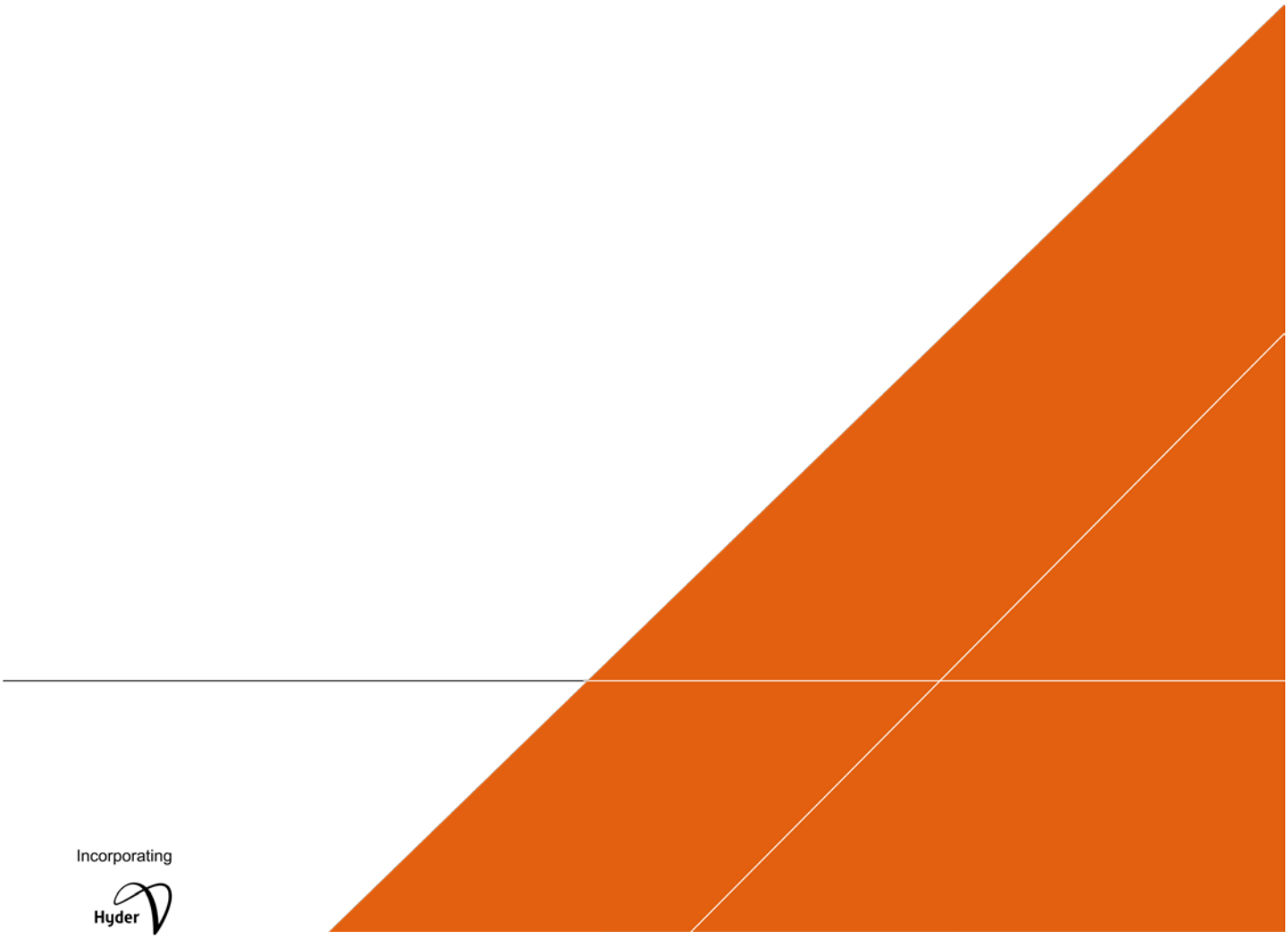
ARCADIS Design & Consultancy for natural and built assets

PENRITH HOMEMAKER CENTRE

Preliminary Traffic Modelling



Incorporating Hyder

CONTACT

Mukit Rahman

Associate Technical Director

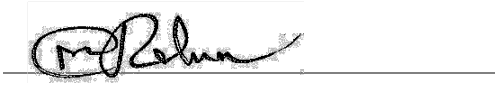
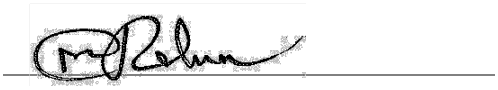
T 02 8907 9242
M 0411 526 995
E Mukit.rahman@arcadis.com

Arcadis
Level 5, 141 Walker Street, North
Sydney, NSW 2060

ROADS AND MARITIME SERVICES (ROADS AND MARITIME)

PENRITH HOMEMAKER CENTRE

Preliminary Traffic Modelling

Authors	Roy Conrad, Mikhael Wong, Mukit Rahman	
Checker	Mukit Rahman	
Approver	Mukit Rahman	
Report No	AA008188	

This report has been prepared for Roads and Maritime in accordance with the terms and conditions of appointment for Mulgoa Road/Castlereagh Road Corridor Between Glenmore Parkway and Andrews Road dated 01/05/2015. Arcadis Australia Pacific Pty Limited (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
A	20/06/2017	Draft Final Report for Clients review	RC, MW	MW

CONTENTS

1 Report Purpose

This preliminary modelling report documents future traffic impacts on Mulgoa Road / Wolseley Street and Mulgoa Road / Blaikie Road intersections which provide access to the Homemaker Centre, Penrith. In the course of preparing this report, relevant documents associated with the Homemaker Centre site have been reviewed, and potential impacts on the road network have been assessed. The traffic assessment has been carried out in consultation with Roads and Maritime project team.

A new traffic survey was undertaken by Arcadis Australia Pty Ltd (Arcadis) during March and April 2017 for Thursday and Saturday peak period for four intersections including Mulgoa Road / Blaikie Road, Mulgoa Road / Wolseley Street, Blaikie Road / Pattys Place and Wolseley Street / Homemaker Centre Carpark access.

For the purpose of traffic modelling, the assessment has been undertaken for 2036 traffic conditions for both Thursday and Saturday peak traffic conditions. The reference design traffic models developed for proposed six lanes upgrades on the Mulgoa Road / Castlereagh Road corridor has been used as a basis for this assessment. The future year traffic modelling has included proposed roundabout realignment at Wolseley Street / Homemaker Centre Carpark.

1.1 Modelling Study Area

Figure 1-1 shows modelling study area for Penrith Homemaker Centre site. The road network includes four key intersections including Mulgoa Road / Blaikie Road, Mulgoa Road / Wolseley Street, Blaikie Road / Pattys Place and Wolseley Street / Homemaker Centre Carpark access.

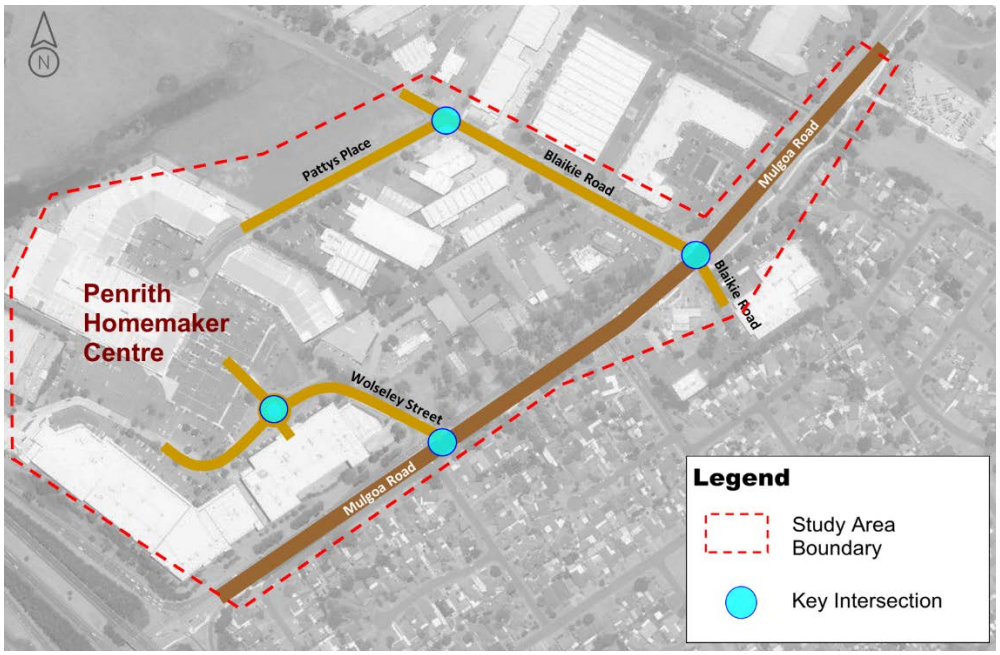


Figure 1-1 Modelling Study Area

1.2 Reference Traffic Data and Model Used

Future Years Models and Updates

The traffic assessment has been undertaken using purposely built micro-simulation traffic model. The micro-simulation model has used VISSIM software (version 9). The reference design traffic models developed for proposed six lanes upgrades on the Mulgoa Road / Castlereagh Road corridor has been used as a basis for this assessment. The future year 2036 traffic modelling has assumed the following upgrades:

- **Mulgoa Road / Blaikie Road Intersection**:
  - Provide one dedicated right turn lane, three through lanes and one dedicated left turn lane on Mulgoa Road northern approach
  - Provide share through and right turn lane, and dedicated left turn lane on Blaikie Road eastern approach
  - Provide three through lanes and one left turn slip lane on Mulgoa Road southern approach
  - Provide bus priority lane on both Mulgoa Road northbound and southbound direction.
- **Mulgoa Road / Wolseley Street Intersection**:
  - Provide three through lanes and two right turn lanes on Mulgoa Road northern approach
  - Provide three through lanes and one left turn slip lane on Mulgoa Road southern approach
  - Provide one left turn lane and two right turn lanes on Wolseley Street
  - Provide bus priority lane on Mulgoa Road northbound direction.

Figure 1-2 below shows the VISSIM micro-simulation (cut version of subarea) models used for Penrith Homemaker Centre traffic assessment.

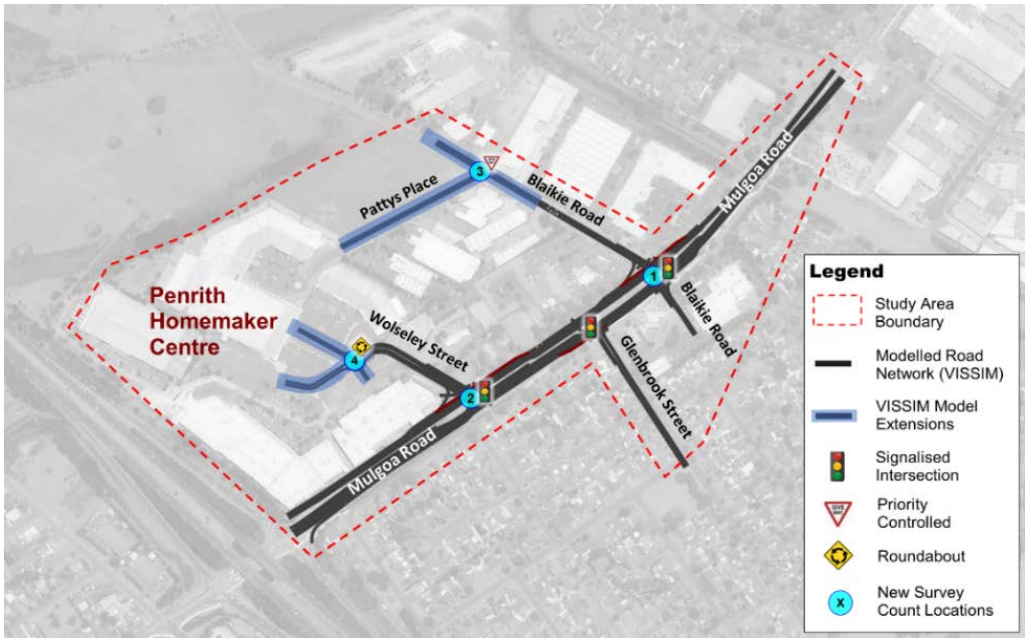
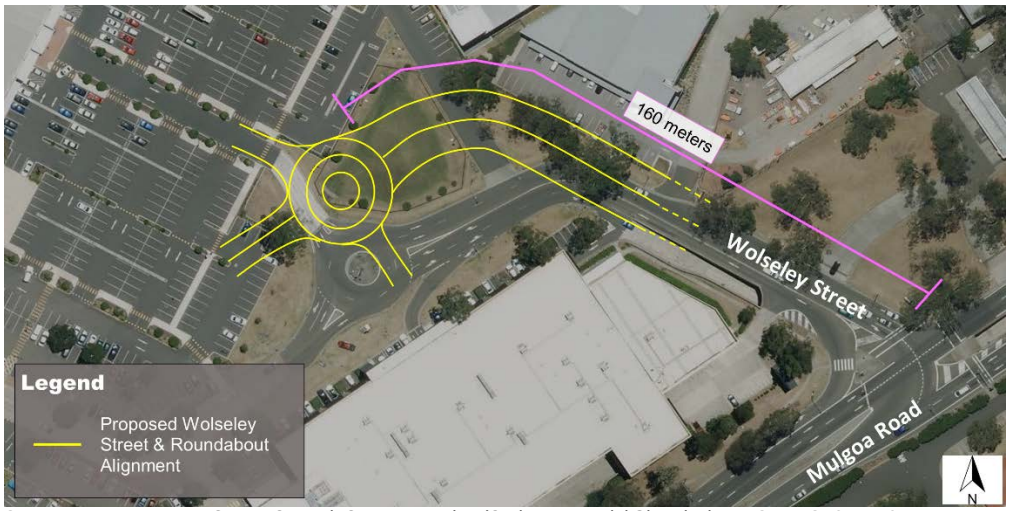


Figure 1-2 VISSIM Model Network for Penrith Homemaker Centre

The future year VISSIM model includes proposed upgrades at Wolseley Street/ Car park roundabout alignment (refer to Figure 1-3).



Source: *Harvey Norman Centre Carpark Concept Design (Option 5 - Partial Site Plan)*, DWG No: SK241_P3 (Leffler Simes Architects, May 2016)

Figure 1-3 Proposed Wolseley Street and Roundabout Alignment

Traffic Surveys and Data

- A new traffic survey was undertaken by Arcadis in March/April 2017 for Thursday and Saturday peak periods at the following intersections:
  1. Mulgoa Road / Blaikie Road (signal)
  2. Mulgoa Road / Wolseley Street (signal)
  3. Blaikie Road / Pattys Place (priority)
  4. Wolseley Street / Carpark (roundabout)
- The 2017 traffic data undertaken by Arcadis was compared with June 2016 traffic data undertaken by Anton Reisch Consulting for Thursday and Saturday peak periods at Mulgoa Road / Wolseley Street intersection. *Appendix A* includes existing traffic volumes in 2017 for Thursday and Saturday.

Future Traffic Growth

For the purposes of this assessment, following traffic growth assumptions are used for both Thursday and Saturday traffic models including:

- Annual growth rate of 2.0 per cent on Mulgoa Road for through traffic. This growth rate is consistent with growth rate reported in Mulgoa Road / Castlereagh Road Corridor Upgrade report (Table 5-3, in Arcadis Report January 2017) for the section between Jamison Road and M4 Western Motorway.
- Annual growth rate of 1.1 per cent for traffic movements in and out of Homemaker Centre via Blaikie Road and Wolseley Street.

Reports and Guidelines

- *Mulgoa Road / Castlereagh Road Corridor Upgrade between Glenmore Parkway and Andrews Road*, Traffic and Transport Assessment Study (Arcadis, January 2017)
- *Traffic Modelling Guidelines* (Roads and Maritime Services, V 1.0, February 2013)
- *Harvey Norman Centre Carpark Concept Design (Option 5 - Partial Site Plan)*, DWG No: SK241_P3 (Leffler Simes Architects, May 2016)
- Anton Reisch Consulting provided traffic survey data

2 Traffic Data Comparison

This section documents the comparison of traffic volumes at Mulgoa Road / Wolseley Street intersection. The traffic volume comparison at Mulgoa Road / Wolseley Street intersection is based on the following two sets of data including:

- Traffic survey undertaken by Anton Reisch Consulting (ARC) in June 2016
- Traffic survey undertaken by Arcadis in April 2017.

Figure 2-1 below shows the location of the Mulgoa Road / Wolseley Street intersection.

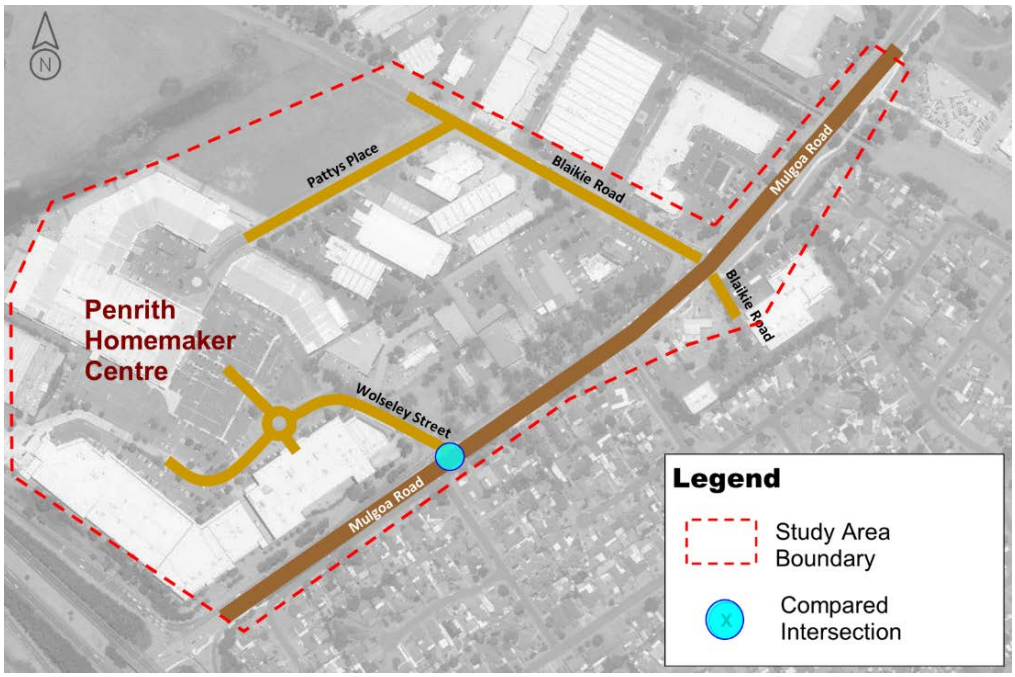


Figure 2-1 Mulgoa Road / Wolseley Street Intersection

2.1 Peak Period

Table 2-1 below shows the survey time periods undertaken on Thursday and Saturday afternoon and evening peak.

Table 2-1 Survey Period

Year	ARC 2016		Arcadis 2017	
	Time Period	No. of Hours	Time Period	No. of Hours
Thursday	4 PM – 6 PM	2	3 PM – 9 PM	6
Saturday	10 AM – 4 PM	6	1 PM – 5 PM	4

Note: ARC = Anton Reisch Consulting.

2.2 Existing Traffic Volumes

Table 2-2 shows the comparison of peak hourly intersection turning volumes at the Mulgoa Road / Wolseley Street intersection undertaken in 2016 and 2017.

Table 2-2 Comparison of Peak Hourly Intersection Volume at Mulgoa Road/Wolseley Street Intersection

Intersection volume	2016 Traffic Survey by ARC	2017 Traffic Survey by Arcadis	Difference	% Diff.
Thursday	4335	4446	111	2.6%
Saturday	4570	4574	4	0.1%

Note: ARC = Anton Reisch Consulting.

The traffic volumes at Mulgoa Road / Wolseley Street intersection has found to be similar when two sets of data are compared. The 2017 total intersection volumes at Mulgoa Road / Wolseley Street intersection are about 2.6 per cent higher on Thursday and about 0.1 per cent higher on Saturday than 2016 traffic volumes.

The 2016 data by ARC on Thursday indicates highest peak hour between 5 PM and 6 PM.

The 2017 data by Arcadis on Thursday indicates highest peak hour between 3 PM and 4 PM.

For Saturday traffic conditions, ARC 2016 data shows between 1.30 PM and 2.30 PM as the highest peak hour while Arcadis 2017 data shows between 2 PM and 3 PM as the highest peak hour.

Figure 2-2 and Figure 2-3 below shows the comparison of 2016 and 2017 turning volumes and percentage distribution at Mulgoa Road / Wolseley Street intersection for Thursday and Saturday traffic conditions respectively.

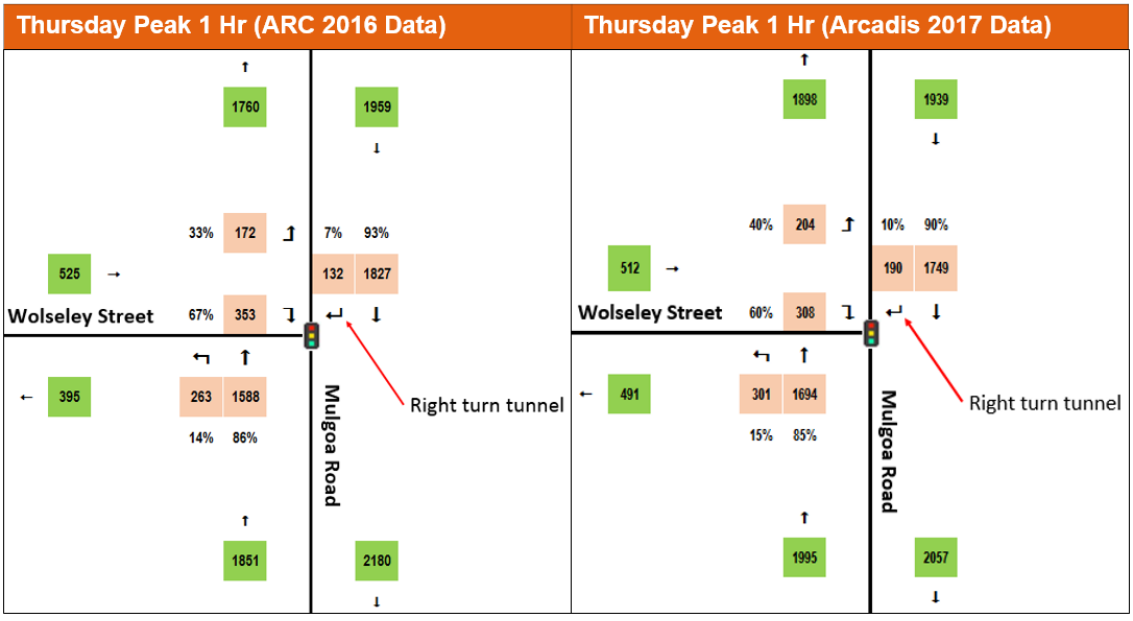


Figure 2-2 Traffic Volume Comparison at Mulgoa Road / Wolseley Street Intersection for Thursday

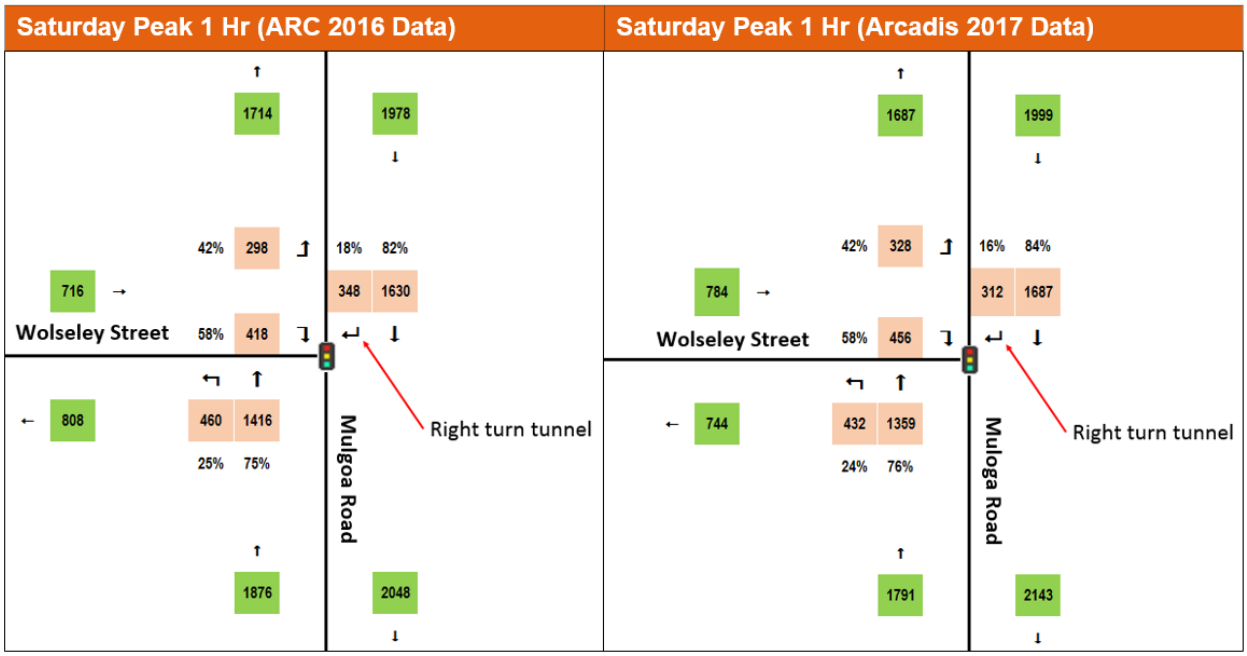


Figure 2-3 Traffic Volume Comparison at Mulgoa Road / Wolseley Street Intersection for Saturday

The turning volume distribution to and from Homemaker Centre is generally similar for both 2016 and 2017 data with minor differences:

- For Thursday traffic conditions:
  - The north-south through movement on Mulgoa Road is similar for both surveys. About 1,800 and 1,750 southbound vehicles are counted in 2016 and 2017 respectively. About 1,600 northbound vehicles in 2016 and about 1,700 northbound vehicles in 2017 are counted on Mulgoa Road
  - About 60 more inbound vehicles into Homemaker Centre are counted using the “mouse hole” in 2017 compared to 2016. About 40 more inbound vehicles are counted from the south in 2017 compared to 2016
  - The outbound vehicles from Homemaker Centre are found to be in the order of 500 vehicles for both surveys.
- For Saturday traffic conditions:
  - The north-south through movement on Mulgoa Road is similar for both surveys. About 1,650 and 1,700 southbound vehicles are counted in 2016 and 2017 respectively. About 1,400 northbound vehicles are counted on Mulgoa Road in both 2016 and 2017
  - About 40 less inbound vehicles into Homemaker Centre are counted using the “mouse hole” in 2017 compared to 2016. About 30 less inbound vehicles are counted from the south in 2017 compared to 2016
  - The outbound vehicles from Homemaker Centre are found to be 720 vehicles in 2016 and about 780 vehicles in 2017, contributing to about 60 more vehicles in 2017.

2.3 Homemaker Centre Traffic Generation

Currently Homemaker Centre provides access to Mulgoa Road via Wolseley Street and Pattys Place. Wolseley Street provides access to Homemaker Centre via mousehole tunnel underneath Mulgoa Road. Pattys Place provides access to Homemaker Centre via Blaikie Road.

Table 2-3 and Table 2-4 show trip generation to/from Homemaker Centre in 2016 and 2017 for Thursday and Saturday peak hour respectively.

Table 2-3 Thursday Peak Hourly Trips Generated to / from Homemaker Centre

	ARC 2016		Arcadis 2017	
Peak 1 Hour Trip Generation - Thursday	**Inbound**	**Outbound**	**Inbound**	**Outbound**
Wolseley Street	395	525	491 ▲	512 ▼
Pattys Place	281	110	166 ▼	145 ▲
Total 2-way peak hour trips	1311		1314 ▲	

Note: ARC = Anton Reisch Consulting.

Table 2-4 Saturday Peak Hourly Trips Generated to / from Homemaker Centre

	ARC 2016		Arcadis 2017	
Peak 1 Hour Trip Generation - Saturday	**Inbound**	**Outbound**	**Inbound**	**Outbound**
Wolseley Street	808	716	744 ▼	784 ▲
Pattys Place	218	193	270 ▲	224 ▲
Total 2-way peak hour trips	1935		2022 ▲	

Note: ARC = Anton Reisch Consulting.

The trip generation comparison for Homemaker Centre suggests that:

- About 100 more inbound trips are observed to use Wolseley Street in 2017 compared to 2016 for Thursday traffic conditions. Thursday outbound trips using Wolseley Street were observed to be about 500 for both surveys.
- About 1,300 total 2-way trips were observed for both surveys for Thursday traffic conditions
- About 60 less inbound trips are observed to use Wolseley Street in 2017 compared to 2016 for Saturday traffic conditions. Observed Saturday outbound trips were about 720 in 2016 and about 780 in 2017, contributing to about 60 more vehicles in 2017
- About 1,900 total 2-way trips were observed in 2016 and about 2,000 total 2-way trips in 2017. This contributes to an increase of about 100 more trips in 2017 compared to 2016
- Saturday peak hourly traffic in and out of Homemaker Centre is generally higher than Thursday peak hourly traffic, about 48 per cent higher in 2016 and 54 per cent higher in 2017.

2.4 Summary on Traffic Data Comparison

In 2016 and 2017, traffic volumes at Mulgoa Road / Wolseley Street intersection are found to be similar. The 2017 total intersection volumes at Mulgoa Road / Wolseley Street intersection are about 3 per cent higher on Thursday and about 0.1 per cent higher on Saturday than 2016 traffic volumes.

The inbound and outbound traffic distribution to and from Homemaker Centre was found to be similar between 2016 and 2017 data.

The 2017 counts undertaken by Arcadis are recent and marginally higher than 2016 counts undertaken by Anton Reisch Consulting.

In agreement with Roads and Maritime project team, the 2017 traffic survey data undertaken by Arcadis has been used in future year traffic modelling and assessment.

3 Traffic Assessment

This section documents future traffic modelling results undertaken for Thursday and Saturday traffic conditions in 2036. The level of service is reported for four intersections as follow:

- Mulgoa Road / Wolseley Street (upgraded as per six lanes reference design of Mulgoa Road corridor upgrade)
- Mulgoa Road / Blaikie Road (upgraded as per six lanes reference design of Mulgoa Road corridor upgrade)
- Wolseley Street / Carpark (upgraded roundabout realignment)
- Blaikie Road / Pattys Place (at its current form, no upgrade is required)

The forecast traffic volumes in 2036 for modelled intersections are included in *Appendix A*.

3.1 Level of Service Criteria

Level of service is reported in accordance with the Roads and Maritime guideline (*Traffic Modelling Guidelines, V 1.0, February 2013*). It recommends that intersections with roundabouts or sign controlled intersections, the level of service (LoS) value is determined by the critical movement with the highest delay whereas for signalised intersections (TCS), LoS criteria are related to the average intersection delay measured in seconds per vehicle. The performance of an intersection is measured by the intersection average delay per vehicle which in turns leads to a "level of service" measure for the intersection.

Table 3-1 below shows the standard LoS criteria used for intersection assessment.

Table 3-1 Level of Service Criteria

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 mode	At capacity, requires other control mode
F	>70	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing

Source: Roads and Maritime Guide to Traffic Modelling, February 2013

The following sections report future traffic performance and level of service of four intersections assessed for post upgrade conditions in 2036 (Figure 3-1 below shows location of four intersections).

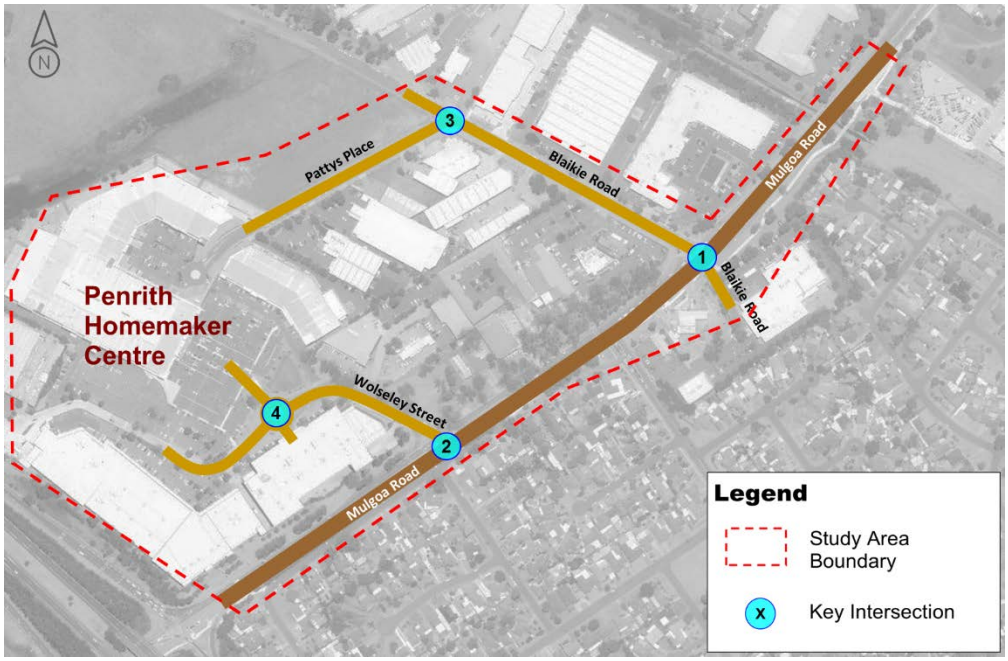


Figure 3-1 Location of Four Intersections Assessed

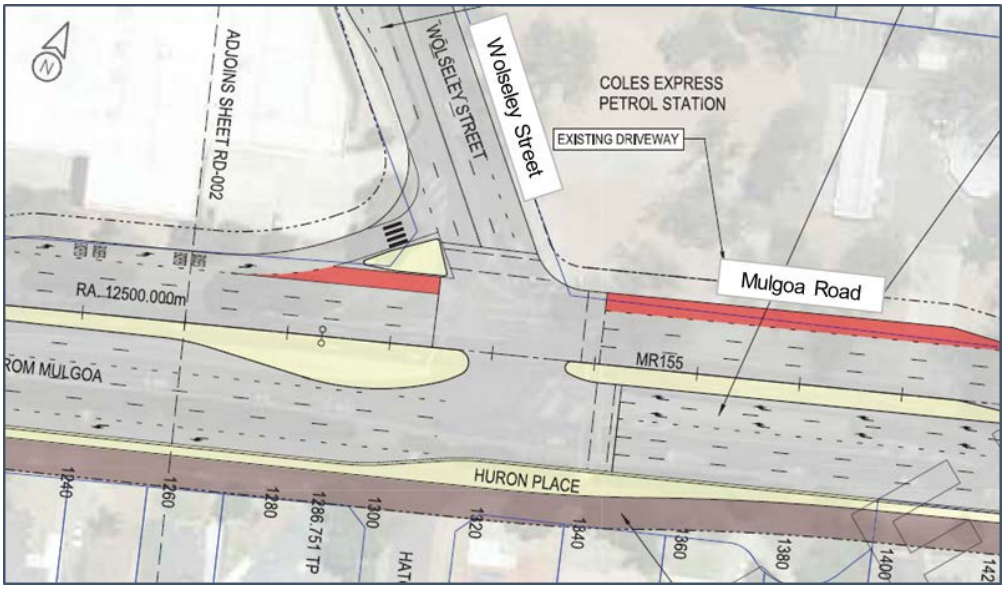
3.2 Traffic Impact at Mulgoa Road / Wolseley Street Intersection

Proposed Upgrades

The proposed upgrades at Mulgoa Road / Wolseley Street signalised intersection (Figure 3-2) include:

- Provide three through lanes and two right turn lanes on Mulgoa Road northern approach
- Provide three through lanes and one left turn slip lane on Mulgoa Road southern approach
- Provide one left turn lane and two right turn lanes on Wolseley Street
- Provide bus priority lane on Mulgoa Road northbound direction.

The reference design proposes to replace the grade separated access (mousehole) that provides for right-turn movements from Mulgoa Road (southbound) into Wolseley Street, with dual right-turn lanes.



Source: *Mulgoa Road / Castlereagh Road Corridor Upgrade between Glenmore Parkway and Andrews Road*, Traffic and Transport Assessment Study (Rev E dated January 2017)

Figure 3-2 Mulgoa Road / Wolseley Street Intersection Upgrade

Level of Service

Table 3-2 shows future traffic performance in 2036 at Mulgoa Road / Wolseley Street intersection for Thursday and Saturday traffic conditions. The delay and level of service is reported for the entire intersection for post upgrade conditions in 2036.

Table 3-2 Traffic Performance in 2036 – Mulgoa Road / Wolseley Street Intersection

Future Traffic Conditions	Overall Intersection Delay (sec)	Level of Service
Thursday	18	B
Saturday	23	B

Thursday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Thursday model\20170623 Penrith Homemaker Centre_2036_Thursday_PM
Saturday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Saturday model\20170623 Penrith Homemaker Centre_2036_Saturday_PM

Queue Lengths

Table 3-3 below shows predicted queue length for post upgrade conditions in 2036 for Thursday and Saturday. The traffic modelling indicated that:

- The longest queues on the Mulgoa Road (northern approach) is predicted for right turn movement for Saturday peak traffic condition. However, queues would contain within the storage length proposed in the reference design
- The longest queues on the Mulgoa Road (southern approach) is predicted for through traffic movement for Thursday and Saturday peak traffic condition. The queues would contain within intersection approach length
- The queues on Wolseley Street (western approach) would not extend to the carpark roundabout.

Table 3-3 95th-percentile of Maximum Queues Predicted at Mulgoa Road/Wolseley Street Intersection in 2036

Approach	Thursday (metres)	Saturday (metres)	Distance to upstream intersection
Mulgoa Road (N) Right turn	29 ✓	54 ✓	80 m of right turn bay storage length
Mulgoa Road (S)	109 ✓	140 ✓	300 m to M4 interchange
Wolseley Street (W)	63 ✓	87 ✓	160 m to Wolseley Street roundabout

Traffic Implications

The traffic modelling undertaken in 2036 for Mulgoa Road / Wolseley Street intersection indicated that proposed upgrades would provide level of service B (18 seconds delay) for Thursday traffic condition. Model predicted level of service B (23 seconds delay) for Saturday traffic condition.

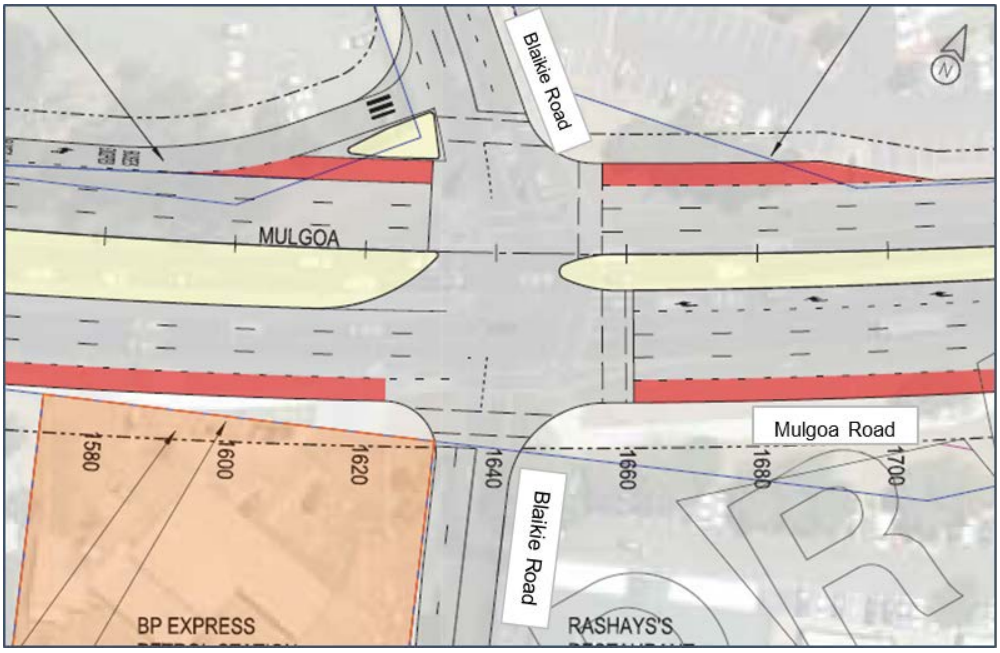
Replacing the grade separated access (mousehole) with dual right-turn lanes from Mulgoa Road (southbound) into Wolseley Street would increase delay for the right-turn movement from the current zero to about 42 seconds in 2036, traffic modelling indicates that the overall intersection would still operate satisfactorily at level of service B for both weekday and weekend traffic conditions.

3.3 Traffic Impact at Mulgoa Road / Blaikie Road Intersection

Proposed Upgrades

The proposed upgrades at Mulgoa Road / Blaikie Road signalised intersection (Figure 3-3) include:

- Provide one dedicated right turn lane, three through lanes and one dedicated left turn lane on Mulgoa Road northern approach
- Provide shared through and right turn lane, and dedicated left turn lane on Blaikie Road eastern approach
- Provide three through lanes and one left turn slip lane on Mulgoa Road southern approach
- Provide bus priority lane on both Mulgoa Road northbound and southbound direction.



Source: *Mulgoa Road / Castlereagh Road Corridor Upgrade between Glenmore Parkway and Andrews Road*, Traffic and Transport Assessment Study (RevE dated January 2017)

Figure 3-3 Mulgoa Road / Blaikie Road Intersection Upgrade

Level of Service

Table 3-4 shows future traffic performance in 2036 at Mulgoa Road / Blaikie Road intersection for Thursday and Saturday traffic conditions. The delay and level of service is reported for the entire intersection for post upgrade conditions in 2036.

Table 3-4 Traffic Performance in 2036 – Mulgoa Road / Blaikie Road Intersection

Future Traffic Conditions	Overall Intersection Delay (sec)	Level of Service
Thursday	20	B
Saturday	30	C

Thursday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Thursday model\20170623 Penrith Homemaker Centre_2036_Thursday_PM
Saturday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Saturday model\20170623 Penrith Homemaker Centre_2036_Saturday_PM

Queue Lengths

Table 3-5 below shows predicted queue length for post upgrade conditions in 2036 for Thursday and Saturday. The traffic modelling indicated that:

- The longest queues on the Mulgoa Road (northern approach) is predicted for through traffic movement for Saturday peak traffic condition. However, queues would contain within intersection approach length
- The longest queues on the Mulgoa Road (southern approach) is predicted for through traffic movement for Thursday peak traffic condition. The queues would contain within intersection approach length
- The queues on Blaikie Road (western approach) would not extend to the Pattys Place intersection.

Table 3-5 95th-percentile of Maximum Queues Predicted at Mulgoa Road/Blaikie Road Intersection in 2036

Approach	Thursday (metres)	Saturday (metres)	Distance to upstream intersection
Mulgoa Road (N)	140 ✓	167 ✓	410 m to Batt Street intersection
Blaikie Road (E)	18	31	-
Mulgoa Road (S)	53 ✓	37 ✓	95 m to Glenbrook Street intersection
Blaikie Road (W)	48 ✓	161 ✓	280 m to Pattys Place intersection

Traffic Implications

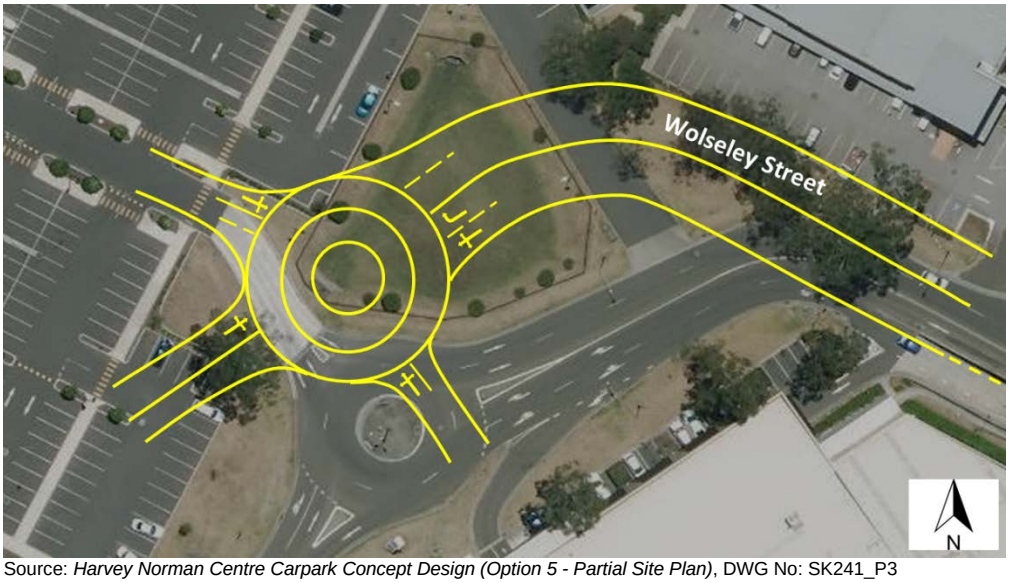
The traffic modelling undertaken in 2036 for Mulgoa Road / Blaikie Road intersection indicated that proposed upgrades would provide level of service B (20 seconds delay) for Thursday traffic condition. Model predicted level of service C (30 seconds delay) for Saturday traffic condition.

3.4 Traffic Impact at Wolseley Street / Homemaker Centre Carpark Roundabout

Proposed Upgrades

The proposed upgrades at Wolseley Street / Homemaker Centre Carpark roundabout (Figure 3-4) include:

- Realign roundabout towards to north
- Provide two circulating lanes in roundabout
- Provide two lane entry - one dedicated right turn lane and one shared left, through and right turn lane on Wolseley Street northern approach
- Provide one lane entry on eastern approach (Domayne carpark)
- Provide one lane entry on southern approach (Harvey Norman/Bunnings carpark)
- Provide one lane entry on western approach (Homemaker Centre carpark).



Source: *Harvey Norman Centre Carpark Concept Design (Option 5 - Partial Site Plan)*, DWG No: SK241_P3 (Leffler Simes Architects, May 2016)

Figure 3-4 Wolseley Street / Carpark Intersection Upgrade

Level of Service

Table 3-6 shows future traffic performance in 2036 at Wolseley Street / Homemaker Centre Carpark roundabout for Thursday and Saturday traffic conditions. The delay and level of service for roundabout is reported for the worst movement for post upgrade conditions in 2036.

Table 3-6 Traffic Performance in 2036 – Wolseley Street / Homemaker Centre Carpark roundabout

Future Traffic Conditions	Worst Movement Delay (sec)	Level of Service
Thursday	13*	A
Saturday	47*	D

Thursday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Thursday model\20170623 Penrith Homemaker Centre_2036_Thursday_PM
Saturday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Saturday model\20170623 Penrith Homemaker Centre_2036_Saturday_PM
*Note: Priority/roundabout intersection delay represents worst movement delay.

Queue Lengths

Table 3-7 below shows predicted queue length for post upgrade conditions in 2036 for Thursday and Saturday. The traffic modelling indicated that:

- The queues on the Wolseley Street (northern approach) would not extend to the Mulgoa Road / Wolseley Street intersection
- The queues on the roundabout southern approach would not extend beyond 90 meters
- The queues on the roundabout eastern and western approaches would not extend beyond 35 meters.

Table 3-7 95th-percentile of Maximum Queues Predicted at Wolseley Street Roundabout in 2036

Approach	Thursday (metres)	Saturday (metres)	Distance to upstream intersection
Wolseley Street (N)	14 ✓	43 ✓	160 m to Mulgoa Road/ Wolseley Street intersection
Carpark (E)	10	14	-
Carpark (S)	13	90	-
Carpark (W)	14	33	-

Traffic Implications

The traffic modelling undertaken in 2036 for Wolseley Street / Homemaker Centre Carpark roundabout indicated that proposed upgrades would provide level of service A (13 seconds delay) for Thursday traffic condition. Model predicted level of service D (47 seconds delay) for Saturday traffic condition.

3.5 Traffic Impact at Blaikie Road / Pattys Place

The Blaikie Road / Patty Place local intersection was assessed as priority controlled configuration. No upgrade is required at this intersection. Figure 3-6 shows the existing intersection configuration used in the modelling.

Figure 3-5 Blaikie Road / Pattys Place Intersection

Level of Service

Table 3-8 shows future traffic performance in 2036 at Blaikie Road / Pattys Place intersection for Thursday and Saturday traffic conditions. The delay and level of service is reported for the worst movement in 2036.

Table 3-8 Traffic Performance in 2036 – Blaikie Road / Pattys Place Intersection

Future Traffic Conditions	Worst Movement Delay (sec)	Level of Service
Thursday	5*	A
Saturday	8*	A

Thursday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Thursday model\20170623 Penrith Homemaker Centre_2036_Thursday_PM
Saturday Model: F:\AA008188\Variation 13 - Homemaker Centre\Modelling\VISSIM\Saturday model\20170623 Penrith Homemaker Centre_2036_Saturday_PM
*Note: Priority/roundabout intersection delay represents worst movement delay.

Queue Lengths

The traffic modelling did not indicate queuing issues at Blaikie Road / Pattys Place intersection.

Traffic Implications

The traffic modelling undertaken in 2036 for Blaikie Road / Pattys Place intersection indicated that under current form this intersection would provide level of service A for both Thursday and Saturday traffic conditions.

4 Conclusions

Overview

This traffic modelling report documents future traffic impacts on Mulgoa Road / Wolseley Street and Mulgoa Road / Blaikie Road intersections which provide access to the Homemaker Centre, Penrith.

The traffic assessment has been carried out in consultation with Roads and Maritime project team.

A new traffic survey was undertaken by Arcadis Australia Pty Ltd (Arcadis) during March and April 2017 for Thursday and Saturday peak period for four intersections including Mulgoa Road / Blaikie Road, Mulgoa Road / Wolseley Street, Blaikie Road / Pattys Place and Wolseley Street / Homemaker Centre Carpark access. The 2017 traffic data undertaken by Arcadis was compared with June 2016 traffic data undertaken by Anton Reisch Consulting for Thursday and Saturday peak periods at Mulgoa Road / Wolseley Street intersection.

The traffic assessment has been undertaken using purposely built micro-simulation traffic model. The micro-simulation model has used VISSIM software (version 9). The reference design traffic models developed for proposed six lanes upgrades on the Mulgoa Road / Castlereagh Road corridor has been used as a basis for this assessment. The future year traffic modelling has also included proposed roundabout realignment at Wolseley Street / Homemaker Centre Carpark.

For the purpose of traffic modelling, the assessment has been undertaken for 2036 traffic conditions for both Thursday and Saturday peak traffic conditions.

Traffic Impact Assessment

Currently Homemaker Centre provides access to Mulgoa Road via Wolseley Street and Pattys Place. Wolseley Street provides access to Homemaker Centre via a tunnel (mousehole) underneath Mulgoa Road. Pattys Place provides access to Homemaker Centre via Blaikie Road.

In 2016 and 2017, traffic volumes at Mulgoa Road / Wolseley Street intersection are found to be similar. The 2017 total intersection volumes at Mulgoa Road / Wolseley Street intersection are about 3 per cent higher on Thursday and about 0.1 per cent higher on Saturday than 2016 traffic volumes.

The inbound and outbound traffic distribution to and from Homemaker Centre was found to be similar between 2016 and 2017 data.

The 2017 counts undertaken by Arcadis are recent and marginally higher than 2016 counts undertaken by Anton Reisch Consulting.

In agreement with Roads and Maritime project team, the 2017 traffic survey data undertaken by Arcadis has been used in future year traffic modelling and assessment.

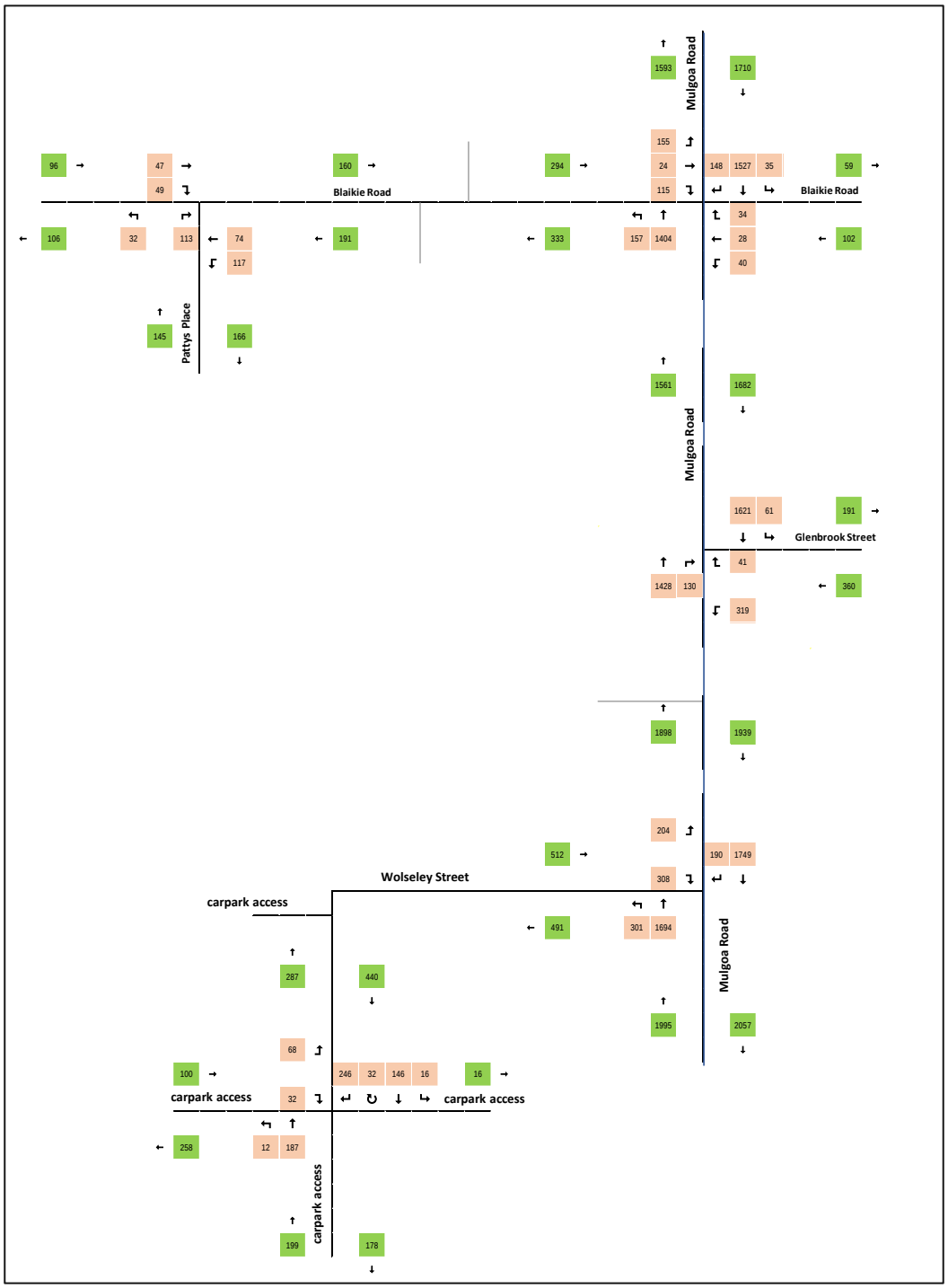
Arcadis' traffic modelling assessment in 2036 for post upgrade conditions has found that:

- Proposed upgrades at Mulgoa Road / Wolseley Street intersection would provide level of service B for both weekday (Thursday) and Saturday traffic conditions. The predicted queue length data suggested that queues on the Wolseley Street would not extend to the Homemaker Centre carpark roundabout. The roundabout realignment at Wolseley Street / Homemaker Centre Carpark would work from traffic grounds.
- Proposed upgrades at Mulgoa Road / Blaikie Road intersection would provide level of service B for weekday (Thursday) and level of service C for Saturday traffic conditions.
- The reference design proposes to replace the grade separated access (mousehole) that provides for right-turn movements from Mulgoa Road (southbound) into Wolseley Street, with dual right-turn lanes. While this would increase delay for the right-turn movement from the current zero to about 42 seconds in 2036. Traffic modelling indicates that overall Mulgoa Road / Wolseley Street intersection would still operate satisfactorily with level of service B for both weekday and weekend traffic conditions.

APPENDIX A EXISTING AND FUTURE TURN VOLUME DIAGRAMS

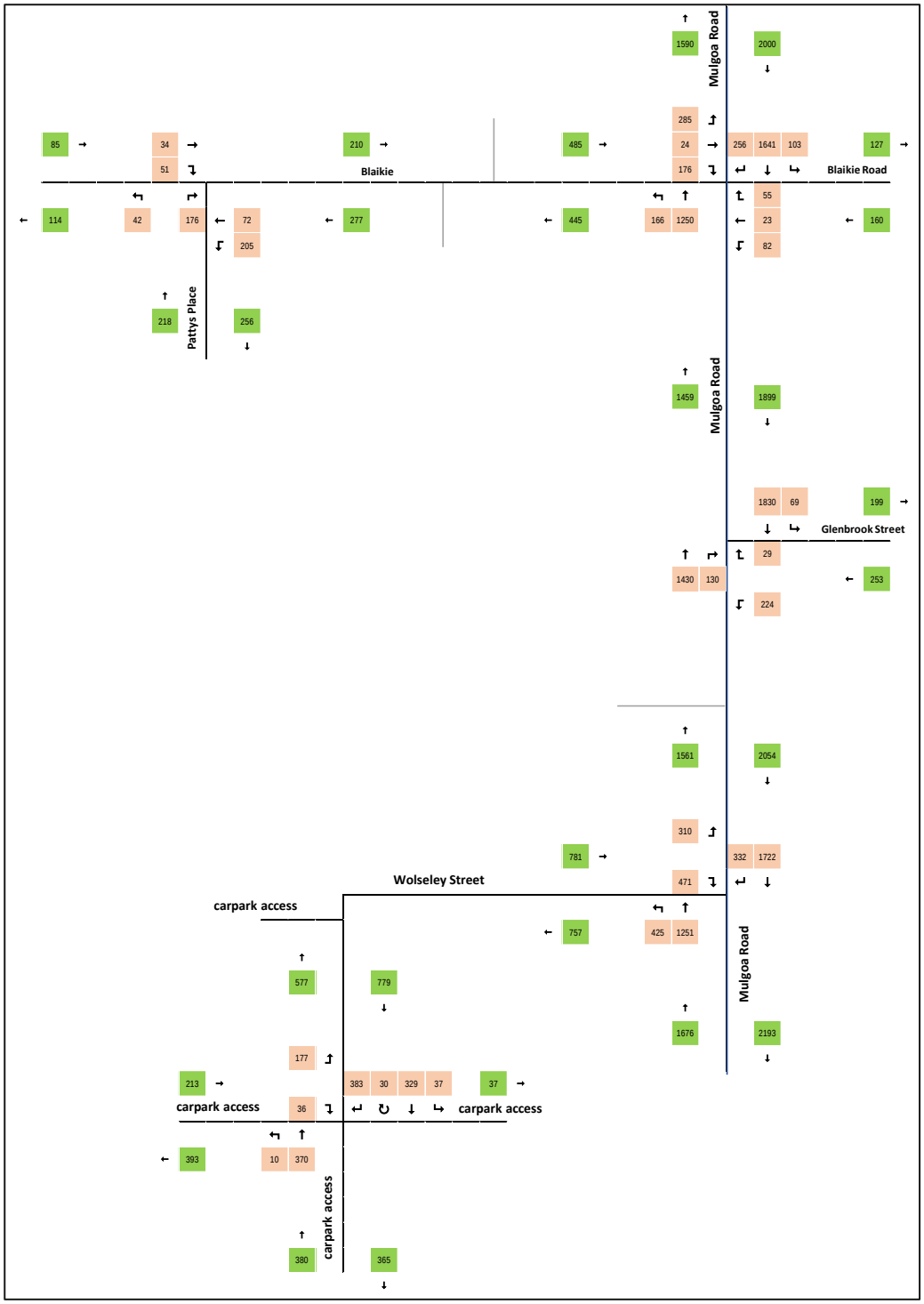
2017 EXISTING TURN VOLUMES

2017 Thursday Peak 1 Hour Traffic Conditions



Note: 2017 Thursday peak 1 hour represents 3 PM to 4 PM.

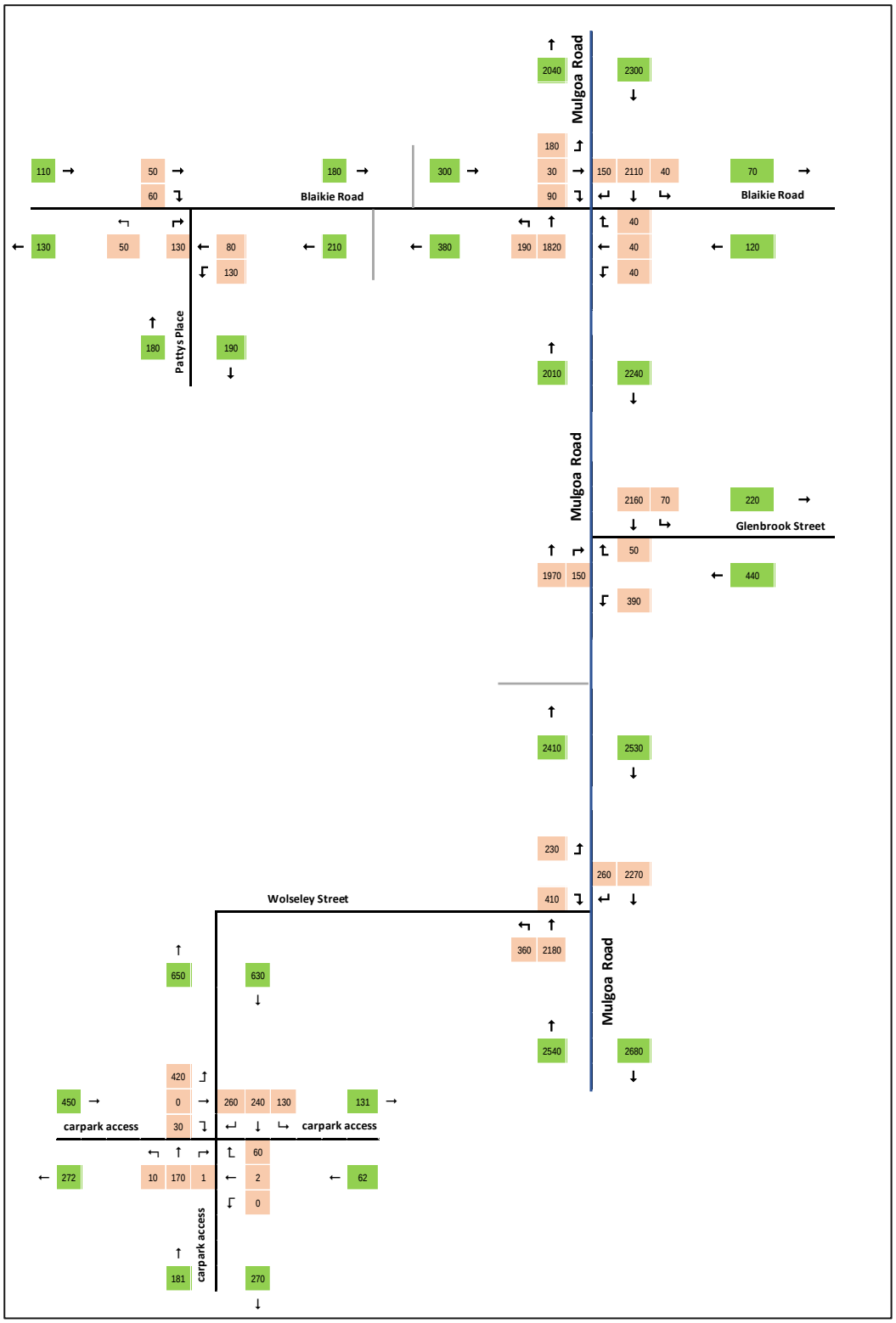
2017 Saturday Peak 1 Hour Traffic Conditions



Note: 2017 Saturday peak 1 hour represents 2 PM to 3 PM.

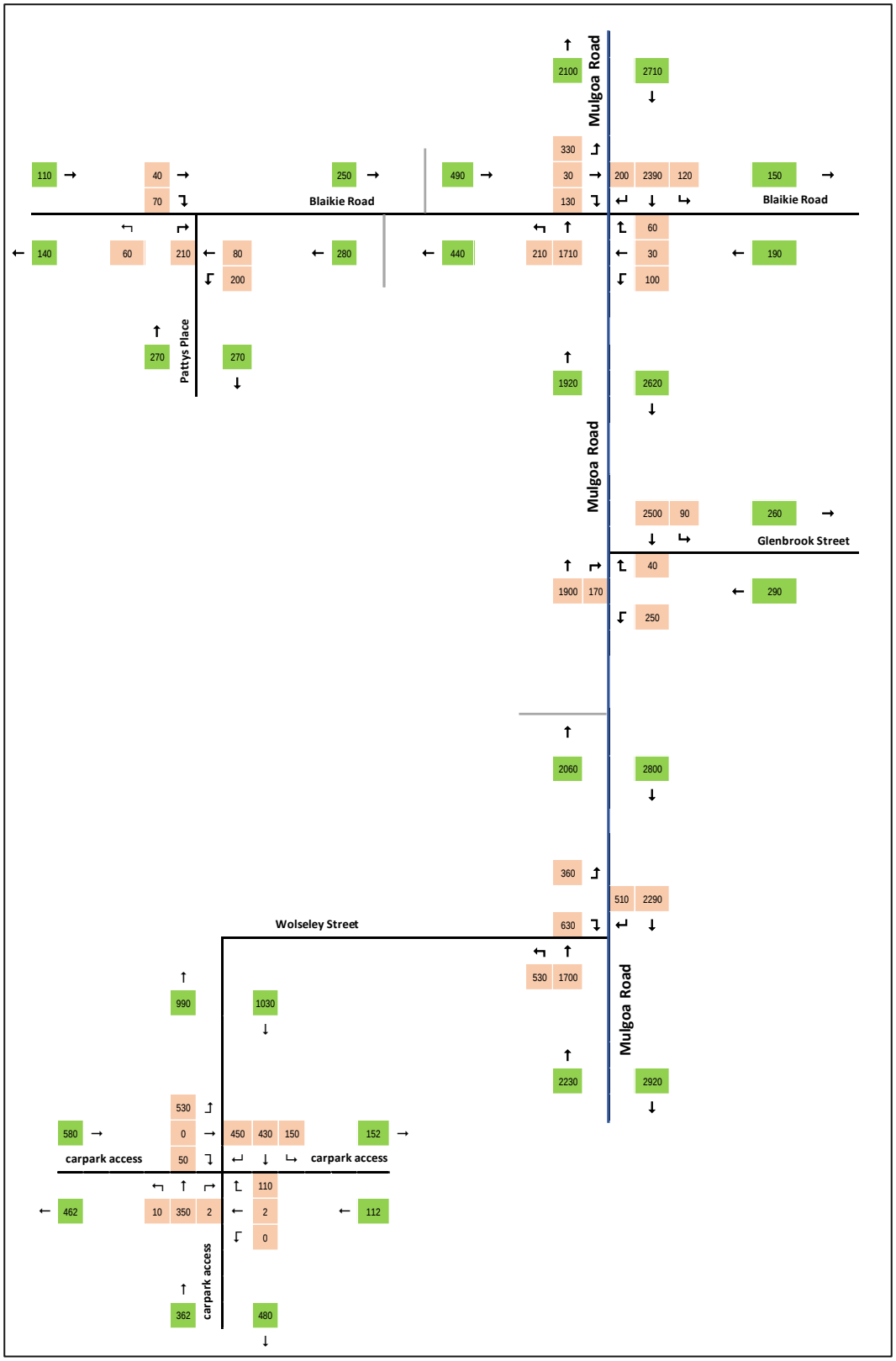
2036 FORECAST TURN VOLUMES

2036 Thursday Peak 1 Hour Traffic Conditions



Note: 2036 Thursday peak 1 hour represents 3 PM to 4 PM (rounded to nearest 10 for volumes more than 10)

2036 Saturday Peak 1 Hour Traffic Conditions



Note: 2036 Saturday peak 1 hour represents 2 PM to 3 PM (rounded to nearest 10 for volumes more than 10)