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Commuter Car Park Program

Traffic, Transport and Access Impact Assessment

Edmondson Park South Commuter Car Park

MTMS0TA-FURL-EDP-TP-RPT-140001

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Contents

1 Executive Summary

Transport for NSW (TfNSW) is undertaking a program to develop commuter car parks at up to 15 locations across Sydney. The development of these car parks contributes towards Transport for NSW's initiative of providing seamless integration of transport services across different modes.

The NSW Government has committed to delivering up to 2,000 additional car parking spaces at Edmondson Park Station as part of the Commuter Car Park Program. The first step in delivering these additional parking spaces is a proposed new Multi Storey Car Park (MSCP) on an existing at-grade parking facility fronting onto Henderson Road (Lot 3, DP1200987). The 216 space at-grade commuter car park is proposed to be replaced with a MSCP of approximately 1270 spaces which will increase over-all parking capacity by approximately 1060 spaces.

The existing Edmondson Park Station services and facilities include:

- Rail services for the T2 and T5 Lines;
- A taxi rank and kiss and ride stopping area;
- One sheltered and three unsheltered bicycle parking areas providing 5 racks for up to 10 cycles each;
- Interchange area with sheltered bus stops for 859, 868, 869 bus services; and
- 531 at-grade commuter parking spaces

Construction Impacts

The following impacts are expected during the construction stage:

- Loss of 216 commuter parking spaces. To offset this impact, a temporary at-grade car park will be provided to offset all the parking spaces that would be temporarily lost during construction.
- To facilitate access from the north, it is recommended that consideration be given to modifying the intersection of Buchan Avenue and Soldiers Parade to include a southbound right turn from Soldiers Parade into Buchan Avenue;
- Based on a peak workforce of 80, and assuming that 40 percent of workers choose to travel to the site daily by car, with a car occupancy rate of 1.5 workers per vehicle, the increased demand for parking could be as high as 21 spaces (just over four percent of current capacity);
- To offset the parking losses during construction the proposed temporary parking facility will need to accommodate approximately 230 spaces, subject to detailed design;
- Deliveries to and from the sites would peak at 60 trucks per day, during the concrete pours and would be spread evenly throughout the day (7 to 8 trucks per hour). This peak impact would be for the duration of construction of the MSCP superstructure, a 20-week period; and
- The combined construction movements (deliveries and worker trips by car) represent less than a 2 percent increase in traffic movements at the intersection of Soldiers Parade and Henderson Road, during peak periods.

Operational Impacts

The following impacts are expected during the construction stage:

- The proposed MSCP would increase commuter car parking capacity at the station by approximately 1060 spaces (100 percent increase). This is expected to reduce informal over- flow parking issues throughout the precinct;
- Access to the MSCP site is subject to detailed design and consultation with relevant stakeholders but this assessment assumes access to be primarily via Buchan Avenue, Bernera Road and MacDonald Road. The design for the intersection of Soldiers Parade and Buchan Avenue does not include a southbound right turn from Soldiers Parade, or an eastbound right turn from Buchan

Avenue. These movements are restricted by a central median. During detailed design it is recommended to further consider opening that median to accommodate both movements;

- Based on an additional capacity of 2,000 spaces, the MSCP would generate 840 inbound trips during the AM peak hour; and 700 outbound trips during the PM peak hour; and
- Analysis of road network performance, under the impact of the MSCP, revealed that all critical intersections around the site would operate at satisfactory levels of service (LoS 'D' or better).

2 Introduction

2.1 Overview of Proposal

The NSW Government is committed to delivering accessible public transport infrastructure, which is why more commuter car parks are being provided where they are needed. The delivery of commuter car parks at key transport interchanges will provide a range of benefits, including:

- improving customer access to the public transport network;
- encouraging mode shift away from private vehicles; and
- reducing congestion on our road network.

The Commuter Car Park (CCP) Program upgrades contribute towards the NSW Government's objectives of increasing public transport patronage by making public transport more accessible to all customers.

TfNSW is planning to provide up to 2,000 additional commuter car parking spaces at Edmondson Park Station. This Traffic, Transport and Access Impact Assessment (TTAIA) discusses the impacts of providing approximately 1,000 additional commuter car parking spaces at Edmondson Park on the site of the existing at-grade car park on the southern side of the station, which is the first step in delivering up to 2,000 additional parking spaces.

2.2 The proposed Activity

The proposed activity is to build a multi-storey commuter car park (MSCP) on the southern side of the station on an existing at-grade parking facility fronting onto Henderson Road (Lot 3, DP1200987). This proposed activity will increase overall precinct parking capacity by approximately 1,000 spaces.

The Edmondson Park precinct currently has approximately 195 spaces in the northern at-grade car park, 216 spaces in the southern at-grade car park and 120 on-street parking spaces around the precinct. The current commuter car parking facilities are significantly over-subscribed, which has led to parking overspill into adjacent roads and illegal parking practices within the precinct.

TfNSW is currently investigating the provision of further additional car parking spaces facility within the station precinct to meet the commitment of up to 2,000 additional spaces. In the impact assessment that follows, an additional capacity of 2,000 spaces has been assumed.

Subject to planning approval, construction is expected to commence in mid-2020, and be complete in mid-2021. A detailed description of the Proposal is provided in the Section 3.

2.3 Purpose of the Assessment

This TTAIA will support the Review of Environmental Factors (REF) for the proposed activity, which is being prepared by TfNSW, in accordance with the relevant Clause 228 factors under the *Environmental Planning and Assessment Regulation 2000* and the *State Environmental Planning Policy (Infrastructure) 2007 (ISEPP).*

Figure 1: Locality Map of the Edmondson Park MSCP site

3 Description of the Proposal

3.1 The Proposal

The proposal is to construct a MSCP within the Edmondson Park Station precinct to provide approximately 1,000 additional commuter parking spaces (refer Figure 2).

The MSCP is 7,700 m^2 in area and is located on an existing at-grade parking facility fronting onto Henderson Road (Lot 3, DP1200987). The at-grade facility is proposed to be replaced with a multi-storey car park providing up to 1,278 spaces.

Access to the car park is subject to detailed design and consultation with relevant stakeholders. This assessment has considered access to the car park via a new extension of Buchan Avenue, the northern Station Access Road, MacDonald Road and Henderson Road, with the car park entry located mid-block on Henderson Road between MacDonald Road and Main Street.

Subject to detailed design and consultation with relevant stakeholders, there is potential for:

- a mid-block closure of Henderson Road, west of Main Street; and
- a mid-block closure of the Northern Station Access Road, east of the at-grade car park access.

The indicative access arrangements are presented in Figure 3 and Figure 4.

Subject to planning approval, construction of the car park is expected to commence in mid-2020, and be completed in mid-2021.

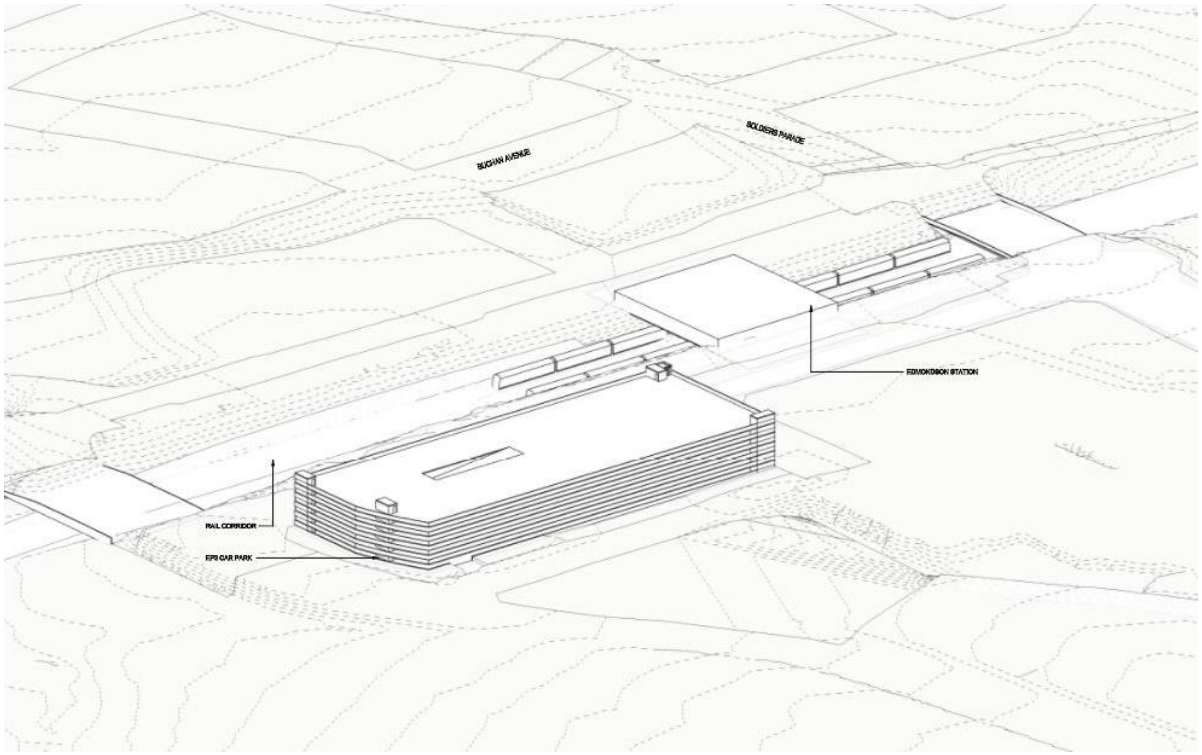


Figure 2: Indicative Layout of MSCP Site

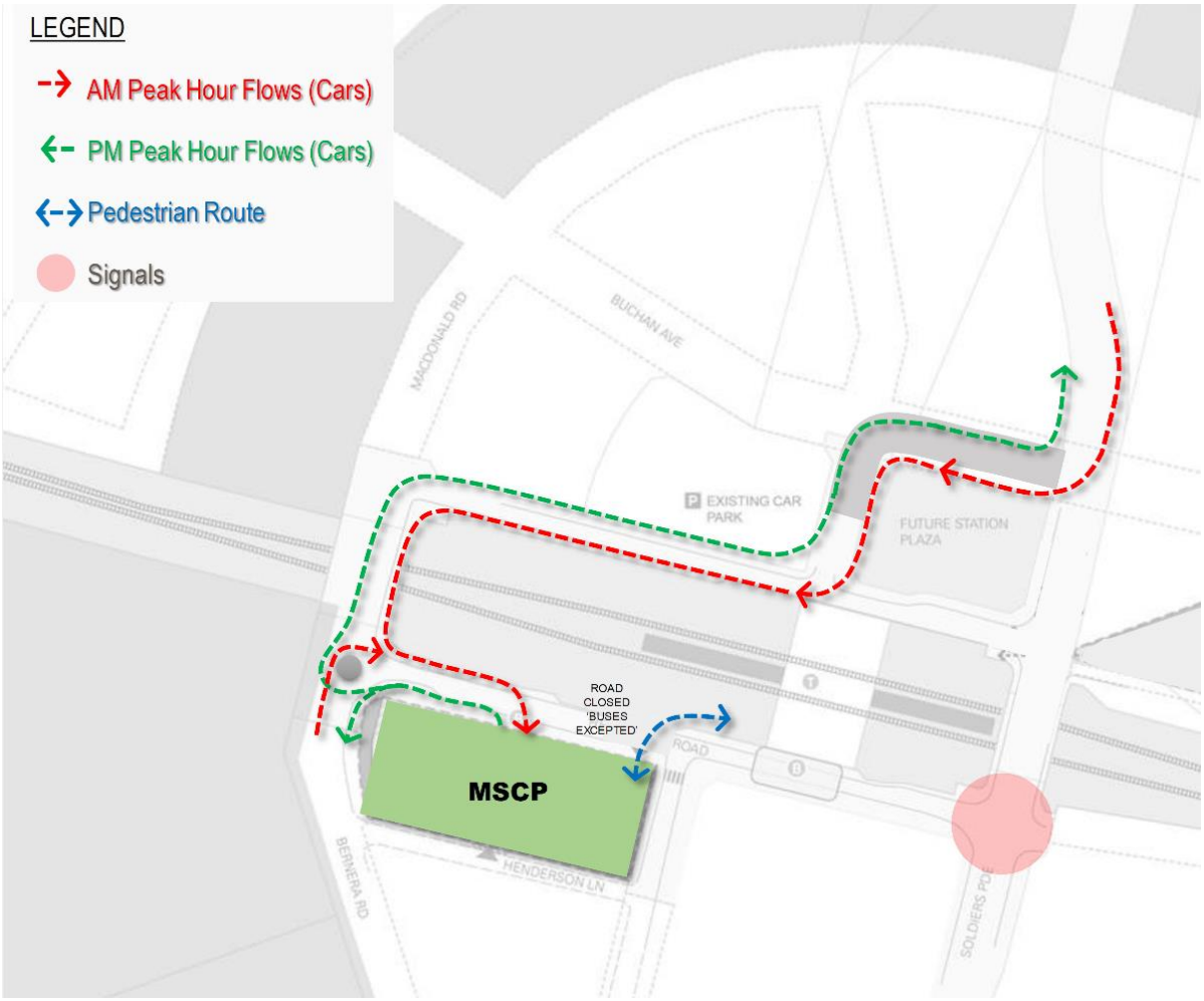


Figure 3: Indicative MSCP Access Arrangements, Partial Network

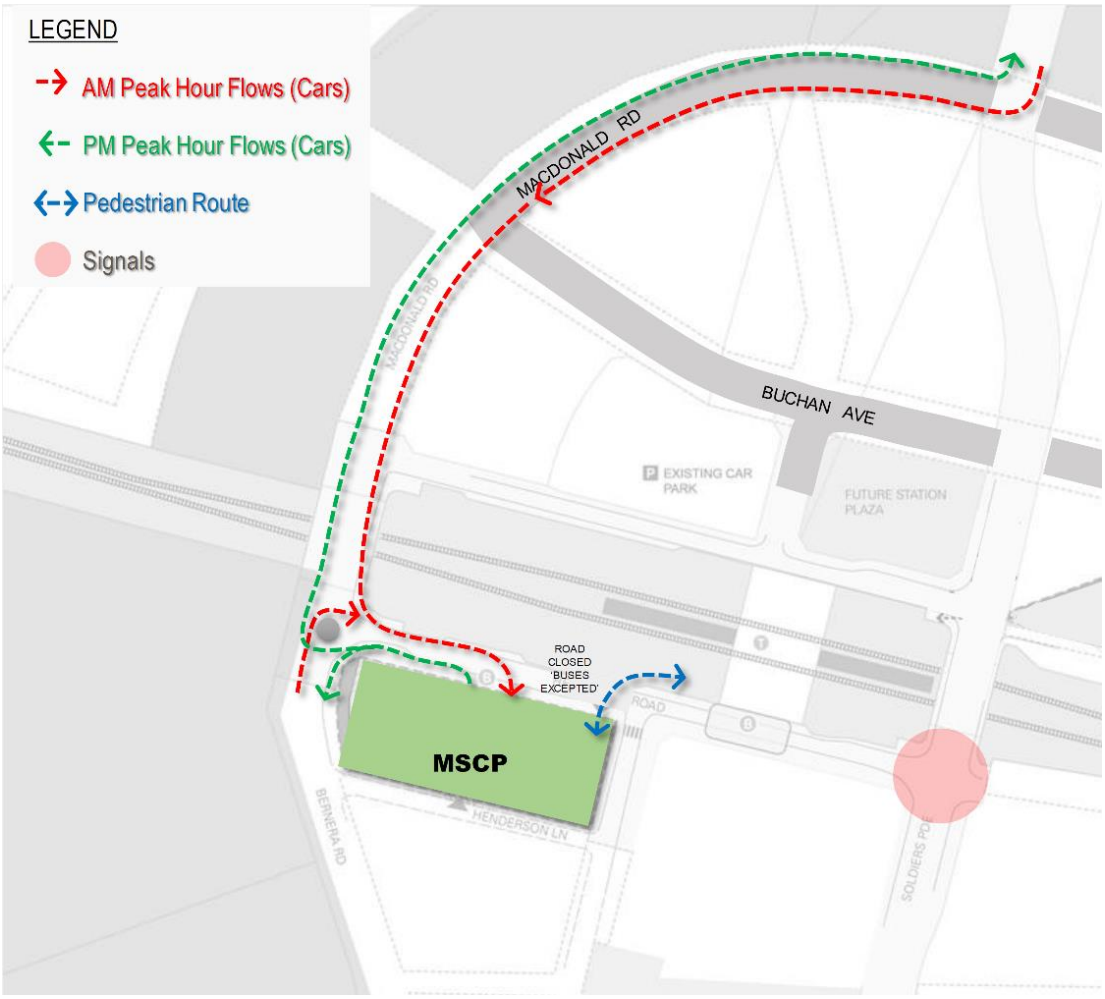


Figure 4: Indicative MSCP Access Arrangements, Full Network

3.2 Construction Activities

3.2.1 Methodology

Subject to planning approval, construction of the MSCP is expected to be complete in mid-2021.

The construction methodology would be further developed during the detailed design of the Proposal by the nominated construction contractor in consultation with TfNSW.

The indicative construction activities for the site are identified in Table 1.

This staging is indicative and is based on the current concept designs and may change once the detailed design methodology is finalised. The staging is also dependent on the Contractor's preferred methodology, program and sequencing of work.

3.2.2 Plant and Equipment

The plant and equipment likely to be used during construction includes:

- Tower and mobile cranes;
- Water trucks, street sweepers, road saws, rollers, road saws, trench compactors, concrete trucks, semi-trailers and spoil trucks (truck and dog);
- Welding equipment, air compressors, concrete saws, generators, concrete vibrators, concrete pumps, jack hammer;
- Excavators (8-30 tonnes); and
- Elevated work platforms.

3.2.3 Working Hours

Most works required for the Proposal would be undertaken during standard NSW Environment Protection Authority (EPA) construction hours, as follows:

- 7am to 6pm Monday to Friday
- 8am to 1pm Saturdays
- no work on Sundays or public holidays.

Certain works may need to occur outside standard hours to minimise disruption to customers, pedestrians, road users and nearby sensitive receivers.

Approval from Transport for NSW would be required for any out of hours work and the affected community would be notified as outlined in Transport for NSW's *Construction Noise and Vibration Strategy* (Transport for NSW, 2019).

3.2.1 Earthworks

Excavations and earthworks at the MSCP site would be minimal as works would be undertaken on an existing at-grade car park. The existing at-grade car park may be regraded in some areas with minor levelling to allow for column placement and foundations.

Excavations and earthworks would generally be required for footings and foundations for the car park, lift shaft, drainage/stormwater works, and trenching activities for service adjustments and relocations.

Excavated material would be reused onsite where possible or disposed of in accordance with relevant legislative requirements.

Table 1: Indicative Construction Staging for Key Activities

STAGE	ACTIVITIES	DURATION (WEEKS)	MAXIMUM DAILY DELIVERIES (TRUCKS)	MAXIMUM DAILY WORKFORCE
Site preparation	• Secure site boundary with temporary fencing and hoarding • Provide traffic and pedestrian controls in the vicinity of the proposal site in accordance with Liverpool City Council requirements • Undertake survey to identify site boundary and mark out existing services and proposed foundations of car park • Clear site of any existing vegetation not being retained, and demolish obsolete kerbs and pavements • Establish site office, amenities and plant/material storage areas • Establish other environmental controls, such as erosion and sediment controls.	4	32	18
Utilities infrastructure	• Locate and excavate storm water drainage and undertake storm water relocation works • Provide necessary services to various points within the car park footprint.	4	32	24
Foundations	• Prepare site for construction of foundations • Construct piles and ensure adequate embedment into appropriate bedrock is achieved • Construct footing beams and pile caps over new piles • Form and pour ground floor slab.	10	40	35
Superstructure	• Construct suspended levels, including stairs, walls and columns one level at a time • Construct block work on each level • Make good of at grade car park where existing surface has been disturbed for installation of services or construction of new foundations • Install new lifts • Install electrical, hydraulic and mechanical services infrastructure.	20	60	80
Architectural features/ finishes	• Install protective screens around building perimeter • Install vehicular crash barriers • Install balustrades • Install new cladding • Landscape area at ground level • Painting of car park concrete elements • Marking of car park lines, directional arrows etc and installation of way finding signage • Construct new footpaths, kerbs and accesses within the proposal site to link adjacent infrastructure.	4	32	45

3.2.1 Traffic Access and Vehicle Movements

The MSCP site has good construction access via the signals at Henderson Road and Soldiers Parade. This intersection accommodates all movements to/from the north and south (Refer Figure 5).

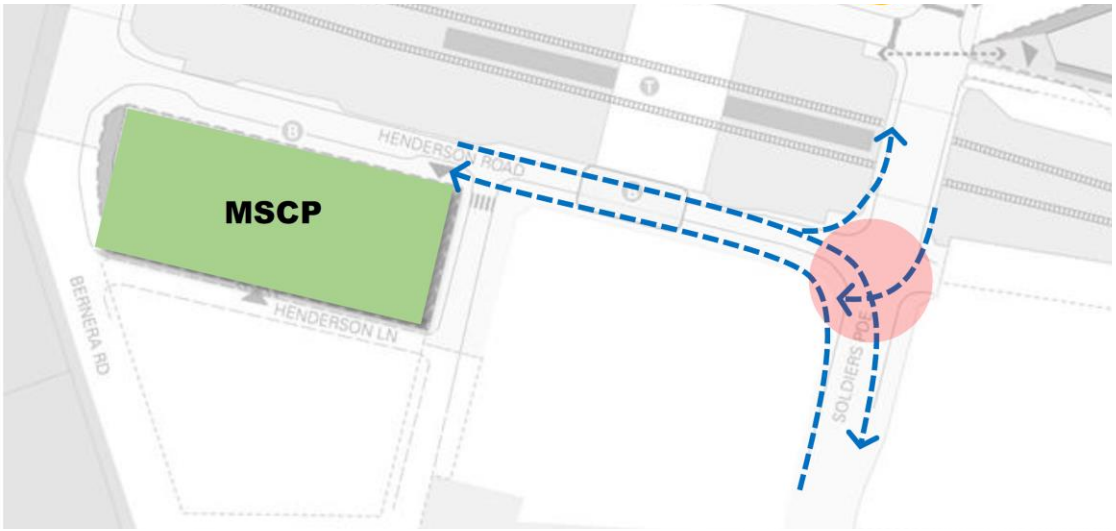


Figure 5: Proposed construction traffic access

3.3 Operations and Maintenance

The MSCP would operate 24/7 with access security provided by Opal Card operated boom gates.

The operation and maintenance of the proposed commuter car park is subject to further discussions with Sydney Trains, TfNSW and Liverpool City Council. The car park structure constructed under this Proposal would be maintained by Sydney Trains.

3.4 Design Standards

The Proposal would be designed in accordance with the following standards and guidelines:

- Transport for NSW *Wayfinding Planning Guide, Car Parks, Dec 2018*
- Transport for NSW *Commuter Car Parks Urban Design Guidelines*
- Transport Access Program *Urban Design Plan Guidelines*
- *Disability Standards for Accessible Public Transport 2002*
- *Disability Discrimination Act 1992* (Cwth)
- Building Code of Australia
- Relevant Australian Standards
- Asset Standards Authority (ASA) standards
- Crime Prevention Through Environmental Design (CPTED) principles
- Council standards, where relevant.

4 Existing Transport Access Arrangements

The suburb of Edmondson Park is located within the Liverpool Council LGA, approximately eight km south-west of the Liverpool City Centre and 40km south-west of the Sydney Central Business District (CBD).

The Edmondson Park interchange precinct consists of a train station and bus interchange with two connecting bus routes to the surrounding suburbs. The precinct provides people with the opportunity to access and transfer between transport modes including train, bus, bicycle and private vehicle. The station is located on the western side of Soldiers Parade and is mostly isolated from residential and employment land uses, although several residential, retail and commercial development sites, to the south of the station, are under construction.

Edmondson Park is bounded by the localities of Prestons and Horningsea Park to the north, Bardia to the south, Leppington and Denham Court to the west and Casula to the east.

The land is zoned B4 - Mixed Use under the *State Environmental Planning Policy (State Significant Precincts) 2005*. Land zoning surrounding the site comprises mixed use top the north and south, and Regional Park to west. The layout of the existing interchange is presented in Figure 6.

4.1 Land Use Context

Edmondson Park is a major land release area in the south west growth region of Greater Sydney. It was rezoned for urban development in 2008 and is one of the first areas to be planned under the NSW Government's South West Sydney Priority Growth Area (formerly the South West Growth Centre).

Edmondson Park is no longer part of the South West Sydney Priority Growth Area. However, the Department maintains a role in regional infrastructure co-ordination and delivery in the area through a Special Infrastructure Contribution (SIC) requirement, as well as bio-certification offsets. The planning delivery and consent roles are administered by Liverpool and Campbelltown Councils.

Edmondson Park encompasses two key master planned areas, currently being delivered to the south and north of the station. The master plans include a mixed-use town centre directly to the south of the station, with a variety of residential typologies surrounding it with new public open spaces, public and active transport links. The first residential apartment buildings of this precinct are currently under construction to the south of the station.

In March 2010, the Edmondson Park South Concept Plan (MP10_0118) was lodged by Landcom which established the overall planning framework for Edmondson Park South. On 18 August 2011, the Concept Plan (MP10_0118) was approved by the Planning Assessment Commission.

The planned development at Edmondson Park is the most significant near Edmondson Park Station. The release and rezoning of land is expected to accommodate up to 6,700 dwellings. The number of dwellings is expected to increase at Edmondson Park as a result of intensification within the Edmondson Park Town Centre North under MP10_0118 MOD 5.

The proposed future Town Centre access arrangements are presented in Figure 7.

Figure 6: Layout of the Edmondson Park Station Interchange Precinct

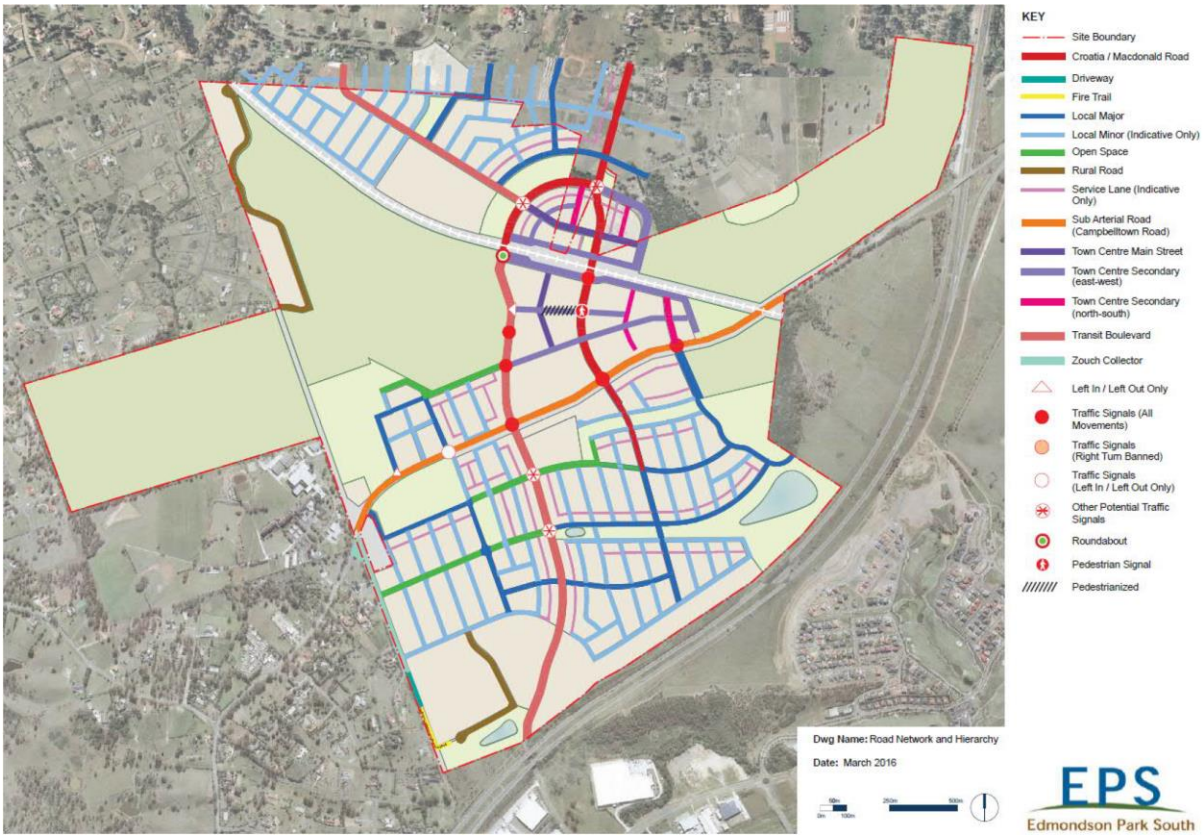


Figure 7: Edmondson Park South Road Network (Source: Robertsday, 2018)

4.2 Rail Services

Edmondson Park Station is serviced by the T2 Inner West & Leppington Line and the T5 Cumberland Line, providing train services between Richmond, Parramatta and the Sydney CBD.

Edmondson Park Station consists of a single island platform with two tracks. Platform 1 services trains to the Inner West/CBD (T2 Line) or Richmond (T5 Line).

Platform 2 services trains to Leppington on the T2 Line and T5 Line. Opal poles are provided at the station entrance on the concourse level.

The number of services departing Edmondson Park Station Platform 1 rail to the City, Inner West and Richmond are presented in Table 2. Between 6.00 am and 7.00 am, a service departs Platform 1 on average every five to six minutes.

Table 2: AM peak hour inbound services

HOUR COMMENCING	T2 LINE SERVICES TO INNER WEST AND CITY	T5 LINE SERVICES TO RICHMOND	TOTAL	AVERAGE SERVICE INTERVAL (MIN:SEC)
5.00 am	4	-	4	15:00
6.00 am	9	2	11	5:27
7.00 am	9	2	11	5:27
8.00 am	6	2	8	7:30
AM Peak Total	28	6	32	

Source: Transport for NSW timetable, valid from 5 January 2020

Figure 8: Sydney Rail Network

4.3 Station Patronage

A review of Edmondson Park Opal data for May and August 2019 recorded an average of 1,900 station entries and exits during the morning weekday peak period (5am to 9am). This four-hour period accounted for 71 percent (1,770) of all daily station entries during that period. The AM peak hour was recorded in the hour commencing at 7.00 am and represents 42 percent of the AM peak period.

Table 3: Edmondson Park Station entries (May to August 2019)

HOUR COMMENCING	AVERAGE STATION ENTRIES	AM PEAK DEMAND PROFILE (%)	DAILY DEMAND PROFILE (%)
5.00 am	155	9%	6%
6.00 am	506	29%	20%
7.00 am	733	42%	30%
8.00 am	372	21%	15%
AM Peak Total	1766	100%	71%
Daily Total	2483		100%

Source: Station Entry/Exit Opal Data (May-August 2019)

Given the station location at the end of the T2 Inner West & Leppington Line and the T5 Cumberland Line, most customers arriving at the station in the morning peak are travelling towards the City, Parramatta or Richmond.

Land-use around the Edmondson Park station is under development. There are currently no major trip generators or attractors within 800 m of the site. This will change over time as the Edmondson Park release area is developed. However, a consequence of the current land use is that the station demand patterns are very tidal in nature, mostly inbound in the AM towards the major City employment areas and then outbound in the PM peak on the return journey to Edmondson Park (Refer Figure 9).

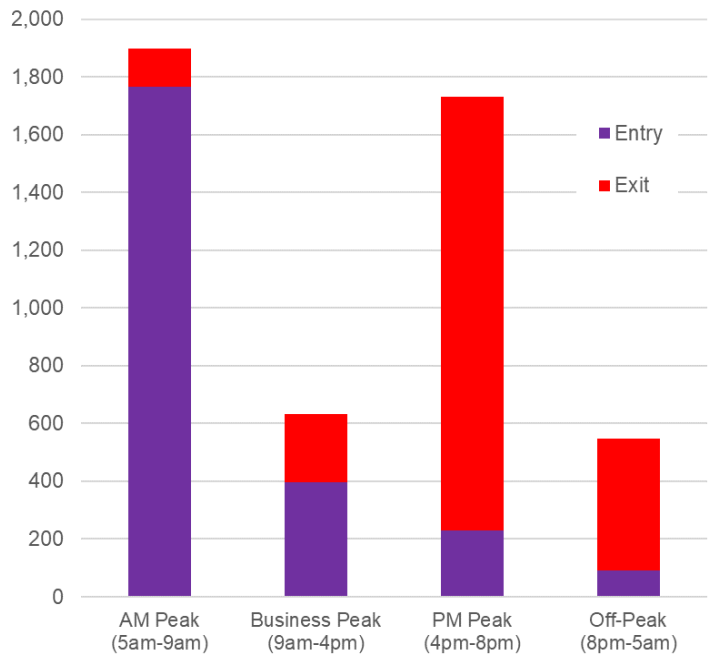


Figure 9: 2019 station entry and exit profiles

4.4 Access mode share

Another consequence of the current land use context is that the access mode share is mostly park and ride. This is a consequence of:

- Poor active transport links between the station and the existing residential catchments within 5 km of the station. These will improve soon with the development of the town centre to the immediate south of the station; and
- The quality of bus services connecting the station to the larger residential catchments to the north of Camden Valley Way. It is faster for customers to drive a car to the station than catch a bus.

4.5 Walking

Pedestrian access to the concourse at Edmondson Park Station is provided via shared footpaths to the north and south of the station. From the concourse, two sets of stairs located in the paid area provide access to the platform level. Lifts are also available in the paid area.

Pedestrian access to the existing commuter car parks is provided via shared footpaths to the north and south of the station along Henderson Road and the northern CCP access road. Raised pedestrian crossing facilities are provided across these roads, providing a link between the at-grade CCPs and the station entrances. Crossings are also provided at key point across the internal car park access roads.

Further outside the precinct, there are shared two-way paths along the western side of Soldiers Parade, with appropriate signage and line markings to ensure safety and guidance for cyclists and pedestrians accessing the site. A signalised crossing is also provided on the western approach of Henderson Road at Soldiers Parade. This is the only station pedestrian approach with a formal signalised pedestrian crossing facility. There are no formal east-west pedestrian crossing facilities across Soldiers Parade in the vicinity of the station. Additionally, off-road pedestrian and cycling facilities are being provided along both sides of Campbelltown Road between MacDonald Road and Soldiers Parade.

Overall, the pedestrian connectivity to Edmondson Park Station is poor because the surrounding area is largely undeveloped. Pedestrian infrastructure has been implemented to service the immediate vicinity of the site; however, it is expected that once the area develops, that pedestrian connectivity to the station will be improved.

4.6 Cycling

Within Edmondson Park Station, 40 bicycle parking spaces are currently provided near the station entrances on the northern and southern access roads fronting the station and consist of one sheltered bicycle parking area and three unsheltered bicycle parking areas. There are five u-rails at each bicycle parking area.

Off-road cycling facilities (trails) are provided along Campbelltown Road near Edmondson Park Station. There are shared two-way paths along the western side of Soldiers Parade, with appropriate signage and line markings to ensure safety and guidance for cyclists and pedestrians accessing the site. A signalised crossing is also provided on the western approach of Henderson Road at Soldiers Parade.

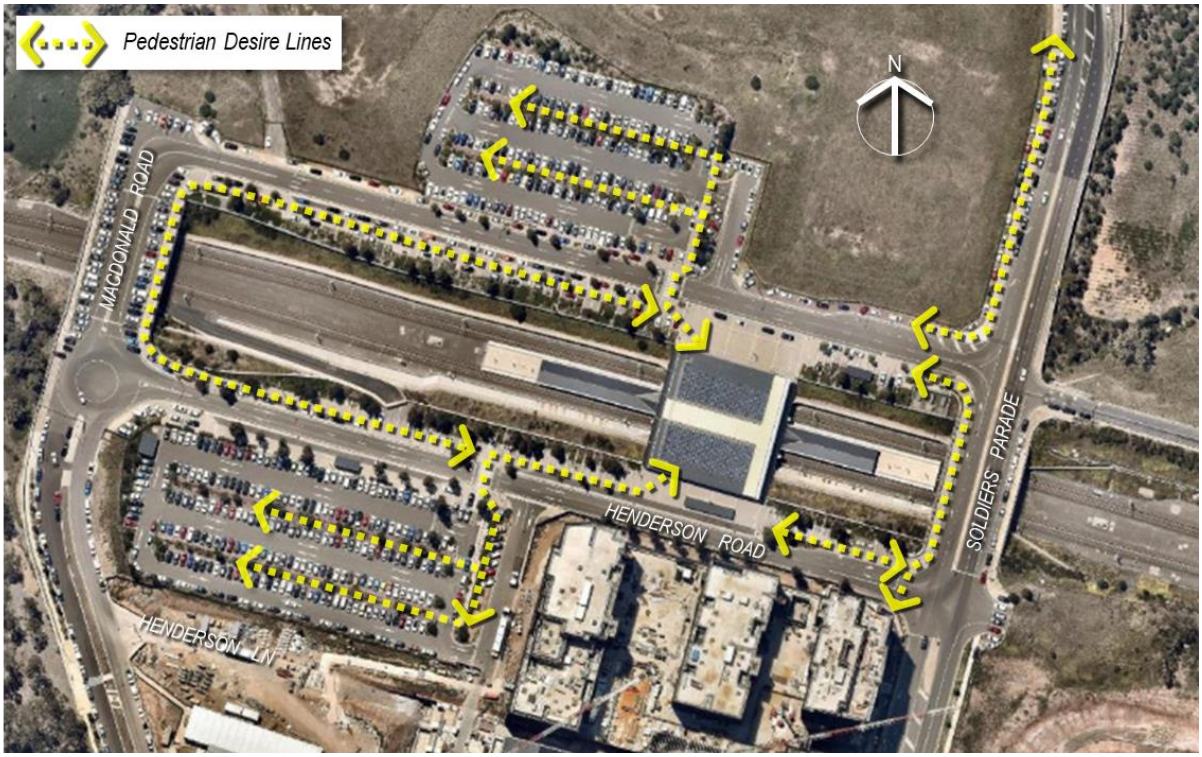


Figure 10: Existing pedestrian facilities and desire lines at the Edmondson Park Station Commuter Car Park

4.7 Bus

The following Interline Bus Services routes currently operate through the Edmondson Park Station interchange:

- Bus Route 859 – operates to the north between Carnes Hill and Edmondson Park Station as shown in Figure 11.
- Bus Route 868 – operates to the south between Edmondson Park Station and Ingleburn as shown in Figure 12
- Bus Route 869 – operates between Ingleburn and Liverpool via Edmondson Park and Prestons as shown in Figure 13.
- Additionally, on-demand services provide flexible public transport services between Edmondson Park Station and the Edmondson Park Estate, to the north of the station, extending up to Camden Valley Way, as outlined in Figure 14. These trial services began in January 2018. Services to the station operate between 6.00 am and 9.00 am. Services departing the station operate between 4.00 pm and 8.00 pm.

The bus interchange facility is located on the south side of the station at the eastern end of Henderson Road. While the signalisation of Henderson Road and Soldiers Parade facilitates bus access to the station, it also has the following disadvantages:

- Encourages general traffic to mix with bus operations
- Reduces pedestrian connectivity between the station entrance and the proposed town centre development to the south.

The bus interchange has seating, shelter, flag, timetable, rubbish bin and tactile facilities. Layover facilities are provided for Routes 859 and 868 at the western end of Henderson Road.

The number of buses arriving and departing the Edmondson Park Station during weekdays is provided in Table 4.

Table 4: Edmondson Park Station bus services

TIME	ROUTE 859		ROUTE 868		ROUTE 869	
	To Carnes Hilll	From Carnes Hill	To Ingleburn	From Ingleburn	To Liverpool	To Ingleburn
Before 6.00 am	-	-	1	1	2	2
6.00 am-9.00 am	5	6	3	4	7	6
9.00 am-4.00 pm	7	7	9	8	15	14
4.00 pm- 7.00 pm	5	6	4	4	7	6
After 7.00 pm	2	1	-	-	5	4
Total	*19*	*20*	*17*	*17*	36	32

Source: Transport for NSW

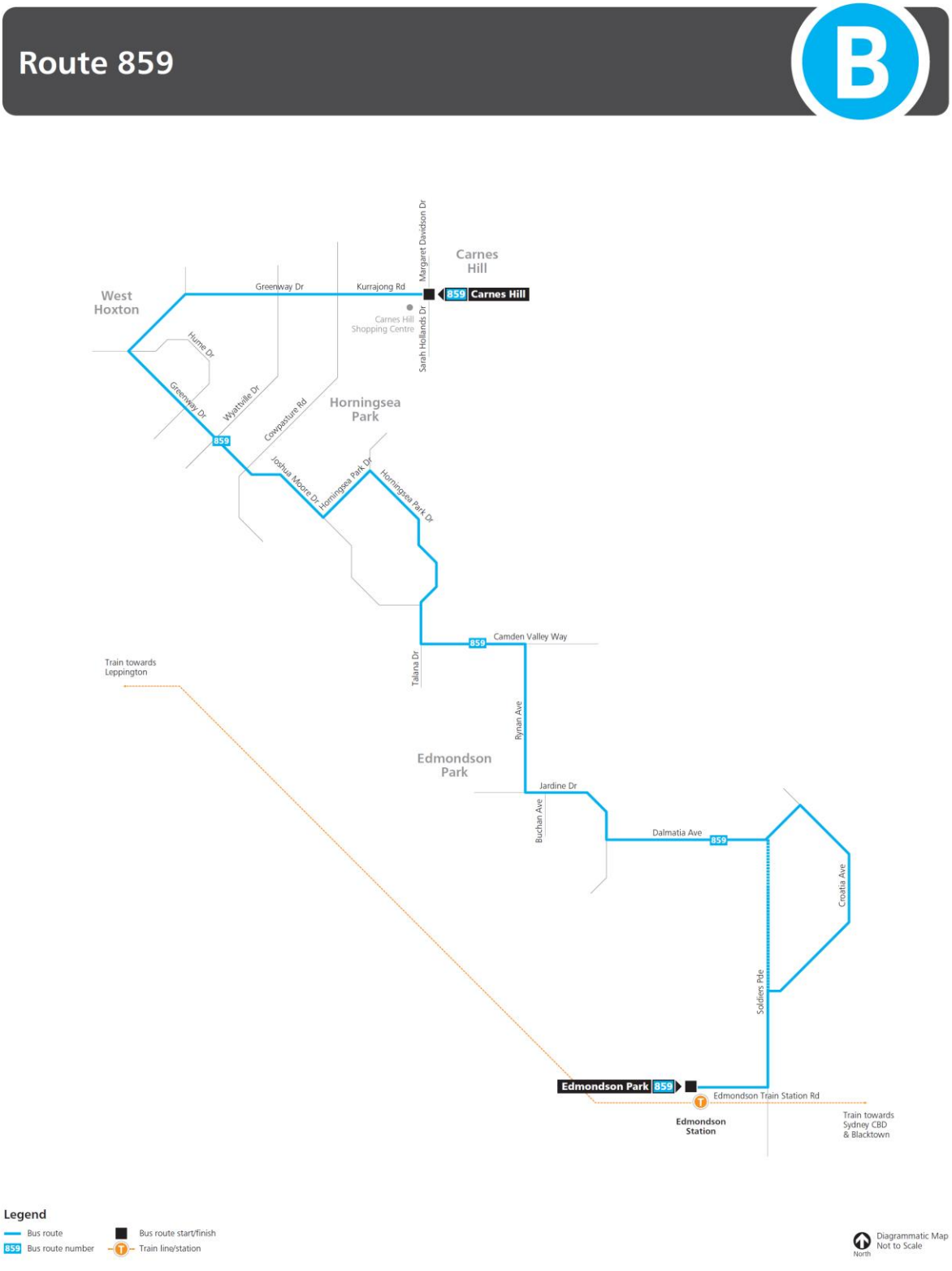


Figure 11: Bus Route 859

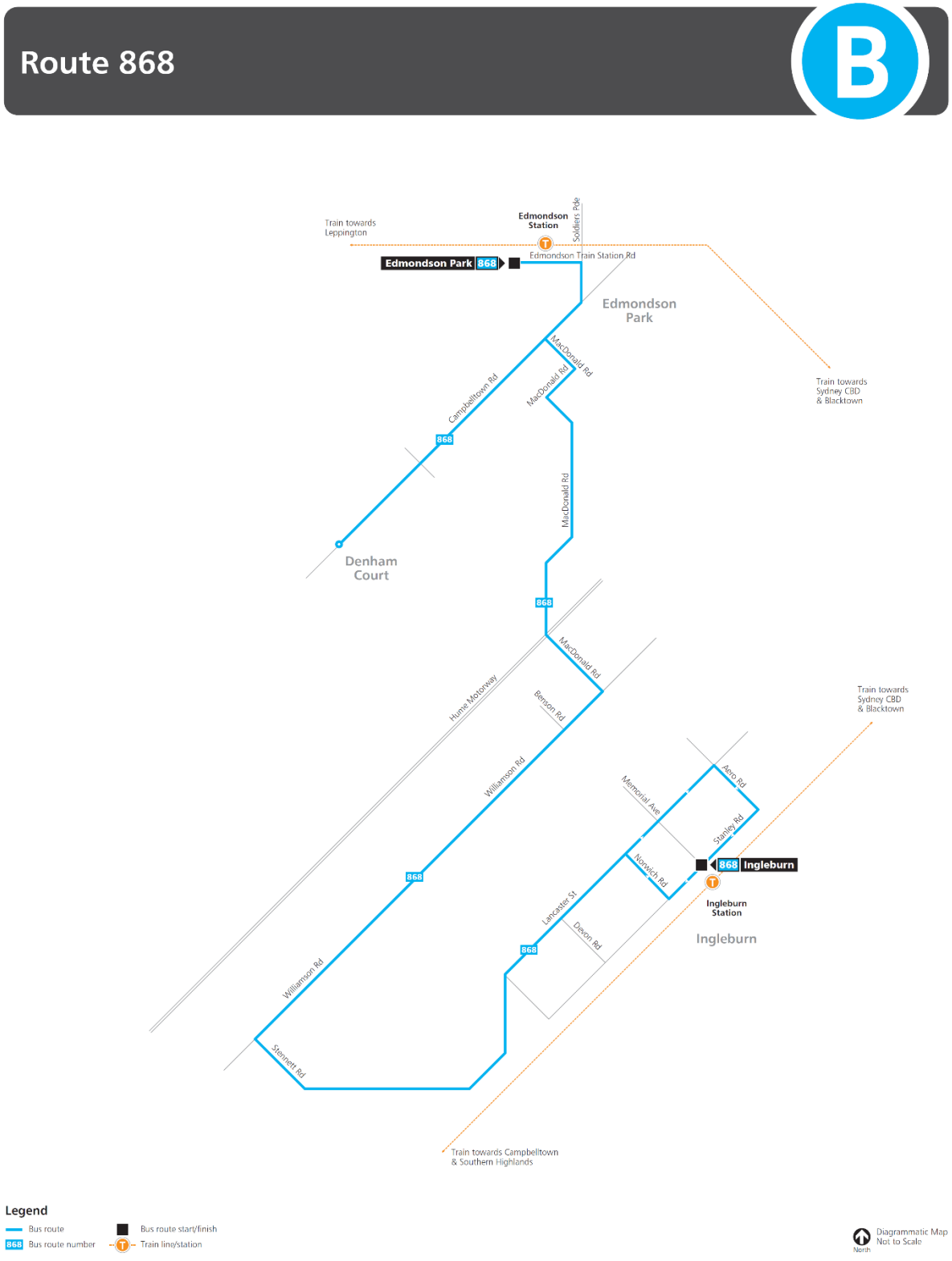


Figure 12: Bus Route 868

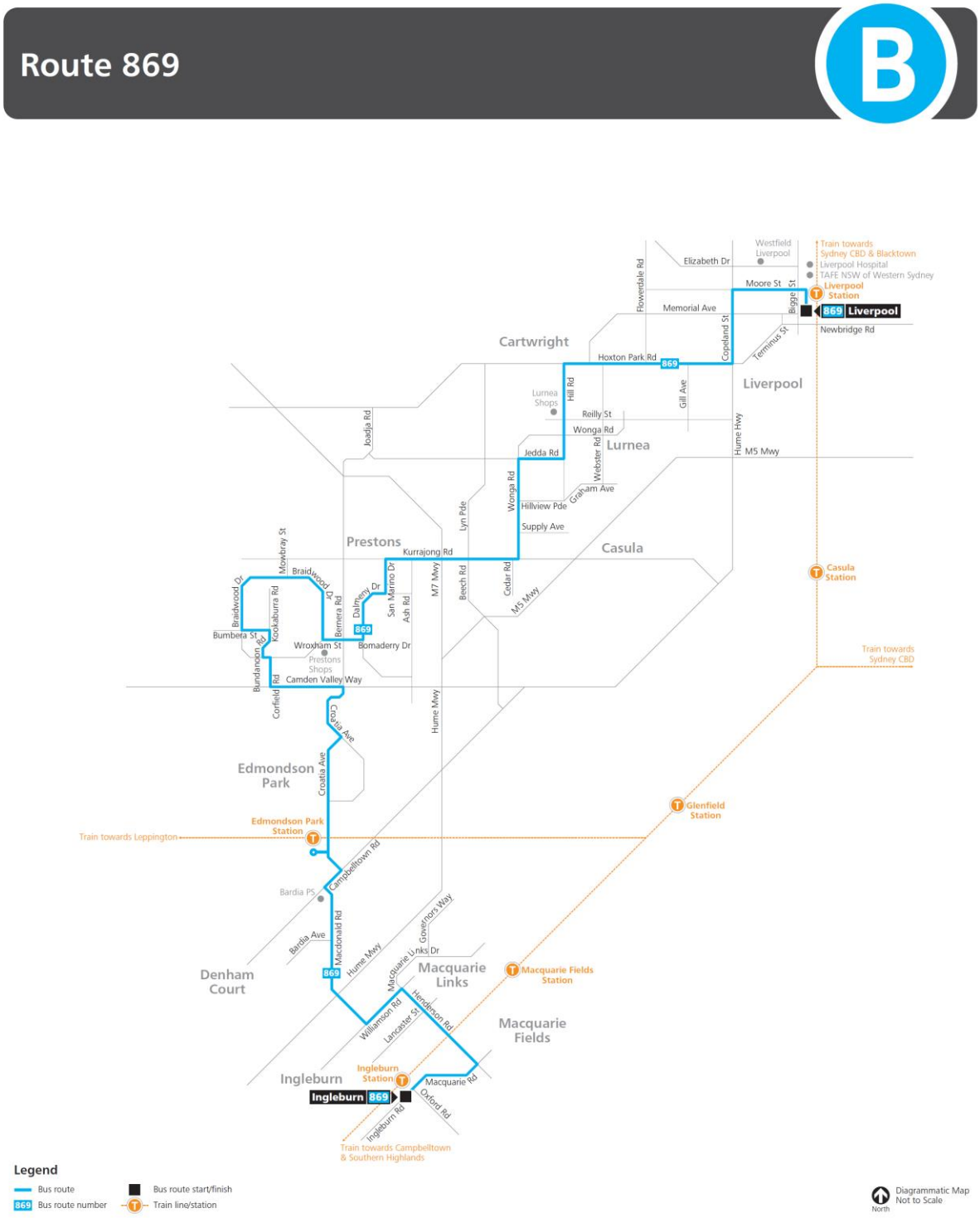


Figure 13: Bus Route 869

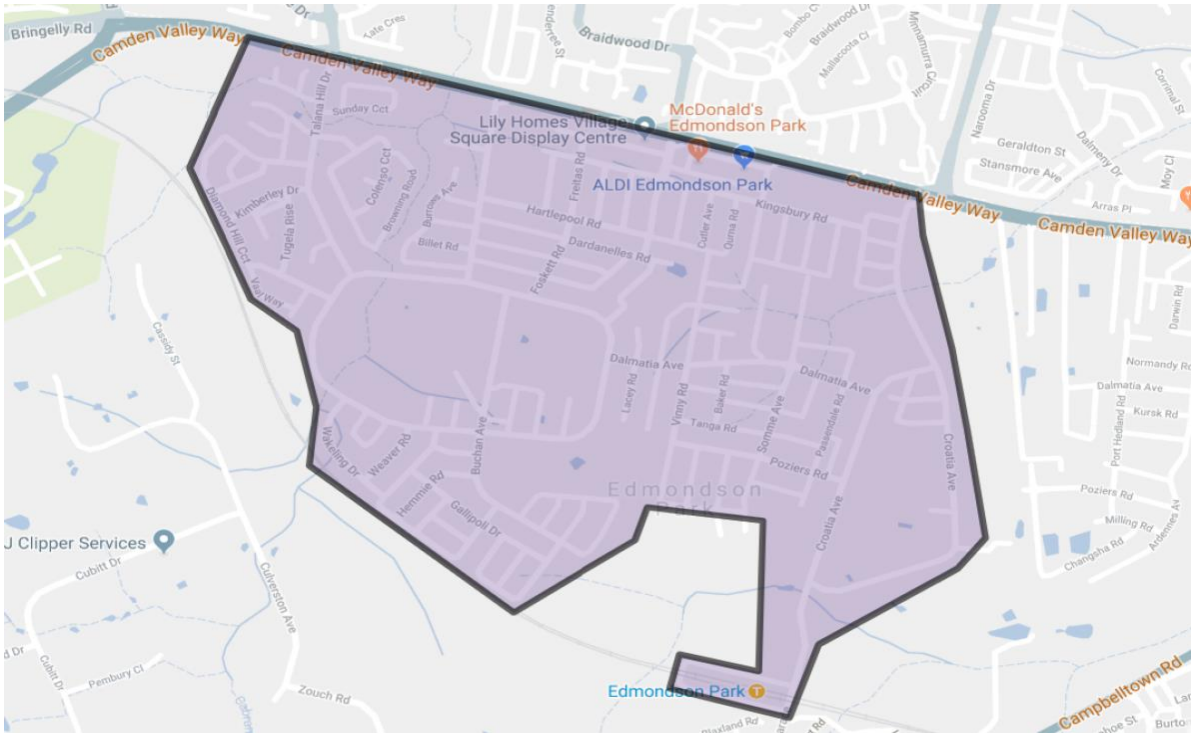


Figure 14: On-demand services catchment

4.8 Kiss and ride

A formal kiss and ride area is provided at Edmondson Park Station along its northern frontage with capacity for approximately 18 cars. Due to the over-subscription of adjacent park and ride facilities, it is common for the kiss and ride facility to be blocked with illegally parked commuter vehicles.

4.9 Taxi facilities

A taxi rank is provided on the northern side of Henderson Road, west of Main Street. It has a capacity for approximately six taxis. Due to the over-subscription of park and ride facilities, it is common for the taxi facility to be blocked with illegally parked commuter vehicles.

4.10 Road access

The existing road network near the Edmondson Park Station precinct includes Soldiers Parade, Campbelltown Road, Camden Valley Way and the Hume Highway. Figure 15 below shows the road hierarchy of existing road network adjacent to the Edmondson Park Station.

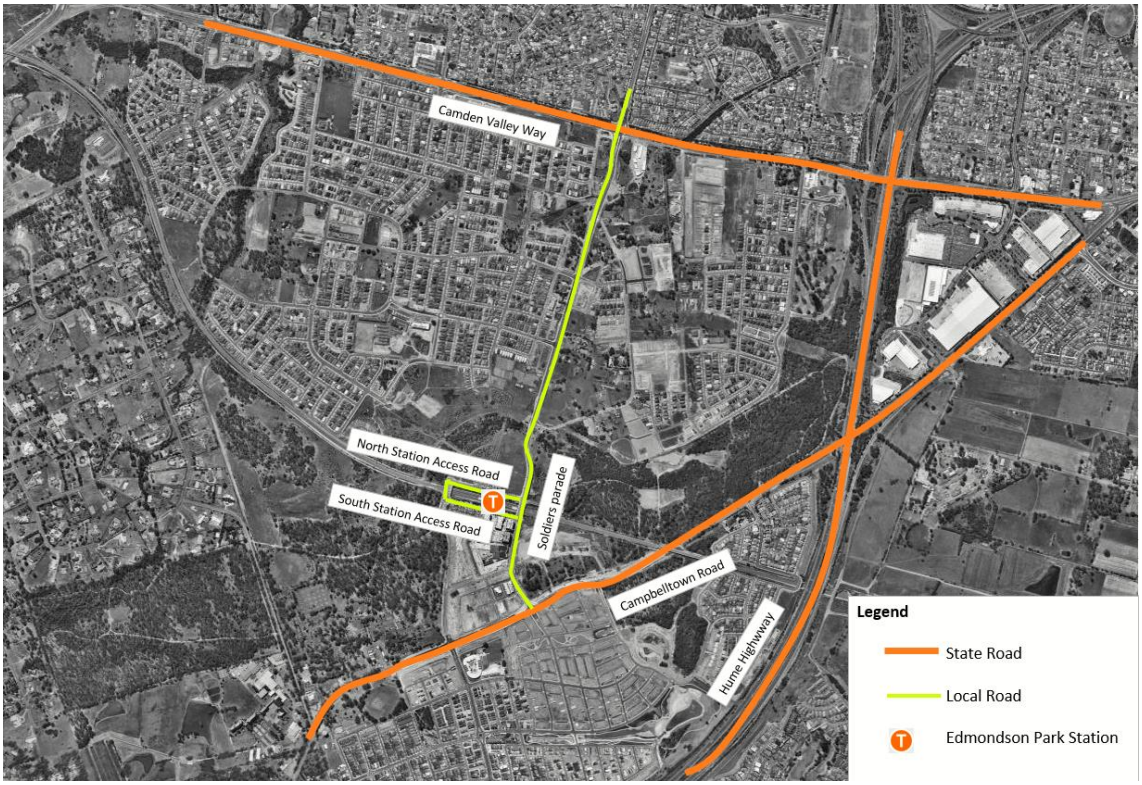


Figure 15: Edmondson Park road access network

4.10.1 Soldiers Parade

Soldiers Parade is a north-south local road connecting Edmondson Park to the State Road arterial network at Camden Valley Way to the north, and Cowpasture Road to the south. It is the main road access to the station precinct and is located immediately to the east of the station. It provides one traffic lane in each direction and has several turning lanes for access to and from the station. Near the station and approaching the State Road network it widens to dual carriageway.

Average weekday hourly demand profiles for Soldiers Parade are presented in Figure 16.

Shared paths are provided on the west side of Soldiers Parade, near to Edmondson Park Station, with limited crossing opportunities provided along the road.

The posted speed limit is 50 km/h. Speed surveys undertaken in December 2019 reveal that during the AM peak period the 85th percentile speeds are 45 to 47 km/h. In the PM peak, the 85th percentile speeds increase to 52 km/h to 61 km/h. Traffic signals are provided at the intersection of Soldiers Parade and Henderson Road.

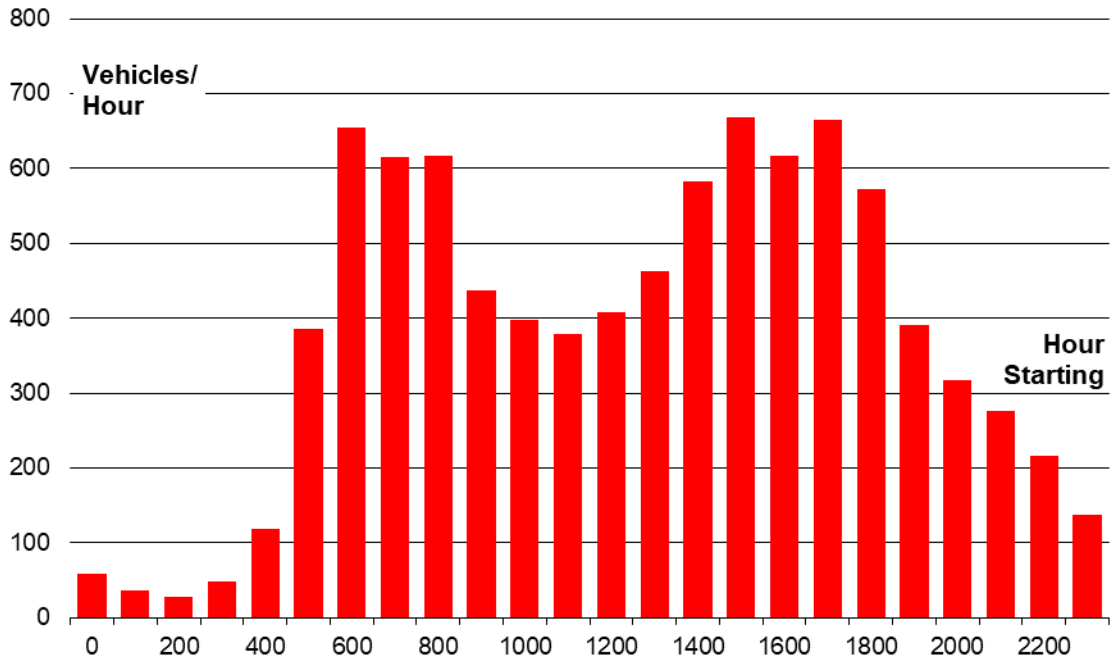


Figure 16: Soldiers Parade average weekday hourly demand profile, two-way (December 2019)

4.10.2 Campbelltown Road

Campbelltown Road is an east-west State Road link (MR177) located at the southern end of Soldiers Parade. Campbelltown Road is currently undergoing a major upgrade. Roads and Maritime is upgrading 5.4 km of Campbelltown Road between Camden Valley Way, Casula and Brooks Road, Denham Court. Stage 1 of this upgrade, between East Town Centre Road and the newly realigned MacDonald Road, is due for completion in 2020. The upgrade will:

- Widen Campbelltown Road from one lane in each direction to two, with potential to add a third lane if needed in the future
- Include major intersection upgrades at Soldiers Parade and MacDonald Road
- Provide off-road shared pedestrian/cyclist paths on both sides of Campbelltown Road
- Install designated turning lanes and cycle and pedestrian crossings at traffic lights.

The posted speed limit on Campbelltown Road is 70 km/h.

4.10.3 Camden Valley Way

Camden Valley Way is an east-west State Road link located to the north of Edmondson Park. It is a major transport route for communities in Sydney's South West Growth Centre, linking the Hume Highway and the Westlink M7 and M5 Motorway interchanges at Prestons with Camden, Narellan and Liverpool. The road comprises four lanes, divided by a large median. It is signed at 70 km/h in both directions of travel. Camden Valley Way operates as a public transport corridor servicing bus routes 851, 852, 855, 856, 857, 864, and 867.

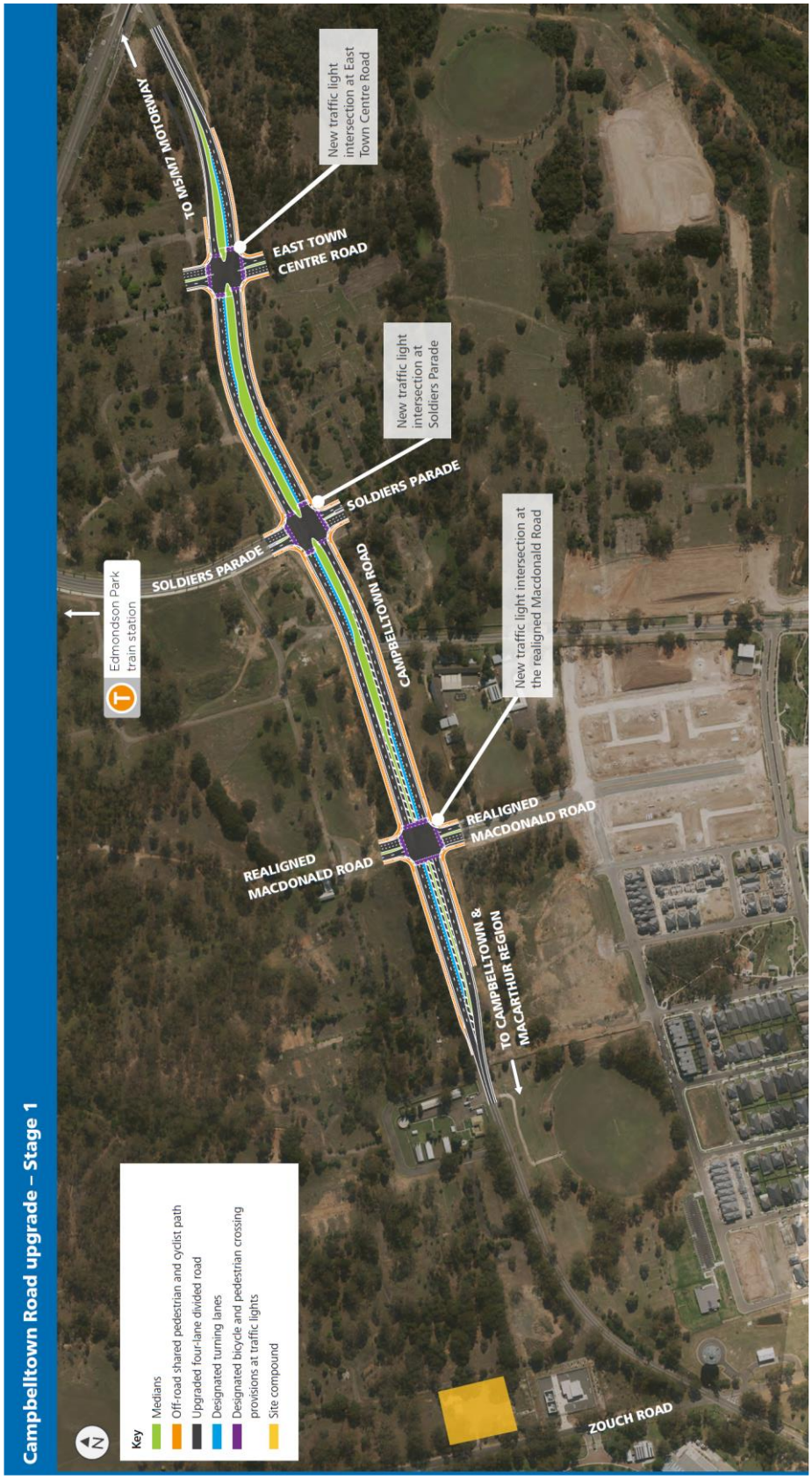


Figure 17: Campbelltown Road Upgrade, Stage 1 (Roads and Maritime)

4.10.4 The Hume Highway

The Hume Motorway is an eight lane, divided, classified road providing connection to the wider classified road network. It is used as a major north-south link providing access to the M5 Motorway as well as the Westlink M7. The road is signed at 110 km/h in both directions. There is currently no direct access from the Hume Motorway to the study area. The nearest southbound access is off Campbelltown Road near Bow Bowing. The nearest northbound access on to the freeway is made via Camden Valley Way.

4.11 Park and ride

Edmondson Park station provides the following 531 formal commuter car parking spaces:

- Northern Commuter Car Park: 195 spaces
- Southern Commuter Car park: 216 spaces
- On-street parking: 120 spaces.

External to Edmondson Park Station, kerbside parking is currently available along both sides of Soldiers Parade approximately 80 metres to the south of the southern car park entry. Angled parking is provided on the west side of Soldiers Parade, approximately 150 metres to the north of the northern car parking entry. Furthermore, several parking spaces have been line-marked on MacDonald Road—a section of road to the west of the station—as a temporary measure to provide additional parking spaces.

The current commuter car parking facilities are significantly over-subscribed, which has led to parking overspill into adjacent roads and illegal parking practices within the precinct. Most of the formal parking facilities within the precinct are typically full by 8.00 am.

A recent site visit, in December 2019, revealed up to 217 vehicles parked informally or illegally. This suggests that parking demand is exceeding capacity by at least 41 percent and that commuters are willing to risk fines. Anecdotal evidence suggests that the reasons for these parking behaviours may include:

- The additional commute time involved in transfers to other stations if unsuccessful in finding a space at Edmondson Park
- Lack of alternate parking capacity at adjacent stations (e.g. Leppington)
- Lack of information on real-time parking availability at other stations.

Number plate surveys, undertaken in 2018, reveal that from a sample of 802 vehicles using the commuter car park:

- 24 percent originated from Edmondson Park
- 82 percent originated from 15 local suburbs
- The weighted average travel distance for 82 percent of trips was just 3.9 km
- 84 percent of users originated north of the station
- 16 percent of users originated south of the station.

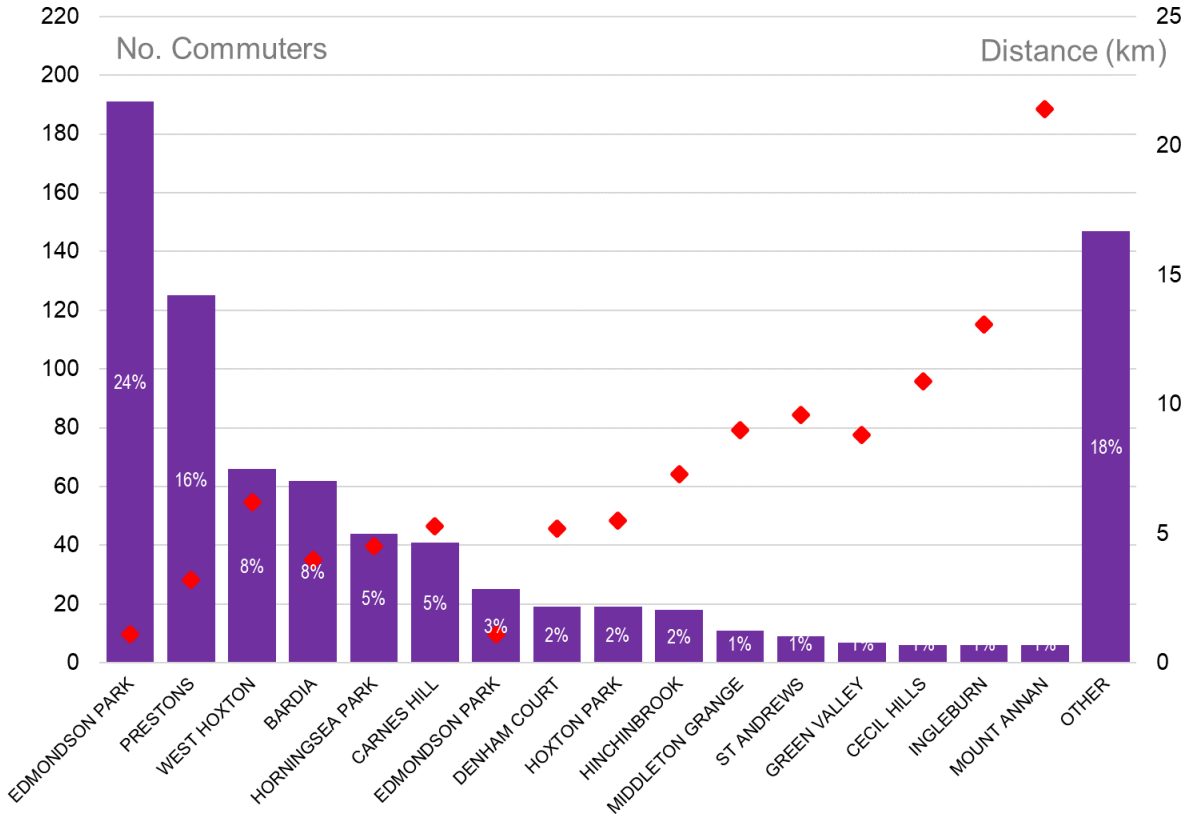


Figure 18: Edmondson Park number plate survey findings

4.12 Road Access Performance

The performance of key intersections providing access to Edmondson Park has been assessed using the SIDRA Network 8.0 software package. Intersection performance is measured in terms of the following:

- Degree of Saturation (DoS): The ratio of arrival (demand) flow rate to capacity during a given flow period. Acceptable intersection performance requires DoS < 1.0.
- Level of Service (LoS): An index of the operational performance of traffic for a given intersection during a given flow period. Acceptable intersection performance requires a minimum of LOS D.
- Average Vehicle Delay in seconds: The delay experienced by a vehicle traversing a signalised intersection

The results are presented in Table 5, and they indicate that the intersections are all performing at satisfactory levels of service (LOS C or better) with reserve capacity to accommodate future growth.

This analysis was undertaken to establish a base case to assess the impacts of the proposed activities and was based on the traffic data available at the time. These base case models are not a fully calibrated representation of the worse-case prevailing conditions at each site, rather they represent the base case for a series of 'change model' assessments.

Table 5: Existing intersection performance[1]

		AM			PM		
Intersection	Type	Average Vehicle Delay (sec)	Level of Service (LoS)	Degree of Saturation (DoS)	Average Vehicle Delay (sec)	Level of Service (LoS)	Degree of Saturation (DoS)
Soldiers Parade and Station North	Give-way	4.4	A	0.25	4.4	A	0.24
Soldiers Parade and Henderson Road	TCS	21.8	B	0.62	21.8	B	0.55
Soldiers Parade and Campbelltown Road	TCS	39.6	C	0.8	36.1	C	0.89

[1] *Based on Classified Intersection Counts undertaken in December 2019.*

5 Environmental Impact Assessment

5.1 Construction impacts

5.1.1 Parking

The proposed MSCP site is located on an existing at-grade commuter car park. All 216 spaces in this car park would be lost during construction. To offset this impact, a temporary at-grade car park will be provided.

The activities associated with construction of the MSCP superstructure is expected to require a maximum daily workforce of up to 80 workers per day.

Despite the Station having convenient access to the T2 Inner West & Leppington Line and the T5 Cumberland Line, it is expected that some percentage of the workforce may choose to travel to the site daily, by car. This would place increased demand on the existing parking facilities and temporarily exacerbate the current over-flow parking issues at the site.

Based on a peak workforce of 80, and assuming that 40 percent of workers choose to travel to the site daily by car, with a car occupancy rate of 1.5 workers per vehicle, the increased demand for parking could be as high as 21 spaces (just over two percent of current capacity). This peak impact would be for the duration of construction of the CCP superstructure, some 20-week period.

To fully offset the parking losses, the proposed temporary parking facility will need to replace all the spaces removed during construction. Construction of the temporary offset car park would be completed before construction of the MSCP begins to ensure the availability of offset parking and minimise disruption to commuters. Separate arrangements for construction worker parking will be investigated to reserve the use of the temporary offset car park for the community.

5.1.2 Road Network

Construction traffic would access the MSCP via the signals at the intersection of Henderson Road and Soldiers Parade.

Deliveries to and from the site would peak at 60 trucks per day, during the concrete pours and would be spread evenly throughout the day (7 to 8 trucks per hour). This peak impact would be for the duration of construction of the MSCP superstructure, a 20-week period.

Due to the low traffic volumes on Soldiers Parade, which currently peak at around 650 vehicles per hour (two-way), the site access point, should perform at acceptable levels of service, under the combined impact of deliveries (7-8 trucks per hour) and workforce trips (21 cars per hour). The combined construction movements represent less that a 4 percent increase in intersection traffic during peak periods.

5.1.3 Taxi operations

Construction of the MSCP is unlikely to impact on Taxi operations due to the taxi rank being located remote from the worksite.

5.1.4 Kiss and Ride Activity

Construction of the MSCP is unlikely to impact on kiss and ride operations as the kiss and ride facility is located remote from the worksite.

5.1.5 Property Access

The MSCP site is located on an existing at-grade car park owned by Transport for NSW. Access to private property would be maintained throughout construction.

5.1.6 Pedestrian Access

Construction of the MSCP is unlikely to impact on pedestrian access as the site is remote from the northern at-grade car park and proposed compensatory parking locations.

5.1.7 Bus Operations

Construction of the MSCP is likely to have the following impacts on bus operations:

- Bus layover facilities (stands and driver facilities) on the southern side of Henderson Road, west of Main Street, may be unavailable during construction.
- Up to 60 trucks per day would pass through the bus interchange on Henderson Road during the concrete pours. These would be spread evenly throughout the day (7 to 8 trucks per hour).

5.2 Operational Impacts

5.2.1 CCP access

Access to and from the MSCP is subject to detailed design and consultation with relevant stakeholders but this assessment assumes access to be primarily via Buchan Avenue, MacDonald Road and Bernera Road (refer to Figure 19).

The design for the intersection of Soldiers Parade and Buchan Avenue does not include a southbound right turn from Soldiers Parade, or an eastbound right turn from Buchan Avenue. These movements are restricted by a central median. It is recommended to consider opening that median and signalising the intersection to accommodate both movements (Refer Figure 20).

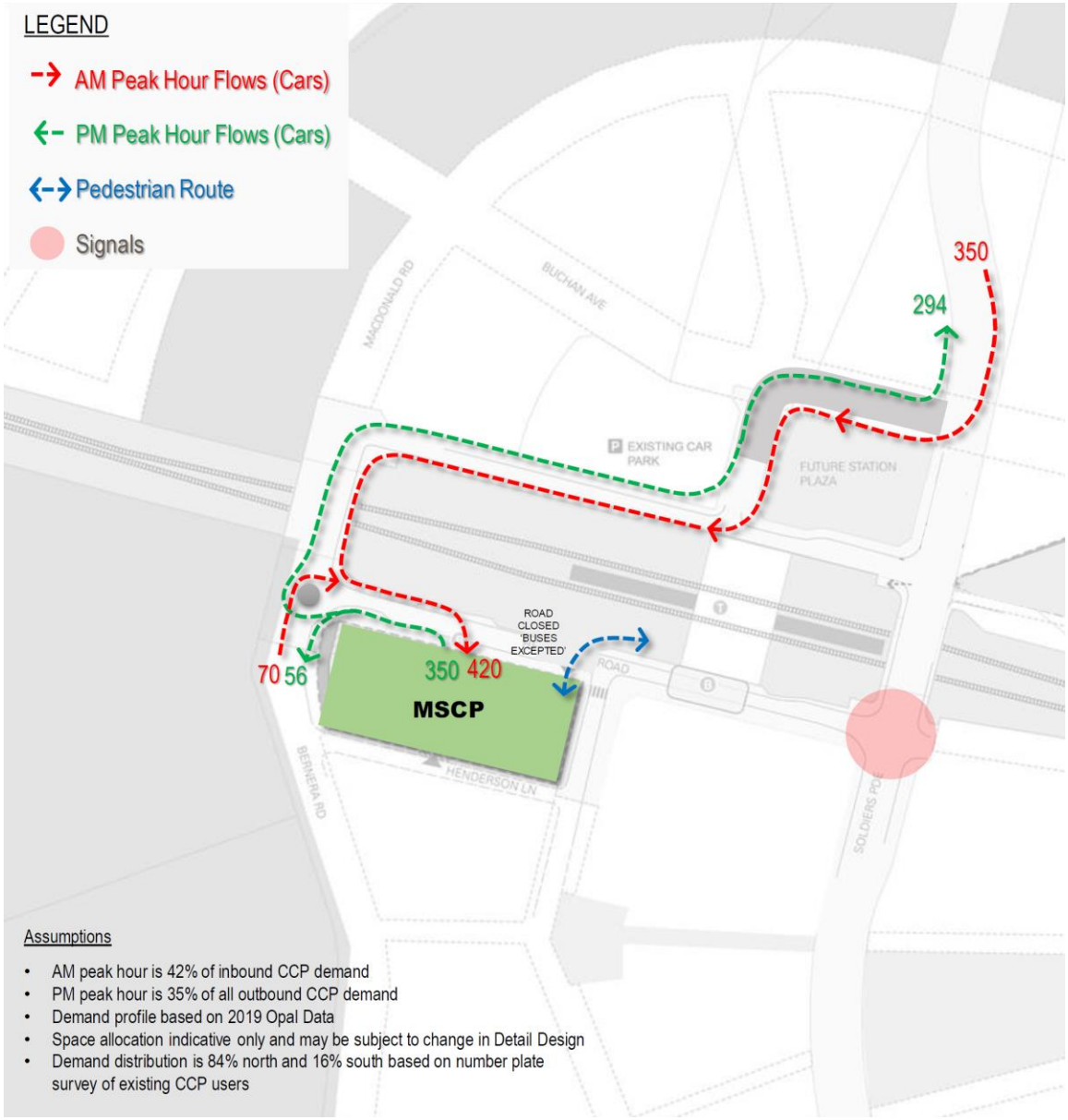


Figure 19: Interim MSCP access impacts

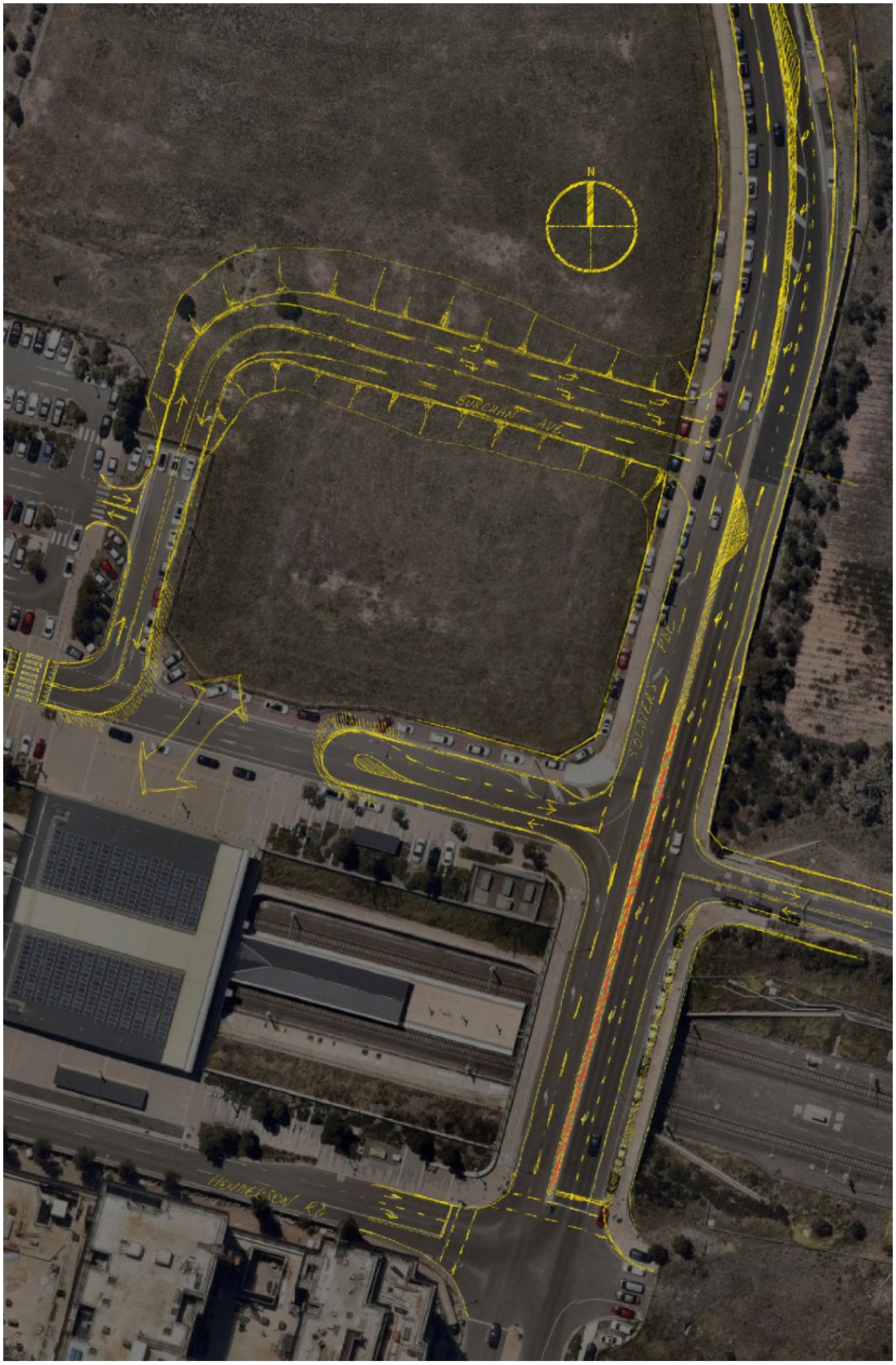


Figure 20: Indicative layout showing potential upgrade of Soldiers Parade and Buchan Avenue (subject to detailed design and stakeholder input)

With the construction of the wider Edmondson Park Town Centre road network, there are opportunities to further revamp precinct access arrangements to improve bus priority and pedestrian connectivity outside the station entrances. It is recommended to consider the introduction of mid-block closures on Henderson Road (buses excepted) and the northern station access road. Some of the Buchan Avenue and Henderson Road movements could then be transferred onto the MacDonald Road ring-road around the town centre, as per Figure 21.

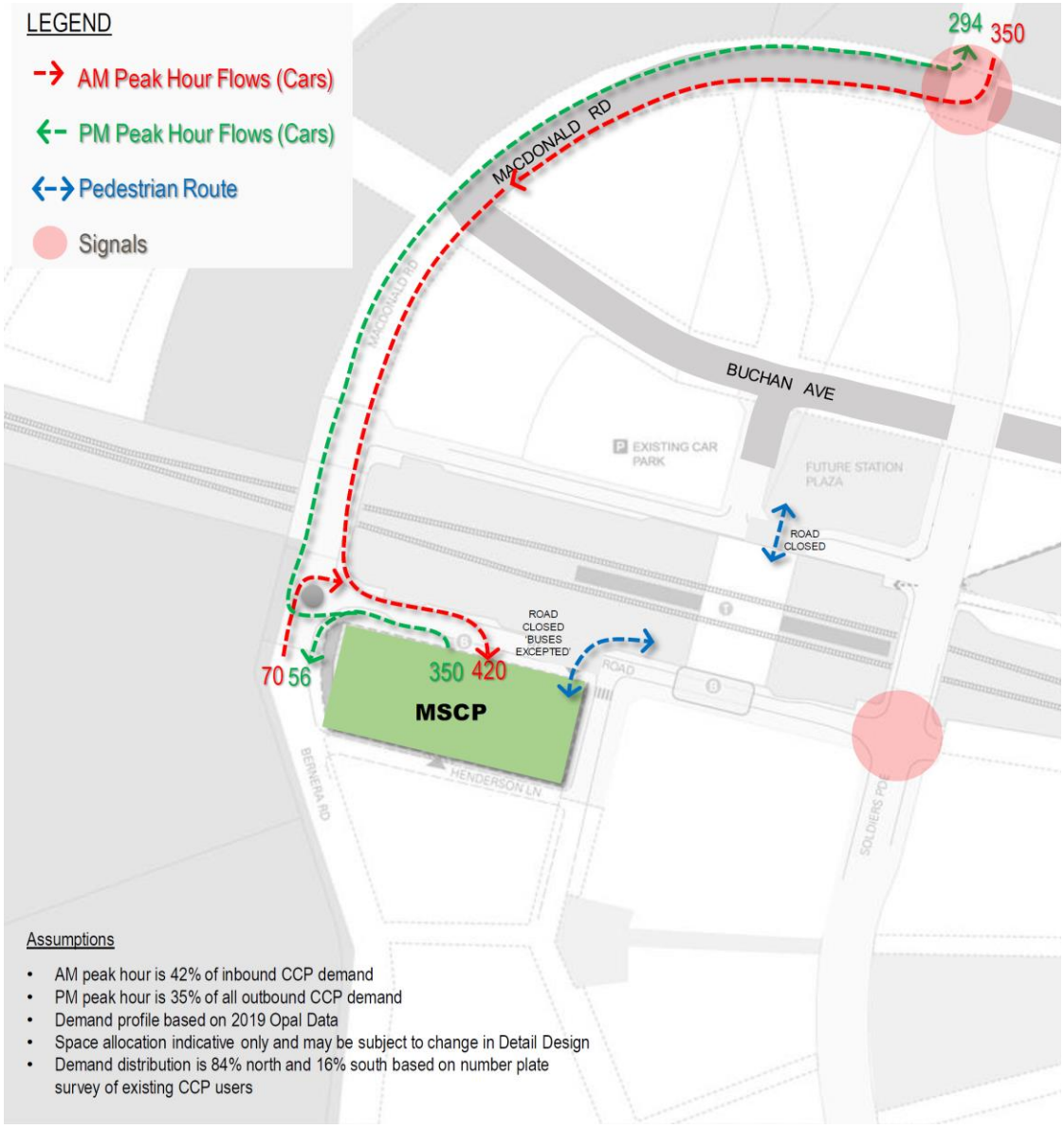


Figure 21: Long-term MSCP access impacts

5.2.2 Parking

The proposed MSCP would increase commuter car parking capacity at the station by approximately 1060 spaces (100 percent). This is expected to reduce informal over-flow parking issues throughout the precinct.

Consideration is being given to the introduction of the parking management system to provide real-time advice to users on the availability of parking spaces across the precinct, thereby reducing unnecessary circulation between different CCP products on offer.

To encourage a more sustainable electric fleet, 20 parking spaces would have charging stations installed, with 15% of total car parking spaces having provision for electric vehicle charging stations to be installed in the future.

Up to 26 spaces in the MSCP would be allocated to accessible parking.

The new CCP may be equipped with Opal Card controlled boom-gate access points.

5.2.3 Traffic Generation

The additional spaces would initially offset the current overflow parking demands. Current overflow parking demands are between 200 to 300 spaces. These are existing trips and would not represent additional trips. However, the large increase in spaces could release short-term suppressed demand for park and ride.

For the purposes of this assessment, a worse-case scenario using the announced 2,000 spaces at Edmondson Park has been used, The worse-case scenario includes that the additional 2,000 spaces generate a combined 2,000 additional trips to the site during the AM peak (5.00 am to 9.00 am) and 2,000 additional trips from the site in the PM peak (3.00 pm to 7.00 pm)

The review of 2019 Opal Data for the Edmondson Park site, revealed:

- The AM peak hour for station entries is 7.00 am to 8.00 am. The AM peak hour accounts for 42 percent of the four hour AM peak period
- The PM peak hour for station exits is 6pm to 7pm. The PM peak hour accounts for 35 percent of the four hour PM peak period

The additional capacity of 2,000 spaces would generate:

- 840 inbound trips during the AM peak hour; and
- 700 outbound trips during the PM peak Hour

Based on 2018 number plate surveys of existing commuter car park users at Edmondson Park, from a sample of 802 users, the distribution of AM and PM peak hour trips along Soldiers Parade would be:

- 84 percent north
- 16 percent south.

5.2.4 Boom Gate Requirements

An estimate of boom gate requirements for the MSCP was undertaken based on 15-min peak within the AM and PM peak hours. It is assumed that the boom-gates will service all 1,278 parking spaces within the MSCP. The MSCP will generate a total of:

- 536 inbound trips during the AM peak hour; and
- 447 outbound trips during the PM peak Hour

A peak flow factor of 0.95 was applied to the peak hour. The 15-min peak equated to 26% of the peak hour. In this instance the peak 15-min demand flows for the 1,278 additional spaces in the MSCP are:

- 139 inbound trips during the AM 15-min peak; and
- 116 outbound trips during the PM 15-min peak.

Boom gate service rates were estimated to be 4 vehicles per minute. This estimate was based on a first principles estimate of 15 seconds per vehicle based on:

- Boom gate opening and closing time of 5 seconds
- Opal pass validation of 5 seconds
- Car deceleration and acceleration time of 5 seconds

Based on a boom gate service rate of 4 vehicles per minute per gate and the peak 15-min demands for the MSCP, the boom gates required to service all arrivals and departures in the peak periods are three entry and two exit boom gates.

5.2.5 Network Performance Impacts

The comparison of network performance with and without the CCP are presented in Table 6. For this analysis, it is assumed that:

- the Soldiers Parade and Buchan Avenue T-intersection would operate under give-way control
- the additional 2,000 spaces would generate a combined 2,000 additional trips to the site during the AM peak (5.00 am to 9.00 am) and 2,000 additional trips from the site in the PM peak (3.00 pm to 7.00 pm)

The analysis suggests that even under the combined impacts of an additional 2,000 spaces, all intersections would operate at satisfactory levels of service (LoS 'D' or better).

Table 6: Future intersection performance with and without CCP (Partial Buchan Avenue Link)

		AM			PM		
Intersection	Scenario	Delay (sec)	LOS	DoS	Delay (sec)	LOS	DoS
Buchan Avenue & Soldiers Parade (Give-way)	Without	-	-	-	-	-	-
	With CCP	8.4	A	0.52	12.6	A	0.73
Soldiers Parade & Henderson Road[2] (Signals)	Without	21.8	B	0.62	21.8	B	0.55
	With CCP	37.3	C	0.79	44.8	D	0.78
Soldiers Parade & Campbelltown Road (Signals)	Without	39.6	C	0.8	36.1	C	0.89
	With CCP	42.4	C	0.84	38.2	C	0.82

[2] *Based on Traffic surveys undertaken in December 2019*

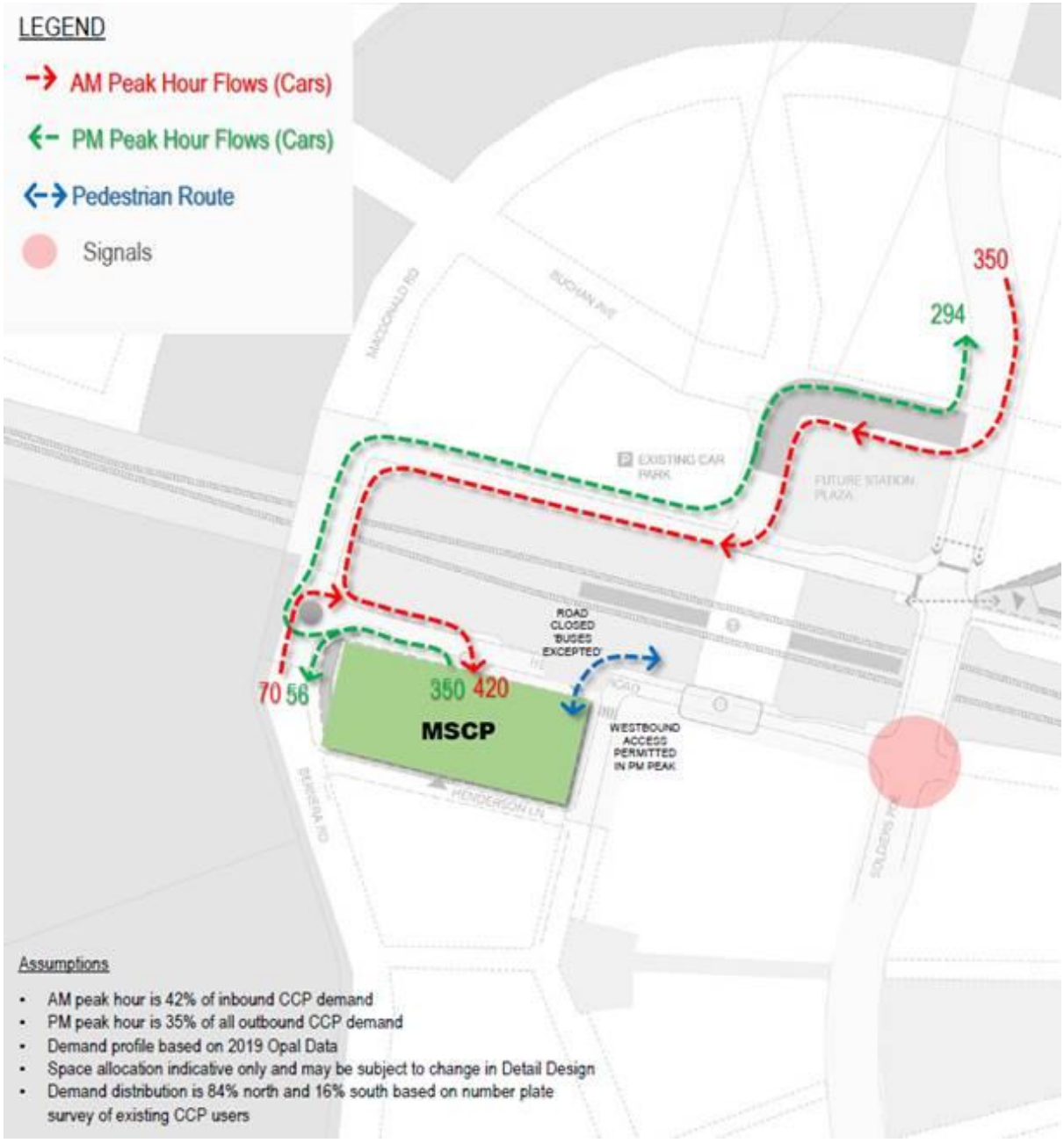


Figure 22: MSCP Traffic Flows

5.2.6 Cumulative Impacts

The proposed CCPs generate a finite number of trips per day, as outlined in the Section 7.2.2 assessment. The deterrents associated with illegal over-flow parking, discourages future demand increases beyond existing observed levels (200-300 spaces).

In 2018, Landcom and the Office of Strategic Lands (OSL) prepared a Transport Management and Accessibility Plan (TMAP) for Concept Plan MOD 5 for the Edmondson Park Town Centre. The concept plan comprises an area of approximately 413 hectares, which forms the southern sub-precinct of the Edmondson Park Release Area. It is located north-west of the M5 Motorway and lies within both the Liverpool and Campbelltown LGAs.

The TMAP included the latest land use forecasts for the Town Centre, including:

- Increasing the minimum yield within the Edmondson Park Town Centre North from 440 to 3286 dwellings;
- Introducing a maximum gross floor area (140,389 m^2) for the Station Precinct equivalent to the floor-space ratio permissible under the *State Environmental Planning Policy (State Significant Precincts) 2005; and*
- Amending the school site to allow for a minimum site area of 2ha and an additional 4 ha if required by the Department of Education.

The 2026 demand forecasts from the TMAP are presented in Figure 23. The TMAP traffic forecasts assume a significant shift of Town Centre access movements away from Soldiers Parade to the Town Centre bypass of MacDonald Road and Bernera Road. This assumption is reflected in the proposed intersection layouts. For example, the southbound approach of Soldiers parade has a single right turn lane at Campbelltown Road. Conversely, the southbound approach of MacDonald Road and Bernera Road has a dual right turn at Campbelltown Road.

The traffic generated by the proposed 2,000 additional parking spaces has been combined with the 2026 TMAP traffic forecasts and the cumulative impacts on network operations assessed. In this scenario, we have modelled two intersection treatments at the intersection of Buchan Avenue and Soldiers parade:

- Option 1 – The intersection operates under give-way control with a southbound right turn into Buchan Avenue, but Buchan Avenue through movements across Soldiers Parade are restricted.
- Option 2 – the intersection operates under signal control with a southbound right turn into Buchan Avenue, pedestrian crossings on all approaches and Buchan Avenue east-west movements across Soldiers Parade are permitted.

The results of the cumulative impact assessments are presented in Table 7.

The analysis indicates that signalisation of the Soldiers Parade & Buchan Avenue intersection provides the best performance. Additionally, it supports east-west traffic and pedestrian connectivity across the town centre. Overall the network appears to be operating at acceptable level of service under the combined Town Centre and CCP traffic loads.

Table 7: 2026 cumulative intersection performance (with CCP and future network)

		AM			PM		
Intersection	Type	Delay (sec)	LOS	DoS	Delay (sec)	LOS	DoS
Buchan Avenue and Soldiers Parade	Give-way (Option1)	56.6	E	0.5	29	C	0.07
Buchan Avenue & Soldiers Parade	Signals (Option 2)	20.4	B	0.69	12.8	A	0.54
Soldiers Parade & Henderson Road	Signals	37.9	C	0.84	40.9	C	0.83
Soldiers parade & Campbelltown Road	Signals	41.8	C	0.88	36.9	C	0.87

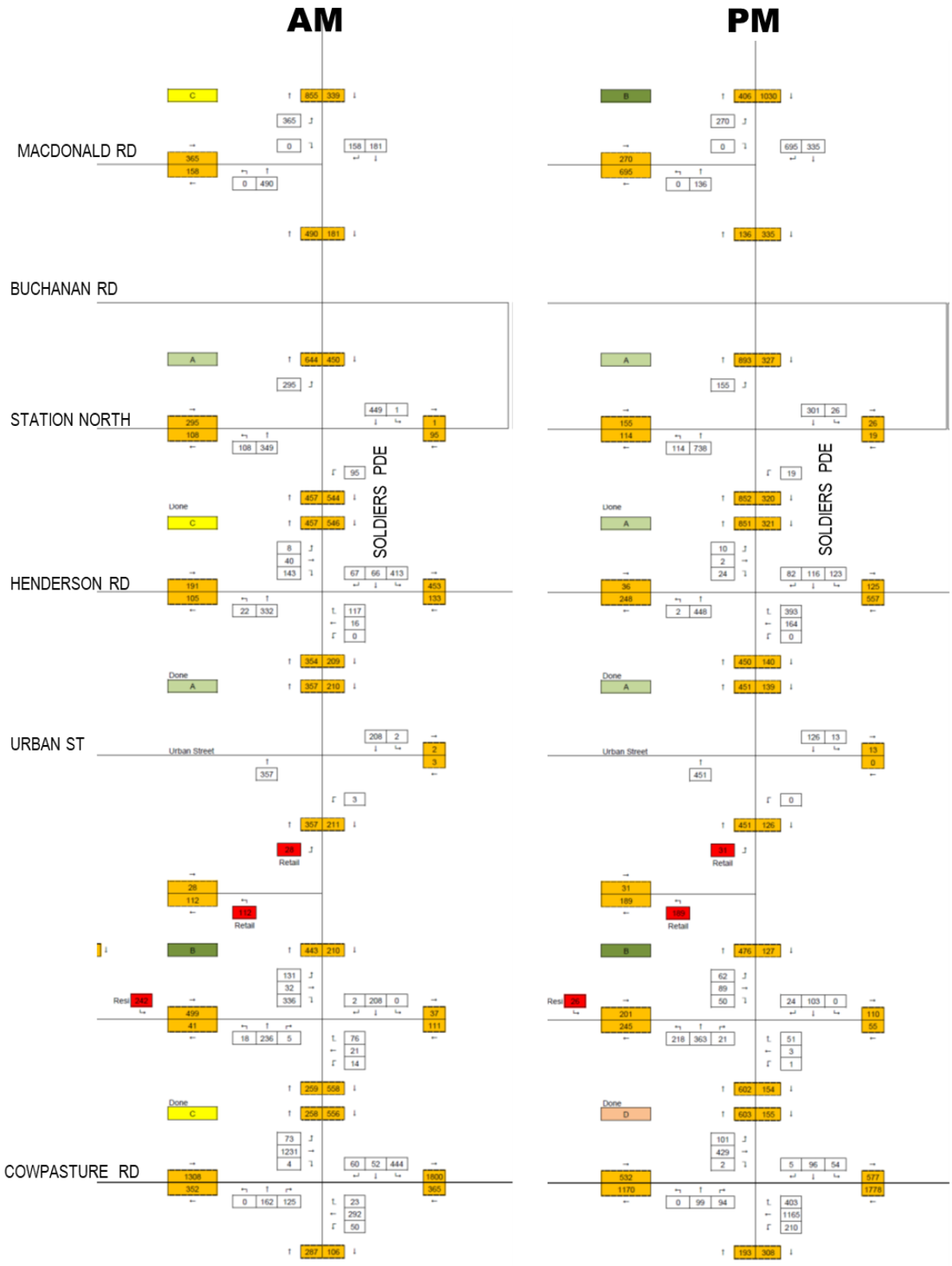


Figure 23: MOD5 Edmondson Park South 2026 peak hour traffic forecasts (TMAP, AECOM, Aug 2018)

6 Mitigation Measures

6.1 Construction

The key mitigation measures being considered to reduce the impacts of the activity during construction include:

- Provision of a temporary at-grade parking facility prior to the commencement of construction, to offset parking losses;
- During detailed design, consideration is to be given to the modification of the intersection of Buchan Avenue and Soldiers Parade to include a southbound right turn into Buchan Avenue;
- Development of a Construction Traffic & Pedestrian Management Plan (CTPMP).
- Procedures for preparing and implementing Traffic Control Plans (TCPs);
- Procedures for preparing and implementing Pedestrian Management Plans (PMPs); and
- Delivery scheduling outside peak periods.

6.2 Operations

The key mitigation measures being considered to reduce the impacts of the activity during operations include:

- Construction of the CCP in a manner that facilitates removal and/or conversion to alternate land use more appropriate to the future town centre context;
- During detailed design, consideration is to be given to the closure of Henderson Road, midblock to all traffic, buses excepted;
- During detailed design, consideration is to be given to the closure of Northern Access Road, midblock, to improve pedestrian connectivity with northern station entrance;
- Revisions to road hierarchy to improve bus, pedestrian & cycle access around the station approaches; and
- Opal controlled boom-gate entry/exit to discourage non-commuter parking.

7 Summary

7.1 Design Inputs

7.1.1 Assumptions

The following assumptions have been made in this TTAIA

- A temporary at-grade parking facility would be provided prior to the commencement of construction of the CCP
- That the Buchan Avenue link through to Soldiers Parade prior to the MSCP would become operational
- That the temporary at-grade parking facility would accommodate approximately 230 spaces, to offset parking losses and increase in parking demand due to CCP construction
- The potential origin of CCP users is based on number plate surveys, undertaken in 2018, of a sample of 802 CCP users
- All intersection models are based on classified survey data collected in December 2019. This is not reflective of the annual seasonal peak.
- The intersection analysis was undertaken to establish a base case to assess the impacts of the proposed activities and was based on the traffic data available at the time. These base case models are not a fully calibrated representation of the worse-case prevailing conditions at each site, rather they represent the base case for a series of 'change model' assessments.
- Based on a peak workforce of 80, and assuming that 40 percent of workers choose to travel to the site daily by car, with a car occupancy rate of 1.5 workers per vehicle, the increased demand for parking could be as high as 21 spaces (just over two percent of current capacity). This peak impact would be for the duration of construction of the CCP superstructure, some 20-week period.
- Deliveries to and from the sites would peak at 60 trucks per day, per site, during the concrete pours and would be spread evenly throughout the day (7 to 8 trucks per hour). This peak impact would be for the duration of construction of the CCP superstructures, a 20-week period.
- For the purposes of the assessment, we have assumed the worse-case scenario that the new CCP facilities generates 2,000 additional trips to the site during the AM peak (5.00 am to 9.00 am) and 2,000 additional trips from the site in the PM peak (3.00 pm to 7.00 pm)
- The AM peak hour for station entries is 7.00 am to 8.00 am. The AM peak hour accounts for 42 percent of the four-hour AM peak period
- The PM peak hour for station exits is 6.00 pm to 7.00 pm. The PM peak hour accounts for 35 percent of the four-hour PM peak period
- An estimate of boom gate requirements was undertaken based on 15-min peak within the AM and PM peak hours identified in the previous section. A peak flow factor of 0.95 was applied to the peak hour. The 15-min peak equated to 26% of the peak hour.
- Boom gate service rates were assumed to be 4 vehicles per minute (15 seconds per vehicle); and.
- Future traffic growth up to 2026 is based on outputs from the Transport Management and Accessibility Plan (TMAP) for Concept Plan MOD 5 for the Edmondson Park Town Centre that was prepared by Landcom and the Office of Strategic Lands (OSL). The TMAP traffic forecasts assume a significant shift of Town Centre access movements away from Soldiers Parade to the Town Centre bypass of MacDonald Road and Bernera Road.

7.1.2 Design Standards

The Proposal would be designed in accordance with the following standards and guidelines:

- Transport for NSW Wayfinding Planning Guide, Car Parks, December 2018
- Transport for NSW Commuter Car Parks Urban Design Guidelines
- Transport Access Program (TAP) Urban Design Plan Guidelines
- Disability Standards for Accessible Public Transport 2002, issued under the Disability Discrimination Act 1992 (Cwth)
- Building Code of Australia
- Relevant Australian Standards
- Asset Standards Authority Standards
- Crime Prevention Through Environmental Design (CPTED) principles
- Local Government standards, where relevant.

Appendix A – SIDRA Analysis Outputs

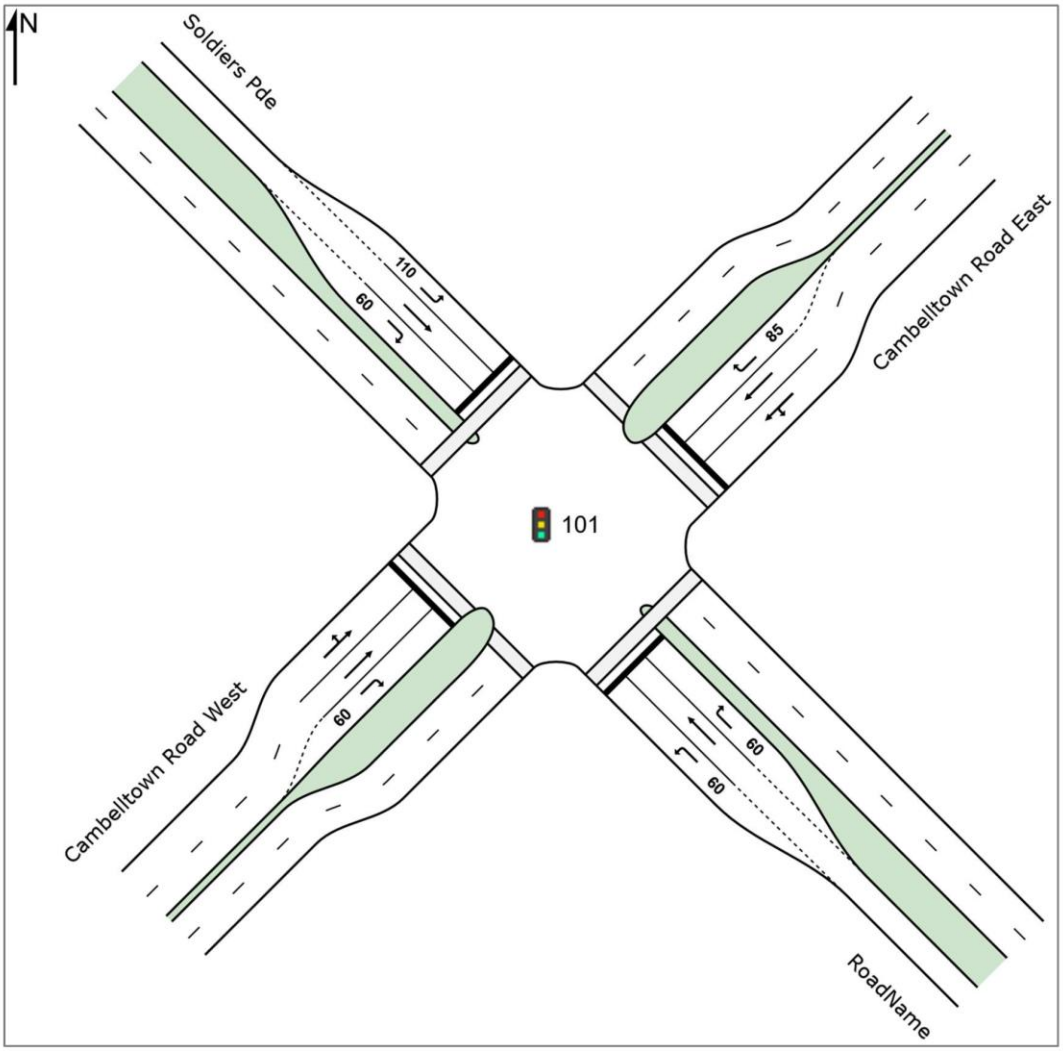
EXISTING CONDITIONS

s

SITE LAYOUT

Site: 101 [Sce1 - TCS 4632 Campbelltown Rd-Soldiers Pde -2019]

Sce1 - TCS 4632 Campbelltown Rd-Soldiers Pde AM-2019
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101 [Sce1 - TCS 4632 Campbelltown Rd-Soldiers Pde AM-2019]

Sce1 - TCS 4632 Campbelltown Rd-Soldiers Pde AM-2019
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 135 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: RoadName												
21	L2	11	5.0	0.112	74.4	LOS F	0.7	5.1	0.98	0.68	0.98	24.5
22	T1	11	5.0	0.050	58.2	LOS E	0.6	4.6	0.92	0.63	0.92	29.1
23	R2	11	5.0	0.108	74.3	LOS F	0.7	5.0	0.98	0.67	0.98	22.8
Approach		32	5.0	0.112	68.9	LOS E	0.7	5.1	0.96	0.66	0.96	25.4
NorthEast: Cambelltown Road East												
24	L2	11	5.0	0.180	21.6	LOS B	6.4	46.4	0.53	0.46	0.53	43.1
5	T1	378	5.0	0.180	15.8	LOS B	6.4	46.4	0.53	0.45	0.53	42.5
6	R2	95	11.1	0.433	65.9	LOS E	5.9	45.4	0.97	0.78	0.97	21.6
Approach		483	6.2	0.433	25.8	LOS B	6.4	46.4	0.62	0.52	0.62	35.6
NorthWest: Soldiers Pde												
7	L2	123	5.1	0.149	26.4	LOS B	4.6	33.3	0.61	0.71	0.61	32.5
28	T1	11	5.0	0.016	29.5	LOS C	0.4	3.2	0.67	0.47	0.67	39.0
9	R2	204	8.2	0.681	64.4	LOS E	11.8	88.1	0.99	1.01	1.52	23.7
Approach		338	7.0	0.681	49.4	LOS D	11.8	88.1	0.84	0.88	1.16	26.5
SouthWest: Cambelltown Road West												
10	L2	363	7.0	0.802	45.0	LOS D	34.2	251.7	0.93	0.87	0.95	29.4
11	T1	811	4.9	0.802	40.2	LOS C	34.2	251.7	0.94	0.87	0.97	29.1
32	R2	11	5.0	0.032	38.1	LOS C	0.5	3.4	0.70	0.67	0.70	34.3
Approach		1184	5.6	0.802	41.6	LOS C	34.2	251.7	0.94	0.87	0.96	29.2
All Vehicles		2037	5.9	0.802	39.6	LOS C	34.2	251.7	0.85	0.78	0.91	29.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	53	61.8	LOS F	0.2	0.2	0.96	0.96
P21	NorthEast Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96
P22	NorthEast Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96
P3	NorthWest Full Crossing	53	61.8	LOS F	0.2	0.2	0.96	0.96
P41	SouthWest Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96
P42	SouthWest Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		316	61.8	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Sce1 - TCS 4632 Campbelltown Rd-Soldiers Pde PM-2019]

Sce1 - TCS 4632 Campbelltown Rd-Soldiers Pde PM-2019
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 91 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: RoadName												
21	L2	11	5.0	0.088	51.0	LOS D	0.5	3.4	0.97	0.67	0.97	30.0
22	T1	11	5.0	0.036	35.6	LOS C	0.4	2.9	0.88	0.60	0.88	36.3
23	R2	11	5.0	0.081	50.8	LOS D	0.5	3.4	0.97	0.67	0.97	28.2
Approach		32	5.0	0.088	45.8	LOS D	0.5	3.4	0.94	0.65	0.94	31.3
NorthEast: Cambelltown Road East												
24	L2	11	5.0	0.433	23.9	LOS B	11.9	84.4	0.73	0.64	0.73	41.8
5	T1	766	1.2	0.433	18.3	LOS B	11.9	84.4	0.73	0.64	0.73	40.7
6	R2	75	0.0	0.259	43.1	LOS D	3.0	21.1	0.92	0.76	0.92	27.2
Approach		852	1.2	0.433	20.5	LOS B	11.9	84.4	0.75	0.65	0.75	39.0
NorthWest: Soldiers Pde												
7	L2	79	1.3	0.079	14.8	LOS B	1.6	11.5	0.50	0.66	0.50	39.0
28	T1	11	5.0	0.013	16.3	LOS B	0.3	2.0	0.61	0.42	0.61	46.2
9	R2	245	5.2	0.875	53.1	LOS D	10.6	77.5	1.00	1.14	1.78	26.3
Approach		335	4.2	0.875	42.9	LOS D	10.6	77.5	0.87	1.00	1.44	28.7
SouthWest: Cambelltown Road West												
10	L2	282	4.5	0.887	52.7	LOS D	20.2	146.0	1.00	1.02	1.31	27.0
11	T1	508	2.7	0.887	47.7	LOS D	20.2	146.0	1.00	1.05	1.32	26.6
32	R2	11	5.0	0.087	48.2	LOS D	0.5	3.3	0.94	0.68	0.94	30.9
Approach		801	3.4	0.887	49.5	LOS D	20.2	146.0	1.00	1.04	1.31	26.8
All Vehicles		2019	2.6	0.887	36.1	LOS C	20.2	146.0	0.87	0.86	1.09	31.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

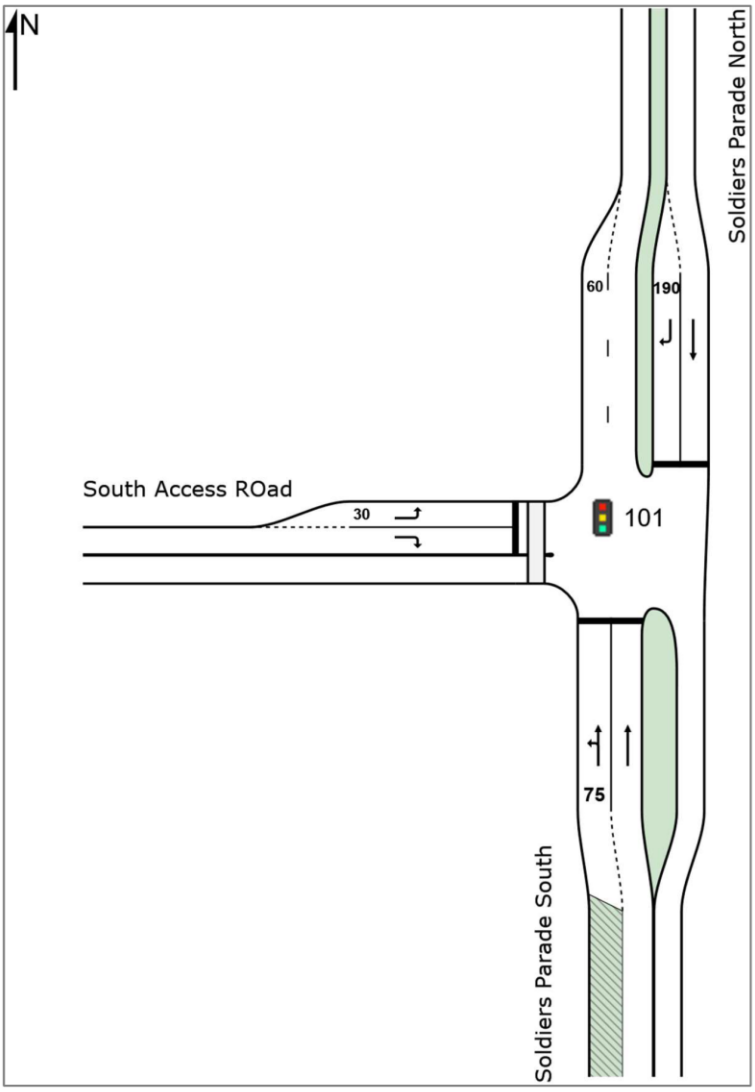
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	53	39.8	LOS D	0.1	0.1	0.94	0.94
P21	NorthEast Stage 1	53	39.8	LOS D	0.1	0.1	0.94	0.94
P22	NorthEast Stage 2	53	39.8	LOS D	0.1	0.1	0.94	0.94
P3	NorthWest Full Crossing	53	39.8	LOS D	0.1	0.1	0.94	0.94
P41	SouthWest Stage 1	53	39.8	LOS D	0.1	0.1	0.94	0.94
P42	SouthWest Stage 2	53	39.8	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		316	39.8	LOS D			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 101 [Sce1 - Soldiers Pde-Henderson Rd- 2019]

Soldiers Pde-Henderson Rd-AM 2019
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101 [Sce1 - Soldiers Pde-Henderson Rd-AM 2019]

Soldiers Pde-Henderson Rd-AM 2019
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
10	L2	72	19.1	0.254	30.4	LOS C	1.9	15.7	0.91	0.75	0.91	31.0
11	T1	339	5.6	0.623	20.8	LOS B	8.9	65.4	0.92	0.78	0.92	43.3
Approach		411	7.9	0.623	22.5	LOS B	8.9	65.4	0.92	0.78	0.92	41.0
North: Soldiers Parade North												
5	T1	226	7.4	0.182	4.1	LOS A	2.5	18.6	0.40	0.34	0.40	55.8
6	R2	317	4.0	0.619	26.5	LOS B	8.4	60.6	0.92	0.83	0.93	34.8
Approach		543	5.4	0.619	17.1	LOS B	8.4	60.6	0.71	0.62	0.71	41.8
West: South Access ROad												
7	L2	142	8.9	0.617	32.4	LOS C	4.3	32.3	0.99	0.84	1.07	31.5
9	R2	78	12.2	0.342	30.7	LOS C	2.2	17.1	0.95	0.75	0.95	29.6
Approach		220	10.0	0.617	31.8	LOS C	4.3	32.3	0.97	0.81	1.03	30.9
All Vehicles		1174	7.2	0.623	21.8	LOS B	8.9	65.4	0.83	0.71	0.84	39.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		53	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Sce1 - Soldiers Pde-Henderson Rd-PM 2019]

Soldiers Pde-Henderson Rd-PM 2019
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
10	L2	39	10.8	0.195	27.1	LOS B	1.9	14.4	0.85	0.70	0.85	33.6
11	T1	362	2.9	0.551	19.7	LOS B	8.2	58.5	0.89	0.75	0.89	43.8
Approach		401	3.7	0.551	20.4	LOS B	8.2	58.5	0.88	0.74	0.88	42.8
North: Soldiers Parade North												
5	T1	151	4.9	0.125	4.7	LOS A	1.7	12.7	0.42	0.35	0.42	55.2
6	R2	222	4.7	0.530	28.2	LOS B	5.9	43.2	0.92	0.81	0.92	34.1
Approach		373	4.8	0.530	18.7	LOS B	5.9	43.2	0.72	0.62	0.72	40.9
West: South Access ROad												
7	L2	155	7.5	0.532	29.6	LOS C	4.4	32.8	0.96	0.79	0.96	32.5
9	R2	85	7.4	0.290	28.3	LOS B	2.3	17.1	0.91	0.75	0.91	30.6
Approach		240	7.5	0.532	29.1	LOS C	4.4	32.8	0.94	0.77	0.94	31.9
All Vehicles		1014	5.0	0.551	21.8	LOS B	8.2	58.5	0.84	0.71	0.84	39.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

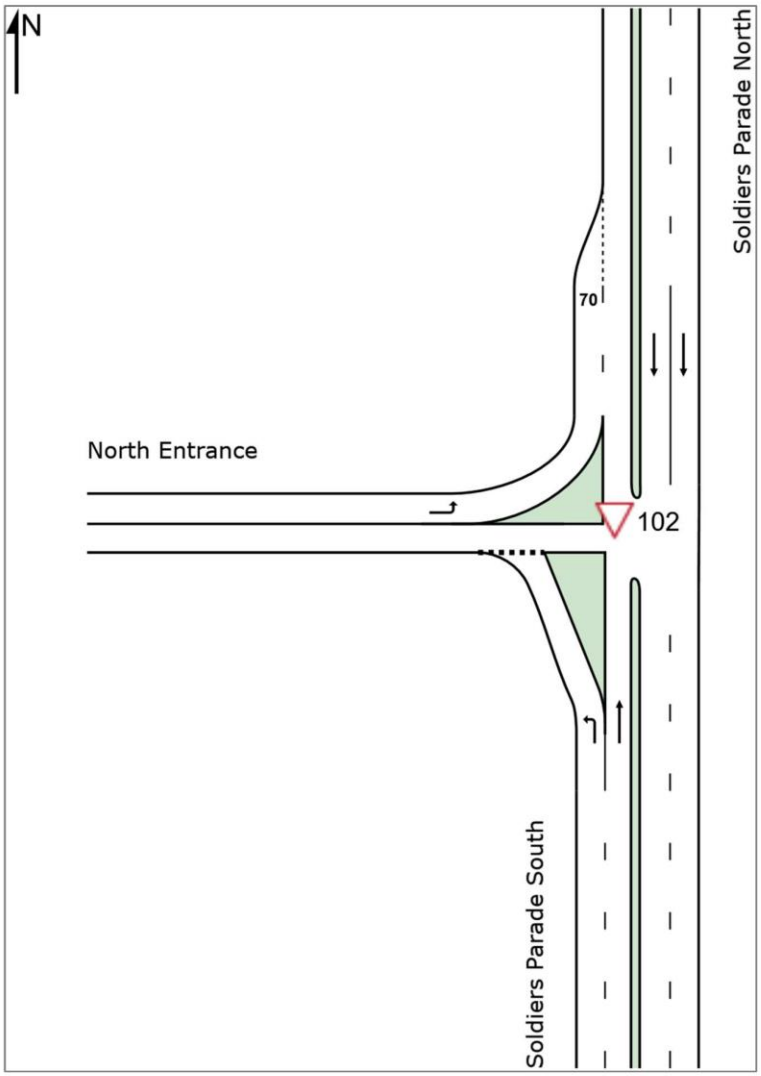
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P3	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		53	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 102 [Sce1 - Soldiers Pde-North Entrance - 2019]

Sce1 - Soldiers Pde-North Entrance - AM 2019
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 102 [Sce1 - Soldiers Pde-North Entrance - AM 2019]

Sce1 - Soldiers Pde-North Entrance - AM 2019
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	28	3.7	0.016	4.2	LOS A	0.0	0.0	0.00	0.49	0.00	43.6
2	T1	457	6.9	0.249	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		485	6.7	0.249	0.3	LOS A	0.0	0.0	0.00	0.03	0.00	49.6
North: Soldiers Parade North												
8	T1	538	5.3	0.142	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		538	5.3	0.142	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: North Entrance												
10	L2	131	0.0	0.070	4.4	LOS A	0.0	0.0	0.00	0.47	0.00	46.8
Approach		131	0.0	0.070	4.4	NA	0.0	0.0	0.00	0.47	0.00	46.8
All Vehicles		1154	5.3	0.249	0.6	NA	0.0	0.0	0.00	0.06	0.00	49.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Sce1 - Soldiers Pde-North Entrance - PM 2019]

Sce1 - Soldiers Pde-North Entrance - PM 2019
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	12	9.1	0.007	4.2	LOS A	0.0	0.0	0.00	0.49	0.00	43.4
2	T1	453	5.6	0.244	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		464	5.7	0.244	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	49.8
North: Soldiers Parade North												
8	T1	409	4.6	0.108	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		409	4.6	0.108	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: North Entrance												
10	L2	162	0.0	0.086	4.4	LOS A	0.0	0.0	0.00	0.47	0.00	46.8
Approach		162	0.0	0.086	4.4	NA	0.0	0.0	0.00	0.47	0.00	46.8
All Vehicles		1036	4.4	0.244	0.7	NA	0.0	0.0	0.00	0.08	0.00	49.1

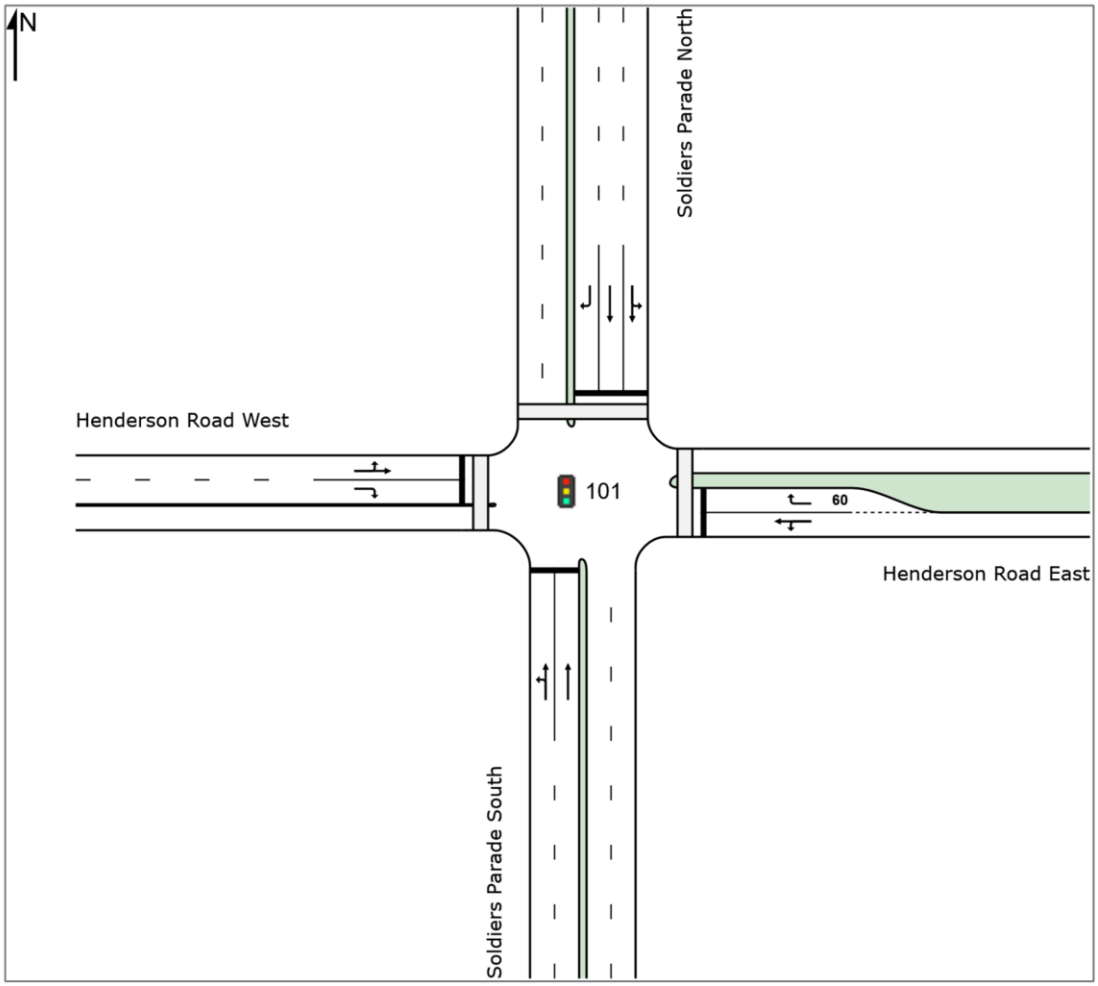
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

WITH PROJECT

SITE LAYOUT

Site: 101 [Sce2 - Soldiers Pde-Henderson Road - AM 2019 - 4C]

Sce2 - Soldiers Pde-Henderson Road - AM 2019
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101 [Sce2 - Soldiers Pde-Henderson Road - AM 2019 - 4C]

Sce2 - Soldiers Pde-Henderson Road - AM 2019
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	72	5.0	0.722	44.3	LOS D	8.4	61.2	1.00	0.90	1.13	26.9
2	T1	349	5.0	0.722	39.4	LOS C	9.5	69.2	1.00	0.89	1.12	22.2
Approach		421	5.0	0.722	40.2	LOS C	9.5	69.2	1.00	0.90	1.12	23.2
East: Henderson Road East												
4	L2	11	5.0	0.075	37.6	LOS C	0.8	5.5	0.88	0.66	0.88	24.6
5	T1	11	5.0	0.075	33.0	LOS C	0.8	5.5	0.88	0.66	0.88	23.0
6	R2	11	5.0	0.045	40.3	LOS C	0.4	2.9	0.90	0.67	0.90	11.6
Approach		32	5.0	0.075	37.0	LOS C	0.8	5.5	0.88	0.66	0.88	20.3
North: Soldiers Parade North												
7	L2	11	5.0	0.390	41.4	LOS C	4.2	31.0	0.93	0.78	1.25	12.3
8	T1	226	5.0	0.390	36.1	LOS C	4.6	33.8	0.94	0.76	1.08	23.4
9	R2	317	5.0	0.790	42.4	LOS C	13.7	99.9	1.00	0.91	1.16	20.2
Approach		554	5.0	0.790	39.8	LOS C	13.7	99.9	0.97	0.85	1.13	21.4
West: Henderson Road West												
10	L2	142	5.0	0.258	17.8	LOS B	2.9	21.2	0.77	0.74	0.77	27.9
11	T1	11	5.0	0.258	12.2	LOS A	2.9	21.2	0.77	0.74	0.77	35.4
12	R2	78	5.0	0.308	42.3	LOS C	3.0	22.0	0.94	0.76	0.94	28.8
Approach		231	5.0	0.308	25.8	LOS B	3.0	22.0	0.83	0.75	0.83	28.6
All Vehicles		1237	5.0	0.790	37.3	LOS C	13.7	99.9	0.95	0.84	1.06	23.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		158	36.8	LOS D			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 104 [Sce2 - Soldiers Pde-Henderson Road - PM 2019 - 4C]

Sce2 - Soldiers Pde-Henderson Road - PM 2019
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 114 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	39	5.0	0.740	58.2	LOS E	10.9	79.7	1.00	0.89	1.11	23.5
2	T1	362	5.0	0.740	53.4	LOS D	11.7	85.6	1.00	0.89	1.10	18.6
Approach		401	5.0	0.740	53.8	LOS D	11.7	85.6	1.00	0.89	1.10	19.2
East: Henderson Road East												
4	L2	11	5.0	0.101	53.5	LOS D	1.1	7.8	0.92	0.68	0.92	20.2
5	T1	11	5.0	0.101	48.9	LOS D	1.1	7.8	0.92	0.68	0.92	18.5
6	R2	11	5.0	0.061	56.2	LOS D	0.5	4.0	0.94	0.67	0.94	9.0
Approach		32	5.0	0.101	52.8	LOS D	1.1	7.8	0.92	0.68	0.92	16.3
North: Soldiers Parade North												
7	L2	11	5.0	0.425	54.1	LOS D	5.8	42.2	0.95	0.79	1.21	9.8
8	T1	224	5.0	0.425	49.1	LOS D	6.2	45.2	0.95	0.77	1.08	19.6
9	R2	517	5.0	0.782	40.6	LOS C	26.4	192.6	0.95	0.89	0.99	20.8
Approach		752	5.0	0.782	43.3	LOS D	26.4	192.6	0.95	0.85	1.02	20.2
West: Henderson Road West												
10	L2	155	5.0	0.273	23.0	LOS B	4.8	34.9	0.76	0.75	0.76	25.2
11	T1	11	5.0	0.273	17.4	LOS B	4.8	34.9	0.76	0.75	0.76	31.5
12	R2	85	5.0	0.361	55.6	LOS D	4.5	32.5	0.95	0.77	0.95	24.9
Approach		251	5.0	0.361	33.8	LOS C	4.8	34.9	0.83	0.76	0.83	25.2
All Vehicles		1435	5.0	0.782	44.8	LOS D	26.4	192.6	0.94	0.84	1.01	20.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

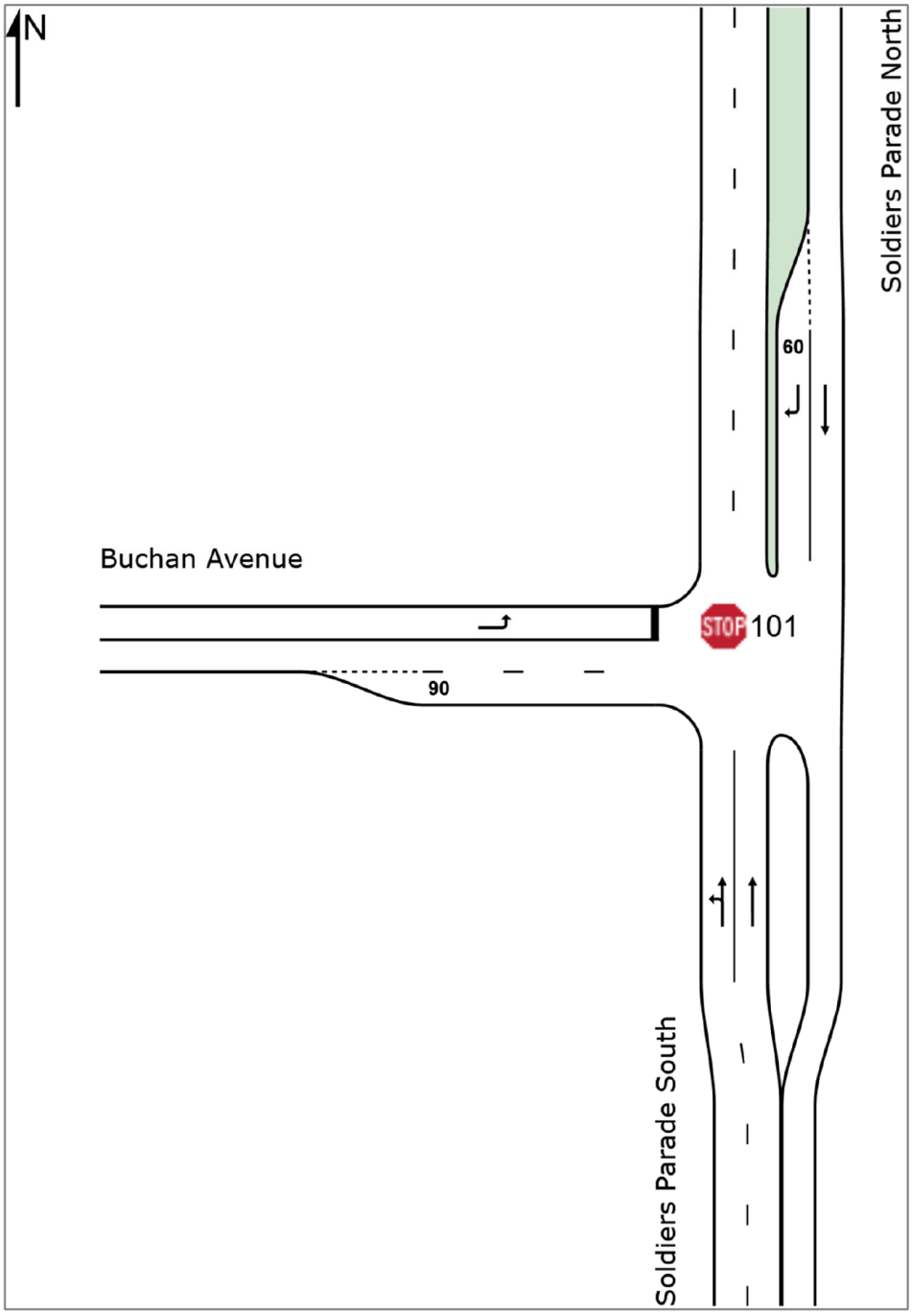
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	51.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	51.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	51.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		158	51.3	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 101 [Sce2- Buchan Ave-Soldiers Pde - 3 leg-AM 2019 – 4C]

Sce2- Buchan Ave-Soldiers Pde - 3 leg-AM 2019
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Sce2- Buchan Ave-Soldiers Pde - 3 leg-AM 2019 – 4C]

Sce2- Buchan Ave-Soldiers Pde - 3 leg-AM 2019
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	81	1.3	0.144	4.3	LOS A	0.0	0.0	0.00	0.16	0.00	46.5
2	T1	457	6.9	0.144	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	49.3
Approach		538	6.1	0.144	0.6	NA	0.0	0.0	0.00	0.08	0.00	49.0
North: Soldiers Parade North												
8	T1	980	2.9	0.517	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	295	0.0	0.340	7.8	LOS A	1.8	12.5	0.59	0.81	0.68	43.6
Approach		1275	2.2	0.517	1.9	NA	1.8	12.5	0.14	0.19	0.16	47.8
West: Buchan Avenue												
10	L2	131	0.0	0.131	8.4	LOS A	0.5	3.6	0.31	0.88	0.31	43.9
Approach		131	0.0	0.131	8.4	LOS A	0.5	3.6	0.31	0.88	0.31	43.9
All Vehicles		1943	3.1	0.517	2.0	NA	1.8	12.5	0.11	0.21	0.12	47.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Sce2- Buchan Ave-Soldiers Pde - 3 leg-PM 2019 - 4C]

Sce2- Buchan Ave-Soldiers Pde - 3 leg-PM 2019
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	12	9.1	0.124	4.3	LOS A	0.0	0.0	0.00	0.03	0.00	48.0
2	T1	453	5.6	0.124	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach		464	5.7	0.124	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.8
North: Soldiers Parade North												
8	T1	409	6.9	0.219	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
9	R2	11	0.0	0.011	6.3	LOS A	0.0	0.3	0.44	0.58	0.44	44.5
Approach		420	6.8	0.219	0.2	NA	0.0	0.3	0.01	0.01	0.01	49.7
West: Buchan Avenue												
10	L2	704	0.0	0.732	12.6	LOS A	11.3	78.8	0.73	1.03	1.12	41.8
Approach		704	0.0	0.732	12.6	LOS A	11.3	78.8	0.73	1.03	1.12	41.8
All Vehicles		1588	3.4	0.732	5.7	NA	11.3	78.8	0.33	0.47	0.50	45.1

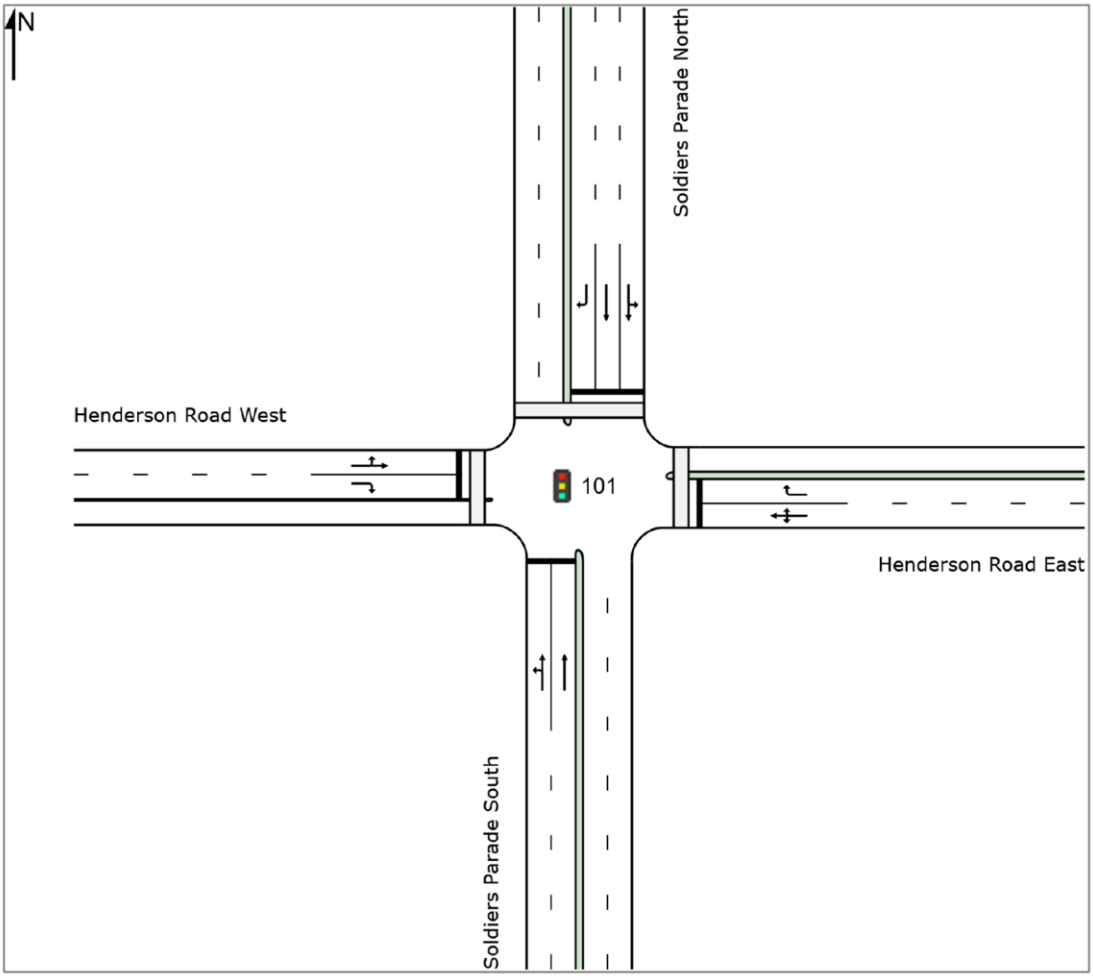
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

CUMMULATIVE IMPACT

SITE LAYOUT

Site: 101 [Sce3 - Soldiers Pde-Henderson Road - AM 2026 - 4D]

Sce3 - Soldiers Pde-Henderson Road - AM 2026
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101 [Sce3 - Soldiers Pde-Henderson Road - AM 2026 - 4D]

Sce3 - Soldiers Pde-Henderson Road - AM 2026
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 94 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	23	5.0	0.500	41.3	LOS C	7.6	55.4	0.94	0.77	0.94	28.2
2	T1	349	5.0	0.500	36.7	LOS C	7.9	58.0	0.94	0.77	0.94	23.2
Approach		373	5.0	0.500	37.0	LOS C	7.9	58.0	0.94	0.77	0.94	23.6
East: Henderson Road East												
4	L2	11	5.0	0.177	35.1	LOS C	2.8	20.4	0.83	0.72	0.83	25.1
5	T1	17	5.0	0.177	30.5	LOS C	2.8	20.4	0.83	0.72	0.83	23.4
6	R2	123	5.0	0.177	35.6	LOS C	2.8	20.4	0.83	0.73	0.83	12.8
Approach		151	5.0	0.177	35.0	LOS C	2.8	20.4	0.83	0.73	0.83	15.4
North: Soldiers Parade North												
7	L2	435	5.0	0.735	21.2	LOS B	10.6	77.4	0.94	0.86	0.98	18.2
8	T1	69	5.0	0.182	33.9	LOS C	2.7	19.5	0.87	0.67	0.87	24.2
9	R2	71	5.0	0.336	47.2	LOS D	3.1	22.7	0.96	0.76	0.96	18.9
Approach		575	5.0	0.735	25.9	LOS B	10.6	77.4	0.93	0.82	0.96	19.4
West: Henderson Road West												
10	L2	8	5.0	0.149	39.6	LOS C	1.6	11.8	0.87	0.70	1.15	20.6
11	T1	42	5.0	0.149	34.0	LOS C	1.6	11.8	0.87	0.70	1.15	25.1
12	R2	151	5.0	0.438	42.6	LOS D	6.3	45.6	0.93	0.79	0.93	28.7
Approach		201	5.0	0.438	40.7	LOS C	6.3	45.6	0.92	0.77	0.98	27.8
All Vehicles		1299	5.0	0.735	32.4	LOS C	10.6	77.4	0.92	0.79	0.94	22.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		158	41.3	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Sce3 - Soldiers Pde-Henderson Road - PM 2026 - 4D]

Sce3 - Soldiers Pde-Henderson Road - PM 2026
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 104 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	2	5.0	0.817	63.7	LOS E	12.9	93.8	1.00	0.98	1.62	22.5
2	T1	472	5.0	0.817	55.5	LOS D	12.9	93.9	1.00	0.98	1.42	18.2
Approach		474	5.0	0.817	55.5	LOS D	12.9	93.9	1.00	0.98	1.42	18.3
East: Henderson Road East												
4	L2	11	5.0	0.853	56.7	LOS E	16.9	123.0	1.00	1.01	1.24	19.5
5	T1	173	5.0	0.853	52.1	LOS D	16.9	123.0	1.00	1.01	1.24	17.9
6	R2	414	5.0	0.853	56.8	LOS E	16.9	123.0	1.00	0.98	1.25	9.0
Approach		597	5.0	0.853	55.5	LOS D	16.9	123.0	1.00	0.99	1.25	12.1
North: Soldiers Parade North												
7	L2	129	5.0	0.195	22.4	LOS B	4.8	34.7	0.63	0.68	0.63	18.0
8	T1	196	5.0	0.195	18.2	LOS B	5.0	36.5	0.64	0.55	0.64	31.5
9	R2	381	5.0	0.884	57.3	LOS E	22.1	161.2	1.00	0.98	1.28	16.5
Approach		706	5.0	0.884	40.0	LOS C	22.1	161.2	0.83	0.80	0.98	19.9
West: Henderson Road West												
10	L2	11	5.0	0.050	47.4	LOS D	0.6	4.1	0.89	0.67	0.89	17.5
11	T1	2	5.0	0.050	41.8	LOS C	0.6	4.1	0.89	0.67	0.89	21.0
12	R2	25	5.0	0.077	43.8	LOS D	1.1	7.8	0.86	0.71	0.86	28.3
Approach		38	5.0	0.077	44.7	LOS D	1.1	7.8	0.87	0.70	0.87	25.1
All Vehicles		1815	5.0	0.884	49.3	LOS D	22.1	161.2	0.93	0.91	1.18	17.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

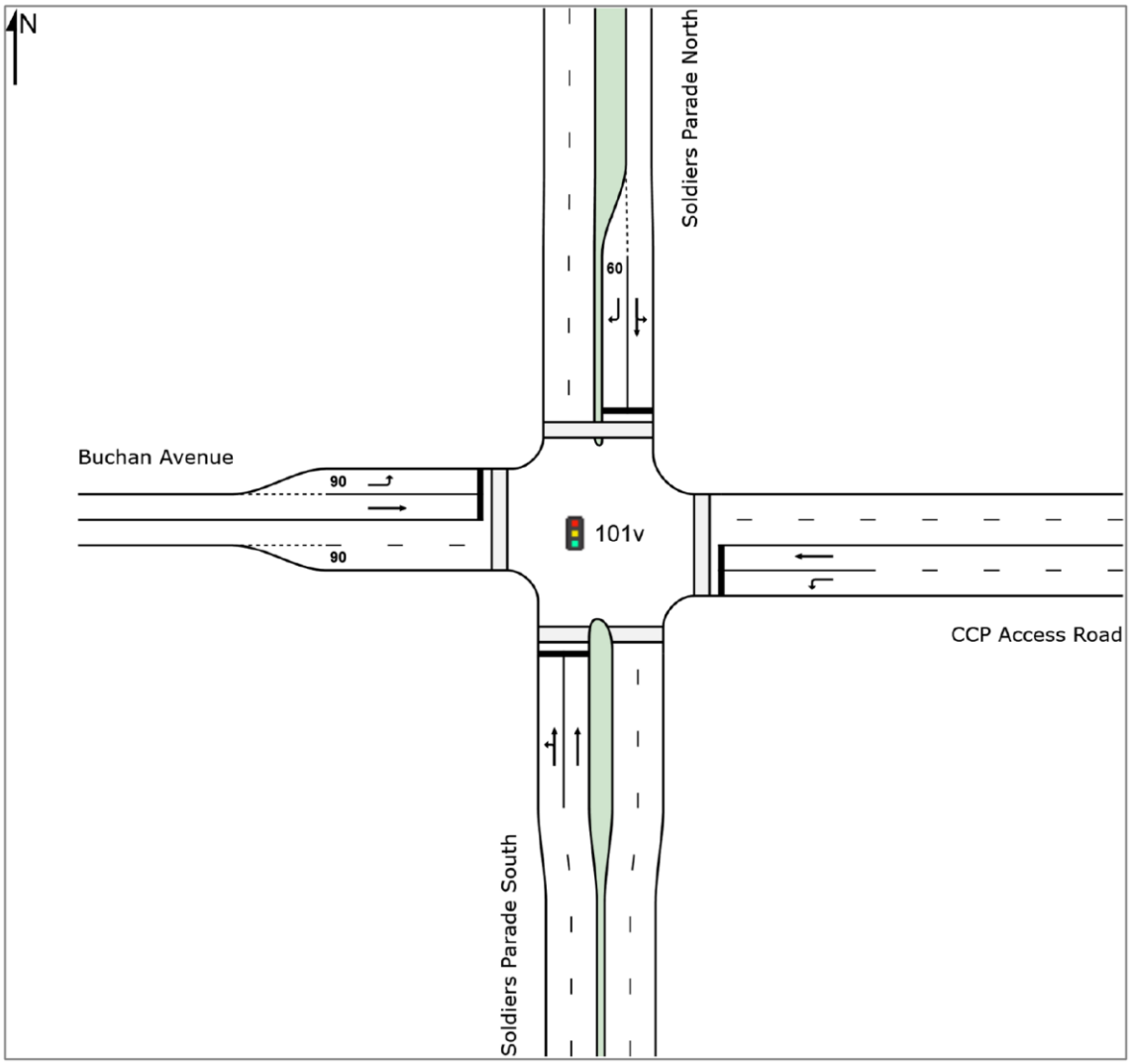
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	46.3	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	46.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	46.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		158	46.3	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 101v [Sce2- Buchan Ave-Soldiers Pde - 4 leg Sig -AM 2026 - 4D]

Sce2- Buchan Ave-Soldiers Pde-4 leg Sig - AM 2026 - 3phase
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101v [Sce2- Buchan Ave-Soldiers Pde - 4 leg Sig -AM 2026 - 4D]

Sce2- Buchan Ave-Soldiers Pde-4 leg Sig - AM 2026 - 3phase
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 61 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	11	0.0	0.658	26.4	LOS B	9.4	68.5	0.94	0.82	0.97	27.7
2	T1	678	4.7	0.658	22.0	LOS B	9.6	69.6	0.94	0.82	0.97	32.6
Approach		688	4.6	0.658	22.1	LOS B	9.6	69.6	0.94	0.82	0.97	32.6
East: CCP Access Road												
4	L2	11	0.0	0.049	31.6	LOS C	0.3	2.0	0.92	0.66	0.92	16.3
5	T1	11	0.0	0.027	21.6	LOS B	0.3	1.8	0.83	0.57	0.83	30.9
Approach		21	0.0	0.049	26.6	LOS B	0.3	2.0	0.87	0.62	0.87	24.1
North: Soldiers Parade North												
7	L2	442	0.0	0.642	15.3	LOS B	13.4	97.3	0.76	0.77	0.76	38.2
8	T1	191	14.9	0.642	10.7	LOS A	13.4	97.3	0.76	0.77	0.76	37.3
9	R2	295	0.0	0.691	29.8	LOS C	8.7	60.6	0.97	0.87	1.05	33.2
Approach		927	3.1	0.691	18.9	LOS B	13.4	97.3	0.82	0.80	0.85	36.0
West: Buchan Avenue												
10	L2	11	0.0	0.013	14.7	LOS B	0.2	1.2	0.58	0.62	0.58	39.8
11	T1	53	0.0	0.137	22.4	LOS B	1.3	9.3	0.86	0.65	0.86	30.5
Approach		63	0.0	0.137	21.1	LOS B	1.3	9.3	0.81	0.64	0.81	32.4
All Vehicles		1700	3.5	0.691	20.4	LOS B	13.4	97.3	0.87	0.80	0.90	34.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P11	South Stage 1	53	24.8	LOS C	0.1	0.1	0.90	0.90
P12	South Stage 2	53	24.8	LOS C	0.1	0.1	0.90	0.90
P2	East Full Crossing	53	24.8	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.8	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	24.8	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		263	24.8	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [Sce2- Buchan Ave-Soldiers Pde - 4 leg Sig -PM 2026 - 4D]

Sce2- Buchan Ave-Soldiers Pde-4 leg Sig - PM 2026 - 3phase
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 69 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Soldiers Parade South												
1	L2	11	0.0	0.539	18.6	LOS B	11.5	82.7	0.77	0.67	0.77	32.7
2	T1	940	3.4	0.539	14.3	LOS A	11.6	83.3	0.77	0.67	0.77	37.1
Approach		951	3.3	0.539	14.4	LOS A	11.6	83.3	0.77	0.67	0.77	37.1
East: CCP Access Road												
4	L2	11	0.0	0.049	34.9	LOS C	0.3	2.3	0.91	0.67	0.91	15.3
5	T1	11	0.0	0.029	24.9	LOS B	0.3	2.0	0.84	0.57	0.84	29.2
Approach		21	0.0	0.049	29.9	LOS C	0.3	2.3	0.88	0.62	0.88	22.7
North: Soldiers Parade North												
7	L2	11	0.0	0.309	10.6	LOS A	5.5	41.0	0.48	0.43	0.48	43.7
8	T1	353	8.1	0.309	6.0	LOS A	5.5	41.0	0.48	0.43	0.48	43.5
9	R2	11	0.0	0.065	37.4	LOS C	0.3	2.4	0.94	0.67	0.94	30.6
Approach		374	7.6	0.309	7.1	LOS A	5.5	41.0	0.50	0.43	0.50	42.8
West: Buchan Avenue												
10	L2	11	0.0	0.020	23.4	LOS B	0.3	1.8	0.74	0.65	0.74	35.7
11	T1	11	0.0	0.029	24.9	LOS B	0.3	2.0	0.84	0.57	0.84	29.2
Approach		21	0.0	0.029	24.1	LOS B	0.3	2.0	0.79	0.61	0.79	33.0
All Vehicles		1366	4.4	0.539	12.8	LOS A	11.6	83.3	0.69	0.61	0.69	38.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P11	South Stage 1	53	28.8	LOS C	0.1	0.1	0.92	0.92
P12	South Stage 2	53	28.8	LOS C	0.1	0.1	0.92	0.92
P2	East Full Crossing	53	28.8	LOS C	0.1	0.1	0.92	0.92
P3	North Full Crossing	53	28.8	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	28.8	LOS C	0.1	0.1	0.92	0.92
All Pedestrians		263	28.8	LOS C			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.