TraffixGroup

Traffic Engineers and Transport Planners

Traffic Engineering Assessment

Additional Traffic Modelling
at
Minta Farm PSP 11

Prepared for

Victorian Planning Authority

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1 Introduction

Traffix Group has been engaged by Victorian Planning Authority to undertake additional traffic modelling in relation to the Minta Farm PSP 11. Specifically, the modelling aims to determine the level of development possible prior to the construction of the key north-south arterial road through the subject site.

This report provides a summary of the detailed traffic modelling undertaken and determines a threshold for development prior to the construction of the north-south arterial road.

2 Modelling Scenarios

The Minta Farm PSP 11 is currently being formulated by the VPA to guide the development of 286 ha of land within the City of Casey. The area will ultimately cater for approximately 3,000 residential properties and 10,000 jobs.

The extents of the Minta Farm PSP is bounded by Soldiers Road, Grices Road, Cardinia Creek and Princes Freeway / O'Shea Road Extension. A locality plan showing the extents of the Minta Farm PSP area is shown in Figure 1 below.

We understand that initial development is likely to occur in the south-west corner of the PSP area, between Grices Road and Chase Boulevard as detailed in Figure 1 below.

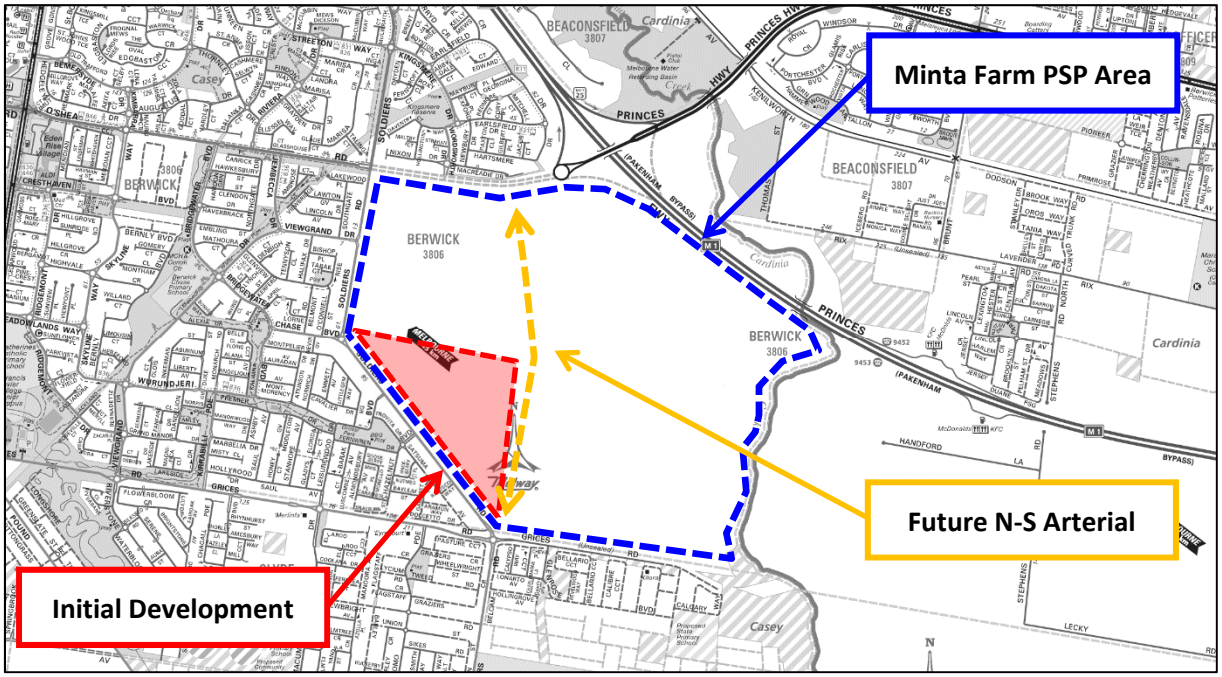

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Figure 1: Locality Plan

Through this assignment, the VPA is seeking additional modelling for the Minta Farm PSP. The modelling has determined the level of initial development that can occur in the south-west corner of the PSP area prior to the need for construction of the north-south arterial through the subject site.

The modelling has reviewed the impacts and capacity of the surrounding road network based on three (3) yields scenarios, as follows:

- 1,000 dwellings,
- 1,250 dwellings, and
- 1,500 dwellings.

3 Existing Conditions

3.1 Road Network

Under the existing conditions the Minta Farm PSP area has vehicle access via Soldiers Road. It is proposed that this approach will continue under the initial stages of development, with access to the broader road network required through the adjacent residential area to the west.

A summary of the key roads in the vicinity of the Minta Farm PSP area is provided in Table 1 below.

Table 1: Existing Road Network

Road	Description
VicRoads Arterial Roads	
Clyde Road	Clyde Road is a VicRoads primary arterial road extending north-south between Princes Highway, Berwick and Cameron Street, Cranbourne. Clyde Road generally provides for three (3) traffic lanes in each direction, separated by a central median. In the vicinity of the subject site signalised intersections are provided at O'Shea Road, Cresthaven Boulevard, Meadowlands Way and Grices Road. The posted speed limit on Clyde Road is 80km/h.
Council Arterial Roads	
O'Shea Road	O'Shea Road is Council arterial road that extends east-west between Clyde Road in the west ad Soldiers Road in the east. Under the existing conditions, O'Shea Road provides for a two lane, two way carriageway with a roundabout at Skyline Way and unsignalised intersections at Bridgewater Boulevard and Jembecca Drive. The posted speed limit on O'Shea Road is 70km/h. In the future O'Shea Road is to be duplicated between Clyde Road and Soldiers Road. Further details are provided in Section 3.2 below. We understand that it has been proposed to extend O'Shea Road east to the Monash Freeway. Further details are provided in Section 3.3 below.
Soldiers Road (Nth of O'Shea Road)	Soldiers Road, north of O'Shea Road operates as a Council arterial road providing a connection between O'Shea Road and Berwick including an overpass over the Princes Freeway. Under the existing conditions Soldiers Road generally provides for a lane of traffic in each direction with a post speed limit of 70km/h.

Road	Description
Collector Roads	
Soldiers Road (Sth of O'Shea Road)	Soldiers Road south of O'Shea Road operates as a collector road extending south to Thompsons Road. Soldiers Road generally provides a lane of traffic in each direction, with formal kerb and channel on the west side and a sealed shoulder on the east side (along the Minta Farm frontage).
Viewgrand Drive	The local area to the west of the Minta Farm site contains a range of collector roads with varying alignments. The alignments of the collector roads is generally governed by the open space extending diagonally north-east to south-west through the local area. Whilst the majority of the road network has been completed, a single section of Cresthaven Boulevard is yet to be constructed between Skyline Way and Bridgewater Boulevard. The collector roads are subject to the default urban speed limit of 50km/h.
Jembecca Drive	
Bridgewater Drive	
Chase Boulevard	
Wurundjeri Boulevard	
Kirrabilli Parade	
Skyline Way	
Meadowlands Way	
Ridgemont Drive	
Cresthaven Boulevard	

3.2 O'Shea Road Duplication

The VPA has provided preliminary alignment plans for the duplication of O'Shea Road between Clyde Road and Soldiers Road. The plans indicate two stages as follows:

- Interim Design – two lanes in each direction.
- Ultimate Design – three lanes in each direction.

The following intersection arrangements are proposed as part of the O'Shea Road duplication:

- Clyde Road / O'Shea Road – Signalised.
- O'Shea Road / Skyline Way – Signalised.
- O'Shea Road / Bridgewater Boulevard – Signalised.
- O'Shea Road / Jembecca Drive – Unsignalised (left in, right in, left out only).

3.3 O'Shea Road Extension

While we understand that the extension of O'Shea Road to the Beaconsfield Interchange has been proposed as part of the overall Monash Freeway / Princes Highway upgrade project, these works are not fully funded and it is not yet clear whether additional funding will be provided or when these works will proceed.

3.4 Traffic Volumes

3.4.1 Automatic Tube Counts

The City of Casey has undertaken a series of tube counts in the local area to the west of the Minta Farm site between 2014 and 2016.

A summary diagram showing the two-way 24 hour volumes is provided in Figure 2 below.

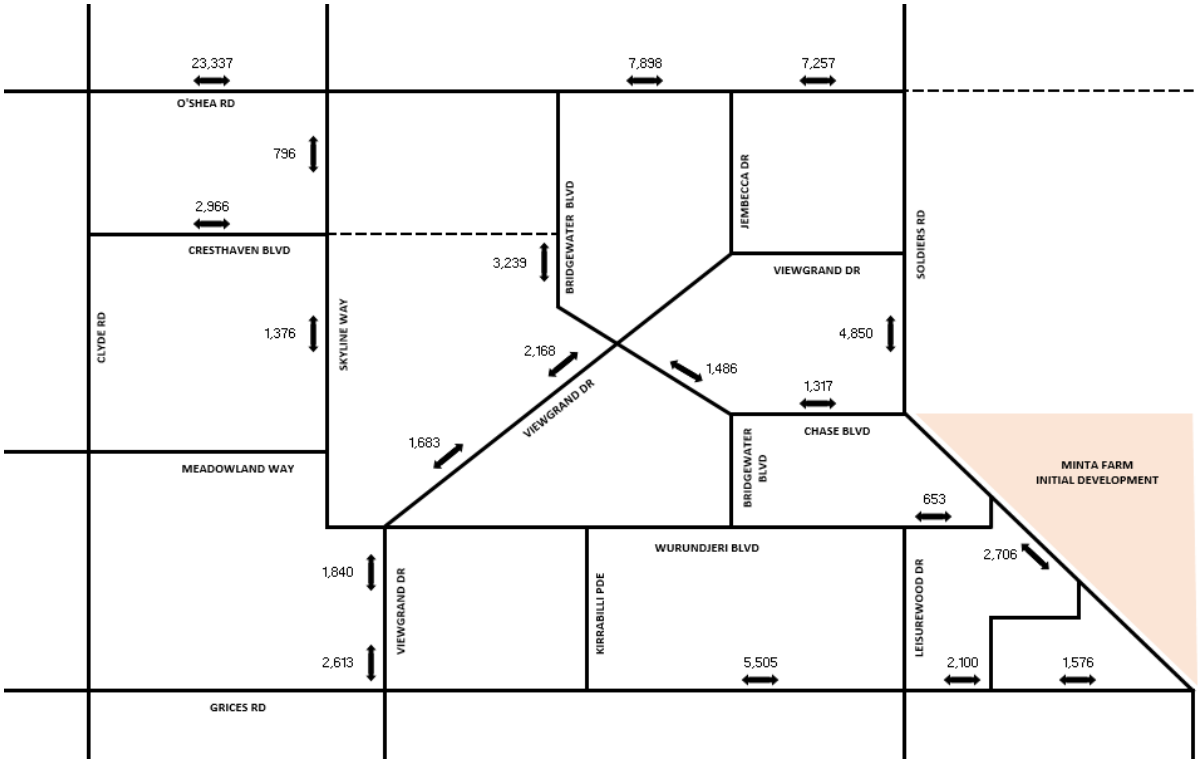


Figure 2: Daily Traffic Volumes (2014-2016)

3.4.2 Turning Movement Counts

Traffix Group conducted turning movement counts on Wednesday, 29th March, 2017 between 7am-9am and 4pm-6:30pm at key unsignalised intersections along O'Shea Road including:

- O'Shea Road / Skyline Way,
- O'Shea Road / Bridgewater Boulevard,
- O'Shea Road / Jembecca Drive, and
- O'Shea Road / Soldiers Road.

In addition, SCATS data was sourced for the signalised intersections along Clyde Road including:

- Clyde Road / O'Shea Road,
- Clyde Road / Cresthaven Boulevard,
- Clyde Road / Meadowlands Way, and
- Clyde Road / Grices Road.

The overall peak hours occurred between 8:00am-9:00am and 5:00pm-6:00pm. The peak hour volumes for the intersections are detailed in Figure 3 and Figure 4 below.

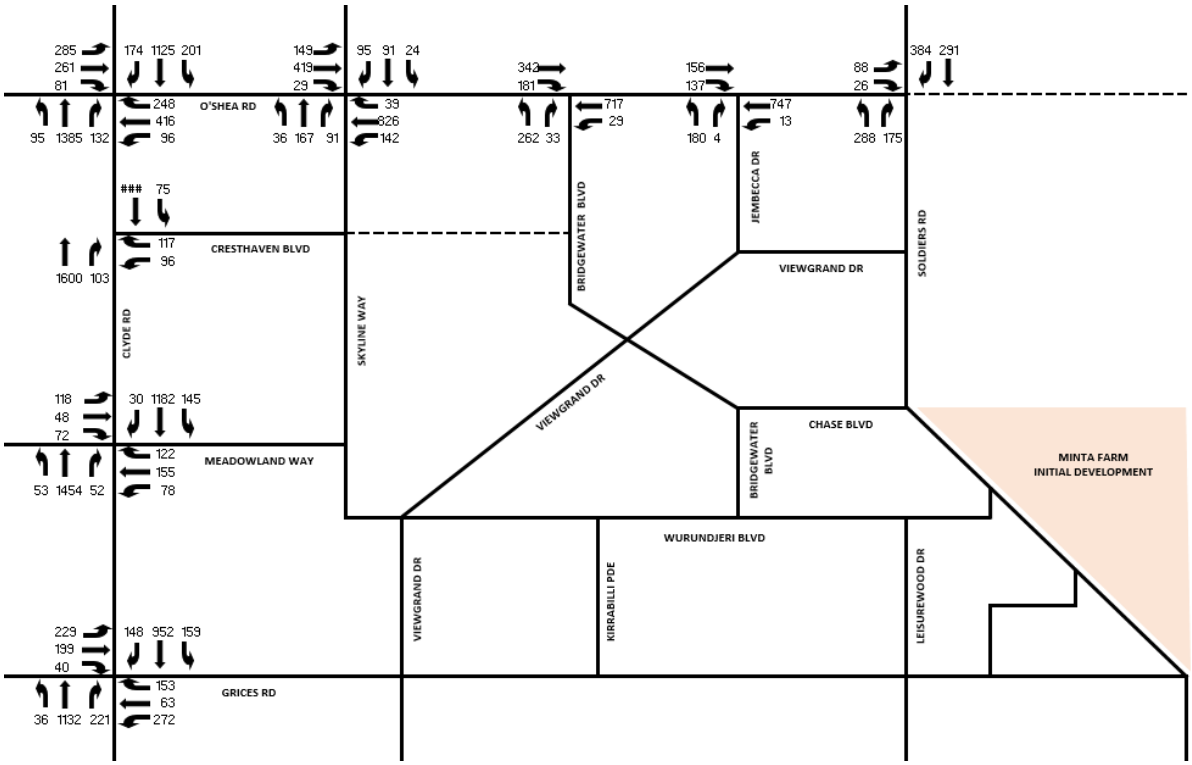


Figure 3: Existing Turning Movements – AM Peak (8am-9am)

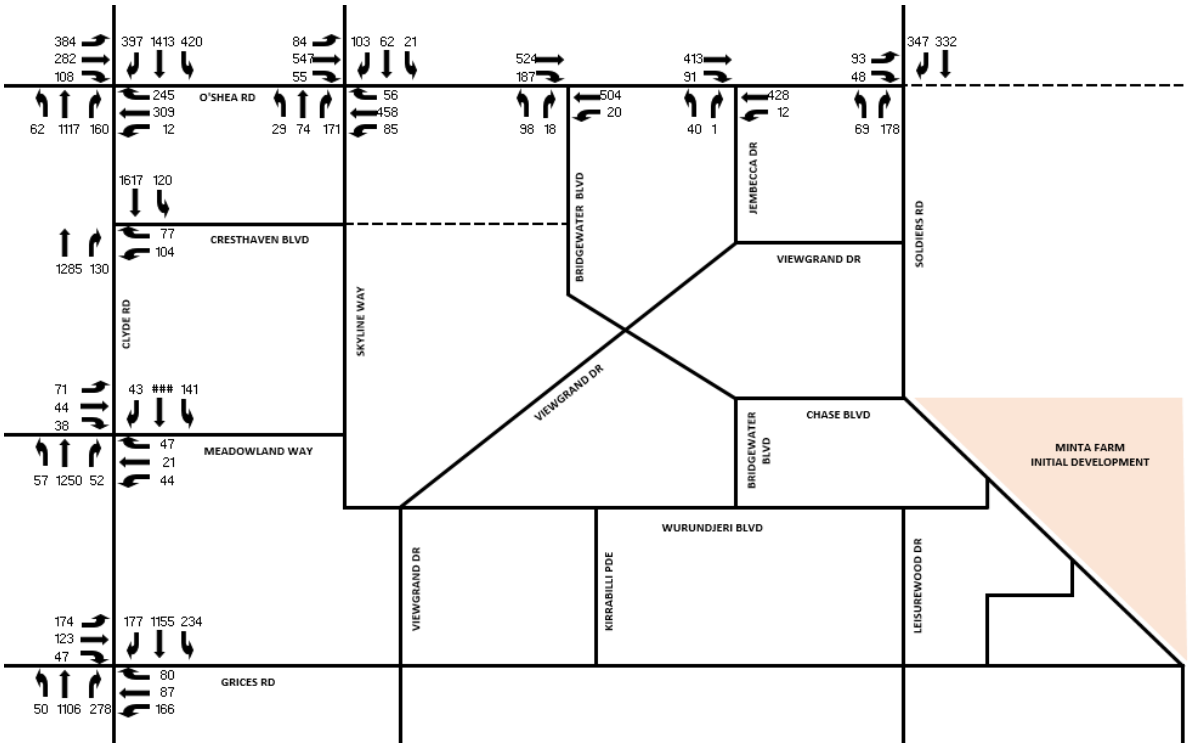


Figure 4: Existing Turning Movements – PM Peak (5pm-6pm)

4 Traffic Modelling

4.1 Traffic Generation

A Strategic Transport Modelling Assessment of the McPherson (PSP 1055), Croskell (1051) and Minta Farm (PSP 11) precincts was prepared by Cardno in August 2015.

This assessment identified the following traffic generation rates for the residential dwellings:

- Daily Traffic Generation – 10 trips/household (25% reduction for internal trips)
- Peak Hour Traffic Generation (AM & PM) – 0.8 trips/household

The report noted that the daily traffic generation rates was based on the VISTA 2009 data for the Casey local government area and the peak hours rates were based on empirical data for comparable sites.

These rates have been adopted for this analysis, with the daily traffic generation reduced by 25% to represent the external trips only. Table 2 below details the traffic generation for the three (3) development scenarios.

Table 2: Traffic Generation

Scenario	Dwellings	Traffic Generation Rate	Traffic Generation
Daily Traffic Generation			
Scenario 1	1,000	7.5 trips / household / day*	**7,500**
Scenario 2	1,250		**9,375**
Scenario 3	1,500		**11,250**
Peak Hour Traffic Generation			
Scenario 1	1,000	0.8 trips / household / hour	**800**
Scenario 2	1,250		**1,000**
Scenario 3	1,500		**1,200**

*Overall generation of 10 trips/household/day discounted by 25% for internal trips

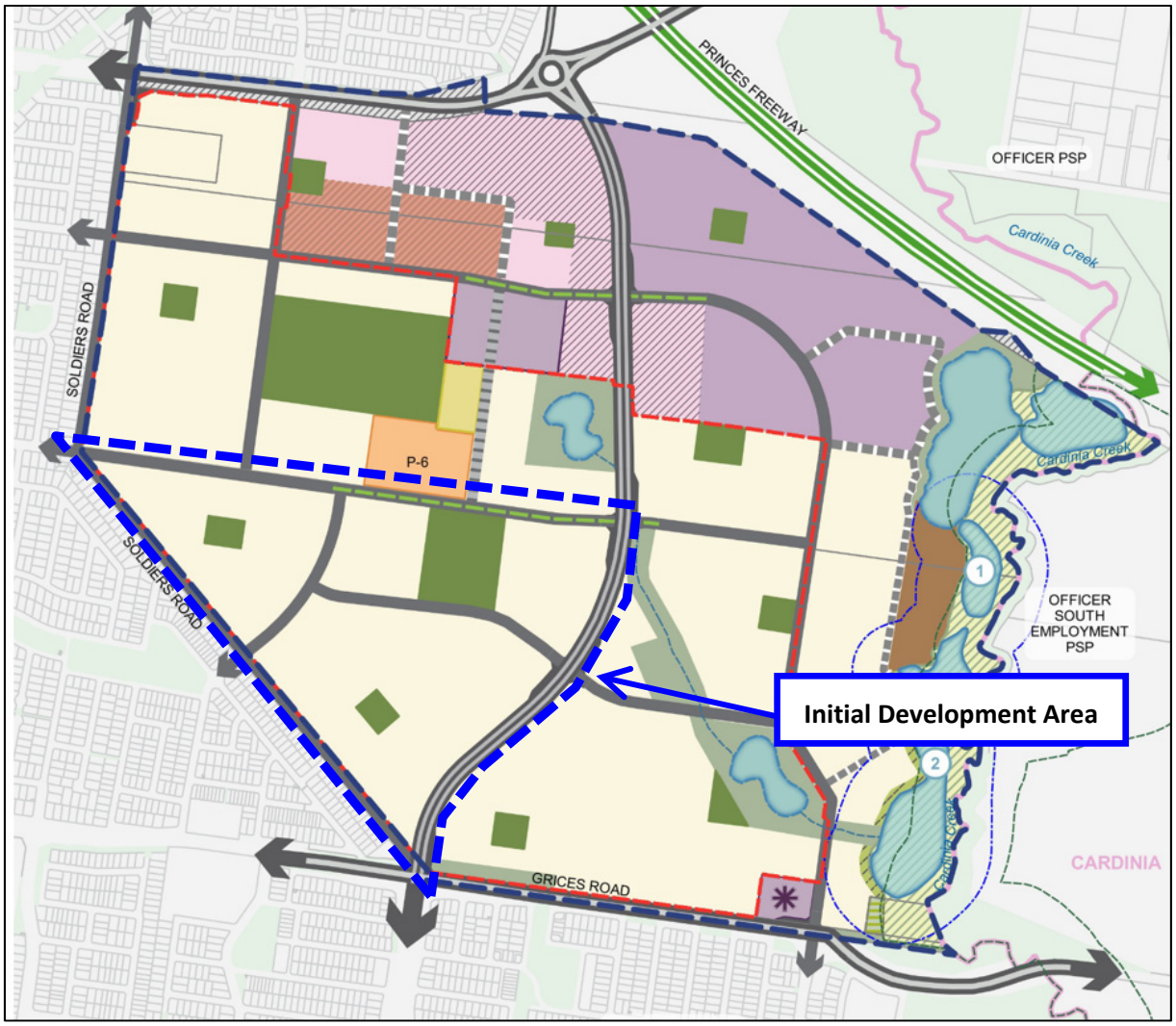
4.2 Traffic Distribution

Based on information provided by the VPA, we understand that the initial development of the Minta Farm site is likely to occur along the Soldiers Road frontage in the south-west corner of the subject site.

Based on the preliminary PSP road network diagram, this section of the PSP area will have three (3) vehicle connections to Soldiers Road including:

- Soldiers Road at Chase Boulevard,
- Soldiers Road at Hazelnut Boulevard, and
- Soldiers Road at Grices Road (part of future north-south arterial).

A summary of the indicative Minta Farm road network is shown in Figure 5 below.



Source: VPA

Figure 5: Minta Farm Road Network

4.2.1 Global Traffic Distribution

The global distribution of traffic volumes throughout the road network has been based on the 2011 ABS Census data for 'Journey to Work'.

The possible travel destinations were grouped into five (5) broad travel directions as follows:

- **North-West** – Trips to the Princes Highway (east and west) and trip north of the study area, utilising Clyde Road.
- **North-East** – Trips to north east of the study area such as Pakenham and Beaconsfield, using Soldiers Road.
- **West** – Trips to the west of the study area such as Lynbrook, Keysborough and Dingley, utilising Greaves Road.
- **South-East** – Trips to south-east of the study area, utilising Soldiers Road.
- **South West** – Trips to the south-west of the study area, utilising Clyde Road.

All of the above allocations have assumed that the Minta Farm development will occur before the O'Shea Road connection is constructed from Soldiers Road to the Beaconsfield interchange.

A summary of the global traffic distribution is provided in Figure 6 below, with a full summary of the distribution analysis provided at Appendix A.

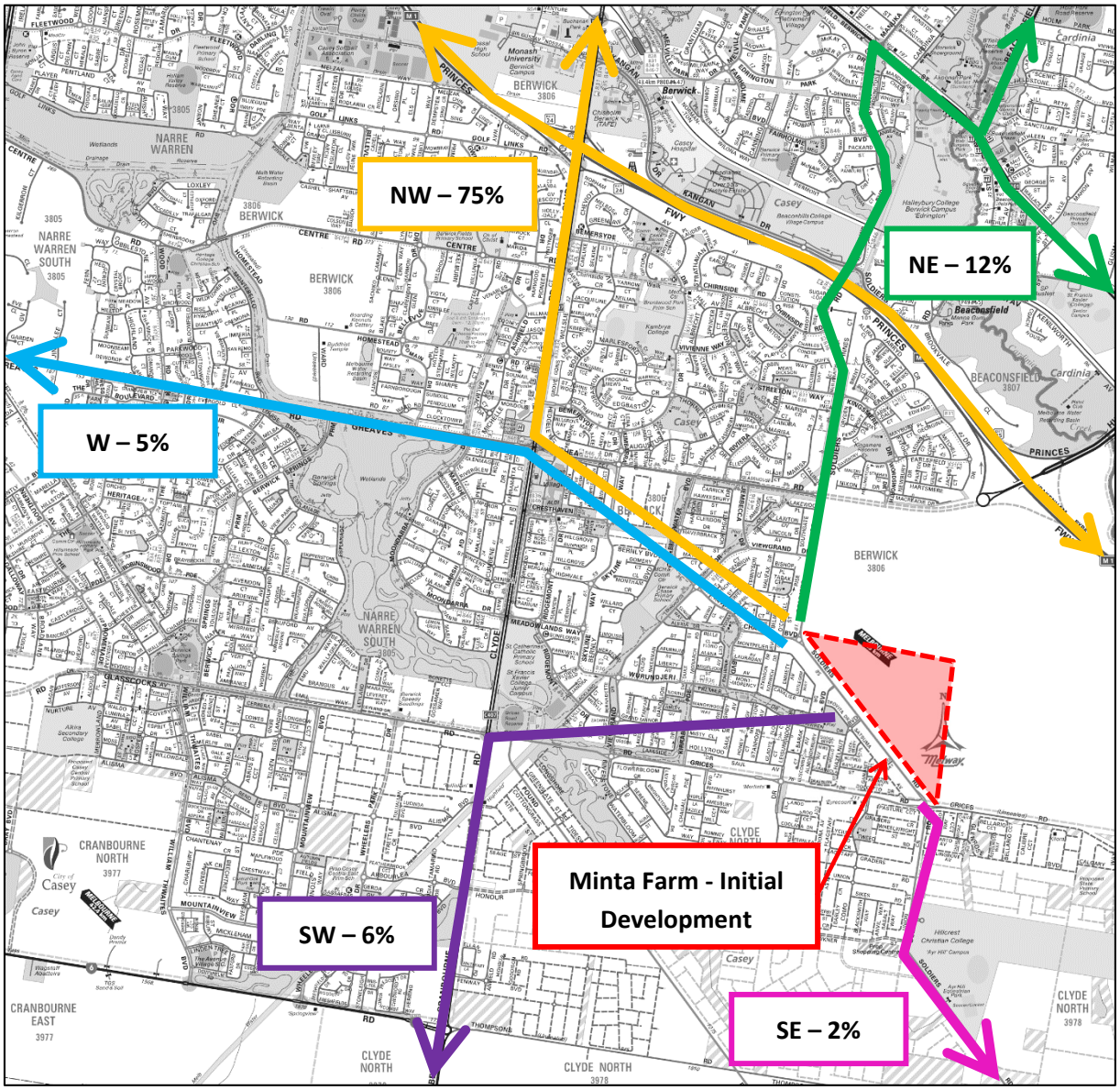


Figure 6: Global Traffic Distribution

4.2.2 Localised Route Selection

For global destination identified above, a localised route through the adjacent local area has been determined based on the shortest and most likely traffic routes. This process has been separated into the three (3) access point to the initial Minta Farm development area to account for the variation in route selection based on the distribution of properties through the Minta Farm Area.

A summary of the possible routes identified through the local area are provided in Figure 7 below, with the summary of the adopted route selection shown in Table 3 below.

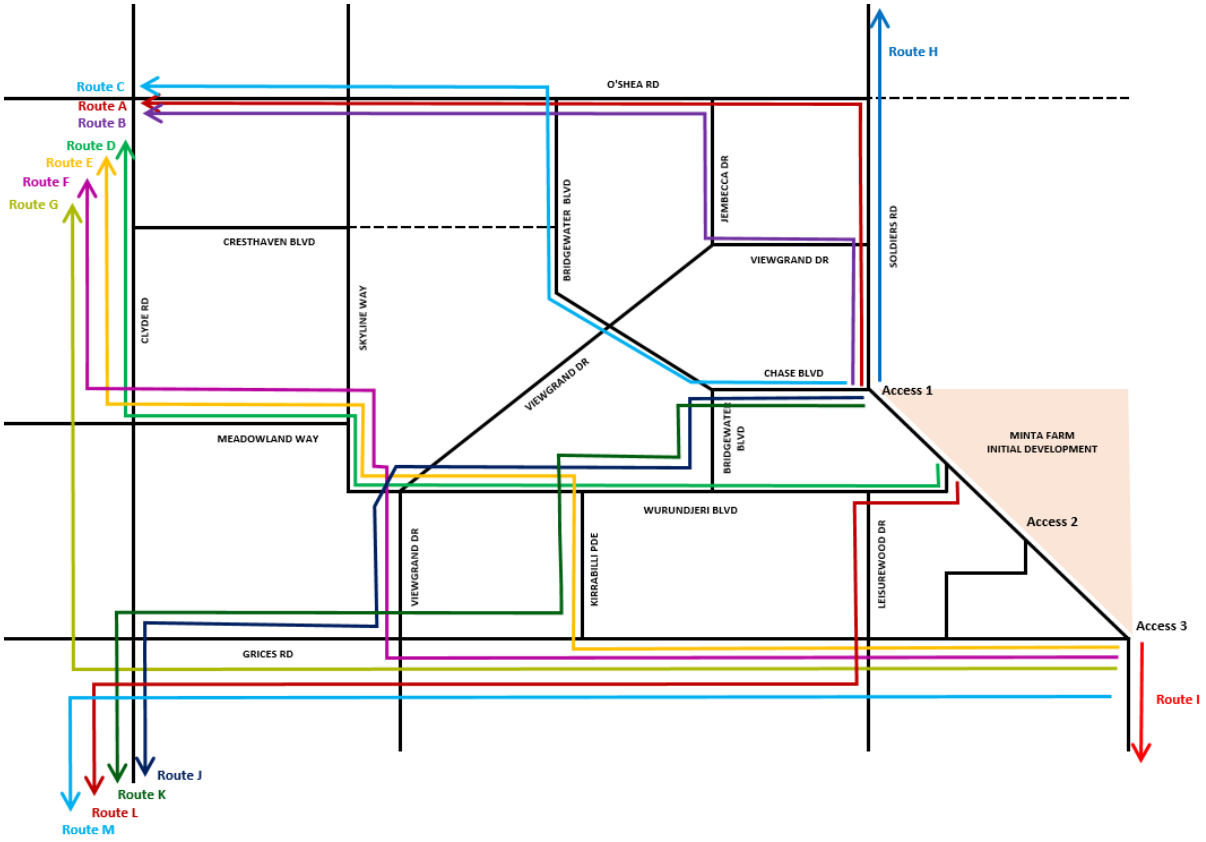


Figure 7: Localised Route Options

Table 3: Adopted Localised Route Selection

Route	Access 1	Access 2	Access 3
North-West			
Route A	33%	25%	-
Route B	33%	25%	-
Route C	33%	25%	-
Route D	-	25%	-
Route E	-	-	33%
Route F	-	-	33%
Route G	-	-	33%
North East			
Route H	100%	100%	100%
South-East			
Route I	100%	100%	100%
South-West			
Route J	50%	-	-
Route K	50%	-	-
Route L	-	100%	-

Route	Access 1	Access 2	Access 3
Route M	-	-	100%
West			
Route A	33%	25%	-
Route B	33%	25%	-
Route C	33%	25%	-
Route D	-	25%	-
Route E	-	-	33%
Route F	-	-	33%
Route G	-	-	33%

4.3 Daily Traffic Volumes

Based on the above traffic generation and distribution, the daily traffic volumes at key points in the road network as shown in Figure 8 (development volumes) and Figure 9 (post development) below.

A full summary of the daily traffic volume calculation is provided in Appendix B.

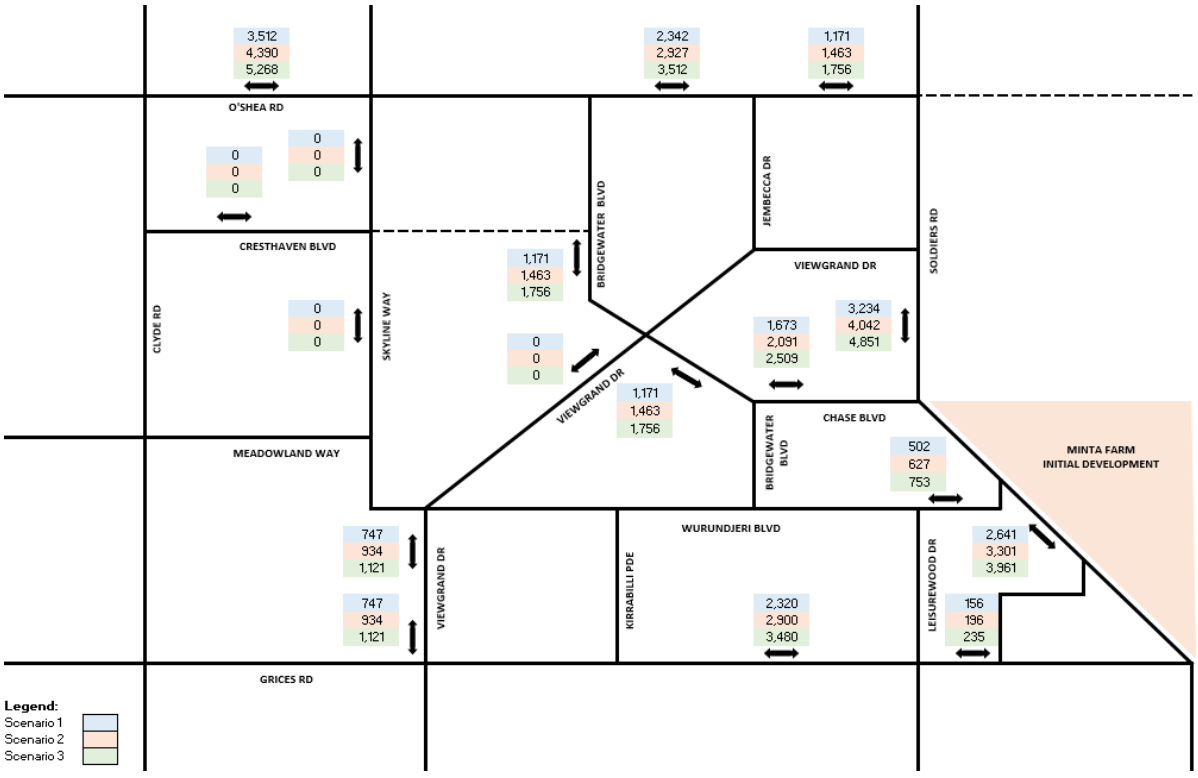


Figure 8: Daily Traffic Volumes – Development

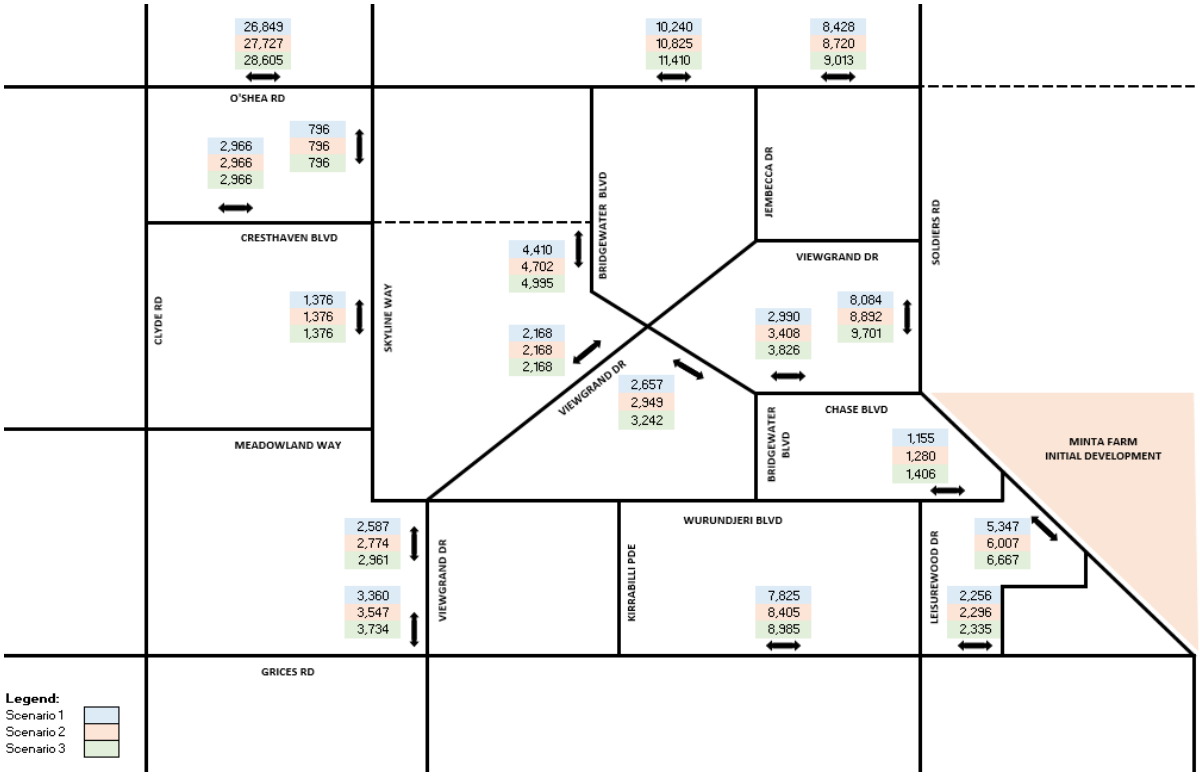


Figure 9: Daily Traffic Volumes – Post Development (Development + Existing)

4.4 Peak Hour Traffic Volumes

Peak hour volume data sets have been developed to assess the key intersections along O'Shea Road and Clyde Road. The traffic generation and distribution is the same as previously presented for the daily traffic volumes.

The in/out split for residential development have been adopted as follows:

- AM Peak – 80% 'Out' / 20% 'In'
- PM Peak – 40% 'Out' / 60% 'In'

A full summary of the AM and PM peak traffic volume data sets is provided at Appendix C.

4.5 Sensitivity Testing – Scenario 1 (1,000 Dwellings)

In order to test the sensitivity of the model, three (3) sensitivity options were considered by altering key variables and assessing the impact on the model results. The following sections detail the various sensitivity options. Each of the sensitivity options was based on Scenario 1, detailed above, with only those variables described in each section below being altered for each sensitivity testing option.

Option 1 – Trip Generation A

Option 1 considered the impact of a reduced trip generation rate. While the original trip generation rate (7.5 trips/dwelling/day) was consistent with our experience in similar outer-suburban areas, it was noted that the rate specified in the Cardno report (*Strategic Transport Modelling Assessment* (*Ultimate Scenario): McPherson, Croskell and Minta Farm Precincts*, dated: 31 August, 2015) considered all trips

(not only car trips). On this basis, our original trip generation rate was factored down to consider only those trips undertaken by car. The 2012-2013 VISTA travel survey indicated that the proportion of trips taken by private vehicle in "outer Melbourne" was 81%. A trip generation rate of 6.5 trips/dwelling/day was therefore adopted for sensitivity testing for Option 1.

The reduced trip generation rate results in traffic volumes reducing at all locations across the study area, compared to the original model. The key traffic volume, on Soldiers Road between Chase Boulevard and Viewgrand Drive, reduced from 8,084 vehicles per day to 7,653 vehicles per day.

Option 2 – Trip Distribution A

Option 2 considered the impact of altering the proportions of vehicles using each of the three (3) access points to access the initial development area. The original equal split was altered to partially favour the central access point (Access 2). On this basis, 50% of trips were assumed to utilise Access 2, with the remaining 50% of trips equally split (i.e. 25% each) between Access 1 and Access 3.

This option resulted in an increased traffic volume on Soldiers Road, between Chase Boulevard and Viewgrand Drive, with an increase from 8,084 vehicles per day to 8,251 vehicles per day expected. Furthermore, Chase Boulevard, between Bridgewater Boulevard and Soldiers Road, is also expected to experience an increase in traffic volumes, with 3,324 vehicles per day expected to utilise this link, up from 2,990 vehicles per day under Scenario 1.

Option 3 – Trip Distribution B

Option 3 also considered the impact of altering the proportions of vehicles using each of the access points. This option attempted to push vehicles away from using Soldiers Road by using only Access 2 and Access 3 (50% split each), rather than Access 1 (0% split). This option reflects the case that the northern access to Soldiers Road is not constructed as part of the initial development of the Minta Farm PSP area.

This option resulted in 7,247 vehicles per day utilising Soldiers Road, between Chase Boulevard and Viewgrand Drive a reduction of 837 vehicles per day compared to Scenario 1.

Sensitivity Testing Summary

Table 4 summarises the key differences and results of the various sensitivity testing options.

Table 4: Summary of Sensitivity Testing Options

Sensitivity Option	Trip Generation Rate	Access Split	Traffic Volume	
			Soldiers Road	Chase Boulevard
Original (Scenario 1)	**7.5 trips/dwelling/day**	**Access 1: 33%** **Access 2: 33%** **Access 3: 33%**	**8,084vpd**	**2,990vpd**
Option 1 **Trip Generation A**	6.5 trips/dwelling/day	Access 1: 33% Access 2: 33% Access 3: 33%	7,653vpd	2,767vpd

Sensitivity Option	Trip Generation Rate	Access Split	Traffic Volume	
			Soldiers Road	Chase Boulevard
Option 2 **Access Split A**	7.5 trips/dwelling/day	Access 1: 25% Access 2: 50% Access 3: 25%	8,251vpd	3,324vpd
Option 3 **Access Split B**	7.5 trips/dwelling/day	Access 1: 0% Access 2: 50% Access 3: 50%	7,247vpd	2,822vpd

Based on the above sensitivity testing, we are confident that the traffic generation and distribution model provides results that satisfactorily reflects the operation of the road network within the study area.

5 Traffic Impacts

5.1 Daily Traffic Volumes

The City of Casey has a Road Management Plan that defines a road classification system for the local road network. The roads managed by Council have been given a classification ranging from limited access to secondary arterial.

Table 5 below outlines the classifications of the key roads impacted by the proposed Minta Farm traffic volumes.

Table 5: Road Hierarchy – City of Casey

Classification	Description	Roads
Secondary Arterial	*'Roads that supplement the primary arterial roads, providing through traffic movement to an individually determined limit sensitive to roadway characteristics and abutting land uses. These roads provide a direct traffic link from one part of a region to another. Access to abutting properties and lower order roads is typically limited.'*	• O'Shea Road • Soldiers Road (North of O'Shea)
Trunk Collector	*'Roads that provide a specialised form of connection between the local streets and the arterial network where – due to localised constraints – traffic is required to be concentrated at a level higher than desirable for a collector road. Access to abutting properties is permitted; however, the traffic function of the road is clearly recognised.'*	• Skyline Way
Collector	*Collector roads are important local roads whose function is to distribute traffic between the arterial roads and the local road system and to provide access to the abutting property. A reasonable level of local amenity is maintained by restricting traffic volumes and vehicle speeds. The collector street may be used as a bus route.*	• Soldiers Road (South of O'Shea) • Bridgewater Boulevard • Viewgrand Drive • Cresthaven Boulevard • Wurundjeri Boulevard (west of Kirrabilli Parade)
Local Access	*'Roads or streets not having a significant through traffic function. These roads provide access to abutting property. The local environment is dominant, traffic is subservient, speed and volume are low, and pedestrian and cycling movements are facilitated.'*	• Grices Road • Chase Boulevard • Wurundjeri Boulevard (east of Kirrabilli Parade)

The Road Management Plan then provides guidance on the appropriate traffic volumes in Appendix B (Design Standards). The Appendix includes a reproduction of the VPA Engineering Design & Construction Manual guides for traffic volumes as follows:

- Local Access – 1,000-3,000 vehicles per day,
- Collector Road – 3,000-7,000 vehicles per day,
- Trunk Collector – 7,000-12,000 vehicles per day, and
- Arterial Road – 12,000-60,000 vehicles per day

Table 6 below summarises the expected post develop traffic volumes and compares these with the target range for each road classification. It is noted that assessments have been made only at the locations were existing conditions daily traffic volumes are available.

The Clyde North PSP indicates that Grices Road will ultimately become a duplicated arterial road. On this basis for the purpose of this assessment, the capacity has been taken as an arterial road rather than a local street as currently allocated in Council's Road Management Plan.

Table 6: Post Development - Daily Traffic Volume Assessment

Road	Target Vol.	Scenario 1		Scenario 2		Scenario 3	
		Vol.	Comply	Vol.	Comply	Vol.	Comply
O'Shea Road Clyde Rd-Skyline Way	12,000-60,000	26,849	Yes	27,727	Yes	28,605	Yes
O'Shea Road Bridgewater Dr-Jembecca Dr		10,240	Yes	10,825	Yes	11,410	Yes
O'Shea Road Jembecca Dr-Soldiers Rd		8,428	Yes	8,720	Yes	9,013	Yes
Soldiers Road Chase Blvd-Viewgrand Dr	3,000-7,000	8,084	No	8,892	No	9,701	No
Soldiers Road Hazelnut Blvd-Wurundjeri Dr		5,347	Yes	6,007	Yes	6,667	Yes
Chase Boulevard Bridgewater Dr-Soldiers Rd	>3,000	2,990	Yes	3,408	No	3,826	No
Bridgewater Boulevard Chase Blvd-Viewgrand Dr	3,000-7,000	2,657	Yes	2,949	Yes	3,242	Yes
Bridgewater Boulevard O'Shea Rd-Viewgrand Dr		4,410	Yes	4,702	Yes	4,995	Yes
Grices Road Leisurewood Dr-Soldiers Rd	12,000-60,000*	2,256	Yes	2,296	Yes	2,335	Yes
Grices Road Kirrabilli Dr-Leisurewood Dr		7,825	Yes	8,405	Yes	8,985	Yes
Viewgrand Drive Bridgewater Blvd-Wurundjeri Dr	3,000-7,000	2,168	Yes	2,168	Yes	2,168	Yes
Viewgrand Drive Ridgemont Dr-Wurundjeri Dr		2,587	Yes	2,774	Yes	2,961	Yes
Viewgrand Drive Grices Rd-Ridgemont Dr		3,360	Yes	3,547	Yes	3,734	Yes
Skyline Way Cresthaven Blvd-O'Shea Rd	3,000-7,000	796	Yes	796	Yes	796	Yes
Skyline Way Cresthaven Blvd-Meadowlands Way	>3,000	1,376	Yes	1,376	Yes	1,376	Yes
Cresthaven Boulevard Ridgemont Dr-Skyline Way	3,000-7,000	2,966	Yes	2,966	Yes	2,966	Yes

*Grices Road assumed to operate as an Arterial Road as per PSP classification, rather than local road as per current Road Management Plan classification.

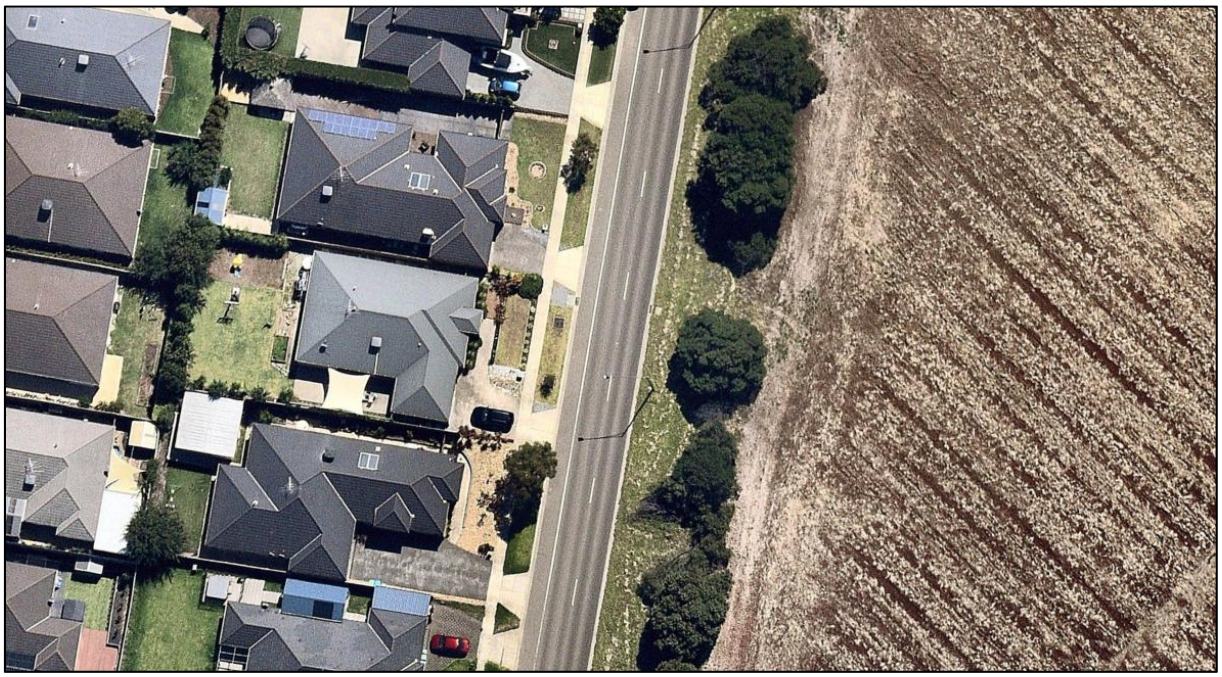
Based on the above assessment, Soldiers Road (south of O'Shea Road) and Chase Boulevard will exceed the target capacity thresholds as specified above. It is noted that these target capacity thresholds are environmental capacities that do not represent the physical maximum number of vehicles that can travel along a road, but rather a level of traffic that maintains an acceptable level of amenity for residents living along the road.

5.1.1 Soldiers Road (South of O'Shea Road)

A 'Street View' image and an aerial photograph of the existing conditions on Soldiers Road, between Chase Boulevard and Viewgrand Drive are shown in Figure 10 and Figure 11 below.

Source: www.google.com.au/maps

Figure 10: Soldiers Road (Chase Boulevard to Viewgrand Drive) – View South



Source: Nearmap

Figure 11: Soldiers Road (South of O'Shea Road) – Typical Cross-Section

In this section, Soldiers Road is classified as a collector road and provides an approximately 8.3m wide carriageway that accommodates a 3.0m wide traffic lane in each direction and a 2.3m wide kerbside parallel parking lane on the west side of the roadway. The roadway is contained within an approximately 21m wide road reserve, which provides a 4.5m wide verge on the west side and an 8.2m wide verge on the east side of the carriageway. Under current conditions, properties are constructed only on the west side of the road with the east side of the road comprising the later stages (non-initial development) of the Minta Farm PSP area. On this basis, it is expected that the east side of Soldiers Road will not be developed prior to the construction of the key north-south arterial road through the Minta Farm PSP area. Soldiers Road is subject to a posted speed limit of 60km/h in this section.

To the north of O'Shea Road, Soldiers Road is subject to a speed limit of 70km/h which reflects the operation of this section as a secondary arterial with minimal direct property access and the provision of a key link across the Princes Freeway. To the south of Grices Road, Soldiers Road serves key land uses including schools and recreational facilities. It is also noted that upon the completion of the key north-south arterial through the Minta Farm PSP area, it is expected that the Soldiers Road connection to Grices Road will be closed in favour of a connection between Grices Road and the new north-south arterial. On this basis, Soldiers Road currently forms a key north-south link within the road network that belies its formal classification. In the future, the north-south arterial road is expected to largely take over this role and cause a shift in traffic volumes from Soldiers Road onto the north-south arterial road.

Across the proposed scenarios the volume ranges between 8,084-9,701 vehicles per day, which is approximately 1,100-1,700 vehicles per day above the 7,000 vehicles per day threshold. While we acknowledge that the traffic volumes on Soldiers Road exceed the generally accepted environmental capacity of 7,000 vehicles per day for a collector road, the sensitivity testing has shown that the traffic volumes remain within approximately 15% of this threshold. Our experience indicates that roads such as Soldiers Road are capable of carrying traffic volumes in excess of this threshold (7,000 vehicles per day) and that there are examples of collector roads that carry up to 10,000 vehicles per day. On this basis, we consider it acceptable, in the short- to medium-term, for Soldiers Road to accommodate the traffic volumes associated with the initial development of 1,000 dwellings on the Minta Farm site.

5.1.2 Chase Boulevard

Chase Boulevard is a short 300m length of road between Soldiers Road and Bridgewater Boulevard. However, due to the priority at the Chase Boulevard / Soldiers Road intersection, Chase Boulevard effectively becomes Bridgewater Boulevard.

Council's road register identifies Chase Boulevard as a local road. However, the cross-section is more in line with a collector road (separate lanes in each direction with indented parking on both sides) and has the same cross-section as Bridgewater Boulevard to the west (which is identified as a collector road in Council's road register. A 'Street View' image and an aerial photograph of Chase Boulevard are provided below.

Source: www.google.com.au/maps

Figure 12: Chase Boulevard (Soldiers Road to Viewgrand Drive) – View East

Source: Nearmap

Figure 13: Soldiers Road (South of O'Shea Road) – Typical Cross-Section

It appears that Chase Boulevard has been misclassified under Council's Road Register and we are of the view that is could accommodate collector road volumes (i.e. 3,000-7,000). On this basis, the projected 2,990-3,826 vpd can be accommodated by Chase Boulevard.

5.2 Peak Hour Volumes

5.2.1 Capacity Modelling Methodology

SIDRA Intersection 7.0 has been utilised to model the peak period traffic conditions. A total of 8 intersections were reviewed including:

O'Shea Road:

- Skyline Way,
- Bridgewater Boulevard,
- Jembecca Drive, and
- Soldiers Road.

Clyde Road:

- O'Shea Road,
- Cresthaven Boulevard,
- Meadowlands Way, and
- Grices Road.

For the O'Shea Road intersections, the following inputs were used:

- The intersection layout were based on the proposed duplicated layout for O'Shea Road which includes traffic signals at Clyde Road, Skyline Way, Bridgewater Boulevard and Soldiers Road. The intersection with Jembecca Drive will remain unsignalised allowing for left in, right in and left out movements.
- For the signalised intersections, a standard signal phasing has been adopted. An overall cycle time of 120 seconds has been applied with SIDRA optimising the various phase times.

For the Clyde Road intersections, the following inputs were used:

- All intersection layouts were assumed to remain as per the existing conditions, with the exception of the O'Shea Road / Clyde Road intersection which adopted the proposed duplicated layout (assumed to be constructed prior to the Minta Farm development), and
- The signal phasing has been based on sample observations of the existing conditions undertaken at the time of turning movement counts. Each intersection has been applied with a cycle time of 120 seconds with SIDRA optimising the various phase times.

5.2.2 Intersection Capacity Threshold

The SIDRA Intersection 7.0 software package provides several key indicators to measure intersection performance. These include:

- Degree of saturation (DOS),
- Average delay (in seconds), and
- 95th percentile queue length (in metres).

The SIDRA users guide provides indicates the maximum intersection DOS for the following intersection types:

Table 7: SIDRA Intersection Users Guide – Intersection Capacity

Intersection Type	Maximum DOS
Traffic Signals	0.90-0.95
Roundabout	0.85-0.95
Sign Control	0.80-0.90

These thresholds have been adopted for the analysis.

5.2.3 Intersection Capacity Results

The results of the intersection capacity analysis are shown in Table 8 below.

Table 8: SIDRA Capacity Modelling Results

Location	Intersection DOS		
	Scenario 1 (1,000 Lots)	Scenario 2 (1,250 Lots)	Scenario 2 (1,500 Lots)
AM Peak			
O'Shea Rd / Skyline Way	**0.47**	-	-
O'Shea Rd / Bridgewater Blvd	**0.53**	-	-
O'Shea Rd / Jembecca Dr	**0.61**	-	-
O'Shea Rd / Soldiers Rd	**0.63**	-	-
Clyde Road / O'Shea Road	**0.89**	-	-
Clyde Road / Cresthaven Blvd	**0.47**	-	-
Clyde Road / Meadowlands Way	**0.87**	-	-
Clyde Road / Grices Road	**0.87**	-	-
PM Peak			
O'Shea Rd / Skyline Way	**0.39**	-	-
O'Shea Rd / Bridgewater Blvd	**0.45**	-	-
O'Shea Rd / Jembecca Dr	**0.34**	-	-
O'Shea Rd / Soldiers Rd	**0.41**	-	-
Clyde Road / O'Shea Road	**0.82**	-	-
Clyde Road / Cresthaven Blvd	**0.64**	-	-
Clyde Road / Meadowlands Way	**0.94**	-	-
Clyde Road / Grices Road	**0.87**	-	-

It is noted that intersection capacity analysis has not been undertaken for Scenario 2 or Scenario 3 as it was established in Section 5.1 that the daily traffic volume on Soldiers Road would exceed its formal target volume under Scenario 1.

The above analysis indicates that the intersections along O'Shea Road (post duplication layout) will operate with adequate capacity when accounting for the predicted volumes from the initial development on the Minta Farm site.

The signalised intersection of Clyde Road and Meadowlands Way will operate close to its practical capacity (DOS 0.94) and on this basis delays and queue lengths at the upper limit of the acceptable range can be expected. It is noted that results are based on SIDRA applying optimum phase time at each intersection and therefore there may be a loss of efficiency when the signals are linked together to optimise flow on Clyde Road. On this basis, under Scenario 1 (1,000 dwellings), a number of intersections along Clyde Road are expected to operate at a level close to their practical capacity.

The intersection at Cresthaven Boulevard will operate at a lower DOS (0.47-0.64). It is noted that our analysis has not allowed for any distribution from the Minta Farm site to this intersection (due to the existing missing link in Cresthaven Boulevard between Skyline Way and Bridgewater Boulevard). However due to the congestion expected at the adjacent intersection, it is likely that there may be some migration away from the other intersections along Clyde Road to Cresthaven Boulevard.

6 Conclusions

We have undertaken a detailed traffic engineering assessment associated with the modelling to determine the level of development possible prior to the construction of the key north-south arterial through the Minta Farm PSP area. On this basis we are of the opinion that:

a) The three (3) development scenarios (i.e. 1,000, 1,250 and 1,500 lots) are expected to generate between 7,500-11,250 vehicles per day with 800-1,200 vehicles in each peak hour.

b) These vehicles would select from a number of possible routes through the local and arterial road networks based on both the nearest access point in the proposed development and their ultimate destination,

c) Sensitivity testing has been undertaken to confirm that the traffic generation and distribution model satisfactorily reflects the operation of the road network in the vicinity of the subject area,

d) Under Scenario 1 (1,000 lots), the daily traffic volume (8,084 vehicles per day) on Soldiers Road (between Chase Boulevard and Viewgrand Drive) would exceed the formal daily target volume (7,000 vehicles per day) for a collector road,

    i) However, given the existing cross section and the significant role that Soldiers Road plays in the broader road network, we consider it appropriate for Soldiers Road to carry traffic volumes of up to 10,000 vehicles per day.

e) Intersection capacity analysis indicates that under Scenario 1, a number of intersections along Clyde Road are likely to operate at a level close to their practical capacity.

Appendix A
Global Traffic Distribution

GRP22294: Minta Farm PSP 11

Traffic Generation and Distribution

Traffix Group
Traffic Engineers and Transport Planners

Trip Generation

Development Yield		
Residentia	1,000	dwellings

Traffic Generation Rate		
Residentia	7.5	trips/dwelling/day
Residentia	10.7%	daily trips occurring in each peak hour

Note: 10 trips/dwelling/day with 25% internal as adopted in Cardno report

Peak Hour Directional Split		
	AM Peak	PM Peak
IN	20%	60%
OUT	80%	40%

Trip Distribution

Access	Split
Access 1	33%
Access 2	33%
Access 3	33%
Total	100%

Ultimate Direction	JTW Data		Directional Split	
	Direction	Percentage	Count	Percentage
North-Wes	NW	100%	6,755	75%
North-East	NE	100%	1,072	12%
South-East	S	20%	141	2%
South-Wes	S	80%	564	6%
West	W	100%	480	5%
Total	-	-	9,012	100%

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Traffic Generation and Distribution

Route	Route Splits		
	Access 1	Access 2	Access 3
North-West			
A	33%	25%	-
B	33%	25%	-
C	33%	25%	-
D	-	25%	-
E	-	-	33%
F	-	-	33%
G	-	-	33%
Total	**100%**	**100%**	**100%**
North-East			
H	100%	100%	100%
Total	**100%**	**100%**	**100%**
South-East			
I	100%	100%	100%
Total	**100%**	**100%**	**100%**
South-West			
J	50%	-	-
K	50%	-	-
L	-	100%	-
M	-	-	100%
Total	**100%**	**100%**	**100%**
West			
A	33%	25%	-
B	33%	25%	-
C	33%	25%	-
D	-	25%	-
E	-	-	33%
F	-	-	33%
G	-	-	33%
Total	**100%**	**100%**	**100%**

Route	Daily Volume (vpd)			Total
	Access 1	Access 2	Access 3	
North-West				
A	625	468	-	**1,093**
B	625	468	-	**1,093**
C	625	468	-	**1,093**
D	-	468	-	**468**
E	-	-	625	**625**
F	-	-	625	**625**
G	-	-	625	**625**
Total	**1,874**	**1,874**	**1,874**	**5,622**
North-East				
H	297	297	297	**892**
Total	**297**	**297**	**297**	**892**
South-East				
I	39	39	39	**117**
Total	**39**	**39**	**39**	**117**
South-West				
J	78	-	-	**78**
K	78	-	-	**78**
L	-	156	-	**156**
M	-	-	156	**156**
Total	**156**	**156**	**156**	**469**
West				
A	44	33	-	**78**
B	44	33	-	**78**
C	44	33	-	**78**
D	-	33	-	**33**
E	-	-	44	**44**
F	-	-	44	**44**
G	-	-	44	**44**
Total	**133**	**133**	**133**	**399**

Appendix B
Daily Traffic Volume Calculations

Daily Volumes

Street	Section	Access 1		Access 2		Access 3		Daily Traffic Volume			Road Hierarchy	
		Routes	Volume	Routes	Volume	Routes	Volume	Dev	Ex	Post	lassificatio	Acceptable
O'Shea Road	Clyde Road - Skyline Way	ABC	2,007	ABC	1,505	ABC	0	**3,512**	**23,337**	**26,849**	Arterial	Yes
O'Shea Road	Bridgewater Boulevard - Jembecca Drive	AB	1,338	AB	1,004	AB	0	**2,342**	**7,898**	**10,240**	Arterial	Yes
O'Shea Road	Jembecca Drive - Soldiers Road	A	669	A	502	A	0	**1,171**	**7,257**	**8,428**	Arterial	Yes
Soldiers Road	Chase Boulevard - Viewgrand Drive	ABH	1,635	ABH	1,301	ABH	297	**3,234**	**4,850**	**8,084**	Collector	No
Soldiers Road	Hazelnut Boulevard - Wurundjeri Boulevard	EFGILM	39	ABCDHJK	2,304	ABCDHJK	297	**2,641**	**2,706**	**5,347**	Collector	Yes
Chase Boulevard	Bridgewater Boulevard - Soldiers Road	CD	669	CD	1,004	CD	0	**1,673**	**1,317**	**2,990**	Local	Yes
Bridgewater Boulevard	Chase Boulevard - Viewgrand Drive	C	669	C	502	C	0	**1,171**	**1,486**	**2,657**	Collector	Yes
Bridgewater Boulevard	O'Shea Road - Viewgrand Drive	C	669	C	502	C	0	**1,171**	**3,239**	**4,410**	Collector	Yes
Wurundjeri Boulevard	Bridgewater Boulevard - Soldiers Road	D	0	D	502	D	0	**502**	**653**	**1,155**	Local	Yes
Hazelnut Boulevard	Fernwren Drive - Nutmeg Close	-	0	-	0	-	0	**0**	**428**	**428**	Local	Yes
Grices Road	Leisurewood Drive - Soldiers Road	M	0	M	0	M	156	**156**	**2,100**	**2,256**	Arterial	Yes
Grices Road	Kirrabilli Drive - Leisurewood Drive	EFGLM	0	EFGLM	156	EFGLM	2,164	**2,320**	**5,505**	**7,825**	Arterial	Yes
Viewgrand Drive	Bridgewater Boulevard - Wurundjeri Bouleva	-	0	-	0	-	0	**0**	**2,168**	**2,168**	Collector	Yes
Viewgrand Drive	Ridgemont Drive - Wurundjeri Boulevard	FJ	78	FJ	0	FJ	669	**747**	**1,840**	**2,587**	Collector	Yes
Viewgrand Drive	Grices Road - Ridgemont Drive	FJ	78	FJ	0	FJ	669	**747**	**2,613**	**3,360**	Collector	Yes
Skyline Way	Cresthaven Boulevard - O'Shea Road	-	0	-	0	-	0	**0**	**796**	**796**	Collector	Yes
Skyline Way	Cresthaven Boulevard - Meadowlands Way	-	0	-	0	-	0	**0**	**1,376**	**1,376**	Local	Yes
Cresthaven Boulevard	Ridgemont Drive - Skyline Way	-	0	-	0	-	0	**0**	**2,966**	**2,966**	Collector	Yes

Appendix C
Peak Hour Traffic Volume Calculations

GRP22294: Minta Farm PSP 11

Traffic Generation and Distribution

TraffixGroup
Traffic Engineers and Transport Planners

Peak Hour Volumes

Approach	Movement	AM Peak Hour Volumes								PM Peak Hour Volumes							
		North-West	North-East	South-East	South-West	West	Dev	Ex	Post	North-West	North-East	South-East	South-West	West	Dev	Ex	Post
Clyde Road / Greaves Road / O'Shea Road																	
South	Left	-	-	-	-	14	**14**	**95**	**109**	-	-	-	-	7	**7**	**62**	**69**
South	Through	200	-	-	-	-	**200**	**1,385**	**1,585**	100	-	-	-	-	**100**	**1,117**	**1,217**
South	Right	-	-	-	-	-	**0**	**132**	**132**	-	-	-	-	-	**0**	**160**	**160**
East	Left	-	-	-	-	-	**0**	**96**	**96**	-	-	-	-	-	**0**	**12**	**12**
East	Through	-	-	-	-	20	**20**	**416**	**436**	-	-	-	-	10	**10**	**309**	**319**
East	Right	280	-	-	-	-	**280**	**248**	**528**	140	-	-	-	-	**140**	**245**	**385**
North	Left	70	-	-	-	-	**70**	**201**	**271**	210	-	-	-	-	**210**	**420**	**630**
North	Through	50	-	-	-	-	**50**	**1,125**	**1,175**	150	-	-	-	-	**150**	**1,413**	**1,563**
North	Right	-	-	-	-	-	**0**	**174**	**174**	-	-	-	-	-	**0**	**397**	**397**
West	Left	-	-	-	-	-	**0**	**285**	**285**	-	-	-	-	-	**0**	**384**	**384**
West	Through	-	-	-	-	5	**5**	**261**	**266**	-	-	-	-	15	**15**	**282**	**297**
West	Right	-	-	-	-	4	**4**	**81**	**85**	-	-	-	-	11	**11**	**108**	**119**
Clyde Road / Cresthaven Boulevard																	
South	Through	200	-	-	-	14	**214**	**1,600**	**1,814**	100	-	-	-	7	**107**	**1,285**	**1,392**
South	Right	-	-	-	-	-	**0**	**103**	**103**	-	-	-	-	-	**0**	**130**	**130**
East	Left	-	-	-	-	-	**0**	**96**	**96**	-	-	-	-	-	**0**	**104**	**104**
East	Right	-	-	-	-	-	**0**	**117**	**117**	-	-	-	-	-	**0**	**77**	**77**
North	Left	-	-	-	-	-	**0**	**75**	**75**	-	-	-	-	-	**0**	**120**	**120**
North	Through	50	-	-	-	4	**54**	**1,273**	**1,327**	150	-	-	-	11	**161**	**1,617**	**1,778**
Clyde Road / Meadowlands Way / Moondarra Drive																	
South	Left	-	-	-	-	-	**0**	**53**	**53**	-	-	-	-	-	**0**	**57**	**57**
South	Through	53	-	-	-	4	**57**	**1,454**	**1,511**	27	-	-	-	2	**29**	**1,250**	**1,279**
South	Right	-	-	-	-	-	**0**	**52**	**52**	-	-	-	-	-	**0**	**52**	**52**
East	Left	-	-	-	-	-	**0**	**78**	**78**	-	-	-	-	-	**0**	**44**	**44**
East	Through	-	-	-	-	-	**0**	**155**	**155**	-	-	-	-	-	**0**	**21**	**21**
East	Right	147	-	-	-	10	**157**	**122**	**279**	73	-	-	-	5	**78**	**47**	**125**
North	Left	37	-	-	-	3	**39**	**145**	**184**	110	-	-	-	8	**118**	**141**	**259**
North	Through	13	-	-	-	1	**14**	**1,182**	**1,196**	40	-	-	-	3	**43**	**1,503**	**1,546**
North	Right	-	-	-	-	-	**0**	**30**	**30**	-	-	-	-	-	**0**	**43**	**43**
West	Left	-	-	-	-	-	**0**	**118**	**118**	-	-	-	-	-	**0**	**71**	**71**
West	Through	-	-	-	-	-	**0**	**48**	**48**	-	-	-	-	-	**0**	**44**	**44**
West	Right	-	-	-	-	-	**0**	**72**	**72**	-	-	-	-	-	**0**	**38**	**38**

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Traffic Generation and Distribution

TraffixGroup
Traffic Engineers and Transport Planners

Approach	Movement	AM Peak Hour Volumes								PM Peak Hour Volumes							
		North-West	North-East	South-East	South-West	West	Dev	Ex	Post	North-West	North-East	South-East	South-West	West	Dev	Ex	Post
Clyde Road / Glasscocks Road / Grices Road																	
South	Left	-	-	-	-	-	**0**	**36**	**36**	-	-	-	-	-	**0**	**50**	**50**
South	Through	-	-	-	-	-	**0**	**1,132**	**1,132**	-	-	-	-	-	**0**	**1,106**	**1,106**
South	Right	-	-	10	-	-	**10**	**221**	**231**	-	-	30	-	-	**30**	**278**	**308**
East	Left	-	-	40	-	-	**40**	**272**	**312**	-	-	20	-	-	**20**	**166**	**186**
East	Through	-	-	-	-	-	**0**	**63**	**63**	-	-	-	-	-	**0**	**87**	**87**
East	Right	53	-	-	-	4	**57**	**153**	**210**	27	-	-	-	2	**29**	**80**	**109**
North	Left	13	-	-	-	1	**14**	**159**	**173**	40	-	-	-	3	**43**	**234**	**277**
North	Through	-	-	-	-	-	**0**	**952**	**952**	-	-	-	-	-	**0**	**1,155**	**1,155**
North	Right	-	-	-	-	-	**0**	**148**	**148**	-	-	-	-	-	**0**	**177**	**177**
West	Left	-	-	-	-	-	**0**	**229**	**229**	-	-	-	-	-	**0**	**174**	**174**
West	Through	-	-	-	-	-	**0**	**199**	**199**	-	-	-	-	-	**0**	**123**	**123**
West	Right	-	-	-	-	-	**0**	**40**	**40**	-	-	-	-	-	**0**	**47**	**47**
Kimbarra Drive / O'Shea Road / Skyline Way																	
South	Left	-	-	-	-	-	**0**	**36**	**36**	-	-	-	-	-	**0**	**29**	**29**
South	Through	-	-	-	-	-	**0**	**167**	**167**	-	-	-	-	-	**0**	**74**	**74**
South	Right	-	-	-	-	-	**0**	**89**	**89**	-	-	-	-	-	**0**	**169**	**169**
East	Left	-	-	-	-	-	**0**	**142**	**142**	-	-	-	-	-	**0**	**85**	**85**
East	Through	280	-	-	-	20	**300**	**826**	**1,126**	140	-	-	-	10	**150**	**458**	**608**
East	Right	-	-	-	-	-	**0**	**35**	**35**	-	-	-	-	-	**0**	**55**	**55**
North	Left	-	-	-	-	-	**0**	**24**	**24**	-	-	-	-	-	**0**	**21**	**21**
North	Through	-	-	-	-	-	**0**	**91**	**91**	-	-	-	-	-	**0**	**62**	**62**
North	Right	-	-	-	-	-	**0**	**95**	**95**	-	-	-	-	-	**0**	**102**	**102**
West	Left	-	-	-	-	-	**0**	**149**	**149**	-	-	-	-	-	**0**	**84**	**84**
West	Through	70	-	-	-	5	**75**	**419**	**494**	210	-	-	-	15	**225**	**547**	**772**
West	Right	-	-	-	-	-	**0**	**29**	**29**	-	-	-	-	-	**0**	**55**	**55**
Bridgewater Boulevard / O'Shea Road																	
South	Left	93	-	-	-	7	**100**	**262**	**362**	47	-	-	-	3	**50**	**98**	**148**
South	Right	-	-	-	-	-	**0**	**33**	**33**	-	-	-	-	-	**0**	**18**	**18**
East	Left	-	-	-	-	-	**0**	**29**	**29**	-	-	-	-	-	**0**	**20**	**20**
East	Through	187	-	-	-	13	**200**	**717**	**917**	93	-	-	-	7	**100**	**504**	**604**
West	Through	47	-	-	-	3	**50**	**342**	**392**	140	-	-	-	10	**150**	**524**	**674**
West	Right	23	-	-	-	2	**25**	**181**	**206**	70	-	-	-	5	**75**	**187**	**262**
Jembecca Drive / O'Shea Road																	
South	Left	93	-	-	-	7	**100**	**180**	**280**	47	-	-	-	3	**50**	**40**	**90**
South	Right	-	-	-	-	-	**0**	**4**	**4**	-	-	-	-	-	**0**	**1**	**1**
East	Left	-	-	-	-	-	**0**	**13**	**13**	-	-	-	-	-	**0**	**12**	**12**
East	Through	93	-	-	-	7	**100**	**747**	**847**	47	-	-	-	3	**50**	**428**	**478**
West	Through	23	-	-	-	2	**25**	**156**	**181**	70	-	-	-	5	**75**	**413**	**488**
West	Right	23	-	-	-	2	**25**	**137**	**162**	70	-	-	-	5	**75**	**91**	**166**

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Traffic Generation and Distribution

TraffixGroup
Traffic Engineers and Transport Planners

Approach	Movement	AM Peak Hour Volumes								PM Peak Hour Volumes							
		North-West	North-East	South-East	South-West	West	Dev	Ex	Post	North-West	North-East	South-East	South-West	West	Dev	Ex	Post
O'Shea Road / Soldiers Road																	
South	Left	93	-	-	-	7	**100**	**288**	**388**	47	-	-	-	3	**50**	**69**	**119**
South	Through	-	76	-	-	-	**76**	**175**	**251**	-	38	-	-	-	**38**	**178**	**216**
North	Through	-	19	-	-	-	**19**	**291**	**310**	-	57	-	-	-	**57**	**332**	**389**
North	Right	-	-	-	-	-	**0**	**384**	**384**	-	-	-	-	-	**0**	**347**	**347**
West	Left	-	-	-	-	-	**0**	**88**	**88**	-	-	-	-	-	**0**	**93**	**93**
West	Right	23	-	-	-	2	**25**	**26**	**51**	70	-	-	-	5	**75**	**48**	**123**