Catherine Street - Johnston Street - Ramsay/Marion Streets - New north–south connections (through Rozelle Rail Yards) that may be developed as part of The Bays Precinct.	· The scope of the modelling was developed taking into consideration the secretaries requirements, agency letters and forecast project impacts. The resulting scope of assessment can be seen in **Chapter 4** and **Annexure B**. The results of the traffic impact assessment are reported in **Chapter 10**, with mitigation strategies provided in **Chapter 11**.
· Implication of surface road traffic on existing and likely future bus service.	· Future public transport performance was assessed in the traffic impact assessment. The performance impacts on public transport are discussed in **Chapter 10**.
· Implications of the Rozelle Portal Traffic on: - The proposed Lilyfield Road Cycleway; - The built form of The Bays Precinct; - Opportunities for future public transport to The Bays Precinct (see car dependency note below); - The long term possibility of an extended light rail system to service White Bay; - Long term opportunities to re-instate Glebe Island Bridge as a sustainable transport link.	· Operational traffic modelling was undertaken in the Rozelle area and results are presented in **Chapter 10**. Active transport opportunities are dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS. The Victoria Road Bus Improvement Project was taken into account in

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	the project design. There are no publicly available plans indicating light rail to service White Bay or The Bays Precinct, so this has not been assessed. The use of Glebe Island Bridge is not precluded by the project.
· Implications of the Camperdown Portal on: - Booth Street - Pyrmont Bridge Road - Johnston Street - Parramatta Road - The Crescent - Wigram Road.	· The Camperdown interchange is no longer part of the project.
· Implications of the Wattle Street Connection on: - Ramsay/Marion Street - Dobroyd Parade - Hawthorne Parade.	· Operational traffic modelling was undertaken in the Wattle Street interchange area and results are presented in **Chapter 10**.
· Impact analysis should include potential increased parking demand in areas of Leichhardt LGA that are adjacent to high frequency public transport, that may result from increased accessibility for remote commuters (eg western suburbs residents who work in the CBD and prefer not to pay CBD parking costs).	· The traffic and transport assessment is based on traffic modelling using the WRTM, which relies on forecasts of car driver demand sourced from the STM. The STM uses projections of population and employment for the Sydney and forecasts mode choice between car, rail, bus, light rail and ferry modes for future infrastructure scenarios. However, it does not forecast those that would switch at particular stations and so it is not possible to assess potential future increased parking demand in particular areas.
· Council is actively pursuing the development of open space in and around Rozelle Rail Yards and it is essential that the proposal not preclude opportunities to provide such open space including a series of north–south active transport linkages between Lilyfield and Rozelle. Such linkages should be useable areas of open space rather than simply access corridors. The above linkages should also be cognisant of, and not detrimentally impact on, the enhanced residential environment and active transport linkages currently proposed in Council's North Annandale Neighbourhood Movement Plan.	· Active transport opportunities are dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS and urban design opportunities are dealt with in **Appendix L** (Technical working paper: Urban design) of the EIS.
· The project should not increase separation/isolation of any areas, during any phases of its development, and where possible should enhance connectivity between areas.	· Social implications are assessed in **Appendix P** (Technical working paper: Social and economic) of the EIS and **Appendix N** (Technical working paper: Active transport strategy) of the EIS.
· Journey to work times should be assessed for local residents (of Leichhardt LGA) as well as distant commuters, particularly during the construction phase of the project.	· Travel time analysis and potential delays were undertaken and are presented in **Chapter 7** and **Chapter 10**.

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Marrickville Council (received prior to the amalgamation of Marrickville Council into the Inner West Council)	
Comment	**Section where addressed in EIS**
· A significant amount of traffic exiting the motorway at Camperdown is likely to have a detrimental impact on the suburb and surrounding areas, be this via an increase in through-traffic or vehicles searching for parking. Accordingly, induced traffic demand as a result of the new road link needs to be addressed.	· The Camperdown interchange is no longer part of the project.
· Any future proposal to extend (in length or time) clearways, or introduce new clearways, needs to be supported by a local area traffic management analysis.	· No new clearways are proposed as part of the project.
· Widening of streets immediately adjacent to the portal needs to be evaluated in terms of whether this would only act to displace congestion to other squeeze points.	· A traffic impact assessment was undertaken on the road network adjacent to the portals and is presented in **Chapter 10**.
· A thorough analysis and description of project alternatives, including multi-modal solutions that are assessed against relevant state objectives (rather than the objectives of the Project itself) needs to be undertaken.	· This is presented in **Chapter 4** (Project development and alternatives) of the EIS.
· Road narrowing, at-grade pedestrian crossings, traffic light rephrasing changes in favour of pedestrian movement, enhancement of the pedestrian realm, removal of existing clearways, heavy vehicle restrictions on local roads and area-wide speed reductions need to be considered in the context of new portals at Rozelle and Camperdown.	· The road design and the urban design have considered these. Active transport opportunities are dealt with in **Appendix N** (Technical working paper: Active transport strategy) of the EIS and urban design opportunities are dealt with in **Appendix L** (Technical working paper: Urban design) of the EIS.
· Details to be included of how the proposed interchanges and connections to the surrounding road network and associated road infrastructure facilities meet the traffic, pedestrian and overall transport objectives of the proposal. This is to take into account adjacent sensitive land uses, future growth areas, approved and proposed infrastructure proposals and traffic needs of all those using the road, with pedestrian priority at the forefront (reduced road speeds, at-grade crossings, traffic light phasings etc).	· Meeting of the traffic objectives are discussed in this report, while active transport and urban design objectives and opportunities are discussed in **Appendix N** (Technical working paper: Active transport strategy) of the EIS and **Appendix L** (Technical working paper: Urban design) of the EIS.
· Analysis of impacts on adjacent recreation amenities, including the appeal of walking and cycling, in addition to analysis of the impacts on cultural amenity and accessibility (including adjacent local neighbourhoods and their 'look and feel') must be addressed.	· This analysis is presented in **Appendix L** (Technical working paper: Urban design) of the EIS, **Appendix N** (Technical working paper: Active transport strategy) of the EIS and **Appendix P** (Technical working paper: Social and economic) of the EIS.
· Impact on local schools including noise, air pollution, danger from increased traffic volumes including at road crossings as well as reduced likelihood in children travelling actively to school and the associated impact of this on childhood obesity, social awareness and other learning and development factors must also be addressed.	· These impacts are presented in **Appendix I** (Technical working paper: Air quality) of the EIS, **Appendix J** (Technical working paper: Noise and vibration) of the EIS, **Appendix N** (Technical working paper: Active transport

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	strategy) of the EIS and **Appendix P** (Technical working paper: Social and economic) of the EIS.
· The proponent should address how the proposal incorporates good urban design principles such as increased walkability, cycleways and access to public transport. The impact of increased traffic flows, especially during the construction phase, on pedestrian safety should be considered, along with the impact of property acquisition.	· This is discussed in **Appendix N** (Technical working paper: Active transport strategy) of the EIS and in **Chapter 7**.
City of Sydney Council	
Comment	**Section where addressed in EIS**
· The Proponent must fully assess the impacts of the project on the CBD as a result of the Camperdown interchange, including Railway Square and the Central Station precinct, George Street with the operation of light rail services and the urban renewal precinct of Central to Eveleigh at a minimum. The project, in particular the Camperdown portal with associated changes to Parramatta Road, Broadway and the intersection of Broadway, City Road and Parramatta Road would have considerable impacts on the Sydney CBD. Impacts on public transport services and nodes is of considerable concern	· The Camperdown interchange is no longer part of the project.
· The Proponent must fully assess the impacts of the project on the CBD as a result of the Rozelle interchange, in particular the east–west routes through the CBD and in turn, impacts on light rail operation along George Street, and increased traffic on the Harbour Bridge and in turn, impacts on public transport, in particular bus egress during the PM peak period. The Rozelle interchange would have a considerable impact on traffic flowing to and from the city via Anzac Bridge.	· The scope of the modelling was developed taking into consideration the secretaries requirements, agency letters and forecast project impacts. The resulting scope of assessment can be seen in **Chapter 4** and **Annexure B**. The results of the traffic impact assessment are reported in **Chapter 10**, with mitigation strategies provided in **Chapter 11**.
· The Proponent must fully evaluate the inter-relationship of the project with the Sydney City Centre Access Strategy and its long term aims with respect to the Sydney City Centre.	· The inter-relationship of the project with the Sydney City Centre Access Strategy and its long term aims with respect to the Sydney City Centre is discussed in **Chapter 3**.
· In recognition of the proposed WestConnex concession period and considering the profound implications of the project, the future traffic impacts must be assessed at opening, 2031 and 2041 at a minimum. Traffic analysis across an expanded study area must be presented consistently showing the results, without the project, with the project and a cumulative scenario (potentially including Western Harbour Tunnel etc).	· A traffic impact analysis has been undertaken to assess the impact of a project only scenario at opening (2023) and 10 years after opening (2033), as required in the Roads and Maritime assessment guidelines, which is presented in **Chapter 10**, and for a cumulative scenario (including Western Harbour Tunnel, amongst others) for the same years, which is presented in **Chapter 12**.
· Provision of active transport needs to address existing and future land use, as well as be sized for projected land use change and population and employment growth. The	· Active transport provision and urban design opportunities are discussed in **Appendix N**

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Proponent must demonstrate the adequacy of all proposed facilities in terms of current and future desire lines and capacity, recognising the project is being sized for considerable expected growth in traffic demand. The Proponent must consider CPTED principles and demonstrate how CPTED principles have been met through the proposed project.	(Technical working paper: Active transport strategy) of the EIS and **Appendix L** (Technical working paper: Urban design) of the EIS.
· Induced demand and toll avoidance must be comprehensively addressed and the impacts consistently quantified across the expanded study area and all the assessment years (opening, 2031 and 2041).	· The WRTM traffic forecasts for all future year scenarios include induced demand and any potential toll avoidance due to the project.
· Travel time analysis must be conducted across all assessment years (opening, 2031 and 2041) and for public transport (buses) as well as other vehicles on the network. Travel time analysis for public transport must extend into central Sydney, recognising that increased bus numbers and/or traffic in the CBD as a result of the various WestConnex projects would impact travel times across a wide area.	· Travel time analysis for general traffic and for buses in future year scenarios is presented in **Chapter 10**.
· In particular the city is concerned that in providing an alternative access for traffic on Victoria Road from the north of Iron Cove Bridge to the Sydney CBD and eastern CBD (via the Rozelle interchange and Anzac Bridge) there would be a significant increase in traffic accessing the CBD and passing through the centre's already congested streets. Transport and traffic modelling must include the Sydney city centre street network and the land use change envisaged within the draft Central Sydney Planning Strategy, and provide a long term analysis of the impacts. The Sydney city centre is Australia's pre-eminent commercial and financial centre and relies on a high quality public domain, high levels of walking activity, efficient bus service provision and access for delivery and service vehicles.	· The scope of the modelling was developed taking into consideration the Secretaries requirements, agency letters and forecast project impacts. The resulting scope of assessment can be seen in **Chapter 4** and **Annexure B**. The results of the traffic impact assessment are reported in **Chapter 10**, with mitigation strategies provided in **Chapter 11**.
· In addition to the site specific considerations, Council reaffirms its request for the following, more generalised considerations: - Impacts that the increased capacity and freer flow on Victoria Road may have on public transport patronage (ie leaching patrons from public transport); - There should be inclusion of additional objectives that do not relate solely to road traffic improvements; - Consideration of need for the project in the light of future transport/travel technology.	· The traffic and transport assessment is based on traffic modelling using the WRTM, which relies on forecasts of car driver demand sourced from the STM. The STM forecasts mode choice between car, rail, bus, light rail and ferry modes for future infrastructure scenarios. Induced demand is included in the WRTM traffic forecasts and equates to about 0.3 per cent additional daily trips in 2033. While there may be a reduction in future forecast traffic on Victoria Road, south of the Iron Cove Link portals, the number of traffic signals on Victoria Road means that traffic would not be free flow. Project objectives and project need is dealt with in **Chapter 3** (Strategic context and project need) of the EIS.

Agency letters	
Port Authority of NSW	
Comment	**Section where addressed in EIS**
· The Port Authority requests that the Department of Planning and Environment specifically require the applicant to consult with the Port Authority on the following matters: - The final Rozelle interchange design, potential connections to the Bays Precinct and transport linkages - The existing and proposed landownership of the Rozelle Rail Yards, part of which is owned by the Port Authority - Any proposed use of Port Authority lands for staging of construction works.	· Consultation with Port Authority of NSW is occurring.

Annexure B Justification of modelled areas

Introduction

This annexure presents the scope of the road network impacted by the project to provide justification of the nominated boundaries of the operational model areas. Operational modelling was focused around the areas of largest local impact in the AM and PM peak hours, which are generally around the motorway interchanges, namely the Wattle Street interchange, the Rozelle interchange and the St Peters interchange.

In addition to operational modelling, assessment of the wider network impacts outside of the operational model boundaries was also undertaken through screenline analysis, Sydney metropolitan network plots and travel time analysis.

Bandwidth plots illustrating the forecast change in AM and PM peak hour traffic volumes between the 2033 'with project' and the 'without project' scenarios were assessed. Roads expected to carry less traffic in the future 2033 'with project' scenario are shown in green and roads where volumes are predicted to increase in the future are shown in red. The line thickness is indicative of the magnitude of this change – the thicker the line, the more impact there is likely to be. Difference plots with the nominated modelling boundary overlaid for each motorway interchange are presented.

Wattle Street interchange

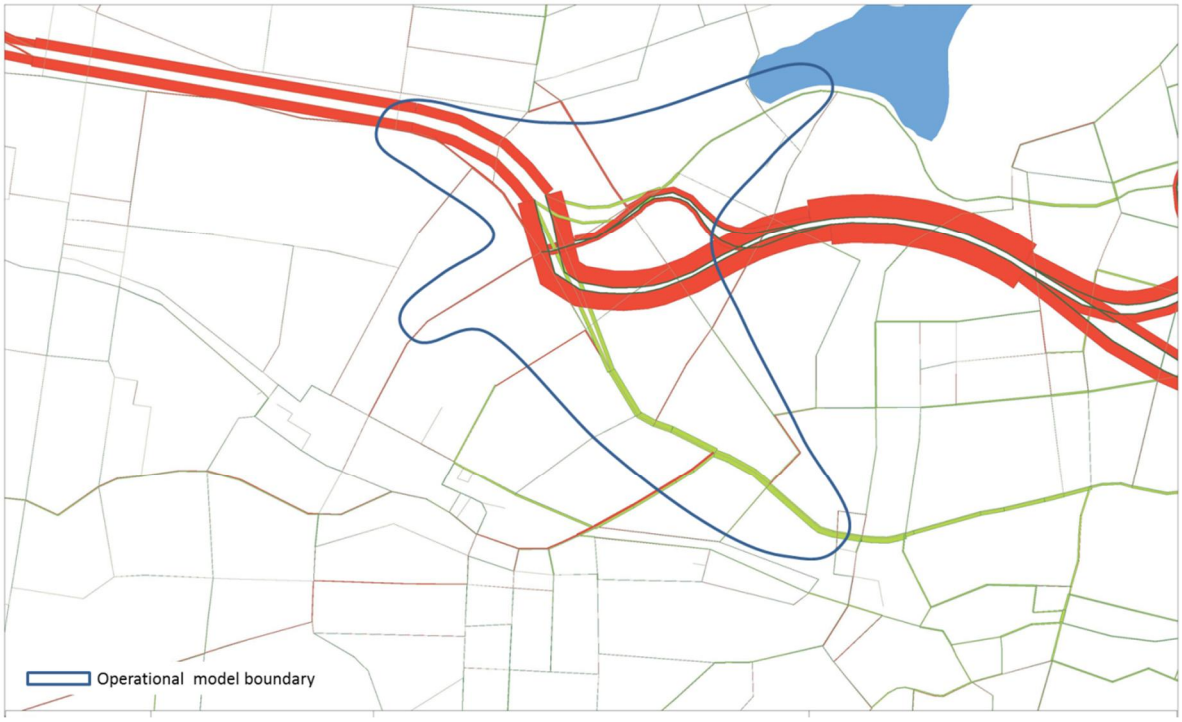
Annexure Figure 1 and **Annexure Figure 2** present the AM and PM peak hour volume difference plots between the 2033 'with project' and the 'without project' modelled scenarios in the vicinity of the Wattle Street interchange, with the operational model boundary overlaid. The impact of the inclusion of the project is mainly focused on Parramatta Road, City West Link and, to a lesser extent, Ramsay Street/Ramsay Road, which are captured within the boundary of the operational model reported on in **section 10.3**. The level of change due to the project along roads like Frederick Street, outside of these boundaries, is small with minimal impact on performance.

Rozelle interchange

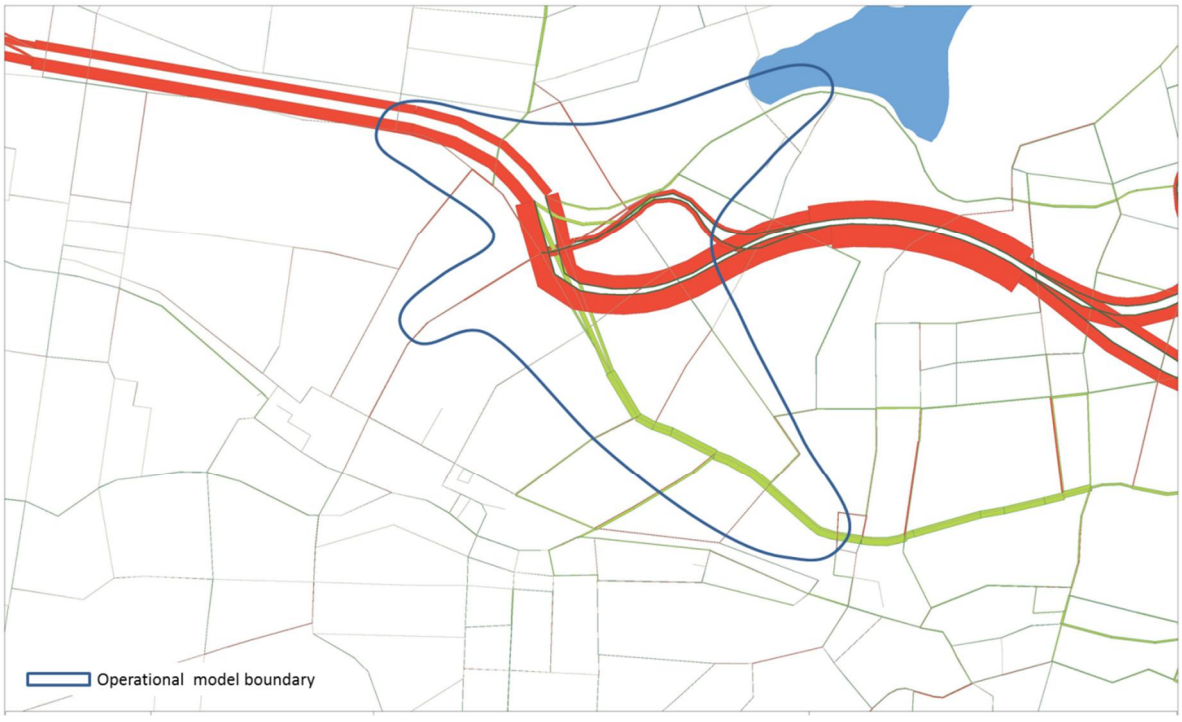
Annexure Figure 3 and **Annexure Figure 4** present the AM and PM peak hour volume difference plots between the 2033 'with project' and the 'without project' modelled scenarios in the vicinity of the Rozelle interchange, with the operational model boundary overlaid. The impact of the inclusion of the project is focused on Victoria Road, City West Link and Anzac Bridge/Western Distributor, which are captured within the boundary of the operational model reported on in **section 10.4**. The impact due to the forecast increase on The Crescent and Johnston Street are captured in the modelling of The Crescent/Johnston Street intersection within the operational model, as well as in the screenline assessment contained in **section 9** of this report.

St Peters interchange

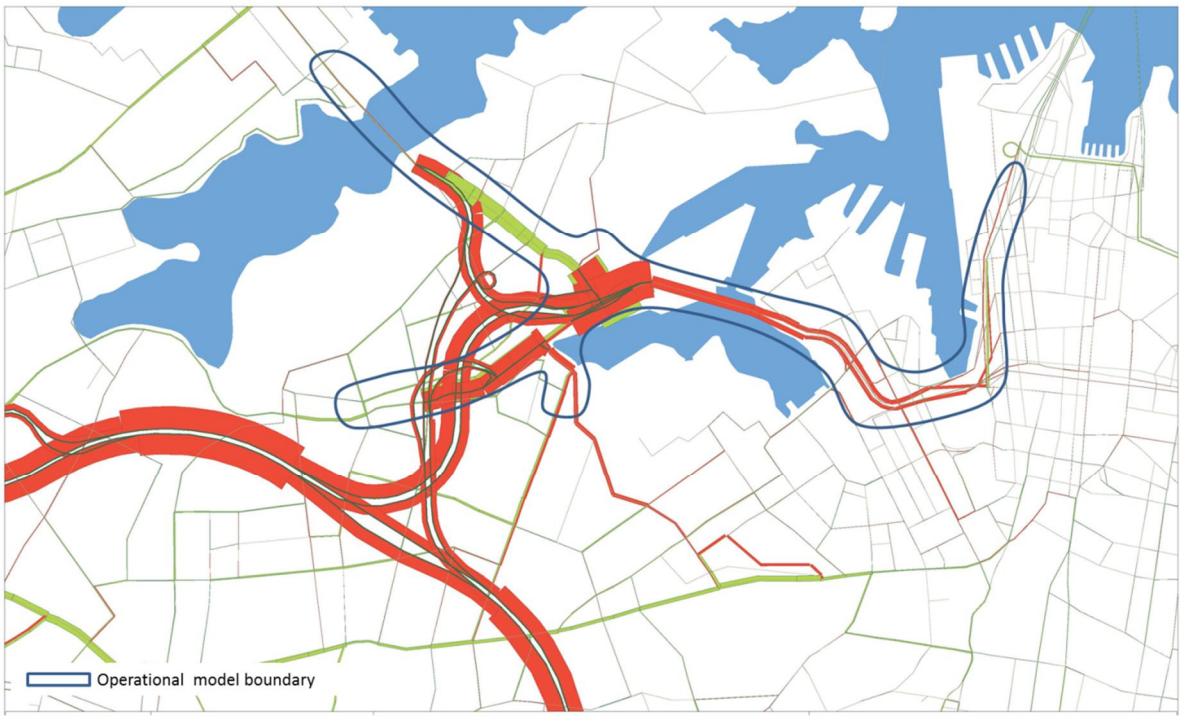
Annexure Figure 5 and **Annexure Figure 6** present the AM and PM peak hour volume difference plots between the 2033 'with project' and the 'without project' modelled scenarios in the vicinity of the St Peters interchange, with the operational model boundary overlaid. The impact of the inclusion of the project is focused on the Princes Highway, Canal Road, Euston Road (south of Sydney Park Road) and the street network north of Sydney Airport, which are captured within the boundary of the operational model reported on in **section 10.5**. The level of change due to the project along roads like Euston Road or Gardeners Road, outside of these boundaries, is small with minimal impact on performance.



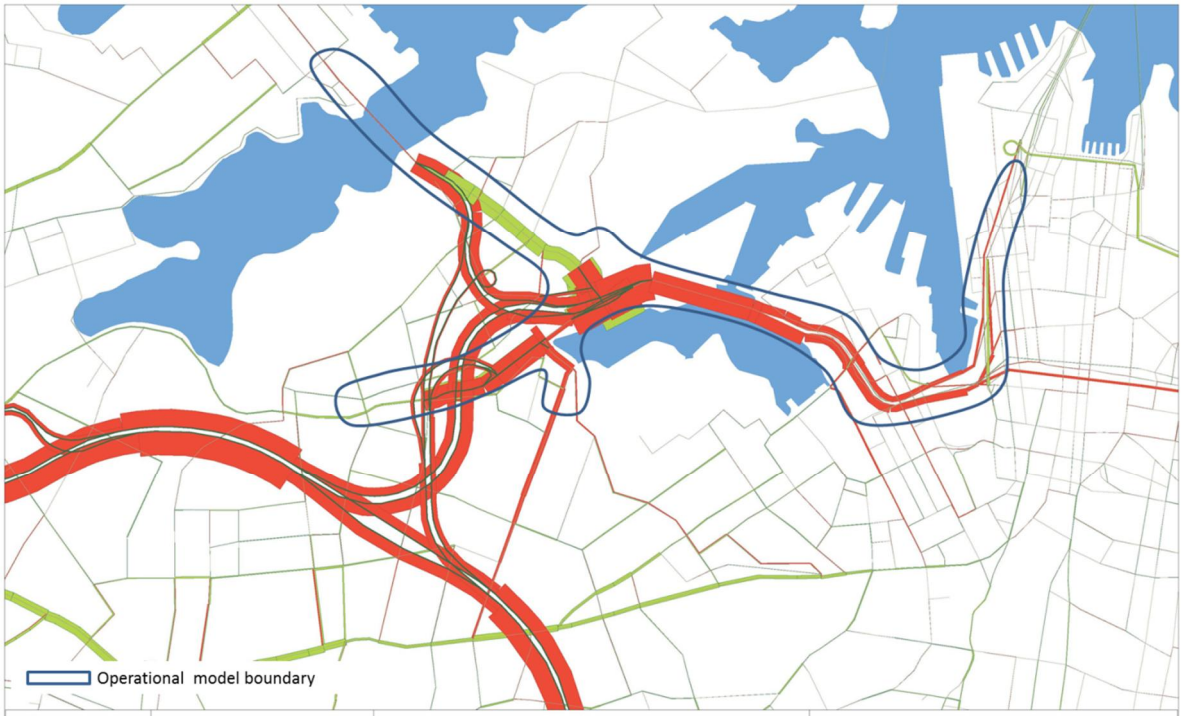
Annexure Figure 1 Wattle Street interchange: comparison of 2033 AM peak hour volumes with and without the project



Annexure Figure 2 Wattle Street interchange: comparison of 2033 PM peak hour volumes with and without the project



Annexure Figure 3 Rozelle interchange: comparison of 2033 AM peak hour volumes with and without the project



Annexure Figure 4 Rozelle interchange: comparison of 2033 PM peak hour volumes with and without the project

Annexure Figure 5 St Peters interchange: comparison of 2033 AM peak hour volumes with and without the project

Annexure Figure 6 St Peters interchange: comparison of 2033 PM peak hour volumes with and without the project

Annexure C Impact of project design changes

Introduction

The M4-M5 Link project was referred to in the EISs for the M4 East and New M5 projects. Both EISs included the M4-M5 Link project in the cumulative impact assessment of the WestConnex program of works. Since the finalisation of these EISs, there have been refinements to the M4-M5 Link project design as previously described and assessed. A description of these design refinements are provided in **Chapter 4** (Project development and alternatives) of the EIS.

The substantive design changes discussed are:

- The removal of the road interchange at Camperdown
- The amendment of the mainline tunnel configuration from three to four lanes (plus merges and tie-ins) in each direction
- The inclusion of a tunnel connection between Victoria Road near the eastern abutment of Iron Cove Bridge and the Rozelle interchange (the Iron Cove Link).

This annexure presents the redistribution of traffic and the impact on traffic volumes using the project design with and without these design changes at the Wattle Street and St Peters interchanges, and indicates if the design developments justify a change in the operational modelling areas at these two locations. A presentation of the redistribution of traffic and the impact on traffic volumes in other parts of the road network is also presented.

Analysis of impacts

To inform the analysis of the traffic impacts of each of the design changes, the WestConnex Road Traffic Model version 2.3 (WRTM v2.3) was used to produce bandwidth plots illustrating the forecast change or difference in the 2033 AM and PM peak hour traffic volumes. Each design change is assessed in isolation to understand the impact to the road network.

Roads that are expected to carry less traffic with the change 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 – the thicker the band, the more impact there is likely to be.

Removal of the Camperdown interchange

Wattle Street interchange

Annexure Figure 7 and **Annexure Figure 8** present the 2033 AM and PM peak hour volume difference plots showing the impact that the removal of the Camperdown interchange is forecast to have at the Wattle Street Interchange, with the operational model boundary overlaid.

The removal of the Camperdown interchange from the project would cause a forecast reduction of about 300 vehicles (two-way) from the M4-M5 Link between the Wattle Street interchange and the Rozelle interchange in the AM peak hour and 500 vehicles (two-way) in the PM peak hour. An increase in peak hour flows (about 100 vehicles (two-way)) is forecast on parts of the surface road network, such as Dobroyd Parade/City West Link and Parramatta Road, but this would not have a significant impact on the operational performance of these roads and no change in the boundary of the operational model is warranted. The impact of these increases is captured in the Wattle Street interchange modelling carried out as part of this traffic and transport assessment.

St Peters interchange

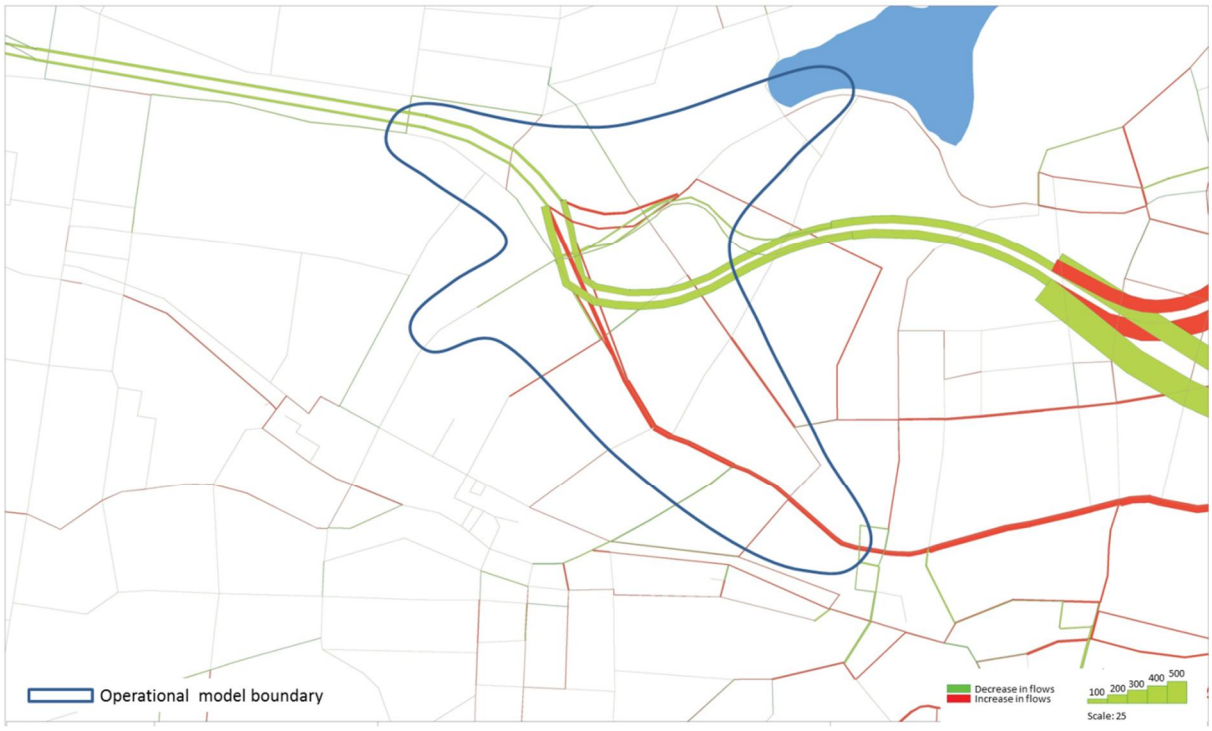
Annexure Figure 9 and **Annexure Figure 10** present the 2033 AM and PM peak hour volume difference plots showing the impact that the removal of the Camperdown interchange would have at the St Peters interchange, with the operational model boundary overlaid.

The removal of the Camperdown interchange from the project would have a forecast reduction on Campbell Road, east of the Princes Highway, of about 200 vehicles (two-way) in the AM peak hour and 50 vehicles (two-way) in the PM peak hour. There is a forecast increase in traffic on Canal Road, east of Princes Highway, of about 150 vehicles (two-way) in the AM peak hour, and on Euston Road, south of Sydney Park Road, of about 100 vehicles (two-way) in each of the AM and PM peak hours. The impact of these increases is captured in the St Peters interchange modelling carried out as part of this traffic and transport assessment.

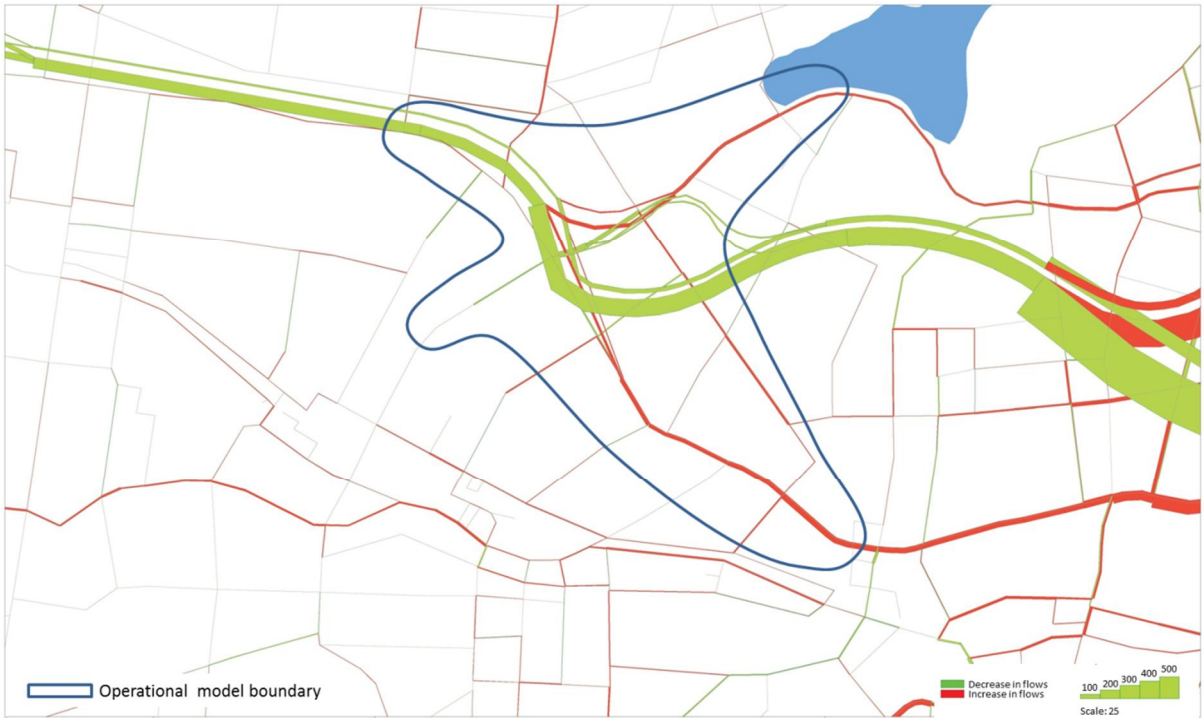
Elsewhere in the operational model area, slight increases and decreases are forecast, however these forecast changes are less than 100 vehicles (two-way) per hour and do not represent a significant change in traffic flows or operational performance. Consequently, no change in the boundary of the operational model is warranted.

Other parts of the network

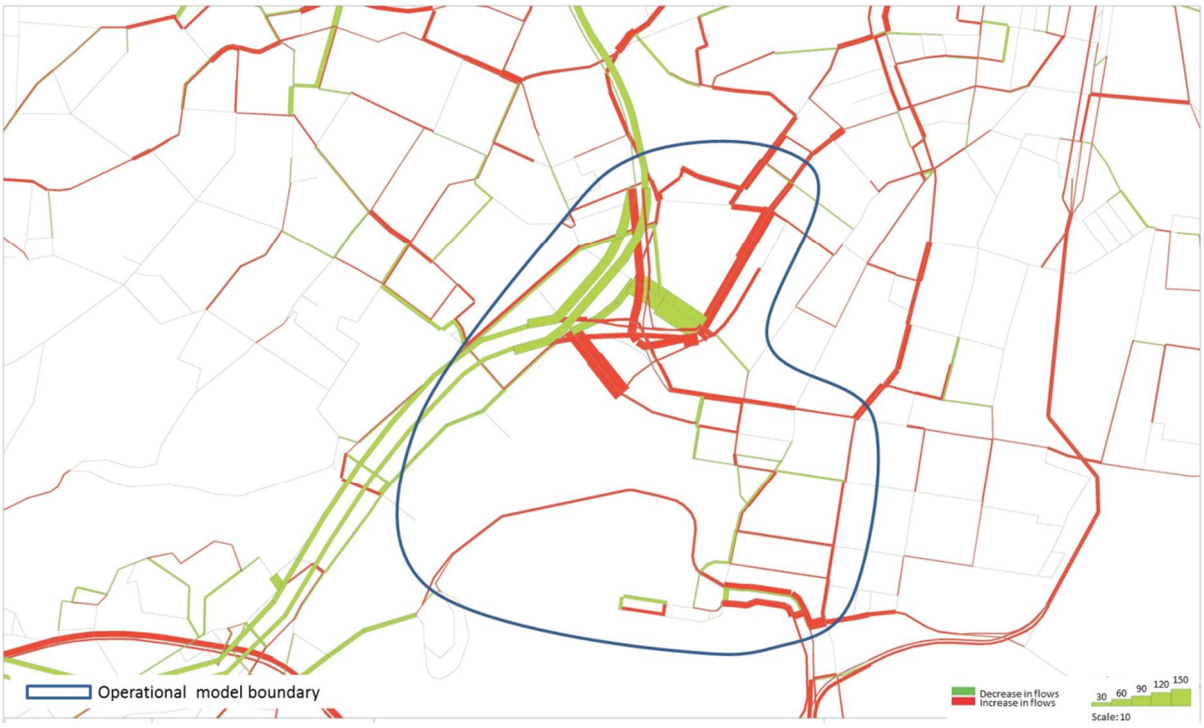
Annexure Figure 11 presents the 2033 AM peak hour volume difference plot showing the impact the removal of the Camperdown interchange from the project would have on the Sydney metropolitan network. The removal would cause a forecast reduction in traffic to the Camperdown area, along Broadway and along City Road with a forecast increase on the M4 exit ramp to Rozelle and Anzac Bridge/Western Distributor, along The Crescent and along Parramatta Road. The impact of these increases is captured in the Wattle Street and Rozelle interchange modelling undertaken as part of this traffic and transport assessment.



Annexure Figure 7 Wattle Street interchange: changes to the 2033 AM peak hour volumes without the Camperdown interchange



Annexure Figure 8 Wattle Street interchange: changes to the 2033 PM peak hour volumes without the Camperdown interchange



Annexure Figure 9 St Peters interchange: changes to the 2033 AM peak hour volumes without the Camperdown ramps

Annexure Figure 10 St Peters interchange: changes to the 2033 PM peak hour volumes without the Camperdown ramps

Annexure Figure 11 Metropolitan network: changes to the 2033 AM peak hour volumes without the Camperdown ramps

Amendment of the mainline tunnel configuration

Wattle Street interchange

Annexure Figure 12 and **Annexure Figure 13** present the 2033 AM and PM peak hour volume difference plots showing the impact of increasing the number of lanes generally from three to four in each direction in the M4-M5 Link mainline in the vicinity of the Wattle Street interchange, with the operational model boundary overlaid.

The plots show that the additional lanes in the mainline tunnels are forecast to have a negligible impact on the surface roads within the boundaries of the operational model. The changes to the peak hour flows are forecast to be less than 100 vehicles per hour in both AM and PM peak periods, which means that there would effectively be no change to the results from the operational models and consequently no change to the boundary of the operational model is warranted.

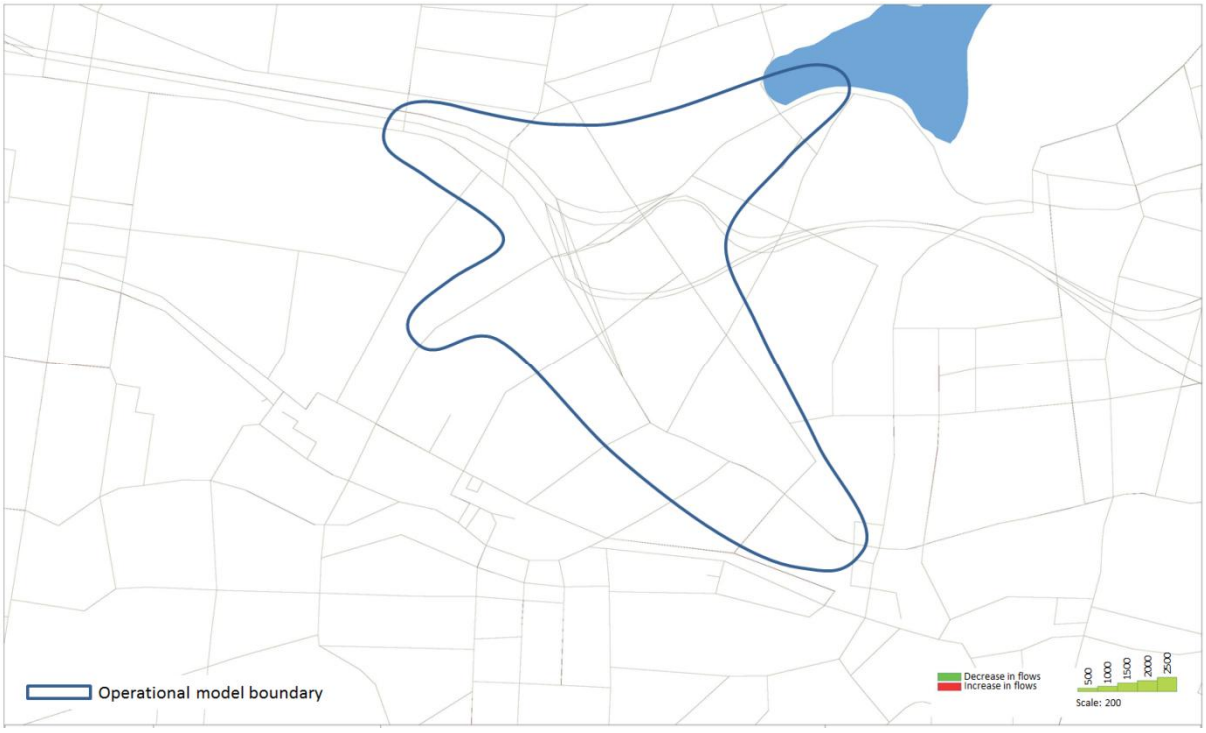
St Peters interchange

Annexure Figure 14 and **Annexure Figure 15** present the 2033 AM and PM peak hour volume difference plots showing the impact of increasing the number of lanes generally from three to four in the M4-M5 Link mainline in the vicinity of the St Peters interchange, with the operational model boundary overlaid.

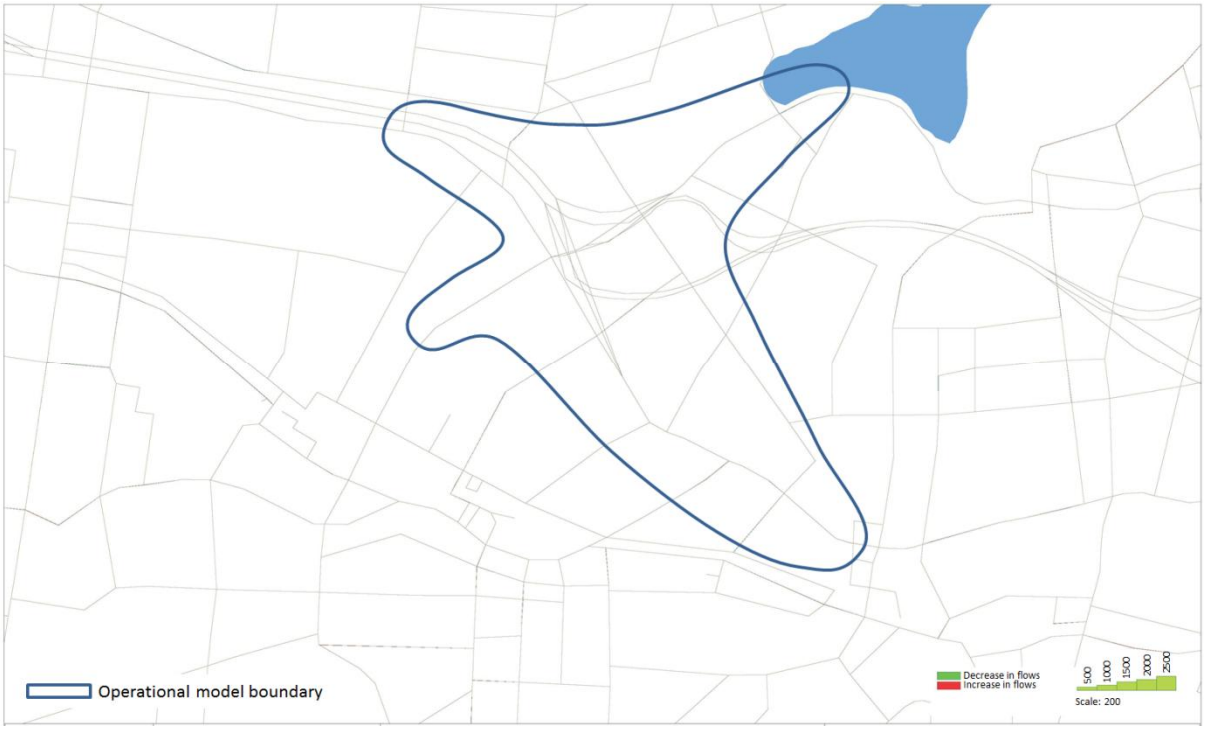
A slight change to flows on the surface road network is forecast. Most changes are forecast to be less than 50 vehicles per hour, including at Euston Road, Campbell Road and Princes Highway. Generally only minimal impacts are forecast on any of the roads in the model area due to the change in the number of mainline lanes and therefore, no change in the boundary of the operational model is warranted.

Other parts of the network

Annexure Figure 16 presents the 2033 AM peak hour volume difference plot showing the impact increasing the number of lanes generally from three to four in the M4-M5 Link mainline would on the rest of the metropolitan road network. The plot shows that the additional lanes in the mainline tunnels are forecast to have a negligible impact on the metropolitan road network.



Annexure Figure 12 Wattle Street interchange: changes to the 2033 AM peak hour volumes with four-lane mainlines



Annexure Figure 13 Wattle Street interchange: changes to the 2033 PM peak hour volumes with four-lane mainlines

Annexure Figure 14 St Peters interchange: changes to the 2033 AM peak hour volumes with four-lane mainlines

Annexure Figure 15 St Peters interchange: changes to the 2033 PM peak hour volumes with four-lane mainlines

Annexure Figure 16 Metropolitan network: changes to the 2033 AM peak hour volumes with four-lane mainlines

Inclusion of the Iron Cove Link

Wattle Street interchange

Annexure Figure 17 and **Annexure Figure 18** present the 2033 AM and PM peak hour volume difference plots in the vicinity of the Wattle Street interchange, showing the impact of the inclusion of the Iron Cove Link, with the operational model boundary overlaid.

The modelling shows that inclusion of the Iron Cove Link into the project design is forecast to increase traffic on the M4-M5 Link mainline tunnels and Wattle Street entry and exit ramps with a corresponding reduction in traffic flows on the surface non-motorway network. The mainline tunnels are forecast to carry an additional 500 vehicles per hour eastbound in the AM peak and a similar volume westbound in the PM peak. These changes would not affect the surface intersections or network.

The biggest impact on the surface network is forecast to City West Link with a drop in traffic volumes of about 200 vehicles per hour forecast in each peak period. This change would improve the surface network operation and consequently no change in the operational model boundary is warranted.

St Peters interchange

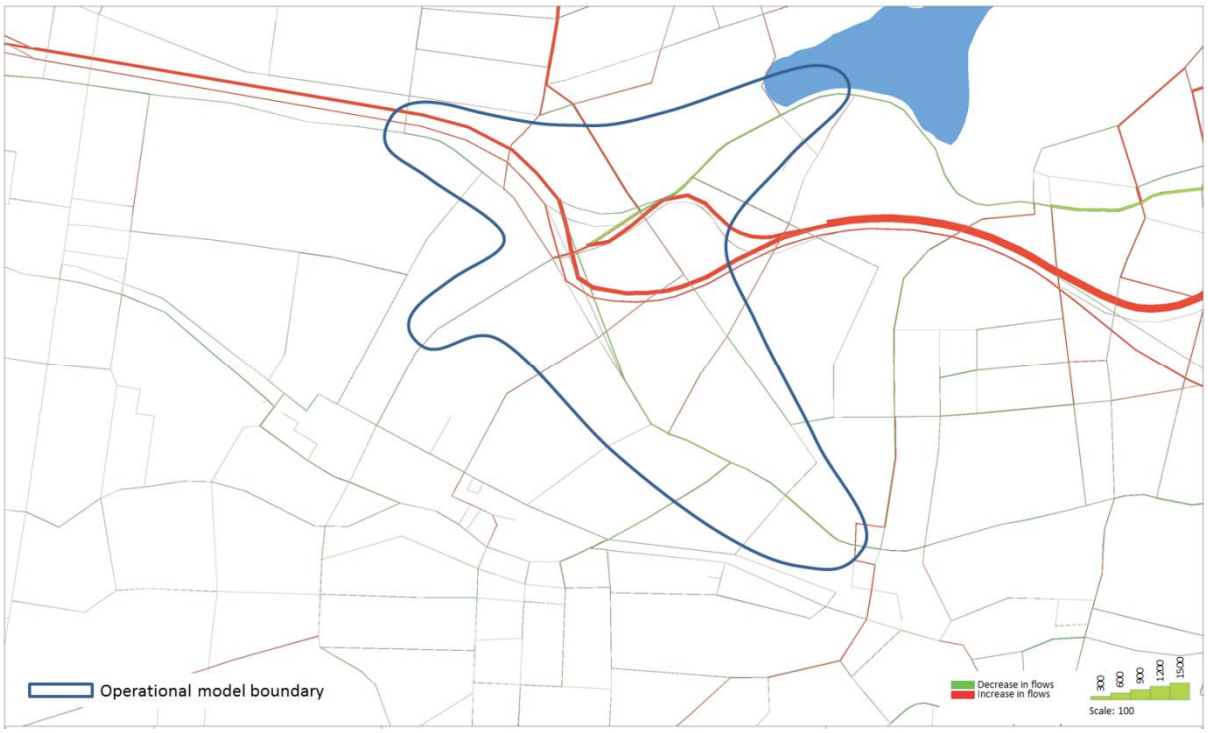
Annexure Figure 19 and **Annexure Figure 20** present the 2033 AM and PM peak hour volume difference plots in the vicinity of the St Peters interchange, showing the impact of the inclusion of the Iron Cove Link, with the operational model boundary overlaid.

The modelling shows that inclusion of the Iron Cove Link into the project design is forecast to generally slightly reduce traffic on the surface roads in the vicinity of St Peters interchange with the exception of Euston Road and Campbell Street. However, the increases on these two roads are forecast to be less than 50 vehicles per hour and not significant in terms of the operational performance of the road network. As the inclusion of the Iron Cove Link generally decreases the volumes in the mainline tunnels and on the surface network, no change in the boundary of the operational model is warranted. The forecast change on Southern Cross Drive in the PM peak hour would be a reduction in volume with the project design and is assessed in the screenline assessment contained in **section 9.5**.

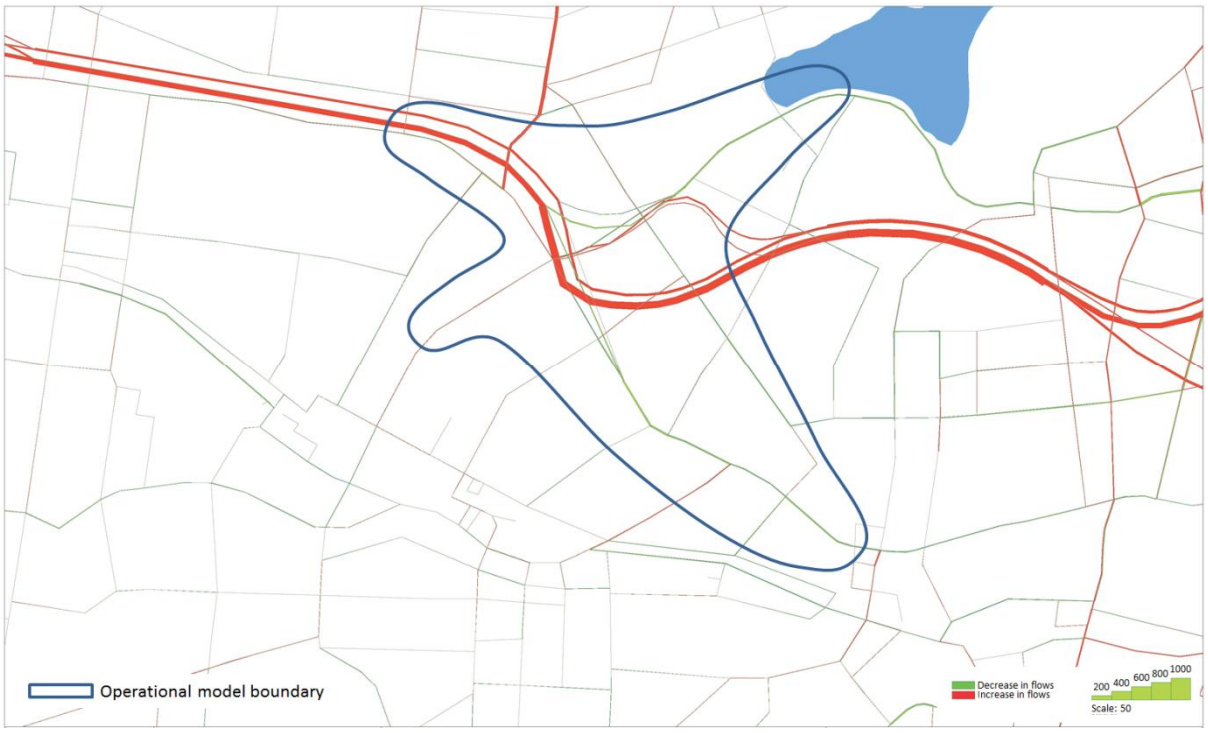
Other parts of the network

Annexure Figure 21 presents the 2033 AM peak hour volume difference plot showing the impact of the inclusion of the Iron Cove Link on the rest of the metropolitan network. The main impact is forecast on Victoria Road, which has a significant forecast reduction in traffic demand south of the Iron Cove Link portals. The inclusion of the Iron Cove Link has therefore reduced traffic demand on this section of Victoria Road. There is also a smaller forecast increase in traffic demand on Victoria Road north of the Iron Cove Link portals, with the inclusion of the Iron Cove Link. The impact of these forecast increases and reductions are captured in the Rozelle interchange operational modelling undertaken as part of this assessment.

Other changes are forecast on the M4-M5 Link mainline, which are captured in the mainline operational modelling, and on Lyons Road, which has a forecast reduction with the inclusion of the Iron Cove Link in the project design. The changes on Lyons Road are assessed in the screenline assessment contained in **section 9.3.**



Annexure Figure 17 Wattle Street interchange: changes to the 2033 AM peak hour volumes with Iron Cove Link



Annexure Figure 18 Wattle Street interchange: changes to the 2033 PM peak hour volumes with Iron Cove Link

Annexure Figure 19 St Peters interchange: changes to the 2033 AM peak hour volumes with Iron Cove Link

Annexure Figure 20 St Peters interchange: changes to the 2033 PM peak hour volumes with Iron Cove Link

Annexure Figure 21 Metropolitan network: changes to the 2033 daily volumes with Iron Cove Link

Annexure D Heavy vehicle screenline analysis

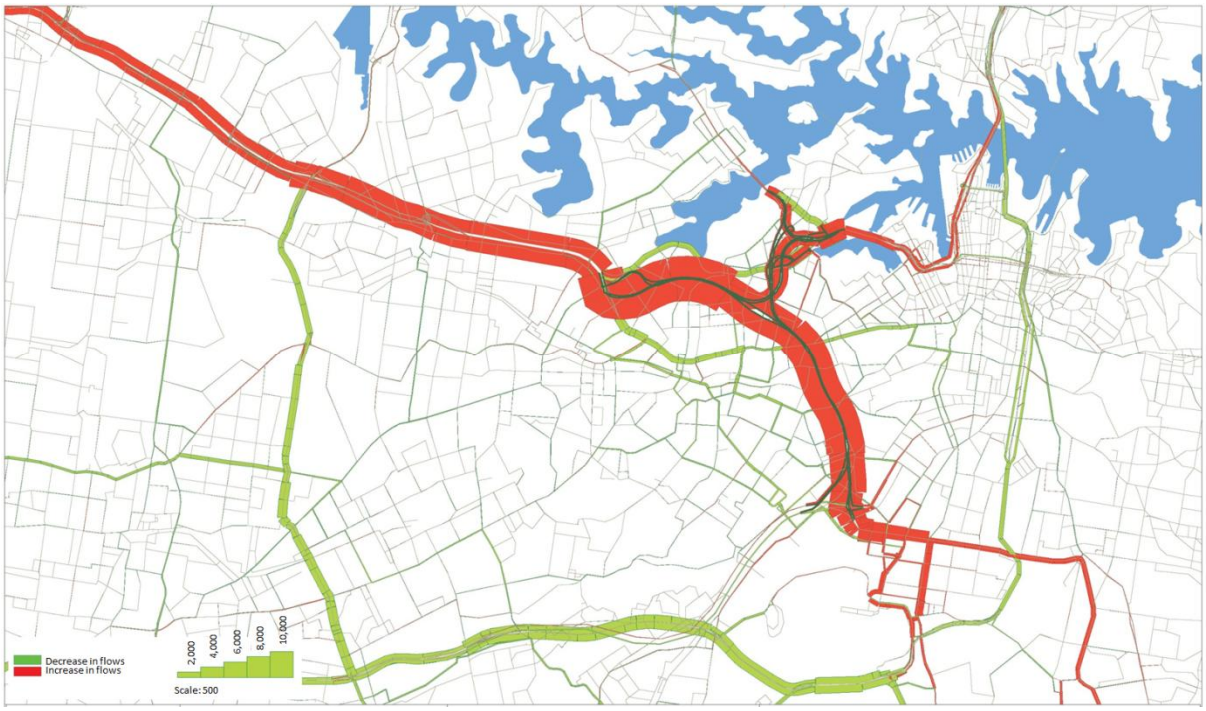
Introduction

This annexure contains screenline analysis carried out using the same methodology as applied in **Chapter 9**. However, this annexure presents heavy vehicle traffic patterns in isolation, and has been carried out for the surface roads within the east–west, the upper north–south and the lower north–south screenlines. These surface roads within the screenlines include non-arterial roads, so as to provide an indication of shifts in heavy vehicle movement.

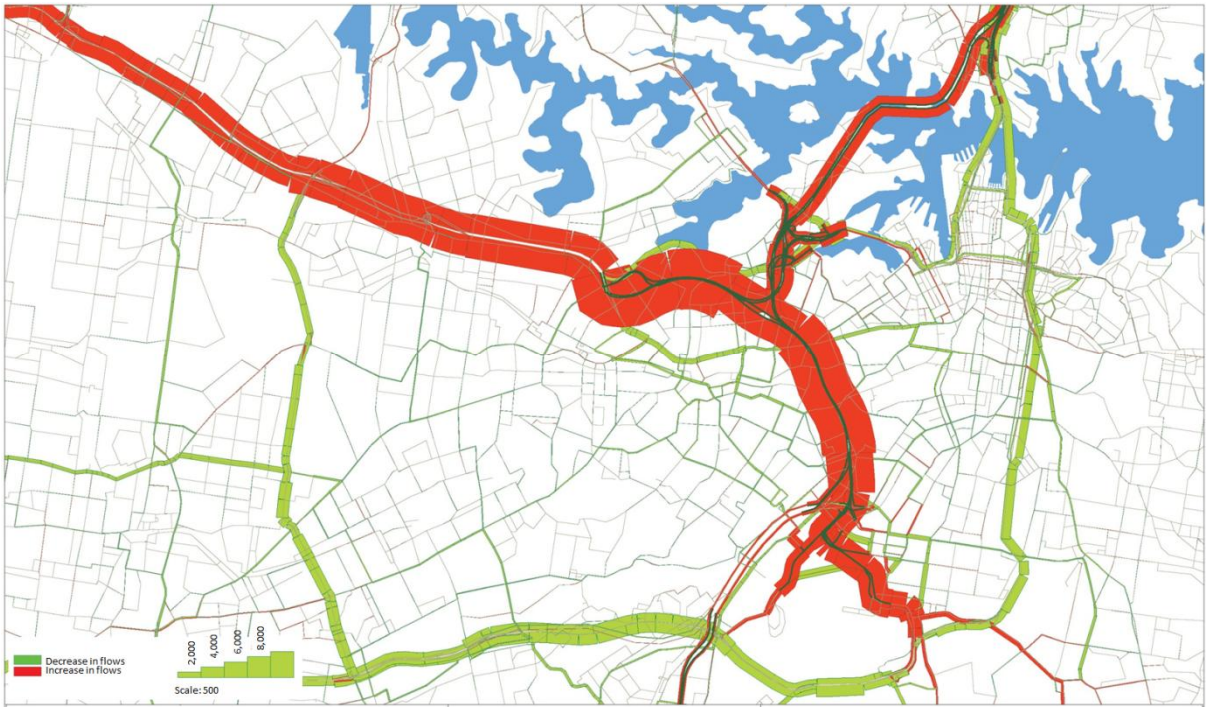
Limitations of heavy vehicle modelling in WRTM are noted: the source of the heavy vehicle origin-destination forecasts from WRTM are from the February 2014 release of demand matrices from the Transport for NSW Freight Movement Model, which were produced using Transport Performance and Analytics September 2012 release of population and employment projections, and induced demand computation are not applied to heavy vehicles.

Sydney metropolitan network

Difference plots showing the impact of the project on average weekday traffic (AWT) heavy vehicle volumes in 2033 can be seen in **Annexure Figure 22**, while **Annexure Figure 23** shows the impact of the 'cumulative' scenario on AWT heavy vehicle volumes in 2033. They show that, the project draws heavy vehicles off existing arterial routes. In particular, there are notable decreases on the existing M5 Motorway, Parramatta Road, City West Link, and the A3. In the 'cumulative' scenario, these impacts are increased, and there is also a greater shift in traffic away from Southern Cross Drive and South Dowling Street as heavy vehicles take up use of the Western Harbour Tunnel.



Annexure Figure 22 Difference in heavy vehicle AWT between 2033 'without project' and 'with project' scenarios



Annexure Figure 23 Difference in heavy vehicle AWT between 2033 'without project' and 'cumulative' scenarios

East–west screenline

Average weekday traffic (AWT) analysis

Annexure Table 2 presents a comparison of the forecast two-way heavy vehicle AWT volumes from WRTM for the surface roads at the east–west screenline location under the 2023 and 2033 'without project' and 'with project' scenarios. The table also shows the change in heavy vehicle traffic volumes with the project in place and the share of traffic movement on each link.

The key observation comparing 2023 'without project' and 'with project' scenarios is that there is a decrease of about 40 per cent in the volume of heavy vehicles crossing the screenline on surface roads. This decrease is primarily driven by decreases on Parramatta Road and on City West Link. The key observation for the 2033 comparison is the same as for the 2023 comparisons with daily two-way heavy vehicle volumes crossing the screenline on surface roads decreasing by 38 per cent.

Annexure Table 3 presents a comparison of the forecast two-way heavy vehicle AWT volumes from WRTM for the surface roads at the east–west screenline location under the 2023 and 2033 'without project' and 'cumulative' scenarios.

Key observations comparing the 2023 'cumulative' to the 'with project' scenarios are that the patterns of change are similar, with decreases which are slightly larger. In both the 2023 and 2033 scenarios, the daily volume of heavy vehicles crossing the screenline on surface roads in the 'cumulative' scenario compared to the 'without project' scenario decreases by about 45 per cent. These decreases are again primarily driven by decreases on Parramatta Road and on City West Link.

Peak hour analysis

Annexure Figure 24 and **Annexure Figure 25** illustrate the changes in the peak one hour heavy vehicle volumes at the east–west screenline. The forecasts indicate that the impact of the project on peak hour heavy vehicle traffic volumes are similar to the impacts forecast for AWT volumes, with reductions in heavy vehicle traffic on surface roads across the screenline. A difference is that in the peak hours, there are significant reductions in heavy vehicles on Lyons Road as well as City West Link and Parramatta Road. This reflects the greater capacity constraints which exist during peak periods forcing more vehicles to use Lyons Road to move between Haberfield and Rozelle.

Annexure Table 2 East–west screenline: WRTM comparison for with and without project scenarios – heavy vehicle AWT volumes

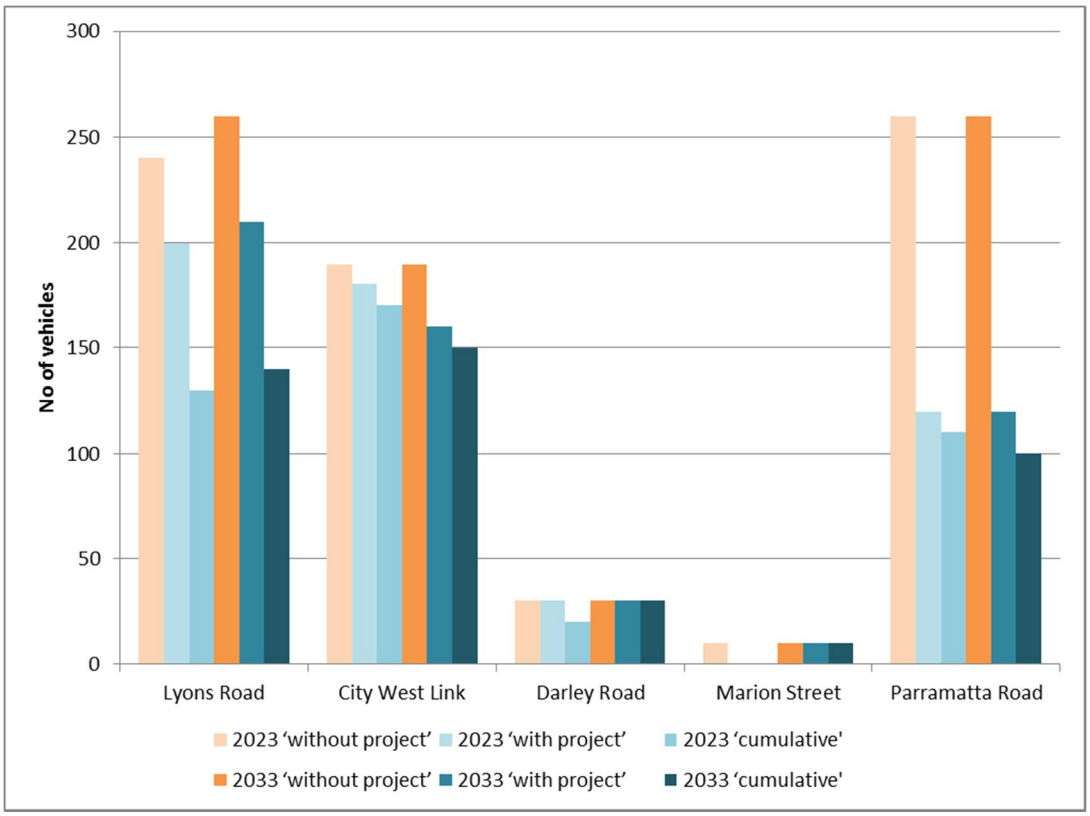
Direction	Location	2023 ‘ without project ’		2023 ‘ with project ’		Change	2033 ‘ without project ’		2033 ‘ with project ’		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Two-way	Lyons Rd	1,560	14%	1,160	18%	-26%	1,900	16%	1,360	19%	-28%
	City West Link	4,610	42%	2,660	41%	-42%	4,750	41%	2,910	41%	-39%
	Darley Rd	690	6%	700	11%	1%	740	6%	740	10%	0%
	Marion St	80	1%	30	0%	-63%	110	1%	40	1%	-64%
	Parramatta Rd	3,960	36%	2,010	31%	-49%	4,130	36%	2,110	29%	-49%
	Total	**10,900**		**6,560**		**-40%**	**11,630**		**7,160**		**-38%**

Source: WRTM v2.3, 2017

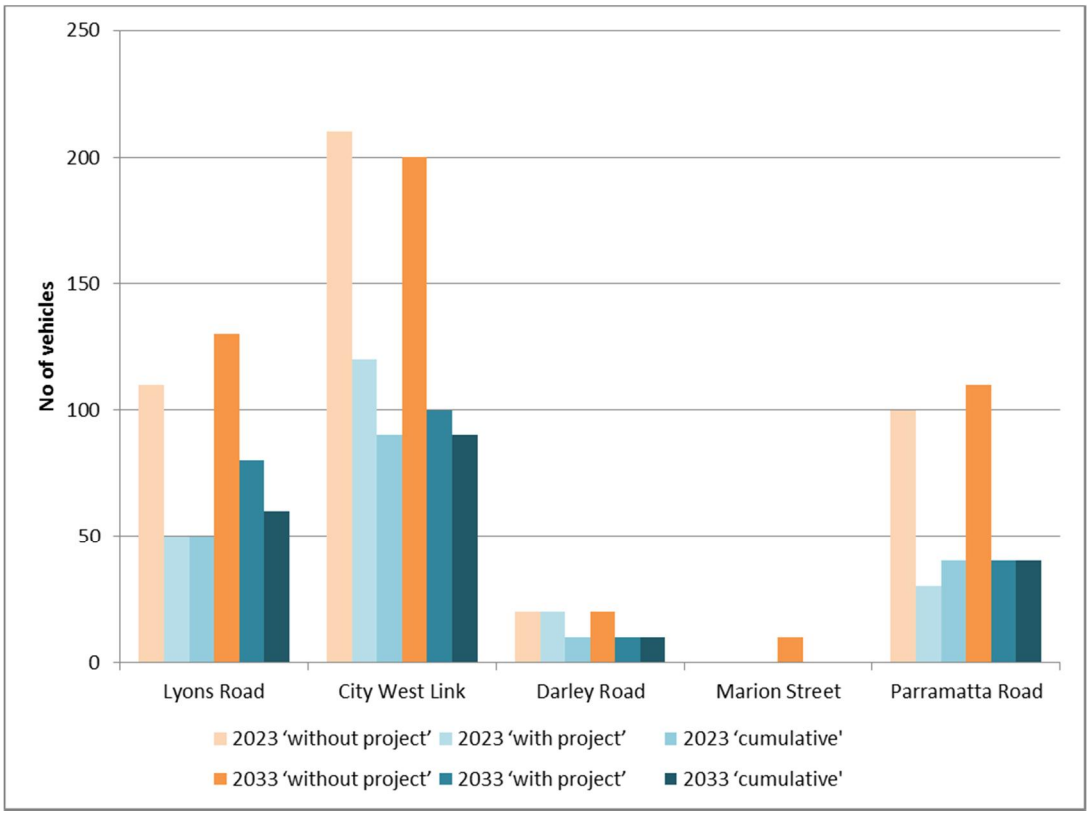
Annexure Table 3 East–west screenline: WRTM comparison for without project and cumulative scenarios – heavy vehicle AWT volumes

Direction	Location	2023 ‘ without project ’		2023 ‘ cumulative ’		Change	2033 ‘ without project ’		2033 ‘ cumulative ’		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Two-way	Lyons Rd	1,560	14%	1,130	19%	-28%	1,900	16%	1,240	19%	-35%
	City West Link	4,610	42%	2,170	36%	-53%	4,750	41%	2,300	36%	-52%
	Darley Rd	690	6%	630	11%	-9%	740	6%	660	10%	-11%
	Marion St	80	1%	30	1%	-63%	110	1%	40	1%	-64%
	Parramatta Rd	3,960	36%	2,040	34%	-48%	4,130	36%	2,120	33%	-49%
	Total	**10,900**		**6,000**		**-45%**	**11,630**		**6,360**		**-45%**

Source: WRTM v2.3, 2017



Annexure Figure 24 East–west screenline: comparison of two-way AM peak one hour heavy vehicle volumes



Annexure Figure 25 East–west screenline: comparison of two-way PM peak one hour heavy vehicle volumes

Upper north–south screenline

Average weekday traffic (AWT) analysis

Annexure Table 4 presents a comparison of the forecast two-way heavy vehicle AWT volumes from the WRTM on surface roads at the upper north–south screenline location under the 2023 and 2033 'without project' and 'with project' scenarios. The table also shows the change in heavy vehicle traffic volumes with the project in place and the share of traffic movement on each link.

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

- A decrease in the volume of daily heavy vehicles crossing the screenline is expected in the 'with project' scenario compared to the 'without project' scenario, with two-way heavy vehicle AWT decreasing by seven per cent
- Significant decreases in heavy vehicle AWT are forecast for Norton Street, Balmain Road, Catherine Street and Booth Street, with two-way AWT on these roads decreasing between about 30 to 70 per cent
- The shift in heavy vehicles away from Parramatta Road also results in an increase in traffic on some roads as traffic moves between the surface road network and the M4-M5 Link. Two-way heavy vehicle AWT is forecast to increase by 25 per cent on Johnston Street, and by almost 20 per cent on Ross Street. This represents an increase of about 100 heavy vehicles on each of these roads over a one day period.

Key observations comparing the 2033 'without project' and 'with project' scenarios are that the patterns of change are the similar to those observed in the 2023 comparisons:

- An overall reduction in heavy vehicle AWT crossing the screenline is forecast in the 'with project' scenario, with two-way AWT decreasing 11 per cent compared to the 'without project' scenario. Again there is an increase in traffic on some links and a decrease on others, as traffic patterns change when vehicles shift away from Parramatta Road and City West Link and onto the M4-M5 Link
- The large forecast decreases in heavy vehicle AWT on Norton Street and Balmain Road are similar to that forecast in 2023
- Several north–south links experience increases in AWT as more vehicles access the M4-M5 Link. Two-way heavy vehicle AWT increases by 28 per cent on Catherine Street, and 15 per cent on Johnston Street. This represents an increase of about 100 heavy vehicles on each of these roads over a one day period.

Annexure Table 5 presents a comparison of the forecast two-way heavy vehicle AWT volumes from the WRTM on surface roads at the upper north–south screenline location under the 2023 and 2033 'without project' and 'cumulative' scenarios.

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

- A decrease in the volume of heavy vehicle AWT crossing the screenline is expected in the 'with project' scenario compared to the 'without project' scenario. Two-way heavy vehicle AWT decreases by seven per cent
- The greatest decrease in heavy vehicle AWT occurs on Norton Street. Two-way AWT on this key link between City Road and Parramatta Road decreases by about 70 per cent
- An increase in AWT occurs on Ross Street, which connects to the M4-M5 Link and the Iron Cove Link via The Crescent. Two-way AWT increases by 22 per cent, which represents an increase of about 130 heavy vehicles over a one day period.

Key observations comparing the 2033 'without project' and 'cumulative' scenarios are that the patterns of change are similar to those observed for the 2023 comparisons:

- Again a decrease in the volume of heavy vehicle AWT crossing the screenline is expected in the 'with project' scenario compared to the 'without project' scenario, with two-way heavy vehicle AWT decreasing by 15 per cent

- Again the greatest decrease in heavy vehicle AWT occurs on Norton Street with two-way AWT decreasing by about 60 per cent
- A 25 per cent increase in two-way AWT is forecast for Catherine Street, this represents an increase of about 100 heavy vehicles over a one-day period
- A decrease in two-way heavy vehicle AWT of about 10 per cent is forecast on Johnston Street.

Annexure Table 4 Upper north–south screenline: WRTM comparison for with and without project scenarios – heavy vehicle AWT volumes

Direction	Location	2023 ' without project '		2023 ' with project '		Change	2033 ' without project '		2033 ' with project '		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Two-way	Norton Street	350	15%	110	5%	-69%	500	17%	120	5%	-76%
	Balmain Road	400	17%	340	16%	-15%	490	17%	380	15%	-22%
	Catherine Street	430	19%	350	16%	-19%	400	14%	510	20%	28%
	Johnston Street	480	21%	600	28%	25%	600	21%	690	27%	15%
	Booth Street	70	3%	50	2%	-29%	80	3%	50	2%	-38%
	Ross Street	580	25%	690	32%	19%	800	28%	810	32%	1%
	Total	**2,310**		**2,140**		**-7%**	**2,870**		**2,560**		**-11%**

Source: WRTM v2.3, 2017
Balmain Road is northbound only between Parramatta Road and Leichhardt Street

Annexure Table 5 Upper north–south screenline: WRTM comparison for without project and cumulative scenarios – heavy vehicle AWT volumes

Direction	Location	2023 ' without project '		2023 ' cumulative '		Change	2033 ' without project '		2033 ' cumulative '		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Two-way	Norton Street	350	15%	110	5%	-69%	500	17%	200	8%	-60%
	Balmain Road	400	17%	380	18%	-5%	490	17%	400	16%	-18%
	Catherine Street	430	19%	420	20%	-2%	400	14%	500	20%	25%
	Johnston Street	480	21%	450	21%	-6%	600	21%	520	21%	-13%
	Booth Street	70	3%	70	3%	0%	80	3%	50	2%	-38%
	Ross Street	580	25%	710	33%	22%	800	28%	770	32%	-4%
	Total	**2,310**		**2,140**		**-7%**	**2,870**		**2,440**		**-15%**

Source: WRTM v2.3, 2017
Balmain Road is northbound only between Parramatta Road and Leichhardt Street

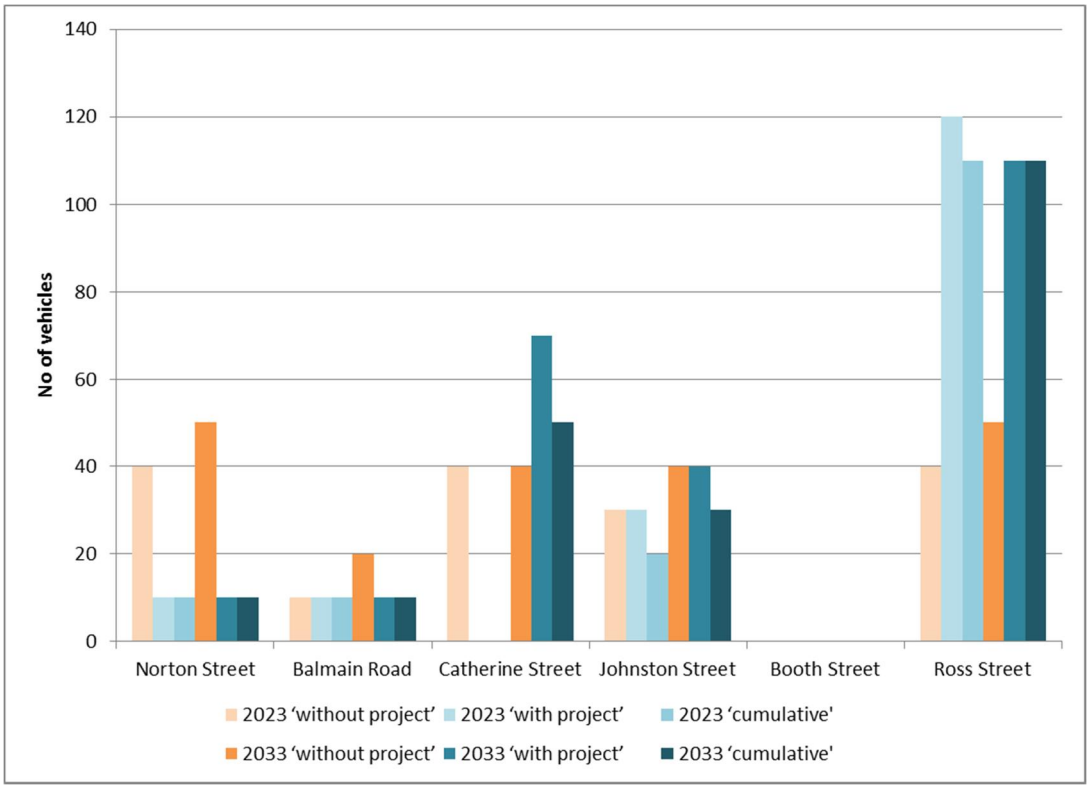
Peak hour analysis

Annexure Figure 26 and **Annexure Figure 27** illustrate the changes in the peak one hour heavy vehicle volumes at the upper north–south screenline. Similar to the AWT forecasts, the AM peak and PM peak forecasts show changes in heavy vehicle traffic volumes on north–south links, with increases on some roads and decreases on others as vehicles move from using Parramatta Road, to using the M4-M5 Link and Iron Cove Link.

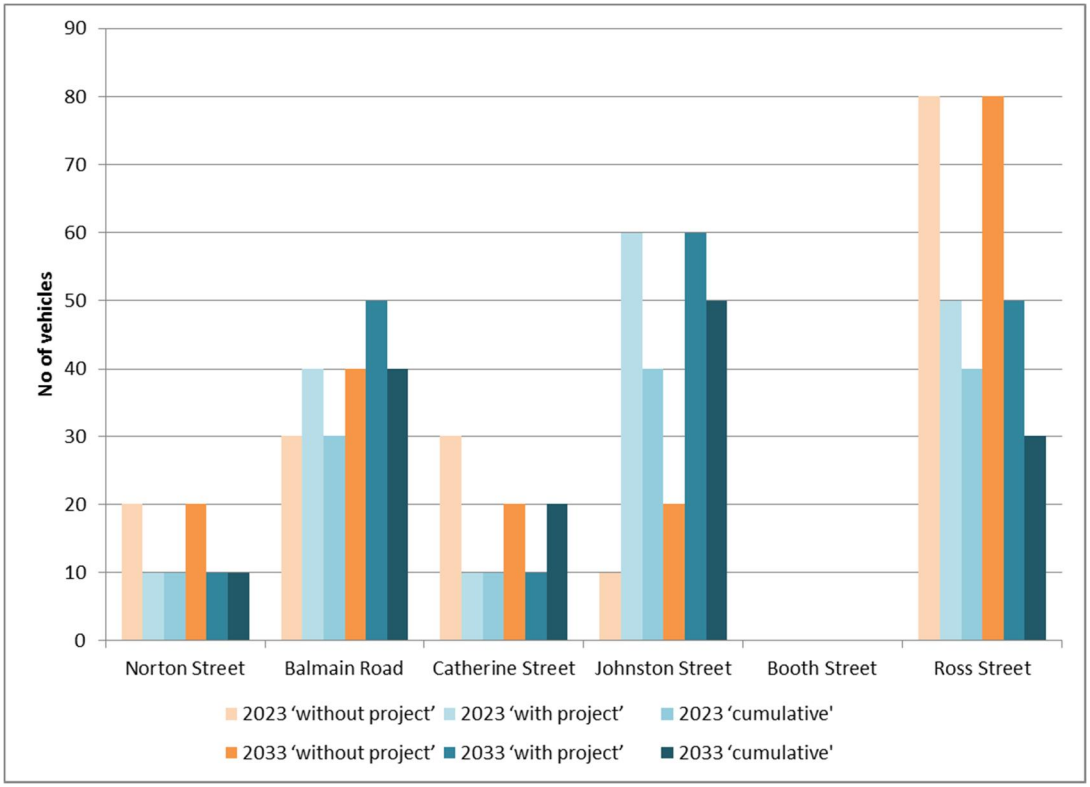
The patterns of change in heavy vehicle volumes differ in the AM peak and the PM peak periods. This is partially due to differences in origins and destinations for vehicle trips in each of the peaks, and also partially resultant from the impact of the turn movements which are allowed at the junction of each of the roads included in the screenline, and their intersection with Parramatta Road and City West Link.

In the AM peak period, decreases in heavy vehicle volumes of between about 30 to 40 vehicles occurs on Norton Street when comparing the 'with project' and 'cumulative' scenarios to the 'without project' scenarios. The largest increases in the AM peak are forecast for Ross Street, where heavy vehicle volumes increase by up to about 80 vehicles over the peak period. There are also smaller increases on Catherine Street of about 30 vehicles or less when comparing the 2033 'with project' and 'cumulative' scenarios with the 2033 'without project' scenario.

The impact of the project on heavy vehicle volume on Ross Street is reversed in the PM peak period which sees decreases in heavy vehicle volumes on Ross Street of between about 30 to 50 vehicles. The greatest increase in heavy vehicles in the PM peak period occurs on Johnston Street where volumes increase by about 30 to 50 heavy vehicles when comparing the 'with project' and 'cumulative' scenarios with the 'without project' scenarios. There are also smaller increases of about 20 heavy vehicles or less on Catherine Street when comparing the 'with project' scenarios to the 'without project' scenarios'.



Annexure Figure 26 Upper north–south screenline: comparison of two-way AM peak one hour heavy vehicle volumes



Annexure Figure 27 Upper north–south screenline: comparison of two-way PM peak one hour heavy vehicle volumes

Lower north–south screenline

Average weekday traffic (AWT) analysis

Annexure Table 6 presents a comparison of the forecast two-way heavy vehicle AWT volumes from the WRTM on surface roads at the lower north–south screenline location under the 2023 and 2033 'without project' and 'with project' scenarios. The table also shows the change in heavy vehicle traffic volumes with the project in place and the share of traffic movement on each link.

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

- There is a decrease in the volume of heavy vehicles crossing the screenline on surface roads in the 'with project' scenario compared with the 'without project' scenario. The total volume of heavy vehicle AWT crossing the screenline on surface roads decreases by 17 per cent
- The largest decrease occurs on South Dowling Drive, as vehicles shift onto the M4-M5 Link to travel north–south between the M5 and Port Botany area and the city or North. There are also significant decreases on Stanmore Road and King Street, which are key north–south arterial roads to the north of the St Peters interchange. Heavy vehicle AWT decreases about 45 per cent on each of these roads in the 'with project' scenario.

Key observations comparing the 2033 'without project' and 'with project' scenarios are that the patterns of change are similar as for the 2023 comparisons. Again, the volume of heavy vehicles crossing the screenline on surface roads decreases in the 'with project' scenario when compared to the 'without project' scenario, with heavy vehicle AWT crossing the screenline on surface roads decreasing by 19 per cent, and this decrease largely driven by decreases on South Dowling Drive and Stanmore Road as vehicles shift onto the M4-M5 Link.

Annexure Table 7 presents a comparison of the forecast two-way heavy vehicle AWT volumes from the WRTM on surface roads at the lower north–south screenline location under the 2023 and 2033 'without project' and 'cumulative' scenarios.

Key observations comparing the 2023 ‘without project’ and ‘cumulative’ scenarios are that patterns of change are similar to the ‘without project’ and ‘with project’ comparisons, with a decrease in two-way heavy vehicle AWT across the screenline. This decrease is larger in the ‘cumulative’ scenarios, driven primarily by a larger decrease on Southern Cross Drive. This is likely due to the increased attractiveness of the M4-M5 Link with the inclusion of the proposed future Western Harbour Tunnel in the ‘cumulative’ 2023 scenario.

Annexure Table 6 Lower north–south screenline: WRTM comparison for without and with project scenarios – heavy vehicle AWT volumes

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Two-way	Stanmore Road	2,160	10%	1,190	6%	-45%	2,320	9%	1,320	6%	-43%
	Addison Road	300	1%	220	1%	-27%	400	2%	230	1%	-43%
	Sydenham Road	2,410	11%	1,970	10%	-18%	2,590	10%	2,010	10%	-22%
	Marrickville Road	820	4%	560	3%	-32%	890	4%	420	2%	-53%
	King Street	920	4%	480	3%	-48%	990	4%	720	4%	-27%
	Wyndham Street	1,390	6%	1,210	6%	-13%	1,310	5%	1,060	5%	-19%
	Botany Road	1,590	7%	1,370	7%	-14%	1,520	6%	1,270	6%	-16%
	Elizabeth Street	700	3%	640	3%	-9%	730	3%	660	3%	-10%
	Southern Cross Drive	12,430	55%	11,160	59%	-10%	14,270	57%	12,630	62%	-11%
	Total	**22,720**		**18,800**		**-17%**	**25,020**		**20,320**		**-19%**

Source: WRTM v2.3, 2017

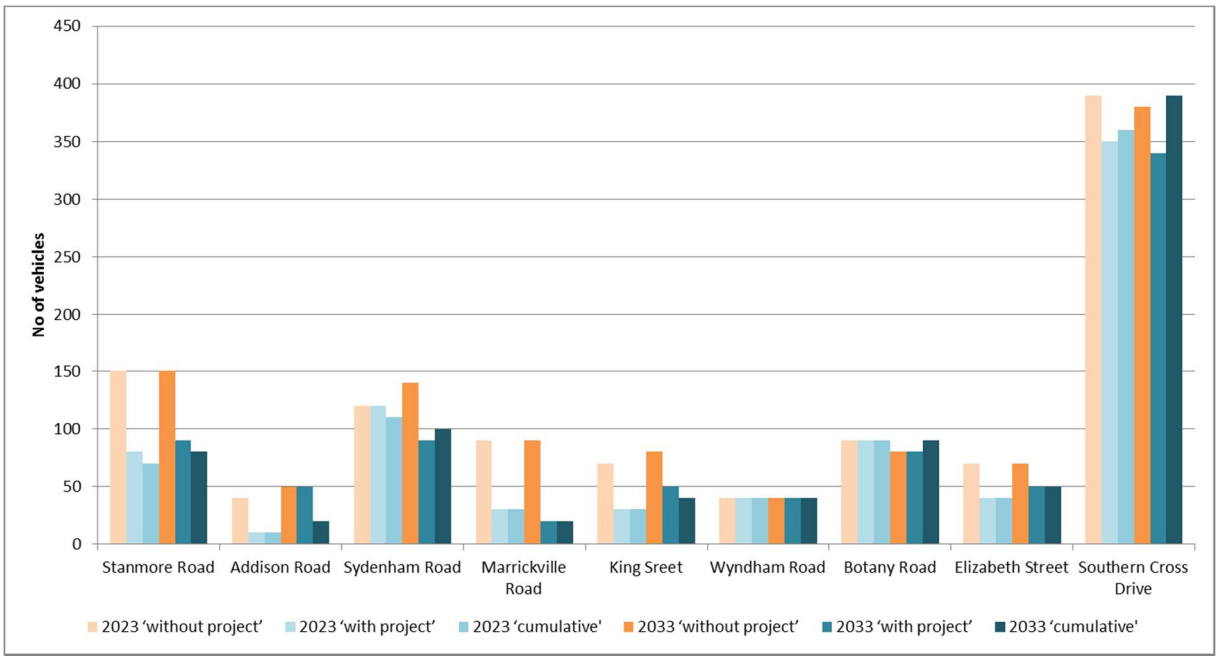
Annexure Table 7 Lower north–south screenline: WRTM comparison for without project and cumulative scenarios – heavy vehicle AWT volumes

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Two-way	Stanmore Road	2,160	10%	1,210	7%	-44%	2,320	9%	1,290	7%	-44%
	Addison Road	300	1%	150	1%	-50%	400	2%	140	1%	-65%
	Sydenham Road	2,410	11%	2,090	12%	-13%	2,590	10%	2,200	12%	-15%
	Marrickville Road	820	4%	570	3%	-30%	890	4%	430	2%	-52%
	King Street	920	4%	500	3%	-46%	990	4%	620	3%	-37%
	Wyndham Street	1,390	6%	1,300	8%	-6%	1,310	5%	1,210	7%	-8%
	Botany Road	1,590	7%	1,240	7%	-22%	1,520	6%	1,230	7%	-19%
	Elizabeth Street	700	3%	670	4%	-4%	730	3%	730	4%	0%
	Southern Cross Drive	12,430	55%	9,560	55%	-23%	14,270	57%	10,470	57%	-27%
	Total	**22,720**		**17,290**		**-24%**	**25,020**		**18,320**		**-27%**

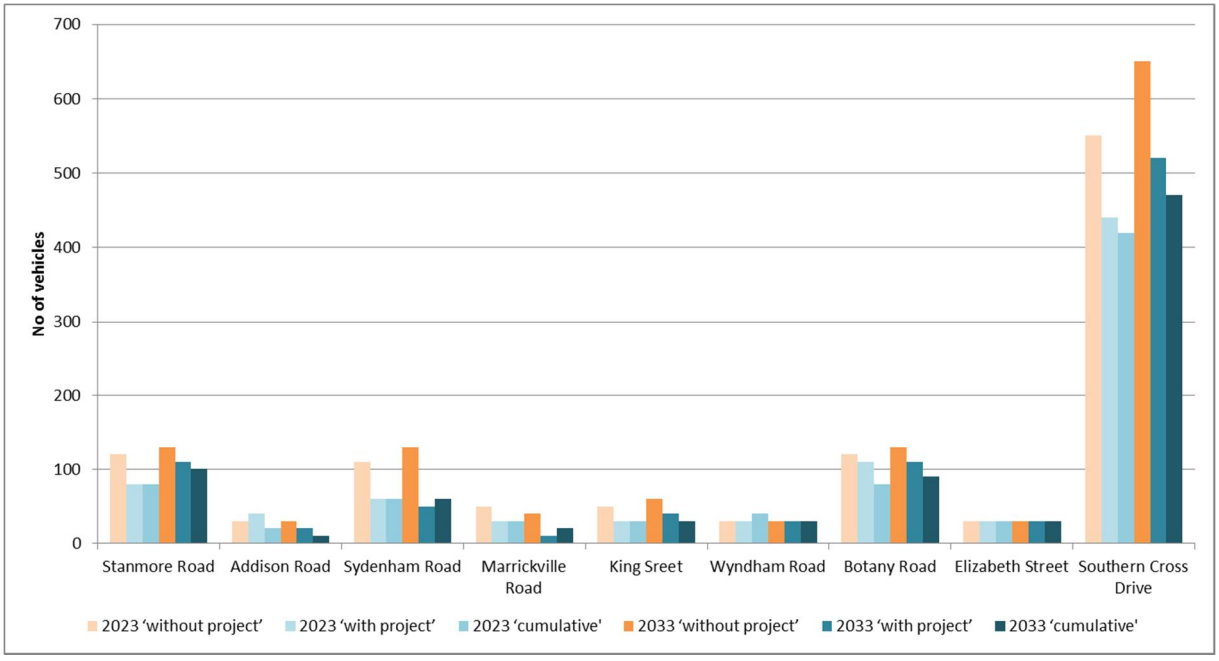
Source: WRTM v2.3, 2017

Peak hour analysis

Annexure Figure 28 and **Annexure Figure 29** illustrate the changes in the peak one hour two-way heavy vehicle volumes at the lower north–south screenline. The peak hour forecasts indicate heavy vehicle traffic volume changes similar to those in the daily forecasts, with traffic decreasing across the screenline. However in the AM peak, the decrease on Southern Cross Drive is much lower. This likely reflects capacity constraints on the network in the AM peak which result in a smaller proportion of total north–south demand being able to shift off of north–south links on surface roads, and onto the M4-M5 Link.



Annexure Figure 28 Lower north–south screenline: comparison of two-way AM peak one hour heavy vehicle volumes



Annexure Figure 29 Lower north–south screenline: comparison of two-way PM peak one hour heavy vehicle volumes