# TRAFFIC AND PARKING IMPACT ASSESSMENT

## Proposed Affordable Residential Development

## 47-49 Close Street, Parkes

Prepared for: SARM Architects

N2331022A (Version 1a)

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# Contents

# 1.INTRODUCTION

Motion Traffic Engineers was commissioned by SARM Architects to undertake a traffic and parking impact assessment of a proposed affordable residential development at 47-49 Close Street in Parkes.

The site is currently comprising of a residential house with the adjacent property vacant with no permanent buildings or structures in place.

This traffic report presents an assessment of the anticipated transport implications of the proposed residential dwelling, with the following considerations:

- Background and existing traffic and parking conditions of the Proposed Affordable Residential Development
- Assessment of the public transport network within the vicinity of the site
- Adequacy of car, bicycle and motorcycle parking provision
- The projected traffic generation of the Proposed Affordable Residential Development and;
- The transport impact of the Proposed Affordable Residential Development on the surrounding road network.

In the course of preparing this assessment, the Proposed Affordable Residential Development and its environs have been inspected, plans of the development are examined, all relevant traffic and parking data have been collected and analysed.

# 2. BACKGROUND AND EXISTING CONDITIONS OF THE PROPOSED SITE

## 2.1. Location and Land Use

The Proposed Affordable Residential Development is in a residential area in Parkes and is within walking distance to the Keast Park and other recreational centres to the north-east of the site. Parkes Railway Station within walking distance to the south of the site. The A39 sub-arterial road is approximately 800 metres to the south. The Proposed Affordable Residential Development is located in *R1: General Residential Zone.*

Figures 1 and 2 show the location of the Proposed Affordable Residential Development from aerial and street map perspective respectively. Figure 2 also shows the location of the surveyed intersections in relation to the site. Figures 3a and 3b shows a photography of the site frontage taken from 47 Close Street and 49 Close Street


**Figure 1: Location of the Proposed Affordable Residential Development on Aerial**

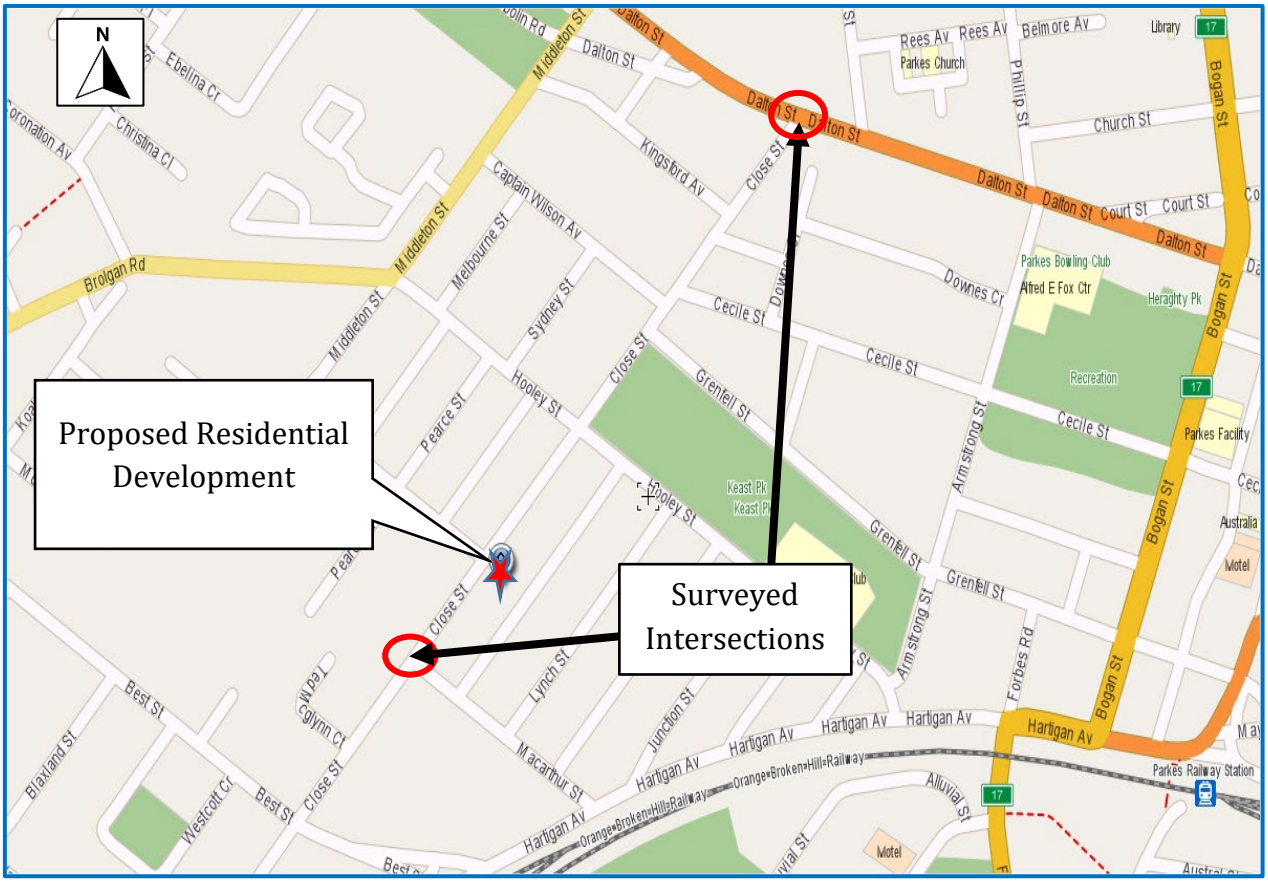


**Figure 2: Location of the Proposed Affordable Residential Development on Street Map**

**Figure 3: Photograph of site frontage at 47 Close Street**

Figure 3b: Photograph site frontage of 49 Close Street

## 2.2. Road Network

This section discusses the road network adjacent to the Proposed Affordable Residential Development.

Close Street is a local road with traffic permitted in both directions with one lane each way. The default speed limit is 50km/hr. Time unrestricted for on-street parking is permitted on the both sides of the road. Figure 4a and 4b shows a photograph of Close Street.

Dalton Street is a minor collector road and has one lane each way. The default speed limit is 50km/hr. Time -unrestricted for on-street parking is permitted on both sides on the road on marked areas. Figure 4c shows a photograph of Dalton Road.

Macarthur Street is a local road and has one lane each way. The default speed limit is 50km/hr. Time un-restricted for on-street parking is permitted on both sides on the road. Figure 4d shows a photograph of Macarthur Street.

Figure 4a: Close Street: Facing north-west from the 47 Close Street frontage

Figure 4b: Close Street: Facing West from the 49 Close Street frontage

Figure 4c: Dalton Street : facing east down after the Intersection of Dalton Street and Close Street

Figure 4d: Macarthur Street: facing north-east after Intersection of Close Street & Macarthur and Laneway on Left

## 2.1.Public Transport

*Bus Service*

The site is located within 500 metres short walking distance from the bus stop located on Close Street. These bus stops are serviced by bus route bus route 554 during the day, providing transportation to range of stops within the Parkes Town Centre.

Also, there are range of intercity buses including 522, southern and western coaches near Parkes Railway station and close proximity to proposed site. These buses provide services to regions such as Manildra and Orange.

*Train Station*

The site is located in walking distance from Parkes Railway Station and the Station is located around 900 metres to the south. This Station is serviced by regional train services providing transportation range of regional town centres.

Overall, the site has excellent access to the public transport for a regional town. Figure 5a and 5b shows the public transport route 554 and 522 map with respect to the location of the Proposed Affordable Residential Development location.


**Figure 5: Bus Route 554 and Proposed Affordable Residential Development Location.**


**Figure 5: Bus Route 522 and Proposed Affordable Residential Development Location.**

## 2.2.Public Parking

On-street parking is available adjacent to the site on Close Street on both sides.

Site visits show that there are number of vacant car spaces on Close Street with a driver required to undertake minimal circulate to find a vacant car space.

## 2.3. Intersection Description

As part of the traffic impact assessment, the performance of two intersection was surveyed and assessed:

- Stop intersection of Dalton Street with Close Street
- Priority intersection of Close Street with Macarthur Street

External traffic travelling to and from the Proposed Affordable Residential Development is likely to travel through the intersections mentioned above.

The stop intersection of Dalton Street with Close Street is a three-leg intersection with all turn movements permitted. Drivers on Close Street must stop and give way to traffic on Dalton Street. Time unrestricted for on-street parking is permitted on both sides of the road. Figure 6a presents the

layout of this intersection using SIDRA 9.1 (and industry standard intersection program software) - and Figure 6b represents the aerial view of the intersection.

The priority intersection of Close Street with Macarthur Street is a three-leg intersection with all turn movements permitted. Drivers on Macarthur Street should give way to traffic on Close Street. Time unrestricted for on-street parking is permitted on both sides of the road. Figure 6c presents the layout of this intersection using SIDRA 9.1 and Figure 6d represents the aerial view of the intersection.

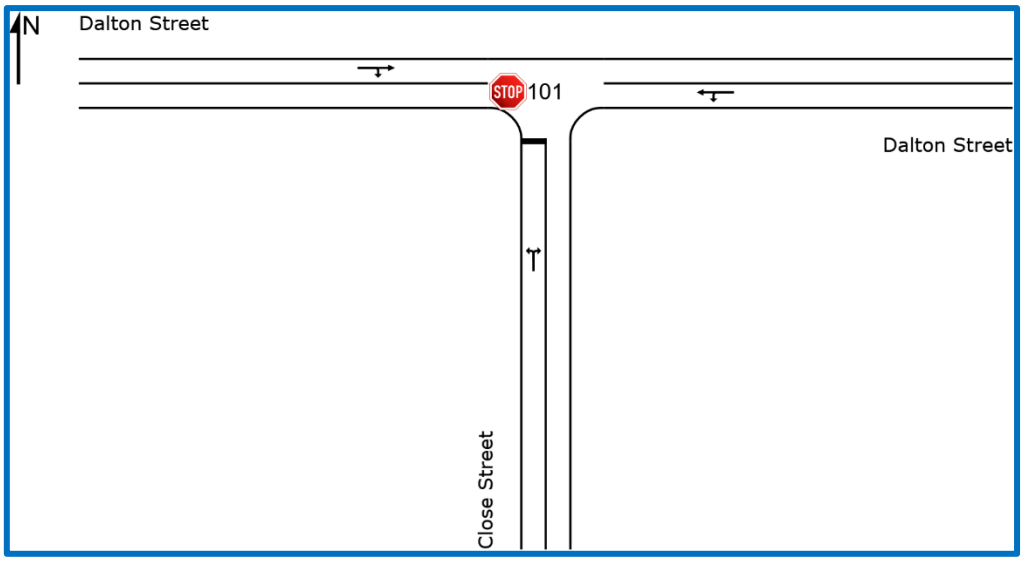


**Figure 6a: Stop Intersection of Dalton Street with Close Street (SIDRA)**

**Figure 6b: Stop Intersection of Dalton Street with Close Street Aerial View**

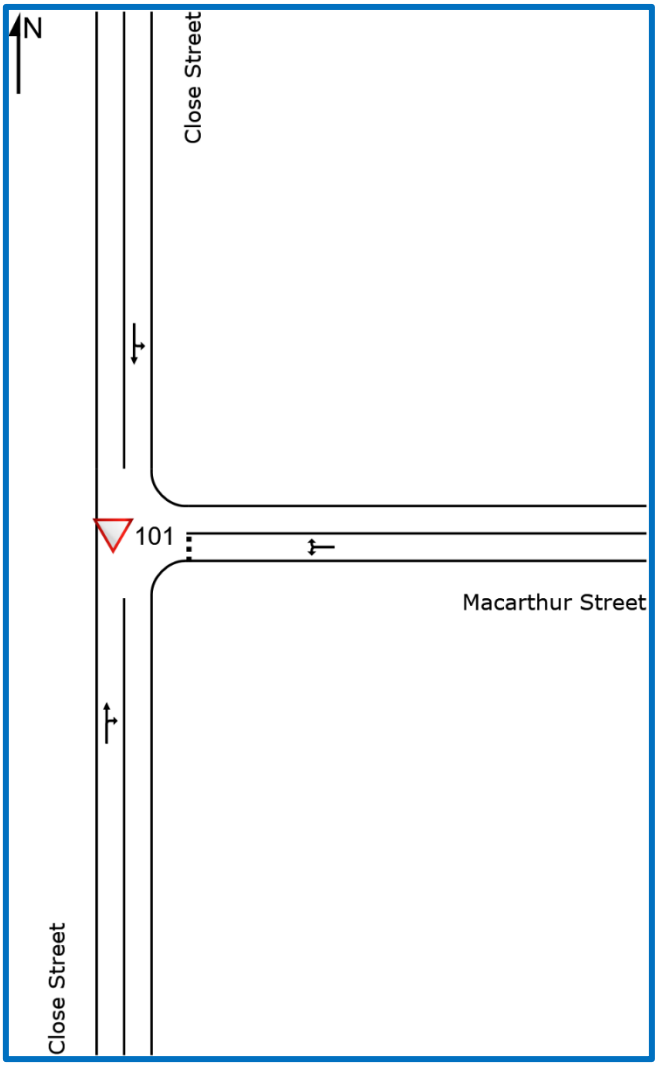


**Figure 6c: Priority Intersection of Close Street with Macarthur Street (SIDRA)**

**Figure 6d: Priority Intersection of Close Street with Macarthur Street Aerial View**

## 2.4. Existing Traffic Volume

As the part of the traffic assessment, traffic counts have been undertaken at the above-mentioned intersections and the AM and PM peak hours are identified accordingly. The AM peak hour is 7:45am to 8:45am and the PM peak hour is 4:45 pm to 5:45 pm. The traffic counts were undertaken in the first week of September 2023.

The following figures present the traffic volumes in vehicles for the weekday peak hours. The bracketed numbers are trucks or buses. The un-bracketed are cars.

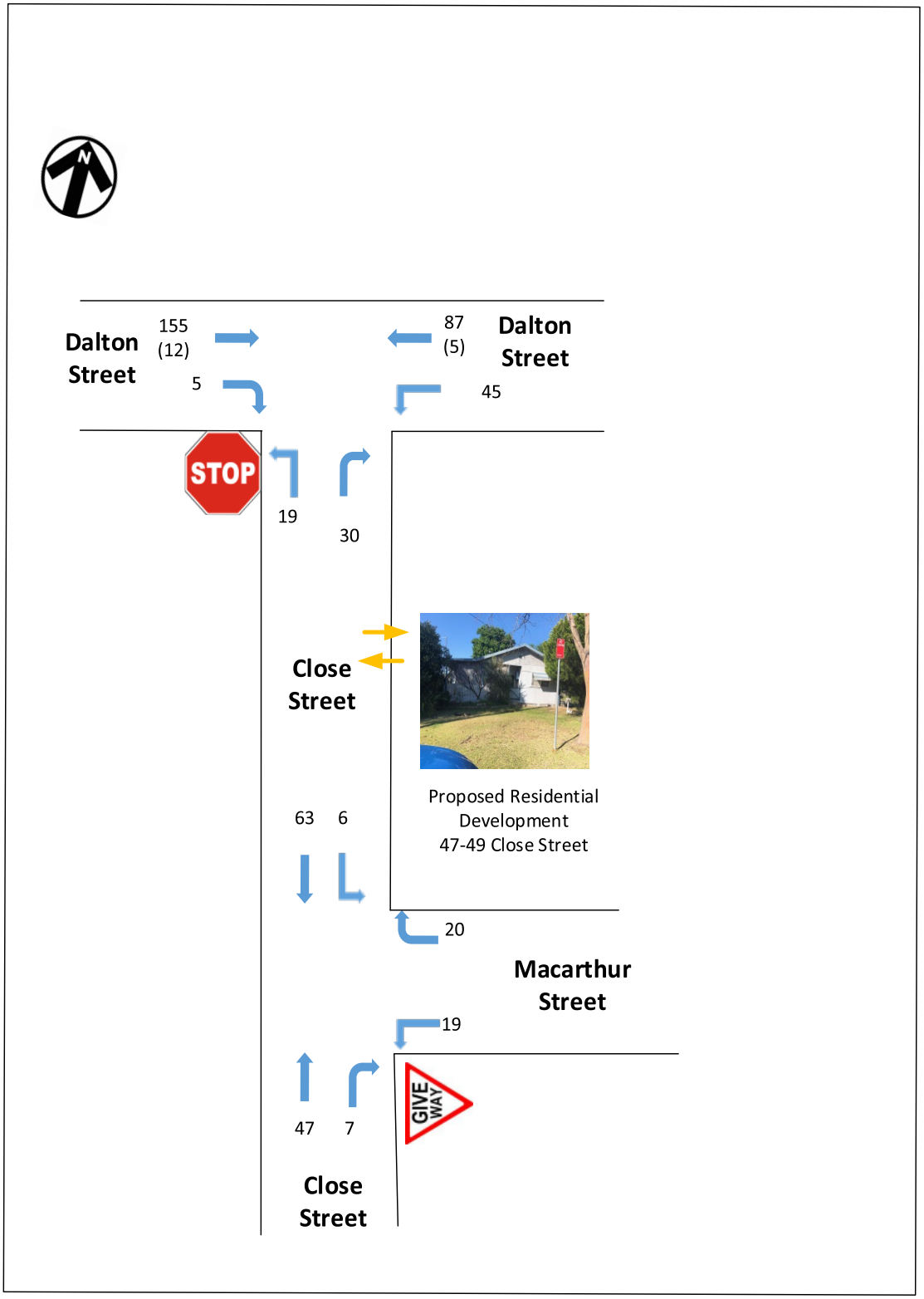


Figure 8a: Existing Weekday Traffic Volumes AM Peak Hour

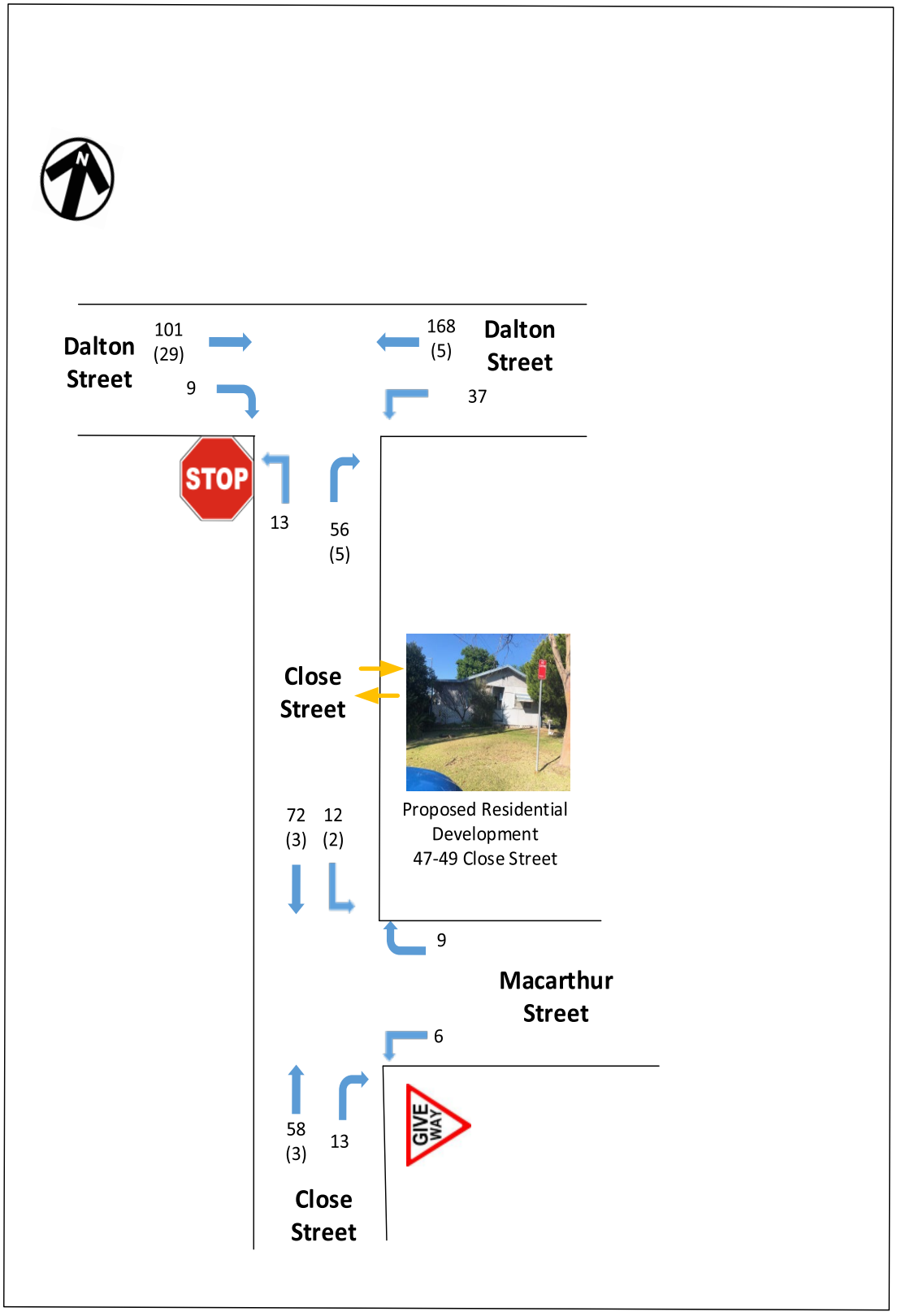


Figure 8b: Existing Weekday Traffic Volumes PM Peak Hour

## 2.5. Intersection Assessment with Existing Traffic

An intersection assessment has been undertaken for the:

- Stop intersection of Dalton Street with Close Street
- Priority intersection of Close Street with Macarthur Street

The existing intersection operating performance was assessed using the SIDRA software package (version 9.1) to determine the Degree of Saturation (DS), Average Delay (AVD in seconds) and Level of Service (LoS) at each intersection. The SIDRA program provides Level of Service Criteria Tables for various intersection types. The key indicator of intersection performance is Level of Service, where results are placed on a continuum from 'A' to 'F', as shown in Table 1.

| LoS | Traffic Signal / Roundabout | Give Way / Stop Sign / T-Junction control |
|---|---|---|
| A | Good operation | Good operation |
| B | Good with acceptable delays and spare capacity | Acceptable delays and spare capacity |
| C | Satisfactory | Satisfactory, but accident study required |
| D | Operating near capacity | Near capacity & accident study required |
| E | At capacity, at signals incidents will cause excessive delays. | At capacity, requires other control mode |
| F | Unsatisfactory and requires additional capacity, Roundabouts require other control mode | At capacity, requires other control mode |

**Table 1: Intersection Level of Service**

The Average Vehicle Delay (AVD) provides a measure of the operational performance of an intersection as indicated below, which relates AVD to LOS. The AVD's should be taken as a guide only as longer delays could be tolerated in some locations (i.e., inner city conditions) and on some roads (i.e., minor side street intersecting with a major arterial route). For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (sign control) the critical movement for level of service assessment should be that movement with the highest average delay.

| LoS | Average Delay per Vehicles (seconds/vehicle) |
|---|---|
| A | Less than 14 |
| B | 15 to 28 |
| C | 29 to 42 |
| D | 43 to 56 |
| E | 57 to 70 |
| F | >70 |

**Table 2: Intersection Average Delay (AVD)**

The degree of saturation (DS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DS approaches 1. It is usual to attempt to keep DS to less than 0.9. Degrees of Saturation in the order of 0.7 generally represent satisfactory intersection operation. When DS exceed 0.9 queues can be anticipated.

The results of the intersection analysis are as follows:

| Intersection/ Performance criteria | AM Peak Hour Existing | PM Peak Hour Existing |
|---|---|---|
| **Dalton Street-Close Street**<br>*LoS*<br>*AVD*<br>*DS* | <br>N/A (Worst Case: A)<br>1.9<br>0.1 | <br>N/A (Worst Case: A)<br>2.2<br>0.16 |
| **Close Street-Macarthur Street**<br>*LoS*<br>*AVD*<br>*DS* | <br>N/A (Worst Case: A)<br>1.7<br>0.04 | <br>N/A (Worst Case: A)<br>1.3<br>0.05 |

**Table 3: Existing Intersection Performances**

As presented in Table 3, both intersections are currently operating at good condition. Overall, there is spare capacity to accommodate the additional traffic. The full intersection results are presented in Appendix A.

## 2.6.Conclusion of existing conditions

The Proposed Affordable Residential Development is located in an area where there are vacant car spaces on Close Street.

All intersections are currently operating at good condition with spare capacity to accommodate additional traffic.

The site has good access to public bus and train transport within the Parkes.

# 3.PROPOSED AFFORDABLE RESIDENTIAL DEVELOPMENT

A description of the Proposed Affordable Residential Development for which approval is now sought features the following elements:

- Construction of a residential development (affordable houses)

The Proposed Affordable Residential Development (dwellings) is located within the Parkes Town Centre where an access road of Close Street, is built. This Proposed Affordable Residential Development will have a vehicle access and egress from the Close Street.

## 3.1.Residential Development

The Proposed Affordable Residential Development comprises of:

*Ground Floor*

- Five-Two Bedroom Units
- Four- One Bedroom Units

A total of nine units comprising of five-two-bedroom units and four-one bedroom units is provided on the ground floor.

## 3.2. Parking

Parking is provided on the ground floor. Access and egress to the ground level is via a two-way driveway that runs off Close Street.

- Ground Foor: seven car spaces including one adaptable

A full scaled plan of the Proposed Affordable Residential Development is provided as part of the Development Application.

# 4.PARKING REQUIREMENTS

## 4.1.Car Parking

*The Parkes Shire Council Development Control Plan 2021* does not stipulate minimum car parking rates as follows for the Proposed Affordable Residential Development. *The State Environmental Planning Policy (Housing 2021)* provides the car parking requirements for affordable housing as a part of Proposed Affordable Residential Development as follows in a non-accessible area:

*Affordable Houses*

- 1 space per dwelling for two-bedroom units
- 0.5 space per dwelling for one bedroom units

Table 4a below presents the minimum car parking requirement for the Proposed Affordable Residential Development based on the car parking rates listed above.

| Type | No of Bedroom | Car Parking Rate | Car Spaces Required | Car Spaces Provided |
|---|---|---|---|---|
| Unit 1 | Two Bedroom | 1 per dwelling | 1 | 7 |
| Unit 2 | Two Bedroom | 1 per dwelling | 1 | |
| Unit 3 | One Bedroom | 0.5 per dwelling | 0.5 | |
| Unit 4 | Two Bedroom | 1 per dwelling | 1 | |
| Unit 5 | One Bedroom | 0.5 per dwelling | 0.5 | |
| Unit 6 | One Bedroom | 0.5 per dwelling | 0.5 | |
| Unit 7 | Two Bedroom | 1 per dwelling | 1 | |
| Unit 8 | One Bedroom | 0.5 per dwelling | 1 | |
| Unit 9 | Two Bedroom | 1 per dwelling | 0.5 | |
| Total | | | 7 | 7 |

**Table 4a: Summary of Car Parking Requirements**

As shown in Table 4a, the Proposed Affordable Residential Development complies with SEPP requirements.

## 5.TRAFFIC GENERATION AND IMPACT

## 5.1. Traffic Generation

The trip generation for different components of the Proposed Affordable Residential Development has been assessed.

The *NSW RTA Guide to Traffic Generating Developments 2002* outlines the trip generation rates for land use of the residential development for dwelling houses as follows.

*Dwelling Houses*

- 0.5 per dwelling/ unit for both AM and PM peak hour for one-bedroom units
- 0.65 per dwelling/unit for both AM and PM peak hour for two -bedroom units

Application of the above-mentioned rates to different components of the Proposed Affordable Residential Development results the peak hour trip generation presented in Table 5a below. The Proposed Affordable Residential Development is a low trip generator.

| Landuse | Units | Trip Generation Rate | Trips Generated |
|---|---|---|---|
| 1 bedroom units | 4 | 0.5 per unit | 2 |
| 2 bedroom units | 5 | 0.65 per unit | 3 |
| Total | | | **5** |

**Table 5a: Trips generated by the Proposed Residential Development in weekday AM and PM peak hours**

## 5.2.Trip Distribution

Application of the above-mentioned trip rates to different components of the Proposed Affordable Residential Development results the peak hour trip distribution presented in Table 6a.

The generated trips by the residential units of residential development are distributed using the following assumptions: 90 percent outbound and 10 percent inbound for the AM, and vice versa for the PM peak Hour as presented in Table 6a.

The proposed residential apartments are a low trip generator in both AM and PM peak hours.

| Land-Use | Type | Peak Hours | Origin | Destination | Total |
|---|---|---|---|---|---|
| | | | | | |
| Residential | 1 bedroom | AM | 3 | 1 | 4 |
| | | PM | 1 | 3 | 4 |
| | | | | | |
| Residential | 2 Bedroom | AM | 4 | 1 | 5 |
| | | PM | 1 | 4 | 5 |
| | | | | | |
| Total | | AM | 7 | 2 | 9 |
| | | PM | 2 | 7 | 9 |

**Table 6a: Summary of Net Trip distribution AM and PM Peak Hour**

### 5.3. Existing with Residential Traffic

The additional residential trips are assigned onto the local traffic network. The following figures present the future traffic volume with the residential trips (in red for origin trips and blue for destination trips) for the weekday AM and PM peak hours.

The additional residential trips represent a moderate proportion of the existing traffic volumes on Close Street.

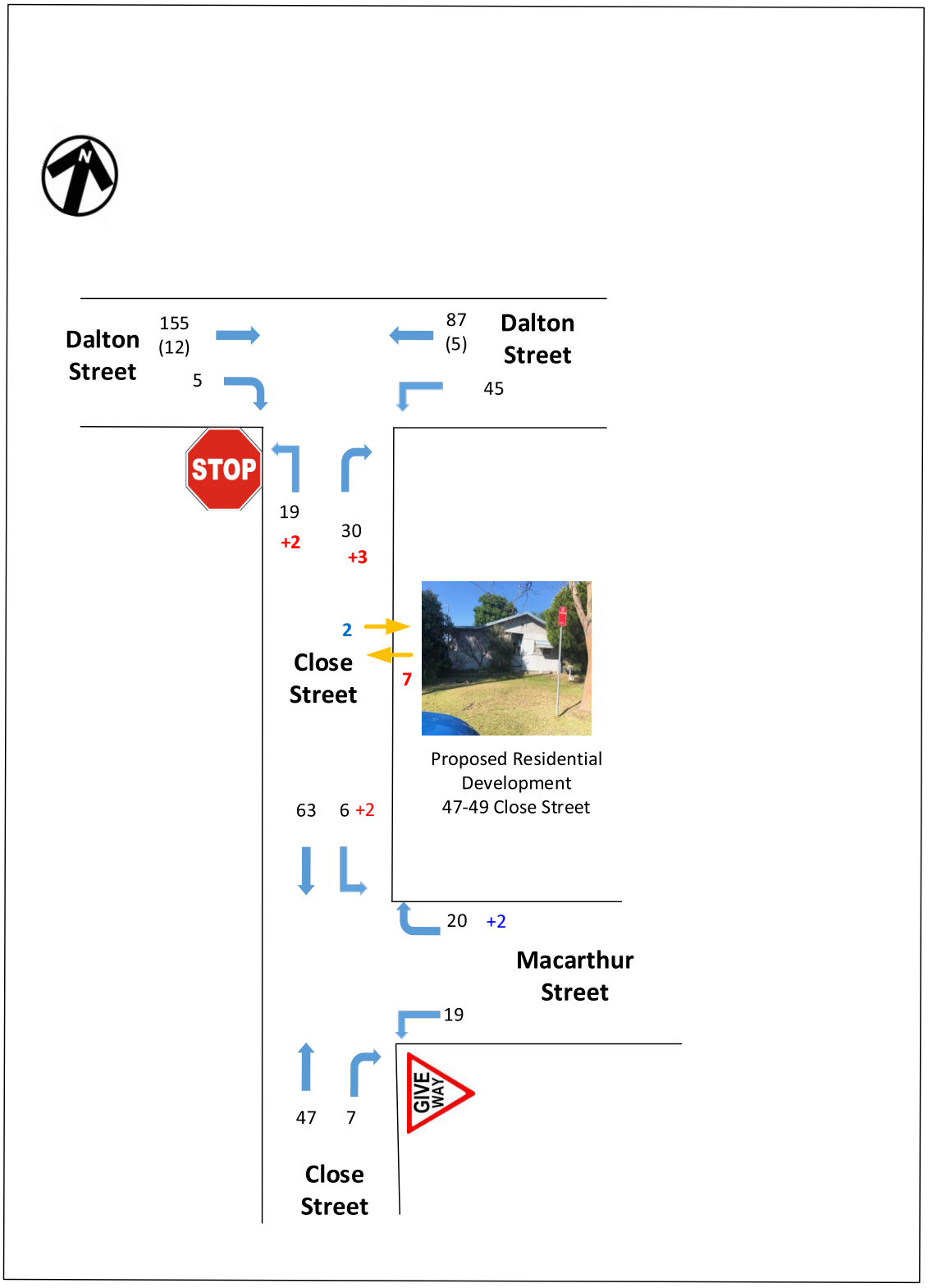


**Figure 9a: Existing Weekday Traffic Volumes with Residential Traffic AM Peak Hour**

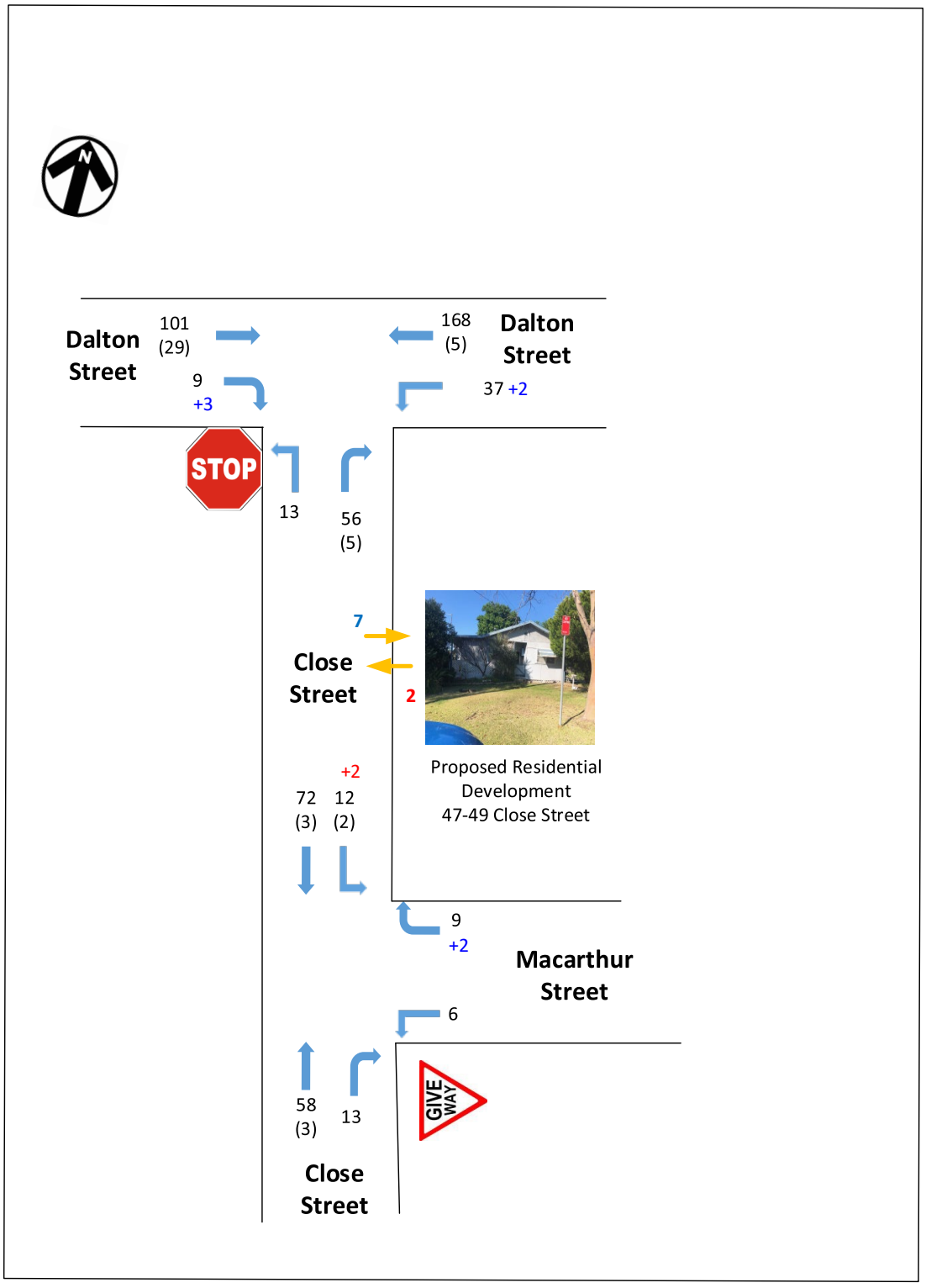


Figure 9b: Existing Weekday Traffic Volumes with Residential Traffic PM Peak Hour

## 5.4. Traffic Impact

This section assesses the following intersections for the existing traffic with the residential traffic. The results of the intersection assessment are as follows:

| Intersection/ Performance criteria | Performance with Existing residential Traffic | | Projected Performance with Existing and residential traffic | |
|---|---|---|---|---|
| | AM Peak Hour Existing | PM Peak Hour Existing | AM Peak Hour Projected | PM Peak Hour Projected |
| **Dalton-Stafford Street**<br>*LoS*<br>*AVD*<br>*DS* | N/A (Worst Case: A)<br>1.9<br>0.1 | N/A (Worst Case: A)<br>2.2<br>0.16 | N/A (Worst Case: A)<br>2<br>0.098 | N/A (Worst Case: A)<br>2.3<br>0.116 |
| **Close Street- Close Street**<br>*LoS*<br>*AVD*<br>*DS* | N/A (Worst Case: A)<br>1.7<br>0.04 | N/A (Worst Case: A)<br>1.3<br>0.05 | N/A (Worst Case: A)<br>1.6<br>0.028 | N/A (Worst Case: A)<br>1.3<br>0.051 |

**Table 7: Projected intersection performance with Residential traffic**

As presented in Table 7 above, the additional trips generated by the Proposed Affordable Residential Development have minimum impact on the intersection performances in both AM and PM peak hours. The LoS, AVD and DS of each intersection are not significantly affected by the addition of residential traffic.

The traffic impacts of the Proposed Affordable Residential Development are therefore considered acceptable.

The full SIDRA results are presented in Appendix B for the existing conditions with the residential traffic.

# 6. CONCLUSIONS

This traffic impact assessment reports relates to a Proposed Affordable Residential Development at *47-49 Close Street in Parkes.* Based on the analysis and discussions presented in this report, the following conclusions are made:

- The residential apartments are located in *R1: General Residential Zone* with good access to local public transport service. Vacant on-street parking spaces and a public car park can be located along Close Street.
- All the intersections perform well with existing traffic and has spare capacity to accommodate additional traffic.
- The minimum car parking requirements outlined in the *State Environmental Planning Policy (Housing 2021)* is met.
- The proposed residential apartments are expected to generate low number of additional trips in both AM and PM peak hours.
- According to the intersection assessment, the additional trips can be accommodated in the nearby intersections without significantly affecting the performance of any turn movement, approach arm or the overall intersection. The traffic impacts of the Proposed Affordable Residential Development are therefore considered acceptable.

There are no traffic engineering reasons why a development consent for the Proposed Affordable Residential Development at 47-49 Close Street in Parkes should be refused.

# APPENDIX A

# INTERSECTION ASSESSMENT FOR EXISTING TRAFFIC

| Vehicle Movement Performance | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 20 | 0.0 | 20 | 0.0 | 0.052 | 7.8 | LOS A | 0.2 | 1.3 | 0.28 | 0.87 | 0.28 | 44.2 |
| 3 | R2 | All MCs | 32 | 0.0 | 32 | 0.0 | 0.052 | 8.4 | LOS A | 0.2 | 1.3 | 0.28 | 0.87 | 0.28 | 44.1 |
| Approach | | | 52 | 0.0 | 52 | 0.0 | 0.052 | 8.2 | LOS A | 0.2 | 1.3 | 0.28 | 0.87 | 0.28 | 44.1 |
| East: Dalton Street | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 47 | 0.0 | 47 | 0.0 | 0.077 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 0.00 | 55.8 |
| 5 | T1 | All MCs | 97 | 5.4 | 97 | 5.4 | 0.077 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 0.00 | 58.2 |
| Approach | | | 144 | 3.6 | 144 | 3.6 | 0.077 | 1.8 | NA | 0.0 | 0.0 | 0.00 | 0.20 | 0.00 | 57.4 |
| West: Dalton Street | | | | | | | | | | | | | | | |
| 11 | T1 | All MCs | 176 | 7.2 | 176 | 7.2 | 0.098 | 0.0 | LOS A | 0.0 | 0.3 | 0.02 | 0.02 | 0.02 | 49.9 |
| 12 | R2 | All MCs | 5 | 0.0 | 5 | 0.0 | 0.098 | 5.0 | LOS A | 0.0 | 0.3 | 0.02 | 0.02 | 0.02 | 48.4 |
| Approach | | | 181 | 7.0 | 181 | 7.0 | 0.098 | 0.1 | NA | 0.0 | 0.3 | 0.02 | 0.02 | 0.02 | 49.8 |
| All Vehicles | | | 377 | 4.7 | 377 | 4.7 | 0.098 | 1.9 | NA | 0.2 | 1.3 | 0.05 | 0.20 | 0.05 | 51.5 |

**Table A1: Weekday Stop Intersection Performance of Dalton Street with Close Street for the AM Peak Hour**

| Vehicle Movement Performance | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | | |
| 2 | T1 | All MCs | 49 | 0.0 | 49 | 0.0 | 0.030 | 0.0 | LOS A | 0.0 | 0.3 | 0.05 | 0.08 | 0.05 | 49.5 |
| 3 | R2 | All MCs | 7 | 0.0 | 7 | 0.0 | 0.030 | 5.0 | LOS A | 0.0 | 0.3 | 0.05 | 0.08 | 0.05 | 48.0 |
| Approach | | | 57 | 0.0 | 57 | 0.0 | 0.030 | 0.6 | NA | 0.0 | 0.3 | 0.05 | 0.08 | 0.05 | 49.3 |
| East: Macarthur Street | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 20 | 0.0 | 20 | 0.0 | 0.036 | 4.7 | LOS A | 0.1 | 0.9 | 0.17 | 0.52 | 0.17 | 45.6 |
| 6 | R2 | All MCs | 26 | 0.0 | 26 | 0.0 | 0.036 | 5.0 | LOS A | 0.1 | 0.9 | 0.17 | 0.52 | 0.17 | 45.4 |
| Approach | | | 46 | 0.0 | 46 | 0.0 | 0.036 | 4.9 | LOS A | 0.1 | 0.9 | 0.17 | 0.52 | 0.17 | 45.5 |
| North: Close Street | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 6 | 0.0 | 6 | 0.0 | 0.037 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 48.5 |
| 8 | T1 | All MCs | 66 | 0.0 | 66 | 0.0 | 0.037 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 49.7 |
| Approach | | | 73 | 0.0 | 73 | 0.0 | 0.037 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 49.6 |
| All Vehicles | | | 176 | 0.0 | 176 | 0.0 | 0.037 | 1.7 | NA | 0.1 | 0.9 | 0.06 | 0.18 | 0.06 | 48.3 |

**Table A2: Weekday Priority Intersection Performance of Close Street with Macarthur Street for the AM Peak Hour**

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 14 | 0.0 | 14 | 0.0 | 0.097 | 8.2 | LOS A | 0.3 | 2.4 | 0.39 | 0.91 | 0.39 | 43.9 |
| 3 | R2 | All MCs | 64 | 8.2 | 64 | 8.2 | 0.097 | 9.4 | LOS A | 0.3 | 2.4 | 0.39 | 0.91 | 0.39 | 43.6 |
| Approach | | | 78 | 6.8 | 78 | 6.8 | 0.097 | 9.2 | LOS A | 0.3 | 2.4 | 0.39 | 0.91 | 0.39 | 43.7 |
| East: Dalton Street | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 39 | 0.0 | 39 | 0.0 | 0.116 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 56.6 |
| 5 | T1 | All MCs | 182 | 2.9 | 182 | 2.9 | 0.116 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 59.0 |
| Approach | | | 221 | 2.4 | 221 | 2.4 | 0.116 | 1.0 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 58.5 |
| West: Dalton Street | | | | | | | | | | | | | | |
| 11 | T1 | All MCs | 137 | 22.3 | 137 | 22.3 | 0.086 | 0.0 | LOS A | 0.1 | 0.6 | 0.05 | 0.06 | 0.05 | 49.6 |
| 12 | R2 | All MCs | 9 | 0.0 | 9 | 0.0 | 0.086 | 6.2 | LOS A | 0.1 | 0.6 | 0.05 | 0.06 | 0.05 | 48.2 |
| Approach | | | 146 | 20.9 | 146 | 20.9 | 0.086 | 0.4 | NA | 0.1 | 0.6 | 0.05 | 0.06 | 0.05 | 49.5 |
| All Vehicles | | | 445 | 9.2 | 445 | 9.2 | 0.116 | 2.2 | NA | 0.3 | 2.4 | 0.08 | 0.23 | 0.08 | 52.3 |

**Table A3: Weekday Stop Intersection Performance of Dalton Street with Close Street for the PM Peak Hour**

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | |
| 2 | T1 | All MCs | 64 | 4.9 | 64 | 4.9 | 0.042 | 0.0 | LOS A | 0.1 | 0.6 | 0.08 | 0.12 | 0.08 | 49.2 |
| 3 | R2 | All MCs | 14 | 0.0 | 14 | 0.0 | 0.042 | 5.2 | LOS A | 0.1 | 0.6 | 0.08 | 0.12 | 0.08 | 47.8 |
| Approach | | | 78 | 4.1 | 78 | 4.1 | 0.042 | 0.9 | NA | 0.1 | 0.6 | 0.08 | 0.12 | 0.08 | 49.0 |
| East: Macarthur Street | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 6 | 0.0 | 6 | 0.0 | 0.013 | 4.8 | LOS A | 0.0 | 0.3 | 0.19 | 0.52 | 0.19 | 45.5 |
| 6 | R2 | All MCs | 9 | 0.0 | 9 | 0.0 | 0.013 | 5.1 | LOS A | 0.0 | 0.3 | 0.19 | 0.52 | 0.19 | 45.3 |
| Approach | | | 16 | 0.0 | 16 | 0.0 | 0.013 | 5.0 | LOS A | 0.0 | 0.3 | 0.19 | 0.52 | 0.19 | 45.4 |
| North: Close Street | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 15 | 14.3 | 15 | 14.3 | 0.050 | 4.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.08 | 0.00 | 48.1 |
| 8 | T1 | All MCs | 79 | 4.0 | 79 | 4.0 | 0.050 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.08 | 0.00 | 49.5 |
| Approach | | | 94 | 5.6 | 94 | 5.6 | 0.050 | 0.8 | NA | 0.0 | 0.0 | 0.00 | 0.08 | 0.00 | 49.3 |
| All Vehicles | | | 187 | 4.5 | 187 | 4.5 | 0.050 | 1.2 | NA | 0.1 | 0.6 | 0.05 | 0.13 | 0.05 | 48.8 |

**Table A4: Weekday Priority Intersection Performance of Close Street with Macarthur Street for the PM Peak Hour**

# APPENDIX B

# INTERSECTION ASSESSMENT WITH RESIDENTIAL TRAFFIC

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | |
| 1 | L2 | 21 | 0 | 22 | 0.0 | 0.058 | 7.8 | LOS A | 0.2 | 1.4 | 0.25 | 0.90 | 0.25 | 44.8 |
| 3 | R2 | 33 | 0 | 35 | 0.0 | 0.058 | 8.4 | LOS A | 0.2 | 1.4 | 0.25 | 0.90 | 0.25 | 44.4 |
| Approach | | 54 | 0 | 57 | 0.0 | 0.058 | 8.2 | LOS A | 0.2 | 1.4 | 0.25 | 0.90 | 0.25 | 44.6 |
| East: Dalton Street | | | | | | | | | | | | | | |
| 4 | L2 | 45 | 0 | 47 | 0.0 | 0.077 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 0.00 | 56.6 |
| 5 | T1 | 92 | 5 | 97 | 5.4 | 0.077 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 0.00 | 58.2 |
| Approach | | 137 | 5 | 144 | 3.6 | 0.077 | 1.8 | NA | 0.0 | 0.0 | 0.00 | 0.20 | 0.00 | 57.6 |
| West: Dalton Street | | | | | | | | | | | | | | |
| 11 | T1 | 167 | 12 | 176 | 7.2 | 0.098 | 0.0 | LOS A | 0.0 | 0.3 | 0.02 | 0.02 | 0.02 | 49.9 |
| 12 | R2 | 5 | 0 | 5 | 0.0 | 0.098 | 5.0 | LOS A | 0.0 | 0.3 | 0.02 | 0.02 | 0.02 | 48.9 |
| Approach | | 172 | 12 | 181 | 7.0 | 0.098 | 0.2 | NA | 0.0 | 0.3 | 0.02 | 0.02 | 0.02 | 49.8 |
| All Vehicles | | 363 | 17 | 382 | 4.7 | 0.098 | 2.0 | NA | 0.2 | 1.4 | 0.05 | 0.22 | 0.05 | 51.6 |

**Table B1: Weekday Stop Intersection Performance of Dalton Street with Close Street for the AM Peak Hour with residential**

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | |
| 2 | T1 | 47 | 0 | 49 | 0.0 | 0.030 | 0.0 | LOS A | 0.0 | 0.3 | 0.05 | 0.07 | 0.05 | 49.5 |
| 3 | R2 | 7 | 0 | 7 | 0.0 | 0.030 | 4.8 | LOS A | 0.0 | 0.3 | 0.05 | 0.07 | 0.05 | 48.5 |
| Approach | | 54 | 0 | 57 | 0.0 | 0.030 | 0.7 | NA | 0.0 | 0.3 | 0.05 | 0.07 | 0.05 | 49.3 |
| East: Macarthur Street | | | | | | | | | | | | | | |
| 4 | L2 | 19 | 0 | 20 | 0.0 | 0.033 | 4.7 | LOS A | 0.1 | 0.8 | 0.16 | 0.52 | 0.16 | 46.3 |
| 6 | R2 | 22 | 0 | 23 | 0.0 | 0.033 | 5.0 | LOS A | 0.1 | 0.8 | 0.16 | 0.52 | 0.16 | 45.8 |
| Approach | | 41 | 0 | 43 | 0.0 | 0.033 | 4.9 | LOS A | 0.1 | 0.8 | 0.16 | 0.52 | 0.16 | 46.0 |
| North: Close Street | | | | | | | | | | | | | | |
| 7 | L2 | 8 | 0 | 8 | 0.0 | 0.039 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.06 | 0.00 | 49.2 |
| 8 | T1 | 63 | 0 | 66 | 0.0 | 0.039 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.06 | 0.00 | 49.6 |
| Approach | | 71 | 0 | 75 | 0.0 | 0.039 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.06 | 0.00 | 49.6 |
| All Vehicles | | 166 | 0 | 175 | 0.0 | 0.039 | 1.6 | NA | 0.1 | 0.8 | 0.06 | 0.18 | 0.06 | 48.6 |

**Table B2: Weekday Priority Intersection Performance of Close Street with Macarthur Street for the AM Peak Hour**

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | |
| 1 | L2 | 13 | 0 | 14 | 0.0 | 0.096 | 8.2 | LOS A | 0.3 | 2.4 | 0.38 | 0.92 | 0.38 | 44.6 |
| 3 | R2 | 61 | 5 | 64 | 8.2 | 0.096 | 9.3 | LOS A | 0.3 | 2.4 | 0.38 | 0.92 | 0.38 | 44.0 |
| Approach | | 74 | 5 | 78 | 6.8 | 0.096 | 9.1 | LOS A | 0.3 | 2.4 | 0.38 | 0.92 | 0.38 | 44.1 |
| East: Dalton Street | | | | | | | | | | | | | | |
| 4 | L2 | 37 | 0 | 39 | 0.0 | 0.116 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 57.4 |
| 5 | T1 | 173 | 5 | 182 | 2.9 | 0.116 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 59.0 |
| Approach | | 210 | 5 | 221 | 2.4 | 0.116 | 1.0 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 58.7 |
| West: Dalton Street | | | | | | | | | | | | | | |
| 11 | T1 | 130 | 29 | 137 | 22.3 | 0.088 | 0.1 | LOS A | 0.1 | 0.7 | 0.06 | 0.05 | 0.06 | 49.5 |
| 12 | R2 | 12 | 0 | 13 | 0.0 | 0.088 | 5.3 | LOS A | 0.1 | 0.7 | 0.06 | 0.05 | 0.06 | 48.5 |
| Approach | | 142 | 29 | 149 | 20.4 | 0.088 | 0.5 | NA | 0.1 | 0.7 | 0.06 | 0.05 | 0.06 | 49.4 |
| All Vehicles | | 426 | 39 | 448 | 9.2 | 0.116 | 2.3 | NA | 0.3 | 2.4 | 0.09 | 0.23 | 0.09 | 52.4 |

**Table B3: Weekday Stop Intersection Performance of Dalton Street with Close Street for the PM Peak Hour**

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
| South: Close Street | | | | | | | | | | | | | | |
| 2 | T1 | 61 | 3 | 64 | 4.9 | 0.042 | 0.1 | LOS A | 0.1 | 0.6 | 0.08 | 0.10 | 0.08 | 49.2 |
| 3 | R2 | 13 | 0 | 14 | 0.0 | 0.042 | 4.8 | LOS A | 0.1 | 0.6 | 0.08 | 0.10 | 0.08 | 48.3 |
| Approach | | 74 | 3 | 78 | 4.1 | 0.042 | 0.9 | NA | 0.1 | 0.6 | 0.08 | 0.10 | 0.08 | 49.1 |
| East: Macarthur Street | | | | | | | | | | | | | | |
| 4 | L2 | 6 | 0 | 6 | 0.0 | 0.015 | 4.8 | LOS A | 0.0 | 0.3 | 0.19 | 0.52 | 0.19 | 46.2 |
| 6 | R2 | 11 | 0 | 12 | 0.0 | 0.015 | 5.1 | LOS A | 0.0 | 0.3 | 0.19 | 0.52 | 0.19 | 45.8 |
| Approach | | 17 | 0 | 18 | 0.0 | 0.015 | 5.0 | LOS A | 0.0 | 0.3 | 0.19 | 0.52 | 0.19 | 45.9 |
| North: Close Street | | | | | | | | | | | | | | |
| 7 | L2 | 16 | 2 | 17 | 12.5 | 0.051 | 4.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 0.00 | 48.8 |
| 8 | T1 | 75 | 3 | 79 | 4.0 | 0.051 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 0.00 | 49.5 |
| Approach | | 91 | 5 | 96 | 5.5 | 0.051 | 0.8 | NA | 0.0 | 0.0 | 0.00 | 0.09 | 0.00 | 49.4 |
| All Vehicles | | 182 | 8 | 192 | 4.4 | 0.051 | 1.3 | NA | 0.1 | 0.6 | 0.05 | 0.14 | 0.05 | 48.9 |

**Table B4: Weekday Priority Intersection Performance of Close Street with Macarthur Street for the PM Peak Hour**