10. Construction traffic, transport and access

This chapter provides a summary of the results of the traffic, transport and access assessment as it relates to construction impacts. A full copy of the assessment report is provided as Technical paper 1 – Traffic, transport and access assessment.

The Secretary's environmental assessment requirements relevant to construction traffic, transport and access, together with a reference to where the relevant results are summarised in this chapter and in the Environmental Impact Statement, is provided in Table 10.1.

Table 10.1 Secretary's environmental assessment requirements – construction traffic, transport and access

Ref	Secretary's environmental assessment requirements – construction traffic, transport and access	Where addressed
13.1	The Proponent must assess construction transport and traffic (vehicle, pedestrian and cyclists) impacts, including, but not necessarily limited to:	A summary of the results of the construction traffic, transport and access assessment is provided in this chapter. The full results are provided in Technical paper 1.
	(a) a considered approach to route identification and scheduling of transport movements;	Sections 9.7.4 and 9.8.8
	(b) the number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements);	Sections 9.8.9
	(c) *blank*	n/a
.	(d) the need to upgrade roads proposed for construction vehicle routes including impacts of road closures, construction worker parking and impacts on availability of public parking;	Section 10.3.3
	(e) the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times and sensitive road users and parking arrangements);	Section 10.2.2
	(f) information on how construction and scheduling of works will be coordinated in regard to cumulative traffic impacts resulting from concurrent work on WestConnex and other approved key construction projects;	Section 10.4.8
	(g) access constraints and impacts on public transport, pedestrians and cyclists including: • impacts on customers and the reliability of suburban and intercity rail services (including increased demand for rail services on other lines, particularly the T2 Inner West, T1 North Shore, Northern and Western Lines) during possession periods and testing and commissioning of metro trains	Section 10.4.5
	• alternative transport arrangements for customers during rail possessions and closure of the rail line (including how the Temporary Transport Plan will be developed in consultation with relevant Councils and the community); and	Sections 9.11 and 10.3.4 (details of the temporary transport strategy and development of temporary transport management plans)
	• identification of key traffic performance issues in the surrounding areas during rail shutdowns and implementation of alternate transport arrangements	Sections 10.4.2 and 10.4.5

Ref	Secretary's environmental assessment requirements – construction traffic, transport and access	Where addressed
	(h) the need to close, divert or otherwise reconfigure elements of the road and cycle network associated with construction of the project.	Sections 10.3.3 (details of the proposed changes) and Section 10.4.3 (impacts of changes).

10.1 Assessment approach

A summary of the approach to the construction traffic, transport and access impact assessment is provided in this section. Further information is provided in Technical paper 1.

10.1.1 Policy context to the assessment

The *Traffic Modelling Guidelines* (Roads and Maritime Services, 2013) were developed to provide consistency in traffic modelling practice, and promote high quality model outputs. The traffic (intersection) modelling carried out for the traffic, transport and access assessment aligns with the *Traffic Modelling Guidelines,* by including the following broad steps:

- selection of computer software models (LinSig or SIDRA) used for similar projects for similar intersection modelling purposes
- calibrate and validate models under existing (2016) conditions using current traffic data
- application of anticipated construction traffic demands to identify potential impacts
- develop mitigation measures as considered necessary.

10.1.2 Methodology

Overview

The construction traffic, transport and access assessment involved:

- general site observations, including lane and intersection configurations, queue lengths, posted speed limits, footpath conditions, lane usage, bottlenecks and pinch points, and the location of parking, bus stops, and other road and roadside infrastructure
- gathering relevant data, including:
  - traffic volume counts
  - Sydney Coordinated Adaptive Traffic System (SCATS) volume and traffic signal data
  - surveys of on-street and off-street parking undertaken between April and December 2016
- analysing future traffic conditions, including likely road changes and growth in traffic volumes
- modelling future road network performance both with and without the proposed construction works
- assessing the potential impacts of construction on road network performance, active transport, public transport, access, and parking
- assessing the potential impacts of implementing the proposed alternative transport arrangements, including the impacts of rail replacement buses
- analysing the physical constraints for construction (heavy) vehicle access to construction compounds
- assessing potential cumulative impacts
- developing mitigation measures and strategies, including for the worst affected intersections.

Further information on the key tasks undertaken is provided below. A detailed description of the methodology is provided in Technical paper 1.

Road network assessment

Modelling of intersection performance was undertaken with consideration of the *Traffic Modelling Guidelines.* Traffic modelling software (SIDRA and/or LinSig) was used to assess intersection capacity and identify potential construction impacts. The following scenarios were modelled:

- 2016 (existing) conditions, based on traffic volume data (for calibration purposes)
- 2023 (future) conditions, including the estimated natural traffic growth rate
- 2023 (future) conditions, with traffic generated by construction vehicles and rail replacement bus operations at station and corridor work sites
- 2023 (future) conditions, with traffic generated by construction vehicles during bridge works, including indicative traffic diversion routes.

The assessment was undertaken:

- for key intersections in the vicinity of compounds and work sites
- along the preliminary construction truck haulage routes, and based on the estimated construction traffic volumes described in Section 9.8
- along the potential routes for rail replacement buses identified for the refined temporary transport management plan (described in Section 10.3.4)
- along the indicative diversion routes during bridge closures, as summarised in Table 10.36 and described in Chapter 6 of Technical paper 1.

Modelling was undertaken with consideration of the impacts likely to be experienced during a typical weekday morning and afternoon peak period, consistent with the approach used for other major infrastructure projects. These peak traffic periods represent a time when the road network typically experiences its maximum demand, and the available spare capacity is at its most limited. However, it is acknowledged that in some locations, Saturday peaks are also high relative to weekday peaks. Where this is likely to occur, specific measures in the construction traffic management plan (described in Section 10.5.1) would be implemented to minimise potential impacts.

The intersection assessments that include consideration of rail replacement buses are also considered to be conservative when applied during the weekday peak period. As described in Section 9.7.3, the rail replacement bus services would typically operate during periods of lower transport infrastructure demand (weekends and school holidays).

The following indicators were used to assess intersection performance:

- Level of service (LoS) – a measure of the overall performance of the intersection. This includes the average delay likely to be experienced by a vehicle waiting at an intersection (the criteria used are listed in Table 10.2).
- Degree of saturation (DoS) – the ratio between traffic volumes and capacity of the intersection, which indicates how close to capacity an intersection is operating (with a number below 1.0 typically targeted).

Table 10.2 Level of service criteria

Level of service	Average delay (seconds)	Traffic signals and roundabouts
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity, incidents will cause excessive delays at signals
F	>70	Signals exceed capacity, roundabouts require other control mode

Bridge works

An assessment of intersection performance along routes that may be used for diverted traffic during partial or full bridge closures was undertaken. The proposed closure configuration, indicative closure durations, and preliminary diversion routes are outlined in Table 10.36. Consistent with the assessment for station and corridor works, the assessment of the impacts along diversion routes was undertaken for a typical weekday morning and evening peak period, based on the traffic generated by construction vehicles.

Access constraints for construction vehicles

A swept-path analysis was undertaken for the preliminary construction vehicle haulage routes, using both 8.8 and 12.5 metre long design vehicles (trucks). This type of analysis identifies possible obstructions to the vehicle performing the manoeuvre safely, and may indicate where road adjustments, such as lane widening, kerb or median adjustments, restrictions and/or removal of parking are required.

Alternative transport arrangements

The alternative transport arrangements proposed to be used during possession periods and station closures are described in Section 9.11. As described in this section, the Temporary Transport Strategy (provided in Appendix G) outlines:

- the process for planning the integrated, multi-modal transport network changes required during possessions of the T3 Bankstown Line to enable construction
- a number of components for alternative public transport arrangements by rail and bus during construction (including rail replacement buses), to minimise impacts to customers during station closures and/or possession periods
- the process for preparing and implementing a temporary transport management plan for each possession period/closure.

A ‘baseline’ temporary transport plan was developed and assessed. This consisted of replacing the peak capacity of the existing rail service with buses, similar to what currently occurs during weekend maintenance possessions by Sydney Trains. As a result of the much larger volume of passengers required to be moved during the weekday peak period, and the large number in buses required, the assessment identified there would potentially be extensive impacts on the road network, as well as to rail customers. A ‘refined baseline’ temporary transport plan was subsequently developed and assessed. This refined baseline plan included conveying passengers west of Campsie Station to other rail lines, to reduce the potential traffic and other impacts at Dulwich Hill, Marrickville and Sydenham stations as identified in the baseline plan. The refined baseline plan is assessed in this chapter.

10.2 Existing environment

A summary of the key features of the regional transport network is provided in Section 10.2.1. A description of local features within and in the vicinity of the project area is provided in Section 10.2.2.

10.2.1 Regional transport context

Active transport

Pedestrian networks

Sydney's Walking Future (Transport for NSW, 2013) identifies that the majority of south and south-western Sydney has a walking mode share of greater than 17 per cent. In general, areas surrounding rail stations that have a higher density of residential development and larger retail/commercial centres (mainly around Marrickville, Canterbury, Campsie, and Bankstown stations) have a higher volume of pedestrians.

The pedestrian network consists of footpaths and dedicated road crossings. A number of un-signalised pedestrian crossing facilities are provided throughout the footpath/road network. Dedicated road crossings also help manage and prioritise conflicting movements and improve safety and accessibility.

Pedestrians can generally move freely on local footpaths and dedicated road crossings, but may experience reduced permeability within centres such as Bankstown due to large street blocks, major roads, and the rail corridor. The areas surrounding these centres generally have a high volume of pedestrians accessing interchanges and commercial precincts.

With the exception of the medium density and commercial/industrial land uses in Canterbury, Campsie, and Bankstown, the rest of the study area generally includes lower density residential areas, generating low pedestrian volumes adjacent to and between the stations.

Cycle networks

The cycle network in the study area is developing from a series of individual on and off road facilities, towards a cohesive network, to support the varied needs of people cycling for leisure and/or commuting. In the vicinity of the project area, the cycle network provides regional and local connections to surrounding transport hubs and residential, commercial, and educational precincts. The majority of local cycling connections are on-road mixed environments or pathways through recreation areas/parks.

Typically, regional cycling routes close to the project area are off-road and shared with pedestrians and include:

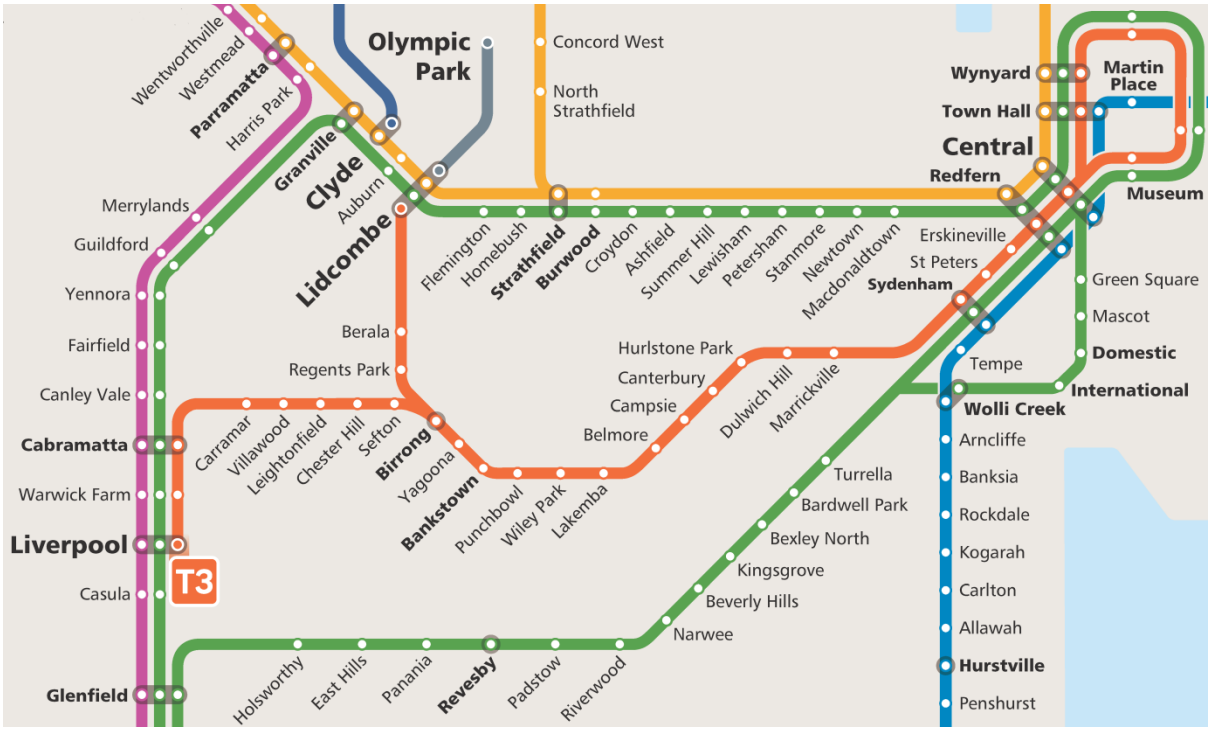
- the Greenway Cycleway, which connects Dulwich Hill to Lewisham
- the Cooks River cycle route, which connects Campsie, Canterbury and Tempe
- Salt Pan Creek cycle route, which connects Bankstown to Georges Hall.

Whilst existing facilities offer some amenity and connectivity to wider transport networks, there are several aspects contributing to a relatively low uptake in cycling. These include restricted bike parking at some locations, and limited capacity of existing cycle facilities.

Public transport

Suburban rail network

The Sydney Trains network, including the T3 Bankstown Line, is shown in Figure 10.1. The T3 Bankstown Line connects Liverpool and Lidcombe to the west, and stations within the project area, to the Sydney CBD (City Circle) via Sydenham Station. West of Bankstown, the line travels through Yagoona and Birrong stations. At Birrong, about half of the T3 Bankstown Line trains continue north to Lidcombe (via Regents Park and Berala stations). The other half travel west to Liverpool (via Sefton, Chester Hill, Leightonfield, Villawood, Carramar, Cabramatta, and Warwick Farm stations). The T2 Airport, Inner West & South Line and the T4 Eastern Suburbs & Illawarra Line also pass through Sydenham Station to the east of the project area.



Note: This figure shows the network map as at July 2017. As part of the NSW Government's More Trains, More Services program, a refreshed rail network map is in the process of being implemented. Line names used in this Environmental Impact Statement reflect the existing naming conventions.

Figure 10.1 Sydney Trains network

Bus networks

Buses in Sydney provide local connections to key transport interchanges and other services, as well as regional public transport services. The key bus routes operating south of the Sydney CBD include those operating along the Princes Highway and King Street. Cross-regional services also operate between Marrickville and Bondi Junction.

The majority of bus routes traverse the project area in a north–south direction, with services providing connections to stations, town centres, and surrounding areas. Connections between bus services and trains are focused at key transport interchanges located at Bankstown and Campsie stations. Buses using interchanges at these stations provide services to other regional centres, including Parramatta, Hurstville, Sutherland, and Macquarie Park. Services using these interchanges are frequent during peak hours.

Light rail

The L1 Dulwich Hill light rail line terminates near the project area at the Dulwich Hill light rail stop, located about 130 metres to the north-west of the Dulwich Hill Station entrance. The line provides services to the Sydney CBD, via the Inner West and Pyrmont.

Freight services

The Sydney Metropolitan Freight Network consists of dedicated freight railway lines that run through a complex metropolitan rail network and link interstate freight rail lines to Sydney's freight facilities located at Enfield and Port Botany. The network extends from Lidcombe/North Strathfield in the north, to Macarthur in the south-west (via the Southern Sydney Freight Line), and Port Botany in the south-east and is managed by ARTC.

A portion of the Metropolitan Freight Network that runs between Port Botany and Enfield is located within the project area. As shown in Figure 10.2, the freight rail line is located on the northern side of the T3 Bankstown Line from east of Marrickville Station to about 700 metres west of Campsie Station. West of Campsie, the freight line turns north towards the Enfield Intermodal Terminal. At Marrickville, the freight line turns south towards Port Botany.

Regional road network

Key roads south of the Sydney CBD include the Eastern Distributor (providing a connection to the M5 Motorway), King Street, the Princes Highway, and Regent Street.

The road network around the project area is shown in Figure 10.2. The South Western Motorway (M5) and the M5 East Motorway alignments run roughly parallel to the project area, and are located around two to three kilometres to the south. The project corridor is also intersected by Stacey Street (part of the A6), and King Georges Road (part of the A3), which are arterial roads that run north–south and provide access to both the M4 and M5.

Other key strategic road corridors situated near to the project corridor include:

- Princes Highway (the A36) and the M1 Southern Cross Drive, located to the east and south-east of Sydenham Station
- Hume Highway (the A22), located about one kilometre north of Bankstown Station
- the proposed WestConnex Motorway and St Peters interchange, located to the south and east of the project area.

10.2.2 Local transport facilities

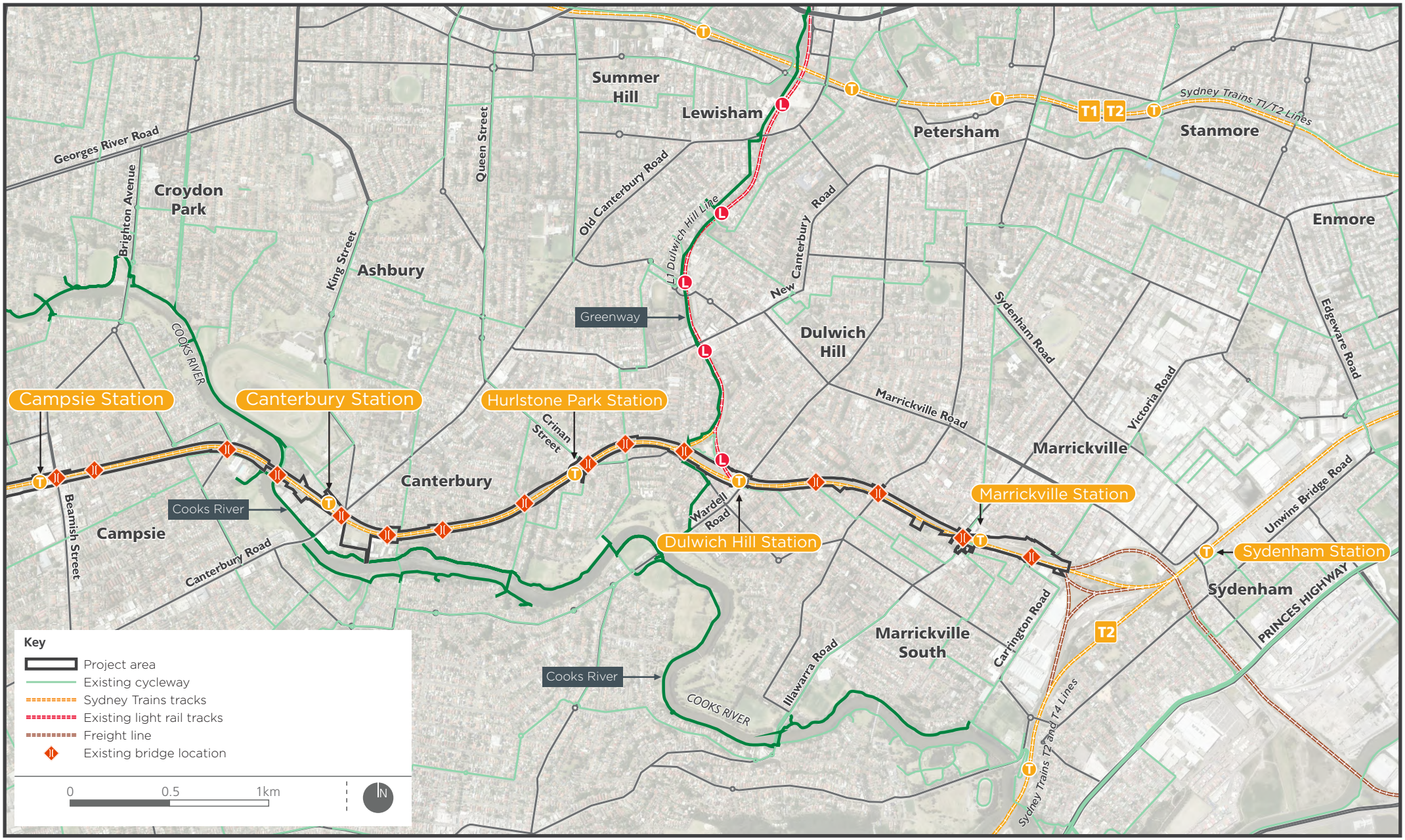
A summary of the key features of the local transport environment at each station is provided below. Further details of the local transport facilities are provided in Technical paper 1.

Marrickville Station

Existing transport facilities at Marrickville Station are shown on Figure 10.3 and summarised in Table 10.3. Further information is provided following the table.

Table 10.3 Transport facilities at Marrickville Station

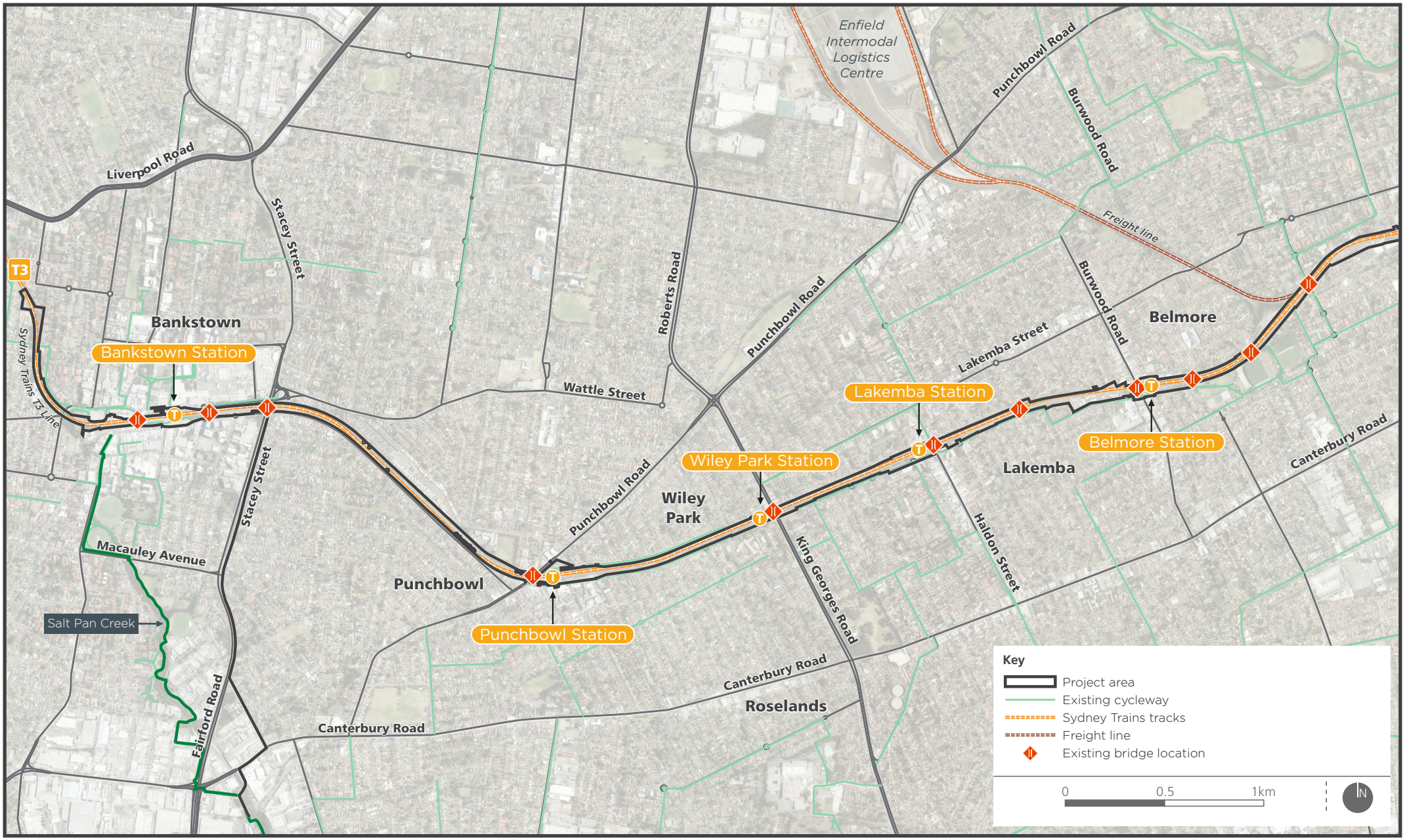
Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (86%)	8	2	3	1



sydney METRO | city & southwest

Road network and transport facilities - map 1

FIGURE 10.2



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Road network and transport facilities - map 2

FIGURE 10.2

Active transport

As shown in Table 10.3, the main mode of travel to Marrickville Station is walking (86 per cent). The walking catchment in the vicinity of the station is relatively good due to the existence of primary roads and a few perpendicular secondary streets within a predominantly residential area. Footpaths are also located on both sides of the roads.

The Cooks River Cycleway runs to the south of Marrickville Station. This cycleway is a key part of the regional cycle network. There are also a number of roads surrounding the station which have on-road cycle lanes/road shoulders/mixed traffic lanes. This includes the route on Illawarra Road, which is part of the regional cycle network and connects to Marrickville Station.

Eight bike parking spaces are provided at the station on the southern corner of Arthur Street and on the western side of Station Street.

Public transport

Existing daily rail travel volumes at Marrickville Station in 2016 were 4,594 entries and 4,356 exits. As shown on Figure 10.3, the station is also serviced by two bus routes along Illawarra Road, travelling to and from the station. These routes connect with the Sydney CBD. The services stop at two bus stops, located on Illawarra Road near the station.

Parking

As shown in Table 10.4, there are about 1,500 on-street parking spaces within 400 metres of the station, and no untimed, dedicated commuter spaces. Demand for unrestricted on-street parking is relatively high (represented by the utilisation rate of 81 per cent) as a result of the competing requirements of residents close to the station, and commuters and visitors to the area.

As shown in Table 10.3, there are three kiss and ride spaces and one taxi bay at Marrickville Station.

Table 10.4 Parking facilities at Marrickville Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation (%)
1,519 (1,257 unrestricted)	81%	0	n/a

Note: 1. Within 400 metres of the station.
2. Verified during parking surveys undertaken after the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The main road in the vicinity of Marrickville Station is Illawarra Road, which is a regional road that travels in a roughly north–south direction immediately to the west of the station. The following State and regional roads are located in the area surrounding the station:

- State roads: Sydenham Road
- Regional roads: Illawarra Road (south of Marrickville Road), Marrickville Road (east and west of Illawarra Road).

Local roads surrounding the station are shown on Figure 10.3. Table 10.5 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of the station.

Table 10.5 Existing weekday traffic volumes – Marrickville Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Richardson Crescent	18,592	17,384	1,208	6	1,538	1,496
Illawarra Road (between Marrickville Road and Calvert Street)	11,967	11,141	826	7	990	963
Marrickville Road (between Illawarra Road and Silver Street)	16,171	14,098	2,073	13	1,338	1,301
Victoria Road (between Marrickville Road and Fernbank Street)	7,828	7,363	466	6	648	630
Warren Road (between Illawarra Road and Moyes Street)	11,039	9,625	1,414	13	913	888

Figure 10.3 Existing transport facilities at Marrickville Station

Dulwich Hill Station

Existing transport facilities at Dulwich Hill Station are shown on Figure 10.4 and summarised in Table 10.6. Further information is provided following the table.

Table 10.6 Transport facilities at Dulwich Hill Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (76%)	20	1	3	0

Active transport

As shown in Table 10.6, the main mode of travel to Dulwich Hill Station is walking (76 per cent). The walking catchment in the vicinity of the station is relatively good, and footpaths are located on both sides of the roads. However, movements are constrained by the rail corridor and the light rail line. Low vehicle speeds and relatively narrow carriageways along Wardell Road make it attractive for pedestrians.

The Cooks River Cycleway runs to the south of Dulwich Hill Station. This cycleway is a key part of the regional cycle network.

Both Albermarle Street and School Parade (parallel to the rail corridor) have on road bike lanes/road shoulders/mixed traffic lanes suitable for riders of varying experience and confidence.

There are 20 bike parking spaces at Dulwich Hill Station, located on the southern side of Bedford Crescent and the northern side of Wardell Road.

Public transport

Existing daily rail travel volumes at Dulwich Hill Station observed in 2016 were 2,706 entries and 2,464 exits. As shown on Figure 10.4, the station is serviced by one bus route that stops on either side of Dudley Street to the east of the station. This route travels to the Sydney CBD.

Parking

As shown in Table 10.7, there are about 1,300 on and off-street parking spaces within 400 metres of the station, including 55 dedicated commuter spaces in Ewart Lane. The demand for the spaces is relatively high, with an existing utilisation rate of 74 per cent for on-street parking spaces, and 100 per cent for commuter spaces.

Figure 10.4 shows the existing kiss and ride facilities (three spaces) located in Bedford Crescent to the north of the station. There are no taxi bays at the station.

Table 10.7 Parking facilities at Dulwich Hill Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
1,275 (1,202 unrestricted)	74%	57 (includes 55 dedicated commuter parking spaces)	100%

Note: 1. Within 400 metres of the station
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016

Road network

The main road in the vicinity of Dulwich Hill Station is Wardell Road, which is a regional road that travels in a north–south direction immediately to the east of the station. The following State and regional roads are located in the area surrounding the station:

- State roads: New Canterbury Road
- Regional roads: Marrickville Road and Wardell Road.

Local roads surrounding the station are shown on Figure 10.4. Table 10.8 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of the station.

Table 10.8 Existing weekday traffic volumes – Dulwich Hill Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Bayley Street (between Ewart Street and Dudley Street)	781	662	119	15	59	97
Ewart Street (between Bayley Street and Wicks Avenue)	7,491	7,123	367	5	566	607
Livingstone Rd (between Warren Road and Jersey Street)	12,117	11,754	363	3	916	982
Wardell Road (between Marrickville Road and Pine Street)	14,377	14,005	372	3	1,086	1,165
Marrickville Road (between Darley Street and Wardell Road)	12,595	11,224	1,371	11	952	1,020
Terrace Road (between New Canterbury Road and Consett Street)	1,310	1,297	13	1	99	176
New Canterbury Road (between Kintore Street and Terrace Road)	28,846	27,813	1,033	4	2,180	2,337

Figure 10.4 Existing transport facilities at Dulwich Hill Station

Hurlstone Park Station

Existing transport facilities at Hurlstone Park Station are shown on Figure 10.5 and summarised in Table 10.9. Further information is provided following the table.

Table 10.9 Transport facilities at Hurlstone Park Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (81%)	12	2	0	0

Active transport

As shown in Table 10.9, the main mode of travel to Hurlstone Park Station is walking (81 per cent). The walking catchment in the vicinity of the station is relatively good, with radiating and intersecting roads, and narrow carriageways and low vehicle speeds in the town centre.

Hurlstone Park has good on-road cycle routes connecting cyclists to the station from Canterbury Road in the north-west, Floss Street in the east, and Foord Avenue in the south, A section of the Floss Street cycle route (between Garnet and Duntroon streets) connects to the Cooks River Cycleway, which runs along the southern boundary of the station area.

Twelve bike parking spaces are provided on Crinan Street outside the station entrance.

Public transport

Existing daily rail travel volumes at Hurlstone Park Station observed in 2016 were 1,532 entries and 1,312 exits.

As shown on Figure 10.5, the station is serviced by two bus routes. Stops for these routes are provided on either side of Crinan Street, near the station.

Parking

As shown in Table 10.10, there are about 1,200 on and off-street parking spaces within 400 metres of the station. There is moderate demand for on-street spaces (utilisation of 54 per cent) and high demand for commuter spaces (utilisation of 100 per cent).

There are no kiss and ride spaces or taxi bays at the station.

Table 10.10 Parking facilities at Hurlstone Park Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
1,185 (1,135 unrestricted)	54%	23 (dedicated commuter parking spaces)	100%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The road network at Hurlstone Park Station is focused around Crinan and Duntroon streets, which converge on the northern side of the rail corridor. Two State roads are located in the area surrounding the station – Canterbury Road and New Canterbury Road.

Local roads surrounding the station are shown on Figure 10.5. Table 10.11 shows existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of the station.

Table 10.11 Existing weekday traffic volumes – Hurlstone Park Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Duntroon Street	1,959	1,892	66	3	148	177
New Canterbury Road (between Wattle Lane and Old Canterbury Road)	25,040	23,976	1,064	4	1,892	2,028
Crinan Street (between Floss Street and Fernhil Street)	8,514	7,845	669	8	643	690
Canterbury Road (between Queen Street and Wattle Lane)	25,477	23,542	1,935	8	1,925	2,064
Canterbury Road (between Queen Street and Princess Street)	29,769	27,593	2,176	7	2,250	2,411

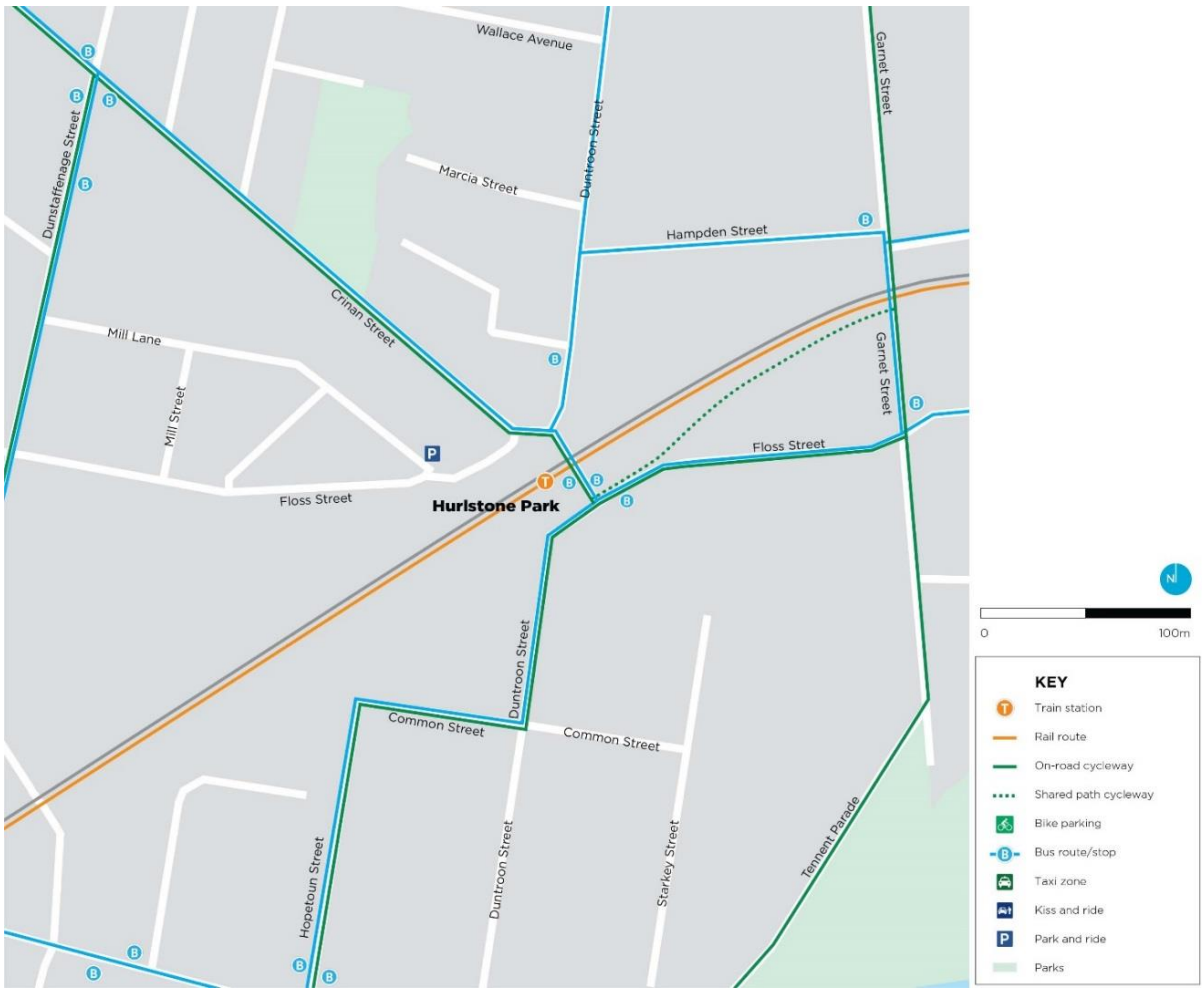


Figure 10.5 Existing transport facilities at Hurlstone Park Station

Canterbury Station

Existing transport facilities at Canterbury Station are shown on Figure 10.6 and summarised in Table 10.12. Further information is provided following the table.

Table 10.12 Transport facilities at Canterbury Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (84%)	4	6	0	0

Active transport

As shown in Table 10.12, the main mode of travel to Canterbury Station is walking (84 per cent), influenced by good pedestrian accessibility for those living to the east and the north of the station. The Cooks River, the railway corridor, and Canterbury Road present barriers to movement from the south.

The Cooks River Cycleway runs on the southern side of the station. This cycleway is a key part of the regional cycle network.

Four bike parking spaces are provided at Canterbury Station in a secured shed located on Broughton Street.

Public transport

Existing daily rail travel volumes at Canterbury Station observed in 2016 were 2,426 entries and 2,164 exits.

As shown on Figure 10.6, the station is serviced by six bus routes, including high frequency routes from the Sydney CBD, Campsie, and Hurstville. These services stop at bus stops located on Canterbury Road or in Broughton Street.

Parking

As shown in Table 10.13, there are about 850 on and off-street parking spaces within 400 metres of the station. There is moderate demand for on-street spaces (utilisation of 59 per cent) and a relatively high demand for commuter spaces (utilisation of 84 per cent).

There are no kiss and ride spaces or taxi bays at the station.

Table 10.13 Parking facilities at Canterbury Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
616 (597 unrestricted)	59%	233 (includes 32 dedicated commuter parking spaces)	84%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The road network at Canterbury Station is focused on Canterbury Road, which is a State road that travels in a north-east/south-west direction immediately to the south of the station. A regional road, Jeffrey Street, intersects with Canterbury road to north-east of the station.

Local roads surrounding the station are shown on Figure 10.6. Table 10.14 shows existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of the station.

Table 10.14 Existing weekday traffic volumes – Canterbury Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Canterbury Road (between Close Street and Broughton Street)	51,361	47,837	3,525	7	2,985	3,603
Broughton Street (between Canterbury Road and Robert Street)	3,613	3,166	447	12	210	253
Canterbury Road (between Jeffrey Street and Minter Street)	35,738	32,965	2,773	8	2,077	2,507
Charles Street (between Canterbury Road and Broughton Street)	929	757	172	19	54	75
Canterbury Road (between Charles Street and Close Street)	51,361	47,837	3,525	7	2,985	3,603
Wonga Street	12,925	12,771	153	1	751	907

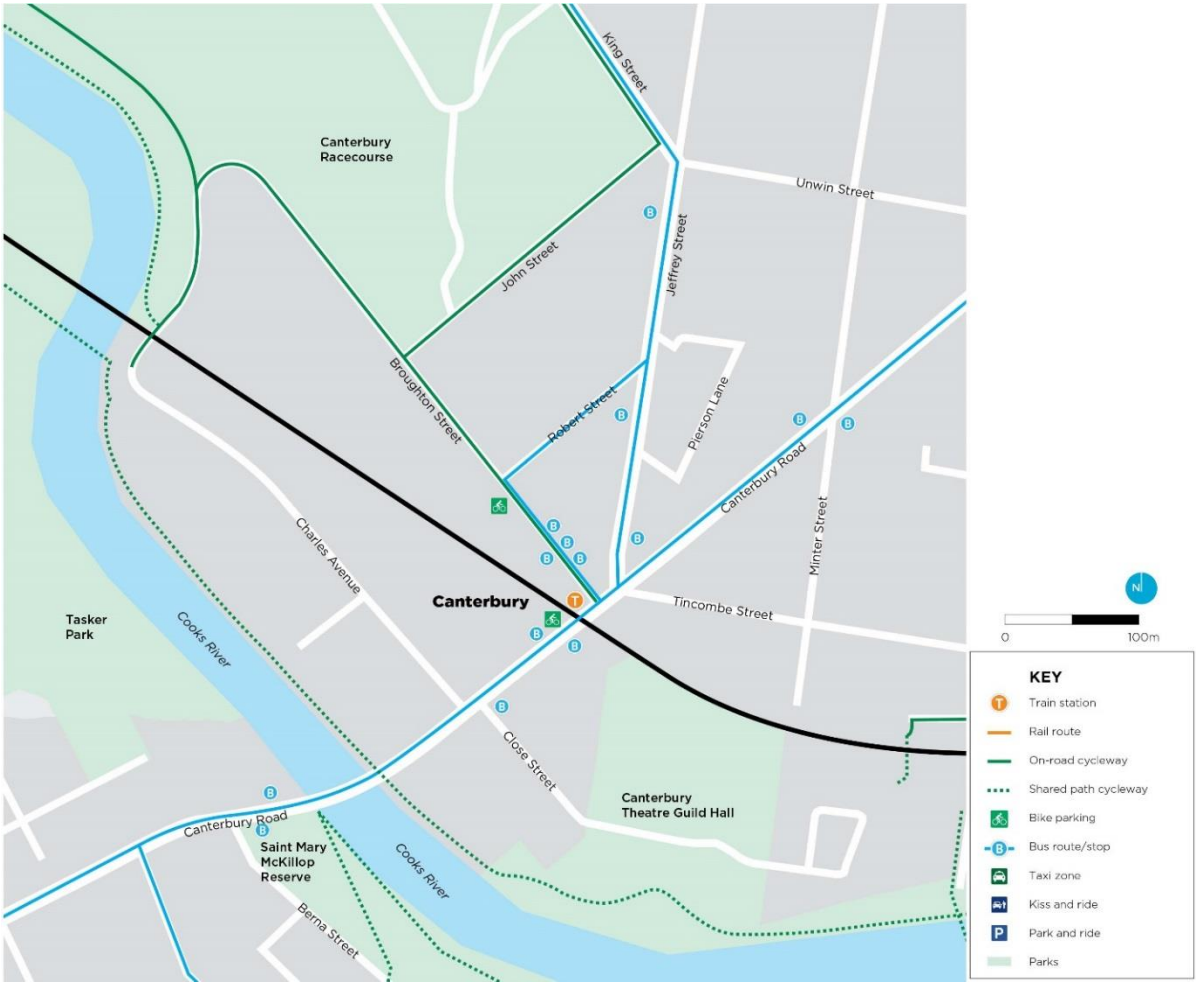


Figure 10.6 Existing transport facilities at Canterbury Station

Campsie Station

Existing transport facilities at Campsie Station are shown on Figure 10.7 and summarised in Table 10.15. Further information is provided following the table.

Table 10.15 Transport facilities at Campsie Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (73%)	10	7	4	6

Active transport

As shown in Table 10.15, the main mode of travel to Campsie Station is walking (73 per cent). The walking catchment in the vicinity of the station is relatively good, with linear intersecting regional roads (e.g. Beamish Street) and perpendicular local roads. Roads also have footpaths on both sides.

The Cooks River Cycleway runs parallel to the rail corridor to the north of the station, however there are no direct on or off road cycleways connecting this cycleway to Campsie Station. There are a number of on-road cycle lanes, road shoulders, and mixed traffic lanes that provide cycle access to the station from surrounding areas.

Ten bike parking spaces are provided on Beamish Street outside the station entrance.

Public transport

Existing daily rail travel volumes at Campsie Station observed in 2016 were 8,237 entries and 8,039 exits.

Campsie is a major hub for bus services and provides a key interchange between buses and rail services. The location of bus stops in the vicinity of the station is shown in Figure 10.7. Seven bus services use the stops on Beamish Street and South Parade. These include services providing access to Macquarie Park.

Parking

As shown in Table 10.16, there are about 1,500 on and off-street parking spaces within 400 metres of the station. About one-third of the spaces available, which includes 138 dedicated commuter spaces, are located off-street. There is a high demand for parking in the vicinity of the station, with a utilisation rate of 85 per cent for on-street spaces, and 100 per cent for off-street spaces.

Four kiss and ride spaces are provided at the station, with two in North Parade (west of Beamish Street) and two in South Parade, and six taxi bays are provided in North Parade (east of Beamish Street).

Table 10.16 Parking facilities at Campsie Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
1,045 (759 unrestricted)	85%	494 (includes 138 dedicated commuter parking spaces)	100%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The existing road network at Campsie Station is focused around Beamish Street, a regional road that runs in a north–south direction immediately to the east of the station. The following State and regional roads are located in the area surrounding the station:

- State roads: Canterbury Road
- Regional roads: Beamish Street, Brighton Avenue, Fifth Avenue, Ninth Avenue.

Local roads surrounding the station are shown on Figure 10.7. Table 10.17 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) in the vicinity of Campsie.

Table 10.17 Existing weekday traffic volumes – Campsie Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Canterbury Rd (between Beamish Street and Scahill Street)	41,161	38,170	2,991	7	2,392	2,888
South Parade (between Beamish Street and Harold Street)	6,916	6,469	447	6	402	352

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
North Parade (between Browning Street and Beamish Street)	2,366	2,351	15	1	138	166
Beamish Street (between South Parade and Amy Street)	18,858	18,457	400	2	1,290	1,430
Gould Street (between Canterbury Road and Redman Street)	2,794	2,558	236	8	162	196
Ninth Avenue (between Beamish Street and Fifth Avenue)	16,272	15,879	393	2	946	1,142
South Parade (between Beamish Street and Harold Street)	5,879	5,499	380	6	402	352
Canterbury Road (between Beamish Street and Kingsgrove Road)	43,029	39,949	3,081	7	2,501	3,019

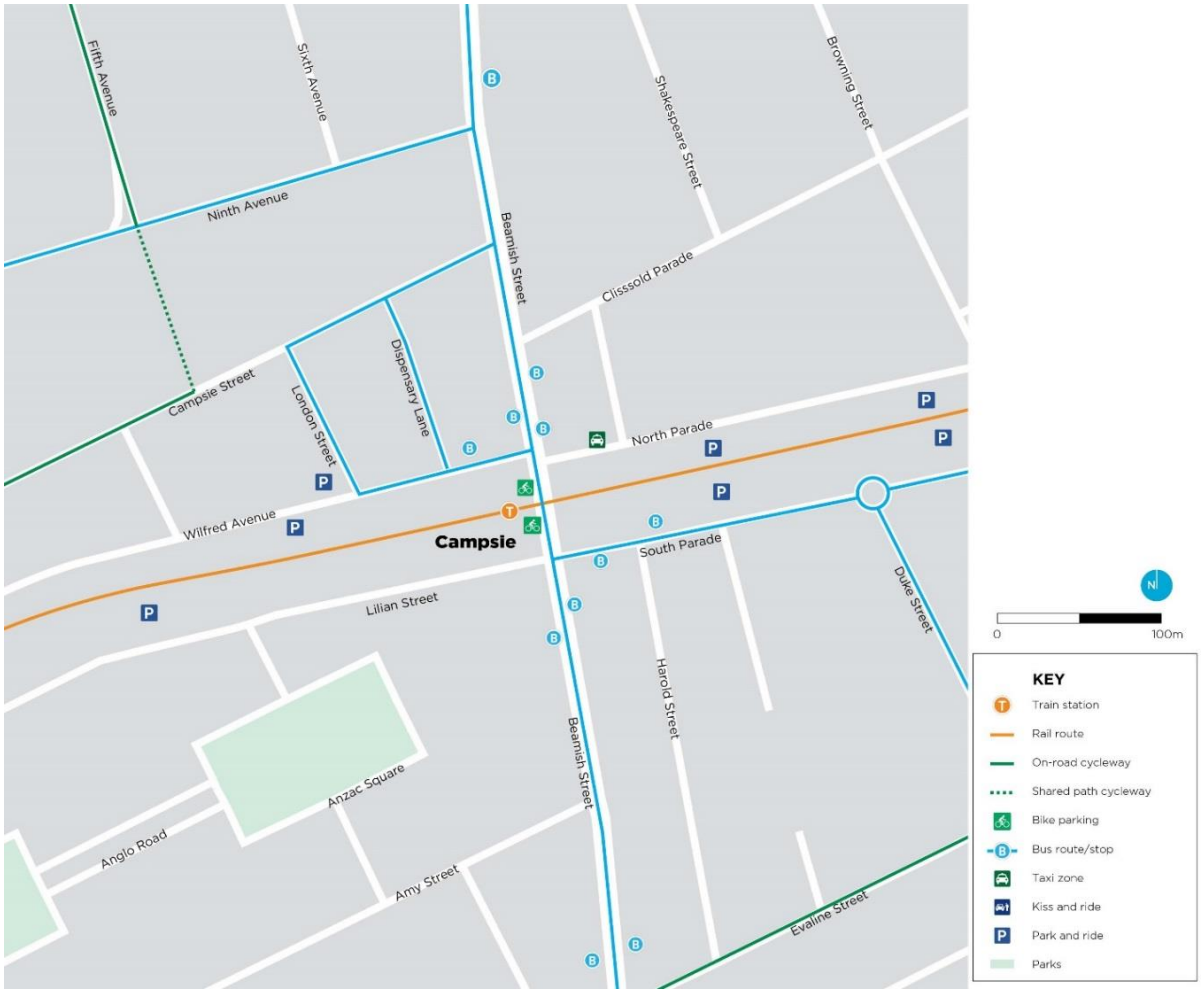


Figure 10.7 Existing transport facilities at Campsie Station

Belmore Station

Existing transport facilities at Belmore Station are shown on Figure 10.8 and summarised in Table 10.18. Further information is provided following the table.

Table 10.18 Transport facilities at Belmore Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (65%)	5	2	0	4

Active transport

As shown in Table 10.18, the main mode of travel to Belmore Station is walking (64 per cent), however the walking mode share is comparatively less than other stations. A relatively good walking catchment is provided in the vicinity of Belmore Station due to a network of intersecting roads through predominately residential areas. The majority of roads in the vicinity of the station have footpaths on both sides.

An existing off-street shared path provides pedestrian and cycle links to the east of the station towards Belmore Sports Ground (which includes Belmore Oval). This path is a key link between the station and the oval on game days. Beyond this shared path, cycle facilities are limited.

Five bike parking spaces are provided to the north of the station entrance adjacent to Burwood Road.

Public transport

Existing daily rail travel volumes at Belmore Station observed in 2016 were 3,025 entries and 2,847 exits.

The location of bus stops in the vicinity of the station is shown in Figure 10.8. The station is serviced by two bus routes, which use the stops on Burwood Road. These services provide access to Haberfield, Burwood, Strathfield, Campsie, and Roselands.

Parking

As shown in Table 10.19, there are about 1,200 on and off-street parking spaces within 400 metres of the station. This includes 56 dedicated commuter off-street parking spaces in two areas located off Redman Parade and Bridge Road. There is moderately high demand for on-street spaces (utilisation of 76 per cent) and a relatively high demand for commuter spaces (utilisation of 92 per cent).

There are no kiss and ride spaces at the station. Four taxi bays are located in Bridge Road just west of Burwood Road.

Table 10.19 Parking facilities at Belmore Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
1,078 (914 unrestricted)	76%	142 (includes 56 dedicated commuter parking spaces)	92%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The road network at Belmore Station is focused around Burwood Road, which is a regional road that runs in a north–south direction immediately to the east of the station. The following State and regional roads are located in the area surrounding the station:

- State roads: Canterbury Road
- Regional roads: Burwood Road and Lakemba Street.

Local roads surrounding the station are shown on Figure 10.8. Table 10.20 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of the station.

Table 10.20 Existing weekday traffic volumes – Belmore Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Redman Parade (between Burwood Road and Sudbury Street)	6,267	6,131	136	2	368	345
Burwood Road (between Redman Parade and Bridge Road)	19,742	17,629	2,115	11	1,159	1,206
Bridge Road (between Marie Lane and Burwood Avenue)	10,543	10,019	524	5	619	644
Canterbury Road (between Kingsgrove Road and Haldon Street)	42,056	38,509	3,546	8	2,444	2,950
Burwood Road (between Bridge Road and Collins Street)	21,492	19,332	2,160	10	1,262	1,313

Figure 10.8 Existing transport facilities at Belmore Station

Lakemba Station

Existing transport facilities at Lakemba Station are shown on Figure 10.9 and summarised in Table 10.21. Further information is provided following the table.

Table 10.21 Transport facilities at Lakemba Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (72%)	8	3	1	3

Active transport

As shown in Table 10.21, the main mode of travel to Lakemba Station is walking (72 per cent). A good walking catchment is provided in the vicinity of the station with a network of intersecting roads located in predominately residential areas. The majority of roads in the vicinity of the station have footpaths on both sides. The roads have low speeds and narrow carriageways, which make them attractive to pedestrians.

There are no off-street cycleways in the vicinity of the station. On-street cycleways are located along Lakemba Street, Haldon Street, and Wangee Street.

Eight bike parking spaces are provided at Lakemba Station, with four spaces on either side of the station adjacent to The Boulevarde and Railway Parade.

Public transport

Existing daily rail travel volumes at Lakemba Station observed in 2016 were 4,302 entries and 4,130 exits.

The location of bus stops in the vicinity of the station is shown in Figure 10.9. The station is serviced by three routes, which use the stops located on Railway Parade and Haldon Street. These services provide access to Roselands, Greenacre, Bankstown, Hurstville, Burwood, and Strathfield.

Parking

As shown in Table 10.22, there are about 1,500 on and off-street parking spaces within 400 metres of the station. About one-third of the spaces available, which includes 138 dedicated commuter spaces off The Boulevarde on both sides of Haldon Street, are located off-street. There is a relatively high demand for parking in the vicinity of the station, with a utilisation rate of 85 per cent for on-street spaces, and 86 per cent for off-street spaces.

A kiss and ride space is located on the southern side of The Boulevarde, east of the station. Three taxi bays are located adjacent to the station entrance on the northern side of The Boulevarde.

Table 10.22 Parking facilities at Lakemba Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
961 (775 unrestricted)	85%	537 (includes 138 dedicated commuter parking spaces)	86%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The existing road network around Lakemba Station is focused around Haldon Street, which runs in a roughly north–south direction immediately to the east of the station, and The Boulevarde, which runs in an east–west direction on the southern side of the rail corridor, between Punchbowl Station and to the west of Lakemba Station. The following State and regional roads are located in the area surrounding the station:

- State roads: Punchbowl Road, Canterbury Road
- Regional roads: Lakemba Street.

Local roads surrounding the station are shown on Figure 10.9. Table 10.23 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of Lakemba Station.

Table 10.23 Existing weekday traffic volumes – Lakemba Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Railway Parade (between Haldon Street and Croydon Street)	4,547	4,445	102	2	267	337
Haldon Street (between Railway Parade and The Boulevarde)	14,972	14,072	900	6	879	915

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
The Boulevarde (between Haldon Street and Croydon Street)	8,099	7,924	174	2	475	495
Haldon Street (between The Boulevarde and Oneata Street)	9,750	8,898	852	9	572	596
Canterbury Road (between Haldon Street and Legge Street)	43,840	39,990	3,850	9	2,574	2,678

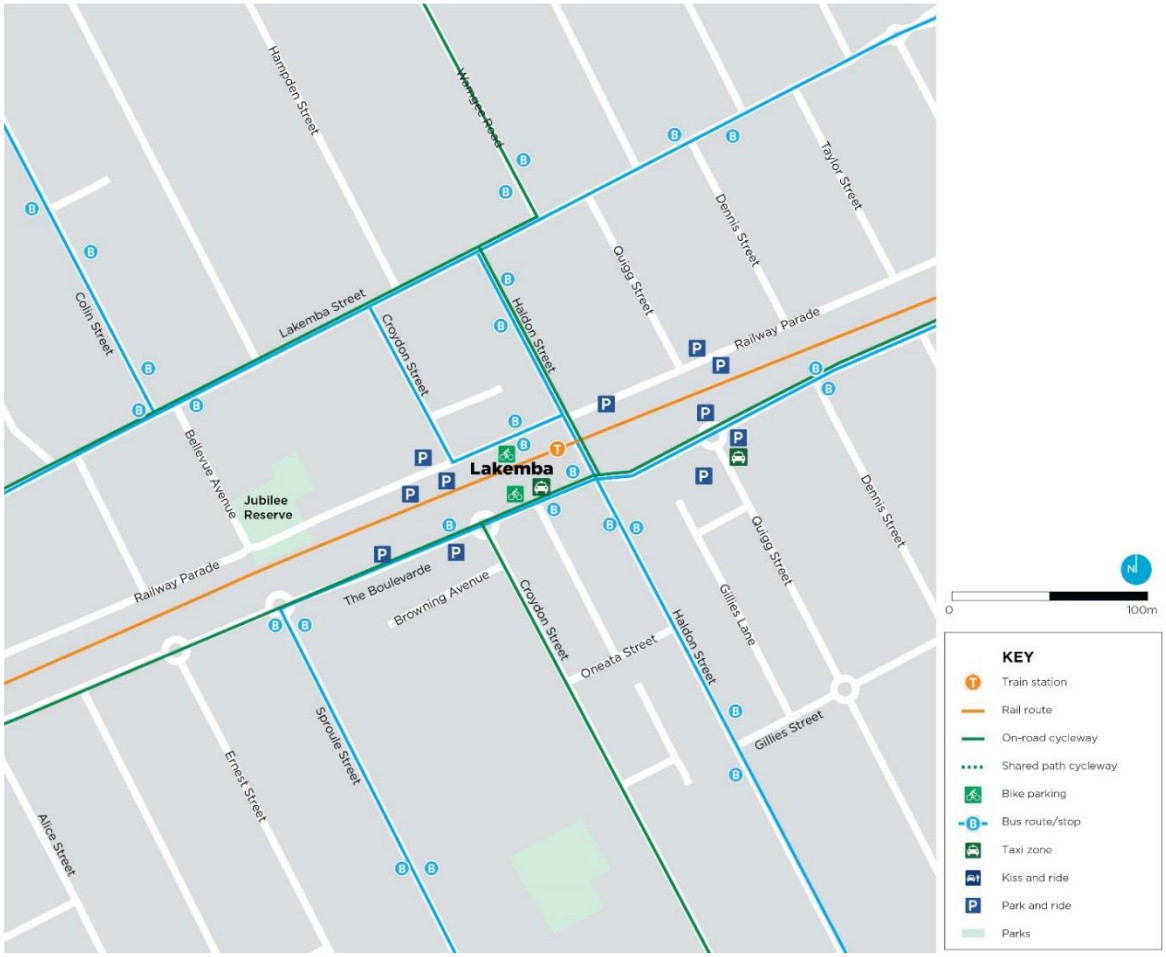


Figure 10.9 Existing transport facilities at Lakemba Station

Wiley Park Station

Existing transport facilities at Wiley Park Station are shown on Figure 10.10 and summarised in Table 10.24. Further information is provided following the table.

Table 10.24 Transport facilities at Wiley Park Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (90%)	4	2	0	0

Active transport

As shown in Table 10.24, the main mode of travel to Wiley Park Station is walking (90 per cent). A good walking catchment is provided in the vicinity of the station, with a network of intersecting roads through predominately residential areas. The majority of roads in the vicinity of the station have footpaths on both sides.

To the west of the station, access is somewhat restricted by King Georges Road, as a result of its width and high traffic volumes. There are three schools located close to the station (to the south of the project area), which would contribute to the high walking mode share.

There are limited cycle facilities in the vicinity of the station, with some cycle infrastructure on Urunga Parade and Lakemba Street.

Four bike parking spaces are provided north of the station entrance, adjacent to the walkway that connects King Georges Road to Wiley Lane and Shadforth Street.

Public transport

Existing daily rail travel volumes at Wiley Park Station observed in 2016 were 2,006 entries and 1,806 exits.

The location of bus stops in the vicinity of the station is shown in Figure 10.10. The station is serviced by two bus routes, which use the stops one King Georges Road. These services provide access to Campsie, Roselands, and Riverwood.

Parking

As shown in Table 10.25, there are about 750 parking spaces (mainly on-street) within 400 metres of the station. There is a moderate demand for parking, with a utilisation rate of 63 per cent for on-street spaces, and 60 per cent for off-street spaces.

There are no kiss and ride or taxi facilities at the station.

Table 10.25 Parking facilities at Wiley Park Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
721 (693 unrestricted)	63%	25 (unrestricted)	60%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The existing road network at Wiley Park Station is focused around King Georges Road, a State road that runs in a north–south direction immediately to the east of the station. King Georges Road is a major road, with up to 90,000 vehicles passing the station over a typical 24 hour period. The Boulevarde runs in an east–west direction on the southern side of the rail corridor, between Punchbowl Station and to the west of Lakemba Station. The following State and regional roads are located in the area surrounding the station:

- State roads: King Georges Road, Canterbury Road and Punchbowl Road
- Regional roads: Lakemba Street.

Local roads surrounding the station are shown on Figure 10.10. Table 10.26 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of Wiley Park Station.

Table 10.26 Existing weekday traffic volumes – Wiley Park Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
The Boulevarde (between Renown Avenue and King Georges Road)	13,893	13,471	422	3	816	849
King Georges Road (between The Boulevarde and Mary Street)	88,000	78,094	9,906	11	5,167	5,375
Lakemba Street (between King Georges Road and Shadforth Street)	3,542	3,472	70	2	208	216
King Georges Road (between Lakemba St and The Boulevarde)	96,775	86,699	10,076	10	5,683	5,911
The Boulevarde (between King Georges Road and Dudley Street)	13,893	13,471	422	3	816	849

Figure 10.10 Existing transport facilities at Wiley Park Station

Punchbowl Station

Existing transport facilities at Punchbowl Station are shown on Figure 10.11 and summarised in Table 10.27. Further information is provided following the table.

Table 10.27 Transport facilities at Punchbowl Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (56%)	12	5	0	2

Active transport

As shown in Table 10.27, the main mode of travel to Punchbowl Station is walking (55 per cent). Punchbowl has one of the lowest walking mode shares of stations in the project area. The walking catchment to the west of the station is somewhat restricted by Punchbowl Road, due to its width and high traffic volumes. The residential density surrounding the station is also less dense than at other stations. The provision of dedicated commuter parking and a number of bus services provide alternate access modes.

There are no off-road cycleways in the vicinity of the station. Some cycle facilities are located along Urunga Parade that are considered suitable for less experienced riders. All other roads in the area are considered to be only suitable for more experienced riders.

Twelve bike parking spaces are provided at the station, located on either side of the rail corridor adjacent to the station entrances.

Public transport

Existing daily rail travel volumes at Punchbowl Station observed in 2016 were 2,935 entries and 2,806 exits.

The location of bus stops in the vicinity of the station is shown in Figure 10.11. The station is serviced by five bus routes, which use the stops on Punchbowl Road and The Boulevarde. These services provide access to Bankstown, Roselands, Riverwood, and Hurstville.

Parking

As shown in Table 10.28, there are about 1,100 on and off-street parking spaces within 400 metres of the station. This includes 137 dedicated commuter spaces located in the car park adjacent to the corridor east of the existing station entrance. There is a moderately high demand for on-street parking (utilisation rate of 79 per cent) and a high demand for off-street/commuter parking (utilisation rate of 100 per cent).

There are no kiss and ride spaces in the vicinity of the station. Two taxi bays are located in Arthur Street on the southern side of the rail corridor near the station entrance.

Table 10.28 Parking facilities at Punchbowl Station[1]

On-street spaces		Off-street spaces	
Number	Overall utilisation[2]	Number	Overall utilisation
838 (626 unrestricted)	79%	285 (includes 137 dedicated commuter parking spaces)	100%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The existing road network at Punchbowl Station is focused around Punchbowl Road, which is a State road that runs in north-east/south-west direction immediately adjacent to the station. The Boulevarde runs in an east–west direction on the southern side of the rail corridor, between Punchbowl Station and to the west of Lakemba Station. The following State and regional roads are located in the area surrounding the station:

- State roads: Punchbowl Road and Canterbury Road
- Regional roads: Wattle Street.

Local roads surrounding the station are shown on Figure 10.11. Table 10.29 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads in the vicinity of the station.

Table 10.29 Existing weekday daily traffic volumes – Punchbowl Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
The Boulevarde (Between Punchbowl Road and Arthur Street)	24,810	23,376	1,434	6	1,457	1,515
Punchbowl Road (Between The Boulevarde and Acacia Avenue)	50,477	46,962	3,515	7	2,964	3,083
South Terrace (Between Loder Lane and Punchbowl Road)	14,041	13,630	412	3	824	858
Punchbowl Road (Between South Terrace and The Boulevarde)	60,737	56,612	4,125	7	3,566	3,710

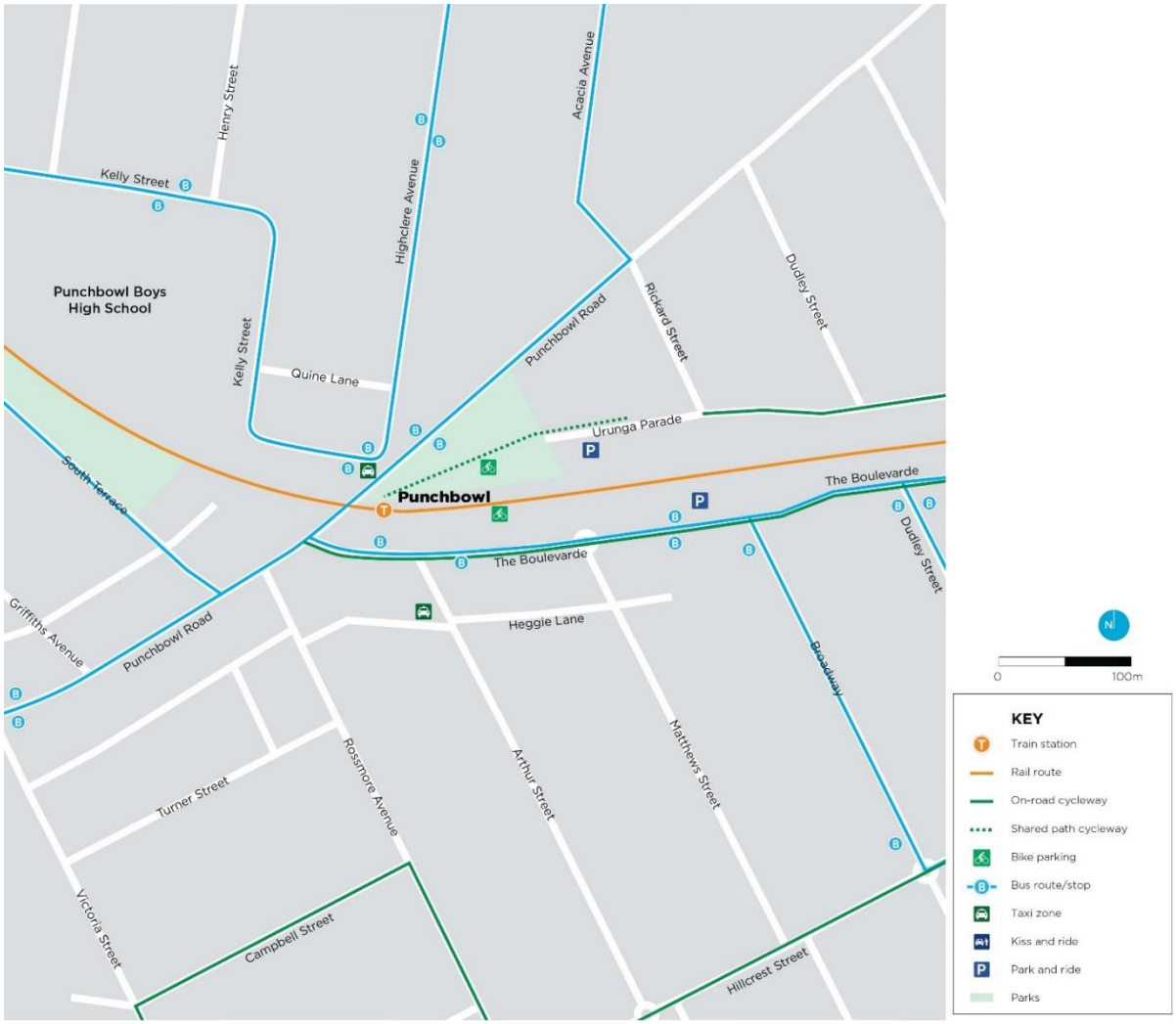


Figure 10.11 Existing transport facilities at Punchbowl Station

Bankstown Station

Existing transport facilities at Bankstown Station are shown on Figure 10.12 and summarised in Table 10.30. Further information is provided following the table.

Table 10.30 Transport facilities at Bankstown Station

Main mode of travel to station (% of total trips)	Number of bike parking spaces	Number of bus services in vicinity of station	Number of kiss and ride spaces	Number of taxi bays
Walking (49%)	32	15	4	10

Active transport

As shown in Table 10.30, the main mode of travel to Bankstown Station is walking (49 per cent). Bankstown has the lowest walking mode share of stations in the project area. The walking catchment is limited as a result of long street blocks, and the barriers presented by the rail corridor (with limited crossing locations), major roads (e.g. Stacey Street) that carry large volumes of traffic, and existing development patterns, with the nearest residential areas located some distance from the station.

The Salt Plan Creek Cycleway and a cycleway from the T2 Inner West & South Line link to the Bankstown town centre, but do not provide access to the station. From these cycleways, there are a number of on-road routes available.

Thirty-two bike parking spaces are provided at the station at the South Terrace bus interchange, Bankstown City Plaza, and on North Terrace.

Public transport

Existing daily travel volumes at Bankstown Station observed in 2016 were 8,993 entries and 9,350 exits.

Bankstown is a major bus interchange. Fifteen routes are located in the vicinity of the station, providing regional connectivity to centres such as Parramatta, Lidcombe, Burwood, Liverpool, Fairfield, Hurstville, and Sutherland. The location of bus stops is shown in Figure 10.12. The majority of the routes connect to the bus interchange located south of the station, however some services operate to a stop on North Parade.

Parking

As shown in Table 10.31, there are about 1,700 parking spaces within 400 metres of the station. The majority of these spaces are off-street spaces, which includes 147 dedicated commuter parking spaces, located adjacent to the rail corridor along North and South Terraces east of the station. There is a high demand for parking, with a utilisation rate of 93 per cent for on-street spaces, and 100 per cent for off-street/commuter parking.

There are four kiss and ride spaces and 10 taxi bays on North Parade to the north of the rail corridor.

Table 10.31 Parking facilities at Bankstown Station

On-street spaces		Off-street spaces	
Number[1]	Overall utilisation[2]	Number[1]	Overall utilisation
588 (58 unrestricted)	93%	1,108 (includes 147 dedicated commuter parking spaces)	100%

Notes: 1. Within 400 metres of the station.
2. After the morning peak in October 2016 on two typical weekdays. Follow-up verification surveys undertaken in November 2016.

Road network

The existing road network at Bankstown Station is focused around North and South terraces, which run parallel to the rail corridor. The following State and Regional roads are located in the area surrounding the station:

- State roads: Stacey Street
- Regional roads: Rickard Road, Greenwood Avenue, Wattle Street, Marion Street, Meredith Street, Chapel Road (north of Richard Road).

Local roads surrounding the station are shown on Figure 10.12. Table 10.32 shows the existing weekday traffic volumes (24 hour and one-hour morning and afternoon peaks) for key roads near the station.

Table 10.32 Existing weekday daily traffic volumes – Bankstown Station

Road	24 hr (daily) volumes				1 hr (peak) volumes	
	Total count	Light	Heavy	Proportion of heavy vehicles (%)	Morning	Afternoon
Stacey Street (between Verbena Avenue and Stanley Street)	66,028	56,288	9,740	15	3,674	4,838
Restwell Street (between Stewart Lane and Raymond Street)	8,794	8,510	284	3	489	644
Raymond Street (between Restwell Street and West Terrace)	6,298	6,014	284	5	350	461
South Terrace (between West Terrace and East Terrace)	12,018	11,777	241	2	669	880
Marion Street (between Bungalow Cres and Meredith Street)	34,733	30,672	4,061	12	1,933	2,545
Meredith Street (between Marion Street and Gordon Street)	24,572	21,064	3,508	14	1,367	1,800

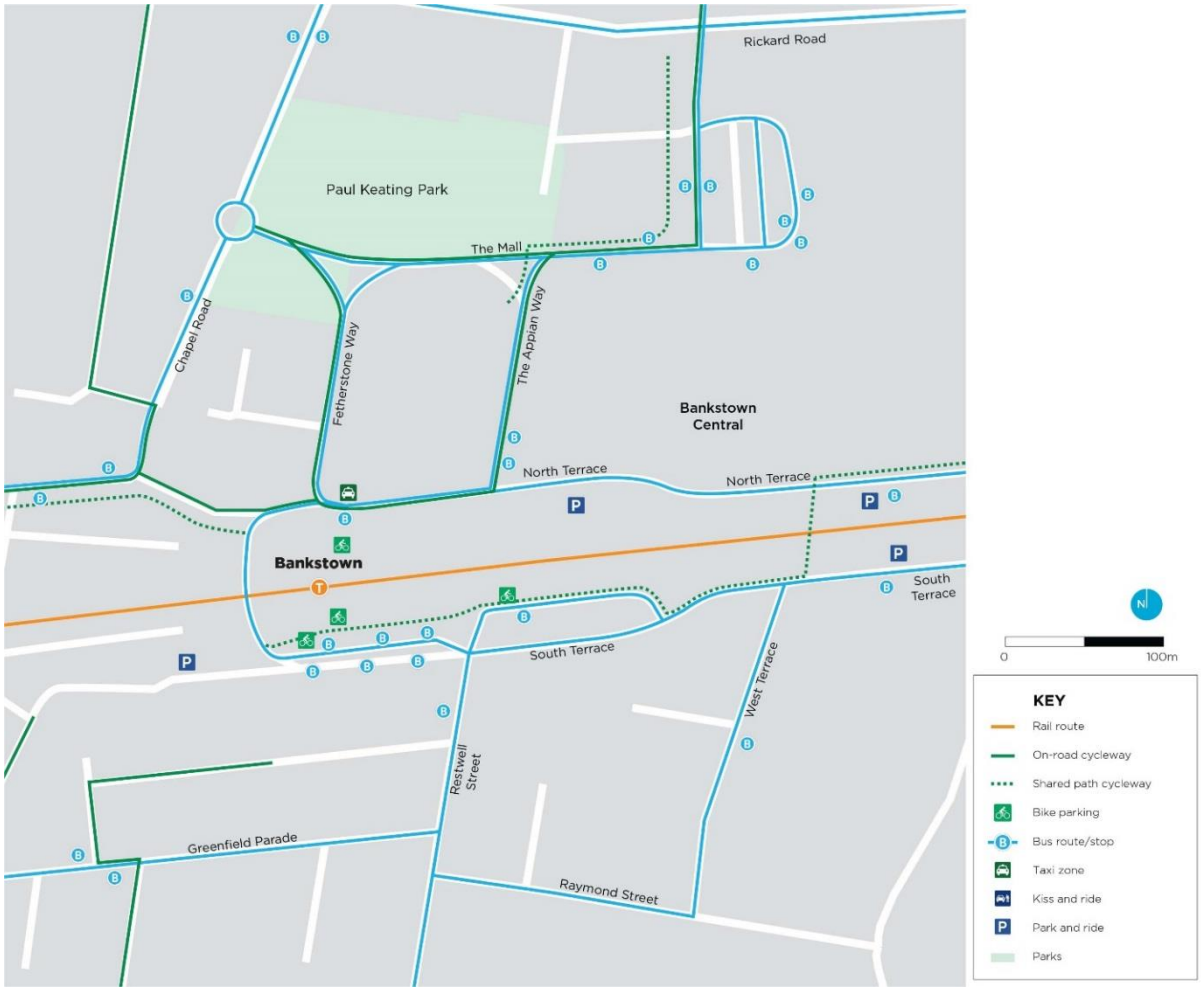


Figure 10.12 Existing transport facilities at Bankstown Station

10.3 Basis for the construction phase assessment

Temporary changes to the road network, public transport, pedestrian and cycle routes/facilities, and car parking would be required to facilitate construction. These changes are required due to the proximity of these facilities to construction compounds, work sites, or construction haulage routes (described in Section 9.8). Indicative changes to the surrounding transport network is described in the following sections.

10.3.1 Active transport

Indicative changes to pedestrian and cycle routes/facilities are outlined in Table 10.33. Cycle and pedestrian facilities would also need to be modified in some locations during the bridge works outlined in Table 10.36. Potential impacts as a result of these changes are assessed in Section 10.4 and mitigation measures are provided in Section 10.5. Diversions would be put in place where there may be impacts to pedestrian and cyclists (e.g. through the temporary closure of a footpath or cycle path) to help delineate an alternative route, maintain flow, and ensure safe access.

Table 10.33 Potential changes to pedestrian and cycle facilities

Location	Pedestrian facility changes	Cycle facility changes
Marrickville Station	Station Street – compound and work site extent would require the establishment of a modified pedestrian zone. On the corner of Warburton Road, Schwebel Street and Illawarra Road footpaths may be temporarily narrowed/require diversions due to the installation of a new signalised intersection and upgrades to the surrounding footpaths.	Illawarra Road and Carrington Road – no cycle facilities would be changed. However, cyclists and construction vehicles would be sharing the road.
Dulwich Hill Station	Ewart Lane, Bedford Crescent – Restricted access and possible diversions for access to existing station due to construction work site/compounds and proposed pavement upgrades	Existing bike parking on Bedford Crescent may be inaccessible during station upgrade works.
Hurlstone Park Station	Floss Street, Duntroon Street – footpath diversions due to the extent of the work site.	Existing bike parking facilities on Duntroon Street would be relocated. Cyclists and construction vehicles would be sharing the road.
Canterbury Station	Broughton Street – footpath diversions during relocation of the station entrance Corner of Broughton Street and Canterbury Road – footbridge relocation due to relocation of the station entrance.	The bike parking facilities on Broughton Street would be relocated into the new station pavement areas north and south of the station.
Campsie Station	South Parade, Beamish Street, North Parade, Lilian Street – potentially reduced footpath widths near construction compounds/work site extent due to site fences and hoardings Lilian Lane during possession periods and construction of the shared zone would require safe pedestrian alternatives to be provided.	The bike parking facilities on the station forecourt on Beamish Street are proposed to be relocated to the new pavement on Wilfred Ave. Cyclists and construction vehicles would be sharing the road.

Location	Pedestrian facility changes	Cycle facility changes
Belmore Station	Tobruk Avenue footpaths may be inaccessible during construction of the station and the proposed shared zone. Burwood Road footpaths may be narrowed/require diversions during the installation of a new signalised intersection and upgrades to existing footpaths.	The bike parking facilities are proposed to be upgraded and moved to the southern side of the station. Some may be temporarily unavailable during this upgrade.
Lakemba Station	The Boulevarde and Railway Parade – potentially reduced footpath widths near construction compounds/work site extent due to site fences and hoardings and during the installation of new footpaths and pavements.	The bike parking facilities are proposed to be upgraded and some may be temporarily unavailable during this upgrade. Cyclists and construction vehicles would be sharing the road.
Wiley Park Station	The Boulevarde and Stanlea Parade – potentially reduced footpath widths near construction compounds/work site extent due to site fences and hoardings and during the installation of new footpaths and pavements.	The bike parking is proposed to be relocated to the north and south side of the station. Some may be temporarily unavailable during this upgrade. Cyclists and construction vehicles would be sharing the road.
Punchbowl Station	Access to the station would be modified in a number of ways during construction at Punchbowl Station: • the corner of Punchbowl Road and Warren Reserve, would be modified due to the extent of work required. • the station access from the corner of Punchbowl Road and Warren Reserve would be removed and a new entrance constructed off Urunga Parade. • The construction of the new pavement and kerbside facilities on the Boulevarde.	The bike parking is proposed to be upgraded and moved east towards the new station entrances. Some may be temporarily unavailable during this upgrade.
Bankstown Station	Access to the station would be modified on South Terrace and North Terrace. Kerbside facilities proposed for North Terrace may also result in temporary pedestrian diversions.	No cycling facility changes.

Note: Some of the changes in the table represent transport facilities delivered as part of the project, as described in Chapter 8.

10.3.2 Public transport - buses

Table 10.34 lists the indicative changes to bus stops and routes that would be required to enable construction and the implementation of alternative transport arrangements. These arrangements may affect bus stops and layovers located between Sydenham and Yagoona stations (inclusive). Changes may include diversion of bus routes and/or relocation of bus stops, which may temporarily increase the walking distances for passengers. The proposed changes, which have been designed to minimise potential impacts on traffic flow and bus services, would be reviewed and confirmed during detailed design and construction planning in consultation with relevant stakeholders.

No changes to light rail services at the Dulwich Hill light rail stop would be required. Access to the light rail stop would be maintained during construction.

Table 10.34 Indicative modifications to public transport facilities during construction

Location[1]	Bus route changes	Bus stop changes
Sydenham Station	Not anticipated at this stage	Rail replacement buses would share existing bus stops on Railway Parade.
Marrickville Station	Route that crosses Illawarra Road Overbridge would require diversion via Charlotte Avenue underbridge (refer to Table 10.36)	Short term bus stop relocations may be required on Illawarra Road due to their close proximity to the project area. Rail replacement buses would share existing bus stops on Illawarra Road.
Dulwich Hill Station	Route that crosses Livingstone Road Overbridge would require diversion via Illawarra Road overbridge (refer to Table 10.36)	Rail replacement buses would share existing bus stops on Dudley Street.
Hurlstone Park Station	Route that crosses Garnett Street Overbridge would require diversion via Hampden Street (refer to Table 10.36) Route that crosses Crinan Street overbridge via Garnet Street overbridge	Rail replacement buses would share existing bus stops on Floss Street and Duntroon Street. Short-term relocation of bus stops may be required during works to the Crinan Street overbridge. Temporary relocation of the existing bus stop on Crinan Street (northbound) due to the presence of a construction compound/work site.
Canterbury Station	Bus routes that cross Canterbury Road Overbridge would remain open, but bus routes may be impacted by traffic management measures (refer to Table 10.36)	Rail replacement buses would share existing bus stops on Canterbury Road. A bus stop on Broughton Street would be relocated to outside the new station entrance.
Campsie Station	Routes that cross Beamish Street overbridge would require diversion via Loch St overbridge (refer to Table 10.36).	Rail replacement buses would share existing bus stops on South Parade. Temporary half lane closures are required on the Beamish Street overbridge during bridge works. The bus stops would be temporarily relocated - potentially to North Parade.
Belmore Station	Route that crosses Burwood Road overbridge would require diversion across Moreton Street Bridge (refer to Table 10.36)	Rail replacement buses would share existing bus stops on Burwood Road. Temporary closure of Burwood Road overbridge may require relocation of bus stops to minimise walking distances.
Lakemba Station	Routes that cross Haldon Street overbridge would require diversion to Moreton Street overbridge (refer to Table 10.36)	Rail replacement buses would share existing bus stops on The Boulevarde. Temporary closure of Haldon Street overbridge may require relocation of bus stops to minimise walking distances.
Wiley Park Station	Not anticipated at this stage	Not anticipated at this stage.
Punchbowl Station	Bus routes that cross Punchbowl Road overbridge would remain, but bus routes may be impacted by traffic management measures (refer to Table 10.36)	Rail replacement buses would share existing bus stops on The Boulevarde.

Location[1]	Bus route changes	Bus stop changes
Bankstown Station	Bus routes that cross Chapel Road overbridge would remain, but bus routes may be impacted by traffic management measures (refer to Table 10.36)	Existing bus stops on North Terrace, South Terrace and The Appian Way would be shared with Rail replacement buses. This includes a Special Events bus zone proposed to be used as a bus layover, and relocating and extending existing layovers.
Regents Park Station	Not anticipated at this stage	Rail replacement buses would share existing stops on Park Road and Amy Street.
Lidcombe Station	Not anticipated at this stage	Rail replacement buses would share existing bus stops on Railway Street.
Birrong Station	Not anticipated at this stage	Not anticipated at this stage.
Yagoona Station	Not anticipated at this stage	Rail replacement buses would share existing bus stops on Church Road.

Note: 1. Includes stations outside the project area that would be affected by possessions, where rail replacement buses would be required.

10.3.3 Road network – station and bridge works

Station works

Potential changes to the road network around stations as a result of construction, including the location of compounds and work sites, are outlined in Table 10.35. These changes include temporary road and lane closures. This table identifies the roads that would potentially need to be changed for the duration of works at stations (including those located within construction compounds or work sites) and roads that may need to be modified for short periods only (i.e. during possession periods). These potential changes are indicative, based on the current stage of the design. Final changes required would be determined during detailed design and construction planning, in consultation with the relevant local council and Roads and Maritime Services.

Table 10.35 Potential changes to road network for station works

Location	Road changes for the duration of construction	Road changes for short periods during construction
Marrickville Station	Station Street – construction compound and work site would occupy part of the street for new station forecourt and shared road	The corner of Station Street, Illawarra Road, Schwebel Street, Leofrene Avenue, and Warburton Street due to construction access or upgrades to intersections
Dulwich Hill Station	Nil	Ewart Lane, Bedford Crescent, Wardell Road, due to construction of new station entries and pavement/landscaping, construction of kerbside facilities, construction access
Hurlstone Park Station	Floss Street – construction compound would occupy part of the Floss Street (car park area) for station works, new pavement and bike parking	Crinan Street and Duntroon Street due to upgrades/ construction of pedestrian crossings, new station entry and construction/removal of kerbside facilities
Canterbury Station	Nil	Broughton Street, Canterbury Road and Close Street due to the construction/removal of station buildings, entries and pavement, kerbside facilities including a new bus stop, pedestrian crossing, construction access

Location	Road changes for the duration of construction	Road changes for short periods during construction
Campsie Station	Lilian Lane – access to the construction compound off Lilian Lane and upgrade of Lilian Lane	Lilian Street, Beamish Street, Wilfred Avenue, North Parade, South Parade, London Street due to construction access, construction of kerbside facilities, station entry and pavement, removal of existing kerbside facilities
Belmore Station	Nil	Tobruk Avenue (new shared area), Redman Parade, Burwood Road, Bridge Road, Acacia Lane, Myall Street due to construction of kerbside facilities, station entries, plaza and pavement, new signalised intersection, new access, removal of existing kerbside facilities, construction access
Lakemba Station	Nil	Railway Parade, Haldon Street, The Boulevarde due to the construction of the station entries and kerbside facilities
Wiley Park Station	Nil	King Georges Road, Wiley Lane, Shadforth Street, The Boulevarde due to the construction/removal of kerbside facilities, new station entry and pavement
Punchbowl Station	Nil	Punchbowl Road, Urunga Parade, The Boulevarde due to construction/removal of kerbside facilities, new station entries/ removal of existing concourse, new signalised pedestrian crossing
Bankstown Station	Nil	North Terrace, South Terrace due to construction of kerbside facilities, reconfigured bus layover, new station entry and pavement

Bridge works

In addition to the potential road network changes around stations, construction would require partial (involving closure of a single traffic lane) and/ or full closures of bridges that cross the rail corridor at times to enable a range of bridge upgrade works to occur. Table 10.36 provides a summary of the potential closures, changes to the road network, and the alternative bridge available for use during works. The types of closures and locations of works are shown in Figure 10.13.

Further information, including figures showing the proposed diversion routes, is provided in Technical paper 1. For the purposes of the traffic and transport assessment, it was assumed that adjacent bridges would not be upgraded simultaneously.

These potential closures and diversion routes are indicative, based on the current stage of the design. Final changes required would be determined during detailed design and construction planning, and would be subject to additional impact assessment if required. With respect to the Illawarra Road overbridge, potentially longer closures (up to one month) are being investigated as a result of ongoing consultation with key stakeholders. Any proposals for longer closures would be confirmed at a later date, and would be subject to additional impact assessment if required.

Table 10.36 Bridge works – indicative closures and road network changes

Bridge[1]	Type of closure (indicative duration for impact assessment purposes)	Alternate location for rail corridor crossing and distance along corridor to alternate location
Charlotte Avenue underbridge, Marrickville	Partial closures (14 weeks) Full closure (three days)	Illawarra Road overbridge – 320 m west
Illawarra Road overbridge, Marrickville	Partial closures (28 days – 14 days per side) Full closure (two days)[1]	Charlotte Avenue underbridge – 320 m east
		Livingstone Road overbridge – 475 m west

Bridge[1]	Type of closure (indicative duration for impact assessment purposes)	Alternate location for rail corridor crossing and distance along corridor to alternate location
Livingstone Road overbridge, Marrickville	Narrow lanes (8 months during weekends/nights) Full closure (two days)	Illawarra Road overbridge – 475 m east
Albermarle Street overbridge, Marrickville	Full closure (one month) Combination of partial and full closures during weekend and night-time works over a seven month period	Livingstone Road overbridge – 300 m east
Wardell Road overbridge, Dulwich Hill	Partial closures (weekends/nights over six months)	Livingstone Road overbridge – 330 m east
Ness Avenue/ Terrace Road underbridge, Dulwich Hill	Partial closures (weekends/nights over six months)	Wardell Road overbridge – 350 m east Garnet Street overbridge – 300 m west
Garnet Road overbridge, Hurlstone Park	Partial closures (weekends/nights over eight months) Full closure (two days)	Crinan Street overbridge – 200 m west Ness Avenue/Terrace Road overbridge – 300 m east
Crinan Street overbridge, Hurlstone Park	Partial closures (weekends/nights over eight months) Full closure (two days)	Garnet Street overbridge – 200 m east
Foord Avenue underbridge, Hurlstone Park	Partial closures (weekends/nights over six months)	Melford Road overbridge – 425 m west Crinan Street overbridge – 370 m east
Melford Road overbridge, Hurlstone Park	Full closures (weekends/nights over eight months)	Foord Avenue – 425 m east
Canterbury Road overbridge, Canterbury	Partial closures (weekends/nights over eight months)	No diversion required
Cooks River/ Charles Street underbridge, Canterbury	Full and partial closures (weekends/nights over six months)	Canterbury Road overbridge – 375 m east
Wairoa M24 Street underbridge Canterbury	Partial closures (weekends/nights over six months) Full closure (one night)	Beamish Street overbridge – 620 m east
Church Street/Hutton Street Footbridge (pedestrians and cyclists only), Canterbury	Full closure (periodic over six months)	No road diversions required; pedestrian and cyclist diversions to Melford Road overbridge and Canterbury Road overbridge – 275 m and 260 m respectively
Duke Street footbridge (pedestrians and cyclists only), Campsie	Full closure (periodic over six months)	No road diversions required; pedestrian and cyclist diversions to Wairoa Street underbridge and Beamish Street Overbridge – 680 m and 190 m respectively
Beamish Street overbridge, Campsie	Partial closures (weekends/nights over six months)	Loch Street overbridge – 275 m east
Loch Street overbridge, Campsie	Partial closures (weekends/nights over six months)	Beamish Street overbridge – 275 m west
Pedestrian access oval underbridge, Belmore	Full closure (weekends/nights over eight months)	No road diversions required; pedestrian and cyclist diversions to Loch Street overbridge and Burwood Road overbridge – 520 m and 500 m respectively
Burwood Road overbridge, Belmore	Partial closures (weekends/nights over six months) Partial closures (four weeks continuous)	Moreton Street overbridge – 600 m west

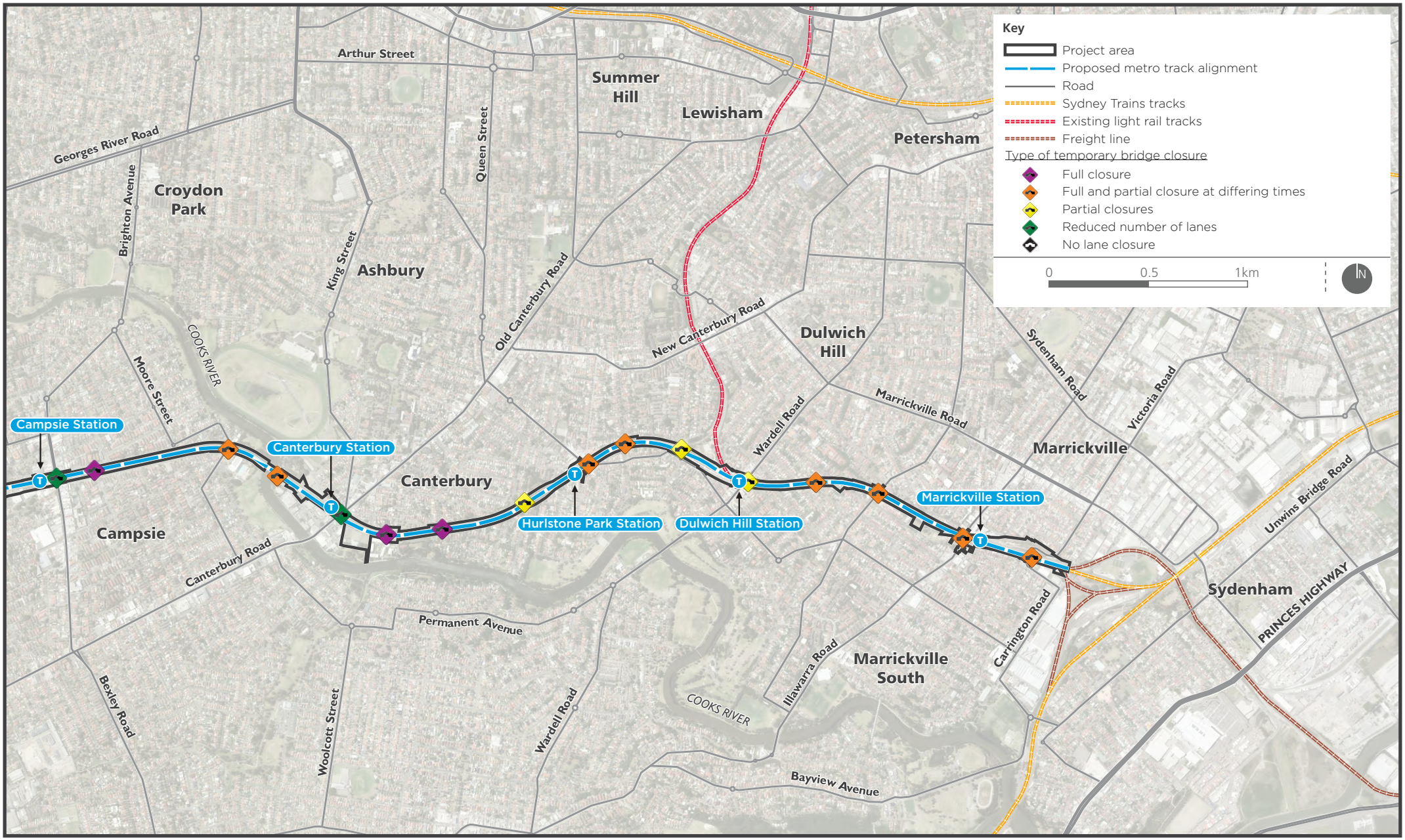
Bridge[1]	Type of closure (indicative duration for impact assessment purposes)	Alternate location for rail corridor crossing and distance along corridor to alternate location
Moreton Street overbridge, Lakemba	Partial closures (weekends/nights over six months) Partial closures (four weeks continuous)	Burwood Road overbridge – 600 m east
Haldon Street overbridge, Lakemba	Partial closures (weekends/nights over six months) Partial closures (four weeks continuous)	Moreton Street overbridge – 480 m west
King Georges Road overbridge, Wiley Park	Partial closures (three weeks)	No diversion required
Punchbowl Road overbridge, Punchbowl	No lane closures required	No diversion required
Stacey Street overbridge, Bankstown	Partial closures (weekends/nights over six months) Partial closures (four weeks continuous)	No diversion required
North Terrace/ South Terrace underbridge, Bankstown	Partial closures (weekends/nights over six months) Full closures (four weeks continuous)	Stacey Street overbridge – 280 m east
Chapel Road overbridge, Bankstown	No lane closures required	No diversion required

Notes: 1. Classified State roads are shown in **bold** font.
2: For the Illawarra Road overbridge, potentially longer closures (up to one month) are being investigated as a result of ongoing consultation with key stakeholders.

Potential modifications to accommodate construction vehicles

Construction traffic would include heavy and light vehicles associated with spoil and waste removal, material deliveries, and the arrival and departure of construction workers accessing the project area. Preliminary haulage routes were identified for each construction compound and other project area access points, as shown in Figures 9.1 and 9.5.

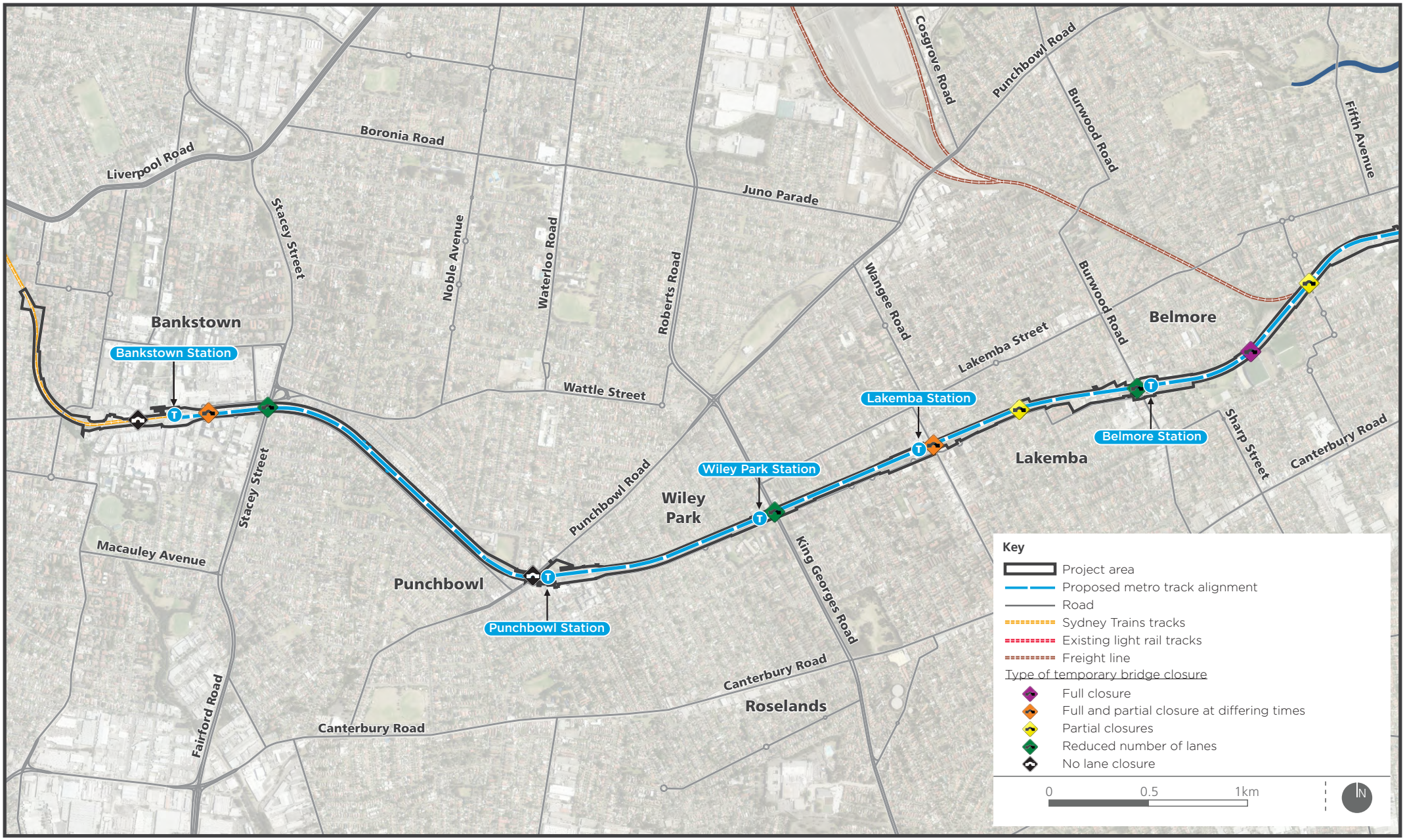
A preliminary swept-path analysis of the haulage routes was undertaken to identify potential obstacles to the movement of heavy vehicles associated with the project. Potential road modifications were identified to address these obstacles, and are outlined in Table 10.37. These works would be subject to further investigations following confirmation of the proposed haulage routes and vehicle types during detailed design and construction planning. Consideration of potential cumulative road network effects would form part of these investigations, which may result in the preliminary haulage routes being modified in consultation with relevant stakeholder.



sydney METRO | city & southwest

Location and types of bridge closures - map 1

FIGURE 10.13



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Location and types of bridge closures - map 2

FIGURE 10.13

Table 10.37 Potential road modifications required for construction vehicles

Station	Intersection/ movement requiring management or modification	Potential conflict identified	Potential scope of works to road and/or mitigation required
Marrickville	Left turn into Station Street from Illawarra Road	Conflict with existing building frontage for vehicles over 8.8 metres	Implementation of traffic controls for larger trucks
Hurlstone Park	Left turn into Crinan Street from Floss Street	Conflict with kerb and a tree	Options include: kerb adjustment works, tree removal and/or adjustment to construction hours
Canterbury	Left In and out movements at Canterbury Road/Close Street	In and out movements cannot take place simultaneously	Implementation of traffic controls for access out of Close Street onto Canterbury Road
	Movements along Close Street	Close Street is narrow and will not accommodate two way movements	Implementation of traffic controls
	Site entry to Canterbury Bowls gate	Conflict of vehicles travelling in and out of the work site	Implementation of traffic controls
	Left turn into Broughton Street from Canterbury Road	Conflicts with vehicles in the street	Temporary relocation of Broughton Street approach limit line further back to keep vehicles waiting at the traffic lights away from the conflict area
Belmore	Right turn into Tobruk Avenue from Burwood Road	Two existing kerb side car parks	Restriction or possible removal of car parking spaces during construction hours
	Right turn into Burwood Road from Dean Avenue	Kerbside parking	Restriction or possible removal of car parking spaces during construction hours
Lakemba	Left turn into Haldon Street from The Boulevarde	Existing kerb	Minor kerb cutback
Wiley Park	Left turn into The Boulevarde from King Georges Road (northbound)	Requirement to turn from lane 2 which is a through lane to avoid vehicles in The Boulevarde	Traffic management and a temporary re-alignment of the centre line on The Boulevarde
	Left turn into Lakemba Street from King Georges Road	Requirement to turn from lane 2 which is a through lane to avoid vehicles in Lakemba Street	Traffic management and closure of kerbside lane on King Georges Road during construction hours
Punchbowl	Left turn into Highclere Avenue from Wattle Street	Requirement to turn from middle lane to avoid vehicles in Highclere Avenue	Traffic management, realignment of Highclere Avenue centre line (including removal of existing centre median) and temporary parking ban on both sides of Highclere Avenue at times of delivery
	Left turn onto South Terrace from Loder Lane	Requirement for longer trucks to cross over the centre line to make the turn	Temporary removal of parking on South Terrace and use of cones or other physical barriers to separate trucks from on-coming vehicles

Station	Intersection/ movement requiring management or modification	Potential conflict identified	Potential scope of works to road and/or mitigation required
Bankstown	Right turn into Restwell Street from Raymond Street	Overlaps with adjacent right turn lane	Minor line-marking changes
	Left turn into Stacey Street from North Terrace	Overlaps with right turn lanes on Wattle Street	Minor adjustments to existing traffic island/ road marking

10.3.4 Alternative transport arrangements

As described in Section 9.11, a Temporary Transport Strategy has been developed to set a framework for managing the multi-modal transport network changes required during possession periods. The Temporary Transport Strategy is provided in Appendix G. The strategy provides options for alternative public transport arrangements, and aims to minimise transport disruption to customers currently accessing or travelling through stations between Lidcombe and Sydenham.

For each possession period, a temporary transport plan would be developed prior to works being undertaken. The temporary transport plan would define the initiatives to be implemented to assist customers affected by closures of the rail line, and the measures to minimise potential impacts associated with proposed alternative arrangements.

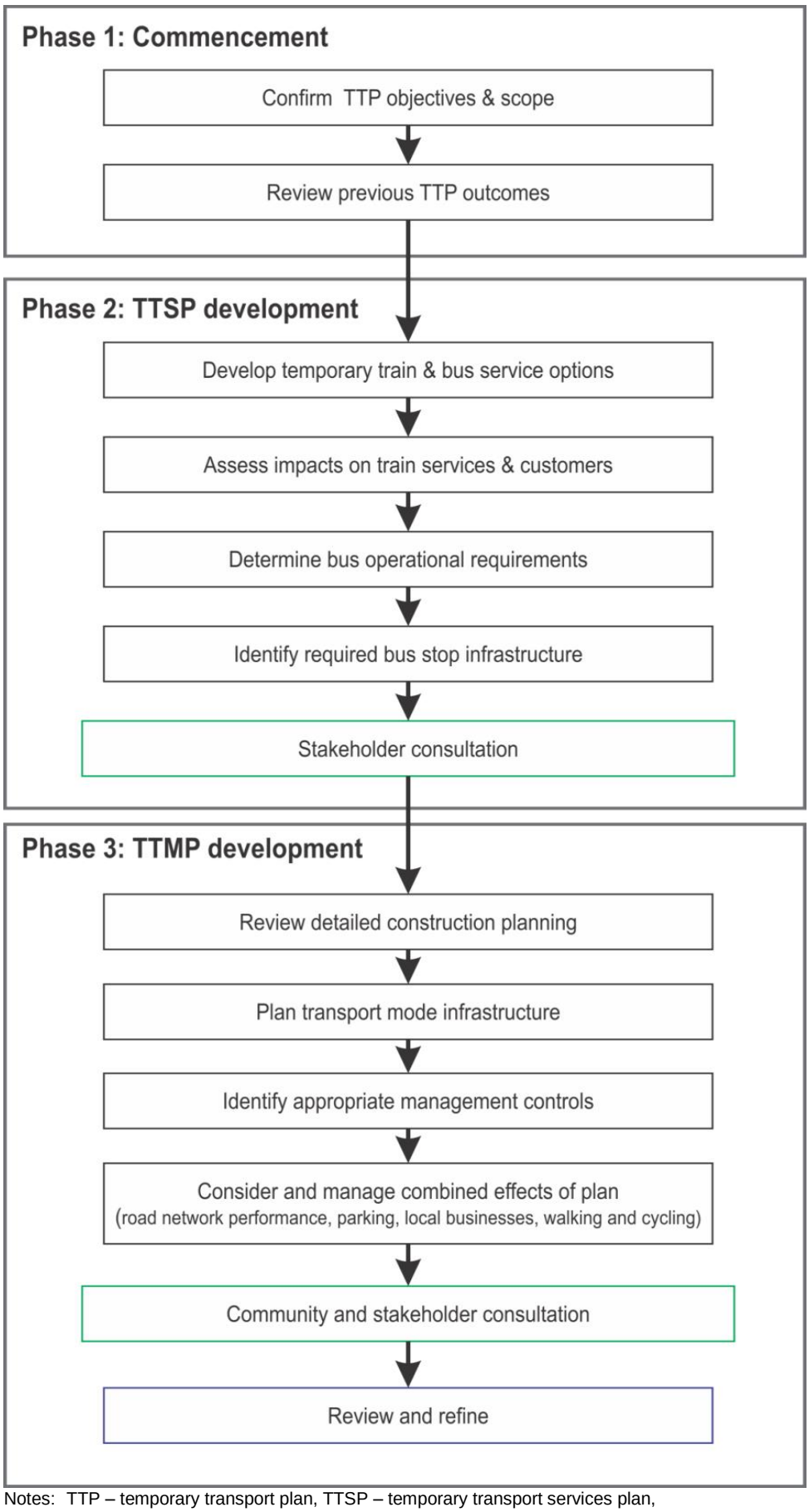
Each temporary transport plan would define the processes by which the impacts created by closures of the T3 Bankstown Line, and the operation of temporary train and bus services, would be managed. Each temporary transport plan would comprise a temporary transport service plan and a temporary transport management plan.

Developing the temporary transport plans would involve three main phases. The first phase would involve confirming the objectives and scope for the plan, and reviewing the performance of previous plans to determine the learnings that can be applied. Development of the first temporary transport plan for the project would include a review of the temporary transport plan for the Sydney Metro Northwest Epping to Chatswood project. Subsequent temporary transport plans would be developed with consideration given to the ones that preceded it, in an ongoing process of revision and refinement.

The second phase would involve preparing the temporary transport service plan. This plan would define the temporary rail and bus services that would operate during the possession period to meet the needs of affected customers.

The third phase would involve preparing the temporary transport management plan, which would consider the potential for wider impacts during possession periods, including those of the line closure, the operation of temporary transport services, and the interactions of construction activities.

The required inputs and three main phases to develop each plan is shown in Figure 10.14. Further information is provided in Section 9.11 and Appendix G.



Notes: TTP – temporary transport plan, TTSP – temporary transport services plan, TTMP – temporary transport management plan.

Figure 10.14 Process for developing a temporary transport plan

For the purposes of the assessment, the refined baseline temporary transport plan identified indicative routes proposed to be used by rail replacement buses (shown on Figure 10.15) which are:

- Route 1 - Lidcombe to Sydenham, all stations. This would provide consistent services during each possession between Sydenham and Lidcombe stations. During some possession periods, the route may only need to travel to Sefton or Regents Park instead of Lidcombe.
- Route 2 - Campsie to Sydenham, via Canterbury. This route would only stop at Canterbury Station when travelling from Campsie to Sydenham. It provides a reduced travel time and increased service reliability for customers travelling from Campsie and Canterbury.
- Route 3 - Hurlstone Park to Sydenham, via Dulwich Hill: This route would only stop at Dulwich Hill when travelling from Hurlstone Park to Sydenham. It would bypass Marrickville Station and travel via Wardell Road. It provides increased service frequency, reliability, and capacity for customers travelling from these stations.

These routes would potentially be supplemented by routes that travel to other rail lines and by increasing the frequency of regular bus routes. Additionally, options would be developed for buses to travel along different roads to reduce the concentration of buses along any one road or intersection.

Figure 10.15 Indicative routes for rail replacement bus services

10.4 Potential impacts

10.4.1 Risk assessment

Potential risks

The environmental risk assessment for the project, undertaken for the State Significant Infrastructure Application Report, identified the following as the main traffic, transport and access risks during construction:

- deterioration of traffic performance on the surrounding road network due to the movement of construction vehicles
- impacts of temporary road closures and traffic diversions
- delays or other impacts on the reliability of existing bus services
- impacts on customers during possession periods
- impacts on the reliability of rail services as a result of the closure of stations
- impacts of traffic performance in the surrounding area due to the operation of rail replacement bus services
- increased demand for rail services on other lines
- impacts on access to private properties
- impacts on availability of parking as a result of any reduction in the availability of commuter parking during construction.

How potential impacts have been avoided or minimised

Design development has included a focus on avoiding and/or minimising the potential for impacts during all key phases of the process. Potential transport and traffic impacts have been avoided/minimised where possible by:

- assessing various options and configuration of possession periods to balance the conversion of the T3 Bankstown Line stations and rail systems with the safety of rail workers, minimising impacts on Sydney Trains and ARTC operations, and options that result in the least disruption to the travelling public (as described in Chapter 6 (Alternatives and options)
- careful selection of preliminary construction haulage routes to ensure that vehicles are directed to suitably classified roads (i.e. designated heavy vehicle routes) via the shortest route and, where possible, minimising the distance travelled through residential areas, impacts to private property access, high pedestrian activity areas or other sensitive land uses
- selection of construction compounds to minimise their number and therefore the number of haulage routes required, which minimises as far as possible impacts to private properties and businesses in proximity to the stations, track and bridge works
- minimising impacts on existing parking areas, in particular used by businesses or residents as much as possible
- considering of construction methodologies to minimise the number of heavy vehicle movements required (e.g. prefabrication of components meaning that one vehicle delivers the component instead of multiple vehicles delivering small components which make the larger component)
- ensuring that viable alternative routes are available for use during bridge closures, and that cumulative impacts on network operation are considered.

- implementation of alternative transport arrangements that aim to minimise the potential impacts on the road network, and rail customers on the T3 Bankstown Line and other rail lines.

10.4.2 Station and corridor works – overview of results

This section describes the potential impacts of construction on regional and local traffic, transport, and access considerations. These potential impacts were assessed following consideration of the existing environment outlined in Section 10.2, alongside the temporary transport network changes required to construct the project outlined in Section 10.3. The results for each station are summarised in Section 10.4.3.

Active transport network

Construction would not impact on pedestrians or cyclists for extended periods of time. As described in Section 10.3, some short-term changes would occur to the active transport network. For pedestrians and cyclists, these changes may result in temporary impacts to routes due to activities such as bridge works resulting in road or pedestrian diversions, reduced road or footpaths widths, or where intersection changes/upgrades are to be undertaken.

For cyclists, construction may require shared haulage and cyclist routes, and temporary loss of cycle facilities at stations. Where practicable, existing bike parking facilities at stations would remain available for use while the new facilities are constructed. Where construction activities are likely to impact on existing bike facilities, alternate bike parking arrangements would be provided early in the construction program.

Interaction between haulage routes and cyclists surrounding stations would be minimal due to the relatively low construction traffic volumes predicted along roads where cycle facilities exist. Further, where haulage routes and cyclist would have to share a road corridor, these routes are generally located on wider streets, which would help to reduce the potential for conflict. Additional enhancements for pedestrian, cyclist, and motorist safety in the vicinity of the construction sites would be implemented where required during construction, as outlined in Section 10.5.

Public transport services

Overall impacts to bus services would be minimal. Bus routes would generally remain unchanged for the majority of the construction period with some short-term changes (described in Section 10.3.2) potentially required due to road diversions during temporary bridge closures.

Some bus stops may need to be temporarily relocated as a result of the positioning of compounds and work sites. In addition, during the implementation of the temporary transport management plans, some existing bus stops and layover areas would need to be shared with rail replacement buses, potentially resulting in temporary impacts to existing services.

Relocation of bus stops and bus rerouting would be limited, and when temporary stops are required, these would be positioned as close to the existing stops as practicable. Bus routing, stops and layover impacts would be considered in detail during preparation of the construction traffic management plan and the development of temporary transport management plans.

Transport for NSW would undertake an extensive community awareness and information campaign before each temporary transport management plan is implemented. This would include a range of communications activities, such as information at stations and bus stops regarding any short term changes, wayfinding signage, and clearly marked bus stop locations.

Road network performance

For construction haulage, the volume of materials that would need to be moved to and from the project area was analysed to estimate the total number of haulage vehicle movements required. The following maximum movements at each station were assumed:

- 20 light construction vehicle trips per hour (with the exception of Canterbury Station where 22 trips are expected)
- 20 heavy construction vehicle trips per hour (with the exception of Canterbury Station where 24 trips are expected)
- 15 to 55 bus trips per hour.

The assessment indicated that several locations exhibited deteriorating levels of service as a result of natural growth in background traffic volumes prior to construction commencing.

The assessment of the potential impacts of construction traffic movements concluded that only one intersection, the intersection of The Boulevarde and Haldon Street (near Lakemba Station on the southern side of the rail corridor), would become oversaturated in both the morning and afternoon peaks as a result of the movement of construction vehicles (not including rail replacement buses).

In addition, a number of other intersections across the project area were identified as likely to experience additional delays as a result of increases in construction traffic. In the majority of cases, the levels of service and degree of saturation would remain acceptable, and infrastructure upgrades are not considered to be required. Impacts at other intersections were remodelled using a range of mitigation options to identify whether the impacts could be reduced by minor changes to the way the intersections work.

Section 10.4.3 provides the road network performance results for each station, including the potential impacts of vehicle movements from compounds and work sites. It also summarises the results of the assessment of rail replacement buses, and the impacts of bridge works, including lane closures and diversions.

Changes to car parking

The project would require the temporary or permanent removal of some dedicated commuter parking spaces at many of the stations during construction, along with changes to the availability of some kiss and ride spaces, accessible spaces, taxis bays, and other restricted on-street parking spaces (i.e. timed spaces).

On-street parking spaces may also be affected by the provision of temporary bus stops during possession periods, however these impacts would occur during periods of lower demand (e.g. on weekends or during school holidays).

For many stations, existing unrestricted parking spaces located within a 400 metre catchment of each station could be used by commuters where dedicated commuter parking spaces (or other parking spaces) are affected during construction. Opportunities would also be investigated to provide replacement commuter parking spaces where long term impacts are anticipated (such as at Punchbowl Station, where 30 dedicated commuter parking spaces would be impacted by construction of the new station forecourt and entrance).

There is the potential that construction workers could use some of the existing parking spaces near stations and construction work areas. This potential impact would be minimised by providing some parking for workers within compounds and/or work sites where practicable. However, these spaces would generally no more than 10 per compound or work site. Opportunities for additional construction worker parking would be investigated during detailed construction planning, particularly for larger sites.

Additional strategies would be developed as part of the construction traffic management plan to minimise the potential for parking impacts, including encouraging workers to car pool or use public transport, and provision of off-site parking alternatives with associated shuttle bus arrangements.

Table 10.38 provides a summary of the indicative changes to parking during construction. These are subject to further investigation during detailed design and particularly in relation to the spaces potentially affected by rail replacement buses. The number of spaces potentially affected by rail replacement buses would be identified as part of the temporary transport management plan. It is noted that, following completion of construction in each area, the majority of these spaces would become available for use. For the purposes of this assessment, 'dedicated commuter parking' is described as existing unrestricted off-street parking spaces, located on RailCorp owned land, which is used for commuter parking.

Further information is provided for each station in Section 10.4.3.

Table 10.38 Indicative on and off-street car parking changes during construction

Station	Spaces affected for the duration of construction at stations		Spaces affected during possessions only		Additional spaces affected by rail replacement buses only	
	On-street	Off-street	On-street	Off-street	On-street	Off-street
Marrickville	3	0	7	0	3	0
Dulwich Hill	9	0	0	27	4	0
Hurlstone Park	0	23 (time-restricted)	0	0	8	0
Canterbury	0	0	0	32 (dedicated commuter)	0	0
Campsie	0	14 (dedicated commuter)	0	45 (dedicated commuter)	3 (time-restricted)	40
Belmore	0	29 (dedicated commuter) 46 (time-restricted spaces)	0	21 (time-restricted spaces)	7	0
Lakemba	0	47 (dedicated commuter)	0	25 (dedicated commuter)	12	0
Wiley Park	0	25[1]	0	0	16	0
Punchbowl	0	30 (dedicated commuter)	50	0	6 (time-restricted)	0
Bankstown	0	90 (dedicated commuter)	0	0	18	0

Note: 1. The 25 spaces temporarily removed at Wiley Park Station refers to the spaces that Roads and Maritime Services proposes to provide as part of the Sydney Clearways project.

In addition to the changes to parking outlined in Table 10.38, some changes to parking at other stations would be required to provide bus stops and layover areas during the operation of rail replacement bus services. Table 10.39 shows the potential changes at these stations, which would temporarily affect some on-street parking availability. The number of spaces affected would be reviewed during detailed design and construction planning.

Table 10.39 Indicative car parking changes at other stations

Station	Spaces affected by rail replacement buses
Sydenham	19
Yagoona	0
Birrong	6
Regents Park	0
Sefton	8
Berala	0
Lidcombe	20

10.4.3 Summary of assessment results

Marrickville Station

Active transport network

During construction of the station and associated facilities, some pedestrian or cyclist diversions would be required, due to the extent of the work site and compound area on Station Street, and during installation of the proposed new signalised intersection on the corner of Warburton Road, Schwebel Street, and Illawarra Road. Potential impacts would be managed by the installation of temporary traffic management measures, including crossings and pedestrian zones, defined by the construction traffic management plan (refer to Section 10.5).

Some changes to pedestrian and cycle networks would also be required during works to the Illawarra Road overbridge, the Charlotte Avenue underbridge, the Livingstone Road overbridge, and the Albermarle Street overbridge (refer to Table 10.36). During partial bridge closures, pedestrians would be diverted to the other side of the bridge, or within dedicated pedestrian areas. Some full closures would also be required for limited periods (up to three days). During these periods, walking distances would increase for those pedestrians diverted to the closest alternate rail corridor crossing, as outlined in Table 10.36.

Works at these bridges would result in cyclists using bridges to either:

- follow traffic management practices controlling traffic flow on the bridge
- follow the proposed traffic diversion to the next closest rail crossing, or
- dismount and walk through the closure before re-joining the route.

Use of the proposed construction haulage routes around Marrickville Station would result in Carrington Road and Illawarra Road being shared by haulage vehicles and cyclists. A review of the road geometry of Carrington Road indicated that there is sufficient width and a painted on-street bicycle shoulder lane, which would assist in minimising the potential for conflicts. As a result, there is considered to be minimal potential for impacts.

Illawarra Road is an on-road bicycle friendly road, which forms part of a regional bicycle route. Cyclists and construction haulage vehicles would share Illawarra Road. Relatively low volumes of construction vehicles would be generated, and as a result, the potential impact on user experience or safety is considered to be minor.

Public transport services

As outlined in Table 10.34, construction is not expected to affect any bus stops in the vicinity of the station, with the exception of:

- a short-term bus stop relocation may be required on Illawarra Road due to the close proximity of the project area, including the compound on Station Street
- temporary transport management plan bus stops would share existing bus stops on Illawarra Road, which may impact on the space available for existing services.

Existing bus services would not generally be impacted by construction, apart from some short-term bridge closures and partial lane closures on the Illawarra Road and Livingstone Road overbridges. This may result in inconveniences for some users of bus routes that cross these bridges. These changes would be limited and managed in consultation with the relevant bus operators and through communication to the general public.

Road network performance

Table 10.40 provides an indication of the performance of the road network surrounding Marrickville Station during construction.

Table 10.40 Marrickville Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Illawarra Road/Warren Road (signals)						
Morning	0.81	B	0.81	B	0.89	B
Afternoon	0.89	B	0.89	B	0.88	B
Marrickville Road/Illawarra Road (signals)						
Morning	0.83	B	0.87	B	0.98	C
Afternoon	0.73	B	0.81	B	0.90	B
Marrickville Road/Victoria Road (signals)						
Morning	1.03	D	1.03	D	1.38	F
Afternoon	1.07	E	1.07	E	1.05	F
Petersham Road/Illawarra Road (signals)						
Morning	0.50	B	0.52	B	0.54	B
Afternoon	0.53	A	0.55	A	0.58	A
Marrickville Station overbridge (signals)						
Morning	0.49	A	0.50	A	0.53	A
Afternoon	0.54	A	0.56	A	0.58	A

Notes:
1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results indicate that the addition of construction vehicles would not change the level of service. However, the results predict that operation of the Marrickville Road/Victoria Road and the Marrickville Road/Illawarra Road intersections would deteriorate during weekday peak periods, as a result of the implementation of rail replacement buses as part of the refined temporary transport management plan. The performance of the Marrickville Road/Illawarra Road intersection would reduce from a level of service B to a level of service C during the morning peak period, and the Marrickville Road/Victoria Road intersection would reduce from a level of service D (morning) and E (afternoon) to a level of service F. However, rail replacement buses would operate during

school holiday periods and/or times when traffic volumes are lower than the peak traffic periods used in the analysis. As a result, the potential impacts of rail replacement buses are likely to be less than predicted.

Further modelling was undertaken for the Marrickville Road/Illawarra Road intersection to include potential phasing changes at this intersection (details of these changes are provided in Section 5.3.4 of Technical paper 1) to mitigate the potential impacts of the operation of rail replacement buses. The inclusion of these phasing changes reduced congestion at this intersection. Traffic signal phasing changes would require the approval of Roads and Maritime Services.

The potential impacts of bridge closures is considered in Section 10.4.4.

Changes to parking

As there are no dedicated commuter spaces at or near Marrickville Station, there would be no impacts to commuter parking. However, three kiss and ride spaces, one accessible space, one taxi bay, and three short term spaces in Station Street, and two short-term spaces on Schwebel Street, would be intermittently unavailable during construction activities at Marrickville Station.

During operation of a temporary transport management plan, about three on-street parking spaces on Illawarra Road south of the rail line may be needed for temporary bus stops. These spaces would only be affected while rail replacement buses are operating. Rail replacement buses would operate during school holiday periods and/or times when parking demand is lower. As a result, the loss of these spaces is considered to be manageable.

These potential impacts (about 13 spaces) would be a small proportion of the existing on-street parking located in the vicinity of the station. As shown in Table 10.4, there are about 1,200 unrestricted on-street parking spaces located within 400 metres of Marrickville Station. Although the existing demand for on-street parking is relatively high (represented by the utilisation rate of 81 per cent), there would be some capacity to absorb the temporary loss of spaces during construction. It is recognised that alternative parking may be located further from the customer's preferred destination.

Dulwich Hill Station

Active transport network

During construction of the station and associated facilities, some pedestrian or cyclist diversions would be required. Construction activities would generally be located outside of the road reserve and would not affect footpaths, general pedestrian connectivity, or safety. However, restricted access and possible minor pedestrian diversions may be required as a result of the relocation of the existing station entrance on Wardell Road and the proposed pavement upgrades. Such changes would be minor and would not result in any substantial changes in travel distances for both pedestrians and cyclists.

There would be minimal potential for impacts to cyclists. Where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact the existing facilities, alternate bike parking arrangements would be provided early in the construction program.

Some changes to pedestrian and cycle networks would be required during works to the Wardell Road overbridge and the Ness Avenue/Terrace Road underbridge (refer to Table 10.36). During these works, pedestrians would be diverted to the other side of the bridge, or within dedicated pedestrian areas.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

As outlined in Table 10.34, construction is not expected to affect bus stops or services in the vicinity of the station. Rail replacement buses would share the existing bus stops on Dudley Street, which may impact the space available for existing services at certain times during possession periods, however such impacts are considered minimal as any queuing of buses would be temporary.

Construction would not affect access to the Dulwich Hill light rail stop. Access to the stop would be maintained at all times when the light rail is operational.

Road network performance

Table 10.41 provides an indication of the performance of the road network surrounding Dulwich Hill Station during construction.

Table 10.41 Dulwich Hill Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Wardell Road/Ewart Street (signals)						
Morning	1.10	F	1.13	F	1.28	F
Afternoon	1.01	D	1.03	E	1.11	F
Wardell Road/Dudley Street (priority controlled)						
Morning	0.91	E	0.91	E	0.99	F
Afternoon	0.82	E	0.82	E	0.85	F
New Canterbury Road/Marrickville Road (signals)						
Morning	0.95	B	0.95	B	0.95	B
Afternoon	0.61	B	0.61	B	0.65	B
Ewart Street/Bayley Street (priority controlled)						
Morning	0.30	B	0.30	B	0.30	B
Afternoon	0.40	B	0.40	B	0.43	B
New Canterbury Road/Terrace Road (priority controlled)						
Morning	0.64	A	0.64	A	0.65	A
Afternoon	0.61	B	0.61	C	0.64	C
Wardell Road/Marrickville Road (signals)						
Morning	1.10	D	1.14	E	1.20	F
Afternoon	0.92	C	0.90	C	1.25	E

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results indicate that the performance of the Wardell Road/Ewart Street, the New Canterbury Road/Terrace Road, and the Wardell Road/Marrickville Road intersections would deteriorate as a result of the addition of construction traffic during morning and/or afternoon weekday peak hours. The implementation of rail replacement buses as part of the refined temporary transport management plan would result in further deterioration in performance at:

- Wardell Road/Ewart Street intersection, during the weekday afternoon peak period
- Wardell Road/Dudley Street intersection, during the weekday morning and afternoon peak periods
- Wardell Road/Marrickville Road intersection, during the weekday morning and afternoon peak periods.

The Wardell Road/Ewart Street and Marrickville Road/Wardell Road intersections are predicted to experience high congestion and delays. Further modelling was undertaken at these intersections to include changes in lane usage and traffic signal phasing (refer to Section 5.4.4 of Technical paper 1 for further details of these measures) to mitigate the potential impacts of construction traffic and rail replacement buses. The inclusion of these changes reduced congestions at both intersections. Traffic signal phasing changes would require the approval of Roads and Maritime Services.

Changes to parking

Due to the location and extent of the work site, it is estimated that about nine of the 17 time restricted on-street spaces along Bedford Crescent would be unavailable during the entire construction period. In addition, about 27 spaces (of the existing 55 dedicated commuter spaces) would be unavailable during possession periods.

The implementation of rail replacement buses is unlikely to impact any dedicated commuter spaces. However, about four on-street spaces on Dudley Street, south of the rail line, would be affected by the bus stops required to service rail replacement buses. These parking spaces would only be affected during possession periods.

Impacts to on-street parking spaces (about 13 spaces) would a small proportion of the existing on-street parking located in the vicinity of the station. About 50 per cent of the dedicated commuter parking spaces available at the station would be temporarily impacted during possession periods. As shown in Table 10.7, there are about 1,200 unrestricted on-street parking spaces within 400 metres of Dulwich Hill Station. As the utilisation rate of on-street parking is 74 per cent, there would be some capacity to absorb the temporary loss of spaces during construction. It is recognised that alternative parking may be located further from the customer's preferred destination. In addition, the commuter spaces would only be affected during possession periods, where there may be lower demand for commuter parking.

Hurlstone Park Station

Active transport network

During construction of the station and associated facilities, footpaths, general pedestrian connectivity, and safety are not expected to be affected, as works would generally be contained in the rail corridor. However, station works would potentially require closure of the Floss Street car park and the footpath on Duntroon Street (adjacent to Hurlstone Park Station) during possession periods. During these periods, pedestrian movements would be maintained.

Bicycle friendly roads, such as Crinan Street, Garnet Street, and Dunstaffenage Street, have been identified as potential construction haulage routes. A review of the road geometry indicates that these roads are wide enough to accommodate construction vehicles. Cyclists and construction haulage vehicles would share sections of these roads. Estimates indicate relatively low volumes of construction vehicles. As a result, there would be minimal potential for impacts on user experience and safety.

Where possible, existing bike parking facilities at stations would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact the existing facilities, alternate bike parking arrangements would be provided early in the construction program.

Some changes to pedestrian and cycle networks would be required during works to the Garnet Road overbridge, the Crinan Street overbridge, the Foord Avenue underbridge, and the Melford Road overbridge (refer to Table 10.36). For all bridges other than the Melford Road overbridge, pedestrians would be diverted to the other side of the bridge, or within dedicated pedestrian areas during partial closures. For the Melford Road overbridge, the narrow width means that full closures

would be required during bridge works. The Garnet Road and Crinan Street overbridges would also require some short-term (up to two days) full bridge closures. These closures would require short-term diversions, resulting in the potential for increases in travel distance (alternate rail corridor crossings are described in Table 10.36).

Public transport services

As outlined in Table 10.34, temporary relocation of the existing bus stop on Crinan Street (northbound) would potentially be required. The temporary replacement bus stop would be positioned close to the existing stop, and no impacts to bus services are expected.

Rail replacement buses would share the existing bus stops on Floss Street and Duntroon Street, which may impact the space available for existing services at certain times during possession periods.

The 406 bus service may need to be re-routed during works on the Crinan Street overbridge. This would require the temporary relocation of two bus stops (one in each direction). The replacement stops would be located as close as practicable to the existing stops, in consultation with bus operators.

The 418 bus service may also need to be re-routed during works on Garnet Street overbridge.

Road network performance

Table 10.42 provides an indication of the performance of the road network surrounding Hurlstone Park Station during construction.

Table 10.42 Hurlstone Park Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Canterbury Road/Crinan Street (signals)						
Morning	0.67	B	0.68	B	0.73	B
Afternoon	0.78	B	0.80	B	0.83	C
Canterbury Road/New Canterbury Road (signals)						
Morning	0.96	C	0.96	C	0.99	C
Afternoon	0.91	C	0.91	C	0.90	C
Crinan Street/Floss Street - south of railway (priority controlled)						
Morning	0.28	A	0.29	A	0.37	A
Afternoon	0.24	A	0.25	A	0.29	A
Floss Street/Crinan Street/Duntroon Street (priority controlled)						
Morning	0.25	A	0.27	B	0.30	B
Afternoon	0.19	B	0.21	B	0.24	B

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results show that each intersection would perform satisfactorily during weekday peak hours.

Changes to parking

It is estimated that 23 time-restricted spaces on Floss Street (north) adjacent to the station would be unavailable during possession periods. About eight on-street spaces on Floss Street, south of

the rail line, would also be affected by bus stops required for rail replacement buses during possession periods.

These potential impacts (about 31 spaces) would be a small proportion of the existing on-street parking located in the vicinity of the station. As shown in Table 10.10, there are about 1,100 unrestricted on-street parking spaces located within 400 metres of Hurlstone Park Station. There is moderate demand for on-street parking spaces (represented by the utilisation rate of 54 per cent). As a result, it is likely that there would be capacity to absorb the temporary loss of spaces during construction. It is recognised that alternative parking may be located further from the customer's preferred destination.

Canterbury Station

Active transport network

During construction of the station and associated facilities, some pedestrian or cycle diversions would be required, however these would be limited as the majority of works would be contained within the rail corridor. Some temporary footpath diversions may be required on Broughton Street during the construction of new kerbside facilities. Temporary pedestrian diversions would also need to be implemented during relocation of the station entrance.

There would be minimal potential for impacts to cyclists. Where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact the existing facilities, alternate bike parking arrangements would be provided early in the construction program.

Some changes to pedestrian and cycle networks would be required during works to the Canterbury Road overbridge, the Cooks River/Charles Street underbridge, and the Wairoa Street underbridge (refer to Table 10.36). During these works, pedestrians would be diverted to the other side of the bridge, or within dedicated pedestrian areas. During short-term full closures of the Cooks River/Charles Street and the Wairoa Street underbridges, the diversion of pedestrians to the closest alternate rail corridor crossing (as outlined in Table 10.36) would result in increased walking distances.

The Duke Street footbridge, a pedestrian and cyclist only bridge, would require periodic full closures during construction. During these times, pedestrians and cyclists would be diverted to the Wairoa Street and Beamish Street overbridges, resulting in some increased walking and cycling distances. Access by cycles along the Cooks River Cycleway would not be impacted. However, the movement of cycles along short sections of Broughton Street would need to be managed during construction.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

Construction is not expected to impact on bus stops in the vicinity of the station. However, the existing bus stop on the south side of Broughton Street would be relocated closer to the station entrance.

Rail replacement buses would share the existing bus service stops on Canterbury Road, which may affect the space available for existing services at certain times during possession periods, however such impacts are considered minimal as any queuing of buses would be temporary.

Partial road closures during works on the Canterbury Road overbridge would not affect bus routes, however service operation may be impacted by traffic management measures such as stop/go operations, or by any traffic congestion.

Road network performance

Table 10.43 provides an indication of the performance of the road network surrounding Canterbury Station during construction.

Table 10.43 Canterbury Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Canterbury Road/Wonga Street (signals)						
Morning	0.82	B	0.83	B	0.84	B
Afternoon	0.83	B	0.84	B	0.86	B
Canterbury Road/Charles Street (priority controlled)						
Morning	0.57	F	0.58	F	0.60	F
Afternoon	0.60	F	0.66	F	0.64	F
Canterbury Road/Jeffrey Road (signals)						
Morning	0.88	B	0.88	B	0.88	B
Afternoon	0.93	B	0.93	B	0.93	B
Canterbury Road/Close Street (priority controlled)						
Morning	0.56	B	0.57	B	0.59	B
Afternoon	0.57	D	0.59	D	0.61	D

Notes:
1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results show that each intersection would perform satisfactorily during weekday peak hours.

Changes to parking

It is estimated that the 32 off-street dedicated commuter parking spaces on Charles Street would be unavailable during possession periods. No other impacts to on or off-street parking around the station are predicted.

Impacts to these off-street parking spaces would a small proportion of the unrestricted parking located in the vicinity of the station. As shown in Table 10.13, there are about 600 unrestricted on-street parking spaces located within 400 metres of Canterbury Station. There is moderate demand for on-street parking spaces (represented by the utilisation rate of 59 per cent). As a result, it is likely that there would be capacity to absorb the temporary loss of off-street parking spaces during construction. It is recognised that alternative parking may be located further from the customer's preferred destination. In addition, the commuter spaces would only be affected during possession periods, where there may be lower demand for commuter parking.

Campsie Station

Active transport network

During construction of the station and associated facilities, works would generally be contained to the rail corridor and impacts on pedestrian and cycle networks would be limited. However, the width of footpaths on South Parade, Lilian Street, and North Parade may need to be reduced in some situations.

The use of the rail corridor access gate adjacent to Lilian Street would require intermittent road closures for a limited period. These closures would occur during night works, and would have limited impacts on pedestrian movements. Traffic management (including but not limited to traffic

control personnel and signage) would be put in place during closures to direct pedestrians along a safe alternative route.

Construction has the potential to impact on cyclists using Lilian Street. Traffic management measures, including detours, would be provided to ensure safe passage for cyclists.

There would be minimal potential for impacts to cyclists. Where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact the existing facilities, alternate bike parking arrangements would be provided early in the construction program.

A short section of Campsie Street, close to Beamish Street, has an on-street cycle path and is proposed as a construction haulage route. Cyclists and construction haulage vehicles would share this section of the road. Estimates indicate relatively low volumes of construction vehicles would be generated, and as a result, the potential impact on user experience and safety is considered to be minor.

Some changes to pedestrian and cycle networks would be required during works to the Beamish Street and Loch Street overbridges (refer to Table 10.36). During partial closures, pedestrians and cyclists would be diverted to the other side of the road.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

Works adjacent to the western end of South Parade would potentially affect a bus stop that serves a number of routes, including 487, 412, 415, 444, 445, and 473. It is proposed to relocate this stop to the opposite side of the rail corridor on North Parade. The stop would retain direct access to the station. The potential impact of this relocation on the reliability of timetabled bus services would be further evaluated during detailed design and construction planning.

During works to the Beamish Street overbridge, partial closures may require one direction of traffic to be periodically redirected to the Loch Street overbridge during weekends and nights, which would require the temporary relocation of bus routes and bus stops. This would be confirmed during detailed design and construction planning.

Rail replacement buses would share existing bus stops on South Parade, which may affect the space available for existing services at certain times during possession periods, however such impacts are considered minimal as any queuing of buses would be temporary.

Road network performance

Table 10.44 provides an indication of the performance of the road network surrounding Campsie Station during construction.

Table 10.44 Campsie Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Beamish Street/Ninth Avenue (signals)						
Morning	0.69	B	0.69	B	0.71	B
Afternoon	0.71	B	0.73	B	0.79	B
Beamish Street/Clissold Parade (signals)						
Morning	0.81	B	0.78	B	0.92	C
Afternoon	1.05	E	1.07	E	1.35	F

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Beamish Street/South Parade (signals)						
Morning	0.90	B	0.92	B	0.91	C
Afternoon	0.96	B	0.94	B	1.79	F
Beamish Street/North Parade (priority controlled)						
Morning	0.71	C	0.72	C	0.72	C
Afternoon	0.72	C	0.72	C	1.78	F
Beamish Street/Amy Street (signals)						
Morning	0.51	A	0.52	A	0.52	A
Afternoon	0.94	B	0.95	B	0.96	B
Canterbury Road/Beamish Street (signals)						
Morning	0.95	C	0.95	C	0.95	C
Afternoon	0.94	C	0.94	C	0.92	C
Ninth Avenue/Loch Street (roundabout)						
Morning	0.97	D	0.97	D	1.01	E
Afternoon	0.97	B	0.97	B	0.99	C

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results indicate no changes to level of service as a result of the addition of construction traffic only. A number of the intersections are close to capacity based on the estimated degree of saturation. With the addition of rail replacement buses, a deterioration in the level of service was predicted at the following intersections:

- Beamish Street/Clissold Parade, during the morning and afternoon peak periods
- Beamish Street/South Parade, during the morning and afternoon peak periods
- Beamish Street/North Parade, during the afternoon peak period
- Ninth Avenue/Loch Street, during the morning and afternoon peak periods.

Changes to parking

It is estimated that about 14 of the 138 dedicated commuter parking spaces at Campsie Station would be unavailable for the duration of construction. About 45 commuter spaces would be temporarily affected during possession periods. In addition, during operation of rail replacement buses, about 40 commuter spaces would be potentially affected by the proposed bus layover areas on South Parade. About three on-street parking spaces would be required to accommodate the additional bus stop area required to manage rail replacement buses.

Impacts to on-street parking (about three spaces) would be a small proportion of the existing on-street parking located in the vicinity of the station. About 10 per cent of the dedicated commuter parking spaces at the station would be unavailable for the duration of construction. The majority of parking impacts at Campsie Station would occur temporarily during possession periods, when about 72 per cent of commuter spaces (or 20 per cent of the total number of off-street spaces) would be affected.

As shown in Table 10.16, there are about 760 unrestricted on-street parking spaces located within 400 metres of Campsie Station. Although the existing demand for on-street parking is high (represented by the utilisation rate of 85 per cent), there would be some capacity to absorb the temporary loss of spaces during construction. Alternatively, customers would need to use buses or

other modes of transport, or walk further than 400 metres to access parking. It is recognised that alternative parking may be located further from the customer's preferred destination. It is noted that the main impacts to commuter parking spaces would be during possession periods, where there may be lower levels of demand.

Belmore Station

Active transport network

During construction of the station and associated facilities, impacts on pedestrian and cycle networks would be limited, as the works would generally be contained within the rail corridor. However, there may be the need for the following pedestrian diversions:

- Footpaths on Tobruk Avenue may need to be closed for limited periods during construction of the station and the proposed shared zone.
- Footpaths on Burwood Road may need to be closured during installation of the new signalised intersection and upgrades to existing footpaths.

Diversions would be provided to minimise the potential impacts of these closures.

Impacts to cyclists would be minimal, and where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact on existing bike facilities, alternate bike parking arrangements would be provided early in the construction program.

There is an off-road shared pedestrian and cycle path adjacent to the rail corridor between Bridge Road/Tobruk Avenue and Edison Lane. Works to the pedestrian underbridge to the Belmore Sports Ground would potentially require intermittent full closure of the shared pathway and underbridge. Local diversions would be put in place when works are undertaken. Where practicable, works would be programmed so as not to coincide with game days at Belmore Oval or other busy periods where practicable. Further information on traffic and access management during special events is provided in Section 10.4.7.

Some changes to pedestrian and cycle networks would be required during works to the Burwood Road overbridge (refer to Table 10.36). During partial closures, pedestrians and cyclists would be diverted to the other side of the road. Travel distances would not be impacted.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

Partial closure of the Burwood Road overbridge would be required for a number of weeks. During this time, bus routes 415 and 942 would need to be diverted and bus stops relocated, resulting in extra walking distances for some customers. Potential impacts would be managed, in consultation with bus operators, by the implementation of temporary traffic management measures defined by the construction traffic management plan.

Rail replacement buses would share the existing bus stops on Burwood Road, which may affect the space available for existing services at certain times during possession periods, however such impacts are considered minimal as any queuing of buses would be temporary.

Road network performance

Table 10.45 provides an indication of the performance of the road network surrounding Belmore Station during construction.

Table 10.45 Belmore Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS	LoS	DoS	LoS	DoS	LoS
Burwood Road/Bridge Road (priority controlled)						
Morning	1.03	F	1.39	F	1.46	F
Afternoon	1.05	F	1.39	F	1.46	F
Burwood Road/Redman Parade (priority controlled)						
Morning	0.69	F	0.72	F	0.74	F
Afternoon	0.72	F	0.74	F	0.76	F
Burwood Road/Lakemba Street (signals)						
Morning	0.96	C	0.92	C	1.51	F
Afternoon	0.90	B	0.90	B	1.56	F
Canterbury Road/Burwood Road (signals)						
Morning	0.91	A	0.91	A	0.91	A
Afternoon	0.97	B	0.97	B	0.97	B

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results show that the level of service at each intersection would not change with the addition of construction traffic. The intersections at Burwood Road/Bridge Road and Burwood Road/Redman Parade would continue to operate at capacity. With the addition of rail replacement buses, the performance of the Burwood Road/Lakemba Street intersection is predicted to deteriorate to a level of service F.

Additional modelling was undertaken for the Burwood Road/Bridge Road and Burwood Road/Lakemba Street intersections to assess the effect of providing mitigation measures such as changes to movements and phasing. The results indicate that implementing these measures would reduce congestion during the morning and afternoon peaks, however the level of service at the Burwood Road/Lakemba Street intersection would remain at F. Further refinement of mitigation measures and routes for rail replacement buses would minimise the potential impacts.

The Burwood Road/Bridge Road intersection is proposed to be signalised as part of the project. Whilst this is not proposed to mitigate the potential construction impacts outlined above, signalising the intersection prior to the operation of rail replacement buses would reduce the potential impacts. An initial assessment showed that a signalised intersection would operate with a level of service B or C.

Change to parking

Due to the location of the work site, it is estimated that about 29 dedicated commuter spaces would be unavailable for the duration of construction. An additional 21 off-street time restricted spaces would be temporarily impacted during possession periods. Following each possession, reconfiguration of these spaces may be required depending on the proposed impacts.

It is estimated that 48 time restricted off-street parking spaces on Tobruk Avenue would be unavailable during and following construction, as this area is required for the new station forecourt and entrance. The potential impact of this long-term loss of parking is considered in Section 11.4.9.

During operation of rail replacement buses, about seven on-street parking spaces would be temporarily affected to enable provision of bus stops in the vicinity of the station.

Impacts to on-street parking spaces (about seven spaces) would a small proportion of the existing on-street parking in the vicinity of the station. About 50 per cent of the dedicated commuter parking spaces at the station would be unavailable for the duration of construction. The majority of commuter parking spaces would be unavailable during possession periods, however these additional impacts would be temporary. As shown in Table 10.19, there are about 900 unrestricted on-street parking spaces within 400 metres of Belmore Station. As the utilisation rate of on-street parking is 76 per cent, there would be some capacity to absorb the loss of spaces during construction. Alternatively, customers would need to use buses or other modes of transport, or walk further than 400 metres to access parking. It is recognised that alternative parking may be located further from the customer's preferred destination.

Lakemba Station

Active transport network

During construction of the station and associated facilities, impacts on pedestrian and cycle networks would be limited, as the works would generally be contained within the rail corridor. However, the width of footpaths on The Boulevarde and Railway Parade may need to be reducted in some situations.

Impacts to cyclists would be minimal, and where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact on existing bike facilities, alternate bike parking arrangements would be provided early in the construction program.

A section of Haldon Street and Lakemba Street is common to both the on-street cycle friendly network and the proposed construction haulage routes. Estimates indicate that relatively low volumes of construction vehicles would be generated on the short section of road to be shared (i.e. 50 metres). As a result, the potential impact on user experience and safety is considered to be minor.

Some changes to pedestrian and cycle networks would be required during works to the Moreton Street and Haldon Street overbridges (refer to Table 10.36). During partial closures, pedestrians and cyclists would be diverted to the other side of the road.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

During works on the Haldon Street overbridge, the bus route using the bridge would be redirected to the Moreton Street overbridge. The diversion of this route would result in a number of stops (up to six) being skipped. This would also increase walking distances to the nearest bus stop (up to 1.2 kilometres). Further consideration of bus routes would be undertaken during detailed design and construction planning to minimise the potential impacts where practicable. Diversions are also only likely to be required during weekends and school holiday periods when the demand for buses is lower.

Rail replacement buses would share existing bus stops on The Boulevarde, which may affect the space available for existing services at certain times during possession periods, however such impacts are considered minimal as any queuing of buses would be temporary.

Road network performance

Table 10.46 provides an indication of the performance of the road network surrounding Lakemba Station during construction.

Table 10.46 Lakemba Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS	LoS	DoS	LoS	DoS	LoS
The Boulevarde/Haldon Street (signals)						
Morning	1.05	E	1.12	F	1.21	F
Afternoon	1.10	E	1.16	F	1.18	F
Lakemba Street/Wangee Road (signals)						
Morning	0.92	B	0.92	B	0.92	B
Afternoon	0.90	B	0.90	B	0.90	B
Haldon Street/Railway Parade (priority controlled)						
Morning	1.03	F	1.22	F	1.22	F
Afternoon	1.06	F	1.18	F	1.18	F
Lakemba Street/Haldon Street (signals)						
Morning	0.59	B	0.59	B	0.59	B
Afternoon	0.57	A	0.57	A	0.57	A
Pedestrian crossing on The Boulevarde (signals)						
Morning	0.46	A	0.46	A	0.49	A
Afternoon	0.38	A	0.38	A	0.42	A
Canterbury Road/Haldon Street (signals)						
Morning	0.86	A	0.86	A	0.86	A
Afternoon	0.90	B	0.90	B	0.90	B

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results indicate that the level of service would not change at the majority of intersections. However, a deterioration in intersection performance is predicted at The Boulevarde/Haldon Street intersection during both the morning and afternoon peaks as a result of the addition of construction vehicles.

The Haldon Street/Railway Parade intersection is predicted to operate at a level of service F even without the addition of construction vehicles and rail replacement buses. Modelling was undertaken to assess the intersection's performance with the inclusion of mitigation measures such as signalisation. The results indicated that these measures would improve the level of service from F to B and A during the morning and afternoon peaks respectively.

Change to parking

It is estimated that about 47 dedicated commuter parking spaces would be unavailable for the duration of construction. An additional 25 commuter parking spaces on Railway Parade would be temporarily impacted during possession periods. About 12 on-street spaces would be affected by the bus stops required for rail replacement buses during possession periods.

The predicted impacts to on-street parking would be a small proportion of the existing on-street parking located in the vicinity of the station. About 34 per cent of the dedicated commuter parking spaces at the station would be unavailable for the duration of construction. This impact would increase to 52 per cent of the spaces during possession periods. However, these additional impacts would be temporary. As shown in Table 10.22, there are about 770 unrestricted on-street and 540 off-street parking spaces within 400 metres of the station. Although the utilisation rate of on-street parking is relatively high (around 85 per cent), there would be some capacity to absorb the loss of spaces during construction. Alternatively, customers would need to use buses or other modes of transport, or walk further than 400 metres to access parking. It is recognised that alternative parking may be located further from the customer's preferred destination.

Wiley Park Station

Active transport network

During construction of the station and associated facilities, works would generally be contained within the rail corridor, however some works adjacent to footpaths on The Boulevarde and Stanlea Parade would be required. As far as practicable, works would be physically separated from footpaths to maintain footpath widths and pedestrian access. In some instances, footpaths may be affected during construction of new kerbside facilities and pavements. Diversions would be provided during these periods.

Lakemba Street and Urunga Parade are common to both the on-street cycle friendly network and the proposed construction haulage routes. Cyclists and construction haulage vehicles would share this section of the road. Estimates indicate that relatively low volumes of construction vehicles would be generated, and as a result, there would be minimal potential for impacts on user experience and safety.

Impacts to cyclists would be minimal, and where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact on existing bike facilities, alternate bike parking arrangements would be provided early in the construction program.

Some changes to pedestrian and cycle networks would be required during works to the King Georges Road overbridge (refer to Table 10.36). During partial closures, pedestrians and cyclists would be diverted to the other side of the road.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

Construction activities are not expected to impact on bus services or stops near the station.

Road network performance

Table 10.47 provides an indication of the performance of the road network surrounding Wiley Park Station during construction.

Table 10.47 Wiley Park Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS	LoS	DoS	LoS	DoS	LoS
King George Road/Lakemba Street (signals)						
Morning	0.95	C	0.97	C	0.95	C
Afternoon	0.96	D	0.98	D	0.98	D
King Georges Road/The Boulevarde (signals)						
Morning	0.98	D	1.01	D	0.96	E
Afternoon	0.96	D	0.97	D	0.95	D

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results indicate that the addition of rail replacement buses would result in a deterioration in the level of service at the King Georges Road/The Boulevarde intersection during the morning peak period, from a level of service D to E. This intersection is already near capacity in the future scenario. The addition of construction traffic and rail replacement buses would result in a further deterioration in performance.

Scheduling works to occur during school holidays would significantly reduce congestion at this intersection due to the lower background traffic flows during these periods.

Change to parking

It is estimated that about 16 on-street parking spaces would be temporarily affected by the bus stops required for rail replacement buses during possession periods. These potential impacts would be a small proportion of the existing on-street parking located in the vicinity of the station. As shown in Table 10.25, there are about 700 unrestricted on-street parking spaces located within 400 metres of the station. As the utilisation rate of on-street parking is 63 per cent, there would be some capacity to absorb the temporary loss of spaces during construction. It is recognised that alternative parking may be located further from the customer's preferred destination.

Punchbowl Station

Active transport network

During construction of the station and associated facilities, works would generally be contained within the rail corridor, limiting potential impacts on pedestrian and cycle networks. However, there may be some situations where the width of footpaths would need to be reduced due to the extent of the work sites and the positioning of hoarding.

The implementation of management measures would ensure that the following pedestrian movements are not impacted:

- access to and from the station entrance on the northern side of the station prior to its removal
- access to and from the proposed new station entrance on the northern side of the station once it is completed and the old entrance is removed
- access along The Boulevarde during construction of new kerbside areas.

Impacts to cyclists would be minimal, and where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact on existing bike facilities, alternate bike parking arrangements would be provided early in the construction program. As outlined in Section 10.5, further information on alternative arrangements will be available following the detailed design and construction planning stages.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

Construction activities are not expected to impact on bus services or stops near the station. Rail replacement buses would share the existing bus stops on The Boulevarde, which may affect the space available for existing services at certain times during possession periods, however such impacts are considered minimal as any queuing of buses would be temporary.

Road network performance

Table 10.48 provides an indication of the performance of the road network surrounding Punchbowl Station during construction.

Table 10.48 Punchbowl Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Punchbowl Road/South Terrace (signals)						
Morning	1.02	F	1.03	F	1.03	F
Afternoon	0.87	C	0.87	C	0.91	C
Punchbowl Road/The Boulevarde (signals)						
Morning	0.99	C	1.00	C	1.05	D
Afternoon	0.87	C	0.88	C	0.93	D
Punchbowl Road/Rossmore Avenue (priority controlled)						
Morning	0.42	A	0.42	A	0.42	A
Afternoon	0.48	A	0.48	A	0.48	A
The Boulevarde/Arthur Street (signals)						
Morning	0.63	B	0.65	B	0.72	B
Afternoon	0.71	B	0.70	B	0.77	B

Notes:
1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results indicate that the addition of rail replacement buses would result in a deterioration in the level of service at the Punchbowl Road/The Boulevarde intersection during the morning and afternoon peak periods, from a level of service C to D.

The Punchbowl Road/South Terrace intersection is at capacity in the future scenario during the morning peak, and its performance is predicted to worsen during construction, with delays increasing to almost 1.5 minutes. However, the level of service (F) would remain the same. The addition of rail replacement buses is not expected to change the level of service of this intersection during the morning peak. During the afternoon peak, low congestion levels mean that the addition of rail replacement buses would result in minimal change to the level of service.

Changes to parking

It is estimated that about 30 dedicated commuter spaces would be unavailable during construction, as this area is required for the new station forecourt and entry on The Boulevarde. An additional 50 unrestricted on-street spaces on The Boulevarde would be unavailable during construction. During the operation of rail replacement buses, about six on-street parking spaces would also be affected by the required bus stops.

The predicted impacts to on-street parking would affect about seven per cent of the existing on-street parking within 400 metres of the station. About 22 per cent of the dedicated commuter parking spaces would be unavailable for the duration of construction. As shown in Table 10.28, there are about 600 unrestricted on-street parking spaces within 400 metres of the station. As the utilisation rate of on-street parking is 79 per cent, there would be some capacity to absorb the loss of spaces during construction. Alternatively, customers would need to use buses or other modes of transport, or walk further than 400 metres to access parking. Opportunities would also be investigated to provide replacement commuter parking spaces for the spaces that would be permanently lost. It is recognised that alternative parking may be located further from the customer's preferred destination.

Bankstown Station

Active transport network

During construction of the station and associated facilities, works would generally be contained within the rail corridor, and would not impact on adjacent footpaths. Works in the vicinity of the station would be staged to ensure that pedestrian and cycle access is provided at all times.

Some changes to pedestrian and cycle networks would be required during works to the Stacey Street overbridge and the North Terrace to South Terrace underbridge (refer to Table 10.36). During the southbound partial closure of the Stacey Street overbridge, re-routing of pedestrians would be required.

A full closure of the North Terrace to South Terrace underbridge would also be required, and pedestrian movements would need to be diverted about 300 metres to the Stacey Street overbridge or the Chapel Street bridge (at the existing Bankstown Station entrance) for about four weeks.

Impacts to cyclists would be minimal, and where possible, existing bike parking facilities at the station would remain available for use while the new facilities are constructed. In situations where construction activities are likely to impact on existing bike facilities, alternate bike parking arrangements would be provided early in the construction program.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

Public transport services

The existing bus layover located adjacent to South Terrace, between Restwell Street and Lopez Lane, would be reconfigured. Initially, construction vehicles would use the layover area to access the adjacent compound. The use of this area is not expected to affect the functionality of the layover.

Rail replacement buses would share the existing bus stops on North Terrace, South Terrace, and Appian Way, which may impact the space available for the existing services at certain times during possession periods.

Road network performance

Table 10.49 provides an indication of the performance of the road network surrounding Bankstown Station during construction.

Table 10.49 Bankstown Station intersection performance

Peak period	Future (without construction)		Future (with construction)		Future with construction and TTMP[1]	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
South Terrace/Restwell Street (signals)						
Morning	0.64	B	0.65	B	0.79	C
Afternoon	0.61	B	0.62	B	0.79	C
Restwell Street/Raymond Street (signals)						
Morning	0.83	B	0.83	B	0.86	B
Afternoon	0.82	B	0.85	B	0.86	C
South Terrace/West Terrace (signals)						
Morning	0.63	C	0.64	C	0.67	B
Afternoon	0.69	C	0.70	C	0.74	C
Meredith Street/Marion Street (signals)						
Morning	0.90	C	0.90	C	0.91	C
Afternoon	0.92	C	0.92	C	0.92	C
Stacey Street/Wattle Street (roundabout)						
Morning	0.89	B	0.89	B	0.89	B
Afternoon	1.10	C	1.10	C	1.10	C
North Terrace/Wattle Street (roundabout)						
Morning	0.77	B	0.77	B	0.95	B
Afternoon	0.99	F	0.99	F	0.99	F
Stanley Street/Stacey Street (signals)						
Morning	0.95	B	0.95	B	0.95	B
Afternoon	1.10	B	1.24	B	1.24	B
The Appian Way/North Terrace (priority controlled)						
Morning	0.68	B	0.68	B	0.76	C
Afternoon	1.07	F	1.07	F	1.25	F
Marion Street/Oxford Avenue (signals)						
Morning	0.75	B	0.75	B	0.75	B
Afternoon	0.90	B	0.90	B	0.90	B
Marion Street/Greenwood Avenue (signals)						
Morning	0.89	C	0.89	C	0.89	C
Afternoon	0.90	C	0.90	C	0.91	C

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.
4. The assessment was based on the assumption that bridges remain open and no route diversions are in place. The potential impacts of bridge works and route diversions are considered in Section 10.4.4.

The modelling results predict a deterioration in intersection performance at the following intersections:

- South Terrace/Restwell Street, during the morning and afternoon peak periods
- Restwell Street/Raymond Street, during the afternoon peak period
- Appian Way/North Terrace, during the morning peak period.

The North Terrace/Wattle Street and the Appian Way/North Terrace intersections would have a level of service F in the future scenario during the afternoon peak period.

During the morning and afternoon peak periods, the South Terrace/Restwell Street intersection would experience a deterioration in performance as a result of the addition of rail replacement buses, from a level of service B to C.

The Restwell/Raymond Street intersection would also experience a reduction in the level of service from B to C during the afternoon peak period. The addition of rail replacement buses would result in a deterioration in the level of service of the Appian Way/North Terrace intersection during the morning peak period, from B to C.

Parking

About 90 dedicated commuter spaces would be unavailable during construction as a result of the proposed location of a construction compound adjacent to North Terrace. During the operation of rail replacement buses, about 18 on-street parking spaces would be temporarily affected by the required bus stops.

The predicted impacts to parking would affect about 61 per cent of the dedicated commuter parking spaces (or about eight per cent of off-street parking spaces), and three per cent of the on-street parking (during possessions only) in the vicinity of the station. As shown in Table 10.31, there is a high demand for parking in the vicinity of the station, with a utilisation rate of 93 per cent for on-street spaces, and 100 per cent for off-street/commuter parking. About 1,500 passengers enter Bankstown Station in the hour from 7:15 to 8:15. This shows that the 147 commuter parking spaces within 400 metres of the station are only providing for a small proportion of the total commuter demand.

There is limited ability for existing on and off-street parking within a 400 metre catchment of the station to absorb construction parking changes, as a result of the high levels of use. During construction, customers would need to use buses or other modes of transport, or walk further than 400 metres to park and ride.

Other stations

The following stations would not be directly impacted by construction, other than as a result of any enabling activities required to implement alternative transport arrangements in accordance with the Temporary Transport Strategy. During possession periods, rail services along the T3 Bankstown Line would be suspended, which would impact rail services at these stations.

The performance of key intersections in the vicinity of these stations was modelled taking into account the operation of rail replacement buses. Potential impacts are summarised below.

Sydenham Station

The results of modelling show that the impact of rail replacement buses would be minimal, with all intersections continuing to operate at a level of service C or better.

During possession periods, about 19 on-street parking spaces on Burrows Avenue and Railway Parade would be affected by the provision of a set down area for rail replacement buses.

Yagoona Station

The results of modelling show that with rail replacement buses operating, the Chapel Road/Hume Highway intersection would retain a level of service C during both the morning and afternoon peaks. The Church Road/Hume Highway has an existing level of service F during the morning and afternoon peaks. The modelled average delay was predicted to increase from the existing 10 minutes to nearly 13 minutes with the addition of rail replacement buses, and 16 minutes under the future scenario. It was also predicted that delays during the afternoon peak would increase from the existing five minutes to nearly 16 minutes.

The impacts of the introduction of rail replacement buses would be monitored, and mitigation strategies would developed if required. In addition, alternative routes for some or all rail replacement buses would be investigated, taking into account the results of modelling.

No impacts to parking spaces are predicted.

Birrong Station

The results of modelling show that with rail replacement buses operating, the level of service would decline to D during the morning peak. However, a level of service D would not cause delays above those that would be reasonably expected in the peak hour. In the afternoon peak, the level of service would decline to C with the addition of rail replacement buses.

During possession periods, about six on-street short-term parking spaces would be affected by the provision of bus stops for rail replacement buses.

Regents Park Station

The results of modelling show that with rail replacement buses operating, key intersections around Regents Park Station would have a level of service of B or better after accounting for a minor predicted increase in delays resulting from future traffic growth. A level of service B would not cause noticeable delays for commuters in the peak hour. In the afternoon peak, the intersections around Regents Park Station are predicted to remain at a level of service A.

No impacts to parking spaces are predicted.

Sefton Station

About eight on-street parking spaces would be impacted as a result of the operation of ail replacement buses.

Berala Station

No impacts are predicted at Berala Station.

Lidcombe Station

The results of modelling show that with rail replacement buses operating, all four intersections near Lidcombe Station would have a level of service D or better after allowing for future traffic growth. The Olympic Drive/Church Street intersection is the only intersection that is forecast to experience a noticeable decline in service, however this is mostly attributable to future traffic growth. The operation of rail replacement buses would increase the delay by about eight seconds. This is considered to be within the range of reasonable daily fluctuations and is unlikely to be noticed by commuters.

In the afternoon peak, it is predicted that three of the four intersections would have a level of service B or better. The Olympic Drive/Church Street intersection is forecast to experience some deterioration as a result of the addition of rail replacement buses in the afternoon peak, with the predicted level of service D in the future traffic scenario worsening to a level of service E. However, as the majority of the possession periods are scheduled to occur in school holidays, congestion would be expected to be less than that modelled.

During possession periods, about 20 on-street time restricted parking spaces would be affected by the provision of bus stops for rail replacement buses.

Impacts of traction power supply route

Construction of the proposed traction power supply cable between Campsie Station and the Canterbury Substation would affect a number of streets along the route. Construction would involve trenching activities within the road reserves, which has the potential to result in temporary impacts

on the operation of those roads. Potential impacts would be related to impacts on the trafficable lanes, parking lanes, or footpaths along roads.

Where practicable, construction of the cable would be managed to ensure that two-way traffic along impacted roads would be maintained. However, temporary lane or road closures could be required. The community would be made aware of any changes to access along these roads, and appropriate traffic management measures would be put in place where changes in traffic movements are required.

The proposed cable would need to cross Canterbury Road, which is a main road with high traffic volumes. Impacts on the road would be minimised by undertaking the works out of hours. The use of horizontal directional drilling techniques would also be considered to minimise potential impacts.

Construction of the cable would have the potential to affect property access. Any impacts would be short-term as the works would move along the alignment. The time during which access could be affected would be minimised to the shortest period possible. Alternative arrangements would be made in consultation with property owners/occupants. This could include, for example, the use of road plates to cross the construction trench. Consultation with adjacent property owners would be undertaken to discuss access arrangements and the measures required to minimise impacts.

Potential impacts would be managed by the installation of temporary traffic management measures, defined by the construction traffic management plan (refer to Section 10.5).

10.4.4 Bridge works

Bridge works would have the potential to impact the local road network where partial or full closures are required. In most cases, this would be managed by staging works to bridges close to one another so that works to adjacent bridges are not undertaken together (and therefore managing any cumulative impacts). Additionally, bridge works requiring full closure would be undertaken during off peak periods wherever practicable. The timing of works would be confirmed during detailed design and construction planning. The construction contractor would also review the proposed staging of bridge closures, and the need for full or partial closures, with the objective of minimising disruptions to the road network.

It is predicted that works to the following bridges would have the potential to impact the performance of surrounding roads:

- Charlotte Avenue underbridge, Marrickville, with traffic diverted to the Illawarra Road overbridge
- Illawarra Road overbridge, Marrickville, with traffic diverted to the Charlotte Avenue underbridge or the Livingstone Road overbridge
- Burwood Road overbridge, Belmore, with traffic diverted to the Moreton Street overbridge
- Haldon Road overbridge, Lakemba, with traffic diverted to the Moreton Street overbridge
- King Georges Road overbridge (lane closures only), Wiley Park, no diversion
- Stacey Street overbridge (lane closures only), Bankstown, no diversion.

Table 10.50 shows the results of modelling for intersections predicted to experience a level of service F with the addition of construction traffic. Key potential impacts are discussed following the table. In reality, it is expected that drivers would use a range of routes, which would spread the area of influence to a greater number of intersections, resulting in a reduced impact to the modelled intersections compared to the predicted impacts.

As noted in Section 10.3.3, the timing of works, duration of closures, and the diversions required are indicative, based on the current stage of the design. Final changes required would be determined during detailed design and construction planning. With respect to the Illawarra Road

overbridge, potentially longer closures (up to one month) are being investigated as a result of ongoing consultation with key stakeholders. Any proposals for longer closures would be confirmed at a later date, and would be subject to additional impact assessment if required.

Table 10.50 Level of service F intersection performance as a result of bridge works

Peak period	Future (without construction)		Future (with construction traffic on diversion routes)	
	DoS[1]	LoS[2]	DoS[1]	LoS[2]
Charlotte Avenue underbridge – Illawarra Road/Warren Road				
Morning - northbound closure	0.81	B	1.30	F
Afternoon – southbound closure	0.89	B	3.24	F
Charlotte Avenue underbridge – Marrickville Road/Illawarra Road				
Morning – northbound closure	0.83	B	1.29	F
Afternoon – southbound closure	0.73	B	1.43	F
Charlotte Avenue underbridge – Warren Road/Carrington Road				
Afternoon – southbound closure	0.75	C	0.93	F
Charlotte Avenue underbridge – Carrington Road/Warren Road				
Morning – southbound closure	0.75	C	1.10	F
Afternoon – southbound closure	0.75	C	1.33	F
Charlotte Avenue underbridge – Marrickville Road/Victoria Road				
Afternoon - southbound closure	1.07	E	1.74	F
Charlotte Avenue underbridge – Marrickville Station Overbridge				
Afternoon – southbound closure	0.54	A	1.05	F
Illawarra Road Overbridge - Marrickville Road/Victoria Road				
Morning – northbound closure	1.03	D	1.30	F
Afternoon – northbound closure	1.07	E	1.14	F
Morning – southbound closure	1.03	D	3.50	F
Afternoon – southbound closure	1.07	E	1.88	F
Illawarra Road Overbridge - Carrington Road/Warren Road				
Afternoon – southbound closure	0.65	C	1.44	F
Burwood Road Overbridge - Lakemba Street/Moreton Street				
Morning	0.83	B	1.81	F
Afternoon	0.88	B	2.23	F
Burwood Road Overbridge - The Boulevarde/Moreton Street				
Morning	0.75	B	1.40	F
Afternoon	0.87	C	1.86	F
Haldon Street Overbridge - Lakemba Street/Moreton Street				
Morning	0.83	B	1.19	F
Afternoon	0.88	B	1.38	F
Haldon Street Overbridge - The Boulevarde/Moreton Street				
Morning	0.75	B	1.20	F

Peak period	Future (without construction)		Future (with construction traffic on diversion routes)	
	DoS[1]	LoS[2]	DoS[1]	LoS[2]
Afternoon	0.87	C	1.84	F
King Georges Road Overbridge - King Georges Road/Lakemba Street				
Afternoon	0.98	D	1.11	F
Stacey Street Overbridge - Stacey Street/Wattle Street				
Morning	0.89	B	1.14	F
Afternoon	1.10	C	1.34	F

Notes: 1. DoS - degree of saturation.
2. LoS - level of service.
3. The assessment considered an indicated closure configuration for each bridge as outlined in Table 10.36. As the assessment was conducted during a typical weekday peak period, it did not include consideration of rail replacement buses.

Charlotte Avenue underbridge

For the northbound closure during the morning peak, it is predicted that the level of service of the Illawarra Road/Warren Road intersection would deteriorate from B to an F while the diversion is in place. The right turning movement from the Warren Road south approach is the worst performing movement, with congestion and delays increasing to over five minutes. However, drivers are unlikely to wait five minutes to turn right and would either re-route using parallel routes, or turn right during less than satisfactory gaps in traffic.

The Marrickville Road/Illawarra Road intersection would also experience a reduction in the level of service from B to an F while the diversion is in place. The movements from the Marrickville Road west approach are the worst performing movements, with delays of over five minutes. It is likely that drivers queuing to turn left at the intersection would use alternative local roads such as Despointes Street to avoid waiting at the intersection.

For the northbound closure during the afternoon peak, it is predicted that the level of service of the intersection of Warren Road/Carrington Road would reduce from C to F, with a delay of 1.5 minutes. Additional traffic added to Warren Road would increase traffic volumes on the minor road. In reality, much of this traffic would divert to a number of parallel roads, relieving some of the demand on the Warren Road/Carrington Road intersection.

During the southbound closures, the Carrington Road/Warren Road intersection would experience a deterioration of performance during the morning peak, with a reduction in the level of service from C to F. Movements from the Warren Road west approach are the worst performing movements, with delays increasing to over two minutes. However, it is expected that much of the traffic would divert to parallel roads, relieving some of the demand on the Warren Road/Carrington Road intersection.

During the afternoon peak, five intersections would have a level of service F after allowing for the diverted traffic, demonstrating that southbound lane closures would have a much greater impact on the surrounding road network during the afternoon peak than the northbound closures. To minimise this potential impact, construction planning would need to (where practicable) maintain southbound traffic on the Charlotte Avenue underbridge during the afternoon peak, and divert the northbound traffic irrespective of which lane requires closure. The required diversions would be assessed in more detail during detailed design and construction planning, to minimise the predicted peak period delays where practicable.

Illawarra Road overbridge

During the morning peak period, the Marrickville Road/Victoria Road intersection is the only intersection predicted to have a level of service F, which would be a result of traffic diversions during southbound closures of the Illawarra Road overbridge. The through and right turning movements from the Victoria Road south approach are the worst performing movements, with modelled delays showing that demand would significantly exceed capacity resulting in significant delays. Given that the degree of saturation shows that the demand is significantly over capacity, undertaking works during holidays would not significantly reduce the predicted delays.

In the afternoon peak period, the Marrickville Road/Victoria Road intersection is predicted to experience a deterioration of the level of service to F, as a result of the southbound closures. The right turning movement from the Marrickville Road west approach onto Victoria Road is the worst performing movement, with a degree of saturation of 1.88. This indicates that the intersection would experience almost twice the level of demand compared to capacity.

The Carrington Road/Warren Road intersection would experience increased delays during the afternoon peak period. The level of service is determined by the worst movement, which has a modelled theoretical delay of over seven minutes. The overall intersection delay is nearly one minute, which implies that the main (through) movement is experiencing minimal delay.

For northbound closures, only the Marrickville Road/Victoria Road intersection would experience a decline in the level of service, from D to F during the morning peak period, and from E to F during the afternoon peak period. Movements from the Victoria Road south approach are the worst performing movements in the morning, with delays of over five minutes. The left turn movement from the Marrickville Road east approach is the worst performing movement in the afternoon peak period, with average delays of over three minutes. However, similar to the southbound diversion, it is expected that actual delays would be much lower than predicted, as a result of changes in driver behaviour or routes travelled.

The required diversions would be assessed in more detail during detailed design and construction planning, to minimise predicted peak period delays where practicable.

Burwood Road overbridge

During the morning peak period, the Lakemba Street/Moreton Street and The Boulevarde/Moreton Street intersections are predicted to experience a deterioration in performance as a result of the addition of diverted traffic, with both intersections experiencing a decline in the level of service from B to F.

At the Lakemba Street/Moreton Street intersection, the movements from the Lakemba Street east approach are the worst performing movements, with delays of over 12 minutes. At The Boulevarde/ Moreton Street intersection, the movements from the Moreton Street north approach are the worst performing movements, with delays of over six minutes. However, it is likely that drivers would choose a range of diversion routes, particularly the Loch Street Bridge, reducing demand and delays at these intersections.

During the afternoon peak, both intersections are predicted to experience a decline in performance as a result of the addition of diverted traffic, with the level of service deteriorating from B and C to F.

The movements from the Lakemba Street east approach at the Lakemba Street/Moreton Street intersection would have a delay of over 18 minutes, while the movements from The Boulevarde east approach at The Boulevarde/Moreton Street intersection would also deteriorate to an average delay of nearly 14 minutes. However, it is likely that drivers would choose a range of diversion routes, particularly the Loch Street Bridge.

The required diversions would be assessed in more detail during detailed design and construction planning, to minimise the predicted peak period delays where practicable.

Haldon Street overbridge

During the morning peak period, the Lakemba Street/Moreton Street and The Boulevarde/Moreton Street intersections are predicted to experience a decline in the level of service from B to F as a result of traffic diversions. The movements from the Lakemba Street west approach at the Lakemba Street/Moreton Street intersection are predicted to experience an average delay of over three minutes. The movements from The Boulevarde west approach at The Boulevarde/Moreton Street intersection are also predicted to experience an average delay of over three minutes. However, it is likely that some vehicles would divert to King Georges Road overbridge, which would reduce the delays at these intersections.

Movements from the Lakemba Street east approach at the Lakemba Street/Moreton Street intersection would have a level of service F and an average delay of six minutes. The movements from The Boulevarde west approach at The Boulevarde/Moreton Street intersection would also have a level of service F with an average delay of 13 minutes. However, it is likely that some vehicles would divert to the King Georges Road overbridge, which would reduce the delays on both of the impacted intersections.

The required diversions would be assessed in more detail during detailed design and construction planning, to minimise the predicted peak period delays where practicable.

King Georges Road overbridge

No intersections would experience a level of service F during the morning peak period. During the afternoon peak period, the King Georges Road/Lakemba Street intersection would experience a decline in the level of service from D to F as a result of the traffic diversions. However, it is likely that some vehicles would re-route to the Haldon Street or Punchbowl Road overbridges, reducing traffic through the intersection.

Stacey Street overbridge

During the morning peak period, the Stacey Street/Wattle Street intersection would experience a reduction in the level of service from B to F as a result of traffic diversions.

It is predicted that the Stacey Street/Wattle Street intersection would have a level of service F during the afternoon peak period. The right turn movement from the Stacey Street south approach is the worst performing movement, with delays increasing from about 1.5 minutes to nearly eight minutes. However, during both the morning and afternoon periods, it is expected that a number of vehicles would divert to adjacent bridges, reducing demand at the Stacey Street/Wattle Street intersection.

The required diversions would be assessed in more detail during detailed design and construction planning, to minimise the predicted peak period delays where practicable.

10.4.5 Implications of the alternative transport arrangements

Changes to rail network operations

During possession periods and any temporary station closures, an alternate train working timetable would be required, involving adjustments to the timing and stopping patterns of trains beyond the T3 Bankstown Line. Changes may be required at stations on the T2 Airport, Inner West & South Line, between Revesby and Sydenham stations, and between Homebush and Redfern stations.

In some cases, these changes may be beneficial, as the addition of temporary additional train services would increase the frequency of services at some stations. These changes may then

change the demand for train services at these stations. Initial planning suggests that extra trains may be required on the T2 Inner West & South Line, to serve passengers north and south of the T3 Bankstown Line.

Some of the changes to train services may result in changes to operations in the Sydney CBD, such as trains travelling in a different direction around the City Circle.

In addition, Erskineville and St Peters stations, which are currently serviced by the T3 Bankstown Line, could be serviced by either the T4 Illawarra Line or the T2 Airport Line via Sydenham Station.

As a result of existing infrastructure configurations, Sydney Trains services at Birrong and Yagoona stations would also need to be replaced by rail replacement bus services during certain possession periods. Buses would provide access to a nearby operating train station(s) such as Sefton or Regents Park. Train passengers could then continue their journey by train to Liverpool or Lidcombe. It is envisaged that during some of the later possession periods (for example from 2021 onwards), Sydney Trains services may be able to operate from Bankstown Station following completion of certain enabling works, which would allow rail services to be reinstated for Birrong and Yagoona stations during possession periods and closedowns.

Transport for NSW is working to determine the most effective ways to take advantage of the capacity released by the T3 Bankstown Line during construction to manage demand, journey times, and service expectations. Further work is being undertaken with respect to the following:

- changes in travel times to Central Station from all rail stations at which timetable changes occur
- changes in demand for train demand from all stations
- impact of demand changes on train loading and crowding
- changes to the locations and number of passengers who need to transfer to other rail services.

Road network performance

Local roads

Potential impacts on road network performance at each station is considered in Section 10.4.3.

Regional roads

Preliminary modelling of the potential regional road network implications of alternative transport arrangements was undertaken. Based on the preliminary modelling results, it appears that bus services could be used to influence a reduction in traffic by operating services:

- For stations east of Canterbury Station:
  - In a north-east direction towards Ultimo and along Canterbury Road/New Canterbury Road (the A34) to Petersham Station, and along Marrickville Road to Marrickville and Sydenham stations
  - At moderate levels along New Canterbury Road, Illawarra Road, and Princes Highway (the A36) to Ultimo.
- For stations west of Canterbury Station:
  - Northbound to Lidcombe Station (via the A6 Stacey Street/Rookwood Road/Joseph Street/Olympic Drive) and towards Strathfield Station (via The Boulevarde)
  - At lower levels by diverting some southbound rail services to Beverly Hills, Riverwood, Padstow, and Revesby stations on the T2 Airport, Inner West & South Line, and bus services to the Great Western Highway/Parramatta Road (the A22).

The model results indicate that traffic would divert mainly to other nearby rail stations. This demand would need to be managed as existing kiss and ride and parking facility provision along with network capacity is limited.

The temporary transport management plans would be refined to establish a balanced spread of bus service destinations and facilities, to minimise the potential impacts on the road network and customer journeys.

Parking impacts

As described in Section 10.4.3, the implementation of alternative transport arrangements would result in temporary impacts to parking at the majority of stations along the T3 Bankstown Line, due to the need to locate bus stops and layover areas. However such impacts would be temporary and would occur during periods of lower parking demand. A reduction in demand could also result from a potential modal shift to cars as people drive to alternate stations or to their ultimate destination.

Other impacts

Subject to further investigation, the operation of rail replacement buses, and bus diversions during bridge works, may require minor road improvements (to be confirmed during detailed design), including:

- extended or new clearways (with some additional temporary parking losses) to ensure buses and other traffic are able to operate safely (such as in Warren Road, Marrickville)
- trimming of trees where buses are proposed to operate in the kerbside lanes and trees currently overhang the operating area
- traffic signal phase changes at some intersections
- right hand movements at some intersections that currently do not allow this movement.

Final changes required would be determined during detailed design and construction planning.

10.4.6 Road user safety

The introduction of additional heavy vehicles to the road network has the potential to result in changes to the road and active transport networks. This may result in safety impacts to pedestrians, cyclists, and other motorists. Key locations where pedestrian and cyclist safety issues may arise include:

- construction compounds and work site access and egress points, where construction vehicles would interface with pedestrians using surrounding footpaths – this would need to be managed, particularly near Campsie, Belmore, and Bankstown stations, where high volumes of pedestrian movements occur
- construction compounds, where access and egress points, and/or haulage routes would interface with marked cycle routes
- where pedestrian and cyclist diversions are required during bridge works.

Access and egress arrangements at construction compounds would be confirmed with consideration of pedestrian, cyclist, and motorist safety. For example, the need for construction vehicles to turn right to or from arterial roads to access construction sites would be avoided, wherever practicable.

Overall, assuming the implementation of traffic control measures and other mitigation and management protocols (e.g. changes to parking or lanes along routes), no particular areas of safety concern are predicted in terms of potential conflicts with heavy vehicles.

Activities at construction compounds and work sites would be arranged to ensure that emergency vehicle access is maintained. Construction compounds would also be made available for emergency vehicle passage if required. Ongoing consultation would be carried out with emergency service providers in relation to changed traffic conditions and the need to maintain station access at all times.

Appropriate controls would be established where vehicles are required to cross footpaths to access construction sites. This could include manual supervision, physical barriers, or temporary traffic signals. Safety audits would be carried out at each construction compound access and egress point.

10.4.7 Special event management

Roads and Maritime Services' special events management guidelines identify the following classes of special events:

- Class 1 – an event that impacts major traffic and transport systems and there is significant disruption to the non-event community.
- Class 2 – an event that impacts local traffic and transport systems and there is low scale disruption to the non-event community. For example, an event that blocks off the main town street or shopping centre but does not impact a principal transport route.
- Class 3 – an event with minimal impact on local roads and negligible impact on the non-event community.
- Class 4 – an event conducted entirely under Police control (but is not a protest or demonstration).

Examples of class 1 events that would occur during construction include New Year's Eve, Mardi Gras Parade and the City 2 Surf. An example of a class 2 event that would occur during construction include game days for the Canterbury Bulldogs at Belmore Oval.

To minimise potential impacts to event visitors, the general public, and the project, appropriate management measures would be developed and implemented in consultation with event organisers of Class 1 and 2 events, and (where relevant) the Sydney Coordination Office and Roads and Maritime Services. Management measures would include measures such as temporary adjustment to haul routes, working hours, or potentially stopping works for the duration of the event.

The construction contractor/s would be required to incorporate known special events into the construction program, and including detailed responses and contingencies in the construction traffic management plan.

10.4.8 Cumulative impacts

The potential for cumulative traffic impacts with the project were considered taking into account the predicted impacts of the Chatswood to Sydenham project and the two closest WestConnex projects (the New M5 and the M4-M5 Link). No cumulative impacts associated with the WestConnex projects were identified, as a result of the distance between the project and the WestConnex projects, and because no common haulage routes are proposed. As a result, the focus for the assessment was on the potential for cumulative impacts in the vicinity of Marrickville and Sydenham stations, as a result of the construction of the project at the same time as the Chatswood to Sydenham project.

A review of the haulage routes for both projects indicated that the haulage routes would not overlap, and no cumulative construction traffic impacts are predicted. Works at Sydenham Station would result in the routes of construction vehicles being shared with the operation of rail

replacement buses during possession periods. Modelling of key intersections in the vicinity of Sydenham Station was undertaken to assess the potential cumulative impacts. The results are summarised in Table 10.51.

Table 10.51 Cumulative intersection performance at Sydenham Station

Peak period	Future (without construction)		Refined TTMP[1]		Refined TTMP[1] with construction	
	DoS[2]	LoS[3]	DoS[2]	LoS[3]	DoS[2]	LoS[3]
Gleeson Avenue/Burrows Road (signals)						
Morning	0.67	B	0.76	B	0.90	B
Afternoon	0.66	C	0.77	C	0.77	C
Gleeson Avenue/Railway Parade (signals)						
Morning	0.54	A	0.58	A	0.75	A
Afternoon	0.50	A	0.54	A	0.55	A
Gleeson Avenue/Unwins Bridge Road (signals)						
Morning	0.92	C	0.92	C	0.97	C
Afternoon	0.79	C	0.79	C	0.79	C

Notes: 1. TTMP - temporary transport management plan.
2. DoS - degree of saturation.
3. LoS - level of service.

The results of modelling indicate that there would not be a reduction in the level of service at key intersections near the station. The Gleeson Avenue/Unwins Bridge Road intersection would experience increased delays, however these delays would be minor (about four seconds). As a result, there is considered to be negligible potential for cumulative impacts.

To minimise the potential for cumulative impacts between Sydney Metro projects, coordination would be undertaken through the Sydney Metro Traffic and Transport Liaison Group. Transport for NSW and the Sydney Metro Traffic and Transport Liaison Group would also coordinate with any other stakeholders to manage cumulative impacts resulting from the project and other non-metro projects.

10.5 Mitigation measures

10.5.1 Approach to mitigation and management

Potential traffic, transport and access impacts during construction would be managed in accordance with the Construction Environmental Management Framework (as described in Chapter 27 (Synthesis of the Environmental Impact Statement)), which provides for development and implementation of a traffic management plan, to include (as a minimum):

- traffic and transport mitigation measures, including those provided in the Construction Environmental Management Framework
- consultation with the relevant road authority, and/or transport operator
- overall traffic management resources, processes and procedures
- construction traffic control plans setting out the specific traffic and transport management arrangements to be implemented at specific locations during construction
- a traffic route management plan
- a parking management plan
- site specific traffic access and management plans
- event management requirements.

The management measures included in the traffic management plan would include those recommended for inclusion by Technical paper 1.

All construction activities would be undertaken in accordance with relevant Transport for NSW guidelines, and the additional guidelines and requirements of stakeholders including Roads and Maritime and local councils. The latter would include the need for road opening permits for classified roads, and for approval of specific traffic management and control plans.

As described in Section 9.11, temporary transport management plans would developed in accordance with the Temporary Transport Strategy.

10.5.2 List of mitigation measures

The mitigation measures that would be implemented to minimise potential construction traffic and transport impacts are listed in Table 10.52.

Table 10.52 Mitigation measures – construction traffic and transport

ID	Impact/issue	Mitigation measures	Relevant location(s)
Design/pre-construction			
TC1	Temporary transport arrangements	Guided by the Temporary Transport Strategy, detailed temporary transport management plan/s would be developed prior to construction to manage the movement of people along the T3 Bankstown Line during possession periods. The plans would be developed in consultation with key stakeholders (including the Sydney Coordination Office, Roads and Maritime Services, Sydney Trains, local councils, emergency services, and bus operators), and would address the requirements specified by the Temporary Transport Strategy. The development of each plan would consider, as a minimum: • a review of the road network constraints along any proposed rail replacement bus route • further traffic analysis of key intersections used by rail replacement buses • potential impacts to local road networks affected by rail passengers diverting to cars to reach their destinations • the design of temporary facilities at bus stop locations in consultation with the relevant road authority • expected changes to parking demand at other stations, displacement of existing parking, and any upgrades that may be required.	All
TC2		Transport for NSW would consult with Roads and Maritime Services, the State Transit Authority, and bus operators, to identify opportunities to minimise impacts to bus layovers and existing bus stops during operation of rail replacement buses.	All

ID	Impact/issue	Mitigation measures	Relevant location(s)
TC3	Impacts of bridge works	Detailed analysis of the network impacts of proposed bridge work would be undertaken, and management measures would be developed, in consultation with Roads and Maritime Services and the Sydney Coordination Office. Measures would include restricting work to some bridges during off peak and/or holiday periods, where practicable, including the following bridges as a minimum: • Charlotte Avenue underbridge • Illawarra Road overbridge • Burwood Road overbridge • Haldon Street overbridge • King Georges Road overbridge • Stacey Street overbridge.	Bridge works
TC4		The impacts on the surrounding road network of road diversions and lane closures resulting from bridge works across the rail corridor would be assessed in detail, to identify the suite of management measures to be implemented for each diversion/closure required. This would be undertaken in consultation with Roads and Maritime Services, the Sydney Coordination Office, the Inner West and Canterbury-Bankstown councils, emergency services, and relevant bus operators. Planning for partial or full bridge closures would consider bus rerouting and timetabling, with the intention of minimising impacts to bus customers and bus operators.	Bridge works
TC5	Pedestrian access	Work affecting the pedestrian underpass providing access to and from the Belmore Sports Ground would be timed, in consultation with the facility manager and owners, to ensure that suitable access is provided. This would include (if necessary) avoiding disruptions to access during events, such as game days at Belmore Oval. Local diversions would be put in place during periods of closure.	Belmore Station
TC6	Parking impacts during construction	Opportunities to reduce the loss of existing on and off street car parking (including the amount of spaces reduced and the time associated with this reduction) would be reviewed during detailed design and construction planning.	All
TC7		Where parking spaces are lost or access is impeded, particularly for extended periods, alternative parking would be provided wherever feasible and reasonable. This would include consideration of other privately owned (or vacant) land within close proximity to affected stations.	All
TC8	Impacts of intersection performance	Further consideration of the need for intersection modifications would be undertaken, to improve intersection performance at locations most affected by the addition of construction heavy vehicles, rail replacement buses, and diverted traffic. This would be undertaken in consultation with Roads and Maritime Services, the Sydney Coordination Office, and the relevant road authority. The improvements considered would include: • modification to the existing traffic signal phasing • lane priority changes • changing lane designations (line markings and signage)	All

ID	Impact/issue	Mitigation measures	Relevant location(s)
		• kerbside changes (such as removing on street parking or implementing no standing zones at peak times to increase lane capacity) • physical geometric changes (such as minor kerb cut-backs to enable large vehicles to safely move through intersections) • restricting turning movements where traffic demand is low.	
TC9	Changes to cyclist facilities during construction	Where existing cycle facilities (e.g. bike parking) would be temporarily unavailable at a station, suitable replacement facilities would be provided while the facility is unavailable.	All
Construction			
TC10	Management of traffic, transport and access	A construction traffic management plan would be prepared and implemented prior to construction. The plan would be prepared in accordance with the Construction Environmental Management Framework, and would detail, as a minimum: • how traffic would be managed when construction works are being carried out • the activities proposed and their impact on the road network and on road users • how these impacts would be addressed. The plan would be prepared in consultation with the Traffic and Transport Liaison Group, and would be approved by the relevant authority before construction commences.	All
TC11	Changes to public transport services and alternative transport arrangements	Modification of existing bus stops, or implementation of new stops and alterations to service patterns, would be carried out by Transport for NSW in consultation with the Sydney Coordination Office, Roads and Maritime Services, the Inner West and Canterbury-Bankstown councils, and bus operators.	All
TC12		Transport for NSW would undertake an extensive community awareness and information campaign before changes to public transport services are implemented. This would include a range of communication activities such as: • information at stations • wayfinding signage • clearly marked bus stop locations • letter box drops • web based information and transport 'app' where changes to travel are found in a single place • information via 131 500 • advertising in local papers • email information bulletins.	All
TC13	Impacts on intersection performance	Intersection operation would be optimised, where reasonable and feasible, to improve intersection performance at the worst affected intersections along construction haulage routes and/or rail replacement bus routes. This may include modifying signal phase times or sequences at traffic signal controlled intersections.	Affected intersections
TC14	Impacts on special events	Consideration of special events would be undertaken as part of construction work programming. For special events that require specific traffic and pedestrian management, measures would be developed and implemented in consultation with Roads and Maritime Services, the Inner West and Canterbury-Bankstown councils, and the organisers of the event.	All

ID	Impact/issue	Mitigation measures	Relevant location(s)
TC15	Impacts of construction compounds and work sites	Vehicle access to and from construction sites would be managed to ensure pedestrian, cyclist, and motorist safety. Depending on the location, this may require manual supervision, barrier placement, temporary traffic signals, modifications to existing traffic signals, or police assistance.	All
TC16	Construction vehicles	Construction vehicles (including contractor staff vehicles) would be managed to: • minimise parking or queuing on public roads • minimise use of residential streets to gain access to work sites or compounds • minimise vehicle movements near schools, particularly during school start and finish times.	All
TC17	Signage	Directional signage and line marking would be used to direct and guide drivers, pedestrians, and other road users past construction compounds and work sites, and on the surrounding road network. This may be supplemented by variable message signs to advise drivers of potential delays, traffic diversions, speed restrictions, or alternate routes.	All
TC18	Construction parking impacts	Construction sites would be managed to minimise construction worker parking on surrounding streets. A worker car parking strategy would be developed in consultation with the relevant local council to identify measures to reduce the impact on the availability of on street and off street parking. The strategy would identify potential mitigation measures including alternative parking locations. The strategy would encourage contractor staff to: • use public transport • car share • park in a designated off site area and access construction sites via shuttle bus.	All
TC19	Traffic incidents	In the event of a traffic related incident, co-ordination would be carried out with the Sydney Coordination Office and Transport Management Centre's Operations Manager.	All
TC20	Changes to road, pedestrian and cyclist networks	The community would be notified in advance of proposed road and pedestrian network changes through appropriate forms of community notification.	All
TC21	Impacts on pedestrian or cyclist paths	A condition survey would be undertaken to confirm changes to routes proposed to be used by pedestrians and/or cyclists are suitable (e.g. suitably paved and lit), with identified modification requirements discussed with the Inner West and/or Canterbury-Bankstown councils and implemented prior to use of the routes.	All
TC22	Pedestrian, cyclist and motorist safety	Pedestrian, cyclist, and motorist safety in the vicinity of the construction sites would be addressed during construction planning and development of the construction traffic management plan. Measures that may be implemented to assist in multi modal traffic management include: • speed awareness signs in conjunction with variable message signs near construction sites to provide alerts to drivers • a community engagement program to provide road safety education and awareness to road users about sharing the road safely with heavy vehicles	All

ID	Impact/issue	Mitigation measures	Relevant location(s)
		• heavy vehicle training for drivers to understand route constraints, safety issues, and limiting the use of compression braking • safety technology and equipment installed on heavy vehicles to enhance vehicle visibility, eliminate vehicles' blind spots, and monitor vehicle location, speeding compliance, and driver behaviour.	
TC23	Impacts to access	Access for residents, businesses, and community infrastructure would be maintained. Where disruption to access cannot be avoided, consultation would be undertaken with the owners and occupants of affected properties, to confirm their access requirements and to discuss alternatives.	All
TC24		Access to stations and surrounding properties for emergency vehicles would be provided at all times. Emergency service providers (i.e. police and ambulance) would be consulted throughout construction to ensure they are aware of changes to access, including lane, bridge or road closures, and changes to station or rail corridor access.	All
TC25	Co-ordination of cumulative traffic effects	The potential cumulative effects of construction traffic from multiple construction sites within the project (including bridge works) would be further considered during development of the construction traffic management plan. Where there is potential for cumulative impacts across the project, these issues would be addressed with the assistance of the Traffic and Transport Liaison Group.	All

10.5.3 Consideration of the interactions between mitigation measures

The implementation of alternative transport arrangements (including rail replacement buses) has the potential to result in noise and air quality impacts. These potential impacts would be experienced away from the project area, as some bus services would operate to other stations, potentially impacting sensitive receivers in the vicinity of these stations. These impacts would be minimised where practicable by the use of arterial roads.

The implementation of alternative transport arrangements also has the potential for an increase in public safety risks due to the increase in vehicles on the road network. Potential hazards and safety impacts are considered in Chapter 25 (Hazards, risks and safety).

10.5.4 Managing residual impacts

While the proposed mitigation measures would minimise the potential impacts identified, there is still the potential for additional delays and queuing that may inconvenience customers and other road users in some locations. These issues would be monitored, reported, and if required, actively addressed by the construction contractor by means of location and issue-specific measures.

Specifically, the temporary transport management plans would be time and event specific, and would be refined in consultation with the community and other stakeholders.

11. Operational traffic, transport and access

This chapter provides a summary of the results of the traffic, transport and access assessment as it relates to operational impacts. A full copy of the assessment report is provided as Technical paper 1 – Traffic, transport and access assessment. The Secretary's environmental assessment requirements relevant to operational traffic, transport and access, together with a reference to where the relevant results are summarised in this chapter and in the Environmental Impact Statement, is provided in Table 11.1.

Table 11.1 Secretary's environmental assessment requirements – operational traffic, transport and access

Ref	Secretary's environmental assessment requirements – operational traffic, transport and access	Where addressed
13. Transport and traffic		
13.2	The Proponent must assess the operational transport impacts of the project, including the wider transport interactions:	A summary of the results of the operation traffic, transport and access assessment is provided in this chapter. The full results are provided as Technical paper 1.
	• local and regional roads	Section 11.4.2
	• changes to commuter parking and loading zones	Section 11.4.2 (overview) Sections 11.4.4 to 11.4.13 (individual station discussion)
	• provision of kiss and ride facilities, cycling, public and freight transport	Section 11.4.2 (overview) Sections 11.4.4 to 11.4.13 (individual station discussion)
	The EIS must define a transport hierarchy and a framework for an active transport strategy	Sections 11.3.2 (definition of hierarchy) and 11.3.4 (framework for active transport corridor)
14. Place making and urban design - accessibility		
14.2	The Proponent must assess the accessibility elements of the project including:	This chapter provides an assessment of the potential impacts of the project in terms of accessibility. A description of how accessibility was incorporated into the design is provided in Chapter 7 (Design development and alternatives).
	(a) impacts on pedestrian access in and around stations and connecting streets, peak capacity of street at peak pedestrian times (including consideration of land use change)	Sections 11.4.4 to 11.4.13
	(b) enhancing the accessibility of each station and the general vicinity of walking and cycling catchments	Sections 7.3.8, 11.4.2 (overview) and 11.4.4 to 11.4.13 (individual station discussion)
	(c) the provision of infrastructure to support accessible paths of travel and interchange	Sections 7.3.8 and 11.4.4 to 11.4.13 (individual station discussion)
	(d) impacts on cyclists (including provision of and integration with active transport routes) and pedestrian access and safety	Sections 7.3.8 and 11.4.4 to 11.4.13

Ref	Secretary's environmental assessment requirements – operational traffic, transport and access	Where addressed
	(e) minimising barriers across the rail corridor and opportunities to integrate cycling and pedestrian elements with surrounding networks and in the project.	Sections 7.2.4 and 11.4.3

11.1 Assessment approach

11.1.1 Legislative and policy context to the assessment

The following principles have been used in the design and operation of the stations and interchanges for the project:

- The project would comply with the objectives of the Commonwealth *Disability Discrimination Act 1992* (DDA) *and Disability Standards for Accessible Public Transport 2002* (DSAPT) standards for travel paths between bus stops and stations. The DDA provides protection against discrimination in terms of disability, prohibiting discrimination in a number of areas, including access to premises used by the public.
- Using CPTED principles when designing any relocated bus stop.

11.1.2 Methodology

A summary of the approach to the operation traffic, transport and access impact assessment is provided in this section. Further information is provided in Technical paper 1.

The assessment of potential operational traffic, transport and access impacts involved:

- determining the role and function, associated demand, and transfer movements at and around existing stations (including associated transport interchanges)
- reviewing relevant design reports and plans, and discussions with the project team
- reviewing the proposed Sydney Metro station design principles that are applied to better facilitate transport integration
- reviewing patronage forecasts, including active travel, public transport, and private vehicle access to and from each station, and the proposed service operating conditions for Sydney Metro
- reviewing the concept design for each station, including how it facilitates the integration of Sydney Metro services with the surrounding transport network
- undertaking a qualitative and quantitative assessment of the potential impacts on traffic, transport, and access during operation, including impacts on active travel, public transport, and private vehicle access to and from stations
- identifying how implementation of the proposed stations would directly impact the surrounding environment and customer transfers between different transport access modes.

The Sydney Public Transport Planning Model for 2026 was specifically prepared and used to develop the patronage forecast following the introduction of Sydney Metro. This strategic transport model is able to forecast patronage, including (particularly relevant to this assessment) the multi-modal journey chains by customers who would use Sydney Metro.

11.2 Existing environment

The existing traffic, transport and access environment within the project area and its surrounds is described in Section 10.2.

11.3 Design approach

11.3.1 Baseline conditions

The baseline for the operational assessment includes other transport and urban renewal projects planned or under construction within and in the vicinity of the study area, including:

- Sydney Metro Northwest and the Sydney City & Southwest Chatswood to Sydenham project
- the Cooks River Cycleway/shared path and the proposed 'The Cooks River to Iron Cove GreenWay'
- cycle routes being developed by the Canterbury-Bankstown and Inner West councils, and routes identified in the *Sydney City Centre Access Strategy* (Transport for NSW, 2013a)
- 'More Trains and More Services' program initiatives on the Sydney Trains network
- initiatives under *Sydney's Bus Future* (Transport for NSW, 2013e)
- the WestConnex program of works, including M4 East, New M5, M4-M5 Link (not yet approved) and Sydney Gateway (not yet approved).

For the purposes of the assessment, the above projects have been considered where possible when considering future traffic and transport issues.

11.3.2 Transport hierarchy

As described in Chapter 7 (Design development and place making) the station access hierarchy (shown in Figure 11.1) was used as the basis for the design of station upgrades and associated facilities. As shown by the figure, while considering and catering for all modes, active transport and public transport modes have been given the highest priority in the design.

Source: Transport for NSW

Figure 11.1 Station access hierarchy

For each transport mode, the designs for the upgraded stations are based on this hierarchy, and the broad design principles are summarised below.

Active transport – walking and cycling

Active transport refers to the use of non-motorised travel, primarily walking and cycling. As the stations are all located within established urban areas, walking and cycling access would be provided mainly via existing and potential future route opportunities. Connections between the station entry/exits and footpaths would be provided, and cycle facilities (i.e. bike parking) would be improved where required.

Walking

The walking catchment for a rail station is generally up to 800 metres. Pedestrian facilities (connections) are designed to provide safe, direct, continuous, high quality, and clearly signposted paths to and between stations and other transport modes. Appropriate footpath widths and gradients would also be provided, wherever possible, outside station exits and around stations to improve links to other transport modes in the vicinity of the station, and provide safe and equitable pedestrian access. Vision and mobility impaired customers would be considered in the pavement designs.

Cycling

The cycling catchment for a rail station is generally up to 2.5 kilometres, or about 10 minutes travel time. Cycling facilities would be provided at stations, including secure and sheltered bike parking. Secure parking would enable customers to safely leave their bikes when catching a train.

The quantity and type of bike parking provided at stations would be based on the NSW Government's Bike and Ride Program initiative, identified in *Sydney's Cycling Future*.

Section 11.3.4 describes a framework for an active transport strategy for the project.

Public transport

A key focus of the design is providing safe and accessible connections to other public transport services. This would facilitate expansion of the customer base for Sydney Metro. To facilitate connections, clear and intuitive wayfinding would be provided. Connections to bus services at all stations and light rail at Dulwich Hill would be enhanced through improved footpaths, including provision of more accessible paths to bus stops and a number of the stations.

Taxi and kiss and ride facilities

Taxi bays with customer waiting areas and kiss and ride facilities would be provided at all stations.

Park and ride

This is the lowest priority access mode as a result of the prioritisation of other modes. Provision of new metro facilities may result in the loss of some existing dedicated (untimed) commuter parking spaces. However, the project aims to achieve no net loss of dedicated commuter parking between Marrickville and Bankstown. Where spaces at a station may be lost as a result of the proposed works, and are not able to be replaced, replacement spaces would be provided at another station.

11.3.3 Transport integration facilities at station

A description of the proposed station upgrade works is provided in Chapter 8 (Project description – operation). In most cases, they are driven by the requirement to make local connections to and from the stations seamless and efficient.

Upgraded stations and platforms would comply with the DDA and DSAPT. This includes:

- Stations, plazas, interchanges, walkways, fixtures and fittings, and retail areas would be designed to meet DDA requirements. Stations would be fully accessible, including the platform, concourse, platform-train interface and facilities.
- Interchanges would incorporate accessible facilities and accessible paths of travel between the station and other transport modes, wherever possible, and resting seats would be provided along pathways.

The proposed works generally include connections between transport modes and station entries, including weather protection. Planned improvements, including station entries, plazas and interchange facilities, would have regard to the station access hierarchy shown in Figure 11.1.

The spatial reach of the works and the extent of upgrades varies from station to station. The main changes proposed at each station are summarised in Table 11.2. The proposed layout of each station is shown in the figures provided in Chapter 8. Figure 11.4 to Figure 11.13 provide an overview of the positioning of transport facilities, such as bus stops, bike parking and kerbside facilities (including accessible parking, taxis and kiss and ride) at each of the stations and within the surrounding area.

The proposed park and ride facilities (i.e. where existing commuter parking requires reconfiguration) have also been subject to similar considerations, although at certain stations, local topography and positioning of existing infrastructure means that achieving DDA compliant access is not always possible.

Table 11.2 Existing and proposed station facilities

	Facility to be provided (number of existing facilities shown in brackets)				
Station	**Accessible parking**	**Bicycle**	**Taxi**	**Kiss and ride**	**Buses**
Marrickville	2 (1)	>40 (8)	2 (1)	5 (3)	Stops retained (one relocated). All but one stop would be within 100 m of entries, and all stops DDA accessible to station.
Dulwich Hill	2 (2)	>40 (10)	1 (0)	5 (3)	Stops retained. Stops are DDA accessible.
Hurlstone Park	3 (3)	>40 (12)	1 (0)	2 (0)	Stops retained. Stops are DDA accessible.
Canterbury	2 (2)	>40 (4)	2 (0)	4 (0)	Stops retained. Stops are partially DDA accessible.
Campsie	6 (6)	>50 (10)	6 (6)	6 (4)	Stops retained. Stops are partially DDA accessible.
Belmore	5 (4)	>40 (5)	1 (4)	4 (0)	Stops retained and relocated to suit new station area. Stops are DDA accessible.
Lakemba	7 (6)	>40 (8)	3 (3)	3 (1)[1]	Stops retained and relocated to suit new station area. Stops are DDA accessible.
Wiley Park	1 (1)	>40 (4)	1 (0)	5 (0)	Stops retained. Stops are DDA accessible.
Punchbowl	3 (3)	>40 (12)	3 (2)	8 (0)	Stops retained and relocated to suit new station area. Stops are DDA accessible.
Bankstown	3 (2)	>50 (32)	10 (10)	13 (4)	Stops retained. Stops are DDA accessible.

Note: 1. Not currently accessible.

11.3.4 Framework for an active transport strategy

By assigning the highest priority to active transport modes (i.e. walking and cycling), the project aims to promote active transport in the study area.

An active transport strategy would be developed by Transport for NSW. The purpose of the strategy would be to investigate measures that support the increase of the overall walking and cycling mode share of access to Sydney Metro.

The strategy would recommend initiatives to improve the mode share for walking and cycling connecting to/from each station. Recommendations would support existing cyclists as well as potential customers who may switch to cycling from other transport modes.

The outcomes of the strategy would be used to inform various aspects of the project, such as the temporary transport management plans, interchange access plans, the detailed design process, and the active transport corridor. Transport for NSW will work with the Department of Planning and Environment to support the development of an active transport corridor, including walking and cycling infrastructure. Transport for NSW will deliver sections of the active transport corridor around stations. This would facilitate walking and cycling connections to important destinations in the local area and region. The indicative location of the active transport corridor is shown in Figure 11.2. Further information on the active transport corridor is provided in Section 8.1.4.

Walking and cycling infrastructure at stations would be delivered as part of the proposed station upgrade works, and these links would form part of the active transport corridor.

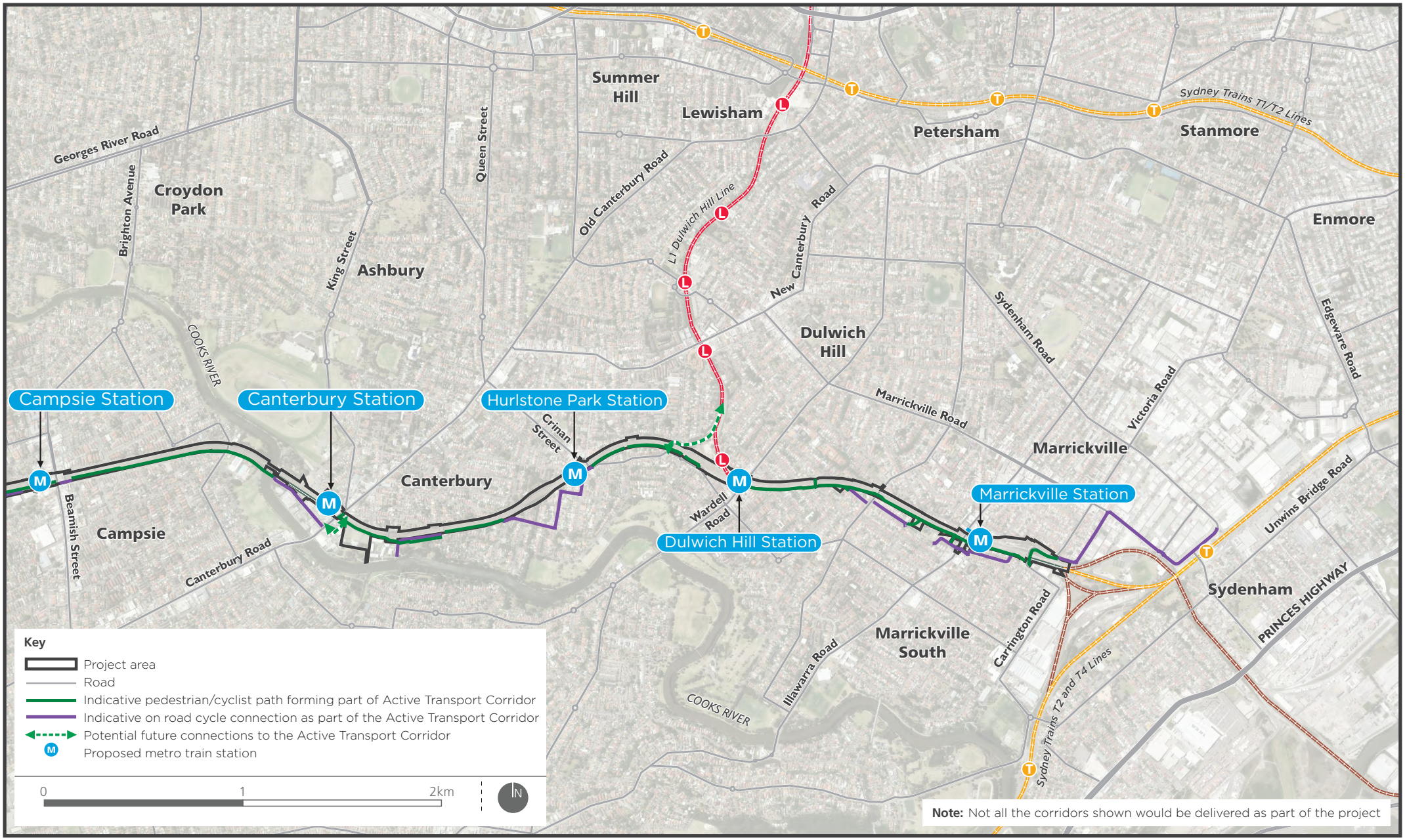
11.4 Impact assessment

11.4.1 Risk assessment

Potential risks

The environmental risk assessment for the project, undertaken for the State Significant Infrastructure Application Report, identified the following as the main traffic, transport and access risks during operation:

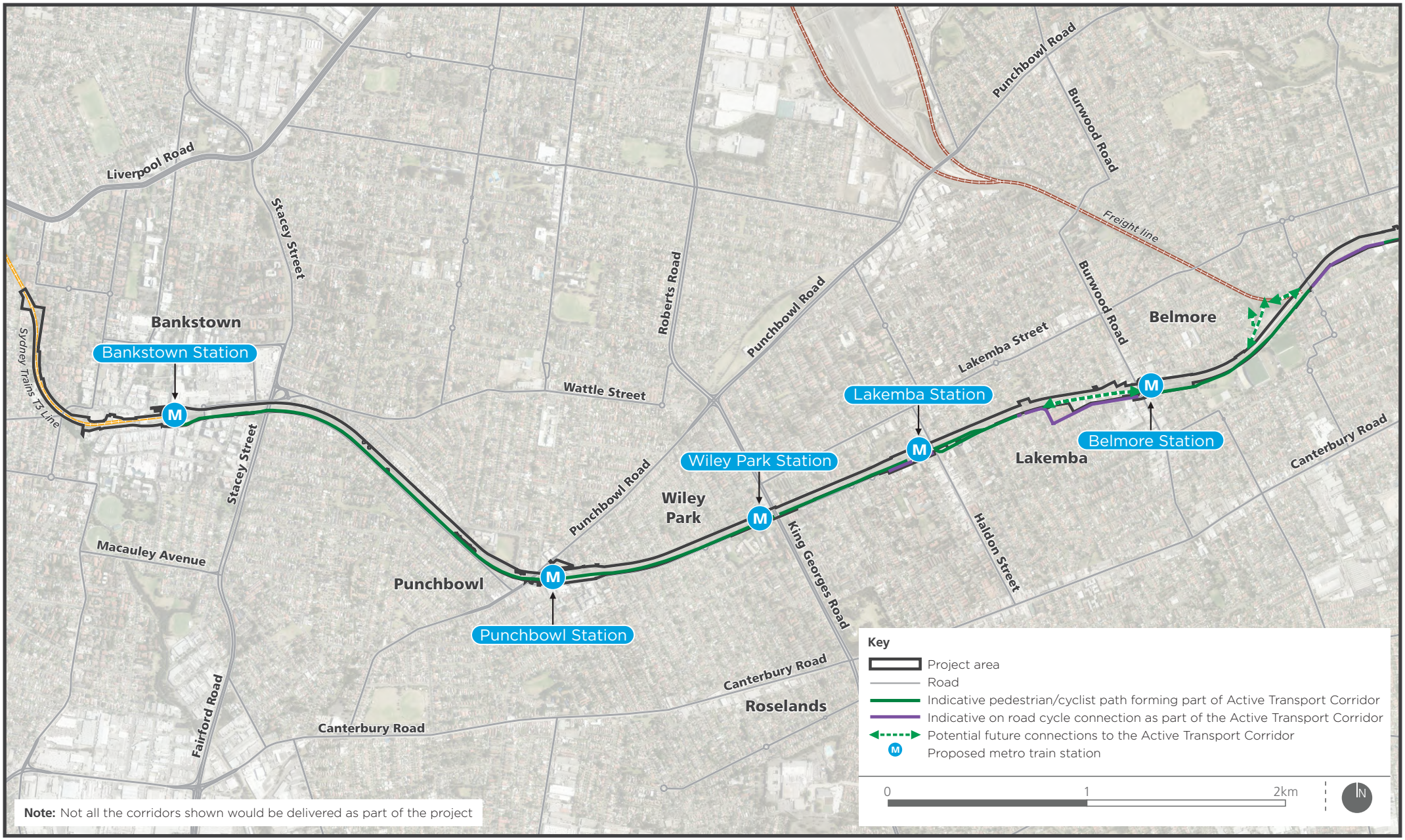
- altered (poorer) pedestrian and cyclist pathways of travel
- impacts to bus, taxi, and kiss and ride facilities at or around stations
- new interchange arrangements at Bankstown for customers moving between Sydney Trains and metro services
- changes to, and potential loss of, dedicated and informal commuter parking areas
- changes to, and potential changes to other off-street or kerbside parking areas or loading zones.



sydney METRO | city & southwest

Indicative location for an active transport corridor - map 1

FIGURE 11.2



sydney METRO | city & southwest

Indicative location for an active transport corridor - map 2

FIGURE 11.2

The report also noted that the project (as part of Sydney Metro) would have the following operational benefits:

- increased rail capacity through the CBD, which would help to relieve existing and potential future congestion issues
- support network reliability benefits across the wider rail network
- supports increased train frequency, particularly in the AM and PM peak periods
- provides customer amenity in the form of upgraded station buildings, station facilities, and connected precinct areas
- improves customer access improvements through enhanced active transport and transport interchange facilities
- supports travel options and health benefits through the provision for an active transport corridor.

How potential impacts have been avoided or minimised

The detailed design would aim to avoid or reduce impacts associated with operational traffic, transport and access. Potential traffic and transport impacts have been minimised, and benefits have been maximised, though the planning and design process, by ensuring that the number of facilities at each station is consistent with the future demand expected.

The results of the operational impact assessment with respect to the main transport modes and transport infrastructure is summarised in the following sections. This includes an assessment on a station by station basis.

11.4.2 Traffic and transport

Active transport

The project has been designed to promote active transport by incorporating the features described in Section 11.3 into the design of stations, and the areas directly surrounding the stations, where feasible. It has sought to improve walking and cycling networks in the vicinity of stations (i.e. pathways particularly connecting to existing walking and cycling networks) and to upgrade those facilities (e.g. bike parking) that would increase the attractiveness of active transport modes to access stations.

The attraction of living near metro stations is expected to promote opportunities for urban renewal, guided by existing strategic planning frameworks including the draft *Sydenham to Bankstown Urban Renewal Corridor Strategy* (Department of Planning and Environment, 2017) and the draft *South District Plan* and *Central District Plan* (Greater Sydney Commission, 2016). Increased housing densities close to many of the stations is expected to lead to an increase in walking and cycling demand, resulting in a shift to use of these modes. The proposed improvements to the pedestrian and cyclist networks would assist in achieving the shift to active transport modes as discussed below. Further information on the implications at each station is provided in Sections 11.4.4 to 11.4.13.

In addition, as described in Section 8.1.4, Transport for NSW will work with the Department of Planning and Environment to support the development of an active transport corridor, including walking and cycling infrastructure. Transport for NSW will deliver sections of the active transport corridor around stations. This would facilitate walking and cycling connections to important destinations in the local area and region.

Pedestrians

Improvements to pedestrian facilities and amenity in the vicinity of stations include the following:

- provision of new pedestrian paths to and around stations, including connections to an active transport corridor (refer to Section 8.1.4)
- creation of public spaces in the vicinity of station entrances (including forecourt areas or entrance plazas) to facilitate pedestrian flows and gathering
- improvements to make movement around stations easier for those who are less mobile, such as the provision of lifts and DDA compliant paths to and from the station entrances and to surrounding areas, including bus stops (discussed further below).

At some stations, some passengers may have to walk further as a result of the relocation of station entrances; while for other passengers, their walking distance may reduce depending on their origin or destination.

The proposed new station concourse at Dulwich Hill Station would reduce walking distances to the Dulwich Hill light rail stop for many residents, particularly those located on the southern side of the corridor. A more direct walking route would be provided to the light rail stop stairs and lift via the new concourse.

Changes to footpaths in the vicinity of stations would also improve the capacity of the pedestrian network, as described in Sections 11.4.4 to 11.4.13.

Cyclists

Designated cycle facilities, including secure access bike parking sheds and undercover bike racks, are proposed as part of the station upgrades. Bike parking has been designed to cater for existing demand and, where possible, to cater for potential future demand (even if only future proofing space for further facilities). Where possible, bike parking is proposed on both sides of the rail corridor. However, in some locations (such as Campsie Station) space constraints have resulted in the facilities being located on one side of the corridor only.

The provision of cycle facilities would improve cyclist access to and from stations, making cycling a more attractive travel mode. Providing bike parking facilities at stations would further increase the attractiveness of bikes as a transport mode to and from stations.

Pedestrian and cyclist safety

The project aims to provide pedestrians and cyclists accessing stations, or those moving around stations, a safe means to do so by:

- creating or enhancing areas to provide more space for pedestrian and cyclist circulation, including the removal of obstructions from high pedestrian areas
- improving platform capacity
- installing platform screen doors making platforms safer for pedestrians
- providing passive surveillance via station entrances and forecourts as views are opened to entrances from surrounding areas
- improving lighting at and in the vicinity of stations
- improving cycle facilities at stations.

The detailed design would continue to consider the safety of pedestrians and cyclists as a key focus.

Disabled access

The proposed station upgrades include a number of elements to ensure that stations comply with DDA and DSAPT, including:

- provision of lifts to those stations without them (such as Dulwich Hill, Hurlstone Park, Canterbury, Wiley Park and Punchbowl stations), to provide access to platforms
- provision of DDA compliant paths to and around the stations, particularly between stations and nearby bus stops.

Providing a design that fully complies with accessibility standards is challenging as the grade of the rail corridor means stations are located mostly in cuttings whereas typically entrances are from nearby road overbridges.

Where the existing terrain does not allow for DDA compliant grading of paths, the following features have been incorporated in the design:

- adjustment to surface levels to achieve full or partial compliance
- reviewing station and precinct arrangements to locate accessible facilities in areas with acceptable gradients.

Detailed design would continue to ensure that DDA compliance is met where possible and where this cannot be fully achieved, accessibility is improved from the existing situation.

Public transport

Operational benefits

As part of Sydney Metro City & Southwest, the project would offer a number of significant, strategic transport and access benefits, summarised below. Further information is provided in Chapter 5 (Project need).

- Supporting growth on the rail network – with the delivery of Sydney Metro City & Southwest (including the project), it is projected that the rail network would cater for an additional 100,000 customers per hour.
- Increased accessibility and trip diversity – improving the frequency of services, interchange with other transport modes, and connections to key destinations would increase accessibility (for example, to major employment, commercial, industrial, and residential areas) and trip diversity (for example, journey to work, education, local service, and work related trips).
- Reducing network complexity and improving reliability – the project would remove the T3 Bankstown Line from its existing requirement to merge/diverge with the T2 Airport, Inner West & South Line, converging into the constrained City Circle. This in turn would allow the City Circle to be dedicated to the T2 Airport, Inner West & South Line, reducing operational complexity and the risk of service unreliability.
- Increasing rail network capacity - removing T3 Bankstown Line services from the City Circle would enable the T2 Airport, Inner West & South Line to use the released capacity. This would improve service frequencies on the Sydney Trains network, reducing overcrowding of trains and stations and station dwell times.
- Improved service legibility – Sydney Metro would provide passengers with the ability to 'turn up and go' as opposed to pre-planning and co-ordinating with a specific train. This service model has led to greater rail patronage in other cities around the world. Removing T3 Bankstown Line services from the City Circle would also reduce the number of different service types/patterns operating through City Circle stations, improving service legibility and

reducing the risk of platform congestion due to passengers having to wait at these stations for a particular service in the afternoon peak.

- Travel time savings – T3 Bankstown Line customers would have access to more direct Sydney Metro services to key activity areas in the Global Economic Corridor. Travel time savings would be experienced by existing rail service passengers (who would directly benefit from shorter travel times), new metro passengers (who could transfer from road-based transport such as buses and cars to rail), and road users, who would potentially experience less congestion.

Table 11.3 provides an overview of the forecast daily travel volumes at each station between Marrickville and Bankstown, including existing volumes and those forecast for 2026 (two years after opening). As shown in the table, patronage at each station is expected to increase by at least 2,000 entries or exits per day (or a daily increase of at least 4,000 people for each station). This increase can be attributed to both improved public transport services and forecast growth.

Table 11.3 Existing and forecast station travel volumes[1]

	2016		2026[2]	
Station	**Entry**	**Exit**	**Entry**	**Exit**
Marrickville	4,594	4,356	6,900	6,900
Dulwich Hill	2,706	2,464	6,800	6,800
Hurlstone Park	1,532	1,312	4,700	4,700
Canterbury	2,426	2,164	7,100	7,100
Campsie	8,237	8,039	10,700	10,700
Belmore	3,025	2,847	6,500	6,500
Lakemba	4,302	4,130	7,400	7,400
Wiley Park	2,006	1,806	5,700	5,700
Punchbowl	2,935	2,806	6,500	6,500
Bankstown	8,993	9,350	11,900	11,900

Notes: 1. Data provided by Transport for NSW.
2. The entry/exit figures for 2026 are derived from modelled data using a method of mirroring the AM period in the PM. This results in symmetrical entry and exit forecasts but does not account for the altered journey chains undertaken by a minority of users. Numbers in table are volumes for metro services only.

Changes to station servicing arrangements

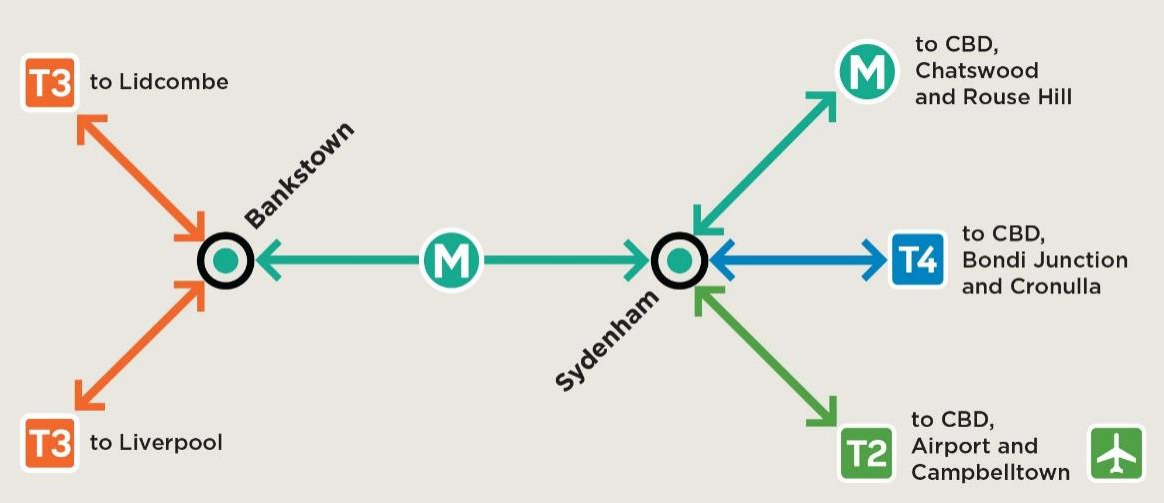
As described in Chapter 8 (Project description – operation), Sydney Metro trains would operate between Bankstown and Cudgegong Road stations, via the Sydney CBD and Chatswood. Between Sydenham and Chatswood, Sydney Metro trains would service the new Waterloo Station, Central Station (via new platforms), and the following five new stations to be constructed as part of the Chatswood to Sydenham project:

- Pitt Street Station
- Martin Place Station
- Barangaroo Station
- Victoria Cross Station (in North Sydney)
- Crows Nest Station.

The project would result in changes to service patterns for some stations along the T3 Bankstown Line and the City Circle. Proposed changes to servicing arrangements are shown in Figure 11.3 and summarised in Table 11.4 and Table 11.5.

As shown in the tables and figure, Sydney Metro customers would be able to change between Sydney Metro and Sydney Trains services at Sydenham, Bankstown, and Central stations.

West of Bankstown, the T3 Bankstown Line would continue to be operated by Sydney Trains between Liverpool, Lidcombe, and Bankstown. Sydney Trains would no longer operate on the T3 Bankstown Line between Sydenham and Bankstown stations.



Source: Transport for NSW

Figure 11.3 Metro integration with Sydney Trains services

Table 11.4 Station servicing arrangements

Existing station - origin	Service availability
Stations east of Sydenham: • St Peters, Erskineville and Redfern • Stations on the City Circle	St Peters, Erskineville and Redfern would continue to be serviced by Sydney Trains, operating on the T2 Airport Line or the T4 Illawarra Line. City Circle stations would continue to be served by T2 line services. Customers needing to access Sydney Metro services could change at Sydenham or Central stations.
Stations between Sydenham and Bankstown	Stations would be serviced by Sydney Metro. Customers needing to access Sydney Trains services could change at Bankstown, Sydenham, or Central stations.
Stations west of Bankstown: • Yagoona, Birrong, Regents Park, Berala • Sefton, Chester Hill, Leightonfield, Villawood, Carramar	Stations would continue to be serviced by Sydney Trains, via trains operating between Liverpool, Bankstown, and Lidcombe stations on the redesigned T3 Bankstown Line. Customers wishing to access Sydney Metro services would be able to change at Bankstown Station. Customers wishing to travel via Sydney Trains to other destinations could change at: • Lidcombe Station, for travel via the T1 Western Line or the T2 Inner West and South Line • Cabramatta Station, for travel via the T2 Inner West and South Line or the T5 Cumberland Line.
• Lidcombe	Lidcombe would continue to be serviced by Sydney Trains, operating on the existing T1 and T2 lines, and the redesigned T3 Bankstown Line. Customers wishing to access Sydney Metro services would be able to change at Bankstown Station.
• Cabramatta	Cabramatta would continue to be serviced by Sydney Trains, operating on the T2 Inner West and South Line, the T5 Cumberland Line, and the redesigned T3 Bankstown Line.

Existing station - origin	Service availability
	Customers wishing to access Sydney Metro services would be able to change at Bankstown Station.
• Warwick Farm and Liverpool	Stations would continue to be serviced by Sydney Trains, operating on the T2 Inner West and South Line and the T5 Cumberland Line. Customers wishing to access Sydney Metro services would need to change at Cabramatta to Sydney Trains services to Bankstown Station.

Table 11.5 Potential changes to travel patterns to key centres

	Servicing patterns on rail to key centres				
Origin	**Sydney CBD**	**Liverpool**	**Parramatta**	**Chatswood**	**Macquarie Park**
Stations east of Sydenham (St Peters, Erskineville and Redfern)	Travel directly via Sydney Trains services	Travel via Sydney Trains and Sydney Metro services by changing trains at Sydenham and Bankstown	Travel via Sydney Trains, changing trains at Redfern Station	Travel via Sydney Trains and then Sydney Metro, by changing at Central or Sydenham, or by Sydney Trains only, changing at Redfern	Travel via Sydney Trains and then Sydney Metro, by changing at Central, Sydenham or Chatswood
Stations between Sydenham and Bankstown	Travel directly via Sydney Metro	Travel via Sydney Metro and Sydney Trains services, by changing trains at Bankstown	Travel via Sydney Metro and Sydney Trains, by changing trains at Bankstown and Lidcombe, or at Sydenham and Redfern	Travel directly via Sydney Metro	Travel directly via Sydney Metro
Yagoona, Birrong, Regents Park, Berala, Sefton, Chester Hill, Leightonfield, Villawood, Carramar	Travel via Sydney Trains and Sydney Metro, changing trains at Bankstown, or by Sydney Trains only, changing at Lidcombe / Cabramatta	Travel via Sydney Trains	Travel via Sydney Trains, by changing trains at Lidcombe or Cabramatta	Travel via Sydney Trains and then Sydney Metro, by changing at Bankstown	Travel via Sydney Trains and then Sydney Metro, by changing at Bankstown
Cabramatta, Warwick Farm	Travel via by Sydney Trains only on the T2 line, or by Sydney Trains and Sydney Metro, changing trains at Bankstown	Travel directly via Sydney Trains on the T2 line	Travel directly via Sydney Trains on the T5 line	Travel via Sydney Trains and then Sydney Metro, by changing at Bankstown, or by Sydney Trains only, changing at Central	Travel via Sydney Trains and then Sydney Metro, by changing at Bankstown, or by Sydney Trains only, changing at Central

Bus network

The project would not involve major changes to existing bus service routes or stops. There are a number of stations where minor changes to service routes and/or stops are proposed, to provide improved accessible paths of travel between existing stops and station entries.

The project is being planned in conjunction with other transport initiatives (as discussed in Section 11.3) as a key component of an integrated public transport network, which includes the bus network. By providing passengers with improved ability to make mode changes (such as from bus to rail), the project would facilitate a significant increase to the passenger catchment of the rail line, with benefits to all transport modes. The project would provide benefits to bus customers by:

- optimising connections between bus and rail services where possible, by locating bus stops as close as practicable to station entries and providing DDA compliant connections, including provision of upgraded or relocated bus stops at some stations
- improving the interchange with bus services.

The proposed changes to bus routes and services at each station are considered in Sections 11.4.4 to 11.4.13.

Taxi and kiss and ride

Taxi and kiss and ride facilities would be provided at each station (refer to Table 11.2). The substantial increase in provision and repositioning of these facilities would improve existing conditions at most stations. The proposed new facilities would be generally closer to stations, more visible, and where feasible, accessible paths would be provided between the facilities and the stations, as discussed in Sections 11.4.4 to 11.4.13.

Road network

The demand for road travel is expected to increase into the future, including as a result of population growth and urban renewal initiatives outlined in the draft *Sydenham to Bankstown Urban Renewal Strategy*. The enhanced customer experience provided by metro, including travel time savings, is expected to result in growth in the use of rail services. This increased growth would potentially result in a reduction in the dependence on motor vehicles as the primary travel mode in the study area. Without an increase in modal share of rail services (and other public transport), the increases in population proposed along the corridor would give rise to greater congestion and delays on the road network. The introduction of metro would benefit local communities by providing a viable alternative to the car with benefits for the local road network

The proposed changes to the road network at each station are considered in Sections 11.4.4 to 11.4.13.

Parking and loading zones

The project has been designed to result in a 'no net loss' of dedicated commuter car parking spaces located adjacent to stations on NSW Government owned land. This commitment applies to parking that is not currently time restricted and is formally line marked and/or signposted as a dedicated commuter car parking zone or area. Additionally, the project design aims to deliver no reduction in the availability of loading zones. The project would provide about 80 additional dedicated commuter parking spaces at Campsie.The creation of new station forecourts and active transport facilities aimed at improving station access by walking and cycling would impact some of the on and off-street parking areas adjacent to stations. These impacts would be mainly as a result of the provision of accessible parking, kiss and ride, and taxi facilities. In total, these proposed changes would result in the loss of about 26 on-street parking spaces along the project area. The majority of these spaces would only be removed from areas directly adjacent to the existing

stations/rail corridor, and would generally not involve removal of spaces directly outside businesses.

A loss of about 58 off-street parking areas that are not dedicated commuter parking spaces would occur at Belmore and Bankstown stations. These areas are currently timed and used for short periods. Off-street parking located within 400 metres of the stations has limited capacity to compensate for the loss of these 58 spaces, however available on-street capacity in the vicinity of the stations would assist in minimising the impacts of the loss of these spaces.

Table 11.6 summarises the expected changes to parking impacts at stations. Overall, the loss of these spaces is considered to be minor in a traffic and transport context due to the availability of alternate parking. It is also noted that the project will achieve no net loss of dedicated commuter spaces on NSW Government owned land which is aimed at facilitating access for existing users with a focus on customers with accessibility needs.

Table 11.6 Indicative parking changes at stations

	Changes to parking		
Station	**Dedicated commuter parking**	**On-street parking spaces[1, 2]**	**Other off-street parking spaces[1]**
Marrickville	0	-1	0
Dulwich Hill	0	-5	0
Hurlstone Park	0	0	0
Canterbury	0	0	0
Campsie	80	-20	0
Belmore	0	0	-48
Lakemba	0	0	0
Wiley Park	0	0	0
Punchbowl	0	0	0
Bankstown	0	0	-10
Totals	**80**	**-26**	**-58**

Notes: 1. Spaces within 400 metres of the station.
2. Does not include potentially impacts spaces due to reconfiguration of kerbside facilities.

In addition to the loss of parking outlined in Table 11.6, further parking loss would potentially occur due to the reconfiguration of kerbside areas to include kiss and ride, taxi or accessible parking facilities in the vicinity of stations. The loss of parking at each station has been estimated based on the existing design and in most instances would be small, however the exact number would be confirmed during detailed design. The sections below provide an overview of the number of spaces which would potentially be lost.

Transport for NSW would work with local councils to minimise adverse impacts from adjustments to parking and other kerbside uses in local streets. This would include for example, relocation of spaces to other kerbside areas or the consideration of kiss and ride facilities that are only available during specified periods of the day such as the peak periods. In this situation, spaces would potentially be available at other times for short-term parking (e.g. outside of the peak periods). Such an arrangement would minimise the loss of spaces for the majority of the day, but would ensure that kiss and ride facilities are provided during periods when they are most likely to be needed.

Further discussion on parking and impacts on loading zones at each station is provided in Sections 11.4.4 and 11.4.13.

Freight transport

The rail corridor between Marrickville and west of Campsie is shared with freight services operated by ARTC travelling between Port Botany and the Enfield Intermodal Terminal north of Campsie. The operation of these services would not be impacted. Some existing track connections between the existing T3 Bankstown Line and the freight line would be removed where no longer required.

Maintenance access during operation by ARTC is not anticipated to change from the existing arrangement. Should any potential changes be proposed during detailed design, this would be discussed with relevant stakeholders.

11.4.3 Transport integration strategy

To enhance access within station area, the project design has been guided by the transport access hierarchy described in Section 11.3.2. The project would:

- support projected growth in travel through appropriate planned infrastructure and service provision, which is designed to integrate with urban renewal, corridor revitalisation, and sustainable travel initiatives
- enhance the accessibility of each station and areas in their general vicinity, with regard to walking and cycling, by incorporating the features summarised in Section 11.3.3
- include infrastructure to support accessible paths of travel and interchange between transport modes, as described in Section 11.3
- maintain all existing road bridges (including underbridges) that cross the rail corridor to maintain access
- provide additional access points across the rail corridor at Dulwich Hill, Canterbury, Belmore, Punchbowl, and Bankstown stations through the provision of new cross corridor connections.

The following sections outline the changes in facilities and infrastructure proposed by the project. Reference should be made to the existing environment described in Section 10.2 for comparison with the changes proposed.

11.4.4 Marrickville Station

Figure 11.4 shows the proposed interchange arrangement in the vicinity of the upgraded station.

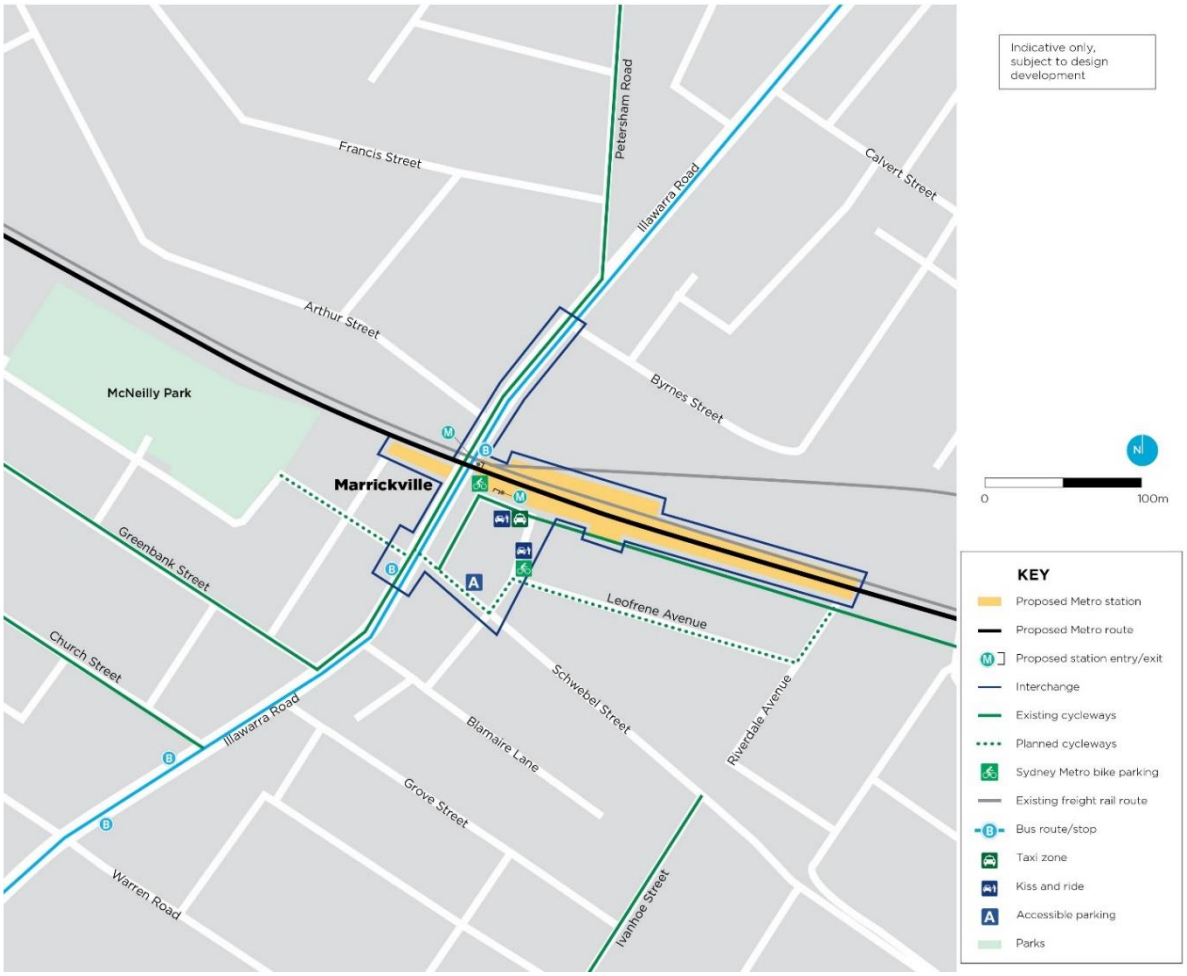


Figure 11.4 Marrickville Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 13,800 daily customer movements (i.e. an entry or exit) at Marrickville Station, with the modal split generally as follows:

- walking – 83 per cent
- cycling – 0.3 per cent
- bus – 3.5 per cent
- kiss and ride – 9.5 per cent
- park and ride – 3.7 per cent.

Pedestrian integration

It is predicted that the number of pedestrian entries and exits at the station would increase by about 3,800 per day by 2026.

Footpaths in the vicinity of the station are considered to have adequate capacity to accommodate this predicted growth. The southbound bus stop on Illawarra Road may constrain flows as people wait for a bus. However, the footpath on Illawarra Road has low pedestrian flows and adequate capacity for pedestrian movements and waiting at the bus stop.

The project includes provision of a new shared zone at Station Street, which would provide safer access to the adjacent station entrance. A new accessible ramp from the station entrance to Schwebel Street would provide a DDA compliant access route, as Station Street would remain partly non-compliant due to the gradient along this street.

The project would involve removal of the existing crossing located outside the station entrance on Illawarra Road. New crossing locations are proposed at the following locations:

- new signalised intersection at the Illawarra Road/Schwebel Street/Warburton Street intersection, including crossings of all roads
- new pedestrian crossing on Illawarra Road at Arthur Street.

The new signalised intersection would improve access to the existing northbound bus stop located south of Warburton Street, and businesses along this section of Illawarra Road.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at Marrickville Station, with new facilities proposed along the eastern section of the Station Street shared zone. This new bike parking would complement the existing parking facility located below the existing stairs adjacent to Station Street. The provision of additional bike parking would meet the predicted demand for spaces at Marrickville Station. Space for the future provision of additional facilities has been provided in the design should demand increase over time.

Bike parking would be provided as close to the station as possible, to allow for short connections into surrounding cycle paths and routes, including the active transport corridor.

Public transport integration

The project would not result in changes to the existing bus routes along Illawarra Road. The existing bus stops would be retained.

Road network integration

The road network in the vicinity of Marrickville Station would generally operate as it currently does. Improvements to the Station Street entrance, including provision of kerbside facilities (taxi and kiss and ride) is expected to increase vehicle movements along Schwebel Street. The project includes the upgrade of the Illawarra Road/Schwebel Street/Warburton Street intersection to a signalised intersection, which would assist with the management of traffic movements.

Kerbside facility integration

The kiss and ride facilities on Station Street would be relocated within the new Station Street shared zone. The project would result in an increase in the number of kiss and ride spaces provided. These spaces would all be fully accessible in line with DDA requirements. Taxi facilities would also be provided within the Station Street shared zone and would also be fully accessible.

Accessible parking would continue to be located on Schwebel Street, and would include an additional accessible parking space. A new path from the station entrance along Station Street would improve access to these spaces.

Parking and loading zones

There is no dedicated commuter parking at Marrickville Station.

The reconfiguration of kerbside areas would result in the potential loss of about two on-street parking spaces on Schwebel Street. Consultation would be undertaken with Inner West Council to discuss possible alternative arrangements, such as the relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). Based on parking surveys undertaken, the surrounding streets are considered to have adequate capacity to cater for this small loss of on-street spaces near the station.

The project would not affect any loading zones at Marrickville Station.

11.4.5 Dulwich Hill Station

Figure 11.5 shows the proposed interchange arrangement in the vicinity of the upgraded station.

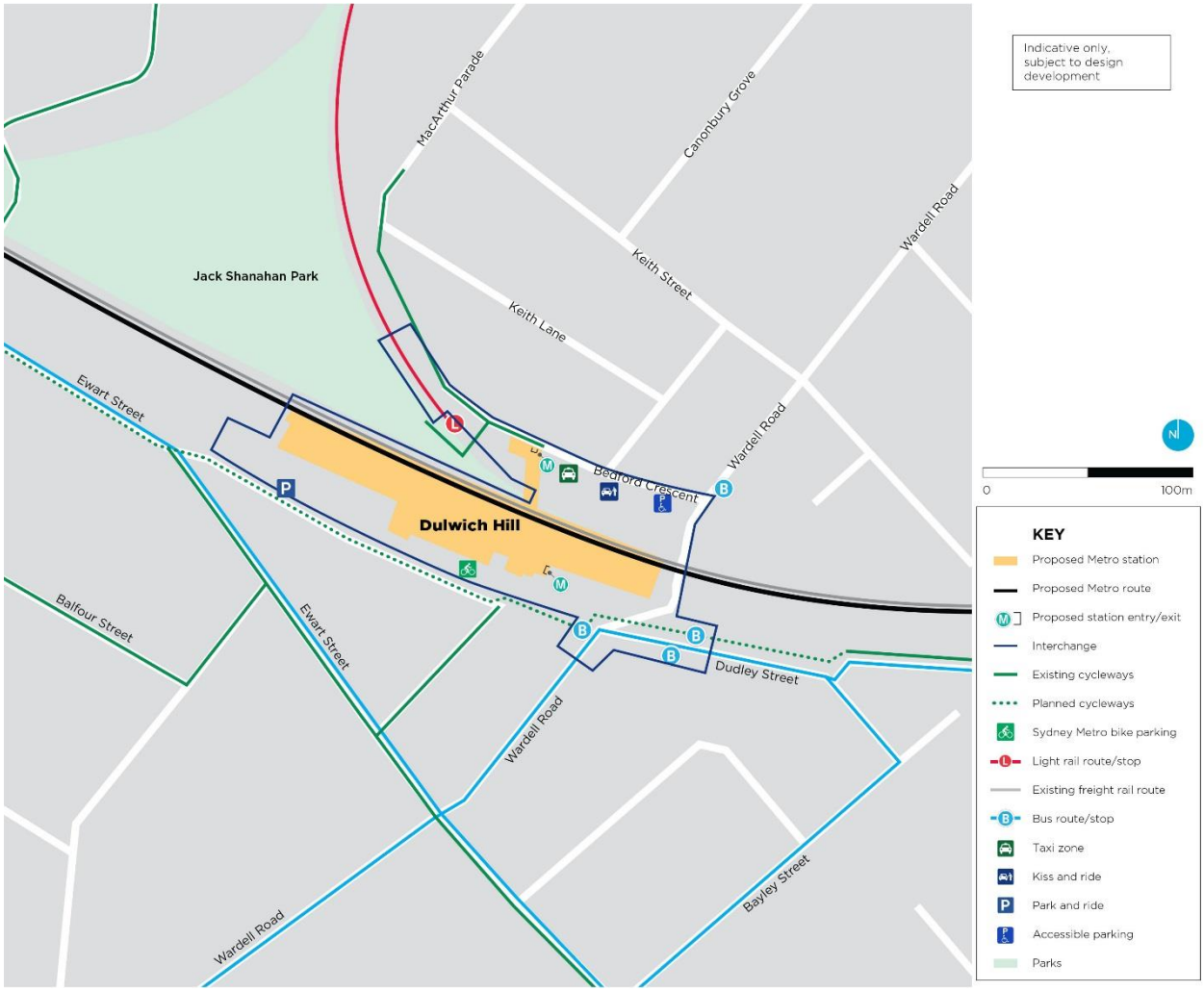


Figure 11.5 Dulwich Hill Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 13,600 daily customer movements (i.e. an entry or exit) at Dulwich Hill Station, with the modal split generally as follows:

- walking – 72 per cent
- cycling – 0.4 per cent
- bus – 4.1 per cent
- kiss and ride – 8 per cent
- park and ride – 5.5 per cent
- light rail – 10 per cent.

Pedestrian integration

It is predicted that the number of pedestrian entries and exits at the station would increase by about 5,800 per day by 2026.

Wider footpaths are proposed on Wardell Road near the new southern station entrance. As a result, retention of the existing northbound bus stop on Wardell Road adjacent to the southern entrance would not constrain pedestrian movements.

No additional pedestrian crossings are proposed in the vicinity of the station. Access to the existing crossing on Wardell Road would be improved, as the new wider footpaths would provide safe access to and from the new entrance. New footpaths would also provide access to the reconfigured car park in Ewart Lane, which is an improvement on the existing situation, as no footpaths are currently provided on the northern side of the lane.

Pedestrian access to kerbside facilities on Bedford Crescent would be provided, with accessible paths to and from the station. Access to the Dulwich Hill light rail stop would be maintained via the existing lift and stairs, which would be integrated into the new station concourse. The new concourse would also provide a more direct route to the light rail stop from areas south of the rail corridor. This would remove the need for some light rail users to travel to the stop via the Wardell Road overbridge, and decreasing the travel distance for some customers.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at Dulwich Hill Station, with new facilities proposed at the southern station entrance. Existing facilities on Bedford Crescent (north of stairs and lift to light rail) would also be retained. The total bike parking provision would meet the estimated demand for spaces at the station. Bike parking has been provided as close to the station as possible, to allow for short connections into surrounding cycle paths and routes, including the active transport corridor.

Public transport integration

Access to existing bus stops would be maintained. Access to the eastbound bus stop in Dudley Street would be improved, with accessible paths linking to the new southern station entrance.

The new station concourse would provide a more direct route to the light rail stop from areas south of the rail corridor.

Road network integration

The project does not involve adjustments to the road network in the vicinity of Dulwich Hill Station.

Kerbside facility integration

A new kerbside area would be provided on Bedford Crescent to the north of the station. This area would accommodate additional kiss and ride, and taxi bays.

Parking and loading zones

The project is not expected to result in a loss of dedicated commuter parking near Dulwich Hill Station. This would be confirmed during detailed design.

The project would result in the loss of up to 10 on-street spaces in Bedford Crescent as a result of the provision of new kerbside facilities in this location. Consultation would be undertaken with Inner West Council to discuss possible alternative arrangements, such as relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). Based on parking surveys undertaken, the surrounding streets are considered to have adequate capacity to cater for the small loss of on-street spaces near the station.

The project would not affect loading zones at Dulwich Hill Station.

11.4.6 Hurlstone Park Station

Figure 11.6 shows the proposed interchange arrangement in the vicinity of the upgraded station.

Figure 11.6 Hurlstone Park Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 9,400 daily customer movements (i.e. an entry or exit) at Hurlstone Park Station, with the modal split generally as follows:

- walking – 67.9 per cent
- cycling – 0.1 per cent
- bus – 17.1 per cent
- kiss and ride – 5.2 per cent
- park and ride – 9.7 per cent.

Pedestrian integration

Pedestrian entries and exits at the station are forecast to increase by over 4,000 per day by 2026. This volume of pedestrians can be readily accommodated on surrounding footpaths.

The proposed pedestrian crossing on Crinan Street would provide direct access to the commercial area on Duntroon Street (south of corridor) and surrounding residential areas. The existing crossing on the Duntroon Street overbridge would be modified to ensure it remains accessible and has ample space on either side to cater for future pedestrian flows.

The new station concourse would have a larger area fronting the Crinan/Duntroon Street overbridge and Duntroon Street. This would provide sufficient space to facilitate pedestrian flows to and from the station.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at Hurlstone Park Station, with new facilities proposed on Floss Street west of the station. The total bike parking provision would meet the estimated demand for spaces at the station. Bike parking has been provided as close to the station as possible, to allow for short connections into surrounding cycle paths and routes, including the active transport corridor.

Public transport integration

No changes to bus services at the station are proposed. Access to bus stops from the station would be similar to the existing situation. All footpaths providing access to and from stops would be accessible.

Road network integration

The project does not involve adjustments to the road network in the vicinity of Hurlstone Park Station.

Kerbside facility integration

A new kerbside area would be provided on Floss Street to the east of the station on the eastern side of the overbridge. This area would include kiss and ride and taxi bays, which would be an improvement compared to the existing situation, with no facilities currently being available.

Parking and loading zones

The project would not result in the loss of dedicated commuter parking at Hurlstone Park Station.

The reconfiguration of kerbside areas would result in the potential loss of up to five spaces in Duntroon Street (south) and Floss Street (east) due to the provision of kerbside facilities. Consultation would be undertaken with Canterbury-Bankstown Council to discuss possible alternative arrangements, such as the relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). Based on parking surveys undertaken, the surrounding streets are considered to have adequate capacity to cater for the small loss of on-street spaces near the station.

All existing accessible parking spaces in Floss Street to the north of the station would be retained. The existing accessible space on the southern side of the station in Duntroon Street would be relocated to a new location in the same section of Duntroon Street.

The project would not affect loading zones at Hurlstone Park Station.

11.4.7 Canterbury Station

Figure 11.7 shows the proposed interchange arrangement in the vicinity of the upgraded station.

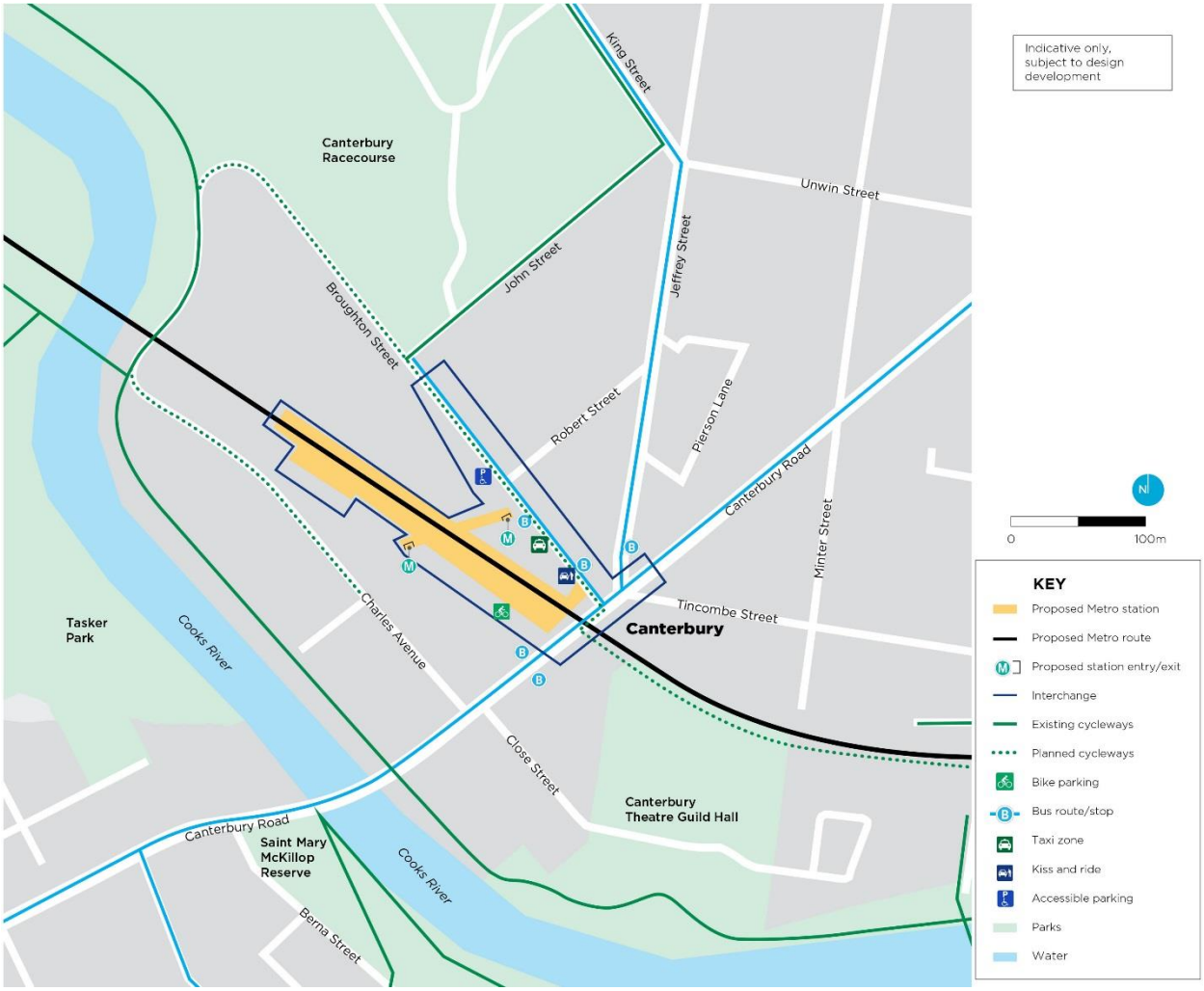


Figure 11.7 Canterbury Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 14,200 daily customer movements (i.e. an entry or exit) at Canterbury Station, with the modal split generally as follows:

- walking – 66.3 per cent
- cycling – 0.2 per cent
- bus – 12.9 per cent
- kiss and ride – 10.5 per cent
- park and ride – 10.1 per cent.

Pedestrian integration

An increase of over 5,500 pedestrians per day by 2026 would not affect the capacity of surrounding footpaths. The existing crossing at Broughton Street has the potential to be a constraint for pedestrian flows. However, the existing footpaths are generally considered to have adequate capacity, which would be enhanced as a result of the proposed upgrades and the new station entrances.

The proposed entrances at Broughton Street and Canterbury Road would improve pedestrian connections with the surrounding areas, particularly the new development areas to the south (the Canterbury Road entrance) and future development areas to the north (the Broughton Street entrance). An additional entrance has been safeguard at Charles Street which would provide improved pedestrian connections to the south of the station in the future if necessary.

The proposed pedestrian crossing on Broughton Street adjacent to the new station entrance would provide safe passage for pedestrians accessing bus stops on the northern side of Broughton Street, as well as to future development areas located north of the station.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at Canterbury Station. New facilities proposed at each of the new station entrances would meet the demand for spaces at the station. Bike parking has been provided as close to the station as possible, to allow for short connections into surrounding cycle paths and routes, including the active transport corridor.

Public transport integration

No changes to bus services at the station are proposed. One minor adjustment to a bus stop in Broughton Street would be required to allow room for the proposed kerbside facilities. This bus stop would be relocated closer to the new station entrance, which is considered a better outcome.

Existing bus stops would be readily accessed via accessible paths from at least one of the proposed station entrances. The provision of the new crossing on Broughton Street would improve access to bus stops on the northern side of Broughton Street.

Road network integration

The project does not involve adjustments to the road network in the vicinity of Canterbury Station.

Kerbside facility integration

New kerbside facilities (including taxi and kiss and ride facilities) would be provided at the Broughton Street entrances to the station. These would be readily accessed from DDA compliant pathways from the Broughton Street station entrance.

Parking and loading zones

The project would not result in the loss of dedicated commuter parking at Canterbury Station.

The reconfiguration of kerbside areas would result in the potential loss of up to about two spaces in Broughton Street to provide new accessible parking spaces. Consultation would be undertaken with Canterbury-Bankstown Council to discuss possible alternative arrangements, such as relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). Based on parking surveys undertaken, the surrounding streets are considered to have adequate capacity to cater for the small loss of on-street spaces near the station.

There would be no loss of accessible parking at the station. Existing spaces would be relocated to Broughton Street to enable them to be accessed from the new station entrance.

The project would not affect loading zones at Canterbury Station.

11.4.8 Campsie Station

Figure 11.8 shows the proposed interchange arrangement in the vicinity of the upgraded station.

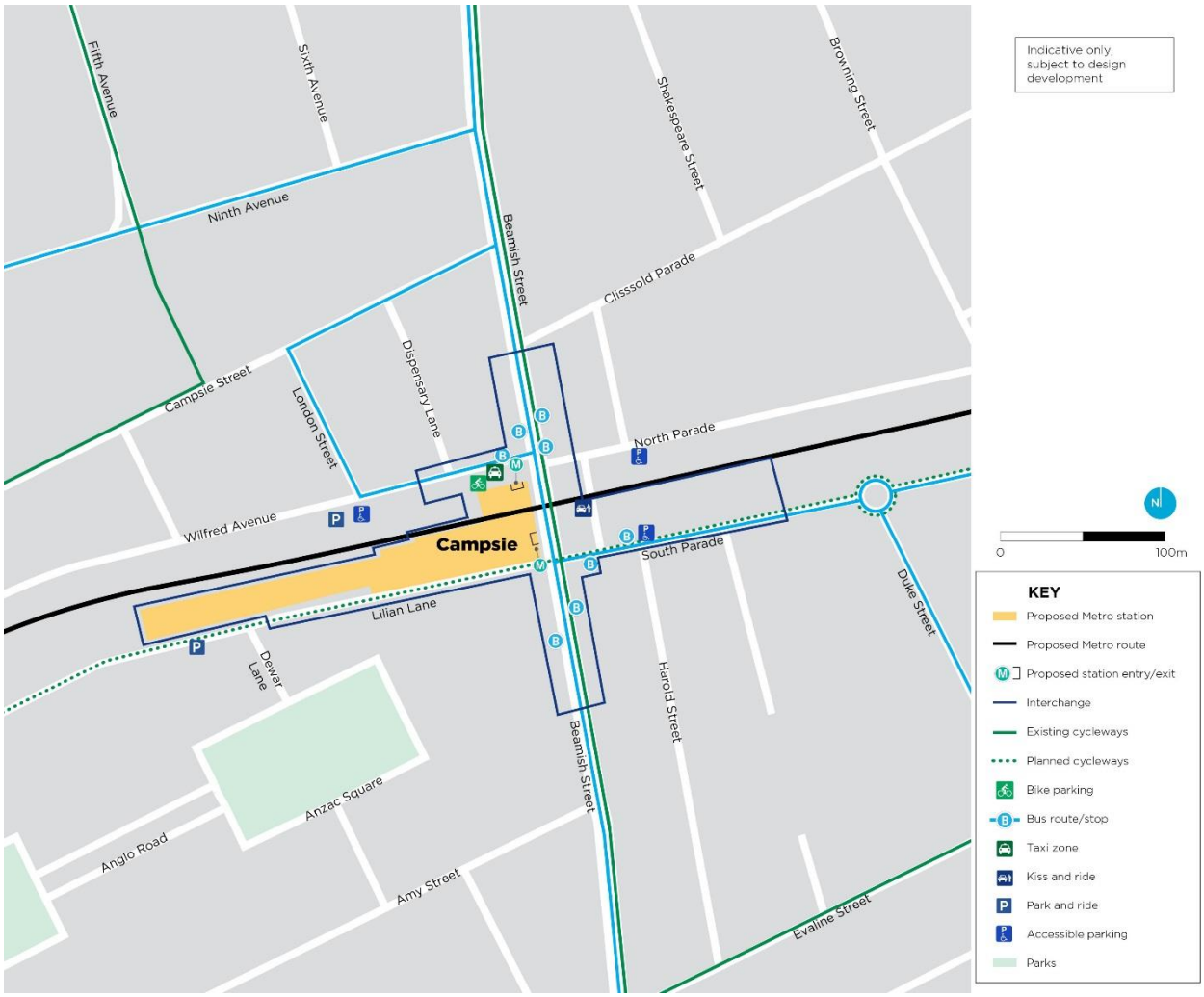


Figure 11.8 Campsie Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 21,400 daily customer movements (i.e. an entry or exit) at Campsie Station, with the modal split generally as follows:

- walking – 64.9 per cent
- cycling – 0.3 per cent
- bus – 17.5 per cent
- kiss and ride – 7.2 per cent
- park and ride – 10.2 per cent.

Pedestrian integration

The number of pedestrian entries and exits at the station is forecast to increase by over 2,000 per day by 2026. Surrounding footpaths have adequate capacity to cater for this growth.

The existing signalised crossing on Beamish Street at South Parade has the potential to be a constraint for pedestrian flows, with pedestrians waiting to cross constraining flows along Beamish Street south of the station. The capacity of existing footpaths in this area as well as the proposed widening of the station forecourt and footpaths adjacent to Beamish Street would minimise the

potential for crowding. The new shared zone along Lilian Lane to the south of the station would further improve pedestrian safety.

The above changes to pedestrian facilities would contribute to improved pedestrian amenity in the area surrounding the station.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at the station, predominantly adjacent to the northern station entrance on North Parade. This increase in bike parking spaces would meet the demand for spaces at the station. Bike parking has been provided as close to the station as possible, to allow for short connections into surrounding cycle paths and routes, including the active transport corridor.

Public transport integration

No changes to bus services or stops at the station are proposed. Accessible paths would be provided to the bus stops.

Road network integration

To the south of the station, Lilian Lane would be upgraded to become a shared zone. Movements along the lane would remain one way, with an exit to Beamish Street.

The project would also include construction of a new access way to be used for kiss and ride facilities on the eastern side of Beamish Street. This road would be one way in a northbound direction and would provide separation from Beamish Street.

Kerbside facility integration

New kiss and ride facilities would be located above the rail corridor to the east of Beamish Street. This would be accessible by pedestrians via existing crossings on Beamish Street.

The project would involve relocation of taxi bays from North Parade (east of Beamish Street) to North Parade (west of Beamish Street). This change would improve access from the station and make this facility more visually prominent from the station entrance.

Parking and loading zones

The project includes construction of a new dedicated commuter parking area along Lilian Street to the west of the station. This area would be located on NSW government (RailCorp) owned land, and would accommodate about 80 new commuter parking spaces.

The reconfiguration of kerbside areas at the station would result in the potential loss of up to 20 on-street spaces in North and South Parade. Consultation would be undertaken with Canterbury-Bankstown Council to discuss possible alternative arrangements, such as relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). The impacts to on-street parking would be a small proportion of the existing on-street parking in the vicinity of the station. As shown in Table 10.16, there are about 1,000 on-street parking spaces located within 400 metres of Campsie Station. Although the existing demand for on-street parking is high (represented by the utilisation rate of 85 per cent), there would be some capacity to absorb the loss of spaces. It is recognised that alternative parking may be located further from the customer's preferred destination.

The project would not affect existing accessible parking spaces. The project would potentially affect the loading zone on North Parade (west of Beamish Street) by the proposed kerbside facilities (taxi bay). Options to minimise impacts include allowing short-term parking in this area during peak periods, with loading allowed at other times, or relocating the loading zone west of the proposed kerbside facilities. The preferred option would be identified during detailed design.

11.4.9 Belmore Station

Figure 11.9 shows the proposed interchange arrangement in the vicinity of the upgraded station.

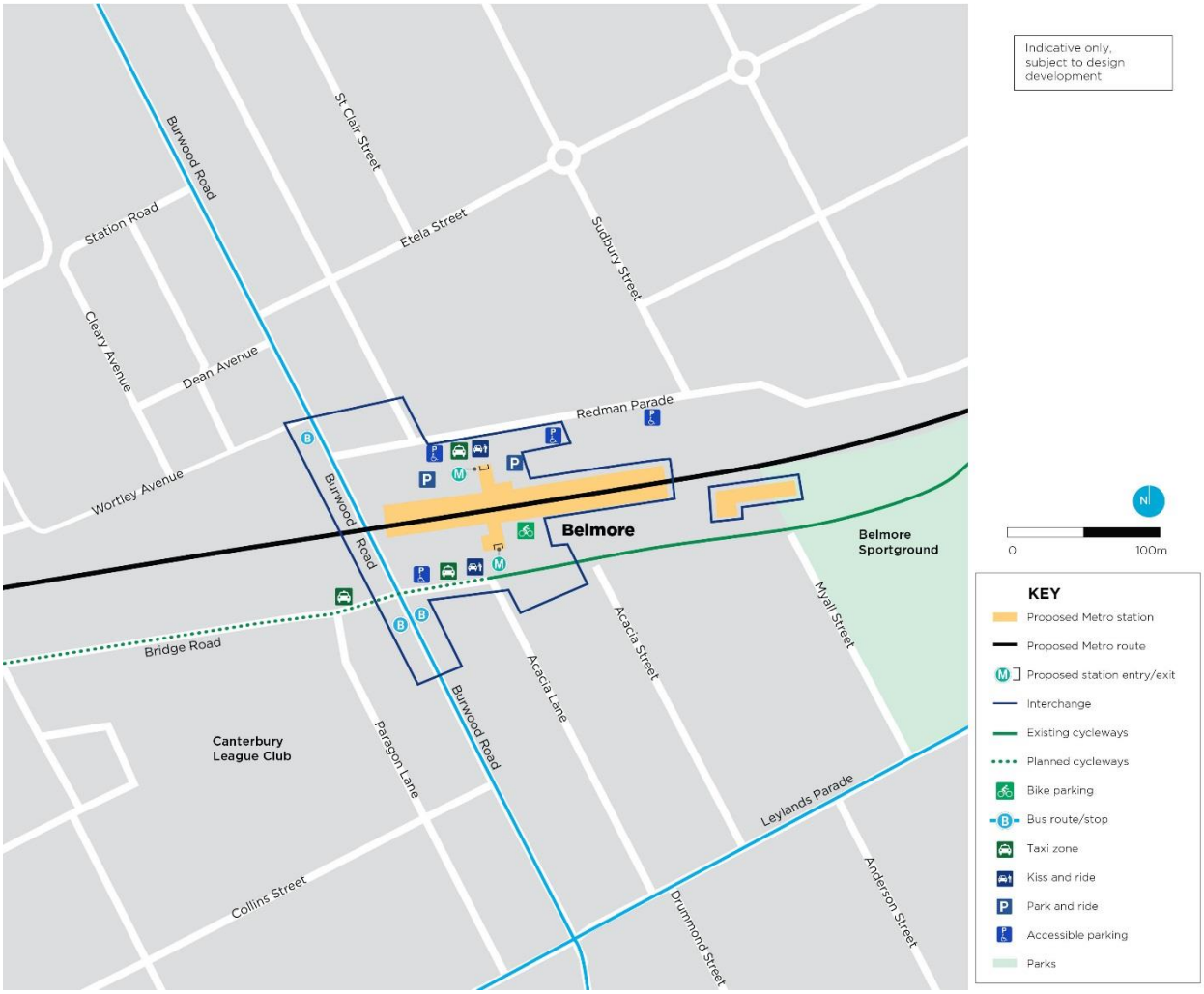


Figure 11.9 Belmore Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 13,000 daily customer movements (i.e. an entry or exit) at Belmore Station, with the modal split generally as follows:

- walking – 63.8 per cent
- cycling – 0.1 per cent
- bus – 9.9 per cent
- kiss and ride – 9 per cent
- park and ride – 17.2 per cent.

Pedestrian integration

It is forecast that the number of pedestrian entries and exits at the station would increase by about 4,500 per day by 2026. Surrounding footpaths have adequate capacity to accommodate this growth.

The proposed shared zone on Tobruk Avenue would provide a clear and legible entry to the station and be easily visible for pedestrians along Burwood Road.

The proposed signalised intersection of Tobruk Avenue/Bridge Road/Burwood Road would provide a more direct and safe path for pedestrians to access the station from the western side of Burwood Road. This intersection would also reduce the potential impacts of the removal of the existing crossing on Burwood Road at the existing station entrance. Accessible paths would also be provided from the new northern entrance to Burwood Road and the shopping areas located along this road.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at the station, with new facilities proposed adjacent to the stairs to the new concourse on the southern side of the corridor. This allocation of bike parking is considered to meet the demand for spaces at Belmore Station. Bike parking has been provided as close to the station as possible, and allows for connections to surrounding cycle paths and routes, including the active transport corridor, which consists of the existing network of paths east of the station towards the Belmore Sports Ground.

Public transport integration

No changes to bus services at the station are proposed. However, it is proposed to relocate the existing southbound stop from north of Tobruk Avenue to south of Tobruk Avenue. The new intersection at Tobruk Avenue/Bridge Road/Burwood Road would ensure that accessible paths are provided to both the northbound and southbound bus stops to and from the station.

Road network integration

The project includes signalisation of the Tobruk Avenue/Bridge Road/Burwood Road intersection. The signalisation of this intersection would minimise impacts to the road network as a result of increased traffic accessing the station, particularly the kerbside facilities in Tobruk Avenue.

Tobruk Avenue would become a shared zone to ensure that the area surrounding the station entrance is more pedestrian friendly while still providing vehicle access.

Kerbside facility integration

The existing station does not have kiss and ride facilities. The project would provide kiss and ride facilities in Tobruk Avenue and Redman Parade adjacent to the southern and northern entrances to the station. The existing taxi facilities in Bridge Road west of the Burwood Road intersection would be retained, and an additional space would be provided adjacent to the new station entrances.

The new kerbside facilities would be more accessible from the station entrance compared to the existing spaces. The new intersection and pedestrian crossing would improve access to the existing taxi facilities.

Parking and loading zones

There is the potential for the loss of some dedicated commuter parking spaces located off Redman Parade. The exact number of spaces would be confirmed during detailed design. It is likely that this car park would be reconfigured to ensure that there is no net loss in spaces at this station. No other loss of parking spaces is proposed in the vicinity of the station.

The project would affect the existing council car park located off Tobruk Avenue, with a total of 48 off-street parking spaces lost permanently lost as a result of the project. This car park is timed and primarily services the retail area located along Burwood Road. This impact would affect just over 50 per cent of the non-commuter off-street parking near the station.

As shown in Table 10.19, there are about 900 unrestricted on-street parking spaces within 400 metres of Belmore Station. As the utilisation rate of on-street parking is 76 per cent, there

would be some capacity to absorb the loss of spaces. It is recognised that alternative parking may be located further from the customer's preferred destination.

The reconfiguration of kerbside areas would result in the potential loss of up to five on-street spaces in Tobruk Avenue due to the provision of kerbside facilities. Consultation would be undertaken with Canterbury-Bankstown Council to discuss possible alternative arrangements available such as relocation of spaces or timing of kerbside facilities to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). The surrounding streets are considered to have adequate capacity to cater for the small loss of on-street spaces near the station.

The project would not affect loading zones at Belmore Station.

11.4.10 Lakemba Station

Figure 11.10 shows the proposed interchange arrangement in the vicinity of the upgraded station.

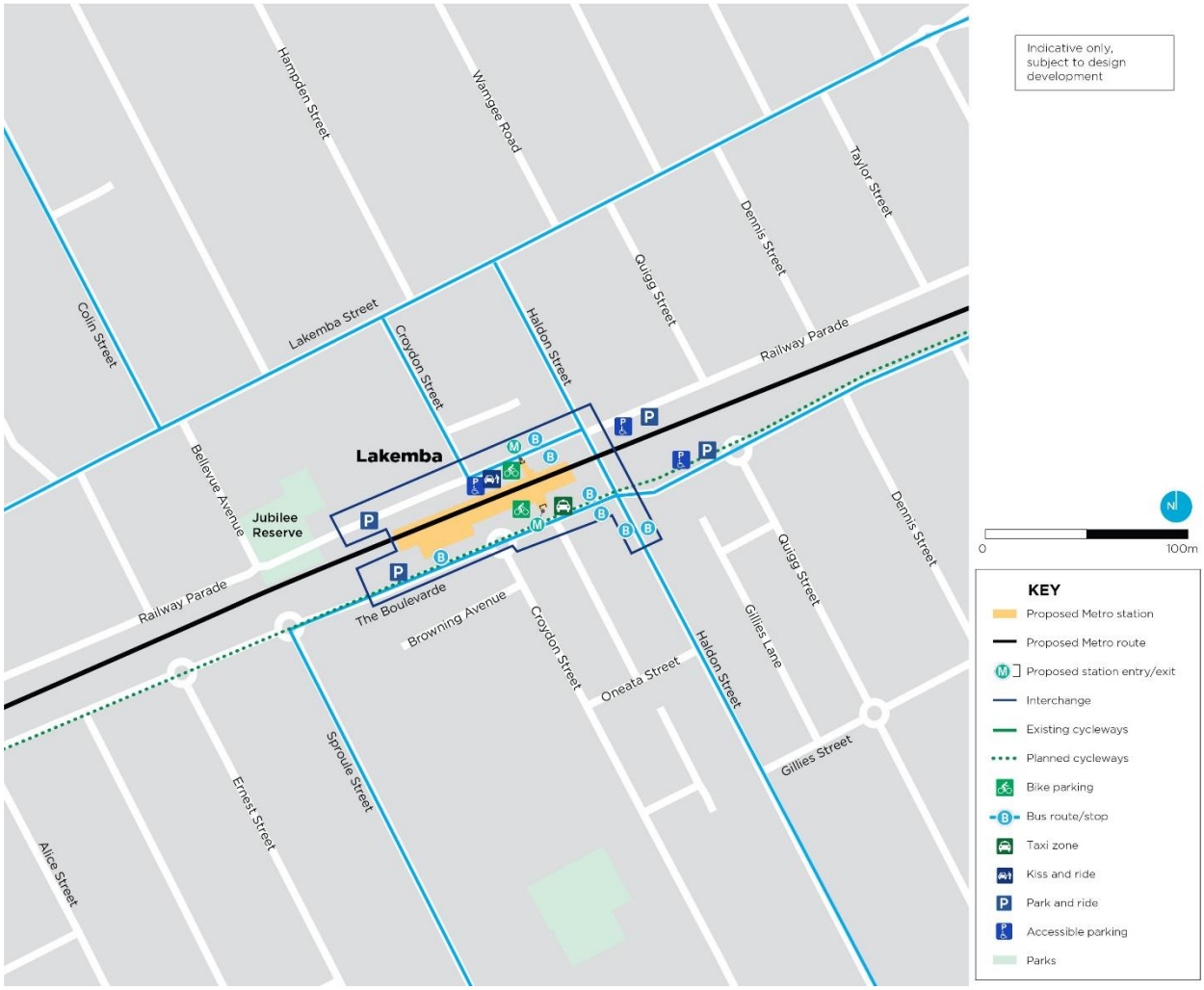


Figure 11.10 Lakemba Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 14,800 daily customer movements (i.e. an entry or exit) at Lakemba Station, with the modal split generally as follows:

- walking – 67.3 per cent
- cycling – 0.2 per cent
- bus – 6.9 per cent

- kiss and ride – 7.3 per cent
- park and ride – 18.3 per cent.

Pedestrian integration

It is forecast that the number of pedestrian entries and exits at the station would increase by about 3,800 pedestrians per day by 2026. Surrounding footpaths have adequate capacity to accommodate this increase. Although the signalised crossing at the Haldon Street/The Boulevarde intersection could potentially impact flows where pedestrians wait to cross the road, the capacity of footpaths in this area is considered to be adequate.

The area in the vicinity of the station would remain similar to the existing situation, with the existing concourse to be retained and upgraded. Some forecourt works on either side of the corridor would improve accessibility, and in some cases, result in more direct access to the station.

The existing station concourse is currently used as a cross-corridor link. The project would maintain this cross-corridor link therefore impacts to pedestrian movements are not considered likely.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at the station, with new facilities proposed adjacent to the access stairs on both sides of the rail corridor. This allocation of bike parking is considered to meet the demand for spaces at Lakemba Station. Bike parking has been provided as close to the station entrances as possible, and allow for connections to surrounding cycle paths and routes, including the active transport corridor along The Boulevarde.

Public transport integration

No changes to bus services or stops at the station are proposed. All stops would retain the existing level of accessibility, including the non-accessible stop on the northern side of Railway Parade. Other stops on Railway Parade and The Boulevarde would continue to be served by accessible paths.

Road network integration

No adjustments to the road network are proposed in the vicinity of Lakemba Station.

Kerbside facility integration

The project would include provision of new kiss and ride spaces along Railway Parade, accessed from the northern station entrance. Existing kiss and ride facilities on the southern side of The Boulevarde would be retained.

The project would include provision of taxi facilities on The Boulevarde, which would be positioned in a similar location to the existing taxi facilities.

Parking and loading zones

The project would not result in the loss of any dedicated commuter parking at Lakemba Station.

The reconfiguration of kerbside areas would result in the potential loss of up to about seven spaces on Railway Parade. Consultation would be undertaken with Canterbury-Bankstown Council to discuss possible alternative arrangements, such as relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). Based on parking surveys undertaken, the surrounding streets are considered to have adequate capacity to cater for the small loss of on-street spaces near the station.

All existing accessible parking spaces would be retained. The project includes provision of a new accessible parking bay within the kerbside area on Railway Parade near the northern station entrance.

The project would not affect loading zones at Lakemba Station.

11.4.11 Wiley Park Station

Figure 11.11 shows the proposed interchange arrangement in the vicinity of the upgraded station.

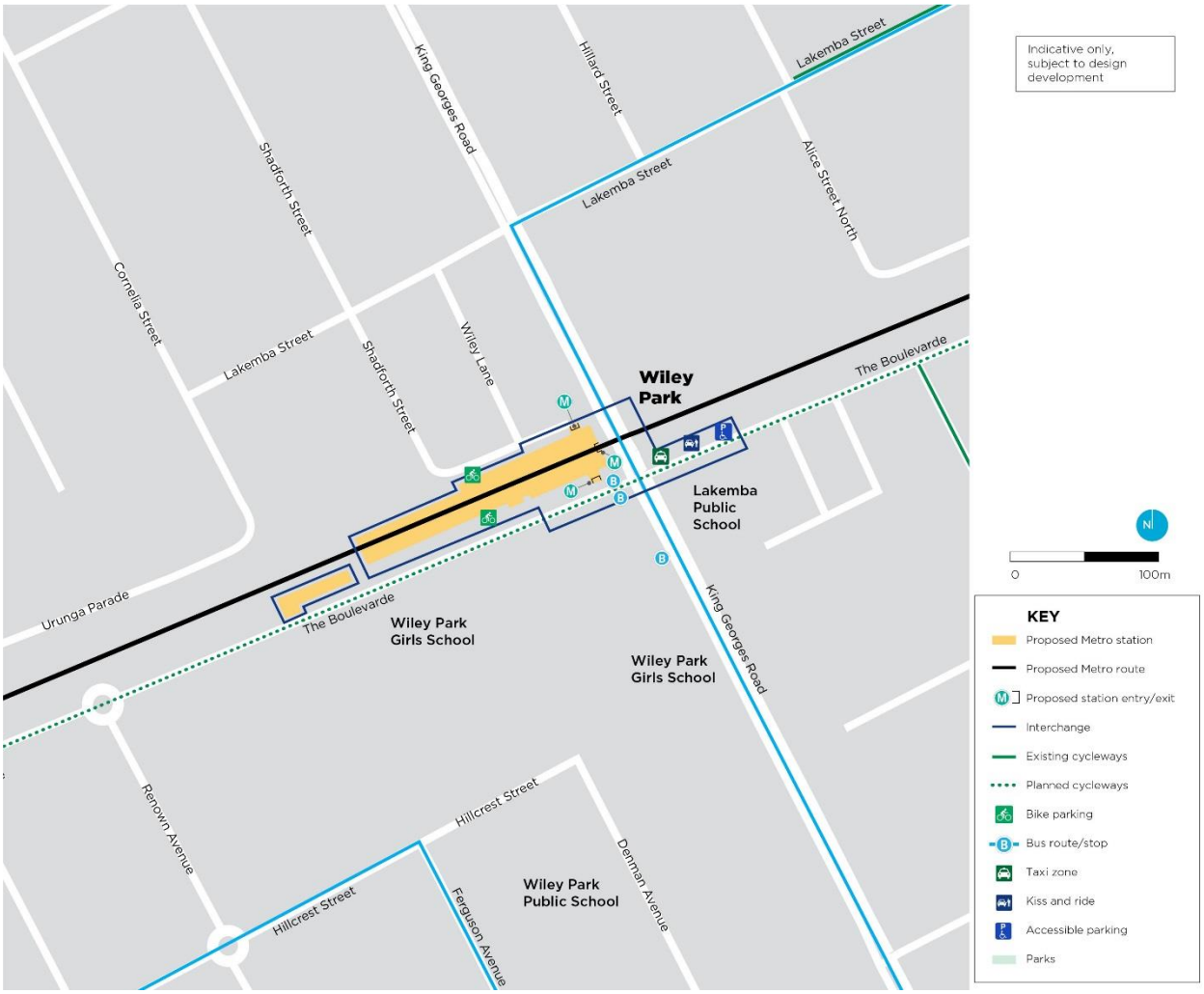


Figure 11.11 Wiley Park Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 11,400 daily customer movements (i.e. an entry or exit) at Wiley Park Station, with the modal split generally as follows:

- walking – 77.9 per cent
- cycling – 0.3 per cent
- bus – 0.9 per cent
- kiss and ride – 11.5 per cent
- park and ride – 9.4 per cent.

Pedestrian integration

Pedestrian entries and exits at the station are forecast to increase by over 5,400 people per day by 2026. Footpaths surrounding the station are generally considered to have adequate capacity to accommodate this increase pedestrian movements. Pedestrian queuing at the crossing at King Georges Road and The Boulevarde has the potential to impact pedestrian flows along King Georges Road, however paths in this location have adequate capacity to ensure that pedestrians flows are not constrained.

New station entrances to the north and south of the corridor would improve connections and accessibility to areas on either side of the rail corridor including surrounding streets.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at the station, with new facilities proposed both platforms to the east of the new station buildings. These two new facilities would be accessible from the adjacent footpaths located on either side of the rail corridor. This allocation of bike parking is considered to meet the demand for spaces at Wiley Park Station. Bike parking has been provided as close to the station entrances as possible, and allows for connections to surrounding cycle paths and routes, including the active transport corridor along The Boulevarde. The proposed locations of these facilities are located adjacent to futureproofed station entrances located on either side of the rail corridor.

Public transport integration

The project would not impact bus operations along King Georges Road. All bus stops would remain in their existing location. This would result in some visibility issues from the new station entrances and wayfinding signage would be installed to improve this.

Access to the bus stops on Kings Georges Road would remain accessible. Existing bus stops on The Boulevarde, which are generally only used for rail replacement buses, would be retained.

Road network integration

No adjustments to the road network are proposed in the vicinity of Wiley Park Station.

Kerbside facility integration

New kerbside facilities would be provided on The Boulevarde to the east of King Georges Road. This would contain taxi and kiss and ride spaces, neither of which are currently provided. This facility would not be highly visible from the station entrances, however accessible paths would connect directly to the station.

Parking and loading zones

The project would not result in a loss of dedicated commuter parking at Wiley Park Station.

The reconfiguration of kerbside areas would result in the potential loss of up to about 10 spaces in The Boulevarde, to the east of King Georges Road. Consultation would be undertaken with Canterbury-Bankstown Council to discuss possible alternative arrangements, such as relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). Based on parking surveys undertaken, the surrounding streets are considered to have adequate capacity to cater for the small loss of on-street spaces near the station.

An accessible parking space would be provided within the kerbside facilities on The Boulevarde east of King Georges Road.

The project would not affect loading zones at Wiley Park Station.

11.4.12 Punchbowl Station

Figure 11.12 shows the proposed interchange arrangement in the vicinity of the upgraded Punchbowl Station.

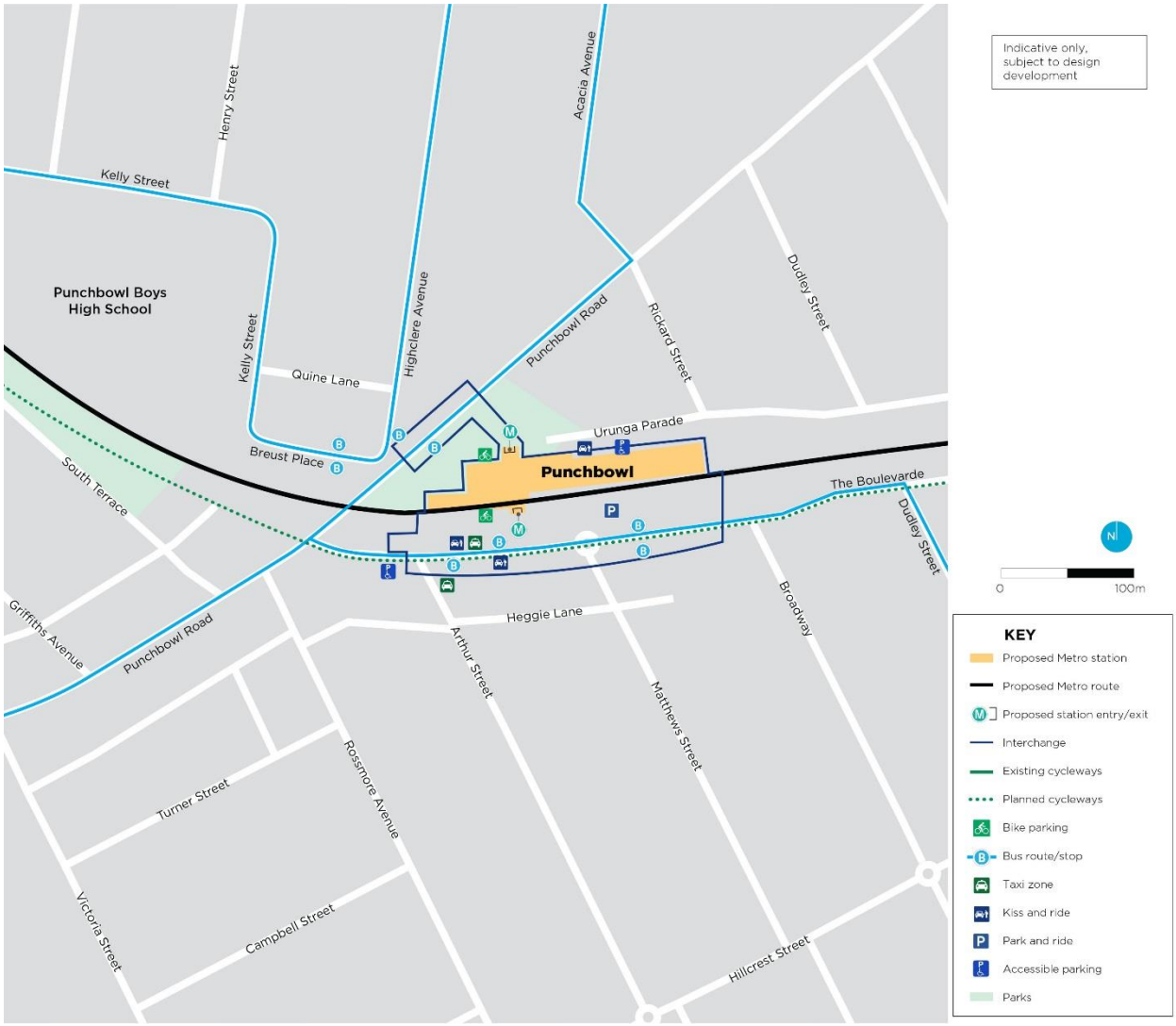


Figure 11.12 Punchbowl Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 13,000 daily customer movements (i.e. an entry or exit) at Punchbowl Station, with the modal split generally as follows:

- walking – 55.6 per cent
- cycling – 0.1 per cent
- bus – 12.3 per cent
- kiss and ride – 15.2 per cent
- park and ride – 16.8 per cent.

Pedestrian integration

The number of pedestrian entries or exits at the station is forecast to increase by over 4,000 people per day by 2026. This rate of increase in the number of pedestrians in the vicinity of the station is not considered to result in capacity issues on surrounding footpaths.

The following changes to the pedestrian network are proposed:

- new crossing across Punchbowl Road to replace the existing pedestrian underpass adjacent to the rail corridor
- accessible ramp and path to Urunga Parade
- improved station forecourt areas on both sides of the corridor providing increased space for pedestrian movements.

The above changes are considered to represent a substantial improvement to pedestrian networks in the vicinity of the station and would provide more direct routes to the station from the nearby town centre and surrounding residential areas. These changes would also assist the provision of accessible paths as part of the station design.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at the station with new facilities to be provided on both sides of the rail corridor adjacent to the station entrances. The provision of bike parking is considered to meet the demand for spaces at Punchbowl Station. Bike parking has been provided as close to the station entrances as possible and also allows for connections into surrounding cycle paths and routes including the active transport corridor.

Public transport integration

Existing bus routes would not be altered by the project. The majority of bus stops would remain unaffected with the exception of the eastbound stop on The Boulevarde which would be relocated east to be outside the new station entrance. This would ensure that the distance between the stop and the station is minimised and the stop is highly visible. Existing bus stops on Punchbowl Road (to be retained) would not be fully visible from the northern station entrance and therefore would require some wayfinding signage.

An accessible path would link the station entrances to the bus stops.

Road network integration

The project would not require adjustments to the road network in the vicinity of Punchbowl Station.

Kerbside facility integration

The existing taxi facilities in Arthur Street on the southern side of The Boulevarde would be retained and would be close to the new station entrance. The visibility of these spaces would however be reduced as the station is to be relocated east away from Arthur Street. An additional space would be provided adjacent to the new southern station entrance and would be highly visible and accessible to and from the station.

The project would include the provision of three new kiss and ride areas (each containing a number of kiss and ride spaces), with two new facilities on either side of The Boulevarde (near the southern entrance) and one on the southern side of Urunga Parade (east of the northern entrance). Accessible paths would link the kiss and ride facilities to the station, however only the areas on the southern side would be visible from the station entrance with wayfinding likely to be required for the facility in Urunga Parade.

Parking and loading zones

The project would result in some impacts on the existing dedicated commuter car park located off The Boulevarde, although this is unlikely to result in a loss of parking spaces, as the car park would be reconfigured to maintain the existing availability of commuter parking.

The reconfiguration of kerbside areas would result in the potential loss of up to about 20 on-street spaces in Urunga Parade and The Boulevarde. Consultation would be undertaken with Canterbury-Bankstown Council to discuss possible alternative arrangements, such as relocation of spaces or timing of kerbside facilities, to minimise the loss of spaces to particular periods of the day (i.e. the peak periods). The surrounding streets are considered to have adequate capacity to cater for the small loss of on-street spaces near the station. It is recognised that alternative parking may be located further from the customer's preferred destination.

Accessible parking spaces are to be provided on both sides of the rail corridor in Urunga Parade and The Boulevarde, connected by accessible paths to the station entrances on either side of the rail corridor.

The project would not affect loading zones at Punchbowl Station.

11.4.13 Bankstown Station

Figure 11.13 shows the proposed interchange arrangement in the vicinity of the upgraded Bankstown Station.

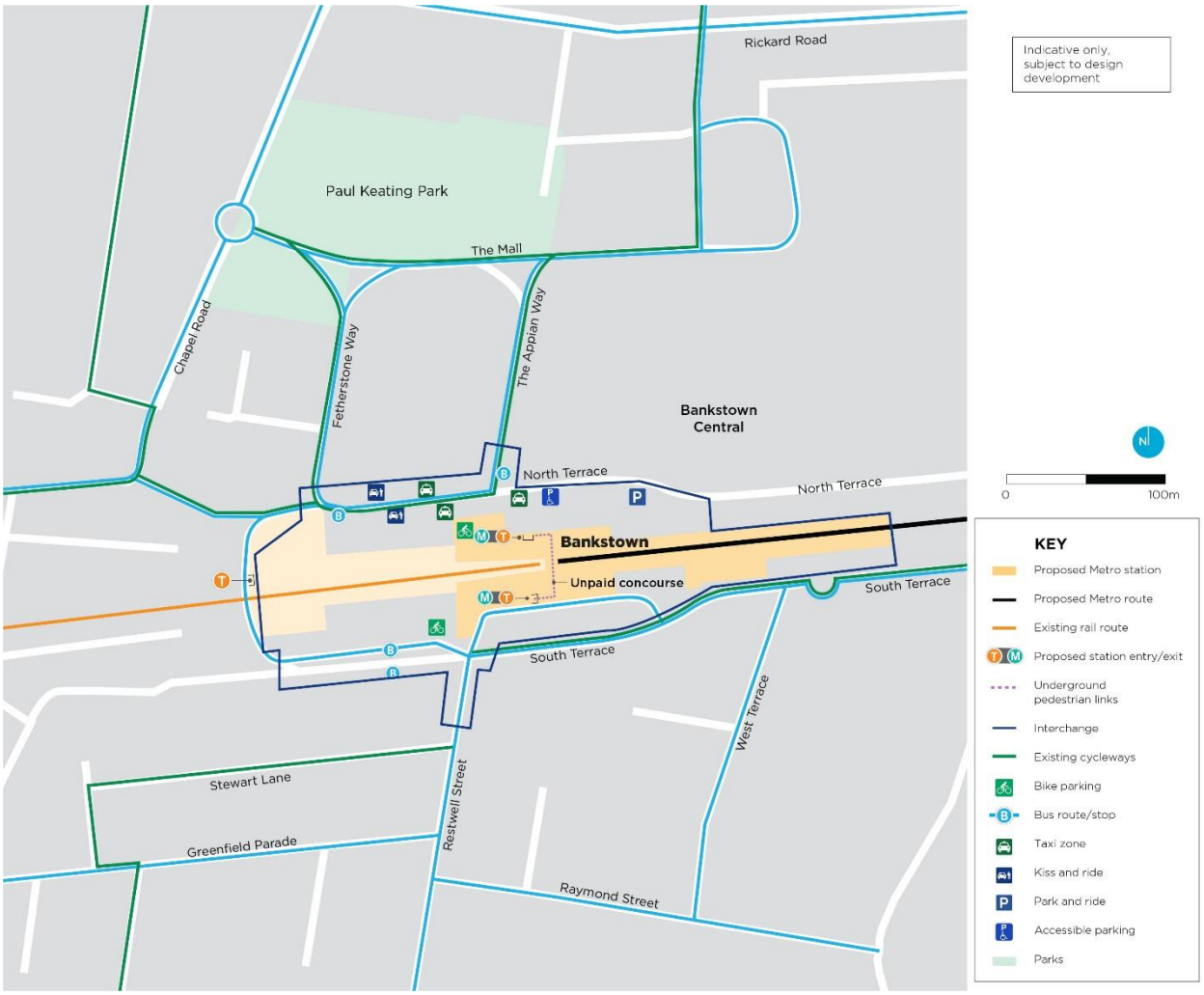


Figure 11.13 Bankstown Station transport interchange arrangement

Passenger demand

By 2026, it is forecast that there would be about 23,800 daily customer movements (i.e. an entry or exit) at Bankstown Station, with the modal split generally as follows:

- walking – 50.8 per cent
- cycling – 0.2 per cent
- bus – 28 per cent
- kiss and ride – 14.7 per cent
- park and ride – 6.3 per cent.

Pedestrian integration

The number of pedestrian entries or exits at the station is forecast to increase by over 3,000 people per day by 2026. This increase in pedestrian activity in the vicinity of the station is not considered to result in capacity issues on surrounding footpaths.

The project would include the construction of a new at grade cross-corridor link. This link would be positioned between the existing Sydney Trains station and the new metro station to be constructed east of the Sydney Trains station. The construction of this new link would provide a new direct access into the Bankstown CBD located midway between the existing crossing points at Bankstown City Plaza or the road link between North and South terraces. This new link will improve access for pedestrians particularly when accessing the Bankstown Central Shopping Centre which is located on the northern side of the corridor. This centre is a major destination within the Bankstown CBD and the new link provides a more direct link to this key land use from areas located south of the rail corridor.

Modelling was undertaken to investigate the potential for passenger movement conflicts at Bankstown Station where there would be interaction of passengers from Sydney Trains and Sydney Metro services. The assessment identified that there would be sufficient space to allow passenger queuing and circulation without undue conflict, should movements be predominately in the same direction.

Cyclist integration

The project would result in a substantial increase in the number of bike parking spaces at Bankstown Station with new facilities to be provided on both sides of the station adjacent to the new pedestrian underpass. The provision of bike parking is considered to meet the demand for spaces at Bankstown Station. Bike parking has been provided as close to the station entrances as possible, and allows for connection to surrounding cycle paths and routes, including the active transport corridor along South Terrace on the southern side of the station.

Public transport integration

The project would not result in changes to bus routes or stops. The construction of the pedestrian link across the corridor would however improve access to the existing bus interchange from the northern side of the rail corridor and particularly Bankstown Central Shopping Centre.

Road network integration

The project would not require adjustments to the road network in the vicinity of Bankstown Station.

Kerbside facility integration

Existing taxi facilities along North Terrace would be retained and would be visible from the new entrance to the station located on the northern side of the corridor.

The project would result in an increase in the number of kiss and ride spaces, all of which would be located along North Terrace adjacent to the new entrance to the station located on the northern side of the corridor.

Parking and loading zones

The project would not result in the loss of dedicated commuter parking. The existing car park located adjacent to the new station entrance on North Terrace would be removed, resulting in the loss of about 10 off-street parking spaces.

The provision of kerbside facilities would not result in the loss of any on-street parking areas.

One additional accessible parking space would be provided on North Terrace.

The project would not affect loading zones at Bankstown Station.

11.5 Mitigation measures

11.5.1 Approach to mitigation and management

The project has been designed to provide efficient interchange between Sydney Metro and other forms of transport. Mitigation measures are proposed to further ensure that the project efficiently interchanges with other forms of transport. This would include further consultation with relevant stakeholders to ensure that impacts to on-road facilities is minimised.

11.5.2 List of mitigation measures

The operational traffic and transport mitigation measures that would be implemented are listed in Table 11.7.

Table 11.7 Mitigation measures – operational traffic and transport

ID	Impact/issue	Mitigation measure	Relevant location(s)
Design/pre-construction			
TO1	Parking impacts	Further consideration of car parking management at stations would be undertaken in consultation with Roads and Maritime Services, the Sydney Coordination Office, and the Inner West and Canterbury-Bankstown councils, to minimise adverse impacts of operation on parking and other kerbside use in local streets.	All stations
Operation			
TO2	Walking	Transport for NSW would work with the Inner West and Canterbury-Bankstown councils to identify and provide improvements and minimise adverse impacts to the surrounding pedestrian network.	All stations
TO3	Cycling	Transport for NSW would work with the Inner West and Canterbury-Bankstown councils and other relevant stakeholders to enhance areas around stations for cyclists.	All stations
TO4	Bus	Transport for NSW would work with the Sydney Co-ordination Office, Roads and Maritime Services, the Inner West and Canterbury-Bankstown councils, and	All stations

ID	Impact/issue	Mitigation measure	Relevant location(s)
		bus operators to identify improvements to bus stops and services.	
TO5	Active transport corridor	Transport for NSW would work with the Department of Planning and Environment to support the development of an active transport corridor along the alignment, including walking and cycling infrastructure. Transport for NSW would deliver sections of the active transport corridor around stations.	All
TO6	Commuter parking	Transport for NSW would monitor the demand for additional commuter car parking spaces and consider opportunities for, and implications of, meeting this demand between Bankstown and Marrickville stations. Transport for NSW would consider provision for additional commuter car parking, subject to consideration of local station and town centre implications, including local traffic conditions.	All stations

11.5.3 Consideration of the interactions between mitigation measures

Mitigation measures proposed to mitigate any traffic and transport impacts during operation are not considered to result in adverse interactions with other mitigation measures.

11.5.4 Managing residual impacts

With the implementation of identified mitigations measures and ongoing development of the design (during detailed design) residual impacts on traffic and transport in the vicinity of the project area are considered to be minimal. This includes consideration of the future redevelopment of the Sydenham to Bankstown Line corridor in accordance with the draft *Sydenham to Bankstown Urban Renewal Corridor Strategy*. There is however potential for residual impacts to occur due to unforeseen changes in land use that may affect patronage at stations.