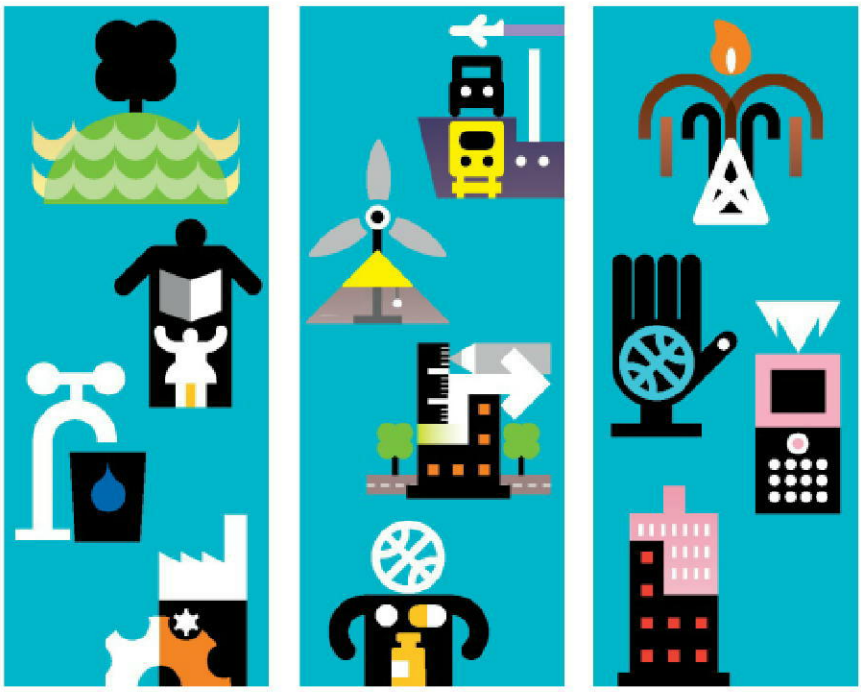

Fernhill Estate, Mulgoa
Eastern Precinct

Traffic Impact Assessment

July 2014

Fernhill Estate

Mott MacDonald

Fernhill Estate, Mulgoa
Eastern Precinct

Traffic Impact Assessment

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Fernhill Estate

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Issue and revision record

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B	10.07.2014	D. Prajapati	G. Hughes	C. Avis	Issued for DA
C	24.07.2014	D. Prajapati	G. Hughes	C. Avis	Re-Issued for DA

Standard

Contents

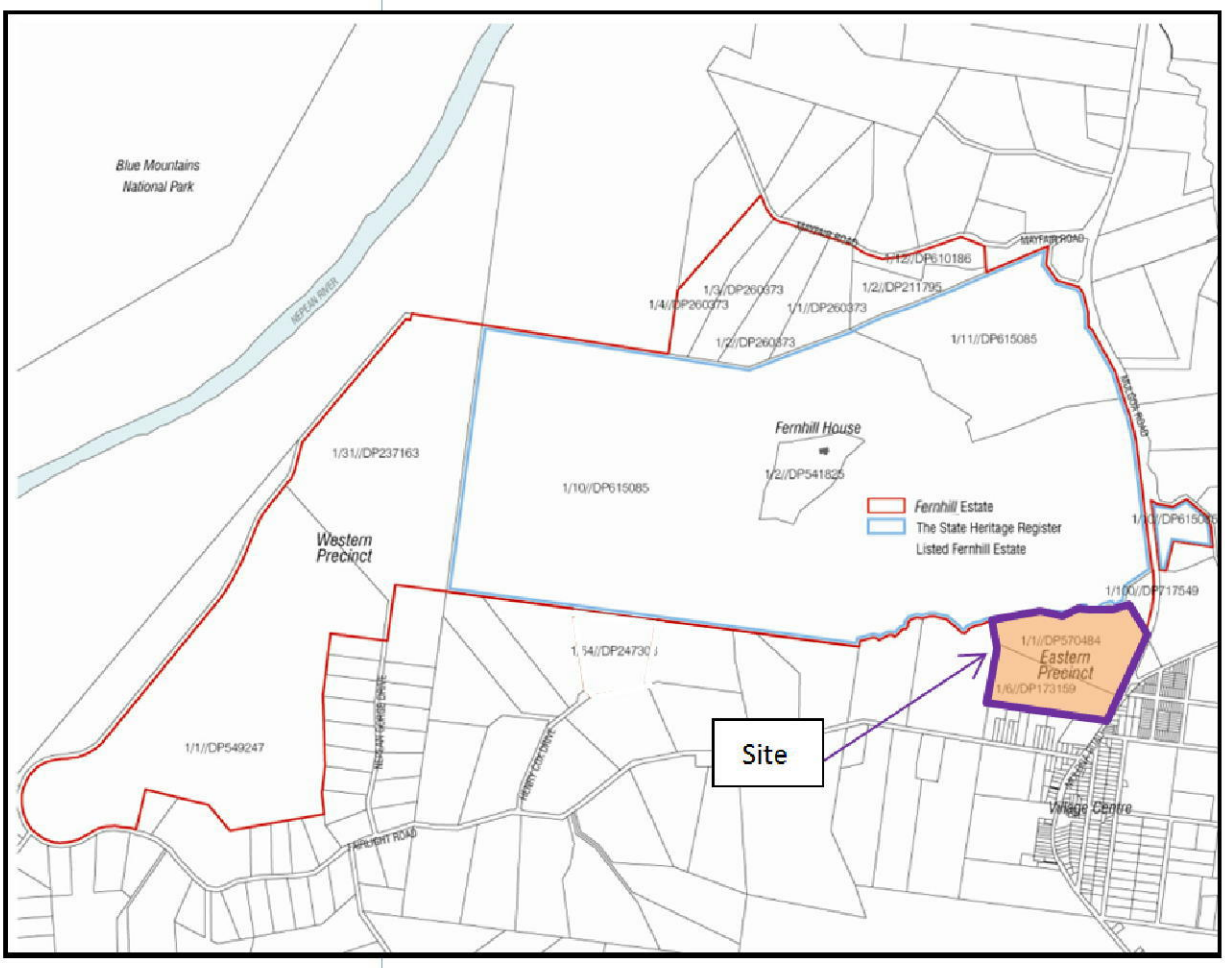
1 Introduction

1.1 Background

Fernhill Estate has commissioned Mott MacDonald to undertake a Traffic Impact Assessment for the proposed Eastern Precinct subdivision, which forms part of the Fernhill Estate. The subject site is located at 1041 Mulgoa Road, Mulgoa and situated 12km to the south of Penrith city centre, 8.5 km to the south of M4 Motorway and 750m to the north of Mulgoa township centre. The Eastern Precinct will be referred to as the 'site' in the remainder of this report.

The subject site location is shown in Figure 1.1.

Figure 1.1: Site Location



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P:\Parramatta\Projects\32xxxx\322876\05 DOCUMENTS\5_1 Working Files\Traffic\322876 140724 - Traffic Impact Assessment - Eastern Precinct for DA.docx

The proposed Eastern Precinct will form part of the entire Fernhill Estate development. The Fernhill Estate development will be developed in three precincts namely Eastern, Western and Central Precincts. Details related to the Central Precinct development with associated traffic impact is presented in the Traffic Impact Assessment report prepared by GTA Consultants in separate application and as such not included as part of this report.

This report includes traffic impact assessment of the proposed Fernhill Estate Eastern Precinct. The traffic impact assessment also includes appraisal of the Fernhill Estate Western Precinct development proposal to provide an understanding of the cumulative impacts from known future development in the area.

Mott MacDonald has previously undertaken a Traffic Impact Assessment (Traffic Impact Assessment report dated 25 October 2013) as part of the previous Development Application for the site. This is an updated Traffic Impact Assessment report with the following changes to the development:

- Reduced lot yield (the currently proposed development includes 50 residential lots while previous proposal included 54 residential lots).
- A single consolidated site access road connecting to Mulgoa Road (previous proposal included two site access roads connecting to Mulgoa Road).
- The proposed site access road to connect to Mulgoa Road at Mulgoa Road/St Thomas Road intersection.

1.2 Purpose of this Report

This report will assess the traffic and transport impacts from the proposed development and has been prepared to form part of the supporting documentation for the Development Application (DA), which will be submitted to Penrith City Council for approval. The report aims to provide the following:

- Describe the existing traffic conditions on the road network surrounding the subject site and identify any current network operational deficiencies based on a site visit and review of available data sets;
- Provide an understanding of the development proposal and its relationship with the Fernhill Estate;
- Assess and identify any traffic operational or safety impacts that could be associated with the delivery of the proposed development; and

- Identify appropriate mitigation measures that should support the development proposal.

1.3 Structure of the Report

This report is structured as follows:

- ***Section 1 – Introduction*** (this section) – provides an understanding of the purpose of the study.
- ***Section 2 - Existing Conditions*** – provides an understanding of the issues associated with current network operations, reviews road safety concerns, and identifies services and public and active transport provision within the existing Mulgoa village centre.
- ***Section 3 – Proposed Development*** – provides an understanding of the development proposal and its relationship with the Fernhill Estate and other development proposals.
- ***Section 4 – Traffic Impact Appraisal*** - provides an understanding of the modelling assumptions, data sources, traffic flows and the scenarios to be modelled as part of the appraisal, and then presents the modelling outcomes and improvements that may be required to support the development proposal.
- ***Section 5 – Key Findings and Recommendations*** – presents a summary of the assessment and recommended mitigating measures to address traffic impacts.

2 Existing Conditions

2.1 Subject Site

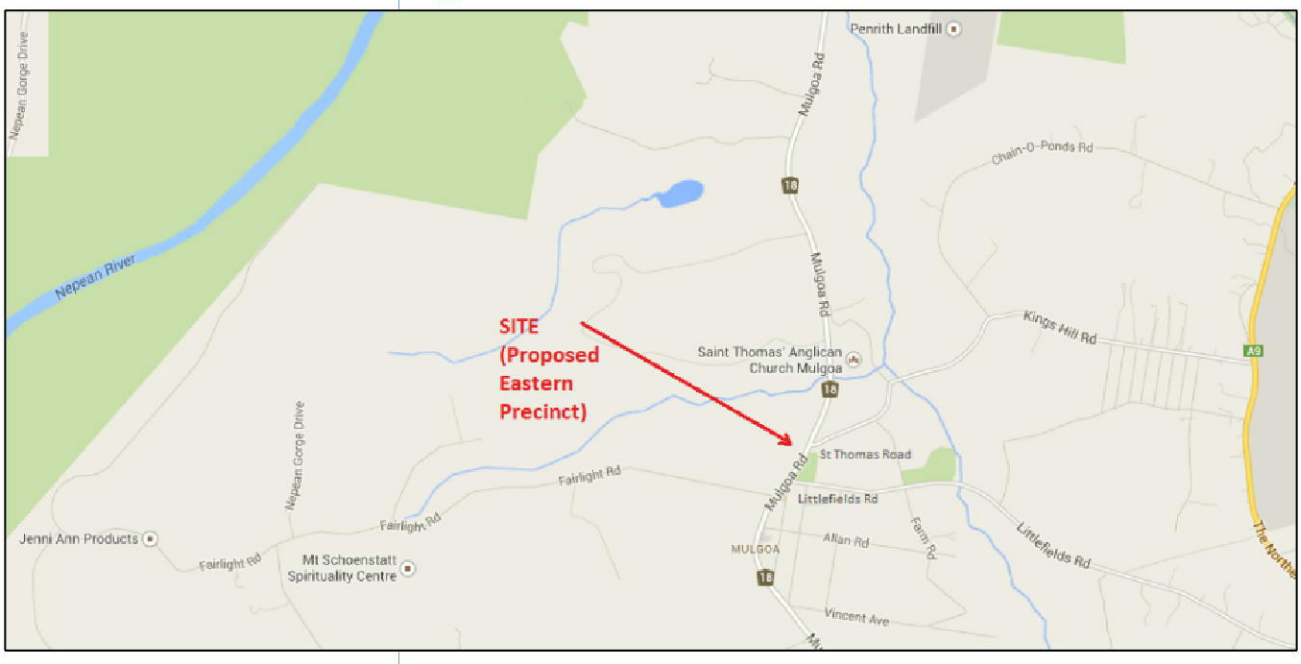
The subject site is located at the eastern end of the Fernhill Estate (Refer Figure 1.1) and is approximately 25.9 hectares in area.

The proposed Eastern Precinct of Fernhill Estate is bound by Mulgoa Road to the east, adjacent rural land to the north and west, Mulgoa Primary School and adjacent rural residential properties to the south and adjacent rural residential lots to the west.

2.2 Existing Road Network

The principal roads within close proximity to the site are shown in Figure 2.1 and discussed below along with a brief description.

Figure 2.1: Local Road Network



Source: Google Maps 2014

The road network in the immediate vicinity of the Site consists of Mulgoa Road, St Thomas Road and Littlefields Road. The classification of roads on the existing road network can be used as an indication of the functional role each road plays with respect to the volume of traffic they should appropriately carry. The Roads and Traffic Authority (RTA), now known as Roads and Maritime Services (RMS,) have developed a set of road hierarchy classifications, as detailed in Table 2.1, and their relationship with typical nominal volume ranges, in average daily traffic (ADT) and peak hour volumes (two way peak hour flows in vehicles per hour).

Table 2.1: Functional Classification of Roads

Type of Road	Traffic Volume (ADT)	Peak Hour Volume (vph)
Arterial Road	>15,000	1,500 – 5,600
Sub-Arterial Road	5,000 – 20,000	500 – 2,000
Collector Road	2,000 – 10,000	200 – 1,000
Local Road	<2,000	0 – 200

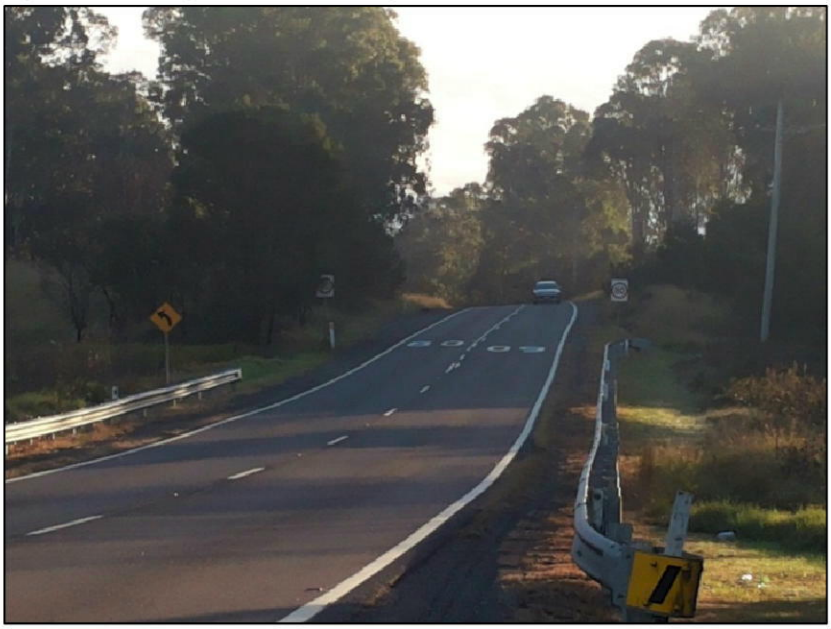
2.2.1 Mulgoa Road

Mulgoa Road is a state road providing a major link to Penrith and the M4 motorway to the north. In proximity of the site, Mulgoa Road has one traffic lane in each direction with unsealed shoulders.

Given the semi-rural location, its characteristics are similar to that of a typical major rural road. The speed limit is typically 80km/h and is reduced to 60km/h within the Mulgoa Township. Mulgoa Road also provides direct driveway access to fronting properties, which includes both residential and commercial properties.

It is noted that in some locations visibility is restricted and this includes the route running to the south of Fairlight Road. Overtaking along this section of Mulgoa Road is restricted and managed through the inclusion of double solid white centre lines.

Figure 2.3: Mulgoa Road – Looking north from St Thomas Road



2.2.2 Fairlight Road

Fairlight Road travels west from Mulgoa and provides access to principally large rural residential lots. It functions as a collector road feeding traffic from the area to Mulgoa Road. It has a variable width, typically present with a six metre wide sealed carriageway with one traffic lane in each direction and one to two metre wide unsealed shoulder. Fairlight Road provides direct driveway access to fronting properties and overtaking on approach to the intersection with Mulgoa Road is restricted and managed through the inclusion of double solid white centre lines.

Figure 2.4: Fairlight Road – Looking east towards Mulgoa Road

Figure 2.5: Fairlight Road – Looking west from Mulgoa Road

2.2.3 St Thomas Road

St Thomas Road runs along an east-west alignment to the east of Mulgoa Road and provides both a loop road connection back to Mulgoa Road to the north and a connection to Kings Hill Road in the east. The route can be used to travel between major rural roads through its connection with Kings Hill Road, which links Mulgoa Road in the west and The Northern Road to the east. It also functions as a collector road serving surrounding properties.

The road route has typical rural characteristics offering direct driveway access to principally large rural residential lots dwellings along a roadway with variable widths and unsealed shoulders. In general, the sealed roadway provides a six metre wide carriageway with one traffic lane in each direction and between one and two metre wide unsealed shoulders. The speed limit on St Thomas Road is typically 60km/h and conflicting traffic flows along the carriageway is separated on approach to the intersection with Mulgoa Road by a raised median.

Figure 2.7: St Thomas Road – Looking east from Mulgoa Road

2.2.4 Littlefields Road

Littlefields Road performs a similar collector road role to that of St Thomas Road providing an east-west connection between Mulgoa Road in the west to The Northern Road in the east. It is situated to the south of St Thomas Road and provides direct driveway access to fronting properties.

In general, Littlefields Road has a six metre wide sealed carriageway with one traffic lane in each direction and between one and two metre wide unsealed shoulders. The speed limit on Littlefields Road is reduced to 50km/h near to Mulgoa Road and conflicting traffic flows along the carriageway are managed on approach to the intersection with Mulgoa Road through the inclusion of double solid white centre lines.

Figure 2.8: Littlefields Road – Looking east from Mulgoa Road

Figure 2.9: Littlefields Road – Looking west towards Mulgoa Road

2.2.5 Nepean Gorge Drive

Nepean Gorge Drive is a local road providing access to rural residential lots. Nepean Gorge Drive provides access to 14 large rural residential dwellings and has approximately 4.3 metre wide sealed carriageway with 2.0 metre wide unsealed shoulders.

2.3 Existing Traffic Volumes

Mott MacDonald undertook typical weekday traffic surveys on Tuesday 24 June 2014 to record existing traffic volumes in the vicinity of the subject site during the following time periods:

- Between 6.45am and 9.30am (AM peak); and
- Between 2.30pm and 6.30pm (PM peak).

The traffic survey data was undertaken for the following key intersections:

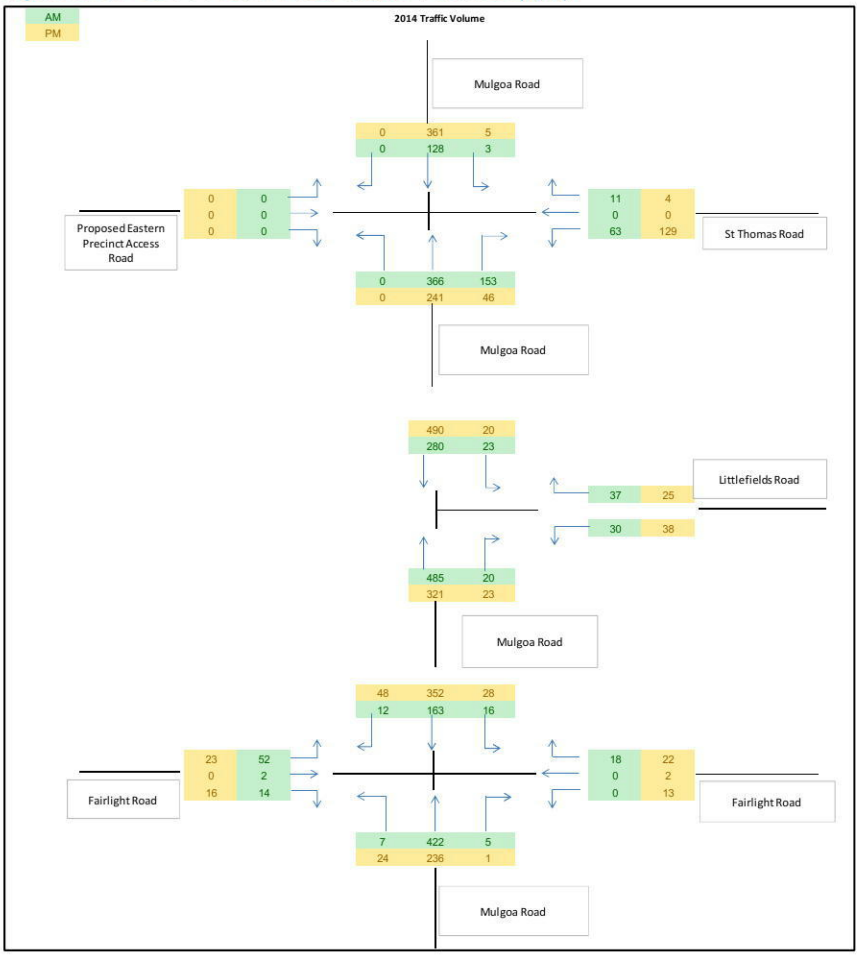
- Mulgoa Road/ Fairlight Road intersection;
- Mulgoa Road/Littlefields Road intersection; and
- Mulgoa Road/St Thomas Road (south) intersection.

The peak traffic periods were generally found to occur at the following times:

- Morning peak hour: between 8.00am and 9.00am
- Evening peak hour: between 4.00pm and 5.00pm

The 2014 morning and evening peak period traffic volumes are summarised in Figure 2.10.

Figure 2.10: 2014 Peak Period Traffic Volumes (vph)



Source: Mott MacDonald 2014

The traffic surveys indicate that the traffic movement on Mulgoa Road is predominantly northbound in the AM peak and southbound in the PM peak. The heaviest traffic flows on side road were recorded on St Thomas Road which attracted right turn movement from Mulgoa Road south in the AM peak and generate left turn movement into Mulgoa Road in the PM peak.

2.4 Public Transport, Bicycle & Pedestrian Facilities

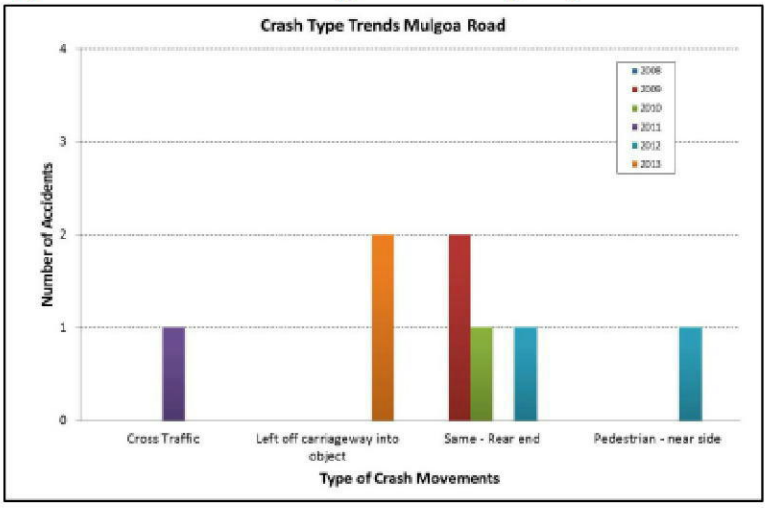
Bus route 795 runs approximately every hour during the weekday peak periods from Warragamba to Penrith Train Station. This bus route 795 runs along Mulgoa Road and services this catchment through a Bus stop located directly in front of Mulgoa Public School (i.e. at the intersection with Littlefields Road). The bus service operates 4 times per day during weekends and public holidays. It is anticipated that the current bus services will be sufficient to cater for the additional demand generated by the proposed development. The bus route map is shown in Appendix A.

The pedestrian footpaths are located on both sides of Mulgoa Road between Littlefields Road and Fairlight Road. The surrounding road network consists of rural environment, such that, there does not appear to be any formalised bicycle facilities on any road within close proximity to the site.

2.5 Crash Analysis

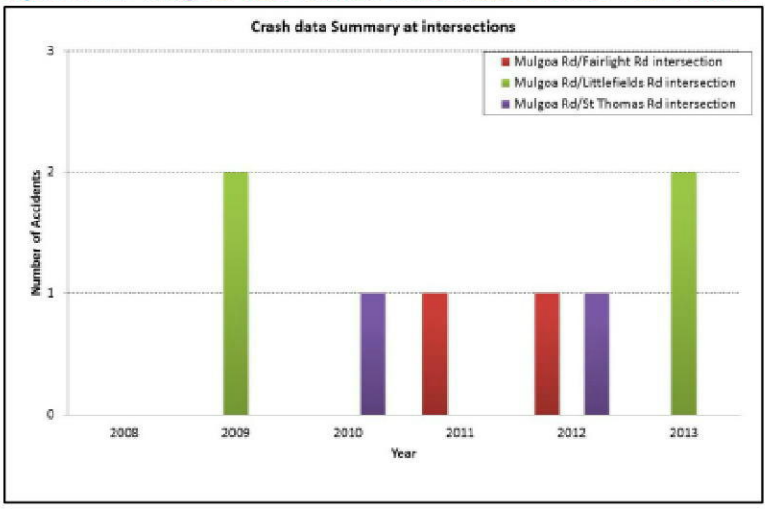
Crash analysis has been undertaken as part of this Traffic Impact Assessment report to identify observed historical crash trends along Mulgoa Road. The key historical trends associated with crashes are identified in Figure 2.11 and 2.12.

Figure 2.11: Historical Crash Type Trends along Mulgoa Road



Source: Roads and Maritime Services NSW, Crash Statistics (July 2008 to June 2013)

Figure 2.12: Mulgoa Road- Annual Crash Rates over a 5 Year Period



Source: Roads and Maritime Services NSW, Crash Statistics (July 2008 to June 2013)

The key crash trends identified from the analysis of the crash statistics, site visit findings and review of background reports are as follows:

- There was in total 8 road crashes recorded for the entire surveyed period in the vicinity of the site, of which 63% (5) resulted in an injury to the vehicle driver or its occupants.
- 25% of all crashes were recorded at Mulgoa Road/St Thomas Road intersection.
- 50% of road crashes were recorded at Mulgoa Road/Littlefields Road intersection.

- 25% of road crashes were recorded at Mulgoa Road/Fairlight Road intersection.
- 50% of road crashes were associated with rear end collisions and 25% of road crashes occurred when vehicle run off road and hit an object.
- All crashes occurred during daylight hours. It is also noted that 37% of crashes occurred during the weekend.

The similar of crash trends at each key intersection are summarised below.

2.5.1 Mulgoa Road/Fairlight Road intersection

Analysis of the crash data revealed that in total, 2 crashes in last 5 years occurred along at Mulgoa Road/ Fairlight Road intersection between July 2008 and June 2013. Of these, 1 crash resulted in injury where vehicle run off carriageway and hit an object. The last crash at Mulgoa Road/Fairlight Road intersection occurred during 2012.

2.5.2 Mulgoa Road/Littlefields Intersection

Analysis of the crash assessment of the crash data revealed that in total, 4 crashes occurred along at the Mulgoa Road with Littlefields intersection between July 2008 and June 2013. Of these 2 (50%) crashes resulted in injuries, 2 (50%) incidents occurred as a result of vehicle run off carriageway and hit an object and 2 incidents occurred due to rear end collision.

2.5.3 Mulgoa Road/St Thomas Road intersection

Analysis of the crash assessment of the crash data revealed that in total, 2 crashes occurred along at the Mulgoa Road with Thomas Road intersection between July 2008 and June 2013. Both crashes resulted in injuries and as a result of rear end shunts, whilst travelling in a northbound direction.

3 Proposed Development

3.1 Land Use

The site comprising Lot 1 DP 570484 and Lot 6 DP 173159 is a 25.9 ha parcel of land fronting Mulgoa Road. It is proposed to develop this precinct to accommodate a total of 50 residential lots ranging from approximately 700-2000 square metres in size. It has been assumed for the purpose of this assessment that all lots will be detached and have three or more bedrooms.

Figure 3.1: Site Plan

Source: AE Design Partnership - Eastern Precinct Lot Layout dated 17/06/2014

3.2 Proposed Layout and Road Network

The proposed layout of the road network is indicated in Figure 3.1. The details of the proposed roadways for the development area are summarised below. It should be noted that detailed design of the road layout is anticipated to be undertaken upon receipt of development consent.

- A single consolidated road connected to Mulgoa Road at Mulgoa Road/St Thomas Road intersection;
- The proposed Eastern Precinct site access road will cater for all turning movements at the intersection with Mulgoa Road/St Thomas Road intersection;

- Speed along the internal road system will be managed through limiting long straight sections of roadway and minimising two way carriageway width to approximately 6 metres; and
- The road layout will ensure that service and refuge vehicles can enter and service the precinct in a safely and efficient manner without having to perform U-turns.

3.3 Proposed Site Access Road and Internal Road Layout

It is proposed to provide a single consolidated access road to serve the Eastern Precinct development site. This access road is proposed to connect directly to Mulgoa Road at the existing intersection with St Thomas Road to form a sign posted controlled four way intersection with priority given to movements along Mulgoa Road. The consolidation to a single access aligns with both RMS Guide to Traffic Generating Development (RTA, 2002) and the Network and Corridor Planning Practice Notes (RTA, 2008) and is sufficient to accommodate the demand associated with the site.

Site observations indicate that adequate sight distance can be provided at the intersection to address the minimum requirement (as specified in Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, Section 3.2.2) for Safe Intersection Sight Distance- SISD under the signposted 60km/h speed limit along this section of Mulgoa Road. The proposed intersection layout modification will be designed to allow safe and efficient access into the site for vehicles travelling along Mulgoa Road.

The proposed internal road layout has been designed around creating a low speed low volume traffic environment that supports its local rural residential function and aligns with the site terrain, as much as is practicable. It is recommended that roadside landscaping on the inner curve of the internal road reserve is kept to a minimum and that the height of vegetation is restricted in these areas in order to minimise its potential impact on sight distance for motorists either in driveways or travelling along the roadway.

The proposed internal road layout is considered adequate and aligns with its rural environment and local road characteristics, although it is acknowledged that it may not be deemed to be strictly in compliance to the horizontal curve requirement set within Austroads Guide to Road Design. However, with the adoption of the following road design applications it is a deemed to adequate to manage these associated risks:

- road reserve width of 12m or higher combined with a sealed carriageway width of 6m or more situated closer to the outside curve;
- the provision of on-street parking bays on horizontal curves to be restricted to the outside curve of the road carriageway only;
- the low signposted travel speed and traffic volumes, and
- the above restriction on roadside landscaping.

3.4 Anticipated Traffic Generation

The anticipated future traffic generation has been estimated based on the RMS Guide to Traffic Generating Developments (2002).

The RMS Guide to Traffic Generating Development specifies trip generation rate for residential dwelling houses as follows:

- Daily vehicle trips = 9.0 per dwelling
- Weekday peak hour vehicle trips = 0.85 per dwelling

The RMS updated their trip generation surveys in 2010 and provided the following trip generation rates for low density residential dwellings:

- Daily Vehicle trips = 10.7 per dwelling in Sydney, 7.4 per dwelling in regional areas;
- Weekday average evening peak hour vehicle trips = 0.99 per dwelling in Sydney (maximum 1.39), 0.78 per dwelling in regional areas (maximum 0.90);
- Weekday average morning peak hour vehicle trips = 0.95 per dwelling in Sydney (maximum 1.32), 0.71 per dwelling in regional areas (maximum 0.85);

The proposed development is located within semi-rural area, which is anticipated to have a lower trip generation rate than that shown for urban areas of Sydney and higher trip generation rate over that shown for regional areas. In light of the above, a trip generation rate 0.85 trips per dwelling during morning and evening peak periods has been adopted for the proposed development, which is consistent with the rate presented in the RMS Guide to Traffic Generating Developments.

The estimated traffic generation for the proposed development is summarised in Table 3.1.

Table 3.1: Proposed Eastern Precinct Development Traffic Generation

Location	No of Residential Lots	Peak Hour Trips (vehicles per hour)
Site (Eastern Precinct)	50	43

The assumed in / out split during each peak period is anticipated to be 10% in / 90% out during the morning peak period and 90% in / 10% out during the evening peak period. The inbound and outbound movement in vehicles per hour is shown below in Table 3.2 and has been calculated using the total number of trips generated by the development during both peak periods.

Table 3.2: Traffic Generation by Direction

Location	Morning Peak Trips (vph)		Evening Peak Trips (vph)	
	In	Out	In	Out
Site (Eastern Precinct)	4	39	39	4

3.5 Trip Distribution

The anticipated trip distribution applied in the network modelling assessment is based on the 2011 journey to work travel zone information contained on the NSW Government website (http://visual.bts.nsw.gov.au/jtwdynamic) and observed traffic movements along the local road network.

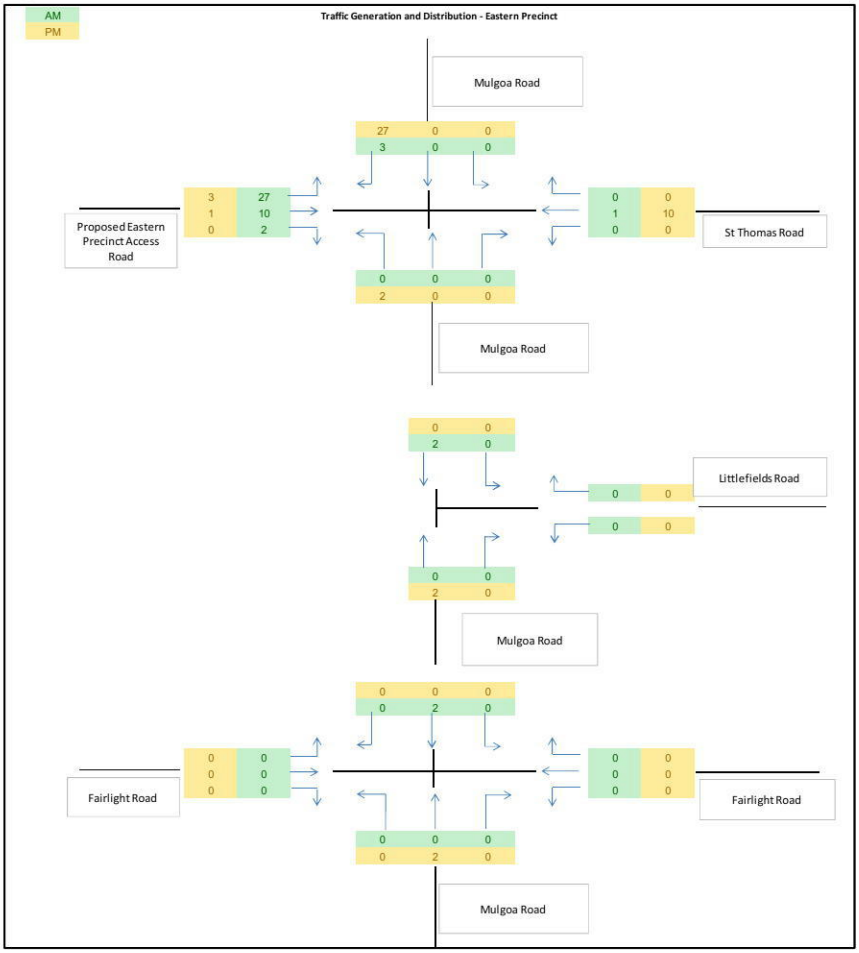
The proposed development's estimated future trip distribution that forms the basis of the traffic impact analysis is shown in Table 3.3.

Table 3.3: Anticipated Trip Distribution based on Journey to Work data (Living in Mulgoa village)

Distribution	Existing (Actual)	Future (Estimated)
Mulgoa Road - North	70%	70%
St Thomas Road - North East	25%	25%
Mulgoa Road - South	5%	5%
Total	**100%**	**100%**

The anticipated traffic generation and distribution as a result of the proposed development is illustrated in Figure 3.2.

Figure 3.2: Anticipated Eastern Precinct Traffic Generation and Distribution



4 Traffic Impact

This section of the report provides an understanding of the assessment process, performance measures and quantifies the impact from the inclusion of the proposed development on the surrounding road network.

4.1 Network Traffic Volumes

Background traffic volumes have been obtained and used to appraisal intersections in this report. The intersections surveyed included the following intersections, which were identified to be potentially impacted by the Fernhill Estate residential development proposal:

- Mulgoa Road with St Thomas Road;
- Mulgoa Road with Fairlight Road; and
- Mulgoa Road with Littlefields Road.

The background traffic flows were extracted directly from peak hour traffic surveys undertaken on Tuesday 24th June 2014. The existing background traffic flows were illustrated in Figure 2.10.

4.2 Performance Measures (Level of Service)

The 'Level of Service' (LoS) is the standard measure used to understand the operational performance of the network and intersections. This is defined as the qualitative assessment of the quantitative effect of factors such as speed, traffic volume, geometric features, delays and freedom of movement. The LoS concept is applied to intersections through measures of effectiveness, as summarised in Table 4.1.

Table 4.1 Measures of Effectiveness for LoS Definition for Intersections

Intersection Control	Measure of Effectiveness
Priority controlled	Degree of Saturation Delay to critical movements (sec/vehicle) Queue length for critical movements
Traffic Signals	Average Delay (sec/vehicle) Delay to critical movements Degree of Saturation Cycle Length Queue length for critical movements
Roundabout	Average Delay (sec/vehicle) Delay to critical movements Degree of Saturation Queue length for critical movements

The assessment of intersection operation is based on criteria outlined in Table 4.2, as defined by Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (RTA 2002).

Table 4.2 Level of Service Criteria for Intersections (RMS NSW)

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control modes	At capacity, requires other control mode
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

Note:
- The average delay assessed for signalised intersections is over all movements.
- For roundabouts and priority control intersections (with Stop and Give Way signs or operating under the T-junction rule), the critical criterion for assessment is the movement with the highest delay per vehicle.
- Average delay is expressed in seconds per vehicle.

4.3 Traffic Modelling Scenarios and Assumptions

In general, the modelling assumptions and scenarios applied in this assessment include:

- No modification to existing traffic arrangements and operations under base line existing conditions modelling.
- Additional residential traffic generated by the proposal has been estimated using RMS Guide to Traffic Generating Developments and RMS Technical Direction TDT 2013/04a - Guide to Traffic Generating Development Updated traffic Surveys (Refer to section 3.4 for further details).
- Appraisal of future traffic conditions has been undertaken using a 10 year design horizon, which is identified as 2026 based on the development receiving approval in 2014 and construction completed by 2016.

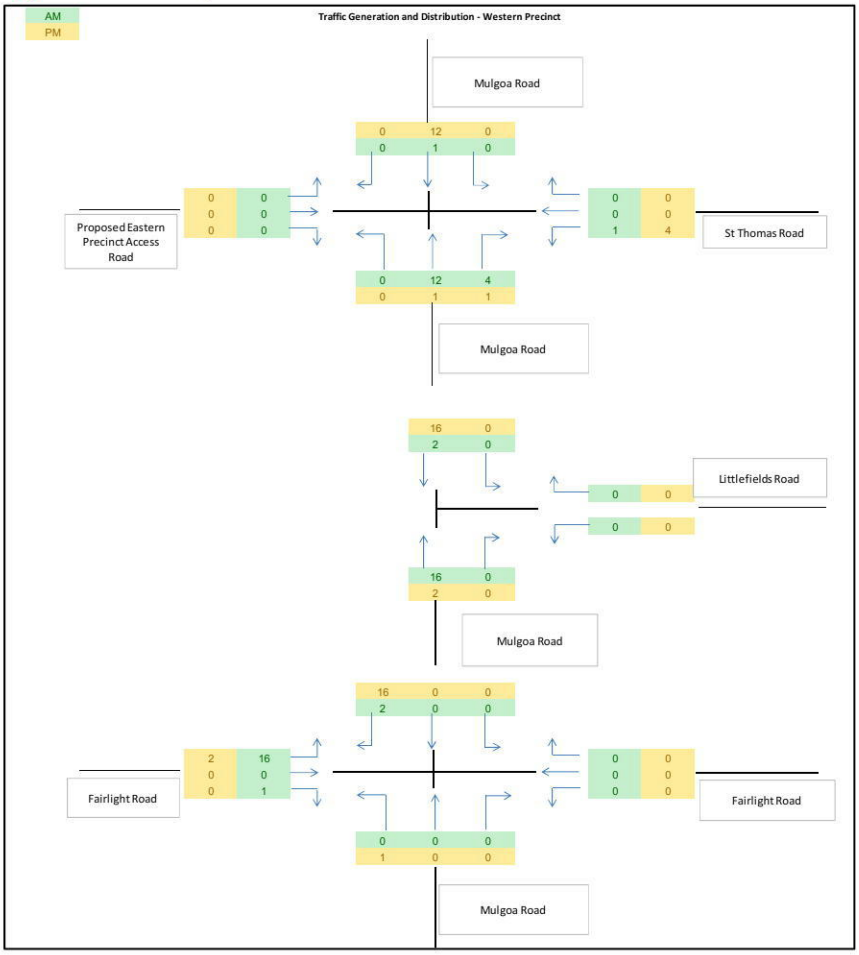
- It is assumed that background traffic would grow by 2% per annum.
- The assessment includes both with and without development scenario to understand the likely impact in the future from the proposal.
- The inclusion of traffic generated from the proposed Fernhill Estate western precinct development proposal has also been included in the appraisal to provide an understanding of the cumulative impacts from known future development in the area (refer to section 4.3.1).
- Traffic distribution is based on BTS JTW suburban data set 2011 for travel zone 4966 and has been generated on place of work (residential movement) data sets (Refer to section 3.5 and Appendix B for further details).
- The performance of intersection will be appraised on the basis that all intersections should achieve a Level of Service C or above.
- It is assumed that queue lengths at intersections should be appropriately managed if different from those estimated under without development traffic conditions.

4.3.1 Future Western Precinct Development

It is anticipated that future development of Fernhill Estate's Western Precinct will comprise of 22 lots including 19 rural residential lots and 3 environmental living lots and is subject to the approval of a separate Development Application. The combined traffic impact from the delivery of both the proposed Eastern and Western Precincts has been included in this report and estimated using RMS standard trip generation rates and a trip distribution profile obtain from reviewing the BTS 2011 Journey to Work travel data sets.

Refer to Figure 4.1 for the anticipated trip generation and distribution from the future development of the Fernhill Estate Western Precinct.

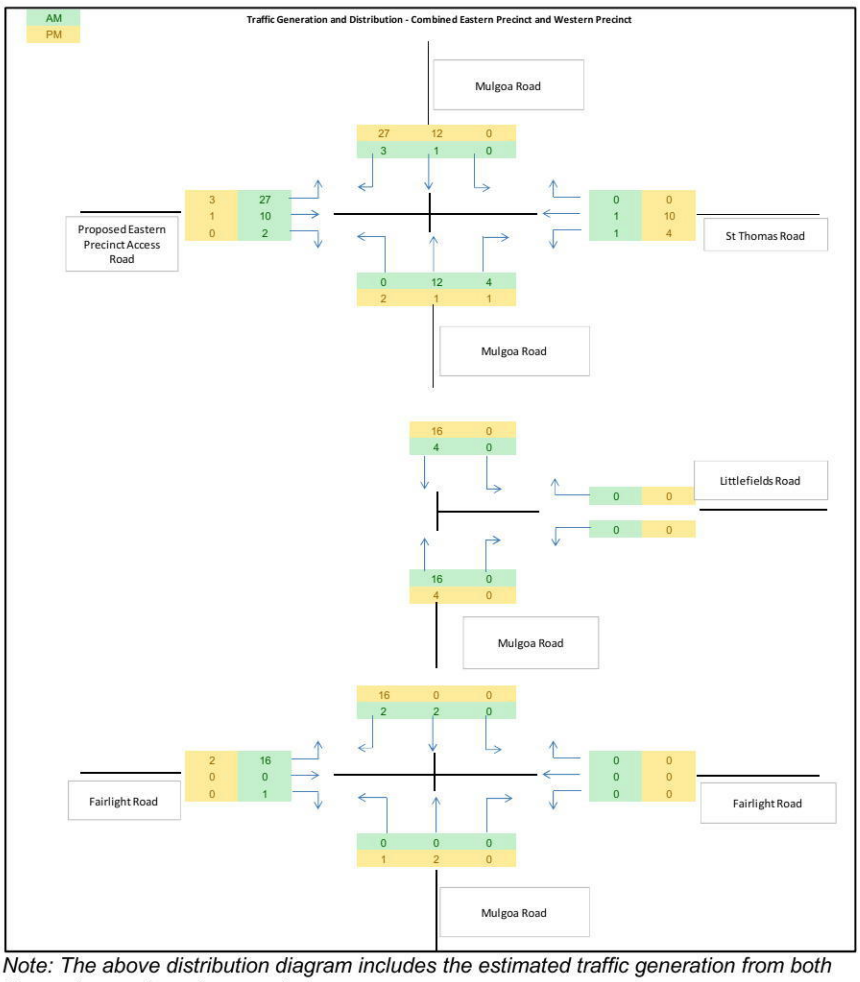
Figure 4.1: Anticipated Western Precinct Traffic Generation and Distribution



4.3.2 Combined Traffic Generation

The anticipated trip generation and distribution for the combined development of proposed Eastern and Western Precincts is illustrated in Figure 4.2.

Figure 4.2: Anticipated Combined Traffic Generation and Distribution



Note: The above distribution diagram includes the estimated traffic generation from both the eastern and western precincts.

4.4 Estimated 2026 Traffic Volumes

2026 traffic volumes have been estimated using a 2% annual growth rate for background traffic on the network, which is assumed to occur with or without the inclusion of the Eastern Precinct and Western Precinct site. Figure 4.3 presents the estimated network traffic volumes without the proposed Fernhill Estate (eastern and western precinct proposals) development and Figure 4.4 provides the resulting increase in traffic from the inclusion of the above proposed developments.

Figure 4.3: 2026 Traffic volumes WITHOUT development

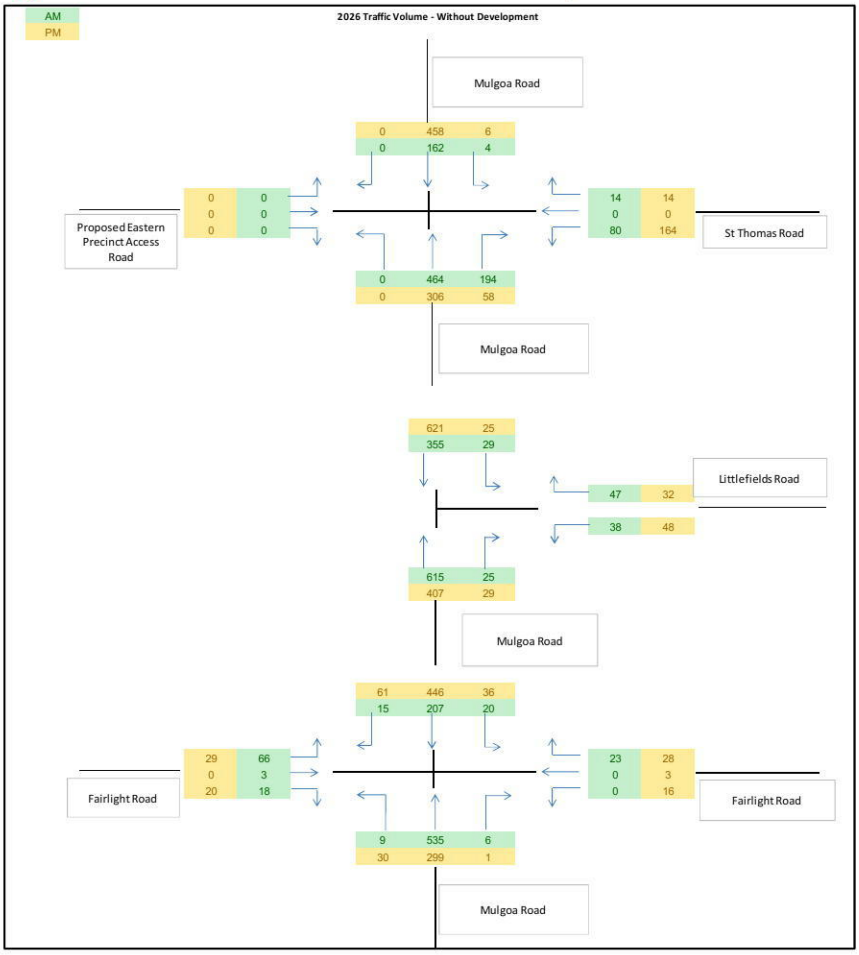


Figure 4.4: 2026 Traffic volumes WITH Proposed Eastern Precinct and future Western Precinct Development

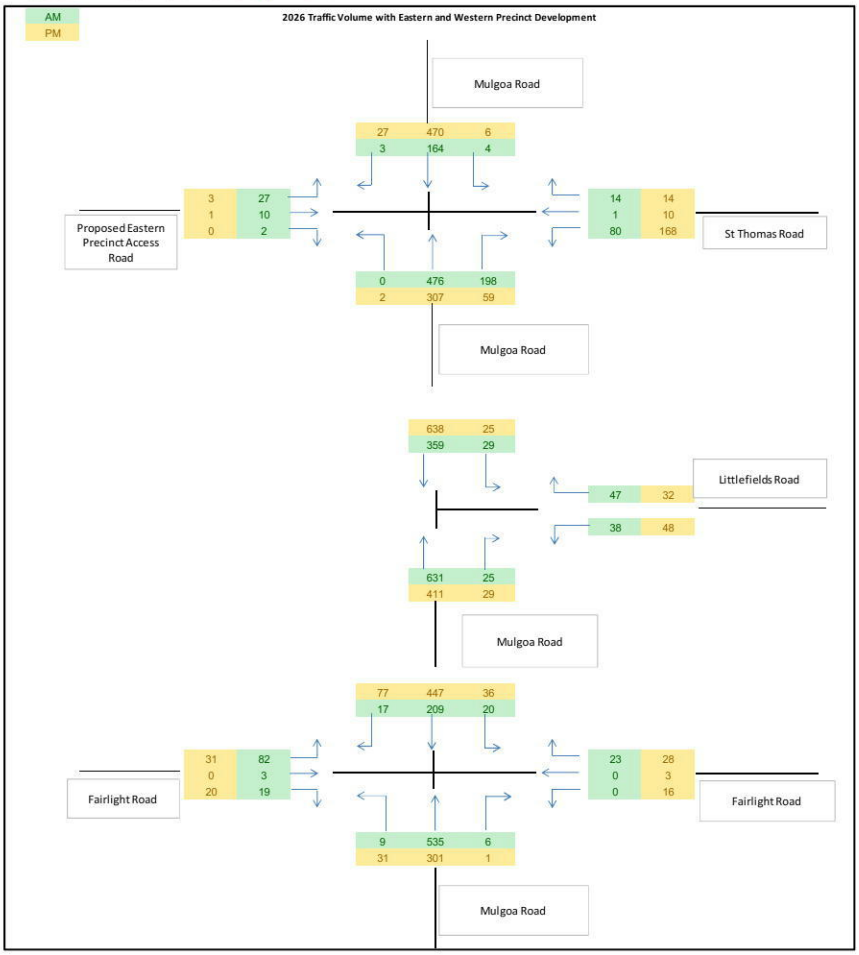
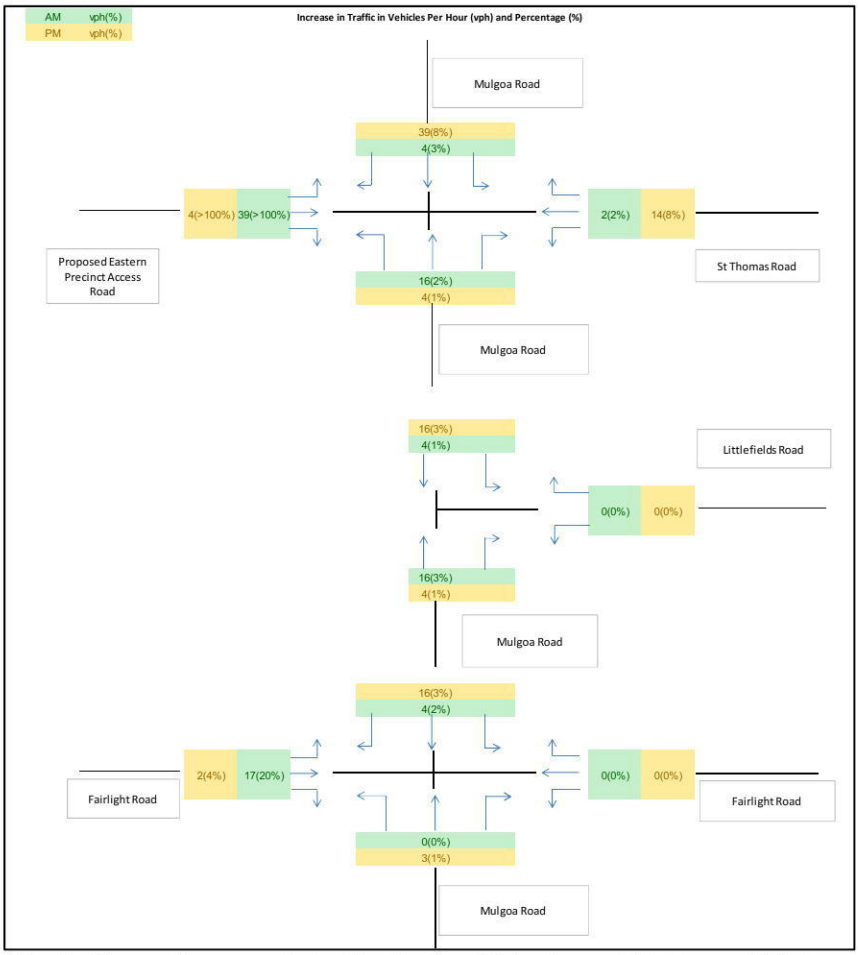


Figure 4.5 has been produced to provide an understanding of the difference in traffic or traffic growth resulting from the inclusion of the Fernhill Estate development proposals under 2026 traffic conditions. This information is presented both in vehicles per hour (vph) and a percentage (%).

Figure 4.5: Estimated Traffic Growth in 2026 under the 'With' Development Scenario



Note: Traffic growth as a result of adding the Fernhill development (Eastern and Western precinct) proposals is shown in vehicles per hour and as a percentage, which is included in brackets in the above diagram (0%).

The review of traffic growth resulting from the inclusion of the combined development in the Eastern and Western Precincts above that expected under background traffic growth indicates the following:

- Traffic growth along Mulgoa Road to the south of St Thomas Road is minimal (below 3%);
- Traffic growth along Mulgoa Road to the north of St Thomas Road increases by 8% in the PM peak or by 39 additional vehicles;
- Traffic growth along Fairlight Road will result in a 20% increase in traffic or 17 additional peak hour vehicle movement;
- Traffic growth along St Thomas Road will result in an 8% increase in traffic or 14 additional peak hour vehicle movements.

4.5 Road Capacity

A review of the outcomes of section 4.4 have been undertaken, which indicates that even with these increases, the two-way traffic volumes on Mulgoa Road are anticipated to be well below the notional capacity of 2,000vph for a sub arterial road.

The anticipated two way traffic volumes on Fairlight Road and St Thomas Road in 2026 with the development will be well below 300vph and anticipated to be accommodated within their notional capacity of 1,000vph for a collector road.

In light of the above, the proposed development is not anticipated to have any significant impact on the surrounding road network in terms of the functional road capacity.

4.6 Intersection Operation

The operational performance of intersections has been assessed using SIDRA Intersection Analysis software tool. The Level of Service criteria set by the RTA (now known as RMS) is outlined in Section 4.2 and SIDRA will be used to calculate the amount of delay experienced by vehicles using an intersection, and identify the Level of Service rating to relate to the operating performance of that intersection. The SIDRA modelling outputs will also include an average delay (in seconds per vehicle) recordings for the worst case movement at the intersection, degree of saturation and the queue length of the worst case movement. The SIDRA outputs are attached in Appendix C.

4.6.1 Mulgoa Road / St Thomas Road Intersection

Figure 4.6 shows existing configuration of Mulgoa Road/St Thomas Road intersection and Figure 4.7 presents the proposed intersection layout with the Proposed Eastern Precinct Access Road at the intersection. The intersection layout under this assessment includes a Basic right turn (BAR) treatment for Mulgoa Road approaches, which result in maximum delay to traffic or a worst case scenario from an operation point of view.

Figure 4.6: Mulgoa Road/St Thomas Road Intersection –Existing configuration

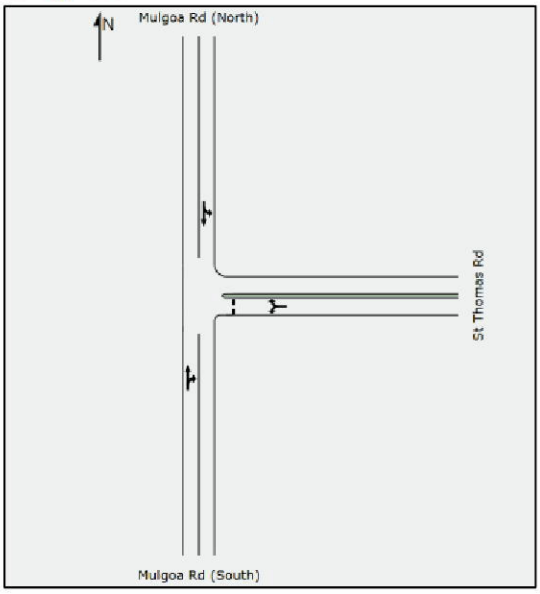
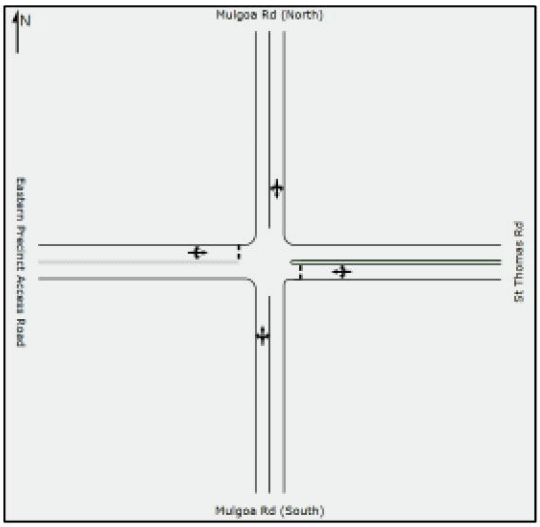


Figure 4.7: Proposed Mulgoa Road/St Thomas Road/Eastern Precinct Access Road Intersection



The operational impact from the inclusion of the proposed development traffic at the intersection was assessed using SIDRA 5.1 Intersection modelling software and results of the analysis are summarised in Table 4.3.

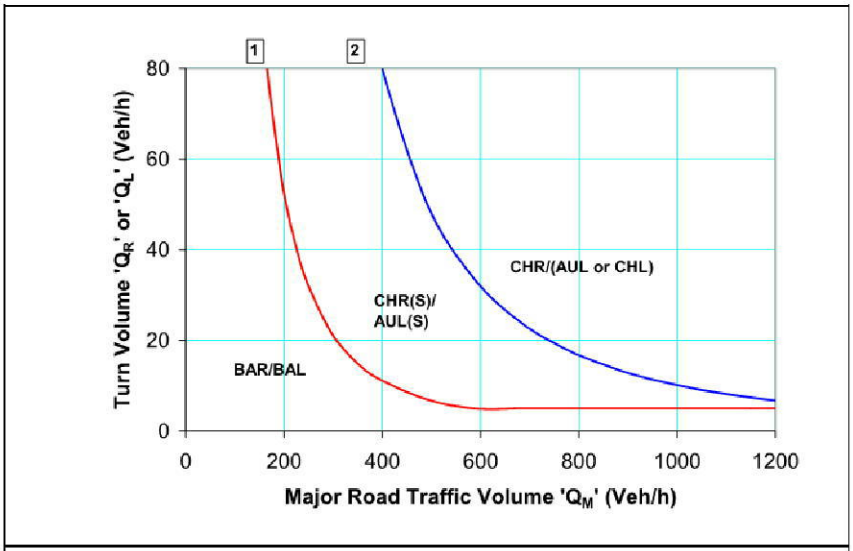
Table 4.3: Mulgoa Road/St Thomas Road/Eastern Precinct Site Access Road Intersection SIDRA Summary

Case	Peak	Degree of Saturation (DoS)	Level of Service (LoS)	Maximum Delay(s)	95% Back of Queue (m)
2026 Without Development	AM	0.417	A	11.8	23.8
2026 With Development	AM	0.428	B	15.2	24.9
2026 Without Development	PM	0.306	A	13.6	14.1
2026 With Development	PM	0.360	B	16.6	17.5

The results of the analysis indicate that the Mulgoa Road/St Thomas Road/Eastern Precinct Site Access Road intersection will continue to perform at an acceptable level of service (LoS B) with minimal change in average delay, degree of saturation or queue length. The critical movement of the intersection is identified to be the right turn movement on the Mulgoa Road southern approach.

It should be noted that the current layout at Mulgoa Road/St Thomas Road intersection assumes a basic turn treatment for right turn movements from Mulgoa Road to St Thomas Road. Further analysis was completed at the intersection using Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, which provides warrants for standard intersection treatments for urban and rural roads. The warrants are based on the through traffic volume and turning traffic volume at the intersection as illustrated in Figure 4.8.

Figure 4.8: Austroads Warrants for Turn Treatments for Design speed<100km/h



Source: Austroads Guide to Road Design – Part 4A, Figure 4.9

It should be noted that Mulgoa Road has existing signposted speed limit of 60km/h in the vicinity of the intersection and that the above graph does not specifically consider speed environment at 60km/h or below.

The existing traffic volume on Mulgoa Road is 497vph and existing right turning traffic volume from Mulgoa Road to St Thomas Road is 153vph during the morning peak period. Based on Figure 4.8 above, the existing traffic volumes trigger a requirement for the installation of a channelized right turn treatment at Mulgoa Road/St Thomas Road intersection.

The crash analysis discussed in Section 2.5.3 indicates that 2 crashes occurred at the Mulgoa Road/St Thomas Road intersection during last five years with both crashes resulting from rear end shunts. The relatively high right turning traffic movement from Mulgoa Road to St Thomas Road during morning peak period and the proposed Channelised (CHR) right turn treatment is anticipated to improve intersection safety and result in operational benefits. It should be noted that this is an existing issue and has identified from the review of historical crash data.

The increase in right turning traffic from Mulgoa Road to St Thomas Road as a result of the proposed combined Fernhill Estate development is 3vph (generated by the development in the western precinct), which is considered insignificant.

The proposed eastern precinct development will generate 27vph trips turning right into the proposed Site Access Road from Mulgoa Road northern approach during the evening peak period. The 2026 traffic volume on Mulgoa Road will be 779vph during the evening peak period. Based on Figure 4.8, it is proposed to provide a Channelised (CHR) right turn treatment for the right turn vehicles from Mulgoa Road northern leg to the proposed Site Access Road. The proposed CHR treatment is anticipated to improve intersection safety and result in operational benefits.

The Mulgoa Road/St Thomas Road/Eastern Precinct Site Access Road is analysed with Channelised (CHR) right turns treatment in accordance with AUSTROADS (Figure 4.9) for the both right turning movements from Mulgoa Road approaches. The provision of a Channelised (CHR) right turns treatment at the intersection is anticipated to provide adequate storage capacity for the right turning movements from Mulgoa Road whilst maintaining through northbound and southbound traffic flows on Mulgoa Road.

Figure 4.9 presents the SIDRA generated intersection layout for St Thomas Road with Mulgoa Road with the adoption of CHR treatments and Table 4.4 summarises SIDRA analysis results for the same.

Figure 4.9: Mulgoa Road/St Thomas Road/Eastern Precinct Access Road Intersection – Channelised (CHR) right turns treatment

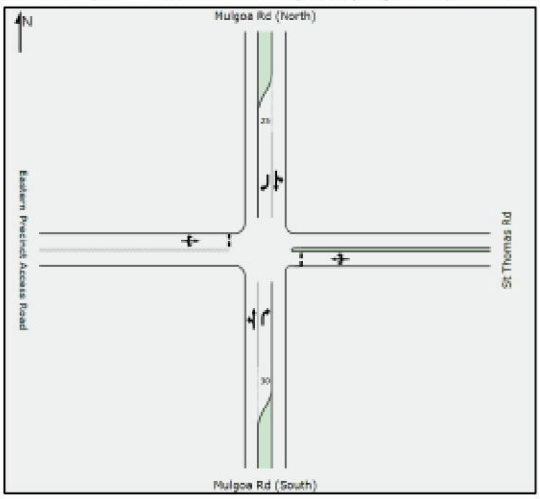


Table 4.4: Mulgoa Road/St Thomas Road/Eastern Precinct Site Access Road Intersection with Channelised (CHR) right turns treatment - SIDRA Summary

Case	Peak	Degree of Saturation (DoS)	Level of Service (LoS)	Maximum Delay(s)	95% Back of Queue (m)
2026 With Development - CHR treatments	AM	0.266	B	14.6	4.9
2026 With Development - CHR treatments	PM	0.355	B	16.1	11.6

Table 4.4 indicates that the treatment offers minimal operational improvement to that presented under a standard BAR treatment, however queue lengths are better managed.

4.6.2 Mulgoa Road/Fairlight Road Intersection

The future impact from the inclusion of the proposed development traffic on the Mulgoa Road/Fairlight Road intersection was assessed using SIDRA 5.1 Intersection modelling software. The Mulgoa Road/Fairlight Road intersection layout is shown in Figure 4.10 and the SIDRA analysis results are shown in Table 4.5.

Figure 4.10: Mulgoa Road/Fairlight Road Intersection Layout

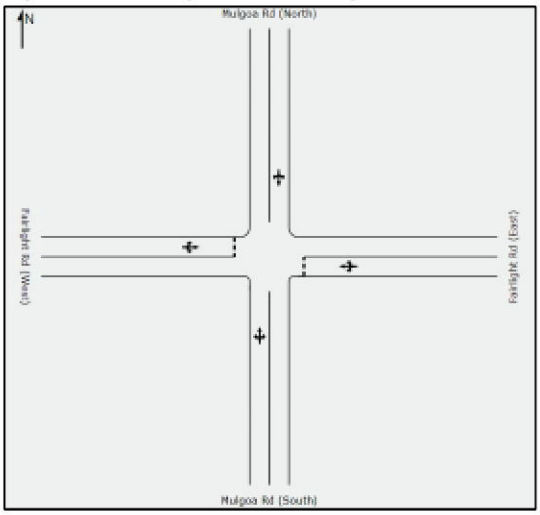


Table 4.5: Mulgoa Road/Fairlight Road Intersection SIDRA Summary

Case	Peak	Degree of Saturation (DoS)	Level of Service (LoS)	Maximum Delay(s)	95% Back of Queue (m)
2026 Without Development	AM	0.309	B	22.6	17.9
2026 With Development	AM	0.309	B	23.2	18
2026 Without Development	PM	0.329	B	19.7	20.2
2026 With Development	PM	0.345	B	20.3	21.7

The results indicate that under the future with or without scenarios the intersection operates satisfactorily with minimal changes in operating performance in the future.

It is evident that the proposed development of the combined Fernhill Estate Precincts is not anticipated to have any significant operational impact on the surrounding road network.

4.6.3 Mulgoa Road / Littlefields Road intersection

The future impact from the inclusion of the proposed development traffic on the Mulgoa Road/Littlefields Road intersection was assessed using SIDRA 5.1 Intersection modelling software. The Mulgoa Road/Littlefields Road intersection layout is shown in Figure 4.11 and the SIDRA analysis results are shown in Table 4.6.

Figure 4.11: Mulgoa Road/Littlefields Road Intersection Layout

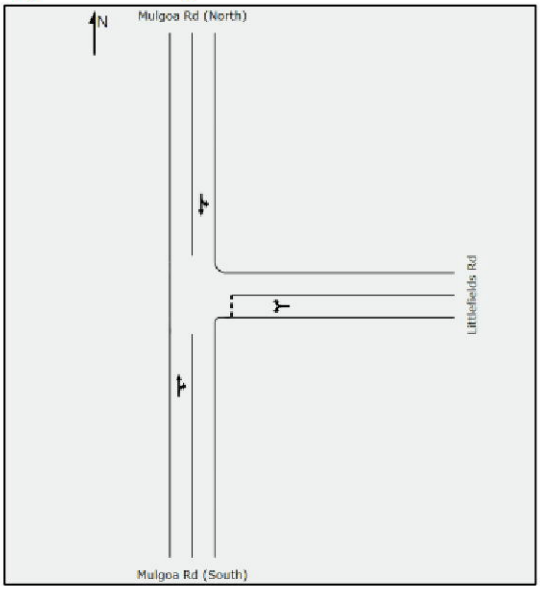


Table 4.6: Mulgoa Road/Littlefields Road Intersection - SIDRA Summary

Case	Peak	Degree of Saturation (DoS)	Level of Service (LoS)	Maximum Delay(s)	95% Back of Queue (m)
2026 Without Development	AM	0.401	C	30	30.2
2026 With Development	AM	0.419	C	31.6	32.2
2026 Without Development	PM	0.371	C	28.5	23.9
2026 With Development	PM	0.390	C	30.1	25

The results indicate that under the future scenario incorporating traffic generated by the proposed combined Eastern and Western Precinct developments, the intersection would operate satisfactorily with minimal changes in operating performance in the future.

It is evident that the proposed combined Fernhill Estate Precincts is not anticipated to have any significant impact on the surrounding road network.

5 Summary and Recommendations

5.1 Key Findings

The likely traffic impact from the proposed development of the Fernhill Estate's Eastern Precinct has been assessed as part of this report. The main points to note from this assessment are as follows:

- It is proposed to subdivide the subject parcel of land in order to provide 50 residential lots for the proposed Fernhill Eastern Precinct Development (Eastern Precinct).
- The development will be served by one consolidated two way access road, which will provide a direct connection to Mulgoa Road at the existing Mulgoa Road/St Thomas Road intersection, which aligns with good network planning principles and concurs with the RMS Guide to Traffic Generating Developments (RTA 2002).
- The proposed access and intersection treatment provides safe and efficient access into the site for vehicles travelling along Mulgoa Road.
- The proposed internal road layout will ensure that traffic speeds are managed and both service and refuge vehicles can travel into and around the precinct in a safe and efficient manner without reversing or performing a U-turn.
- The proposed internal road layout is considered adequate to suit rural environment and local rural road characteristics.
- The intersections at the following locations were appraised as part of this assessment:
  - Mulgoa Road and St Thomas Road;
  - Mulgoa Road and Littlefields Road; and
  - Mulgoa Road and Fairfield Road.
- All intersection performed satisfactorily under both existing and future traffic conditions without the introduction of the proposed development.
- There were eight (8) crashes that were recorded over the last 5 years along this section of Mulgoa Road with 25% (or 2) recorded at the intersection with St Thomas Road.
- There was no weekday peak period trend identified in the appraisal of the crash history at this intersection, but the majority of crashes were identified to occur at or on approach to the intersection and involved a rear end collision for northbound traffic travelling in the same direction.
- Mulgoa Road at the intersection with St Thomas Road does not formally provide a sealed shoulder for a vehicle to pass if a vehicle is waiting to turn right and preliminary investigations indicates that the carriageway is sufficient to accommodate widening at and on approach to the intersection.

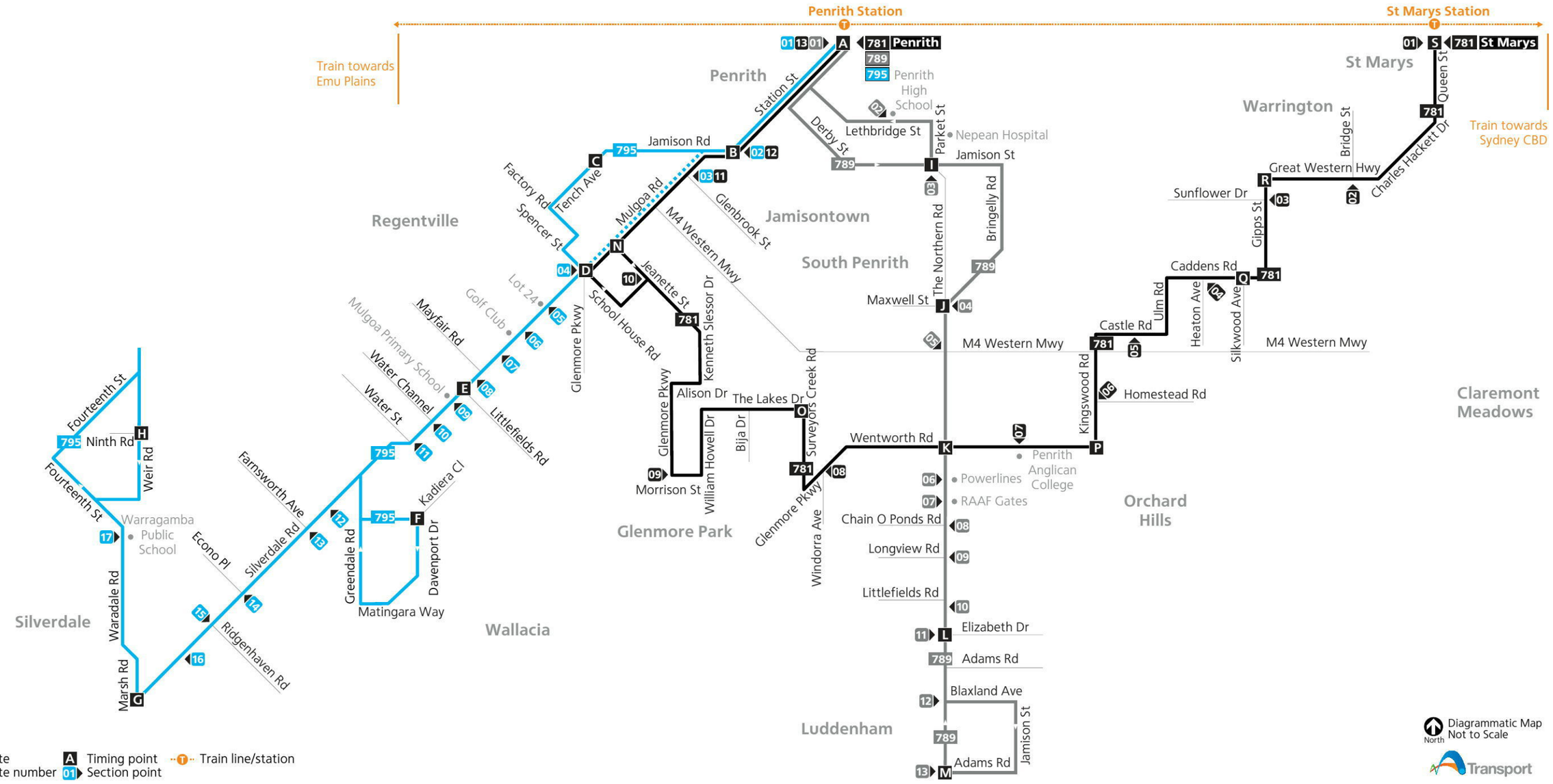
- The crash history and the above existing intersection arrangement indicates that existing traffic flows at the intersection of Mulgoa Road/ St Thomas Road would benefit from the inclusion of a CHR treatment, which is warranted under the Austroads guideline.
- The crash rate should be investigated and upgraded by Council and RMS as part of the blackspot program or RMS road safety initiatives.
- The site is currently served by the 795 bus route, which operates along Mulgoa Road and services Penrith City Centre, Mulgoa, Luddenham and Warragamba and was observed to have sufficient spare capacity.
- Footpaths currently existing on the western and eastern sides of Mulgoa Road in proximity of Littlefields Road and Mulgoa public school and currently stop at the south eastern corner of the site.
- The total traffic generation for the Eastern Precinct development is estimated to be approximately 43 trips during weekday peak hours (AM and PM).
- The proposed development is not anticipated to have any significant impact on the capacity or safe operation of the surrounding road network and all roads will continue to operate within their given functional hierarchy range.
- All intersections were appraised under 2026 traffic conditions using SIDRA under ‘with’ and ‘without’ the development scenarios.
- The development scenario for the Fernhill Estate applied a worst case assessment and included cumulative impacts from the inclusion of both the Eastern and Western Precincts residential development proposals under 2026 AM and PM peak traffic conditions.
- The intersection analysis indicated that all intersections performed satisfactorily with minimal changes in operating conditions with the development and under 2026 peak traffic conditions.
- The provision of a Channelised (CHR) right turns treatment at the Mulgoa Road/St Thomas Road/Site Access Road intersection is anticipated to provide adequate storage capacity for the right turning movements from Mulgoa Road whilst maintaining through northbound and southbound traffic flows on Mulgoa Road.
- The provision of 25m long right turn bay at northern approach of the Mulgoa Road/St Thomas Road/Site Access Road intersection is adequate to accommodate future traffic generated by the proposed Eastern Precinct development.
- The proposed CHR treatment at Mulgoa Road/St Thomas Road intersection is anticipated to improve intersection safety and result in operational benefits.

5.2 Recommendation

- A new western approach to be introduced at the intersection with St Thomas Road and Mulgoa Road to form a four way signposted intersection arrangement.
- The western approach will serve as a new consolidated access road for the proposed Eastern Precinct development and is appropriately located from a network planning perspective.
- Traffic movement from Mulgoa Road northern approach is controlled through the introduction of a CHR treatment to allow traffic to turn right safely into the site.
- That road safety audits are carried during the design development stages for the proposed four way intersection at St Thomas Road with Mulgoa Road.
- That crash history at the intersection of Mulgoa Road and St Thomas Road is further investigated as part of RMS and Council road safety initiatives. It is expected that the southern approach will be upgraded to a new channelized right turning treatment (CHR) by Council/ RMS as it appears to meet the current blackspot program eligibility criteria.
- In order to manage potential motorist sightlines issues along the internal circular local road that serves the proposed rural residential properties it is proposed to adopt the following road design standards:
  - road reserve width of 12m or higher combined with a sealed carriageway width of 6m or more situated closer to the outside curve;
  - the provision of on-street parking bays on horizontal curves to be restricted to the outside curve of the road carriageway only;
  - the low signposted travel speed, and
  - restrict vegetation landscaping on the inner curve of the road reserve.
- That crash history at the intersection of Mulgoa Road and St Thomas Road is addressed under RMS and Council road safety program by providing a new channelized right turning treatment (CHR) for traffic travelling from the Mulgoa Road southern approach to St Thomas Road. This trend may be addressed using the current blackspot eligibility criteria.
- That a footpath be provided to ensure that residents of the Fernhill Estate Eastern Precinct can walk between the new proposed access road on Mulgoa Road and the south-eastern corner of the site (and connect with the existing Mulgoa Road western footpath). That all internal roads within the Eastern Precinct development allow for the provision of footpaths.

Appendices

Appendix A. Bus Route Map



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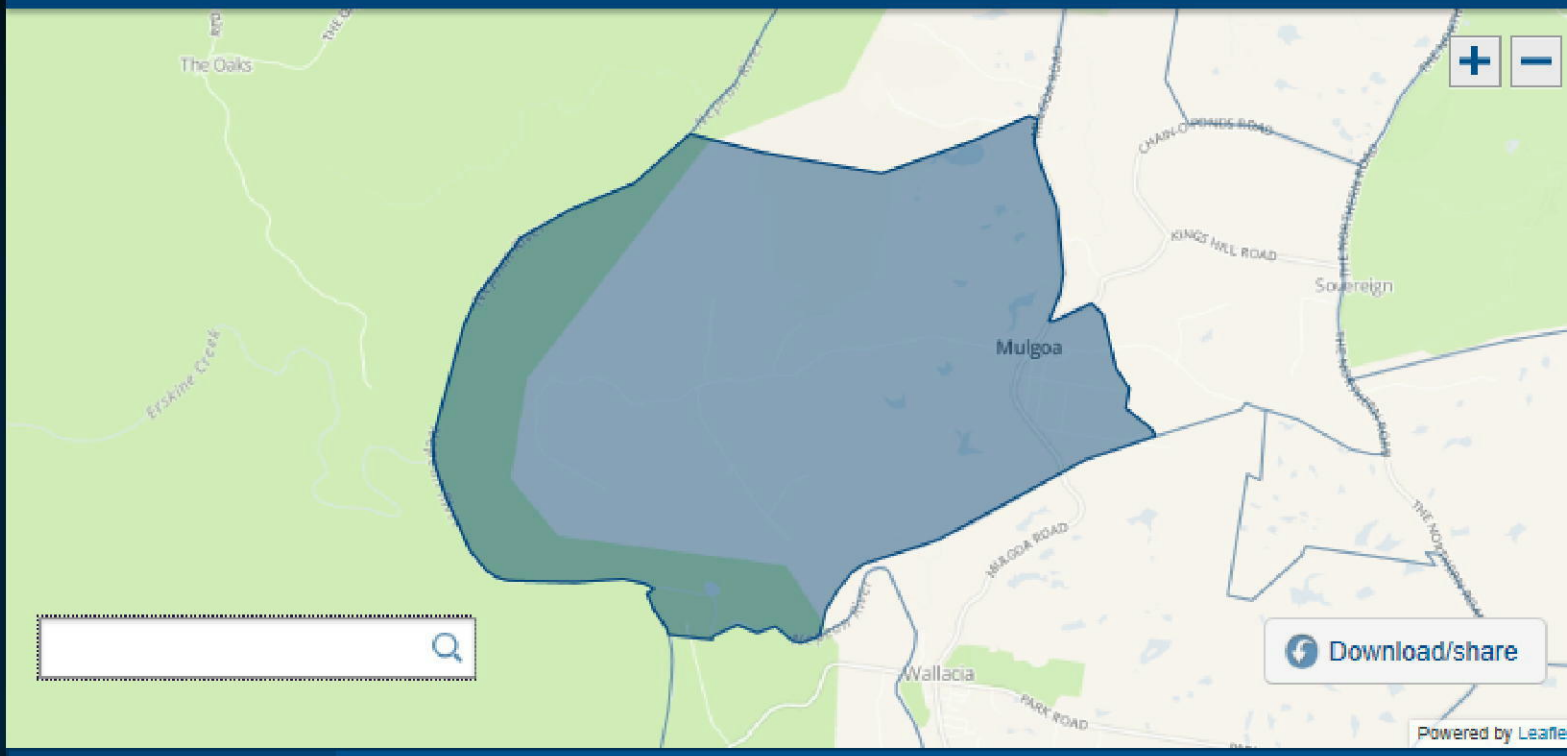
Appendix B. Journey to Work Data (BTS)

Bureau of Transport Statistics

JTW Explorer



TZ Selection | X clear | 4966

Origins - Place of Residence

Top 10 ranking origin locations

Where do the 247 people employed in the selected TZs live?

%	Total	Location
81%	199	Penrith
	7	Blue Mountains
	6	Wollondilly
	6	St Marys
	6	Fairfield
	5	Baulkham Hills
	3	Kiama - Shellharbour
	3	Dural - Wisemans Ferry
	3	Campbelltown (NSW)
	3	Richmond - Windsor

Destinations - Place of Work

Top 10 ranking destination locations

Where do the 596 employed residents in the selected TZs work?

%	Total	Location
50%	300	Penrith
	42	Mount Druitt
	39	No fixed place of work
	25	Parramatta
	23	Sydney Inner City
	23	St Marys
	19	Fairfield
	17	Blacktown
	12	Blue Mountains
	12	Bringelly - Green Valley

Mode Share*

What transport did people coming from Penrith going to the selected TZs use?

All locations

- 82% Vehicle driver
- 8% Vehicle passenger
- 6% Walked only
- 4% Mode not stated

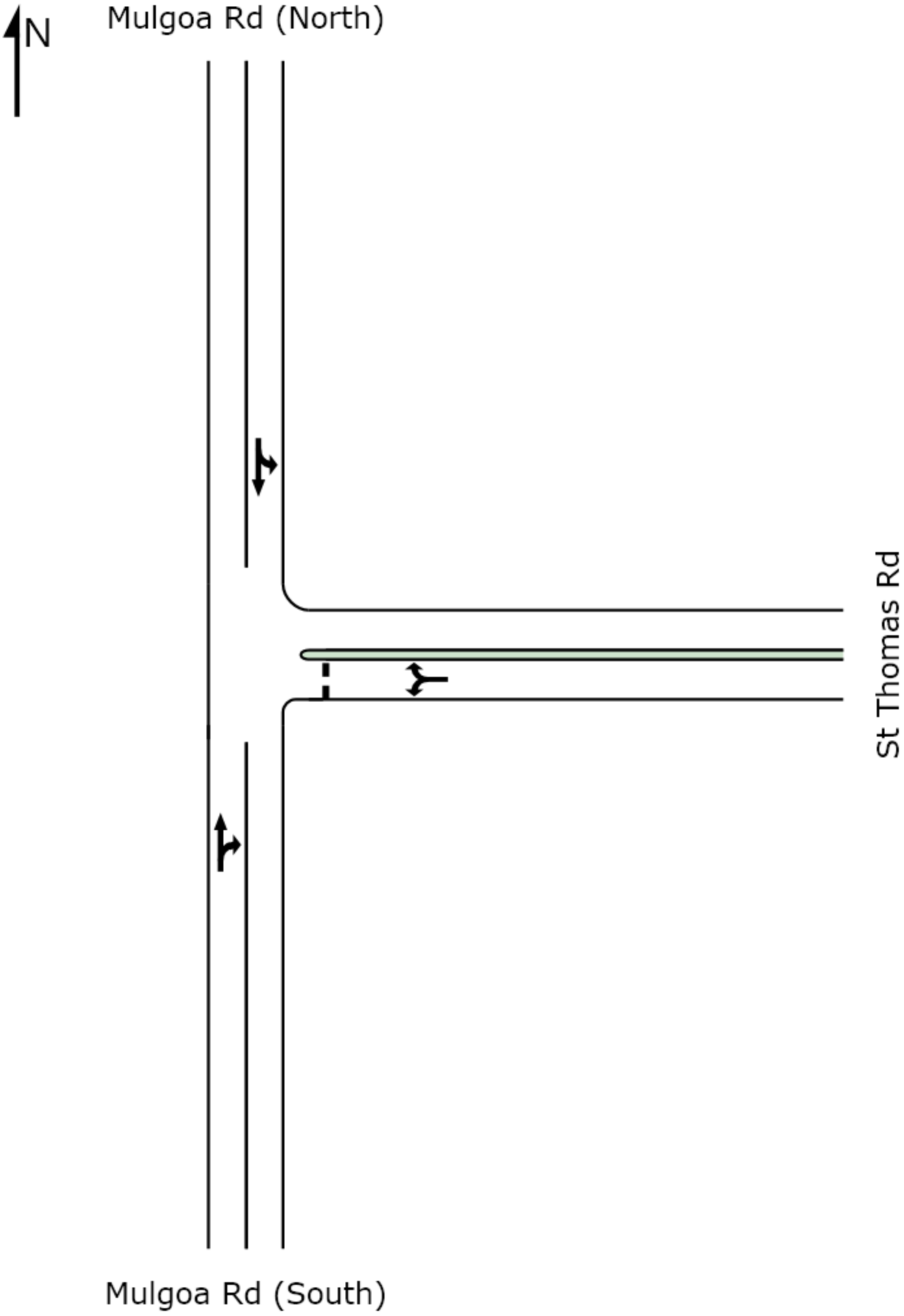
Mode Share*

What transport did people going from selected TZs to Penrith use?

All locations

- 84% Vehicle driver
- 7% Vehicle passenger
- 4% Mode not stated
- 3% Walked only
- 1% Train

Appendix C. SIDRA Output Summary



MOVEMENT SUMMARY

Site: Mulgoa Rd & St Thomas Rd
2026 (AM without development)

Mulgoa Rd / St Thomas Rd Intersection 2026 Morning Peak (Without Development)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
2	T	464	5.0	0.417	1.2	LOS A	3.3	23.8	0.43	0.00	51.7
3	R	194	0.0	0.417	9.6	LOS A	3.3	23.8	0.43	0.83	48.5
Approach		658	3.5	0.417	3.6	NA	3.3	23.8	0.43	0.24	50.7
East: St Thomas Rd											
4	L	80	0.0	0.146	11.5	LOS A	0.5	3.7	0.36	0.65	45.5
6	R	14	0.0	0.146	11.8	LOS A	0.5	3.7	0.36	0.82	45.4
Approach		94	0.0	0.146	11.6	LOS A	0.5	3.7	0.36	0.67	45.5
North: Mulgoa Rd (North)											
7	L	4	0.0	0.093	8.2	LOS A	0.0	0.0	0.00	1.07	49.0
8	T	162	5.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		166	4.9	0.093	0.2	NA	0.0	0.0	0.00	0.03	59.7
All Vehicles		918	3.4	0.417	3.8	NA	3.3	23.8	0.34	0.25	51.5

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

MOVEMENT SUMMARY

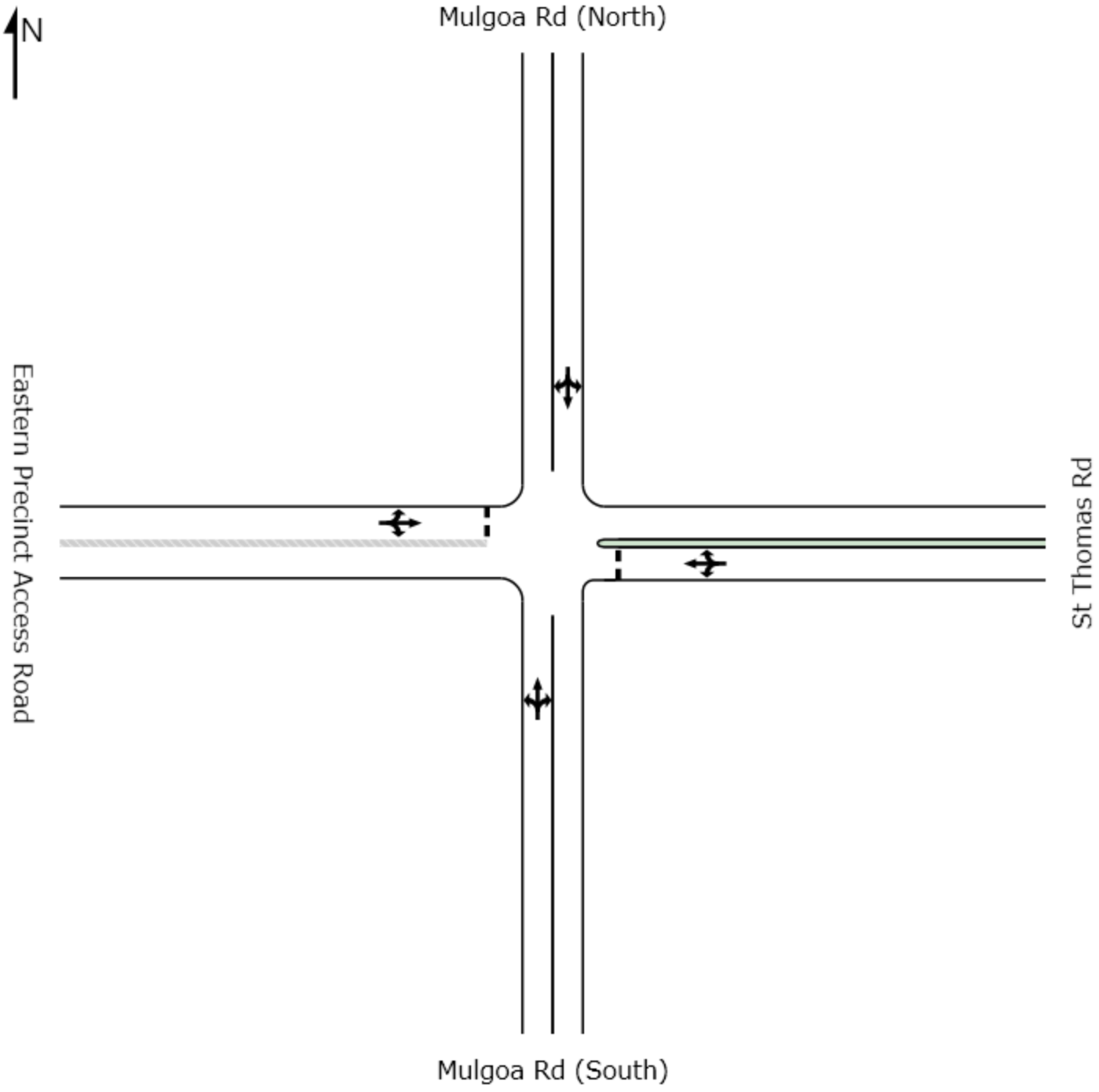
Site: Mulgoa Rd & St Thomas Rd
2026 (PM without development)

Mulgoa Rd / St Thomas Rd Intersection 2026 Evening Peak (Without Development)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
2	T	306	5.0	0.238	3.1	LOS A	1.9	14.1	0.60	0.00	49.4
3	R	58	0.0	0.238	11.5	LOS A	1.9	14.1	0.60	0.97	47.9
Approach		364	4.2	0.238	4.5	NA	1.9	14.1	0.60	0.16	49.1
East: St Thomas Rd											
4	L	164	0.0	0.306	13.4	LOS A	1.3	9.2	0.59	0.89	43.8
6	R	14	0.0	0.306	13.6	LOS A	1.3	9.2	0.59	0.91	43.7
Approach		178	0.0	0.306	13.4	LOS A	1.3	9.2	0.59	0.89	43.8
North: Mulgoa Rd (North)											
7	L	6	0.0	0.259	8.2	LOS A	0.0	0.0	0.00	1.08	49.0
8	T	458	5.0	0.259	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		464	4.9	0.259	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		1006	3.8	0.306	4.0	NA	1.9	14.1	0.32	0.22	52.3

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.



MOVEMENT SUMMARY

Site: Mulgoa Rd & St Thomas Rd Eastern Access 2026 (AM with development combined)

Mulgoa Rd / St Thomas Rd / Eastern Precinct Access Intersection 2026 Morning Peak (With Development - Eastern Precinct +Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	1	0.0	0.428	9.4	LOS A	3.5	24.9	0.44	0.50	48.5
2	T	476	5.0	0.428	1.2	LOS A	3.5	24.9	0.44	0.00	51.5
3	R	198	0.0	0.428	9.6	LOS A	3.5	24.9	0.44	0.83	48.5
Approach		675	3.5	0.428	3.7	NA	3.5	24.9	0.44	0.24	50.6
East: St Thomas Rd											
4	L	80	0.0	0.151	11.7	LOS A	0.5	3.8	0.37	0.65	45.3
5	T	1	0.0	0.151	10.5	LOS A	0.5	3.8	0.37	0.72	46.2
6	R	14	0.0	0.151	12.0	LOS A	0.5	3.8	0.37	0.82	45.2
Approach		95	0.0	0.151	11.8	LOS A	0.5	3.8	0.37	0.67	45.3
North: Mulgoa Rd (North)											
7	L	4	0.0	0.098	10.8	LOS A	0.8	5.8	0.56	0.46	48.6
8	T	164	5.0	0.098	2.6	LOS A	0.8	5.8	0.56	0.00	50.4
9	R	3	0.0	0.098	11.1	LOS A	0.8	5.8	0.56	0.99	48.6
Approach		171	4.8	0.098	3.0	NA	0.8	5.8	0.56	0.03	50.3
West: Eastern Precinct Access Road											
10	L	28	0.0	0.095	14.9	LOS B	0.3	2.3	0.60	0.81	42.6
11	T	11	0.0	0.095	13.6	LOS A	0.3	2.3	0.60	0.82	43.3
12	R	2	0.0	0.095	15.2	LOS B	0.3	2.3	0.60	0.90	42.6
Approach		41	0.0	0.095	14.6	LOS B	0.3	2.3	0.60	0.82	42.8
All Vehicles		982	3.3	0.428	4.8	NA	3.5	24.9	0.46	0.27	49.6

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

MOVEMENT SUMMARY

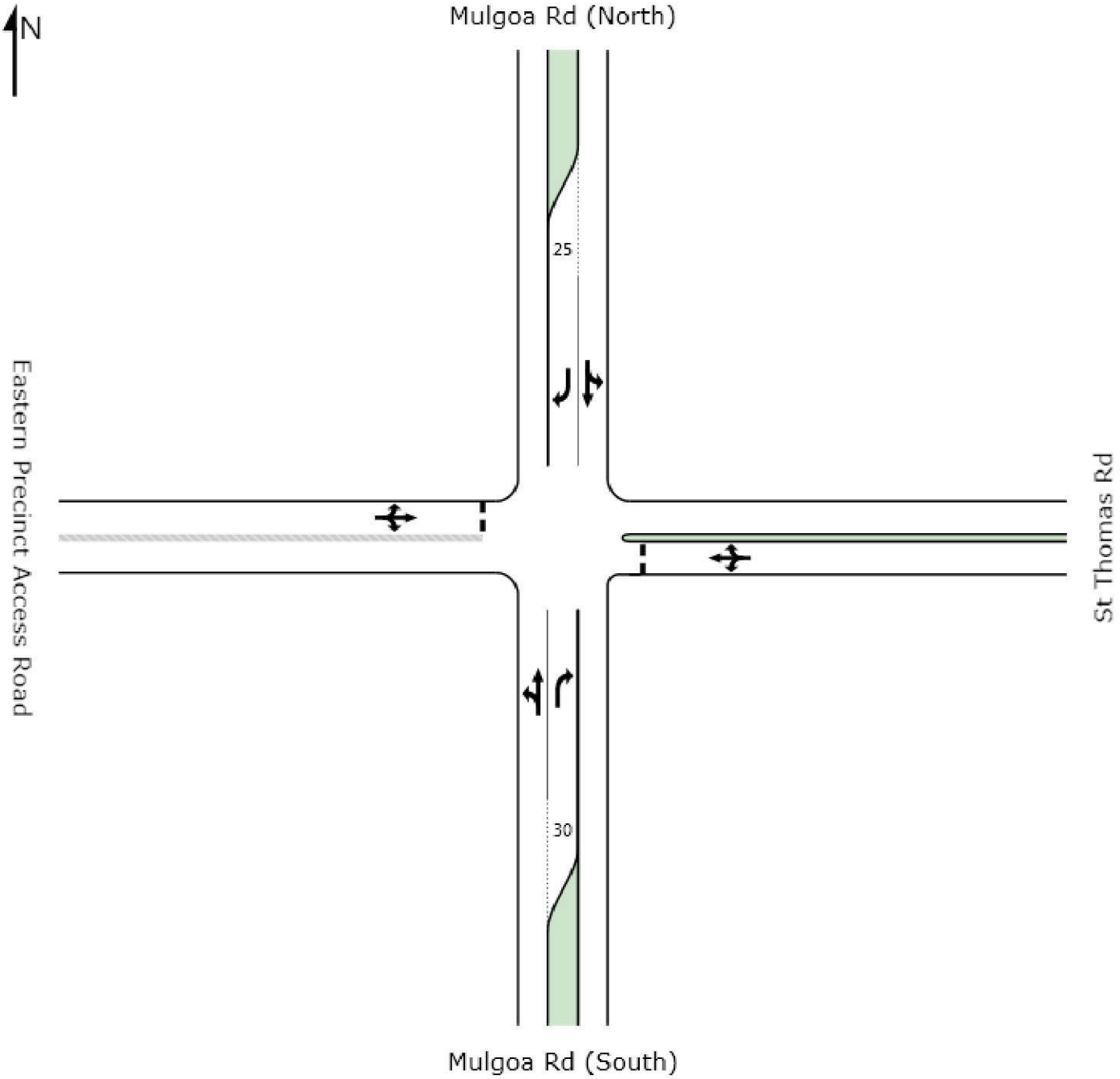
Site: Mulgoa Rd & St Thomas Rd Eastern Access 2026 (PM with development combined)

Mulgoa Rd / St Thomas Rd / Eastern Precinct Access Intersection 2026 Evening Peak (With Development - Eastern Precinct +Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	2	0.0	0.242	11.4	LOS A	2.0	14.5	0.61	0.38	47.8
2	T	307	5.0	0.242	3.3	LOS A	2.0	14.5	0.61	0.00	49.2
3	R	59	0.0	0.242	11.7	LOS A	2.0	14.5	0.61	0.98	47.7
Approach		368	4.2	0.242	4.6	NA	2.0	14.5	0.61	0.16	49.0
East: St Thomas Rd											
4	L	168	0.0	0.360	14.8	LOS B	1.7	11.8	0.62	0.93	42.6
5	T	11	0.0	0.360	13.5	LOS A	1.7	11.8	0.62	0.88	43.3
6	R	14	0.0	0.360	15.0	LOS B	1.7	11.8	0.62	0.94	42.6
Approach		193	0.0	0.360	14.7	LOS B	1.7	11.8	0.62	0.93	42.7
North: Mulgoa Rd (North)											
7	L	6	0.0	0.293	10.1	LOS A	2.4	17.5	0.54	0.48	49.1
8	T	470	5.0	0.293	1.9	LOS A	2.4	17.5	0.54	0.00	50.7
9	R	28	0.0	0.293	10.4	LOS A	2.4	17.5	0.54	0.96	49.1
Approach		504	4.7	0.293	2.5	NA	2.4	17.5	0.54	0.06	50.6
West: Eastern Precinct Access Road											
10	L	3	0.0	0.015	16.3	LOS B	0.0	0.3	0.58	0.65	41.4
11	T	1	0.0	0.015	15.0	LOS B	0.0	0.3	0.58	0.77	42.0
12	R	1	0.0	0.015	16.6	LOS B	0.0	0.3	0.58	0.88	41.3
Approach		5	0.0	0.015	16.1	LOS B	0.0	0.3	0.58	0.72	41.5
All Vehicles		1070	3.6	0.360	5.5	NA	2.4	17.5	0.58	0.25	48.4

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.



MOVEMENT SUMMARY

Site: Mulgoa Rd & St Thomas Rd Eastern Access 2026 (AM with development combined)-CHR

Mulgoa Rd / St Thomas Rd / Eastern Precinct Access Intersection 2026 Morning Peak (With Development - Eastern Precinct +Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	1	0.0	0.266	8.2	LOS A	0.0	0.0	0.00	1.09	49.0
2	T	476	5.0	0.266	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	198	0.0	0.194	9.1	LOS A	0.7	4.9	0.30	0.66	47.5
Approach		675	3.5	0.266	2.7	NA	0.7	4.9	0.09	0.20	55.7
East: St Thomas Rd											
4	L	80	0.0	0.151	11.7	LOS A	0.5	3.8	0.37	0.65	45.3
5	T	1	0.0	0.151	10.5	LOS A	0.5	3.8	0.37	0.72	46.3
6	R	14	0.0	0.151	11.8	LOS A	0.5	3.8	0.37	0.80	45.3
Approach		95	0.0	0.151	11.7	LOS A	0.5	3.8	0.37	0.67	45.3
North: Mulgoa Rd (North)											
7	L	4	0.0	0.094	8.2	LOS A	0.0	0.0	0.00	1.07	49.0
8	T	164	5.0	0.094	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	3	0.0	0.004	10.6	LOS A	0.0	0.1	0.48	0.66	46.3
Approach		171	4.8	0.094	0.4	NA	0.0	0.1	0.01	0.04	59.4
West: Eastern Precinct Access Road											
10	L	28	0.0	0.091	14.5	LOS A	0.3	2.2	0.59	0.81	43.0
11	T	11	0.0	0.091	13.2	LOS A	0.3	2.2	0.59	0.82	43.7
12	R	2	0.0	0.091	14.6	LOS B	0.3	2.2	0.59	0.88	43.0
Approach		41	0.0	0.091	14.1	LOS A	0.3	2.2	0.59	0.81	43.2
All Vehicles		982	3.3	0.266	3.6	NA	0.7	4.9	0.12	0.24	54.4

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

MOVEMENT SUMMARY

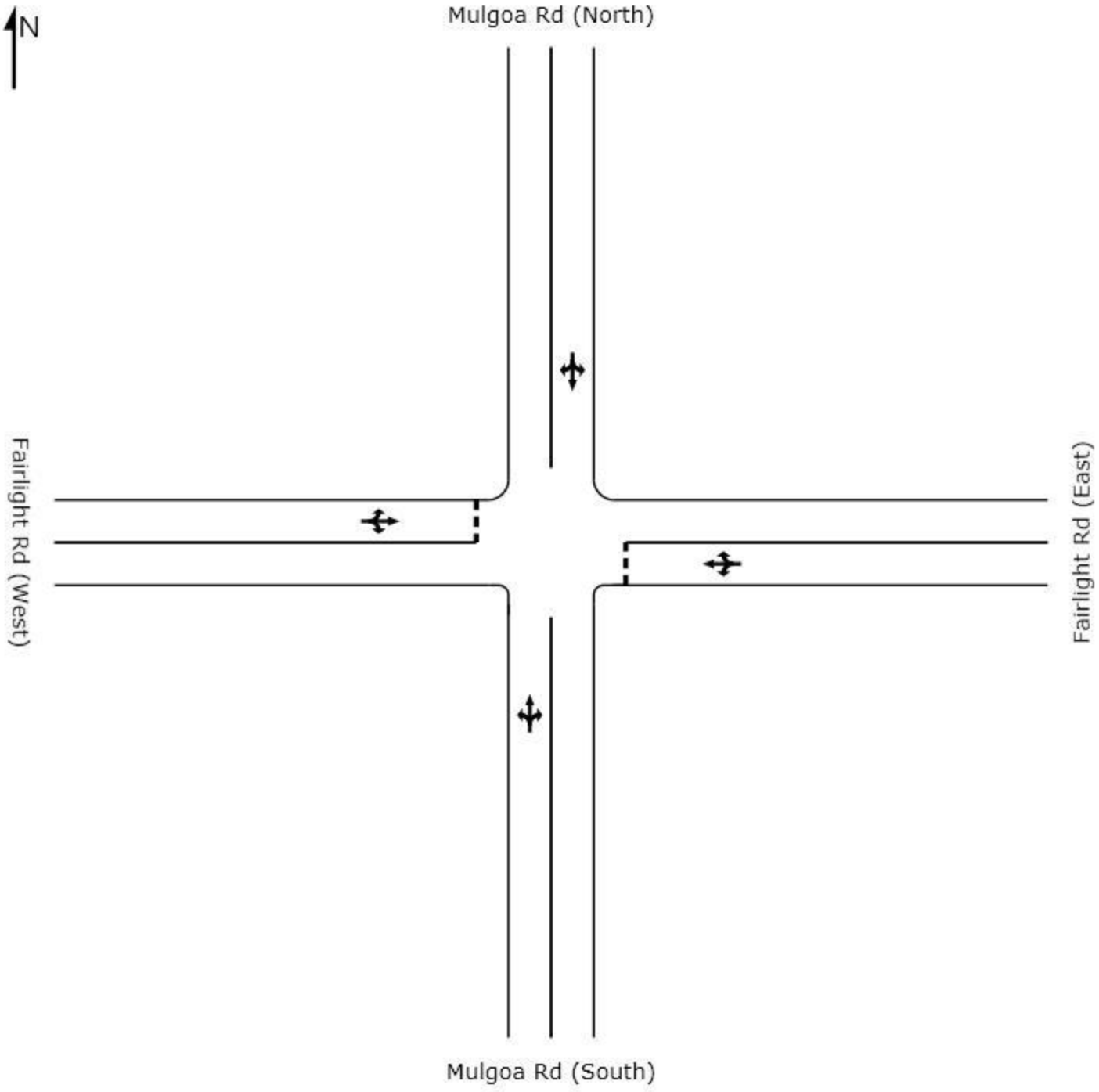
Site: Mulgoa Rd & St Thomas Rd Eastern Access 2026 (PM with development combined)-CHR

Mulgoa Rd / St Thomas Rd / Eastern Precinct Access Intersection 2026 Evening Peak (With Development - Eastern Precinct +Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	2	0.0	0.173	8.2	LOS A	0.0	0.0	0.00	1.09	49.0
2	T	307	5.0	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	59	0.0	0.070	10.8	LOS A	0.3	1.8	0.49	0.76	46.2
Approach		368	4.2	0.173	1.8	NA	0.3	1.8	0.08	0.13	57.2
East: St Thomas Rd											
4	L	168	0.0	0.355	14.6	LOS B	1.7	11.6	0.62	0.93	42.8
5	T	11	0.0	0.355	13.3	LOS A	1.7	11.6	0.62	0.88	43.4
6	R	14	0.0	0.355	14.7	LOS B	1.7	11.6	0.62	0.93	42.8
Approach		193	0.0	0.355	14.5	LOS B	1.7	11.6	0.62	0.93	42.8
North: Mulgoa Rd (North)											
7	L	6	0.0	0.266	8.2	LOS A	0.0	0.0	0.00	1.08	49.0
8	T	470	5.0	0.266	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	28	0.0	0.031	9.7	LOS A	0.1	0.7	0.38	0.67	47.2
Approach		504	4.7	0.266	0.6	NA	0.1	0.7	0.02	0.05	58.9
West: Eastern Precinct Access Road											
10	L	3	0.0	0.014	15.9	LOS B	0.0	0.3	0.57	0.65	41.7
11	T	1	0.0	0.014	14.7	LOS B	0.0	0.3	0.57	0.76	42.4
12	R	1	0.0	0.014	16.1	LOS B	0.0	0.3	0.57	0.86	41.7
Approach		5	0.0	0.014	15.7	LOS B	0.0	0.3	0.57	0.71	41.8
All Vehicles		1070	3.6	0.355	3.6	NA	1.7	11.6	0.15	0.24	54.6

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.



MOVEMENT SUMMARY

Site: Mulgoa Rd & Fairlight Rd
2026 (AM without development)

Mulgoa Rd / Fairlight Rd Intersection 2026 Morning Peak (Without Development)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	9	0.0	0.309	9.5	LOS A	2.5	17.9	0.46	0.57	49.2
2	T	535	5.0	0.309	1.4	LOS A	2.5	17.9	0.46	0.00	51.9
3	R	6	0.0	0.309	9.5	LOS A	2.5	17.9	0.46	0.90	49.2
Approach		550	4.9	0.309	1.6	NA	2.5	17.9	0.46	0.02	51.8
East: Fairlight Rd (East)											
4	L	1	0.0	0.108	22.6	LOS B	0.4	2.5	0.75	0.67	37.0
5	T	1	0.0	0.108	21.3	LOS B	0.4	2.5	0.75	0.89	37.4
6	R	23	0.0	0.108	22.6	LOS B	0.4	2.5	0.75	0.92	37.0
Approach		25	0.0	0.108	22.5	LOS B	0.4	2.5	0.75	0.91	37.0
North: Mulgoa Rd (North)											
7	L	20	0.0	0.146	11.7	LOS A	1.3	9.3	0.63	0.37	47.7
8	T	207	5.0	0.146	3.5	LOS A	1.3	9.3	0.63	0.00	49.1
9	R	15	0.0	0.146	11.7	LOS A	1.3	9.3	0.63	0.96	47.7
Approach		242	4.3	0.146	4.7	NA	1.3	9.3	0.63	0.09	48.9
West: Fairlight Rd (West)											
10	L	66	0.0	0.189	14.5	LOS B	0.7	4.7	0.62	0.87	42.8
11	T	3	0.0	0.189	13.3	LOS A	0.7	4.7	0.62	0.83	43.5
12	R	18	0.0	0.189	14.5	LOS B	0.7	4.7	0.62	0.87	42.8
Approach		87	0.0	0.189	14.5	LOS A	0.7	4.7	0.62	0.87	42.9
All Vehicles		904	4.1	0.309	4.2	NA	2.5	17.9	0.53	0.14	49.5

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

MOVEMENT SUMMARY

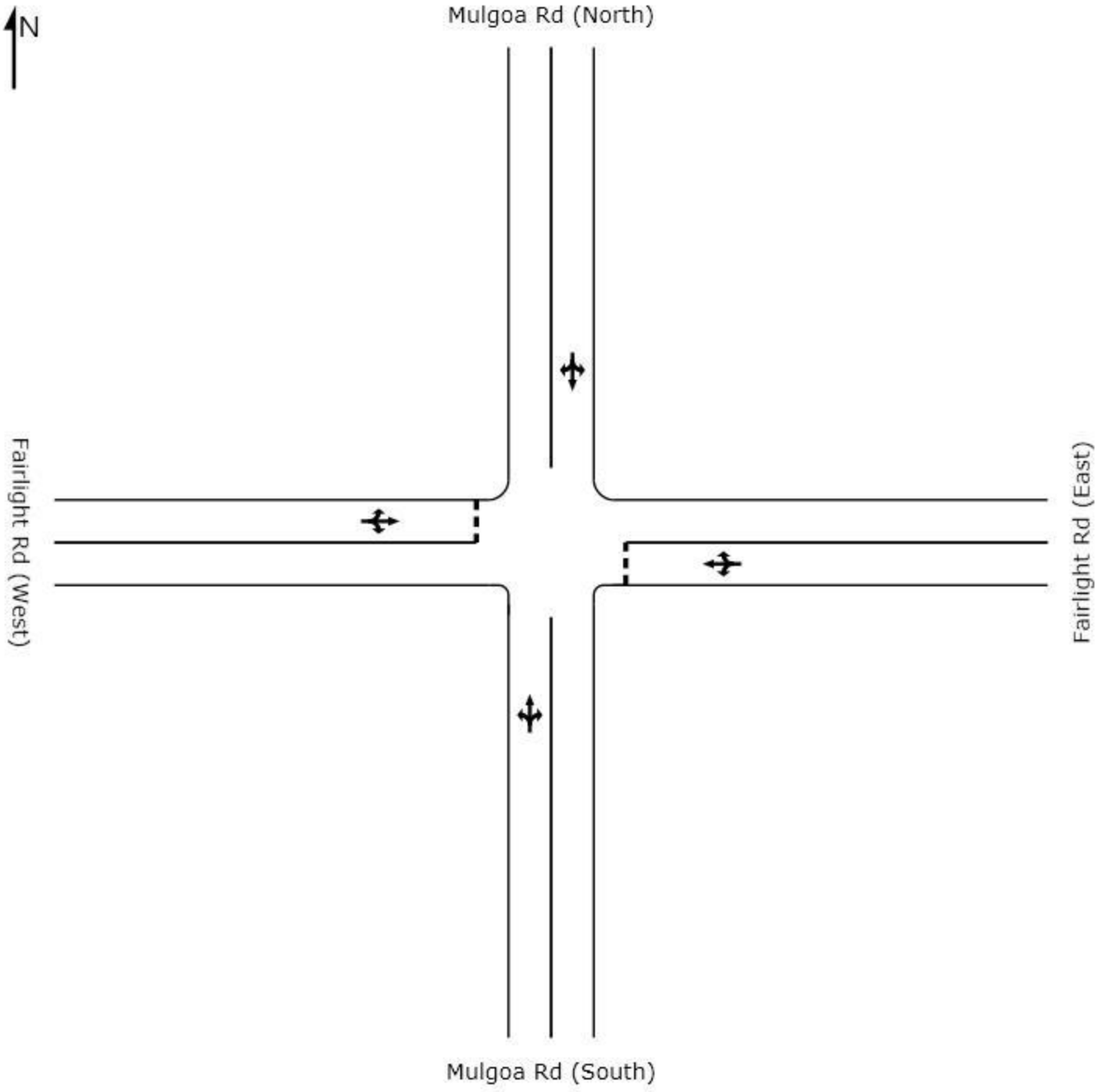
Site: Mulgoa Rd & Fairlight Rd
2026 (PM without development)

Mulgoa Rd / Fairlight Rd Intersection 2026 Evening Peak (Without Development)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	30	0.0	0.185	11.2	LOS A	1.7	12.2	0.64	0.37	48.4
2	T	299	5.0	0.185	3.0	LOS A	1.7	12.2	0.64	0.00	49.2
3	R	1	0.0	0.185	11.2	LOS A	1.7	12.2	0.64	0.95	48.4
Approach		330	4.5	0.185	3.8	NA	1.7	12.2	0.64	0.04	49.1
East: Fairlight Rd (East)											
4	L	16	0.0	0.164	19.7	LOS B	0.6	4.0	0.72	0.86	38.9
5	T	3	0.0	0.164	18.5	LOS B	0.6	4.0	0.72	0.87	39.3
6	R	28	0.0	0.164	19.7	LOS B	0.6	4.0	0.72	0.91	38.9
Approach		47	0.0	0.164	19.7	LOS B	0.6	4.0	0.72	0.89	38.9
North: Mulgoa Rd (North)											
7	L	36	0.0	0.329	10.4	LOS A	2.8	20.2	0.58	0.40	48.8
8	T	446	5.0	0.329	2.2	LOS A	2.8	20.2	0.58	0.00	49.6
9	R	61	0.0	0.329	10.4	LOS A	2.8	20.2	0.58	0.89	48.8
Approach		543	4.1	0.329	3.7	NA	2.8	20.2	0.58	0.13	49.5
West: Fairlight Rd (West)											
10	L	29	0.0	0.128	15.7	LOS B	0.4	3.1	0.58	0.74	41.9
11	T	1	0.0	0.128	14.5	LOS A	0.4	3.1	0.58	0.81	42.5
12	R	20	0.0	0.128	15.7	LOS B	0.4	3.1	0.58	0.86	41.9
Approach		50	0.0	0.128	15.7	LOS B	0.4	3.1	0.58	0.79	41.9
All Vehicles		970	3.8	0.329	5.1	NA	2.8	20.2	0.61	0.17	48.3

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.



MOVEMENT SUMMARY

Site: Mulgoa Rd & Fairlight Rd 2026 (AM with development combined)

Mulgoa Rd / Fairlight Rd Intersection 2026 Morning Peak (With Development Eastern Precinct+Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	9	0.0	0.309	9.6	LOS A	2.5	18.0	0.47	0.57	49.2
2	T	535	5.0	0.309	1.4	LOS A	2.5	18.0	0.47	0.00	51.9
3	R	6	0.0	0.309	9.6	LOS A	2.5	18.0	0.47	0.90	49.2
Approach		550	4.9	0.309	1.6	NA	2.5	18.0	0.47	0.02	51.8
East: Fairlight Rd (East)											
4	L	1	0.0	0.112	23.2	LOS B	0.4	2.6	0.76	0.67	36.6
5	T	1	0.0	0.112	22.0	LOS B	0.4	2.6	0.76	0.89	37.0
6	R	23	0.0	0.112	23.2	LOS B	0.4	2.6	0.76	0.92	36.6
Approach		25	0.0	0.112	23.2	LOS B	0.4	2.6	0.76	0.91	36.6
North: Mulgoa Rd (North)											
7	L	20	0.0	0.150	11.7	LOS A	1.3	9.5	0.63	0.36	47.7
8	T	209	5.0	0.150	3.5	LOS A	1.3	9.5	0.63	0.00	49.0
9	R	17	0.0	0.150	11.7	LOS A	1.3	9.5	0.63	0.96	47.7
Approach		246	4.2	0.150	4.7	NA	1.3	9.5	0.63	0.10	48.8
West: Fairlight Rd (West)											
10	L	82	0.0	0.220	14.5	LOS A	0.8	5.7	0.62	0.88	42.9
11	T	3	0.0	0.220	13.2	LOS A	0.8	5.7	0.62	0.84	43.5
12	R	19	0.0	0.220	14.5	LOS A	0.8	5.7	0.62	0.88	42.9
Approach		104	0.0	0.220	14.5	LOS A	0.8	5.7	0.62	0.88	42.9
All Vehicles		925	4.0	0.309	4.5	NA	2.5	18.0	0.54	0.16	49.3

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

MOVEMENT SUMMARY

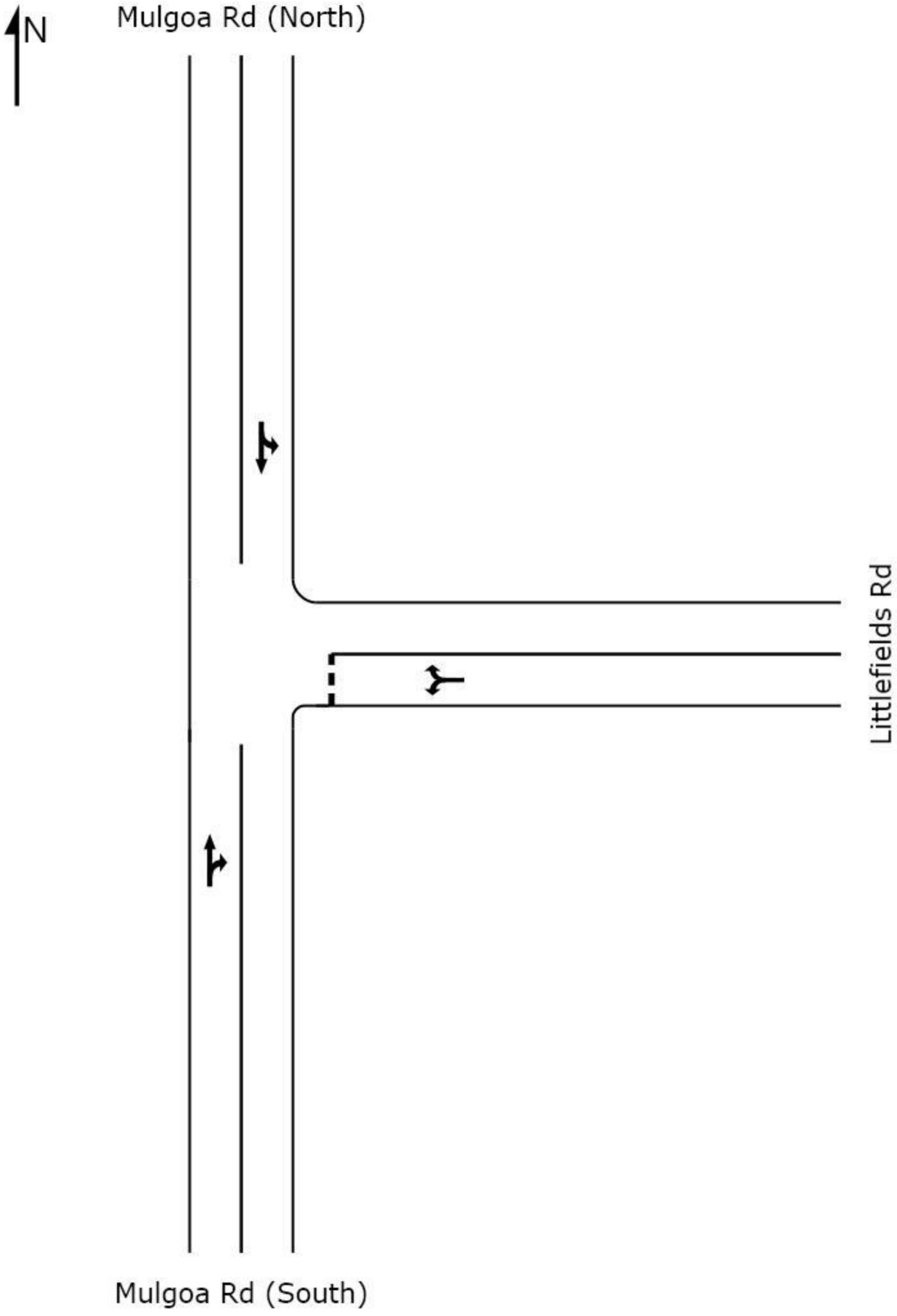
Site: Mulgoa Rd & Fairlight Rd 2026 (PM with development combined)

Mulgoa Rd / Fairlight Rd Intersection 2026 Evening Peak (With Development - Eastern Precinct+Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
1	L	31	0.0	0.187	11.2	LOS A	1.7	12.3	0.64	0.37	48.4
2	T	301	5.0	0.187	3.1	LOS A	1.7	12.3	0.64	0.00	49.1
3	R	1	0.0	0.187	11.2	LOS A	1.7	12.3	0.64	0.95	48.4
Approach		333	4.5	0.187	3.8	NA	1.7	12.3	0.64	0.04	49.1
East: Fairlight Rd (East)											
4	L	16	0.0	0.170	20.3	LOS B	0.6	4.1	0.73	0.87	38.5
5	T	3	0.0	0.170	19.0	LOS B	0.6	4.1	0.73	0.88	39.0
6	R	28	0.0	0.170	20.3	LOS B	0.6	4.1	0.73	0.91	38.5
Approach		47	0.0	0.170	20.2	LOS B	0.6	4.1	0.73	0.89	38.5
North: Mulgoa Rd (North)											
7	L	36	0.0	0.345	10.5	LOS A	3.0	21.7	0.60	0.39	48.6
8	T	447	5.0	0.345	2.3	LOS A	3.0	21.7	0.60	0.00	49.4
9	R	77	0.0	0.345	10.5	LOS A	3.0	21.7	0.60	0.89	48.6
Approach		560	4.0	0.345	4.0	NA	3.0	21.7	0.60	0.15	49.2
West: Fairlight Rd (West)											
10	L	31	0.0	0.134	15.8	LOS B	0.5	3.2	0.58	0.74	41.8
11	T	1	0.0	0.134	14.6	LOS B	0.5	3.2	0.58	0.81	42.4
12	R	20	0.0	0.134	15.8	LOS B	0.5	3.2	0.58	0.86	41.8
Approach		52	0.0	0.134	15.8	LOS B	0.5	3.2	0.58	0.79	41.8
All Vehicles		992	3.8	0.345	5.3	NA	3.0	21.7	0.62	0.18	48.1

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.



MOVEMENT SUMMARY

Site: Mulgoa Rd & Littlefields Rd
2026 (AM without development)

Mulgoa Rd /Littlefields Rd Intersection 2026 Morning Peak (Without Development)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
2	T	615	5.0	0.369	3.2	LOS A	4.1	30.2	0.66	0.00	49.0
3	R	25	0.0	0.369	11.3	LOS A	4.1	30.2	0.66	0.98	48.5
Approach		640	4.8	0.369	3.5	NA	4.1	30.2	0.66	0.04	49.0
East: Littlefields Rd											
4	L	38	0.0	0.401	30.0	LOS C	1.6	11.4	0.78	0.98	32.8
6	R	47	0.0	0.401	30.0	LOS C	1.6	11.4	0.78	0.99	32.8
Approach		85	0.0	0.401	30.0	LOS C	1.6	11.4	0.78	0.99	32.8
North: Mulgoa Rd (North)											
7	L	29	0.0	0.215	8.2	LOS A	0.0	0.0	0.00	1.04	49.0
8	T	355	5.0	0.215	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		384	4.6	0.215	0.6	NA	0.0	0.0	0.00	0.08	59.0
All Vehicles		1109	4.4	0.401	4.5	NA	4.1	30.2	0.44	0.12	50.1

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

MOVEMENT SUMMARY

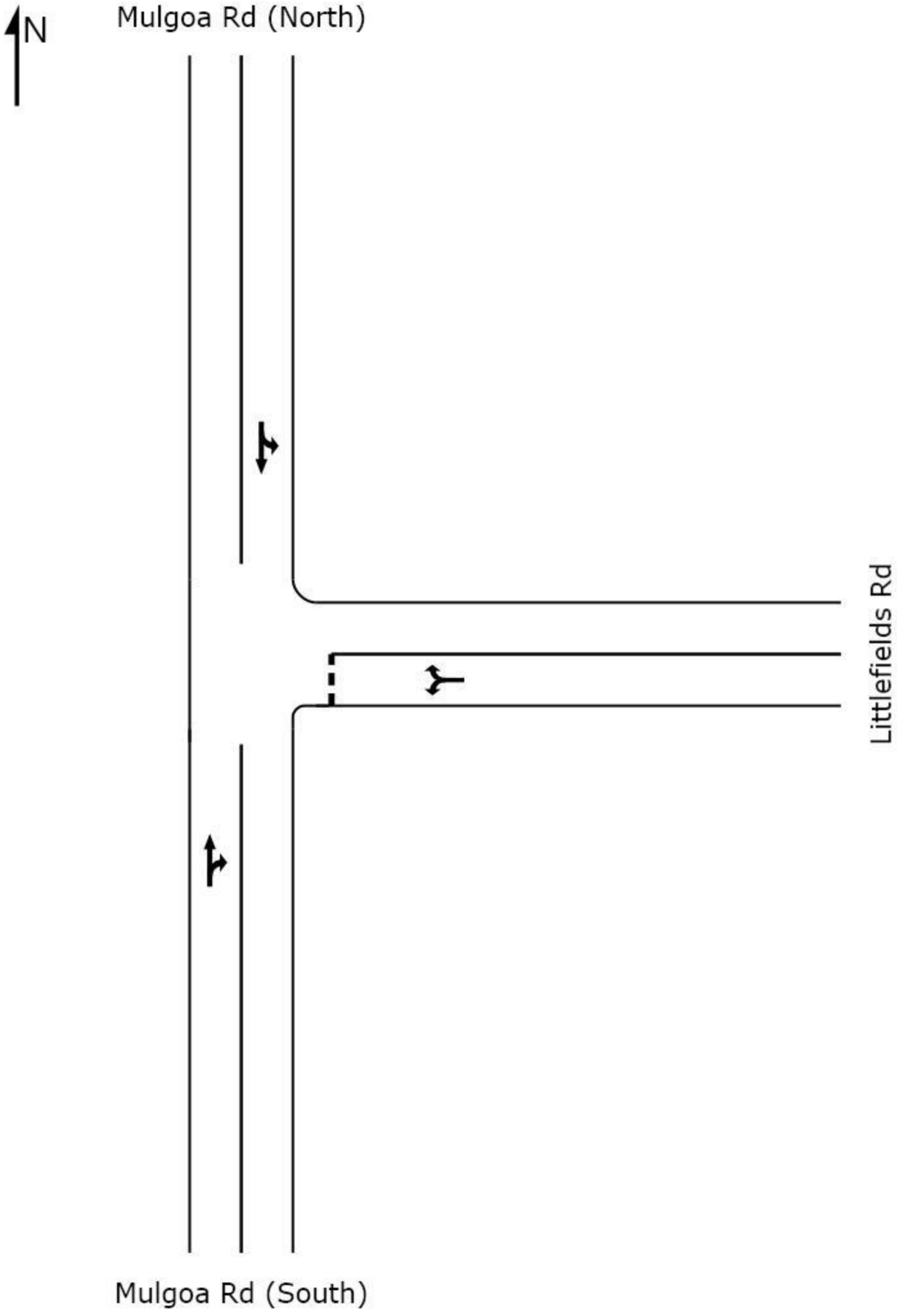
Site: Mulgoa Rd & Littlefields Rd
2026 (PM without development)

Mulgoa Rd /Littlefields Rd Intersection 2026 Evening Peak (Without Development)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
2	T	407	5.0	0.271	5.8	LOS A	3.3	23.9	0.75	0.00	47.7
3	R	29	0.0	0.271	13.9	LOS A	3.3	23.9	0.75	1.04	46.1
Approach		436	4.7	0.271	6.3	NA	3.3	23.9	0.75	0.07	47.6
East: Littlefields Rd											
4	L	48	0.0	0.371	28.5	LOS C	1.4	10.0	0.83	1.01	33.6
6	R	32	0.0	0.371	28.5	LOS C	1.4	10.0	0.83	1.00	33.6
Approach		80	0.0	0.371	28.5	LOS C	1.4	10.0	0.83	1.01	33.6
North: Mulgoa Rd (North)											
7	L	25	0.0	0.361	8.2	LOS A	0.0	0.0	0.00	1.06	49.0
8	T	621	5.0	0.361	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		646	4.8	0.361	0.3	NA	0.0	0.0	0.00	0.04	59.5
All Vehicles		1162	4.4	0.371	4.5	NA	3.3	23.9	0.34	0.12	51.9

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.



MOVEMENT SUMMARY

Site: Mulgoa Rd & Littlefields Rd 2026 (AM with development combined)

Mulgoa Rd /Littlefields Rd Intersection 2026 Morning Peak (With Development - Eastern Precinct+Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
2	T	631	5.0	0.378	3.3	LOS A	4.4	32.2	0.67	0.00	48.9
3	R	25	0.0	0.378	11.5	LOS A	4.4	32.2	0.67	0.99	48.5
Approach		656	4.8	0.378	3.6	NA	4.4	32.2	0.67	0.04	48.9
East: Littlefields Rd											
4	L	38	0.0	0.419	31.6	LOS C	1.7	12.0	0.79	1.00	32.0
6	R	47	0.0	0.419	31.6	LOS C	1.7	12.0	0.79	1.00	32.0
Approach		85	0.0	0.419	31.6	LOS C	1.7	12.0	0.79	1.00	32.0
North: Mulgoa Rd (North)											
7	L	29	0.0	0.217	8.2	LOS A	0.0	0.0	0.00	1.04	49.0
8	T	359	5.0	0.217	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		388	4.6	0.217	0.6	NA	0.0	0.0	0.00	0.08	59.0
All Vehicles		1129	4.4	0.419	4.7	NA	4.4	32.2	0.45	0.12	49.8

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

MOVEMENT SUMMARY

Site: Mulgoa Rd & Littlefields Rd 2026 (PM with development combined)

Mulgoa Rd /Littlefields Rd Intersection 2026 Evening Peak (With Development - Eastern Precinct+Western Precinct)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mulgoa Rd (South)											
2	T	411	5.0	0.275	6.1	LOS A	3.4	25.0	0.77	0.00	47.5
3	R	29	0.0	0.275	14.3	LOS A	3.4	25.0	0.77	1.04	45.9
Approach		440	4.7	0.275	6.6	NA	3.4	25.0	0.77	0.07	47.4
East: Littlefields Rd											
4	L	48	0.0	0.390	30.1	LOS C	1.5	10.5	0.84	1.02	32.8
6	R	32	0.0	0.390	30.1	LOS C	1.5	10.5	0.84	1.01	32.8
Approach		80	0.0	0.390	30.1	LOS C	1.5	10.5	0.84	1.02	32.8
North: Mulgoa Rd (North)											
7	L	25	0.0	0.370	8.2	LOS A	0.0	0.0	0.00	1.06	49.0
8	T	638	5.0	0.370	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		663	4.8	0.370	0.3	NA	0.0	0.0	0.00	0.04	59.5
All Vehicles		1183	4.4	0.390	4.7	NA	3.4	25.0	0.34	0.12	51.8

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.