AMP Capital

Macquarie Centre Redevelopment Stage 1 Concept DA

Transport Management and Access Plan

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Contents

Appendices

1 Introduction

1.1 Background

This report has been prepared on behalf of AMP Capital (AMPC) in support of a Stage 1 Development Application (DA) for the mixed use redevelopment of Macquarie Shopping Centre (Macquarie Centre). The Stage 1 DA seeks concept approval for the redevelopment of Macquarie Centre by establishing:

- Building envelopes and design parameters for future development on the site, including the proposed uses within the podium and tower components.
- The distribution of floor space across the site.
- Future pedestrian and vehicle connections to and within the site.

This report supports the proposed future redevelopment of the Macquarie Centre in relation to transport.

1.2 Site Description

Macquarie Centre is approximately 11.25 hectares in area and is located at the corner of Waterloo Road, Herring Road and Talavera Road, Macquarie Park. The site is legally described as Lot 100 in DP 1190494.

The site is bound by Herring Road to the north west, Talavera Road to the north east, commercial uses to the south east and Waterloo Road to the south west. Located within the Macquarie Park Corridor, the site has excellent access to public transport, situated immediately adjacent the Macquarie University Railway Station and the Herring Road Bus Station. Located between the M2 Hills Motorway and Epping Road, the site also enjoys excellent vehicle connectivity.

Macquarie Centre was originally constructed in 1981. The centre has undergone various stages of redevelopment and extensions. A major refurbishment occurred in 2000, 2003 and most recently in 2014, creating a fresh food court, David Jones expansion, addition of second full line supermarket (Coles), a value supermarket (Aldi), with new speciality food and convenience stores. Today Macquarie Centre is the largest shopping centre in NSW and the 8th largest shopping centre in Australia and includes a wide range of retail, entertainment and service offerings.

The shopping centre currently spans five levels accommodating 368 stores, including major retailers such as David Jones, Myer, Target, Big W, Aldi, Coles and Woolworths. The centre also houses a large number of mini major international retails stores including H&M, Zara, Uniqlo, Forever 21, GAP and Sephora. A number of entertainment offerings exist in the centre including a cinema complex and ice skating rink. The site currently has a gross floor area of 170,850m^2 and accommodates 4,755 car spaces.

Figure 1 Aerial photograph

1.3 Report Structure

This report provides a traffic and transport assessment of the proposed development. This report includes an assessment of:

- Existing transport conditions and access arrangements
- Future operation of the road network including detailed traffic modelling
- Public transport assessment including interface of the development with a future Herring Road bus interchange
- Future access arrangements including servicing
- Future parking provision
- Pedestrian and cyclist access and facilities
- Framework for construction traffic management
- Framework for travel demand management

An internal traffic and parking assessment has been prepared by Colston Budd Rogers & Kafes (CBRK). This has assessed parking requirements, access arrangements, loading docks, parking layouts and principles of construction management. The key findings from this assessment are summarised in this main document, with full details provided in Appendix C.

2 Existing Transport Conditions

2.1 Site Context

Macquarie Park is bounded by high order roads serving the North Shore and North West, including the M2 Hills Motorway, Epping Road and Lane Cove Road.

The Macquarie Centre is located in the heart of Macquarie Park, approximately 15km from the Sydney CBD. Nearby major centres including Epping, Chatswood, Top Ryde and Eastwood as shown in Figure 2 below.

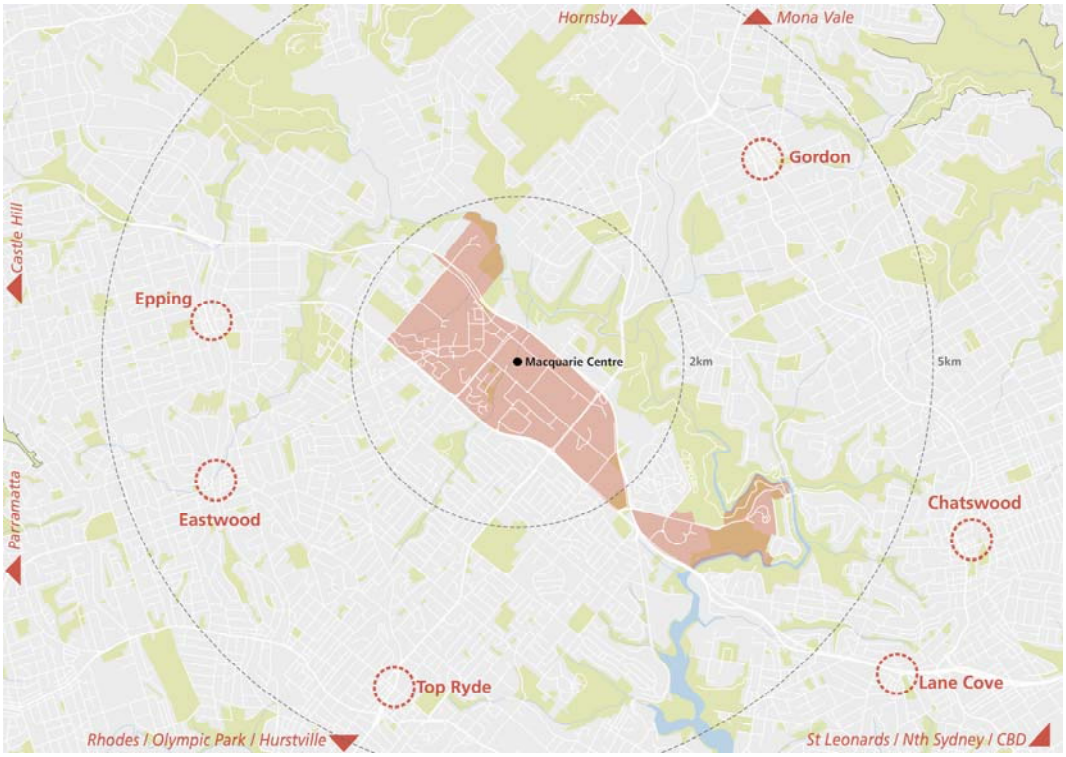


Figure 2 Site context

2.2 Travel Patterns

2.2.1 Mode Share

Each day there are approximately 43,000 work trips made to Macquarie Park, a number of which work at the Macquarie Centre. 65% of people travel to work by car (either car driver or passenger), with an average of 1.05 people per vehicle. Since 2001, the proportion of people travelling to work by car has reduced by 10% which is largely a result of the opening of the Epping to Chatswood rail line in 2009.

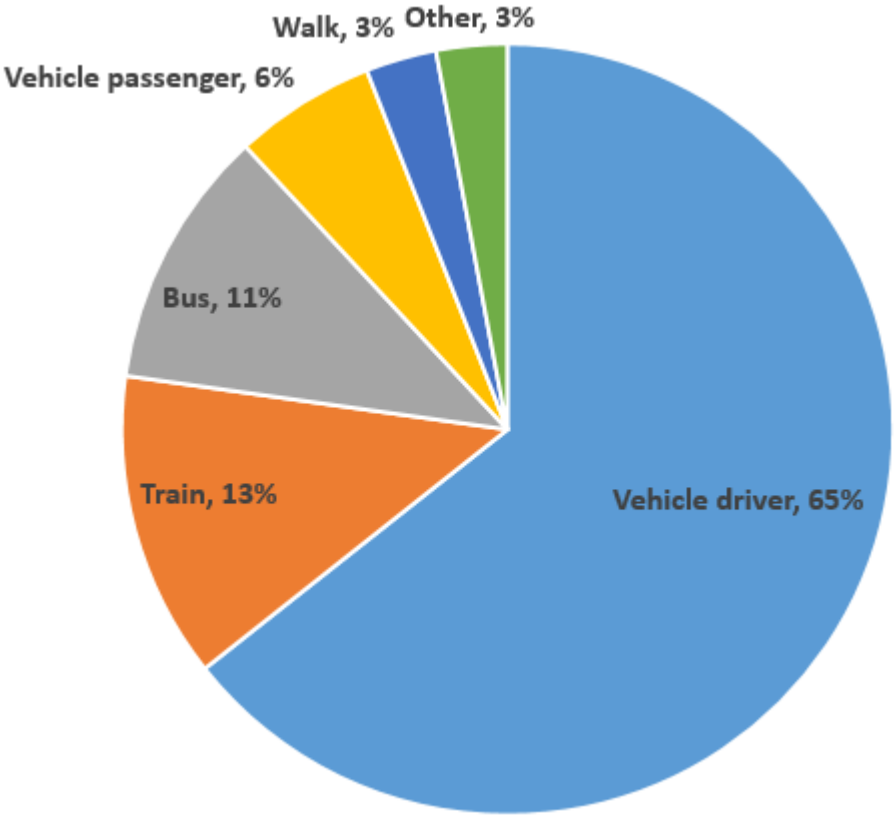


Figure 3 Existing journey to work mode share to Macquarie Park

2.2.2 Journey to Work Locations

The home location of workers of Macquarie Park is presented in Figure 4, and indicates the majority of employees live locally.

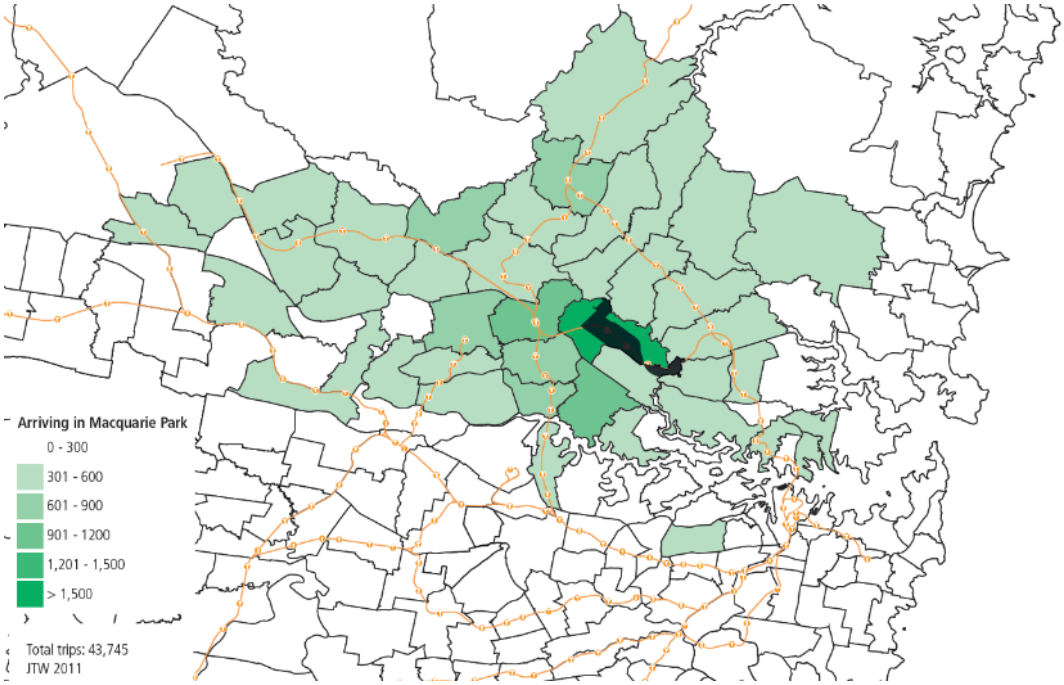


Figure 4 Home location of workers travelling to Macquarie Park

Figure 5 below illustrates the employment destination of residents of Macquarie Park. The Sydney CBD and Chatswood are the locations with the highest levels of employment, which is conducive to travel to work by train given these destinations are served by a direct rail service from Macquarie Park.

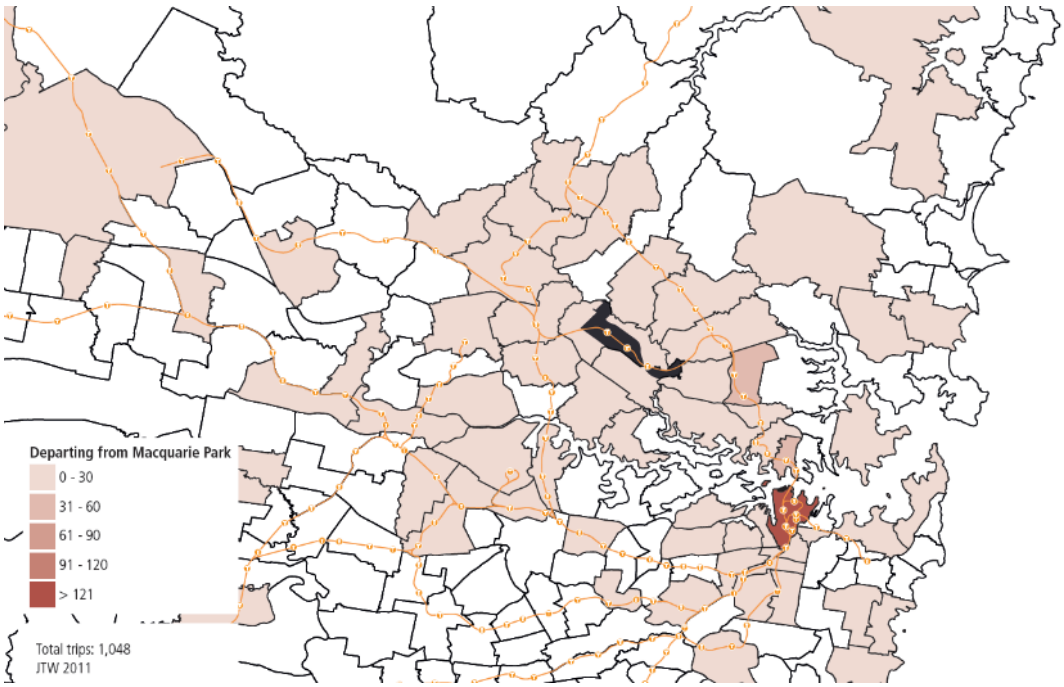


Figure 5 Destination of workers living in Macquarie Park

2.3 Road Network

2.3.1 Major Roads

The Macquarie Centre is surrounded by a number of major roads which carry significant traffic volumes. These roads, including the administrative classification, are:

- Epping Road (State road)
- M2 Motorway (State road)
- Herring Road (Regional road between Epping Road and Talavera Road)
- Talavera Road (Regional road between Lane Cove Road and Culloden Road)
- Waterloo Road (Local road)
- Balaclava Road (Local road)
- Culloden Road (Local road)

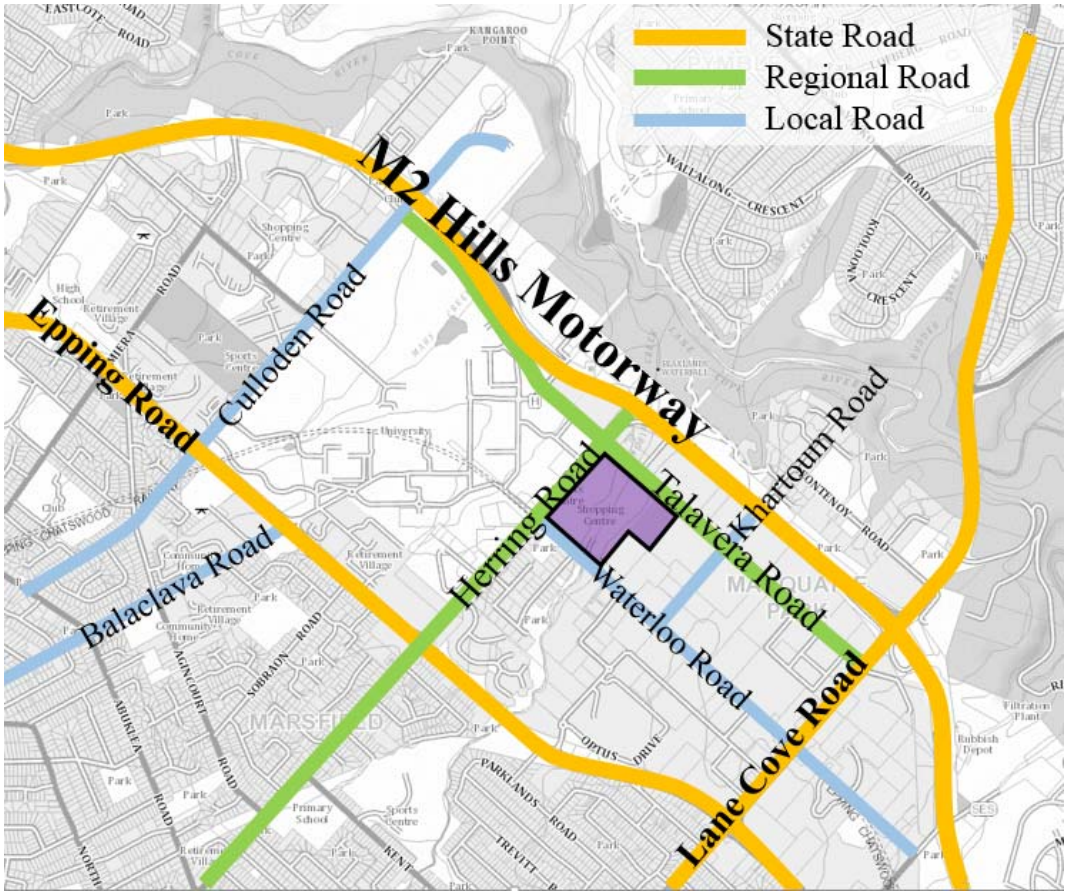


Figure 6 Existing road network

Source: SixMaps 2015

2.3.2 Key Intersections

The operation of the Macquarie Park road network is primarily a function of the performance of key intersections including:

- **Waterloo Road / Herring Road:** Directly adjacent to the Macquarie Centre, this intersection is signalised with pedestrian crossing facilities on all approaches. The northern leg of this intersection provides direct access to MQU.
- **Epping Road / Balaclava Road:** Controlled by traffic signals with pedestrian crossing facilities on all approaches. Left turn slip lanes are provided on the north, south and west approaches. Bus priority lanes exist on Epping Road.
- **Epping Road / Herring Road:** Controlled by traffic signals with pedestrian crossing facilities on all approaches. Bus priority lanes exist on Epping Road.
- **Herring Road / Talavera Road / M2 Ramps:** The eastern leg of this signalised intersection provides vehicular access to the westbound on-ramp of the M2 Motorway. The western leg provides access to Talavera Road from the new M2 off ramp, with only left and right turn movements permitted. Pedestrian crossing facilities are provided on the eastern and northern legs. Right turn movements from Talavera Road into Herring Road are for buses only.
- **Talavera Road / Technology Place / Christie Road:** This intersection is controlled by traffic signals, with pedestrian crossing facilities on all four legs. The Christie Street leg of the intersection is an extension of the eastbound off-ramp and on-ramp of the M2 Motorway.
- **Culloden Road / Waterloo Road:** At the northern end of the campus, this intersection is controlled by a roundabout. There are no dedicated pedestrian crossing facilities provided. The southern leg (Gymnasium Road) of the intersection is off-centre with the other three approaches.

2.3.3 Access from the M2

The M2 Hills Motorway is a 6-lane urban motorway connecting Macquarie Park to the Sydney CBD, lower North Shore and the North West growth area.

Figure 7 shows on and off-ramps for Macquarie Park. Herring Road provides a westbound off-ramp and a westbound on-ramp; while Christie Road to the west provides an eastbound off-ramp.

Lane Cove Road provides a full interchange for Macquarie Park access.

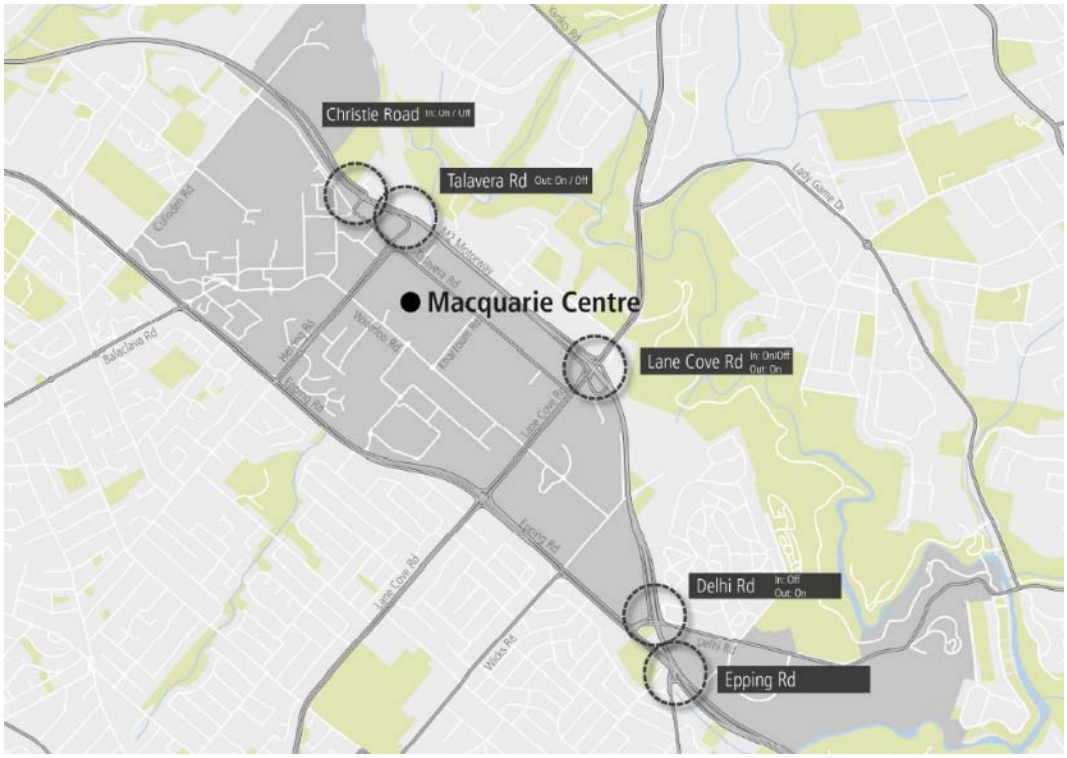


Figure 7 Access from M2

2.4 Traffic Volumes

The Macquarie Centre currently generates in the order of 328,000 vehicles per week, equivalent to approximately 46,000 vehicles per day. The daily traffic profile (recorded from car park entry/exit data in November 2014) is presented in Table 1 below.

Table 1 Daily traffic profile – Macquarie Centre

Time of Day	Monday to Friday		Saturday to Sunday		Monday to Sunday	
	Total	**%**	**Total**	**%**	**Total**	**%**
0001-0600	5,239	2%	904	1%	6,143	2%
0601-0900	22,844	10%	9,765	9%	32,609	10%
0901-1200	57,519	26%	28,811	26%	86,330	26%
1201-1500	61,325	28%	34,719	32%	96,044	29%
1501-1800	46,027	21%	23,983	22%	70,010	21%
1801-2100	23,338	11%	9,037	8%	32,375	10%
2101-0000	2,984	1%	1,608	1%	4,592	1%
Total	**219,276**	**100%**	**108,827**	**100%**	**328,103**	**100%**

2.5 Access Arrangements

The existing vehicular access arrangements for the Macquarie Centre are illustrated in Figure 8 below.

Figure 8 Existing access arrangements

2.6 Parking

There currently 4,755 car parking spaces provided within the Macquarie Centre as summarised in Table 2.

Table 2 Existing car parking

Parking Area	Existing Spaces
Level 5	231
Level 4A/5	0
Level 4	914
Level 3A/4	147
Level 3	151
Level 2A/3	739
Level 2	502
Level 1A/2	784
Level 1	798
Level 0A	489

Total	**4,755**

2.7 Rail

Macquarie University Train Station provides the Macquarie Centre with access to the Sydney Trains network. The station opened in 2009 as part of Epping to Chatswood Rail Link, and provides links to the lower North Shore, CBD, Epping and Hornsby. In peak periods, four services per hour operate in each direction on the T1 North Shore, Northern & Western Line. The Macquarie Centre in the context of the existing rail network is shown in Figure 9.

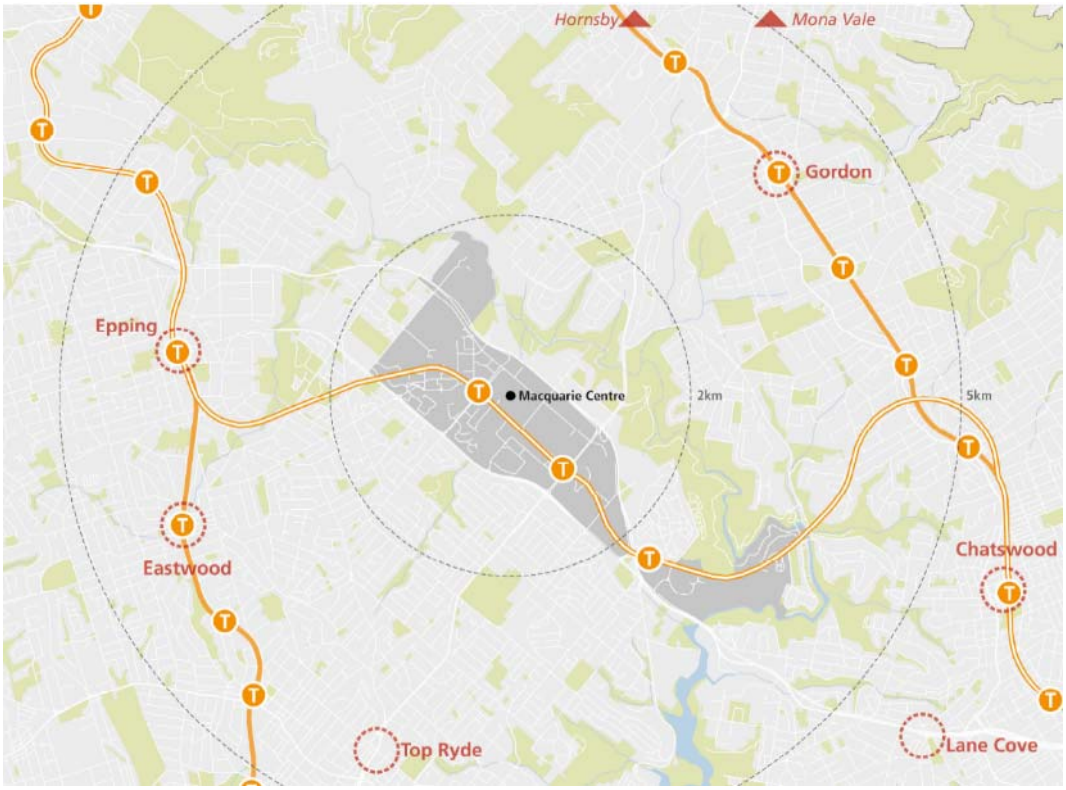


Figure 9 Existing rail network

2.8 Bus

The Macquarie Centre bus interchange, located predominantly in Herring Road, is the hub for some 28 bus routes connecting Macquarie Park with the Sydney CBD, the North Shore, the North West and the West.

The regional bus network and approach corridors are illustrated in Figures 9 and 10 below.

Key bus corridors include the Hills M2 Motorway, which provides access to the North West suburbs (including the centres of Baulkham Hills, Castle Hill, Cherrybrook, Norwest, Bella Vista, Kellyville and Rouse Hill), Epping Road, Lane Cove Road and Herring Road. As well, many bus routes approaching from the north pass through Macquarie University; and some bus routes approaching the interchange from Waterloo Road terminate and lay over in the University grounds.

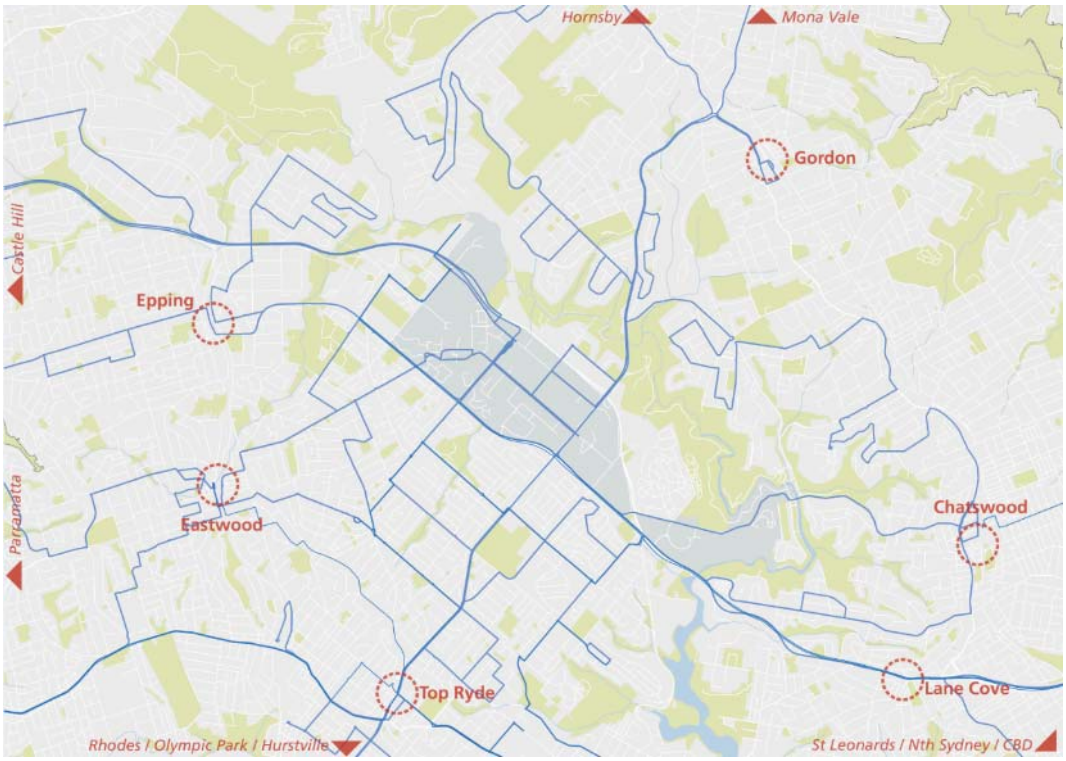


Figure 10 – Regional bus network centred on Macquarie bus interchange

There are nine bus stops comprising the interchange, between Talavera Road and Waterloo Road, with 5 bus stands located on the southern side of Herring Road, adjacent to Macquarie Centre, plus 2 stops each on the north side of Herring Road and the east side of Waterloo Road, south of Herring Road.

Buses access stands A to E, adjacent to Macquarie Centre, by travelling eastbound in Herring Road and performing a u-turn via an overbridge that provides access to the west-facing bus stops, as well as rooftop car park access for the shopping centre.

Additional bus stops in Herring Road and Waterloo Road act as overflow stops, required since the introduction in particular of new bus services from the North west sector which cannot access the main bus interchange stops from Talavera Road. These routes leave the M2 Motorway at Christie Road and turn from Talavera Road to Herring Road using a bus-only access. As there is no vehicle connection to the bus interchange from the Talavera / Herring Road intersection, these buses continue along Herring Road before turning left into Waterloo Road and dropping passengers at stops in Waterloo Road. On their return route, these buses turn right from Waterloo Road to Herring Road, using the bus stop in Herring Road on the north side to drop off and pick up passengers.

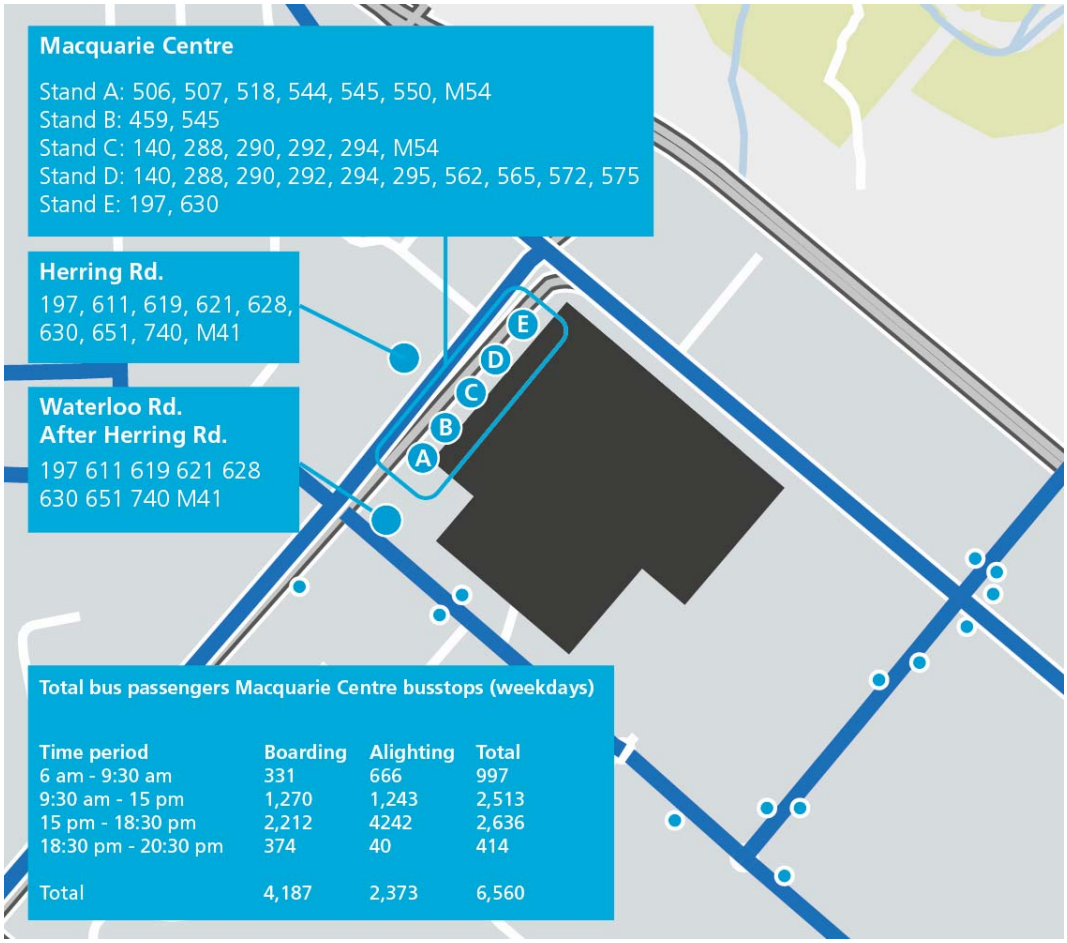


Figure 11 – Macquarie Bus Interchange Local Context

Figure 12 Macquarie Centre bus interchange

During peak periods, some 122 buses operate to and from the Macquarie interchange per hour in peak periods, on some 28 routes. Table 3 summarises AM peak service levels, stops used in the interchange and destinations.

Most bus routes pass through the interchange rather than terminating there, with key terminals in Macquarie Park being Macquarie University (University Avenue and Macquarie Drive) and Macquarie Park station.

Most bus routes approaching from the north pass through Macquarie University before calling at the interchange, approaching via University Avenue. Buses approaching from the south, via Talavera Road or Waterloo Road, must access the interchange via the Waterloo Road / Herring Road intersection to access either the Macquarie Centre bus stands A to E, or the Herring Road stop on the north side of the road.

Bus routes from the North West mainly approach Macquarie Park on the M2 Motorway, using the Christie Road exit to Talavera Road to approach Macquarie Park. On their return route, these bus routes travel east in Herring Road to the Herring Road ramp to the M2 Motorway, westbound.

Table 3 - Existing Bus Interchange Activity

Bus route	To/From	Buses/h AM peak (both directions)	Stands used
140	Epping-Manly	1	C, D
197	Macquarie Uni-Mona Vale	7	E, Waterloo Rd
288	Epping - City (QVB)	6	C, D
290	Epping - City (QVB)	6	C, D
292	Marsfield - City (QVB)	7	C, D

Bus route	To/From	Buses/h AM peak (both directions)	Stands used
294	Macquarie Uni - City (QVB)	1	C, D
295	Macquarie Centre - North Epping	6	C, D
458	Macquarie Uni – Burwood	1	B
459	Macquarie Uni – Strathfield	4	B
506	Macquarie Uni – City	3	A
507	Macquarie Uni – City	1	A
518	Macquarie Uni – City	5	A
544	Macquarie Centre – Auburn	1	A
545	Parramatta – Chatswood	10	A, B
550	Parramatta – Chatswood	0	A
562	Gordon – Chatswood	0	A, E
565	Macquarie Uni – Chatswood	2	D
572	Macquarie Uni – Turramurra	5	E
575	Macquarie Uni – Hornsby	4	D
611	Macquarie Park – Blacktown	8	Herring, Waterloo
619	Macquarie Park – Rouse Hill	5	Herring, Waterloo
621	Macquarie Park – Castle Hill	4	Herring, Waterloo
628	Macquarie Park – Norwest	3	Herring, Waterloo
630	Macquarie Park – Blacktown	3	Herring, Waterloo, E
651	Macquarie Park – Castle Hill	2	Herring, Waterloo
740	Macquarie Park – Plumpton	3	Herring, Waterloo
M41	Marsfield – Hurstville	12	Herring, Waterloo
M54	Macquarie Park – Parramatta	12	A, C
Total		**122**	

In addition to regular scheduled bus services, Optus operates an employee shuttle bus between the Sydney CBD (Wynyard station) and the Optus Centre Macquarie Park. This shuttle service runs from the Optus Campus to the Macquarie Centre at lunchtime.

2.9 Taxis

The transport interchange at the Macquarie Centre includes a thirteen-space taxi rank (west-facing) on Herring Road, adjacent to the bus interchange (see Figure 13). A passenger shelter is provided for taxi customers, and taxi drivers can access the rank from Talavera Road and the M2, as well as from Herring Road eastbound by means of an exclusive u-turn lane across the median, near the bus overbridge.

Figure 13 – Macquarie interchange taxi feeder rank

2.10 Pedestrians

Existing pedestrian facilities around the Macquarie Centre generally consist of pedestrian crossings at major road intersections in the precinct, with the exception of one midblock crossing which facilitates the movement of pedestrians between Macquarie Centre, bus stops, and the University.

Surveys indicate more than 1,700 pedestrians currently utilise the pedestrian mid-block crossing on Herring Road during the lunchtime peak hour (12.30pm – 1.30pm), travelling between the Macquarie Centre and Macquarie University. This crossing is illustrated in Figure 14 below.

Figure 14 Mid-block pedestrian crossing opposite Macquarie Centre

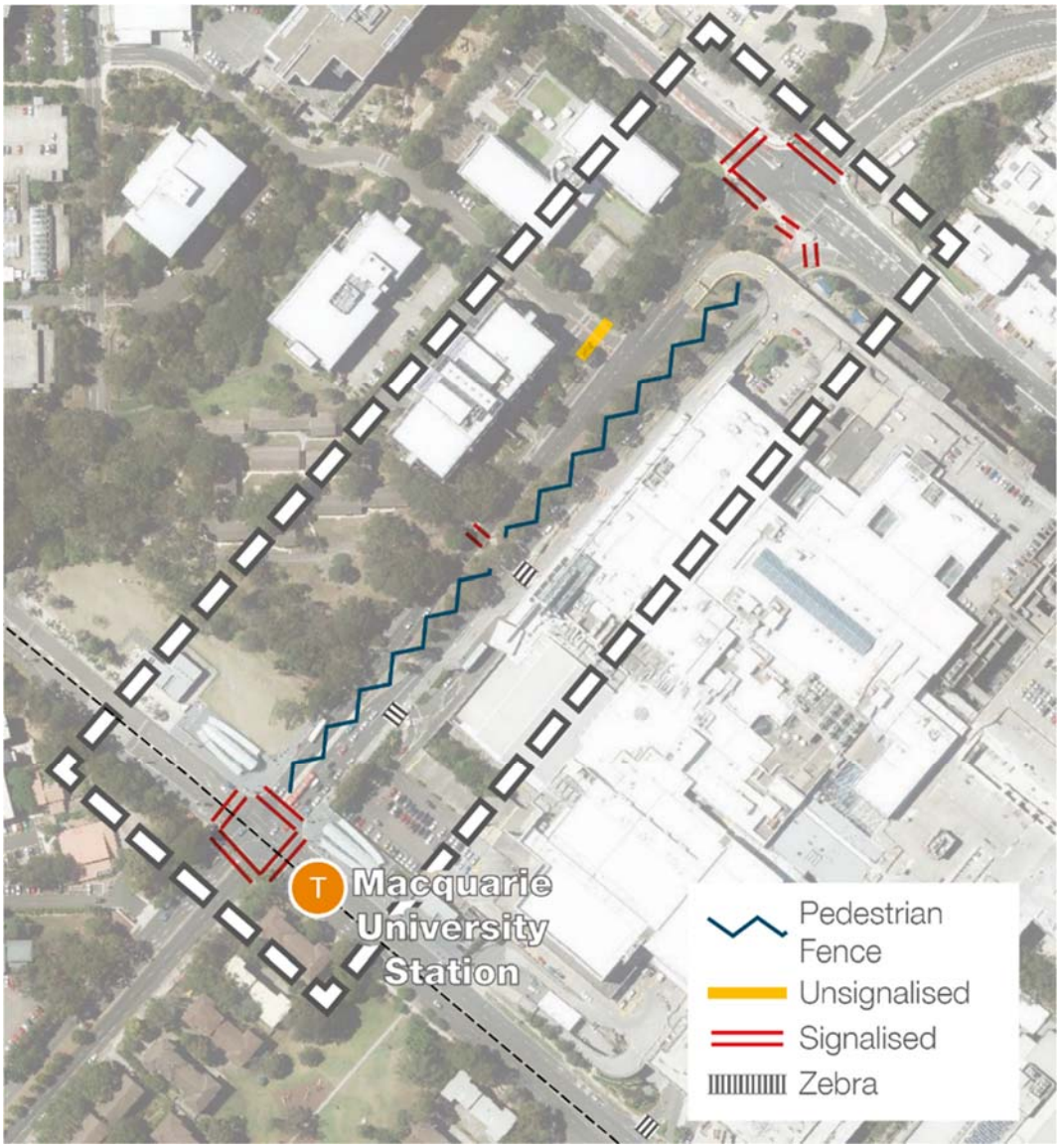


Figure 15 Pedestrian facilities around the Macquarie Centre

Figure 15 shows the extent of pedestrian crossings in the precinct, approximately 150m apart on Herring Road between Talavera and Waterloo Roads.

As Figure 16 shows, there are strong pedestrian desire lines between station entrances, Macquarie University and the Macquarie Centre. During commuter peaks, most pedestrian activity is to and from train station entrances, while in the middle of the day there is a strong demand for pedestrians to cross between the shopping centre and university, mostly utilising the mid-block crossing of Herring Road. This crossing is signalised on Herring Road, but is a zebra crossing at the bus interchange.

Figure 16 – Current pedestrian desire lines

2.11 Cyclists

Figure 17 shows existing cycling routes and facilities in Macquarie Park. Both Talavera Road and Waterloo Road feature shared off-road bike paths that connect to Herring Road.

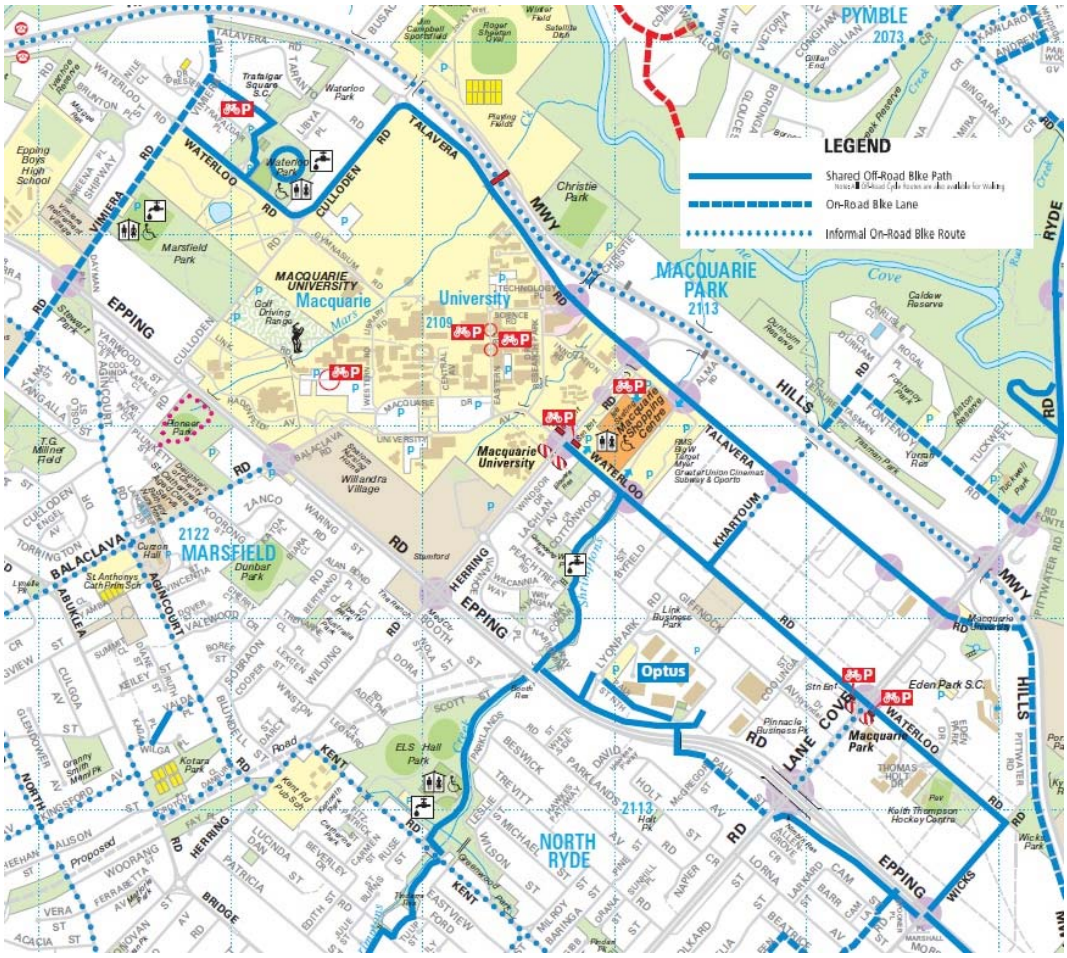


Figure 17 Cycle Routes in Macquarie Park

Source: City of Ryde Council

3 Proposed Development

The Stage 1 DA seeks concept approval for the mixed use redevelopment of Macquarie Centre under s.83B of the *Environmental Planning & Assessment Act* 1979. The first stage will seek concept approval only for:

- Mixed use development to enable a range of land uses. The final mix of land uses will be subject to and determined under the relevant Stage 2 detailed DAs.
- Building envelopes for the proposed basement, expanded podium and tower forms.
- The four tower envelopes fronting Herring Road will have maximum heights ranging from 90m and 120m above existing ground level. The building envelope for Tower 1 is of sufficient dimensions to accommodate alternate tower forms.
- Maximum additional gross floor area (GFA) of 148,000sqm.
- The new retail podium along Herring Road will replace the existing structure. This will provide an active frontage with separate pedestrian entries to Herring Road and the creation of a vibrant atrium space.
- The creation of 'Station Plaza' between the train station and shopping centre, framed by active uses and a landmark building known as the "Shard".
- The building envelopes for the proposed basement and upper levels of the expanded podium will accommodate a maximum of 2,175 additional car spaces.
- New vehicle and pedestrian access points.

The Stage 1 DA does not seek approval for

- Any works, including demolition, excavation, construction and public domain improvements.
- The final arrangement of land uses.
- Layout, mix and number of residential units.
- A specific number of car spaces (as this will be determined having regard to the final mix of land uses).
- The design of the building exteriors including facades and roofs.
- Public domain and landscape design.

Such approvals will be sought via subsequent development applications following receipt of development consent for the Stage 1 DA.

The overview of the indicative mix of land uses within the proposed building envelopes is identified in Table 4 below.

Table 4 – Overview of indicative mix of land uses

Component	Proposed
Basement	Loading docks, car parking and associated vehicle circulation, waste rooms, utilities, future connection to existing train station (subject to consent from RailCorp) and retail premises.
Podium	Retail premises, commercial premises, food and drink premises, entertainment facilities, recreation facilities (indoor), recreation area, car parking and associated vehicle circulation, community uses (subject to further discussions with Council) and communal open space associated with the towers.
Tower 1	Mixed use development comprising commercial premises and/or residential accommodation and/or serviced apartments above a retail podium.
Towers 2, 3 and 4	Mixed use development comprising residential accommodation and/or serviced apartments above a retail podium.

For the purposes of the traffic assessment, two options have been considered for residential/commercial components:

- Option 1: 4 residential towers along the Herring Road frontage (915 residential dwellings) and an additional 39,700m^2 retail GLA
- Option 2: 3 residential and 1 commercial tower along the Herring Road frontage (615 residential dwellings and 44,000m^2 commercial GFA) and an additional 39,700m^2 retail GLA

4 Operational Traffic Assessment

4.1 Existing Traffic Data

Traffic data collected by Arup over recent periods has been used to inform the findings of this analysis. Details of the data collected are provided below.

4.1.1 Traffic count surveys- Thursday 1 August 2013

Turning movement data was collected at four locations in the Macquarie Park area on Thursday 1 August 2013. Surveys were conducted between 7am - 10am (AM) and 4pm – 7pm (PM), and were undertaken during University term and following the opening of the new M2 ramps at Herring Road and Christie Road.

The locations of the intersections surveyed are illustrated in Figure 18.

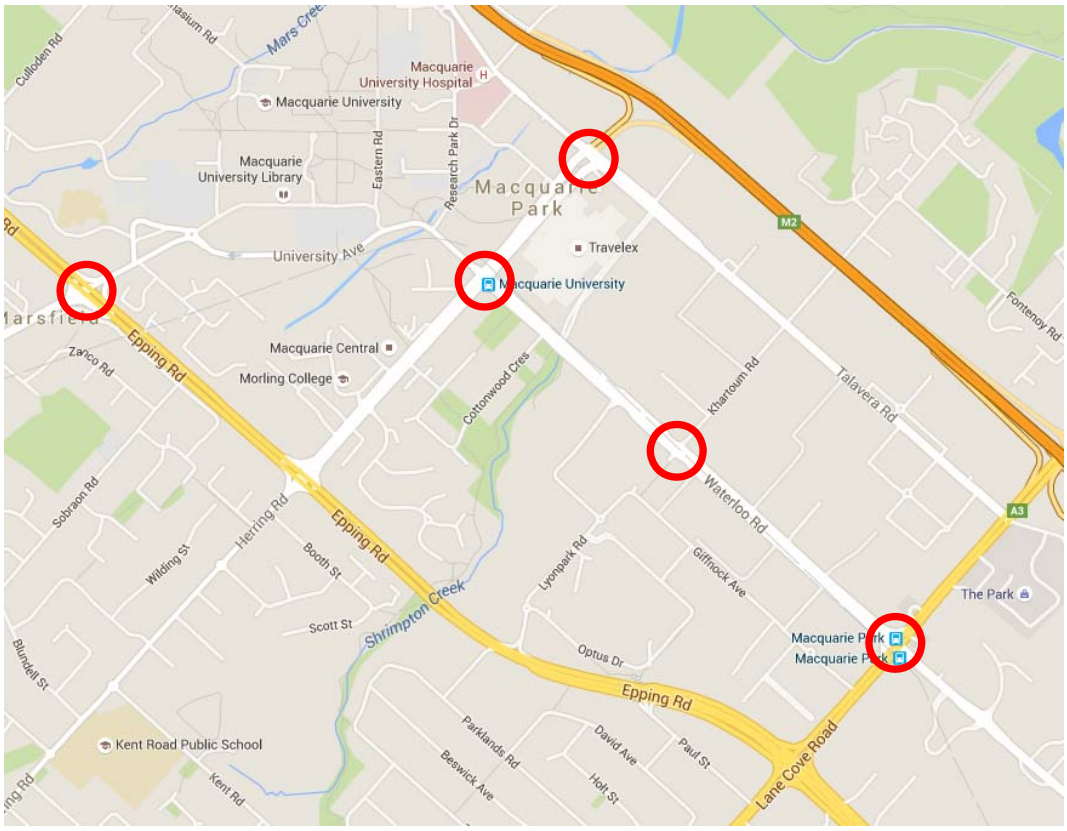


Figure 18 August 2013 traffic surveys

As data used to inform the analysis in this study was collected over different days, results of these traffic counts in August 2013 were used as the basis to scale up/down other traffic volumes in the precinct.

4.1.2 RMS SCATS Counts – July 2015

The RMS provided Arup with SCATS counts for the Khartoum Road / Talavera Road and Lane Cove Road / Talavera Road intersection collected in July 2015. For lanes with shared movements, traffic volumes were proportioned out based on an intersection count undertaken at this location in 2007.

4.1.3 Origin – Destination Surveys – 8 August 2013

Arup commissioned Sky High Traffic Data Australia to undertake an origin-destination survey of Macquarie University in August 2013. The purpose of this survey was to ascertain the number of vehicles utilising the internal roads of the University as a through route whilst travelling through Macquarie Park.

The survey was conducted on Thursday the 8th of August 2013, during both morning and afternoon peak periods:

- AM Peak: 7am – 10am
- PM Peak: 4pm – 7pm

4.2 2015 Base Traffic Model Development

The development of the 2015 base model has been undertaken utilising the existing Macquarie Park Paramics model developed for City of Ryde Council, and as updated by Arup in recent years. This process was undertaken in accordance with the RMS Traffic Modelling Guidelines (February 2013) as well as the Paramics Micro-simulation Modelling RTA Manual, (RTA 2009). The key role of the micro-simulation model is predominantly as an assignment tool, allowing an assessment of the relative impact of growth.

4.2.1 Road network updates

A review of the previously developed model yielded the following required changes to the network to reflect the current situation:

- Addition of slip lane on the western approach to the Balaclava Road/ Epping Road intersection, opened in June 2012
- Updated Macquarie Centre access roads following the expansion of the site in October 2014.
- Updated bus routes and timetable information within the model

4.2.2 Model Calibration

Model calibration is the process of refining a models parameters to adequately reflect observed traffic behaviour to a sufficient level to satisfy the model objectives. In micro-simulation models the task involves a review of global and local parameters that relate to network and demand matrix definition and assignment. Different models require different levels of calibration. Larger

models, such as the Macquarie Park paramics model, are generally more difficult to calibrate than small models.

The base model was primarily calibrated on the basis of:

- A comparison of the modelled base case network against the current road network
- Comparison of modelled turning movements to observed turning movements at key intersections around the site

Calibration of the model also involved a detailed visual review of the model during simulation including inspection of:

- node placement
- kerb placement
- stop line positioning to ensure realistic progression of vehicles between links
- logical lane changing characteristics, by reviewing signposting, next lanes and link characteristics
- merge characteristics on links

Further detail on the calibration process is described in the following sections.

The outcomes of the above process are discussed briefly below.

Random Seed Values

The calibration of the base AM/PM model was performed using the seed value 2849, as was used in the original Paramics model. Once the model was calibrated, a further four runs were completed using Roads and Maritime specified seed values, as summarised in Table 5. The modelled results reported show the average of these five runs.

Table 5 Seed values used for Paramics modelling

Seed Value				
28	560	2849	7771	86524

Intersection Turning Counts

A key part of the calibration of a micro-simulation model involves an adequate correspondence of modelled turning movements to observed turning movements. The statistic most commonly used to measure modelled turning movement counts against observed turning movement counts is the GEH statistic:

$$GEH = \sqrt{(M-C)2/(½(M+C))},$$

Where M is the modelled flow and C is the observed flow.

The GEH statistic is a chi-squared statistic which accounts for the magnitude of the difference between the observed and modelled values together with the magnitude of the observed value.

Queue Lengths

The model was calibrated to reflect queuing in the model on the basis of visual inspections undertaken by Arup on a number of different days throughout the study period. Key locations for calibration included:

- Epping Road from Herring Road to Culloden Road
- Waterloo Road from Byfield Street to Herring Road
- Herring Road from Epping Road to Talavera Road
- Talavera Road from Culloden Road to Lane Cove Road

4.2.3 Bus Demands

Existing bus movements within Macquarie Park (as previously outlined in Section 2.8 of this report) were included within the base traffic model.

4.2.4 Model Calibration Results

The criteria adopted for the purposes of this exercise was to achieve

- For 85% of all turning movements, the comparison of modelled flow to observed flow will have a GEH less than 5.
- For all turning movements, the comparison of modelled flow to observed flow will have a GEH less than 10.

This is in accordance with that stipulated in the Roads and Maritime's *Traffic Modelling Guidelines* for calibration of a micro-simulation model. The results of the model calibration are given below.

Table 6 Model calibration results

Peak Period	Total turn movements	GEH < 5		GEH > 10	
		Number	%	Number	%
AM	48	**44**	92%	1	2%
PM		**44**	92%	0	0%

The calibration process yielded a GEH value of 5 or less for greater than 90% of turning movements in both peak hours. The calibration statistics meet the adopted criteria in the PM peak for all turning movements with a GEH less than 10. The criteria is also met in the AM peak with the exception of:

- Balaclava Road right turn into Epping Road, GEH marginally greater than 10 (11). This movement is outside the core study area and not considered to have a material impact on the future year transport analysis.

Critically, through the core study area (Herring Road between Waterloo Road and Talavera Road), there was a good correlation between observed and modelled counts. Differences between the modelled and observed turning movements for the Herring Road corridor are no more than 100 vehicles with GEH values less

than 5. This demonstrates the model is ‘fit for purpose’ and suitable to model future year traffic impacts.

Additionally, the model has been well calibrated for the right turn from Lane Cove Road into both Talavera Road and Waterloo Road. In both peak hours, a GEH value of less than 5 has been achieved for these movements, with actual differences (between modelled and observed) less than 50 vehicles.

As stated in the introduction to this section, large network models are generally not expected to be as well calibrated as small intersection models. In the instances above the turning movements only fail marginally to meet the adopted criteria and the first two movements are relatively insignificant. The calibration on the basis of turning movement counts is therefore acceptable and fit for purpose.

4.2.5 Model Validation

The model was validated on the basis of travel times on key routes possessing an average modelled travel time within the range of the observed maximum and minimum times. This method has previously been used to validate the Macquarie Park Paramics model.

Travel time surveys were conducted on Thursday 5 March 2015 between 7.45 - 8.45 AM and Wednesday 4 March 2015 between 4.45 - 5.45 PM. Both of these days were representative of typical traffic conditions during peak periods in the Macquarie Park area. A minimum of 5 runs were completed on each route, with up to 9 runs undertaken some routes.

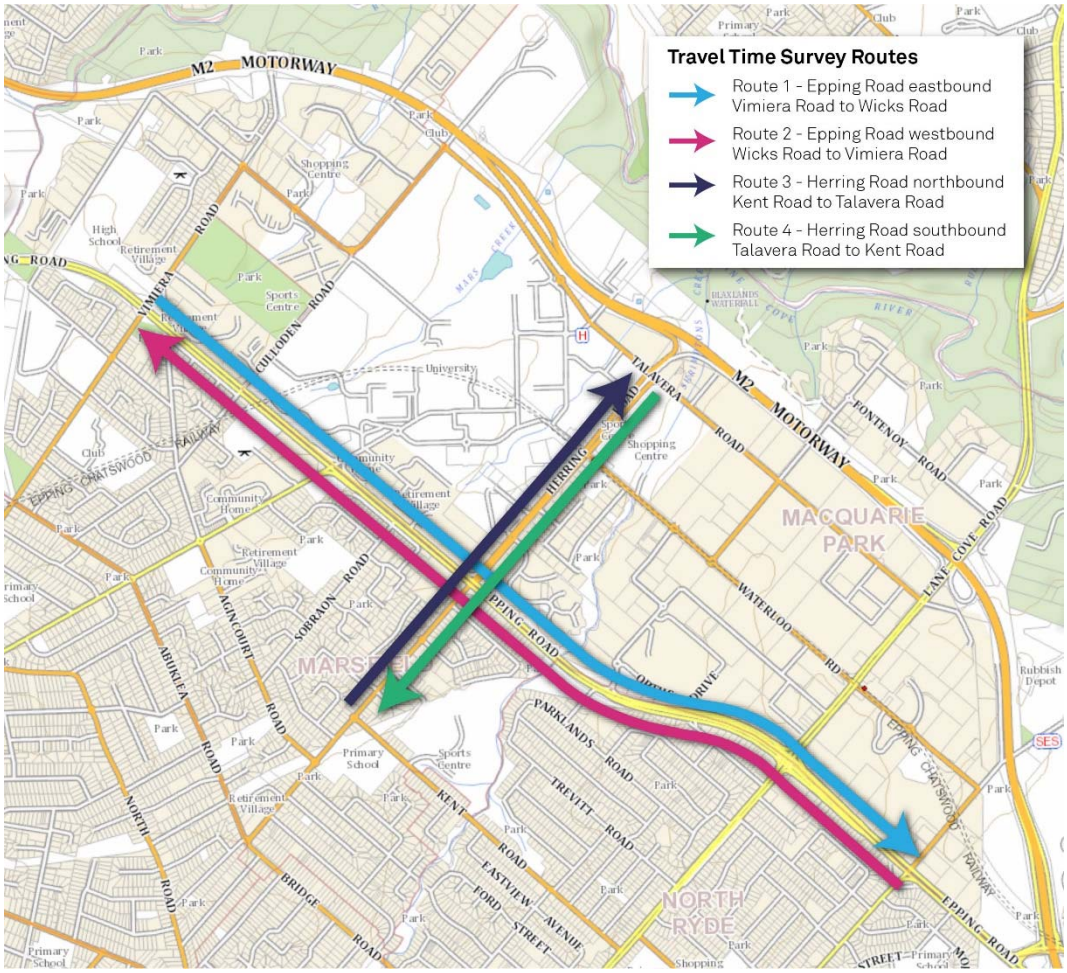


Figure 19 Travel Time Routes for Base Model Validation

Table 7 and Table 8 summarise the results of the validation. The validity of the travel times were assessed based on two factors:

- Whether the modelled travel time was less than 15% or 60 seconds of the average observed travel time
- Comparing average modelled travel times to the range of observed minimum and maximum travel times

Table 7 AM Peak Travel Time Validation Summary

Route	Modelled Travel Time (min)	Observed Travel Times			Acceptable Range (+- 15% or 60s of Ave)		Validation	
		Min	Ave	Max	Min	Max	Min / Max	+-15% / 60s
Route 1	07:11	03:41	05:34	10:21	04:34	06:34	OK	out of range
Route 2	05:52	07:00	09:02	11:41	07:40	10:23	out of range	out of range
Route 3	07:35	04:13	06:21	07:47	05:37	07:37	OK	OK
Route 4	03:51	03:37	05:02	06:13	04:02	06:02	OK	out of range

Table 8 PM Peak Travel Time Validation Summary

Route	Modelled Travel Time (min)	Observed Travel Times			Acceptable Range (+- 15% or 60s of Ave)		Validation	
		Min	Ave	Max	Min	Max	Min / Max	+-15% / 60s
Route 1	06:39	07:00	09:02	11:41	07:40	10:23	OK	out of range
Route 2	08:29	06:30	09:21	13:08	07:57	10:45	OK	OK
Route 3	04:50	03:37	05:17	07:06	04:17	06:17	OK	OK
Route 4	06:45	05:23	07:33	11:01	06:25	08:41	OK	OK

Table 7 and Table 8 demonstrates that the AM and PM base model is validated satisfactorily for the travel routes (both inbound and outbound) along Herring Road. This travel route passes through the core study area and reflects the suitability of the model to assess future transport conditions. Route 4 in the AM peak hour sits just outside the 15% margin (11 seconds). This is considered a minor discrepancy given the good calibration results achieved along the Herring Road corridor and this route is in the counter peak direction.

Travel times for Route 1 in the AM and PM model were found to be outside 15% of the average observed travel time. These routes are however outside the core study area of Herring Road and are not considered to have a significant impact in testing future transport scenarios. In addition, the significant range between minimum and maximum observed travel times demonstrates the variability and congested nature of the Macquarie Park road network which highlights that complete validation will be very difficult to achieve.

4.3 Future Year Traffic Growth

Future year traffic demand forecasts for the forecast year 2026 are comprised of the following components:

- Changes to traffic demand on the wider road network (background traffic growth)
- Increased traffic demand attributable to the growth of the Macquarie University campus
- Increased traffic demand attributable to the Herring Road priority precinct

Future year AM/PM origin-destination demand matrices were developed (as part of the micro-simulation traffic modelling exercise) according to the following methodology:

- Base AM/PM demand matrix as the starting point
- For trips between internal to external and external to external zones of the model network, traffic growth rates were derived from a combination of the STM traffic forecasts and a cordon matrix from the RMS's strategic EMME model (excluding trips to/from STM zone representing MQU).
- Addition of forecast Macquarie University traffic generation (refer to Section 5.1.2 in Appendix A of this document)
- Addition of forecast Herring Road priority precinct traffic (refer to Section 5.1.4 in Appendix A of this document) to/from a number of modelled zones along the Herring Road corridor.

The origin-destination demand matrices indicate global traffic growth across the Macquarie Park network in the future year 2026 are as follows:

- AM peak hour: 1.5% per annum
- PM peak hour: 1.1% per annum

4.4 2026 Future Year Modelling Methodology

Shown in Figure 20 below, is the modelling methodology used to generate the traffic modelling results. This methodology aligns with that agreed with the Roads and Maritime and City of Ryde Council.

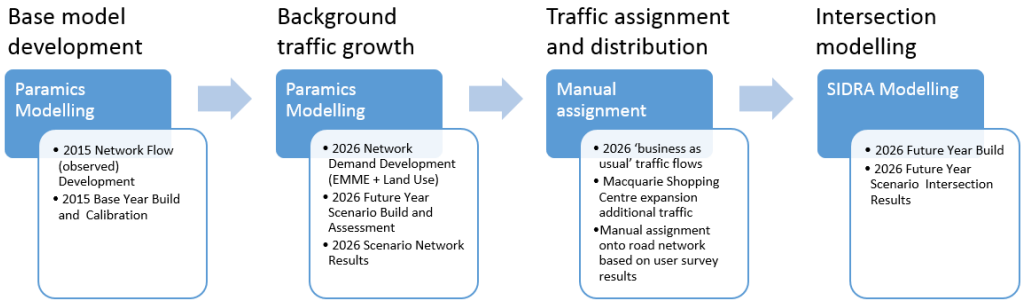


Figure 20 Traffic modelling methodology

4.5 Modelling Scenarios

Two modelling scenarios have been considered in this assessment to determine the traffic impacts arising from the proposed development of the Macquarie Centre, as presented in Table 9 below. These scenarios consider the future land use development envisaged under the Herring Road priority precinct.

Table 9 Traffic modelling scenarios

Modelling Scenario	**Development Scenario**		
	Background traffic growth including Herring Road PP	*Without Macquarie Centre expansion*	*With Macquarie centre expansion*
Scenario 1	✓	✓	×
Scenario 2	✓	×	✓

4.6 Traffic Generation

Estimates of traffic generation of the various components of the Stage 1 DA have been based on RMS Guidelines (residential component) and surveys (retail and commercial components). For the residential component, the traffic generation rates for high density residential development are set out in RMS TDT 2013/04. The TDT suggests the following rates:

- Weekday morning peak hour – 0.19 trips per unit (two way); and
- Weekday afternoon peak hour – 0.15 trips per unit (two way).

For the Saturday midday peak hour the weekday afternoon rate of 0.15 trips per unit (two way) has been adopted.

For the commercial component a generation rate of 0.5 trips per parking space (two way) has been adopted. This reflects the constrained parking and good access to public transport.

For the retail component the existing shopping centre was found to have a traffic generation of 0.9 trips per 100m^2 GLA in the weekday morning peak hour, 3.0 trips per 100m^2 GLA in the weekday (Thursday) afternoon peak hour and 4.0 trips per 100m^2 GLA in the Saturday midday peak hour. These rates are based on surveys of the shopping centre undertaken in February 2015 and adjusted to reflect November traffic flows (adopted as the design month).

A summary of the traffic generation forecasts for both option 1 (4 residential towers and additional retail) and option 2 (3 residential towers, 1 commercial tower and additional retail) is provided in Table 10. This indicates option 2 will generate slightly more traffic in the critical AM and PM commuter peaks, and therefore has been adopted as a worst case scenario for the purposes of the traffic modelling.

Table 10 Traffic generation forecasts

Component	**Rate**	**Option 1**		**Option 2**	
		Size	***Total Trips***	***Size***	***Total Trips***
Weekday AM					
Retail	0.9/100m^2	40,000m^2	360	40,000m^2	360
Residential	0.19/unit	915 units	180	615 units	120
Commercial	0.5/space	0		300 spaces	150
Total			*540*		*630*
Weekday PM					
Retail	3.0/100m^2	40,000m^2	1200	40,000m^2	1200
Residential	0.15/unit	915 units	140	615 units	90
Commercial	0.5/space	0		300 spaces	150
Total			*1340*		*1440*
Saturday					
Retail	4.0/100m^2	40,000m^2	1600	40,000m^2	1600
Residential	0.15/unit	915 units	140	615 units	90
Commercial	0.5/space	0		300 spaces	0
Total			*1740*		*1690*

4.7 Traffic Distribution

The additional traffic generated by the Stage 1 DA has been distributed to the arrival/departure routes and centre accesses based on surveys of existing shoppers at the centre, counts of traffic movements at the access points, changes in access arrangements to/from the shopping centre and review of existing traffic patterns on the surrounding road network. This is provided in further detail within the internal traffic and parking report prepared by Colston Budd Rogers & Kafes (Appendix C).

A summary of the arrival and departure traffic distribution from the wider road network is provided in Figure 21 and Figure 22 respectively.

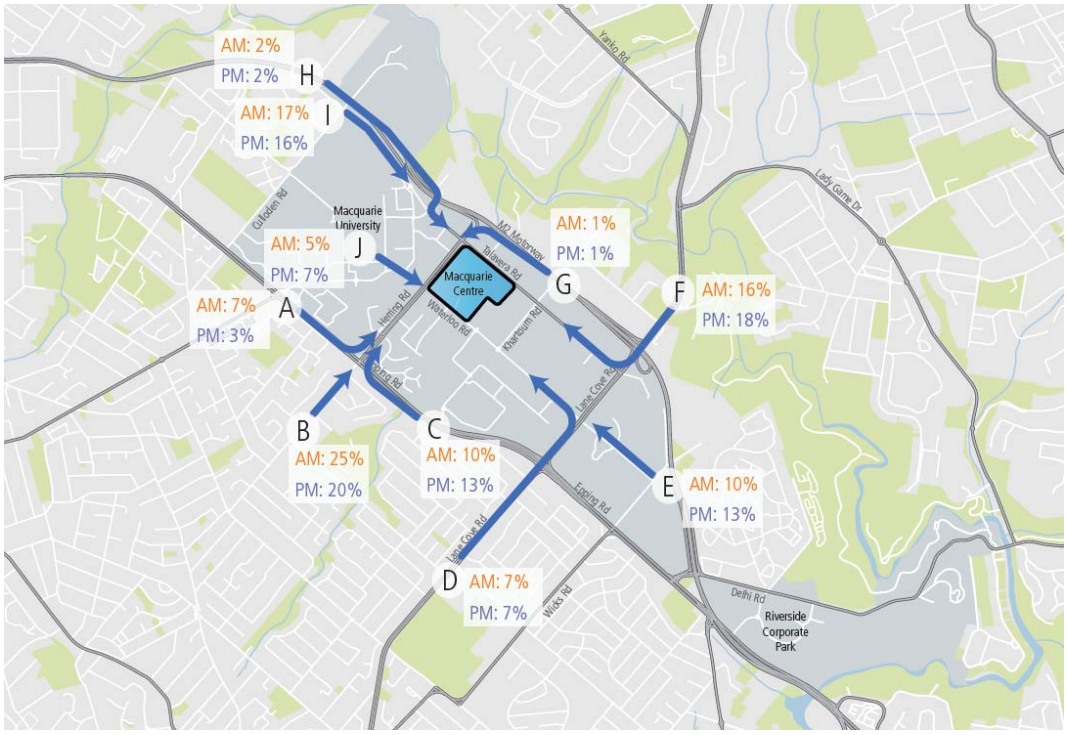


Figure 21 Arrival distribution from wider road network

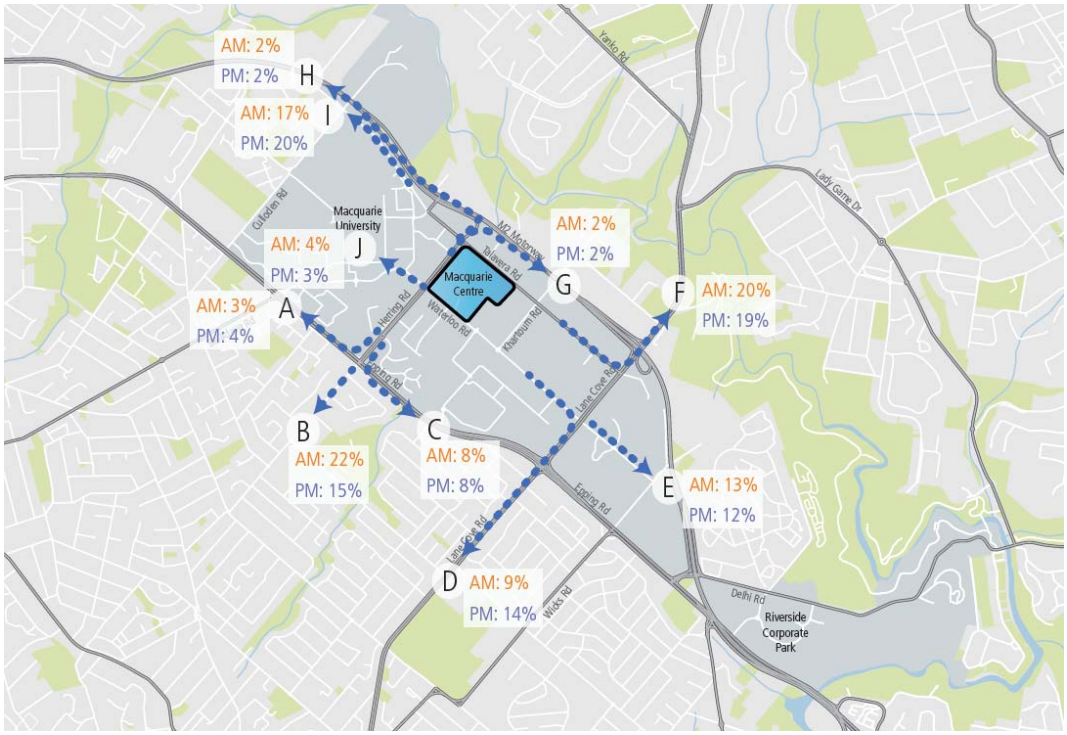


Figure 22 Departure distribution from wider road network

4.8 Access Flows

The additional traffic entering and exiting each access point into the Macquarie Centre as a result of the proposed development is summarised in Table 11 below.

Table 11 Change in access flows

Access	AM Peak Hour		PM Peak Hour	
	In	**Out**	**In**	**Out**
l. Talavera Road (east) -Traffic Signals	30	15	50	50
2. Talavera Road (central) - LI/LO	5	5	5	20
3. Talavera Road (west) -Traffic	90	115	180	355
3A. Talavera Road entry to Tower car park (left in only)	45	0	30	0
4. Herring Road (north) - upper level entry/exit from Silver Car Park	5	0	35	30
5. Herring Road (central) - upper level	n/a	45	n/a	70
6. Herring Road (south)	n/a	-55	n/a	-250
7. Waterloo Road (west) - entry only	20	n/a	15	n/a
8. Waterloo Road (central) -Traffic	130	115	295	310
9. Waterloo Road (east) - LI/LO	25	40	80	165

4.9 Model Extents

As agreed by RMS and City of Ryde Council, the intersection traffic modelling included the following intersections:

- Talavera Road / Lane Cove Road
- Waterloo Road / Lane Cove Road
- Herring Road / Epping Road
- Herring Road / Waterloo Road
- Herring Road / Talavera Road
- Epping Road / Balaclava Road
- Talavera Road / Khartoum Road

It should be noted that modelling for the Waterloo Road / Khartoum Road intersection has not been undertaken at this time given that this intersection is to be upgraded to traffic signals in the future by City of Ryde Council. The layout of this intersection was not available to Arup at the time of writing.

Traffic modelling was undertaken for a typical weekday AM and PM peak hours, with the exception of the Herring Road / Waterloo Road and Herring Road / Talavera Road intersections where the Saturday peak hour was also modelled. This is illustrated in Figure 23.

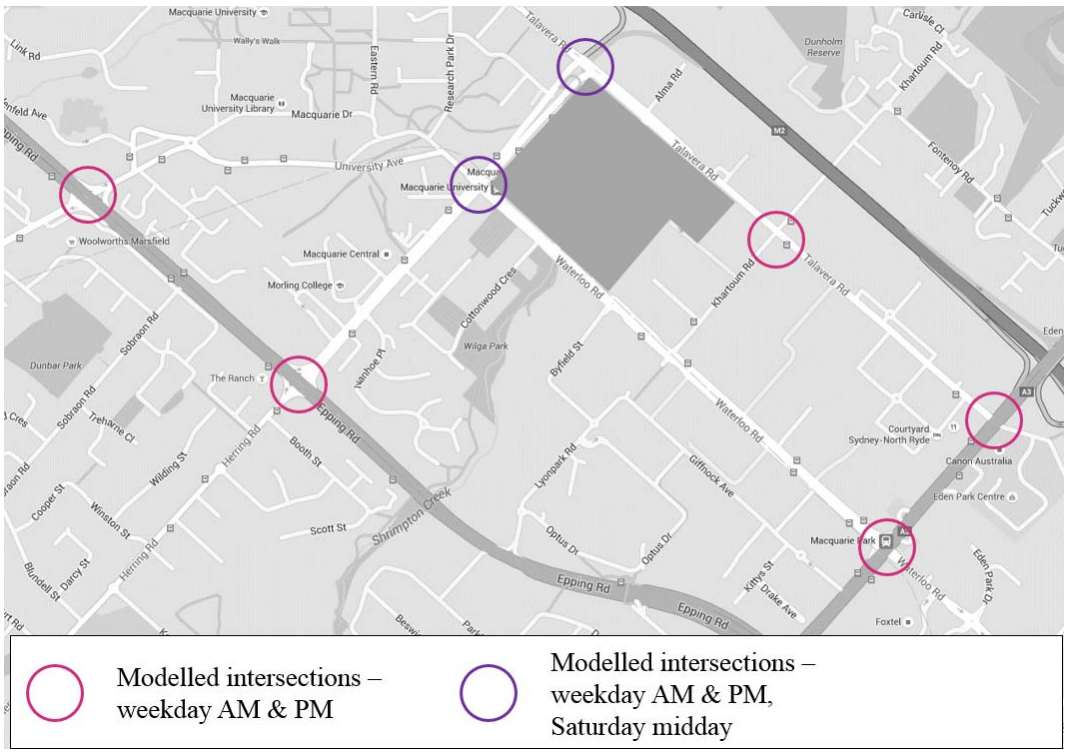


Figure 23 Traffic model extents

4.10 Intersection Operation

4.10.1 Methodology

The future road network performance has been assessed using the SIDRA 6.1 intersection analysis software. Intersection performance has been measured against three parameters, those being:

- Level of Service (LOS)
- Degree of Saturation (DOS)
- Average Vehicle Delay (AVD)

The performance of intersections in an urban environment is measured in terms of its Level of Service (LoS). Levels of service ranges from A (very good) to F (over capacity with significant delays). This is described in the RTA Guide to Traffic Generating Developments. Across the Macquarie Park road network, it is not uncommon for intersections to operate at Level of Service E or F (at capacity) during commuter peak hours.

4.10.2 Results

The results of the traffic modelling are presented in Table 12, Table 13 and Table 14 for the AM, PM and Saturday peak hours respectively. Full results are provided in Appendix B.

Table 12 Intersection Operation – AM Peak Hour

Intersection	**AM Peak Hour**					
	Base			Base + Proposal		
	Deg Sat	LOS	Delay (s)	Deg Sat	LOS	Delay (s)
Epping Road / Balaclava Road	0.86	C	32	0.91	C	35
Epping Road / Herring Road	1.18	F	130	1.29	F	177
Herring Road / Talavera Road	0.98	D	54	0.96	D	54
Herring Road / Waterloo Road	0.74	D	46	0.81	D	46
Khartoum Road / Talavera Road	1.28	F	95	1.33	F	99
Lane Cove / Talavera Road	1.06	E	60	1.13	F	75
Lane Cove / Waterloo Road	1.22	F	178	1.27	F	198

Deg Sat – Degree of saturation; LOS – Level of Service; Delay – Average vehicle delay

Table 13 Intersection Operation – PM Peak Hour

Intersection	PM Peak Hour					
	Base			Base + Proposal		
	Deg Sat	LOS	Delay (s)	Deg Sat	LOS	Delay (s)
Epping Road / Balaclava Road	1.20	E	67	1.20	E	67
Epping Road / Herring Road	1.13	F	86	1.16	F	97
Herring Road / Talavera Road	0.72	D	45	0.81	D	47
Herring Road / Waterloo Road	0.96	E	60	1.04	E	66
Khartoum Road / Talavera Road	0.81	B	29	0.92	C	30
Lane Cove / Talavera Road	1.63	F	337	1.63	F	344
Lane Cove / Waterloo Road	1.08	F	94	1.12	F	129

Deg Sat – Degree of saturation; LOS – Level of Service; Delay – Average vehicle delay

Table 14 Intersection Operation – Saturday Peak Hour

Intersection	Saturday Peak Hour					
	Base			Base + Proposal		
	Deg Sat	LOS	Delay (s)	Deg Sat	LOS	Delay (s)
Herring Road / Talavera Road	0.33	C	31	0.85	C	31
Herring Road / Waterloo Road	0.60	C	36	0.63	C	35

Deg Sat – Degree of saturation; LOS – Level of Service; Delay – Average vehicle delay

4.10.3 Conclusions

The traffic modelling indicates a number of intersections are forecast to function above their operational capacity in the forecast year 2026. At many intersections, even without an expansion of the Macquarie Centre, intersections were found to operate at Level of Service F. Therefore upgrades are required irrespective of any future development at the Macquarie Centre.

With the proposed development of Macquarie Centre, it is expected that average delays at these intersections would increase. It should be noted however that changes in delay as a result of the proposal are relatively minor and generally in the order of 10% or less. The exception to this is at already saturated intersections such as Epping Road / Herring Road and Lane Cove Road / Talavera Road where minor increases in traffic can result in significant increases in vehicle delays.

Importantly, the modelling indicates that the proposal does not result in any change to intersection level of service compared with the base scenario. For the Saturday peak hour, the intersections along Herring Road were found to continue to operate satisfactorily following the completion of the proposed expansion.

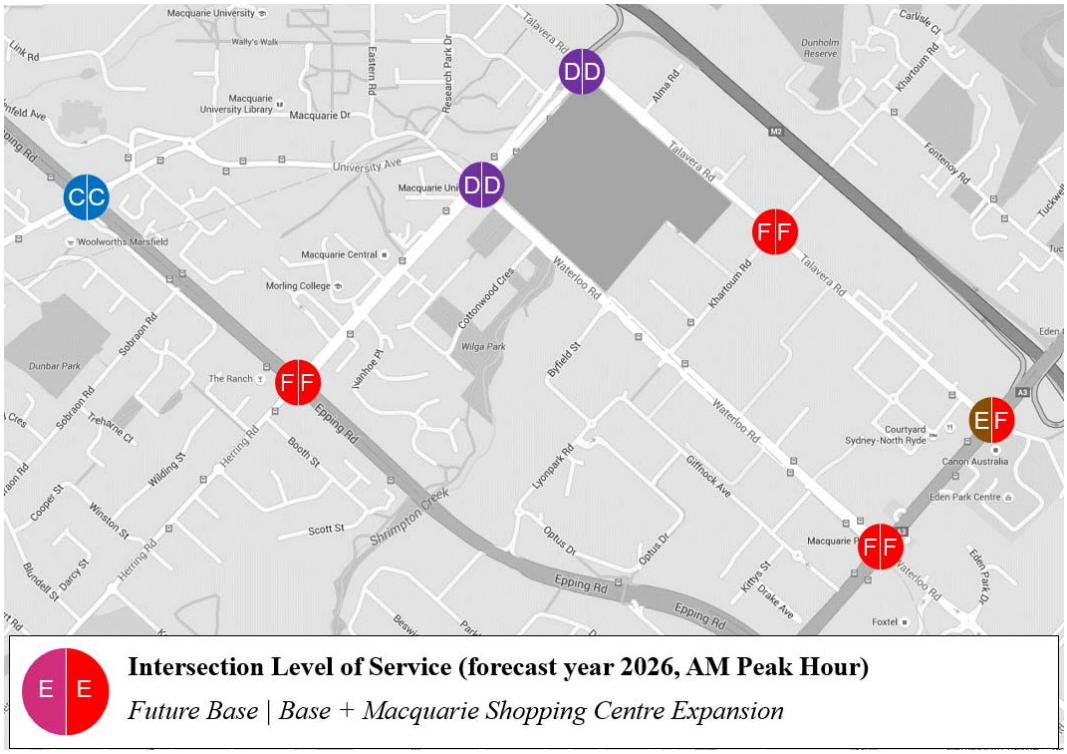


Figure 24 Intersection level of service – AM peak hour

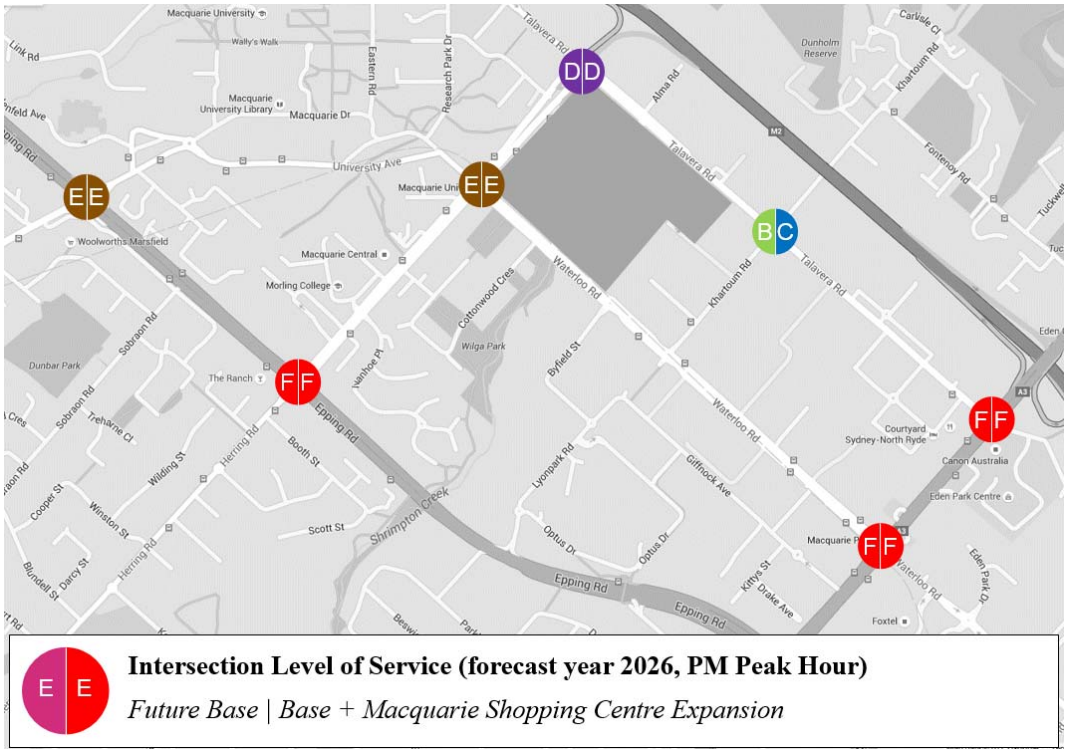


Figure 25 Intersection level of service – AM peak hour

4.10.4 Improvement Works

At this preliminary stage of the development process, improvement works have been identified at a number intersections where modelling forecasts these sites to operate above capacity in future years. Further investigation into these improvement works (including infrastructure works, signal optimisation, other mitigating measures) could be undertaken as the project progresses, and detailed in subsequent development applications, which further enhance the performance of the road network in the future. This would be undertaken in close consultation with key stakeholders such as City of Ryde Council, Roads and Maritime and Transport for NSW.

Potential improvements are listed in Table 15 below.

Table 15 Potential improvement works

Intersection	Potential Improvement Works
Epping Road / Balaclava Road	• Creation of an additional traffic lane on Balaclava Road on the southern approach to Epping Road. This would be achieved without road widening by narrowing the southbound general traffic lane in Balaclava Road between Epping Road and Koorong Street.
Epping Road / Herring Road	• Modify signal phasing to provide double diamond (currently split phasing on Herring Road approaches. This would be achieved by signalising the slip lane on the Epping Road north west approach. • Provide additional through lane on the Herring Road south west approach. This may require land acquisition from the adjacent Ranch Hotel. • Grade separation of the intersection, potentially including a tunnel for the right turn movement from Epping Road (south east) to Herring Road.
Herring Road / Talavera Road	• No upgrades considered necessary given intersection is modelled to operate at Level of Service D in future
Herring Road / Waterloo Road	• Provide an additional left turn lane on Herring Road south west by shifting existing central median across to reduce number of southbound departure lanes from three to two. • Provide dual right turn bay on Waterloo Road south east approach by shifting existing central median across to reduce number of eastbound departure lanes from three to two
Khartoum Road / Talavera Road	• Investigate modified signal phasing to provide shared through/right turn lane on Talavera Road north west approach
Lane Cove / Talavera Road	• Provide a staged pedestrian crossing on the south west approach of the intersection to reallocate green time to adjacent movements.
Lane Cove / Waterloo Road	• Remove one right turn lane on Lane Cove Road south west approach to enable diamond phasing arrangement on Waterloo Road approaches. • Provide additional traffic lane on Waterloo Road south east approach by shifting existing central median across to reduce number of eastbound departure lanes from three to two

5 Public Transport Assessment

5.1 Future Public Transport Demands

5.1.1 Rail demand

Transport for NSW provided forecasts of AM peak period (6.00 am to 9.30 am) train customer entries and exits for 2016, 2021 and 2036, including the impacts of the Herring Road Priority Precinct, as well as Metro North West and the subsequent Sydney Metro. These are summarised in Table 3 and show substantial growth forecast for station exits (that is, customers using the train to get to Macquarie Park) and more modest growth in customers entering the station in the morning peak (that is, customers getting on trains at Macquarie Park to go somewhere else).

The future forecasts in Table 3 are compared with latest existing data from 2013. This shows that by 2013, Macquarie University station was primarily a destination station, with more than double the number of customers leaving the station in the morning peak, than entering.

This destination role will continue to increase in importance, with 2036 forecasts showing that destination customers will outnumber outbound customers by more than 4 times. Destination customers will grow by 180% while outbound customers (who have origins in Macquarie Park) will increase by 75%.

Macquarie University station entries in 2013 are similar to:

- Waverton station (AM peak entries) and
- Kogarah station (AM peak exits)

By 2036, Macquarie University's demands will be similar to:

- Current Meadowbank station (AM peak entries)
- Current St Leonards station (AM peak exits)

Table 16 – Macquarie University station customer forecasts

Time	2013		2016		2021		2036	
	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
0600-0930	1,130	2,990	1,280	3,940	1,570	6,250	1,980	8,480

Source: Transport for NSW

5.1.2 Future bus demand

Transport for NSW provided forecasts for future bus spaces in the Herring Road bus station post-NWRL, to 2036. These forecasts were based on transport modelling for different growth scenarios for trips to and from Macquarie Park, with a medium long-term growth scenario adopted which included growth from the Herring Road Priority Precinct, the introduction of North West Metro and adoption of City of Ryde Council's 40% non-car mode Journey to Work target, comprising the following growth assumptions:

- 50% increase in bus trips
- 57% increase in peak hour services
- 2.7% growth per year in services

TfNSW identified the following bus space requirements in the bus station in 2019 (following introduction of the NWRL), 2026, and 2036 with Sydney Metro in place (see Table 17).

As the table shows, the current bus station capacity is considered adequate for post-NWRL operations to 2026, at which an additional space will be required (on opening of NWRL, some bus routes to Macquarie Park from the North West will be discontinued). By 2036, an additional 4 spaces will be required, for a total of 14 passenger bus stops in the bus station.

Table 17 – TfNSW Future Bus Space Requirements, Herring Road Bus Station

Year	AM peak hour bus flow	Bus spaces needed	Additional spaces required
2015	122	9	0
2019	150	9	0
2026	Not provided	10	1
2036	236	14	5

TfNSW's forecast assumes some reorganisation of bus routes to improve efficiency of the existing stops in the bus station, allowing a substantial increase in bus flows through to be accommodated without a need to expand the number of bus stops.

5.2 Macquarie Centre Interchange Improvements

To facilitate the Macquarie Centre expansion, the Macquarie Centre's 5 bus stops within the Herring Road bus station, largely on AMP property, will be reconfigured to improve bus-rail transfer distances and improve customer access to the reconfigured Herring Road frontage for the shopping centre and commercial and retail towers.

There will be no change to the existing bus stops in Herring Road outside the university; and in Waterloo Road south of Herring Road; and no change to the taxi rank in Herring Road, or the kiss & ride parking space in Herring Road outside the university.

The proposed bus station arrangements are illustrated in Figure 26.

As the figure shows, adjustments to the Herring Road median near Waterloo Road and closure of the shopping centre car park egress driveway on Herring Road near Waterloo Road will permit lengthening of lane 1 in Herring Road westbound and allow relocation of bus stops A to E some 60 metres closer to the Macquarie University station entrance. In this way the bus station stops will better serve bus-rail customers, as well as customers of the shopping centre and commercial and retail buildings of the proposed development.

There would be no change to bus routes accessing or egressing the bus station, and no change to the location or operation of other interchange modes, including kiss & ride and taxis. The bus layover space in the bus station would remain in its current location towards the eastern end.

The bus stops would be supported by bus shelters, seats and awnings that would also be consistent with the needs of a possible future enhancement of the Herring Road bus interchange.

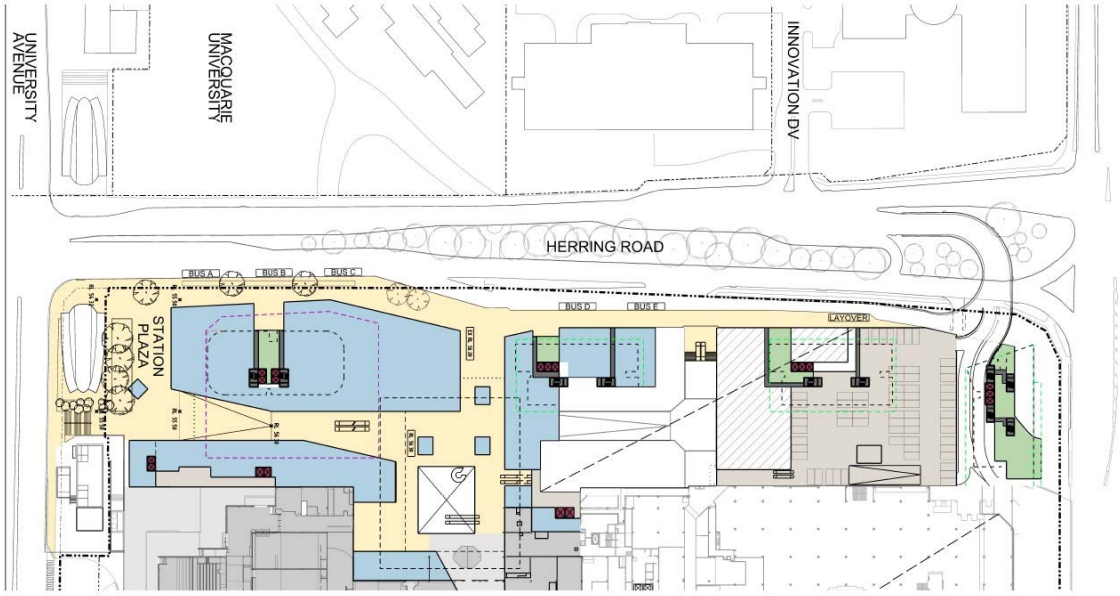


Figure 26 Proposed Herring Road Bus Station Arrangements

5.3 Public Transport Impacts

Public transport impacts of the proposed Macquarie Centre expansion include:

- The need to accommodate increased bus flows forecast by TfNSW to cater for expected increased passenger demand from the proposed development;
- Increased train and bus passenger demands from increased retail floorspace, as well as new commercial floorspace and residential units in the development proposal; and
- Ensuring associated changes to the bus station support the different functions of the bus station, including catering for intermodal transfer as well as access to adjacent activities.

5.3.1 Accommodation of increased bus flows

As indicated in this report, Transport for NSW has forecast future bus flows for the bus station following the introduction of North West Metro as a shuttle service between Cudgegong Road and Chatswood stations (assumed 2019) and in 2036, assuming operation of the full Sydney Metro between Cudgegong Road and Bankstown via the Sydney CBD.

The Transport for NSW forecasts take into account Ryde Council public transport growth targets and NSW Government projections for population and employment within the Herring Road Priority Precinct (of which the Macquarie Centre expansion proposal is a part).

As previously shown in Table 17, the existing 9 stops in the bus station would accommodate forecast future bus flows to 2025.

TfNSW has identified that the identified pedestrian-vehicle conflict at the pedestrian crossing of the Macquarie Centre bus roadway will need to be resolved to ensure efficient future operation of the bus station. This can be achieved by signalisation of the crossing (bus stop locations in the Macquarie Centre expansion bus station proposals would permit signalisation) or pedestrian grade separation, by other.

TfNSW, Macquarie University and AMP Capital are working together to investigate and develop options for eventual bus station expansion and improvements to ensure sufficient longer-term bus and customer capacity.

The impact of the proposed redevelopment has been taken into account in TfNSW bus route and network planning for the bus station with the North West Metro in place in 2019, and up to 2036. This work shows that the existing interchange stops in the interchange will be adequate to 2025.

5.3.2 Accommodation of passenger demand

Public transport patronage forecasting by TfNSW for Macquarie University interchange (including the Herring Road bus station) to 2036 includes development of the Herring Road Priority Precinct, of which the Macquarie Centre expansion is a part. The TfNSW forecasts indicate a 50 per cent increase in bus passenger trips in the bus station, meaning an increase from some 6,600 passenger boardings and alightings at the bus station stops per day, to 9,900 per day.

Based on bus stop occupancy surveys and calculations, the number of people expected to be waiting for a bus in the bus station at one time in the evening peak will increase to 138 people, or 28 people per stop in 2036.

Based on a Fruin level of service C for queuing areas, this would require some 111m^2 of waiting space by 2036.

Based on TfNSW growth rates, passenger activity in the bus station is expected to increase by 17 per cent over current levels by 2019. This would result in a PM peak waiting passenger accumulation of some 108 passengers, requiring some 87m^2 of waiting space.

By 2025, when the existing bus station bus stop provision is expected to be at capacity, it is estimated that bus passenger activity in the interchange would have grown by some 17 per cent, for an estimated PM peak waiting passenger accumulation of some 127 people, requiring some 101m^2 of waiting space.

The estimated passenger waiting space available in the Herring Road bus station under the Macquarie Centre expansion proposal would be some 474 m^2, leaving some 373m^2 (or 78 per cent of the available footpath space) for pedestrian circulation by 2025.

Passenger space in the proposed bus station would be ample for expected levels of demand up to 2025.

Future bus station expansion and improvement options being investigated by TfNSW, Macquarie University and AMP Capital are intended to accommodate future bus and passenger demands, as well as other activity associated with the Herring Road Priority Precinct and will be compatible with the Macquarie Centre expansion.

5.3.3 Interchange function

As indicated elsewhere in this report the Macquarie Centre transport interchange performs two important functions:

- Facilitating intermodal transfer, particularly between bus and train; and
- Providing access to workers, students and other visitors to the precinct, including the Macquarie Centre and Macquarie University.

The relocation of bus stops A to E as part of the Macquarie Centre redevelopment proposal will:

- Move bus stops closer to the Macquarie University station entrance by 60 metres, reducing walking distance for intermodal customers;
- Improve the relationship of the bus stops to the entrances to the shopping centre, and the commercial and residential tower lobbies, promoting bus access and providing convenient access to bus stops for residents, workers and other visitors to the development.

Other interchange components, including taxi rank and kiss & ride parking, will not be affected by the development.

5.4 Conclusions

As part of the expansion of Macquarie Centre, bus stops in the Herring Road bus station will be relocated to improve bus-train customer transfer distance, and to improve the relationship of the bus stops to the shopping centre and residential and commercial towers proposed as part of the development.

The capacity of the bus station will be adequate to 2025 (beyond 2019 interchange improvements which are expected to be identified by TfNSW in association with AMP Capital and Macquarie University) for both expected bus flows and bus passengers.

There will be no other changes to taxi ranks and kiss & ride parking as part of the proposed redevelopment.

Passenger forecasting and bus service and network planning for the Herring Road bus station has included the impacts of the Herring Road Priority Precinct (of which the proposed Macquarie Centre expansion is a part) as well as the North West and Sydney Metro projects (the first of which is under construction).

6 Transport Assessment

6.1 Access Arrangements

Access to the shopping centre will be maintained via the existing driveways onto Herring Road, Talavera Road and Waterloo Road. In association with the proposed expansion to the shopping centre, the following changes to access are proposed:

- A new entry driveway to the new tower parking (commercial and/or residential parking) will be provided off Talavera Road east of Herring Road;
- One new loading dock access driveway and a reconfigured existing loading dock access driveway will be provided off Talavera Road, between Herring Road and Link Road.
- Removal of the existing car park exit driveway onto Herring Road, located to the north of Waterloo Road.
- An additional exit lane on the Link Road approaches to the traffic signal controlled intersections with Waterloo Road and Talavera Road

Access arrangements, including internal circulation and design issues, are discussed in further detail in the internal traffic and parking report prepared by Colston Budd Rogers & Kafes (Appendix C).

6.2 Parking Provision

The following section outlines the proposed parking arrangements serving the Macquarie Centre, undertaken by Colston Budd Rogers & Kafes and detailed in Appendix C.

6.2.1 Retail Car Parking

The existing shopping centre provides some 4,755 parking spaces. With some 136,300m^2 GLA, this is a provision of 3.5 spaces per 100m^2 GLA. Analysis indicates that that provision of additional retail parking at the existing rate would satisfactorily cater for the parking generated by the expanded retail area. On this basis the expanded retail area (some 39,700m^2 GLA) would require an additional 1,390 parking spaces. Parking for the expanded retail area will be provided at a rate of 3.5 spaces/100m^2 GLA. Appropriate disabled and bicycle parking will be provided in accordance with Council requirements.

6.2.2 Residential Car Parking

For the high density residential component, parking will be provided consistent with the City of Ryde DCP 2014 rates as set out below:

- 0.6 spaces per one bedroom dwelling;
- 0.9 spaces per two bedroom dwelling; and
- 1.4 spaces per three bedroom dwelling

Visitor parking would be provided at a rate of 1 space per 10 units. Any additional visitor parking could be accommodated within the main retail car park, noting the sites close proximity to the rail station/bus interchange and that peak visitor parking would occur at night when retail parking demand is lower.

6.2.3 Commercial

For the commercial component, on-site parking has been constrained to minimise traffic generation and encourage travel to/from work by public transport (noting the sites close proximity to the rail station/bus interchange). A total of 300 on-site parking spaces are proposed, a rate of one space per 158m^2 GFA. This is lower than the rate of 1 space per 80m^2 GFA set out in DCP 2014.

It should be noted that Council has resolved to amend their commercial parking rates for the Macquarie Park corridor down to 1 space per 100m^2 GFA. The reduced parking rate for the Macquarie Centre is considered appropriate given the site's close proximity to nearby public transport and the overall objective of reducing peak hour traffic generation – aligning with City of Ryde's mode share target of 40% non-car trips for journeys to work.

6.3 Pedestrians

The Macquarie Centre already has good pedestrian access from the surrounding area. The proposed development involves the provision of two new improved access points to the shopping centre along the Herring Road frontage, in close proximity to the Macquarie University railway station and bus interchange. This is particularly important for the new residents and commercial workers within the development. The proposal also involves improved internal circulation and connectivity for pedestrians.

6.4 Car Share

The Macquarie Park DCP notes that 1 car share space should be provided for every 50 proposed residential parking spaces. The quantum and location of car share spaces within the Macquarie Centre will be confirmed in subsequent development applications.

6.5 Cyclists

Secure on-site bicycle parking and end of trip facilities (e.g. lockers and change rooms) will be provided for the new residents and commercial workers in the precinct.

AMP Capital are currently investigating the provision of additional bicycle parking spaces in the public domain for use of visitors to the precinct. The quantum and location of these spaces will be detailed in subsequent development applications following close consultation with City of Ryde Council and Transport for NSW. It is important a 'whole of precinct' approach is considered when assessing the requirement for visitor bicycle parking – given the shopping centre's proximity to the bus and rail interchange. There may be opportunities for sharing of spaces given commuter demand will be highest on weekday morning and afternoon, with demand from the shopping centre highest on weekends.

6.6 Vehicle Servicing / Loading

Existing loading areas will be reconfigured and additional loading areas will be provided as part of the Stage 1 DA to service the additional retail and commercial/residential areas. Two new loading areas are proposed which are further detailed in in the internal traffic and parking report prepared by Colston Budd Rogers & Kafes (Appendix C). These areas are as follows:

- Northern loading area to service the existing department store and new retail area. This loading area would be located immediately west of Link Road and would have left in/left out access from Talavera Road
- Western loading areas to service new retail area located adjacent to Herring Road and the new commercial/residential towers.

6.7 Framework Travel Plan

The Macquarie Centre will be easily accessible for employees, residents and visitors through a number of different transport modes. This can be enforced through the introduction of a suite of travel demand management measures contained within a framework travel plan (FTP). The primary purpose of the Framework Travel Plan measures is to achieve the target mode split for journey to work trips of 40% public transport / 60% private vehicle for the new residents and commercial workers within the Macquarie Centre.

The main objectives of the FTP are to reduce the need to travel and promotion of sustainable means of transport. The implementation of a FTP would address travel demand and sustainable travel initiatives for the residential, commercial and retail components of the Macquarie Centre, and would bring benefits such as:

- Residents and employees can enjoy improved health, less stress, a better quality of life, cost and time savings, and greater travel choice;
- Reduced traffic congestion;
- Benefit from improved air quality, less noise and pollutants; and
- Deliver health benefits, tackle obesity and improve residents quality of life

The FTP details proposed initiatives to encourage sustainable travel alternatives. The FTP is catered to residents, visitors and staff of the Macquarie Centre. The FTP also includes aspects of monitoring and administration to ensure the schemes are executed and improved over time.

A detailed Framework Travel Plan is provided in Appendix D of this document.

6.8 Construction Traffic Management

Details regarding arrangements for construction traffic management is provided in the internal traffic and parking report prepared by Colston Budd Rogers & Kafes (Appendix C). As a general principle, construction of the proposed development will be staged to minimise traffic effects and to maintain the continued operation of the shopping centre during the period of construction. Pedestrian activity on adjacent streets including Talavera Road, Waterloo Road and Herring Road will be protected with the provision of appropriate construction barriers.

The overall principles for traffic management during construction of the development will include:

- Maintain appropriate parking for customers, associated with the on-going operation of the centre;
- Maintain access to properties located in the vicinity of the site at all times during the construction process;
- Maintain access for delivery vehicles associated with the continued operation of the shopping centre;
- Manage and control construction traffic movements on the adjacent road network and vehicles movements to and from the construction site;
- Trucks to enter and exit the site in a forward direction;
- Maintain traffic capacity in the vicinity of the site;
- Restrict construction vehicle activity to designated truck routes through the area;
- Construction access driveways and on-street work zones to be managed and controlled by site personnel;
- Provide a convenient and appropriate environment for pedestrians;
- Maintain convenient access and circulation for public transport;
- Pedestrian movements adjacent to construction activity, across construction access driveways and to/from public transport facilities along Herring Road and to/from the various on-site car parking areas will be managed and controlled by site personnel;
- Traffic marshals will manage and control traffic movements on the surrounding road network adjacent to the shopping centre to ensure appropriate access to adjacent properties and to maintain two-way access at all times during the construction period; and
- Pedestrian warning signs and construction safety signs/devices to be utilised in the vicinity of the site and to be provided in accordance with WorkCover requirements;
- Construction activity to be carried out in accordance with Council's approved hours of work.

7 Summary

This transport management and accessibility plan has been prepared on behalf of AMP Capital (AMPC) in support of a Stage 1 Development Application (DA) to be submitted to the City of Ryde Council. The Stage 1 seeks concept plan approval for the expansion of Macquarie Centre by establishing:

- Building envelopes and design parameters for future development on the site, including the proposed uses within the podium and tower components.
- The distribution of floor space across the site.
- Future pedestrian and vehicle connections to and within the site.

Key findings of the assessment in relation to transport are as follows:

- Access arrangements will be modified to account for changes in parking layouts, changes to the surrounding road network and to accommodate the additional traffic generated by the Stage 1 DA
- Retail parking will be provided at the same rate as currently provided for the shopping centre, residential parking consistent with the City of Ryde DCP 2014 rates and commercial parking constrained due to the site's good proximity to nearby public transport.
- Traffic modelling indicates a number of intersections are forecast to function above their operational capacity in the forecast year 2026. At many intersections, even without an expansion of the Macquarie Centre, intersections were found to operate at Level of Service F. Therefore upgrades are required irrespective of any future development at the Macquarie Centre.
- The modelling indicates that the proposal does not result in any change to intersection level of service compared with the base scenario. For the Saturday peak hour, the intersections along Herring Road were found to continue to operate satisfactorily following the completion of the proposed expansion.
- At this preliminary stage of the development process, improvement works have been identified at a number intersections. Further investigation into these improvement works could be undertaken as the project progresses in consultation with key stakeholders.
- Bus stops in the Herring Road bus station will be relocated to improve bus-train customer transfer distance, and to improve the relationship of the bus stops to the shopping centre and residential and commercial towers proposed as part of the development. The capacity of the bus station will be adequate to 2025 for both expected bus flows and bus passengers.
- Secure on-site bicycle parking and end of trip facilities (e.g. lockers and change rooms) will be provided for the new residents and commercial workers in the precinct.

Appendix A

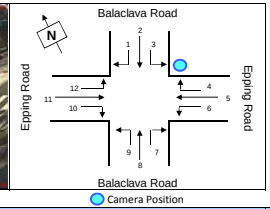
Base Traffic Model Calibration / Validation Report

Intersection of Epping Road and Balaclava Road

Thursday, 1 August 2013

Austraffic

Survey Start	7:00 AM 15:30 PM
Intersection Type	Cross Junction
Intersection No.	5
North Approach	Balaclava Road
East Approach	Epping Road
South Approach	Balaclava Road
West Approach	Epping Road
Date	1/08/13
Classification	Light Heavy Bus



Camera Position

TIME PERIOD	VEHICLE MOVEMENT 1				2				3				4				5				6			
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
7:00 - 7:15	4	0	3	7	6	0	1	7	2	0	0	2	11	1	0	12	136	4	3	143	30	0	0	30
7:15 - 7:30	2	0	3	5	9	2	3	14	4	0	0	4	23	0	0	23	142	4	6	152	60	2	0	62
7:30 - 7:45	2	0	6	8	15	0	1	16	4	0	1	5	22	0	1	23	163	6	6	175	56	5	0	61
7:45 - 8:00	2	0	2	4	4	0	1	5	5	0	0	5	33	0	0	33	170	4	6	180	61	0	2	63
8:00 - 8:15	8	0	5	13	14	0	2	16	7	0	0	7	39	0	1	40	151	5	2	158	62	5	2	69
8:15 - 8:30	6	0	1	7	12	0	2	14	5	0	0	5	64	0	0	64	173	6	6	185	58	3	0	61
8:30 - 8:45	9	0	7	16	15	1	1	17	9	0	0	9	70	1	0	71	162	6	4	172	47	1	1	49
8:45 - 9:00	7	0	3	10	11	0	1	12	5	0	0	5	77	1	0	78	133	6	4	143	54	2	0	56
9:00 - 9:15	7	0	4	11	18	0	1	19	3	1	0	4	36	0	0	36	139	3	4	146	54	2	0	56
9:15 - 9:30	11	0	5	16	15	0	2	17	10	0	1	11	45	0	0	45	105	7	5	117	45	1	6	52
9:30 - 9:45	3	0	1	4	13	0	1	14	10	1	0	11	50	0	0	50	183	5	3	191	61	2	3	66
9:45 - 10:00	16	0	3	19	22	0	1	23	13	0	0	13	53	0	0	53	128	16	4	148	60	0	0	60
Σ	77	0	43	120	154	3	17	174	77	2	2	81	523	3	2	528	1785	72	53	1910	648	23	14	685

TIME PERIOD	VEHICLE MOVEMENT 7				8				9				10				11				12				GRAND TOTAL			
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
7:00 - 7:15	120	4	0	124	27	3	1	31	3	1	0	4	7	1	0	8	512	10	2	524	27	0	7	34	885	24	17	926
7:15 - 7:30	166	4	0	170	58	0	2	60	7	1	0	8	13	0	0	13	466	6	5	477	19	2	1	22	969	21	20	1010
7:30 - 7:45	153	3	2	158	61	0	2	63	6	0	0	6	20	0	0	20	495	5	5	505	47	0	3	50	1044	19	27	1090
7:45 - 8:00	168	3	0	171	80	0	2	82	11	1	0	12	14	1	0	15	432	3	3	438	48	1	4	53	1028	13	20	1061
8:00 - 8:15	136	4	0	140	77	0	0	77	4	0	0	4	22	0	0	22	404	7	5	416	65	0	3	68	989	21	20	1030
8:15 - 8:30	172	1	0	173	96	0	2	98	4	1	0	5	19	0	0	19	380	1	4	385	82	0	3	85	1071	12	18	1101
8:30 - 8:45	158	1	0	159	91	0	3	94	9	0	0	9	26	0	0	26	382	3	2	387	55	0	9	64	1033	13	27	1073
8:45 - 9:00	156	2	0	158	78	0	2	80	9	1	0	10	16	0	1	17	378	5	2	385	52	0	7	59	976	17	20	1013
9:00 - 9:15	130	3	1	134	95	0	2	97	15	1	0	16	20	0	0	20	407	7	4	418	58	1	6	65	982	18	22	1022
9:15 - 9:30	155	2	0	157	55	0	2	57	9	0	0	9	27	3	0	30	355	5	2	362	49	2	5	56	877	24	28	929
9:30 - 9:45	120	5	0	125	49	0	1	50	11	0	0	11	18	1	0	19	375	7	6	388	53	0	2	55	946	21	17	984
9:45 - 10:00	123	4	0	127	55	0	2	57	12	0	0	12	18	1	0	19	310	3	2	315	51	0	5	56	861	24	17	902
Σ	1753	40	3	1796	822	3	21	846	100	6	0	106	220	7	1	228	4896	62	42	5000	606	6	55	667	11661	227	253	12141

TIME PERIOD	VEHICLE MOVEMENT 1				2				3				4				5				6			
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
15:30 - 15:45	46	0	3	49	33	1	2	36	26	0	0	26	19	0	1	20	360	5	0	365	137	8	0	145
15:45 - 16:00	44	0	5	49	45	1	3	49	38	0	1	39	21	0	0	21	384	3	1	388	135	2	0	137
16:00 - 16:15	57	0	4	61	60	0	3	60	51	0	0	51	15	0	0	15	371	5	5	381	145	0	0	145
16:15 - 16:30	61	0	3	64	50	0	3	53	27	1	0	28	13	0	0	13	342	5	2	349	177	2	1	180
16:30 - 16:45	56	0	4	60	72	0	2	74	29	0	0	29	20	0	0	20	347	4	3	354	160	4	0	164
16:45 - 17:00	48	0	5	53	64	0	1	65	31	0	0	31	12	0	0	12	285	6	1	292	157	0	0	157
17:00 - 17:15	67	0	5	72	68	0	2	70	55	0	0	55	15	0	0	15	330	1	2	333	167	5	0	172
17:15 - 17:30	50	0	3	53	81	0	3	84	44	0	0	44	13	0	0	13	302	4	0	306	141	3	0	144
17:30 - 17:45	45	0	3	48	60	0	0	60	26	0	0	26	15	0	0	15	302	2	4	308	162	1	0	163
17:45 - 18:00	57	0	5	62	67	0	3	70	30	0	0	30	22	0	1	23	324	6	1	331	157	0	1	158
18:00 - 18:15	44	0	4	48	71	0	1	72	33	0	0	33	18	0	2	20	295	0	4	299	138	0	0	138
18:15 - 18:30	37	0	8	45	47	0	2	49	25	0	0	25	8	0	0	8	335	2	2	339	129	0	0	129
Σ	612	0	52	664	718	2	22	742	415	1	1	417	191	0	4	195	3977	43	25	4045	1805	25	2	1832

TIME PERIOD	VEHICLE MOVEMENT 7				8				9				10				11				12				GRAND TOTAL			
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
15:30 - 15:45	84	1	0	85	23	0	1	24	36	1	0	37	24	0	0	24	215	3	3	221	15	1	5	21	1018	20	15	1053
15:45 - 16:00	68	0	1	69	21	1	1	23	29	0	0	29	35	0	0	35	196	0	1	197	23	0	4	27	1029	7	23	1059
16:00 - 16:15	85	0	0	85	24	0	4	28	30	0	0	30	33	0	0	33	210	3	3	216	13	0	2	15	1094	8	18	1120
16:15 - 16:30	84	0	0	84	22	0	3	25	20	0	0	20	24	1	1	26	225	1	2	228	16	2	4	22	1061	12	19	1092
16:30 - 16:45	82	1	1	84	26	0	3	29	23	0	0	23	36	0	0	36	196	1	4	200	21	1	5	27	1067	11	22	1100
16:45 - 17:00	71	3	0	74	31	0	1	32	33	0	0	33	26	1	0	27	210	1	2	222	19	0	3	22	996	11	13	1020
17:00 - 17:15	79	0	0	79	23	0	2	25	24	0	0	24	41	0	0	41	224	2	2	228	20	0	3	23	1113	8	16	1137
17:15 - 17:30	85	0	0	85	32	0	3	35	22	0	0	22	41	1	0	42	248	2	2	252	17	0	5	22	1076	10	16	1102
17:30 - 17:45	85	0	1	86	34	0	2	36	27	1	0	28	45	0	0	45	176	0	2	178	26	0	5	31	1003	4	17	1024
17:45 - 18:00	75	0	0	75	35	0	2	37	34	0	0	34	33	0	0	33	184	1	1	186	25	0	0	25	1043	7	14	1064
18:00 - 18:15	85	0	0	85	26	0	2	28	37	0	0	37	30	0	0	30	207	1	7	215	19	0	3	22	1009	1	23	1027
18:15 - 18:30	92	1	0	93	17	0	2	19	33	0	0	33	30	0	0	30	251	0	2	253	12	0	5	17	1016	3	21	1040
Σ	975	6	3	984	314	1	26	341	344	2	0	346	398	3	1	402	2544	15	37	2596	226	4	44	274	12519	102	217	12838

HOURLY FLOW

TIME PERIOD	VEHICLE MOVEMENT 1				2				3				4				5				6			
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
7:00 - 8:00	10	0	14	24	34	2	6	42	15	0	1	16	89	1	1	91	611	18	21	650	207	7	2	216
7:15 - 8:15	14	0	14	28	42	2	6	50	20	0	1	21	120	1	1	122	629	19	20	668	228	9	3	240
7:30 - 8:30	18	0	16	34	45	1	8	54	21	1	1	23	158	1	2	161	657	21	20	698	237	13	4	254
7:45 - 8:45	25	0	15	40	45	0	8	53	26	0	1	27	206	1	1	208	656	21	18	695	228	9	5	242
8:00 - 9:00	30	0	16	46	52	1	8	61	26	0	0	26	250	2	1	253	619	23	16	658	221	11	3	235
8:15 - 9:15	29	0	15	44	56	1	8	65	22	1	0	23	247	2	0	249	607	21	18	646	213	8	1	222
8:30 - 9:30	34	0	16	50	59	1	9	69	27	1	1	29	228	2	0	230	539	22	17	578	200	6	7	213
8:45 - 9:45	38	0	14	52	59	1	9	69	28	1	1	30	206	2	0	208	560	21	16	597	210	5	8	223
9:00 - 10:00	37	0	13	50	68	0	5	73	36	2	1	39	184	0	0	184	555	31	16	602	220	5	9	234

TIME PERIOD	VEHICLE MOVEMENT 7				8				9				10				11				12				GRAND TOTAL				
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	
7:00 - 8:00	607	14	2	623	226	3	7	236	27	3	0	30	54	2	0	56	1905	24	15	1944	141	3	15	159	3926	77	84	4087	
7:15 - 8:15	629	11	2	642	314	0	6	320	28	2	0	30	69	1	0	70	1791	21	18	1830	142	3	16	161	4028	74	85	4187	
7:30 - 8:30	629	11	2	642	314	0	6	320	28	2	0	30	75	1	0	76	1711	16	17	1744	142	1	13	156	4132	65	88	4285	Peak
7:45 - 8:45	634	9	0	643	344	0	7	351	28	2	0	30	81	1	0	82	1595	14	14	1623	250	1	19	270	4121	59	85	4265	
8:00 - 9:00	650	9	0	659	342	0	7	349	26	3	0	29	83	1	0	84	1544	16	13	1573	244	0	22	266	4060	63	85	4217	
8:15 - 9:15	616	7	1	624	360	0	9	369	37	3	0	40	81	0	1	82	1547	16	12	1575	247	1	25	273	4062	60	87	4209	
8:30 - 9:30	595	12	1	608	319	0	9	328	42	2	0	44	89	3	1	93	1522	20	10	1552	214	3	27	244	3868	72	97	4037	
8:45 - 9:45	574	12	1	587	294	0	8	302	41	2	0	43	96	3	1	100	1515	24	11	1550	212	3	30	245	3781	80	97	3948	
9:00 - 10:00	524	18	1	543	254	0	7	261	47	1	0	48	83	5	0	88	1447	22	14	1483	211	3	18	232	3666	87	84	3837	

TIME PERIOD	VEHICLE MOVEMENT 1				2				3				4				5				6			
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
15:30 - 16:30	208	0	16	223	188	2	8	198	142	1	1	144	68	0	1	69	1467	19	8	1493	594	12	1	607
15:45 - 16:45	218	0	16	234	227	1	8	236	145	1	1	147	68	0	0	68	1444	17	11	1472	617	8	1	626
16:00 - 17:00	222	0	16	238	246	0	8	252	138	1	0	139	60	0	0	60	1345	20	11	1376	639	6	1	646
16:15 - 17:15	232	0	17	249	254	0	8	262	142	1	0	143	60	0	0	60	1304	16	8	1328	661	11	1	673
16:30 - 17:30	221	0	17	238	285	0	8	293	150	0	0	150	60	0	0	60	1264	15	6	1285	625	12	0	637
16:45 - 17:45	210	0	16	226	273	0	8	281	156	0	0	156	55	0	0	55	1219	13	7	1239	627	9	0	636
17:00 - 18:00	219	0	16	235	276	0	8	284	155	0	0	155	65	0	1	66	1258	13	7	1278	627	9	1	637
17:15 - 18:15	196	0	15	211	279	0	7	286	133	0	0	133	68	0	3	71	1223	12	9	1244	598	4	1	603
17:30 - 18:30	183	0	20	203	245	0	6	251	114	0	0	114	63	0	3	66	1256	10	11	1277	986	1	1	988

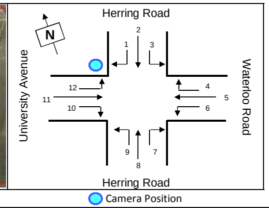
TIME PERIOD	VEHICLE MOVEMENT 7				8				9				10				11				12				GRAND TOTAL				
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	
15:30 - 16:30	321	1	1	323	90	1	0	91	109	1	0	110	111	1	0	112	840	7	15	862	67	3	15	85	4202	47	75	4324	
15:45 - 16:45	319	1	2	322	93	1	11	105	98	0	0	98	128	1	1	130	820	5	16	841	73	3	15	91	4251	38	82	4371	Peak
16:00 - 17:00	322	4	1	327	103	0	11	114	106	0	0	106	119	2	1	122	849	6	11	866	69	3	14	86	4218	42	72	4332	
16:15 - 17:15	316	4	1	321	102	0	9	111	100	0	0	100	127	2	1	130	863	5	10	878	76	3	15	94	4237	42	70	4349	
16:30 - 17:30	317	4	1	322	112	0	9	121	102	0	0	102	144	2	0	146	886	6	10	902	77	1	16	94	4252	40	67	4359	
16:45 - 17:45	320	4	1	325	120	0	9	129	106	1	0	107	153	2	0	155	907	5	9	921	82	1	16	99	4198	37	62	4283	
17:00 - 18:00	324	0	1	325	124	0	9	133	107	1	0	108	160	2	0	162	832	5	7	844	88	0	13	101	4235	29	63	4327	
17:15 - 18:15	330	1	0	331	127	0	9	136	120	1	0	121	149	1	0	150	815	4	12	831	87	0	13	100	4125	22	70	4217	
17:30 - 18:30	337	1	1	339	112	0	9	120	131	1	0	132	138	0	0	138	818	2	12	832	82	0	13	95	4065	15	73	4155	

Intersection of Waterloo Road,University Avenue and Herring Road

Thursday, 1 August 2013

Austraffic

Survey Start	7:00 AM	15:30 PM
Intersection Type	Cross Junction	
Intersection No.	3	
North Approach	Herring Road	
East Approach	Waterloo Road	
South Approach	Herring Road	
West Approach	University Avenue	
Date	1/08/13	
Classification	Light Heavy Bus	



TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
7:00 - 7:15	5	0	6	11	15	0	3	18	13	1	15	29	24	5	10	39	12	0	1	13	20	2	0	22
7:15 - 7:30	8	0	10	18	22	1	1	24	17	3	11	31	15	2	13	30	29	0	1	30	18	1	0	19
7:30 - 7:45	8	1	5	14	31	0	5	36	26	1	12	39	24	2	10	36	30	0	2	32	23	4	0	27
7:45 - 8:00	13	0	6	19	23	0	4	27	24	2	13	39	26	1	9	36	39	1	1	41	18	0	1	19
8:00 8:15	16	0	10	26	27	0	5	32	29	0	12	41	16	0	14	30	51	0	0	51	25	2	2	29
8:15 8:30	12	0	8	20	24	0	1	25	35	1	10	46	34	5	14	53	64	0	0	64	29	3	1	33
8:30 8:45	11	0	6	17	23	0	7	30	31	1	17	49	32	1	17	50	54	0	1	55	30	0	0	30
8:45 9:00	19	0	9	28	16	2	3	21	21	1	11	33	30	0	9	39	68	1	0	69	27	3	1	31
9:00 - 9:15	19	0	12	31	26	0	6	32	18	1	12	31	35	0	19	54	64	0	2	66	38	1	0	39
9:15 - 9:30	12	0	10	22	25	1	5	31	26	0	13	39	36	2	18	56	56	0	1	57	28	1	1	30
9:30 - 9:45	17	0	3	20	30	2	2	34	22	3	12	37	51	0	11	62	50	0	1	51	30	1	1	32
9:45 10:00	14	0	13	27	26	2	1	29	24	1	9	34	53	2	10	65	86	0	0	86	53	0	1	54
Σ	154	1	98	253	288	8	43	339	286	15	147	448	376	20	154	550	603	2	10	615	339	18	8	365

TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ
7:00 - 7:15	71	2	0	73	83	3	4	90	15	1	0	16	8	0	0	8	18	0	0	18	5	1	12	18	289	15	51	355
7:15 - 7:30	110	1	0	111	102	0	3	105	18	1	0	19	12	0	0	12	28	2	0	30	11	0	5	16	390	11	44	445
7:30 - 7:45	116	2	0	118	119	0	4	123	39	1	1	41	7	0	0	7	39	0	0	39	8	1	7	16	470	12	46	528
7:45 - 8:00	144	5	0	149	154	1	4	159	57	0	0	57	14	0	0	14	38	1	0	39	22	0	10	32	572	11	48	631
8:00 8:15	172	1	0	173	142	0	3	145	42	1	0	43	16	2	0	18	66	1	0	67	21	0	9	30	623	7	55	685
8:15 8:30	142	1	0	143	143	3	3	149	53	2	0	55	17	0	1	18	60	0	0	60	20	0	8	28	633	15	46	694
8:30 8:45	195	2	0	197	160	3	3	166	63	0	0	63	14	0	0	14	41	1	0	42	17	0	9	26	671	8	60	739
8:45 9:00	180	1	1	182	148	2	5	155	76	1	0	77	9	0	0	9	51	0	0	51	21	1	13	35	666	12	52	730
9:00 - 9:15	145	1	0	146	143	2	2	147	57	0	0	57	9	0	0	9	39	0	3	42	22	1	13	36	615	6	69	690
9:15 - 9:30	113	1	0	114	166	2	4	172	57	0	0	57	11	0	0	11	20	1	0	21	12	3	8	23	562	11	60	633
9:30 - 9:45	82	5	1	88	166	4	0	170	53	0	0	53	10	0	0	10	23	0	2	25	17	0	8	25	551	15	41	607
9:45 10:00	96	3	0	99	148	0	6	154	48	1	0	49	14	0	0	14	22	0	1	23	11	0	9	20	595	9	50	654
Σ	1566	25	2	1593	1674	20	41	1735	578	8	1	587	141	2	1	144	445	6	6	457	187	7	111	305	6637	132	622	7391

TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
15:30 - 15:45	16	0	6	22	88	1	5	94	28	0	10	38	50	0	8	58	39	1	1	41	106	0	0	106
15:45 - 16:00	12	0	14	26	76	1	5	82	26	2	11	39	49	0	0	49	62	1	1	64	132	1	1	134
16:00 - 16:15	20	0	9	29	112	0	4	116	26	1	11	38	58	1	11	70	52	0	2	54	164	2	2	168
16:15 - 16:30	17	0	8	25	95	0	5	100	26	1	10	37	76	0	8	84	45	0	0	45	130	2	2	134
16:30 - 16:45	24	0	13	37	112	0	4	116	30	0	12	42	54	2	11	67	53	0	1	54	154	4	1	159
16:45 - 17:00	15	0	7	22	88	0	6	94	26	0	15	41	73	0	18	91	62	0	3	65	161	1	0	162
17:00 - 17:15	23	0	10	33	114	0	3	117	28	1	19	48	93	1	10	104	52	0	1	53	190	0	1	191
17:15 - 17:30	25	0	6	31	89	0	6	95	31	0	13	44	52	0	13	65	69	0	3	72	158	1	1	160
17:30 - 17:45	25	0	8	33	95	0	5	100	18	0	9	27	62	0	11	73	66	0	1	67	131	1	2	134
17:45 - 18:00	31	0	9	40	75	0	3	78	27	0	14	41	67	0	11	78	59	0	1	60	128	0	1	129
18:00 - 18:15	27	0	8	35	77	0	2	79	23	0	15	38	55	2	12	69	47	0	1	48	125	0	0	125
18:15 - 18:30	10	0	12	22	79	0	3	82	34	1	12	47	79	0	17	96	45	0	2	47	116	0	0	116
Σ	245	0	110	355	1100	2	51	1153	323	6	151	480	768	6	130	904	651	2	17	670	1695	12	11	1718

TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ
15:30 - 15:45	56	0	0	56	122	1	4	127	19	0	0	19	29	0	0	29	36	2	0	38	35	0	11	46	624	5	45	674
15:45 - 16:00	57	0	0	57	123	1	5	129	14	0	0	14	25	0	0	25	48	0	1	49	37	0	10	47	661	6	48	715
16:00 - 16:15	28	0	0	28	112	1	0	113	14	0	0	14	51	0	0	51	72	0	0	72	43	0	10	53	752	5	49	806
16:15 - 16:30	56	0	1	57	122	0	4	126	23	0	0	23	31	0	0	31	37	1	0	38	38	0	12	50	696	4	50	750
16:30 - 16:45	54	1	0	55	141	2	7	150	25	0	0	25	48	0	0	48	48	1	0	49	41	0	9	50	784	10	58	852
16:45 - 17:00	42	1	0	43	127	0	2	129	19	0	0	19	37	0	0	37	51	0	0	51	38	0	9	47	739	2	60	801
17:00 - 17:15	46	0	0	46	147	0	2	149	24	0	0	24	53	0	0	53	74	0	0	74	56	0	14	70	900	2	60	962
17:15 - 17:30	63	0	0	63	171	0	3	174	27	0	0	27	56	0	0	56	53	0	0	53	39	0	13	52	833	1	58	892
17:30 - 17:45	57	0	0	57	138	0	4	142	18	0	0	18	43	0	0	43	65	0	0	65	43	0	10	53	761	1	50	812
17:45 - 18:00	53	0	0	53	156	3	3	162	17	0	0	17	29	0	0	29	62	0	0	62	51	0	7	58	755	3	49	807
18:00 - 18:15	50	1	0	51	167	0	4	171	17	0	0	17	43	0	0	43	71	0	0	71	53	0	12	65	755	3	54	812
18:15 - 18:30	72	0	0	72	205	0	3	208	18	0	0	18	50	0	0	50	36	0	0	36	28	0	6	34	772	1	55	828
Σ	634	3	1	638	1731	8	41	1780	235	0	0	235	495	0	0	495	653	4	1	658	502	0	123	625	9032	43	636	9711

HOURLY FLOW

TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
7:00 - 8:00	34	1	27	62	91	1	13	105	80	7	51	138	89	10	42	141	110	1	5	116	79	7	1	87
7:15 - 8:15	45	1	31	77	103	1	15	119	96	6	48	150	81	5	46	132	149	1	4	154	84	7	3	94
7:30 - 8:30	49	1	29	79	105	0	15	120	114	4	47	165	100	8	47	155	184	1	3	188	95	9	4	108
7:45 - 8:45	52	0	30	82	97	0	17	114	119	4	52	175	108	7	54	169	208	1	2	211	102	5	4	111
8:00 - 9:00	58	0	33	91	90	2	16	108	116	3	50	169	112	6	54	172	237	1	1	239	111	8	4	123
8:15 - 9:15	**61**	**0**	**35**	**96**	**89**	**2**	**17**	**108**	**105**	**4**	**50**	**159**	**131**	**6**	**59**	**196**	**250**	**1**	**3**	**254**	**124**	**7**	**2**	**133**
8:30 - 9:30	61	0	37	98	90	3	21	114	96	3	53	152	133	3	63	199	242	1	4	247	123	5	2	130
8:45 - 9:45	67	0	34	101	97	5	16	118	87	5	48	140	152	2	57	211	238	1	4	243	123	6	3	132
9:00 - 10:00	62	0	38	100	107	5	14	126	90	5	46	141	175	4	58	237	256	0	4	260	149	3	3	155

TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ	
7:00 - 8:00	441	10	0	451	458	4	15	477	129	3	1	133	41	0	0	41	123	3	0	126	46	2	34	82	1721	49	189	1959	
7:15 - 8:15	542	9	0	551	517	1	14	532	156	3	1	160	49	2	0	51	171	4	0	175	62	1	31	94	2055	41	193	2289	
7:30 - 8:30	574	9	0	583	558	4	14	576	191	4	1	196	54	2	1	57	203	2	0	205	71	1	34	106	2298	45	195	2538	
7:45 - 8:45	653	9	0	662	599	7	13	619	215	3	0	218	61	2	1	64	205	3	0	208	80	0	36	116	2499	41	209	2749	
8:00 - 9:00	689	5	1	695	593	8	14	615	234	4	0	238	56	2	1	59	218	2	0	220	79	1	39	119	2593	42	213	2848	
8:15 - 9:15	**662**	**5**	**1**	**668**	**594**	**10**	**13**	**617**	**249**	**3**	**0**	**252**	**49**	**0**	**1**	**50**	**191**	**1**	**3**	**195**	**80**	**2**	**43**	**125**	**2585**	**41**	**227**	**2853**	**Peak**
8:30 - 9:30	633	5	1	639	617	9	14	640	253	1	0	254	43	0	0	43	151	2	3	156	72	5	43	120	2514	37	241	2792	
8:45 - 9:45	520	8	2	530	623	10	11	644	243	1	0	244	39	0	0	39	133	1	5	139	72	5	42	119	2394	44	222	2660	
9:00 - 10:00	436	10	1	447	623	8	12	643	215	1	0	216	44	0	0	44	104	1	6	111	62	4	38	104	2323	41	220	2584	

TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
15:30 - 16:30	65	0	37	102	371	2	19	392	106	4	42	152	233	1	27	261	198	2	4	204	532	5	5	542
15:45 - 16:45	73	0	44	117	395	1	18	414	108	4	44	156	237	3	30	270	212	1	4	217	580	9	6	595
16:00 - 17:00	76	0	37	113	407	0	19	426	108	2	48	158	261	3	48	312	212	0	6	218	609	9	5	623
16:15 - 17:15	79	0	38	117	409	0	18	427	110	2	56	168	296	3	47	346	212	0	5	217	635	7	4	646
16:30 - 17:30	**87**	**0**	**36**	**123**	**403**	**0**	**19**	**422**	**115**	**1**	**59**	**175**	**272**	**3**	**52**	**327**	**236**	**0**	**8**	**244**	**663**	**6**	**3**	**672**
16:45 - 17:45	88	0	31	119	386	0	20	406	103	1	56	160	280	1	52	333	249	0	8	257	640	3	4	647
17:00 - 18:00	104	0	33	137	373	0	17	390	104	1	55	160	274	1	45	320	246	0	6	252	607	2	5	614
17:15 - 18:15	108	0	31	139	336	0	16	352	99	0	51	150	236	2	47	285	241	0	6	247	542	2	4	548
17:30 - 18:30	93	0	37	130	326	0	13	339	102	1	50	153	263	2	51	316	217	0	5	222	500	1	3	504

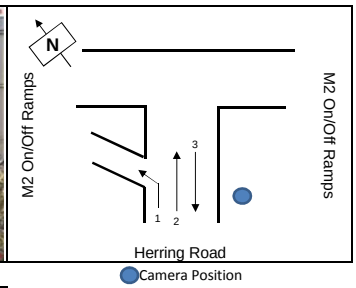
TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ	
15:30 - 16:30	197	0	1	198	479	3	13	495	70	0	0	70	136	0	0	136	193	3	1	197	153	0	43	196	2733	20	192	2945	
15:45 - 16:45	195	1	1	197	498	4	16	518	76	0	0	76	155	0	0	155	205	2	1	208	159	0	41	200	2893	25	205	3123	
16:00 - 17:00	180	2	1	183	502	3	13	518	81	0	0	81	167	0	0	167	208	2	0	210	160	0	40	200	2971	21	217	3209	
16:15 - 17:15	198	2	1	201	537	2	15	554	91	0	0	91	169	0	0	169	210	2	0	212	173	0	44	217	3119	18	228	3365	
16:30 - 17:30	**205**	**2**	**0**	**207**	**586**	**2**	**14**	**602**	**95**	**0**	**0**	**95**	**194**	**0**	**0**	**194**	**226**	**1**	**0**	**227**	**174**	**0**	**45**	**219**	**3256**	**15**	**236**	**3507**	**Peak**
16:45 - 17:45	208	1	0	209	583	0	11	594	88	0	0	88	189	0	0	189	243	0	0	243	176	0	46	222	3233	6	228	3467	
17:00 - 18:00	219	0	0	219	612	3	12	627	86	0	0	86	181	0	0	181	254	0	0	254	189	0	44	233	3249	7	217	3473	
17:15 - 18:15	223	1	0	224	632	3	14	649	79	0	0	79	171	0	0	171	251	0	0	251	186	0	42	228	3104	8	211	3323	
17:30 - 18:30	232	1	0	233	666	3	14	683	70	0	0	70	165	0	0	165	234	0	0	234	175	0	35	210	3043	8	208	3259	

Intersection of M2 On/Off Ramps & Herring Road

Thursday, 1 August 2013

Austraffic

Survey Start	**7:00 AM 15:30 PM**
Intersection Type	**T Junction**
Intersection No.	**1**
North Approach	
East Approach	**M2 On/Off Ramps**
South Approach	**Herring Road**
West Approach	**M2 On/Off Ramps**
Date	**1/08/13**
Classification	**Light Heavy Bus**



TIME PERIOD	VEHICLE MOVEMENT												GRAND TOTAL			
	1				2				3							
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
7:00 - 7:15	9	0	0	9	25	3	2	30	14	1	0	15	48	4	2	54
7:15 - 7:30	8	0	0	8	19	1	4	24	28	1	1	30	55	2	5	62
7:30 - 7:45	18	0	0	18	18	0	2	20	49	0	1	50	85	0	3	88
7:45 - 8:00	29	0	0	29	25	1	2	28	46	3	2	51	100	4	4	108
8:00 - 8:15	21	0	0	21	24	0	5	29	55	5	0	60	100	5	5	110
8:15 - 8:30	33	0	0	33	20	2	6	28	67	2	1	70	120	4	7	131
8:30 - 8:45	28	0	0	28	17	3	5	25	68	3	0	71	113	6	5	124
8:45 - 9:00	15	0	0	15	16	2	6	24	80	3	0	83	111	5	6	122
9:00 - 9:15	14	1	0	15	22	2	9	33	38	3	0	41	74	6	9	89
9:15 - 9:30	13	1	0	14	21	3	3	27	40	5	0	45	74	9	3	86
9:30 - 9:45	8	1	0	9	17	1	6	24	28	4	0	32	53	6	6	65
9:45 - 10:00	11	0	0	11	20	1	4	25	27	1	0	28	58	2	4	64
Σ	207	3	0	210	244	19	54	317	540	31	5	576	991	53	59	1103

TIME PERIOD	VEHICLE MOVEMENT												GRAND TOTAL			
	1				2				3							
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ
15:30 - 15:45	3	1	0	4	92	3	1	96	21	0	1	22	116	4	2	122
15:45 - 16:00	1	2	0	3	94	6	4	104	17	1	0	18	112	9	4	125
16:00 - 16:15	0	0	0	0	141	4	3	148	16	0	0	16	157	4	3	164
16:15 - 16:30	3	0	0	3	155	1	2	158	14	1	0	15	172	2	2	176
16:30 - 16:45	2	0	0	2	175	4	1	180	25	0	0	25	202	4	1	207
16:45 - 17:00	2	0	0	2	192	2	4	198	18	0	0	18	212	2	4	218
17:00 - 17:15	0	1	0	1	218	4	5	227	27	0	0	27	245	5	5	255
17:15 - 17:30	2	0	0	2	176	2	5	183	35	1	0	36	213	3	5	221
17:30 - 17:45	1	0	0	1	172	5	3	180	28	0	0	28	201	5	3	209
17:45 - 18:00	3	0	0	3	163	3	5	171	33	1	0	34	199	4	5	208
18:00 - 18:15	1	1	0	2	146	3	3	152	15	1	0	16	162	5	3	170
18:15 - 18:30	0	0	0	0	130	1	4	135	21	0	0	21	151	1	4	156
Σ	18	5	0	23	1854	38	40	1932	270	5	1	276	2142	48	41	2231

HOURLY FLOW

TIME PERIOD	VEHICLE MOVEMENT												GRAND TOTAL				
	1				2				3								
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	
7:00 - 8:00	64	0	0	64	87	5	10	102	137	5	4	146	288	10	14	312	
7:15 - 8:15	76	0	0	76	86	2	13	101	178	9	4	191	340	11	17	368	
7:30 - 8:30	101	0	0	101	87	3	15	105	217	10	4	231	405	13	19	437	
7:45 - 8:45	111	0	0	111	86	6	18	110	236	13	3	252	433	19	21	473	
8:00 - 9:00	**97**	**0**	**0**	**97**	**77**	**7**	**22**	**106**	**270**	**13**	**1**	**284**	**444**	**20**	**23**	**487**	**Peak**
8:15 - 9:15	90	1	0	91	75	9	26	110	253	11	1	265	418	21	27	466	
8:30 - 9:30	70	2	0	72	76	10	23	109	226	14	0	240	372	26	23	421	
8:45 - 9:45	50	3	0	53	76	8	24	108	186	15	0	201	312	26	24	362	
9:00 - 10:00	46	3	0	49	80	7	22	109	133	13	0	146	259	23	22	304	

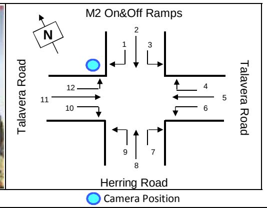
TIME PERIOD	VEHICLE MOVEMENT												GRAND TOTAL				
	1				2				3								
	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	Light	Heavy	Bus	Σ	
15:30 - 16:30	7	3	0	10	482	14	10	506	68	2	1	71	557	19	11	587	
15:45 - 16:45	6	2	0	8	565	15	10	590	72	2	0	74	643	19	10	672	
16:00 - 17:00	7	0	0	7	663	11	10	684	73	1	0	74	743	12	10	765	
16:15 - 17:15	7	1	0	8	740	11	12	763	84	1	0	85	831	13	12	856	
16:30 - 17:30	6	1	0	7	761	12	15	788	105	1	0	106	872	14	15	901	
16:45 - 17:45	**5**	**1**	**0**	**6**	**758**	**13**	**17**	**788**	**108**	**1**	**0**	**109**	**871**	**15**	**17**	**903**	**Peak**
17:00 - 18:00	6	1	0	7	729	14	18	761	123	2	0	125	858	17	18	893	
17:15 - 18:15	7	1	0	8	657	13	16	686	111	3	0	114	775	17	16	808	
17:30 - 18:30	5	1	0	6	611	12	15	638	97	2	0	99	713	15	15	743	

Intersection of Talavera Road and Herring Road

Thursday, 1 August 2013

Austraffic

Survey Start	7:00 AM	15:30 PM
Intersection Type	Cross Junction	
Intersection No.	2	
North Approach	M2 On&Off Ramps	
East Approach	Talavera Road	
South Approach	Herring Road	
West Approach	Talavera Road	
Date	1/08/13	
Classification	Light Heavy Bus	



TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
7:00 - 7:15	7	0	0	7	0	0	0	0	8	1	0	9	7	0	0	7	40	1	0	41	14	1	0	15
7:15 - 7:30	14	0	0	14	0	0	1	1	12	1	0	13	8	0	0	8	43	3	1	47	16	2	0	18
7:30 - 7:45	13	0	1	14	0	0	0	0	32	0	0	32	10	0	1	11	58	3	0	61	26	1	0	27
7:45 - 8:00	15	0	1	16	0	0	0	0	25	3	1	29	13	0	0	13	55	2	0	57	25	1	0	26
8:00 8:15	20	1	0	21	0	0	0	0	28	4	0	32	11	0	0	11	49	3	0	52	32	0	0	32
8:15 8:30	13	0	1	14	0	0	0	0	50	2	0	52	7	1	0	8	72	2	0	74	23	2	0	25
8:30 8:45	23	0	0	23	0	0	0	0	43	3	0	46	10	1	0	11	58	5	0	63	25	0	0	25
8:45 9:00	29	1	0	30	0	0	0	0	44	2	0	46	9	2	0	11	65	5	0	70	20	1	0	21
9:00 - 9:15	12	0	0	12	0	0	0	0	30	3	0	33	9	2	0	11	69	3	1	73	23	0	0	23
9:15 - 9:30	16	0	0	16	0	0	0	0	22	5	0	27	14	1	0	15	60	1	0	61	25	0	0	25
9:30 - 9:45	14	2	0	16	0	0	0	0	14	2	0	16	8	0	0	8	71	1	0	72	27	3	0	30
9:45 10:00	10	0	0	10	0	0	0	0	17	1	0	18	12	0	0	12	88	1	0	89	25	2	0	27
Σ	186	4	3	193	0	0	1	1	325	27	1	353	118	7	1	126	728	30	2	760	281	13	0	294

TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ
7:00 - 7:15	42	4	0	46	14	2	2	18	11	1	1	13	0	0	7	7	142	4	1	147	13	1	0	14	298	15	11	324
7:15 - 7:30	45	1	0	46	13	0	4	17	11	0	3	14	0	0	3	3	196	4	0	200	6	1	0	7	364	12	12	388
7:30 - 7:45	57	2	0	59	13	0	1	14	14	1	1	16	0	0	6	6	223	3	0	226	12	0	0	12	458	10	10	478
7:45 - 8:00	70	1	0	71	24	1	2	27	20	1	2	23	0	0	4	4	251	2	0	253	17	0	0	17	515	11	10	536
8:00 8:15	59	0	1	60	18	0	5	23	24	0	1	25	0	0	6	6	243	4	0	247	14	0	0	14	498	12	13	523
8:15 8:30	77	4	0	81	23	1	6	30	11	2	1	14	0	0	5	5	270	1	0	271	23	0	0	23	569	15	13	597
8:30 8:45	71	0	0	71	20	2	5	27	11	1	3	15	0	0	6	6	243	0	0	243	12	0	0	12	516	12	14	542
8:45 9:00	67	3	0	70	13	0	6	19	13	0	0	13	0	0	6	6	227	3	0	230	9	0	0	9	496	17	12	525
9:00 - 9:15	56	0	0	56	17	1	9	27	16	1	2	19	0	0	5	5	182	4	1	187	7	0	0	7	421	14	18	453
9:15 - 9:30	43	3	0	46	10	3	3	16	10	1	2	13	0	0	2	2	159	3	0	162	9	0	0	9	368	17	7	392
9:30 - 9:45	41	1	0	42	12	2	6	20	20	0	2	22	0	0	6	6	138	2	1	141	5	0	0	5	350	13	15	378
9:45 10:00	40	0	0	40	13	0	4	17	11	0	0	11	0	0	5	5	123	6	0	129	6	1	0	7	345	11	9	365
Σ	668	19	1	688	190	12	53	255	172	8	18	198	0	0	61	61	2397	36	3	2436	133	3	0	136	5198	159	144	5501

TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
15:30 - 15:45	11	0	1	12	0	0	0	0	10	0	0	10	39	3	0	42	79	0	0	79	28	0	0	28
15:45 - 16:00	10	0	0	10	0	0	0	0	6	0	0	6	45	4	0	49	79	2	0	81	32	2	0	34
16:00 - 16:15	5	1	0	6	0	0	0	0	12	0	0	12	56	3	0	59	89	0	0	89	41	1	0	42
16:15 - 16:30	8	0	0	8	0	0	0	0	6	1	0	7	62	1	0	63	103	2	0	105	29	1	0	30
16:30 - 16:45	12	0	0	12	0	0	0	0	14	0	0	14	78	2	0	80	112	0	0	112	44	0	1	45
16:45 - 17:00	10	0	0	10	0	0	0	0	8	0	0	8	89	2	0	91	104	0	0	104	38	0	0	38
17:00 - 17:15	15	0	0	15	0	0	0	0	10	0	0	10	93	4	0	97	132	1	0	133	58	1	0	59
17:15 - 17:30	15	1	0	16	0	0	0	0	21	0	0	21	85	2	0	87	150	2	0	152	42	0	0	42
17:30 - 17:45	16	0	0	16	0	0	0	0	13	0	0	13	82	4	0	86	117	0	0	117	34	0	0	34
17:45 - 18:00	19	1	0	20	0	0	0	0	13	0	0	13	78	1	0	79	118	0	0	118	35	0	1	36
18:00 - 18:15	10	1	0	11	0	0	0	0	5	0	0	5	70	1	0	71	104	0	0	104	28	0	0	28
18:15 - 18:30	11	0	0	11	0	0	0	0	9	0	0	9	59	0	0	59	110	0	1	111	29	1	0	30
Σ	142	4	1	147	0	0	0	0	127	1	0	128	836	27	0	863	1297	7	1	1305	438	6	2	446

TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ
15:30 - 15:45	34	1	0	35	38	0	1	39	19	0	1	20	0	0	4	4	102	4	0	106	18	1	0	19	378	9	7	394
15:45 - 16:00	40	0	0	40	45	3	4	52	14	0	3	17	0	0	4	4	97	0	0	97	16	2	0	18	384	13	11	408
16:00 - 16:15	61	1	0	62	60	1	3	64	14	0	2	16	1	0	3	4	94	3	1	98	22	0	0	22	455	10	9	474
16:15 - 16:30	55	0	0	55	73	0	2	75	23	0	0	23	0	0	7	7	91	3	0	94	23	0	0	23	473	8	9	490
16:30 - 16:45	48	1	0	49	77	1	1	79	16	1	3	20	1	0	5	6	106	1	2	109	23	1	0	24	531	7	12	550
16:45 - 17:00	65	0	0	65	78	0	4	82	21	0	3	24	0	0	7	7	110	3	1	114	23	0	0	23	546	5	15	566
17:00 - 17:15	54	1	1	56	92	1	5	98	21	0	1	22	1	0	9	10	100	2	0	102	33	0	0	33	609	10	16	635
17:15 - 17:30	68	0	0	68	75	0	5	80	33	0	2	35	0	0	3	3	115	1	0	116	20	0	0	20	624	6	10	640
17:30 - 17:45	74	1	1	76	71	0	3	74	36	0	1	37	5	0	4	9	104	0	0	104	21	1	0	22	573	6	9	588
17:45 - 18:00	65	1	0	66	72	2	5	79	28	0	0	28	0	0	5	5	107	0	0	107	18	0	0	18	553	5	11	569
18:00 - 18:15	75	0	0	75	60	1	3	64	26	1	2	29	1	0	7	8	111	0	0	111	17	1	0	18	507	5	12	524
18:15 - 18:30	69	0	0	69	55	0	4	59	36	0	3	39	1	0	5	6	100	2	1	103	18	1	0	19	497	4	14	515
Σ	708	6	2	716	796	9	40	845	287	2	21	310	10	0	63	73	1237	19	5	1261	252	7	0	259	6130	88	135	6353

HOURLY FLOW

TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
7:00 - 8:00	49	0	2	51	0	0	1	1	77	5	1	83	38	0	1	39	196	9	1	206	81	5	0	86
7:15 - 8:15	62	1	2	65	0	0	1	1	97	8	1	106	42	0	1	43	205	11	1	217	99	4	0	103
7:30 - 8:30	61	1	3	65	0	0	0	0	135	9	1	145	41	1	1	43	234	10	0	244	106	4	0	110
7:45 - 8:45	**71**	**1**	**2**	**74**	**0**	**0**	**0**	**0**	**146**	**12**	**1**	**159**	**41**	**2**	**0**	**43**	**234**	**12**	**0**	**246**	**105**	**3**	**0**	**108**
8:00 - 9:00	85	2	1	88	0	0	0	0	165	11	0	176	37	4	0	41	244	15	0	259	100	3	0	103
8:15 - 9:15	77	1	1	79	0	0	0	0	167	10	0	177	35	6	0	41	264	15	1	280	91	3	0	94
8:30 - 9:30	80	1	0	81	0	0	0	0	139	13	0	152	42	6	0	48	252	14	1	267	93	1	0	94
8:45 - 9:45	71	3	0	74	0	0	0	0	110	12	0	122	40	5	0	45	265	10	1	276	95	4	0	99
9:00 - 10:00	52	2	0	54	0	0	0	0	83	11	0	94	43	3	0	46	288	6	1	295	100	5	0	105

TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ	
7:00 - 8:00	214	8	0	222	64	3	9	76	56	3	7	66	0	0	20	20	812	13	1	826	48	2	0	50	1635	48	43	1726	
7:15 - 8:15	231	4	1	236	68	1	12	81	69	2	7	78	0	0	19	19	913	13	0	926	49	1	0	50	1835	45	45	1925	
7:30 - 8:30	263	7	1	271	78	2	14	94	69	4	5	78	0	0	21	21	987	10	0	997	66	0	0	66	2040	48	46	2134	
7:45 - 8:45	**277**	**5**	**1**	**283**	**85**	**4**	**18**	**107**	**66**	**4**	**7**	**77**	**0**	**0**	**21**	**21**	**1007**	**7**	**0**	**1014**	**66**	**0**	**0**	**66**	**2098**	**50**	**50**	**2198**	**Peak**
8:00 - 9:00	274	7	1	282	74	3	22	99	59	3	5	67	0	0	23	23	983	8	0	991	58	0	0	58	2079	56	52	2187	
8:15 - 9:15	271	7	0	278	73	4	26	103	51	4	6	61	0	0	22	22	922	8	1	931	51	0	0	51	2002	58	57	2117	
8:30 - 9:30	237	6	0	243	60	6	23	89	50	3	7	60	0	0	19	19	811	10	1	822	37	0	0	37	1801	60	51	1912	
8:45 - 9:45	207	7	0	214	52	6	24	82	59	2	6	67	0	0	19	19	706	12	2	720	30	0	0	30	1635	61	52	1748	
9:00 - 10:00	180	4	0	184	52	6	22	80	57	2	6	65	0	0	18	18	602	15	2	619	27	1	0	28	1484	55	49	1588	

TIME PERIOD	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ
15:30 - 16:30	34	1	1	36	0	0	0	0	34	1	0	35	202	11	0	213	350	4	0	354	130	4	0	134
15:45 - 16:45	35	1	0	36	0	0	0	0	38	1	0	39	241	10	0	251	383	4	0	387	146	4	1	151
16:00 - 17:00	35	1	0	36	0	0	0	0	40	1	0	41	285	8	0	293	408	2	0	410	152	2	1	155
16:15 - 17:15	45	0	0	45	0	0	0	0	38	1	0	39	322	9	0	331	451	3	0	454	169	2	1	172
16:30 - 17:30	52	1	0	53	0	0	0	0	53	0	0	53	345	10	0	355	498	3	0	501	182	1	1	184
16:45 - 17:45	56	1	0	57	0	0	0	0	52	0	0	52	349	12	0	361	503	3	0	506	172	1	0	173
17:00 - 18:00	**65**	**2**	**0**	**67**	**0**	**0**	**0**	**0**	**57**	**0**	**0**	**57**	**338**	**11**	**0**	**349**	**517**	**3**	**0**	**520**	**169**	**1**	**1**	**171**
17:15 - 18:15	60	3	0	63	0	0	0	0	52	0	0	52	315	8	0	323	489	2	0	491	139	0	1	140
17:30 - 18:30	56	2	0	58	0	0	0	0	40	0	0	40	289	6	0	295	449	0	1	450	126	1	1	128

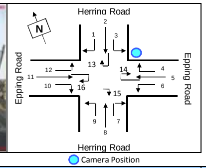
TIME PERIOD	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ	
15:30 - 16:30	190	2	0	192	216	4	10	230	70	0	6	76	1	0	18	19	384	10	1	395	79	3	0	82	1690	40	36	1766	
15:45 - 16:45	204	2	0	206	255	5	10	270	67	1	8	76	2	0	19	21	388	7	3	398	84	3	0	87	1843	38	41	1922	
16:00 - 17:00	229	2	0	231	288	2	10	300	74	1	8	83	2	0	22	24	401	10	4	415	91	1	0	92	2005	30	45	2080	
16:15 - 17:15	222	2	1	225	320	2	12	334	81	1	7	89	2	0	28	30	407	9	3	419	102	1	0	103	2159	30	52	2241	
16:30 - 17:30	235	2	1	238	322	2	15	339	91	1	9	101	2	0	24	26	431	7	3	441	99	1	0	100	2310	28	53	2391	
16:45 - 17:45	261	2	2	265	316	1	17	334	111	0	7	118	6	0	23	29	429	6	1	436	97	1	0	98	2352	27	50	2429	
17:00 - 18:00	**261**	**3**	**2**	**266**	**310**	**3**	**18**	**331**	**118**	**0**	**4**	**122**	**6**	**0**	**21**	**27**	**426**	**3**	**0**	**429**	**92**	**1**	**0**	**93**	**2359**	**27**	**46**	**2432**	**Peak**
17:15 - 18:15	282	2	1	285	278	3	16	297	123	1	5	129	6	0	19	25	437	1	0	438	76	2	0	78	2257	22	42	2321	
17:30 - 18:30	283	2	1	286	258	3	15	276	126	1	6	133	7	0	21	28	422	2	1	425	74	3	0	77	2130	20	46	2196	

Intersection of Epping Road and Herring Road

Thursday, 1 August 2013

Austraffic

Survey Start	7:00 AM	15:30 PM
Intersection Type	Cross Junction	
Intersection No.	4	
North Approach	Herring Road	
East Approach	Epping Road	
South Approach	Herring Road	
West Approach	Epping Road	
Date	1/08/13	
Classification	Light Heavy Bus	



VEHICLE MOVEMENT

Time Period	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ
7:00 - 7:15	26	1	1	28	21	0	0	21	25	0	1	26	69	3	3	75	158	6	4	168	6	1	0	7	66	0	0	66	64	0	1	65
7:15 - 7:30	31	1	0	32	12	0	1	13	37	3	1	41	60	2	1	63	193	5	6	204	9	0	0	9	71	1	0	72	88	1	1	90
7:30 - 7:45	25	2	1	28	36	1	2	39	50	0	1	51	99	1	2	102	208	7	6	221	19	1	1	21	94	0	0	94	108	0	1	109
7:45 - 8:00	24	0	1	25	22	0	1	23	57	0	1	58	159	2	2	163	218	4	7	229	14	0	0	14	93	0	0	93	95	0	0	95
8:00 8:15	34	4	2	40	27	1	6	34	58	2	2	62	148	2	1	151	210	7	3	220	22	1	0	23	89	1	0	90	130	0	1	131
8:15 8:30	29	2	2	33	36	0	0	36	50	1	0	51	136	1	2	139	242	4	1	247	32	0	0	32	100	1	0	101	113	0	1	114
8:30 8:45	32	0	2	34	29	1	2	32	64	1	3	68	176	3	2	181	230	11	2	243	35	2	0	37	82	0	0	82	130	0	0	130
8:45 9:00	22	1	2	25	50	1	2	53	82	0	0	82	189	2	1	192	214	6	1	221	26	1	0	27	89	1	0	90	129	0	0	129
9:00 - 9:15	26	1	0	27	41	0	2	43	79	2	5	86	166	0	1	167	193	4	5	202	33	0	0	33	82	1	0	83	114	2	1	117
9:15 - 9:30	29	0	2	31	21	0	3	24	58	2	1	61	137	4	1	142	173	9	2	184	16	0	0	16	75	2	0	77	134	0	2	136
9:30 - 9:45	26	3	1	30	28	0	3	31	44	1	1	46	126	4	0	130	253	5	1	259	29	1	0	30	61	1	0	62	85	1	0	86
9:45 10:00	40	0	1	41	29	0	1	30	42	2	0	44	90	1	1	92	226	14	3	243	17	1	0	18	39	1	0	40	79	0	4	83
Σ	344	15	15	374	352	4	23	379	646	14	16	676	1555	25	17	1597	2518	82	41	2641	258	8	1	267	941	9	0	950	1269	4	12	1285

Time Period	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	13 Light	13 Heavy	13 Bus	13 Σ	14 Light	14 Heavy	14 Bus	14 Σ	15 Light	15 Heavy	15 Bus	15 Σ	16 Light	16 Heavy	16 Bus	16 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ
7:00 - 7:15	5	0	0	5	5	0	0	5	575	14	1	590	72	1	0	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1092	26	11	1129
7:15 - 7:30	3	0	0	3	6	0	0	6	520	7	5	532	110	1	1	112	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1141	21	16	1178
7:30 - 7:45	5	0	0	5	4	0	0	4	495	7	4	506	111	2	3	116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1254	21	21	1296
7:45 - 8:00	3	0	1	4	2	0	0	2	468	5	3	476	138	2	1	141	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1295	13	17	1325
8:00 8:15	3	0	0	3	5	0	0	5	439	9	4	452	123	4	0	127	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1291	31	19	1341
8:15 8:30	5	1	1	7	4	0	0	4	448	3	3	454	150	2	2	154	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1347	15	12	1374
8:30 8:45	4	0	0	4	8	0	0	8	416	2	1	419	152	1	1	154	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1360	21	13	1394
8:45 9:00	3	1	0	4	8	0	0	8	363	4	3	370	166	1	0	167	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1342	18	9	1369
9:00 - 9:15	7	0	0	7	11	0	0	11	373	9	3	385	133	1	1	135	1	0	0	1	2	0	0	2	0	0	0	0	0	0	0	0	1261	20	18	1299
9:15 - 9:30	6	0	0	6	13	0	0	13	395	10	3	408	140	2	1	143	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1200	29	15	1244
9:30 - 9:45	11	0	0	11	8	0	1	9	409	11	4	424	117	3	1	121	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1198	30	12	1240
9:45 10:00	8	0	0	8	8	0	0	8	315	6	2	323	127	0	1	128	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1022	25	13	1060
Σ	63	2	2	67	82	0	1	83	5216	87	36	5339	1539	20	12	1571	1	0	0	1	19	0	0	19	0	0	0	0	0	0	0	0	####	270	176	####

VEHICLE MOVEMENT

Time Period	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ
15:30 - 15:45	100	1	0	101	72	0	4	76	75	1	0	76	80	1	0	81	426	13	1	440	54	1	0	55	18	1	0	19	82	0	4	86
15:45 - 16:00	108	1	1	110	84	0	2	86	57	1	2	60	73	0	1	74	408	4	2	414	56	1	0	57	27	1	0	28	71	0	3	74
16:00 - 16:15	147	0	2	149	133	2	3	138	69	0	2	71	72	2	1	75	422	7	1	430	58	1	1	60	24	0	0	24	54	0	1	55
16:15 - 16:30	123	1	2	126	119	0	3	122	65	1	1	67	83	0	1	84	448	4	0	452	69	1	0	70	28	0	0	28	58	0	1	59
16:30 - 16:45	131	0	3	134	125	2	2	129	61	1	1	63	71	1	2	74	391	12	1	404	65	0	0	65	25	0	1	26	64	1	4	69
16:45 - 17:00	123	0	1	124	142	2	3	147	62	0	2	64	73	0	1	74	374	10	0	384	85	0	0	85	24	1	0	25	99	0	2	101
17:00 - 17:15	143	0	2	145	142	0	2	144	59	1	1	61	112	1	0	113	416	3	2	421	81	0	0	81	29	0	0	29	95	0	2	97
17:15 - 17:30	129	1	1	131	164	1	2	167	95	0	2	97	89	0	1	90	359	4	0	363	86	1	0	87	20	1	1	22	89	0	2	91
17:30 - 17:45	144	1	3	148	147	0	4	151	55	0	1	56	81	0	1	82	385	2	0	387	76	2	0	78	23	0	0	23	110	1	2	113
17:45 - 18:00	113	0	2	115	127	0	0	127	54	0	1	55	68	1	1	70	348	5	3	356	75	1	0	76	37	2	0	39	111	2	3	116
18:00 - 18:15	105	0	1	106	105	0	3	108	55	0	0	55	79	0	1	80	345	0	1	346	79	0	0	79	39	0	1	40	93	0	1	94
18:15 - 18:30	91	0	1	92	121	0	1	122	70	0	1	71	102	0	1	103	376	2	1	379	75	0	0	75	23	0	0	23	82	1	3	86
Σ	1457	5	19	1481	1481	7	29	1517	777	5	14	796	983	6	11	1000	4698	66	12	4776	859	8	1	868	317	6	3	326	1008	5	28	1041

Time Period	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	13 Light	13 Heavy	13 Bus	13 Σ	14 Light	14 Heavy	14 Bus	14 Σ	15 Light	15 Heavy	15 Bus	15 Σ	16 Light	16 Heavy	16 Bus	16 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ
15:30 - 15:45	14	1	0	15	12	1	0	13	241	4	2	247	86	0	0	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1260	24	11	1295
15:45 - 16:00	18	0	0	18	13	0	2	15	230	0	5	235	55	0	1	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1200	8	19	1227
16:00 - 16:15	9	0	0	9	13	0	0	13	231	3	3	237	85	0	0	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1317	15	14	1346
16:15 - 16:30	8	1	1	10	22	0	0	22	246	2	1	249	84	0	1	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1353	10	11	1374
16:30 - 16:45	6	1	0	7	23	1	0	24	217	0	6	223	62	0	0	62	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1242	19	20	1281
16:45 - 17:00	9	0	0	9	30	0	0	30	211	3	1	215	89	1	1	91	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1322	17	11	1350
17:00 - 17:15	6	0	0	6	29	0	0	29	231	2	2	235	96	0	0	96	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1440	7	11	1458
17:15 - 17:30	6	1	0	7	46	0	0	46	248	2	1	251	89	0	1	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1420	11	11	1442
17:30 - 17:45	10	0	0	10	28	0	0	28	183	1	3	187	82	0	1	83	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1326	7	15	1348
17:45 - 18:00	17	1	0	18	28	0	0	28	154	1	1	156	76	0	0	76	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1209	13	11	1233
18:00 - 18:15	19	0	2	21	26	0	0	26	221	1	4	226	96	0	0	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1262	1	14	1277
18:15 - 18:30	18	0	0	18	32	0	0	32	246	1	2	249	105	0	2	107	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1342	4	12	1358
Σ	140	5	3	148	302	2	2	306	2659	20	31	2710	1005	1	7	1013	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	####	136	160	####

HOURLY FLOW

VEHICLE MOVEMENT

Time Period	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ
7:00 - 8:00	106	4	3	113	91	1	4	96	169	3	4	176	387	8	8	403	777	22	23	822	48	2	1	51	324	1	0	325	355	1	3	359
7:15 - 8:15	114	7	4	125	97	2	10	109	202	5	5	212	466	7	6	479	829	23	22	874	64	2	1	67	347	2	0	349	421	1	3	425
7:30 - 8:30	112	8	6	126	121	2	9	132	215	3	4	222	542	6	7	555	878	22	17	917	87	2	1	90	376	2	0	378	446	0	3	449
7:45 - 8:45	119	6	7	132	114	2	9	125	229	4	6	239	619	8	7	634	900	26	13	939	103	3	0	106	364	2	0	366	468	0	2	470
8:00 - 9:00	**117**	**7**	**8**	**132**	**142**	**3**	**10**	**155**	**254**	**4**	**5**	**263**	**649**	**8**	**6**	**663**	**896**	**28**	**7**	**931**	**115**	**4**	**0**	**119**	**360**	**3**	**0**	**363**	**502**	**0**	**2**	**504**
8:15 - 9:15	109	4	6	119	156	2	6	164	275	4	8	287	667	6	6	679	879	25	9	913	126	3	0	129	353	3	0	356	486	2	2	490
8:30 - 9:30	109	2	6	117	141	2	9	152	283	5	9	297	668	9	5	682	810	30	10	850	110	3	0	113	328	4	0	332	507	2	3	512
8:45 - 9:45	103	5	5	113	140	1	10	151	263	5	7	275	618	10	3	631	833	24	9	866	104	2	0	106	307	5	0	312	462	3	3	468
9:00 - 10:00	121	4	4	129	119	0	9	128	223	7	7	237	519	9	3	531	845	32	11	888	95	2	0	97	257	5	0	262	412	3	7	422

Time Period	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	13 Light	13 Heavy	13 Bus	13 Σ	14 Light	14 Heavy	14 Bus	14 Σ	15 Light	15 Heavy	15 Bus	15 Σ	16 Light	16 Heavy	16 Bus	16 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ	
7:00 - 8:00	16	0	1	17	17	0	0	17	2058	33	13	2104	431	6	5	442	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4782	81	65	4928	
7:15 - 8:15	14	0	1	15	17	0	0	17	1922	28	16	1966	482	9	5	496	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	4981	86	73	5140	
7:30 - 8:30	16	1	2	19	15	0	0	15	1850	24	14	1888	522	10	6	538	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	5187	80	69	5336	
7:45 - 8:45	15	1	2	18	19	0	0	19	1771	19	11	1801	563	9	4	576	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	5293	80	61	5434	
8:00 - 9:00	**15**	**2**	**1**	**18**	**25**	**0**	**0**	**25**	**1666**	**18**	**11**	**1695**	**591**	**8**	**3**	**602**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5340**	**85**	**53**	**5478**	**Peak**
8:15 - 9:15	19	2	1	22	31	0	0	31	1600	18	10	1628	601	5	4	610	1	0	0	1	7	0	0	7	0	0	0	0	0	0	0	0	5310	74	52	5436	
8:30 - 9:30	20	1	0	21	40	0	0	40	1547	25	10	1582	591	5	3	599	1	0	0	1	8	0	0	8	0	0	0	0	0	0	0	0	5163	88	55	5306	
8:45 - 9:45	27	1	0	28	40	0	1	41	1540	34	13	1587	556	7	3	566	1	0	0	1	7	0	0	7	0	0	0	0	0	0	0	0	5001	97	54	5152	
9:00 - 10:00	32	0	0	32	40	0	1	41	1492	36	12	1540	517	6	4	527	1	0	0	1	8	0	0	8	0	0	0	0	0	0	0	0	4681	104	58	4843	

VEHICLE MOVEMENT

Time Period	1 Light	1 Heavy	1 Bus	1 Σ	2 Light	2 Heavy	2 Bus	2 Σ	3 Light	3 Heavy	3 Bus	3 Σ	4 Light	4 Heavy	4 Bus	4 Σ	5 Light	5 Heavy	5 Bus	5 Σ	6 Light	6 Heavy	6 Bus	6 Σ	7 Light	7 Heavy	7 Bus	7 Σ	8 Light	8 Heavy	8 Bus	8 Σ
15:30 - 16:30	478	3	5	486	408	2	12	422	266	3	5	274	308	3	3	314	1704	28	4	1736	237	4	1	242	97	2	0	99	265	0	9	274
15:45 - 16:45	509	2	8	519	461	4	10	475	252	3	6	261	299	3	5	307	1669	27	4	1700	248	3	1	252	104	1	1	106	247	1	9	257
16:00 - 17:00	524	1	8	533	519	6	11	536	257	2	6	265	299	3	5	307	1635	33	2	1670	277	2	1	280	101	1	1	103	275	1	8	284
16:15 - 17:15	520	1	8	529	528	4	10	542	247	3	5	255	339	2	4	345	1629	29	3	1661	300	1	0	301	106	1	1	108	316	1	9	326
16:30 - 17:30	526	1	7	534	573	5	9	587	277	2	6	285	345	2	4	351	1540	29	3	1572	317	1	0	318	98	2	2	102	347	1	10	358
16:45 - 17:45	**539**	**2**	**7**	**548**	**595**	**3**	**11**	**609**	**271**	**1**	**6**	**278**	**355**	**1**	**3**	**359**	**1534**	**19**	**2**	**1555**	**328**	**3**	**0**	**331**	**96**	**2**	**1**	**99**	**393**	**1**	**8**	**402**
17:00 - 18:00	529	2	8	539	580	1	8	589	263	1	5	269	350	2	3	355	1508	14	5	1527	318	4	0	322	109	3	1	113	405	3	9	417
17:15 - 18:15	491	2	7	500	543	1	9	553	259	0	4	263	317	1	4	322	1437	11	4	1452	316	4	0	320	119	3	2	124	403	3	8	414
17:30 - 18:30	453	1	7	461	500	0	8	508	234	0	3	237	330	1	4	335	1454	9	5	1468	305	3	0	308	122	2	1	125	396	4	9	409

Time Period	9 Light	9 Heavy	9 Bus	9 Σ	10 Light	10 Heavy	10 Bus	10 Σ	11 Light	11 Heavy	11 Bus	11 Σ	12 Light	12 Heavy	12 Bus	12 Σ	13 Light	13 Heavy	13 Bus	13 Σ	14 Light	14 Heavy	14 Bus	14 Σ	15 Light	15 Heavy	15 Bus	15 Σ	16 Light	16 Heavy	16 Bus	16 Σ	GRAND TOTAL Light	GRAND TOTAL Heavy	GRAND TOTAL Bus	GRAND TOTAL Σ	
15:30 - 16:30	49	2	1	52	60	1	2	63	948	9	11	968	310	0	2	312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5130	57	55	5242	
15:45 - 16:45	41	2	1	44	71	1	2	74	924	5	15	944	286	0	2	288	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	5112	52	64	5228	
16:00 - 17:00	32	2	1	35	88	1	0	89	905	8	11	924	320	1	2	323	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	5234	61	56	5351	
16:15 - 17:15	29	2	1	32	104	1	0	105	905	7	10	922	331	1	2	334	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5357	53	53	5463	
16:30 - 17:30	27	2	0	29	128	1	0	129	907	7	10	924	336	1	2	339	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5424	54	53	5531	
16:45 - 17:45	**31**	**1**	**0**	**32**	**133**	**0**	**0**	**133**	**873**	**8**	**7**	**888**	**356**	**1**	**3**	**360**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5508**	**42**	**48**	**5598**	**Peak**
17:00 - 18:00	39	2	0	41	131	0	0	131	816	6	7	829	343	0	2	345	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	5395	38	48	5481	
17:15 - 18:15	52	2	2	56	128	0	0	128	806	5	9	820	343	0	2	345	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5217	32	51	5300	
17:30 - 18:30	64	1	2	67	114	0	0	114	804	4	10	818	359	0	3	362	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	5139	25	52	5216	

Appendix B

Model Calibration Results

Macquarie Park Paramics Model

2014 AM Model Calibration

Run 208

GEH Statistics	
No. of Count	48
% GEH < 5	90%
No. > 10	1
No. > 5	5

Intersection Herring Road / Talavera Road / M2 Ramps

Intersection Details **AM**

Approach	Movement		Data	Modelled	Difference	GEH
M2 Ramps	L	9011_668_677	176	183	7	0.5
	R	9011_668_667	88	74	-14	1.6
Talavera E	L	678_680_793	103	116	13	1.2
	T	677_668_667	259	178	-81	5.5
	R	677_668_672	41	68	27	3.7
Herring	L	671_668_667	67	59	-8	1.0
	T	670_668_672	99	134	35	3.2
	R	670_668_677	282	241	-41	2.5
Talavera W	L	667_668_672	58	42	-16	2.3
	T	667_668_677	991	909	-82	2.7
Totals			**2164**	**2004**	**-160**	**3.5**
					No. > 5	1
					No. > 10	0

Intersection Herring Road / Waterloo Road

Approach	Movement		Data	Modelled	Difference	GEH
Herring N	L	2067_708_2065	169	152	-17	1.3
	T	2067_708_1031	108	139	31	2.8
	R	2067_708_709	91	69	-22	2.5
Waterloo	L	2111_708_1031	123	63	-60	6.2
	T	2111_708_709	239	273	34	2.1
	R	2065_708_780	172	156	-16	1.2
Herring S	L	367_708_709	238	237	-1	0.1
	T	367_708_780	615	658	43	1.7
	R	1031_708_2065	695	602	-93	3.7
University	L	710_708_780	119	82	-37	3.7
	T	710_708_2065	220	172	-48	3.4
	R	709_708_1031	59	114	55	5.9
Totals			**2848**	**2717**	**-131**	**2.5**
					No. > 5	2
					No. > 10	0

Intersection Epping Road / Herring Road

Approach	Movement		Data	Modelled	Difference	GEH
Herring N	L	487_488_499	263	299	36	2.1
	T	1432_574_494	155	197	42	3.2
	R	1432_574_576	132	84	-48	4.6
Epping E	L	2101_494_390	119	96	-23	2.2
	T	2101_574_576	931	941	10	0.3
	R	499_574_1432	663	642	-21	0.8
Herring S	L	494_576_502	18	16	-2	0.5
	T	494_574_1432	504	470	-34	1.5
	R	494_574_499	363	303	-60	3.3
Epping W	L	1548_1432_492	602	537	-65	2.7
	T	1553_574_499	1695	1559	-136	3.4
	R	576_574_494	25	41	16	2.8
Totals			**5470**	**5185**	**-285**	**3.9**
					No. > 5	0
					No. > 10	0

Intersection	Epping Road / Balaclava Road					
Approach	**Movement**		**Data**	**Modelled**	**Difference**	**GEH**
Balaclava N	L	49_591_1550	26	33	7	1.3
	T	591_580_579	59	140	81	8.1
	R	591_580_587	46	157	111	11.0
Epping E	L	1549_48_579	235	197	-38	2.6
	T	1549_580_587	658	620	-38	1.5
	R	1550_580_591	253	259	6	0.4
Balaclava S	L	15_587_588	28	13	-15	3.3
	T	15_580_591	349	310	-39	2.1
	R	15_580_1550	630	566	-64	2.6
Epping W	L	592_591_49	276	252	-24	1.5
	T	589_580_1550	1573	1535	-38	1.0
	R	587_580_579	84	93	9	1.0
Totals			**4217**	**4175**	**-42**	**0.6**
					No. > 5	2
					No. > 10	1

Intersection	Lane Cove Rd / Talavera Rd					
Approach	**Movement**		**Data**	**Modelled**	**Difference**	**GEH**
Lane Cove N	R	803_548_799	730	677	-53	2.0
Totals			**730**	**677**	**-53**	**2.0**
					No. > 5	0
					No. > 10	0

Intersection	Lane Cove Rd / Waterloo Rd					
Approach	**Movement**		**Data**	**Modelled**	**Difference**	**GEH**
Lane Cove N	R	734_716_717	569	562	-7	0.3
Totals			**569**	**562**	**-7**	**0.3**
					No. > 5	0
					No. > 10	0

Macquarie Park Paramics Model

Run 216

2014 PM Model Calibration

GEH Statistics	
No. of Count	48
% GEH < 5	92%
No. > 10	0
No. > 5	4

Intersection Herring Road / Talavera Road / M2 Ramps

Intersection Details **PM**

Approach	Movement		Data	Modelled	Difference	GEH
M2 Ramps	L	9011_668_677	53	28	-25	3.9
	R	9011_668_667	53	132	79	8.2
Talavera E	L	678_680_793	184	217	33	2.3
	T	678_668_667	501	471	-30	1.4
	R	677_668_672	355	474	119	5.8
Herring	L	671_668_667	101	67	-34	3.7
	T	670_668_672	339	367	28	1.5
	R	670_668_677	238	283	45	2.8
Talavera W	L	667_668_672	100	95	-5	0.5
	T	667_668_677	441	354	-87	4.4
Totals			**2365**	**2488**	**123**	**2.5**
					No. > 5	2
					No. > 10	0

Intersection Herring Road / Waterloo Road

Approach	Movement		Data	Modelled	Difference	GEH
Herring N	L	2067_708_2065	175	181	6	0.4
	T	2067_708_1031	422	412	-10	0.5
	R	2067_708_709	123	108	-15	1.4
Waterloo	L	2111_708_1031	672	815	143	5.2
	T	2111_708_709	244	210	-34	2.3
	R	2065_708_780	327	280	-47	2.7
Herring S	L	367_708_709	95	108	13	1.3
	T	367_708_780	602	522	-80	3.4
	R	1031_708_2065	207	264	57	3.7
University	L	710_708_780	219	211	-8	0.5
	T	710_708_2065	227	236	9	0.6
	R	709_708_1031	194	191	-3	0.2
Totals			**3507**	**3538**	**31**	**0.5**
					No. > 5	1
					No. > 10	0

Intersection Epping Road / Herring Road

Approach	Movement		Data	Modelled	Difference	GEH
Herring N	L	487_488_499	285	275	-10	0.6
	T	1432_574_494	587	616	29	1.2
	R	1432_574_576	534	560	26	1.1
Epping E	L	2101_494_390	318	275	-43	2.5
	T	2101_574_576	1572	1678	106	2.6
	R	499_574_1432	351	287	-64	3.6

Herring S	L	494_576_502	29	40	11	1.9
	T	494_574_1432	358	309	-49	2.7
	R	494_574_499	102	121	19	1.8
Epping W	L	1548_1432_492	339	393	54	2.8
	T	1553_574_499	924	1020	96	3.1
	R	576_574_494	129	111	-18	1.6
Totals			**5528**	**5685**	**157**	**2.1**
					No. > 5	0
					No. > 10	0

Intersection	**Epping Road / Balaclava Road**					
Approach	**Movement**		**Data**	**Modelled**	**Difference**	**GEH**
Balaclava N	L	49_591_1550	159	155	-4	0.3
	T	591_580_579	293	233	-60	3.7
	R	591_580_587	238	195	-43	2.9
Epping E	L	1549_48_579	637	588	-49	2.0
	T	1549_580_587	1285	1483	198	5.3
	R	1550_580_591	60	82	22	2.6
Balaclava S	L	15_587_588	102	78	-24	2.5
	T	15_580_591	121	111	-10	0.9
	R	15_580_1550	322	337	15	0.8
Epping W	L	592_591_49	94	92	-2	0.2
	T	589_580_1550	902	1004	102	3.3
	R	587_580_579	146	212	66	4.9
Totals			**4359**	**4570**	**211**	**3.2**
					No. > 5	1
					No. > 10	0

Intersection	**Lane Cove Rd / Talavera Rd**					
Approach	**Movement**		**Data**	**Modelled**	**Difference**	**GEH**
Lane Cove N	R	803_548_799	374	421	47	2.4
			374	**421**	**47**	**2.4**
					No. > 5	0
					No. > 10	0

Intersection	**Lane Cove Rd / Waterloo Rd**					
Approach	**Movement**		**Data**	**Modelled**	**Difference**	**GEH**
Lane Cove N	R	734_716_717	116	163	47	4.0
Totals			**116**	**163**	**47**	**4.0**
					No. > 5	0
					No. > 10	0

Appendix B

SIDRA Intersection Outputs

MOVEMENT SUMMARY

Site: S1_AM

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Balaclava Road S											
10	L2	35	21.7	0.844	64.7	LOS E	29.2	213.9	0.98	0.94	31.1
11	T1	409	4.0	0.844	58.9	LOS E	29.2	213.9	0.98	0.94	30.7
12	R2	749	1.5	0.732	55.0	LOS D	22.1	156.8	0.92	0.84	32.3
Approach		1193	3.0	0.844	56.6	LOS E	29.2	213.9	0.94	0.88	31.7
East: Epping Road E											
1	L2	282	3.2	0.349	9.4	LOS A	2.5	19.6	0.17	0.53	55.5
2	T1	810	7.2	0.469	14.6	LOS B	11.2	79.8	0.45	0.41	54.6
3	R2	242	0.0	0.829	76.6	LOS F	8.7	60.6	1.00	0.85	27.4
Approach		1334	5.0	0.829	24.6	LOS B	11.2	79.8	0.49	0.52	46.4
North: Balaclava Road N											
4	L2	50	27.3	0.271	37.2	LOS C	2.3	21.0	0.80	0.71	38.1
5	T1	66	9.9	0.712	72.9	LOS F	4.3	30.3	0.98	0.79	27.8
6	R2	52	33.3	0.809	87.0	LOS F	3.9	35.5	1.00	0.86	25.2
Approach		168	22.3	0.809	66.5	LOS E	4.3	35.5	0.93	0.79	29.1
West: Epping Road W											
7	L2	315	4.9	0.295	7.2	LOS A	0.6	4.3	0.03	0.57	56.9
8	T1	1920	1.1	0.864	21.7	LOS B	37.9	266.8	0.70	0.67	49.5
9	R2	96	1.4	0.664	73.5	LOS F	6.6	46.5	1.00	0.79	28.0
Approach		2331	1.6	0.864	21.8	LOS B	37.9	266.8	0.62	0.66	48.8
All Vehicles		5026	3.5	0.864	32.4	LOS C	37.9	266.8	0.67	0.68	41.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P4	South Full Crossing	6	29.6	LOS C	0.0	0.0	0.65	0.65
P1	East Full Crossing	191	54.5	LOS E	0.7	0.7	0.89	0.89
P2	North Full Crossing	3	30.9	LOS D	0.0	0.0	0.66	0.66
P3	West Full Crossing	108	57.9	LOS E	0.4	0.4	0.91	0.91
All Pedestrians		308	54.9	LOS E			0.89	0.89

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

MOVEMENT SUMMARY

Site: S2_AM

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Balaclava Road S											
10	L2	35	21.7	0.866	67.9	LOS E	30.3	221.8	0.99	0.97	30.3
11	T1	409	4.0	0.866	62.1	LOS E	30.3	221.8	0.99	0.97	29.9
12	R2	749	1.5	0.751	56.5	LOS E	22.7	160.6	0.94	0.85	31.9
Approach		1193	3.0	0.866	58.8	LOS E	30.3	221.8	0.96	0.90	31.1
East: Epping Road E											
1	L2	282	3.2	0.345	9.0	LOS A	2.2	17.3	0.15	0.53	55.8
2	T1	810	7.2	0.462	13.8	LOS A	10.7	76.5	0.43	0.39	55.2
3	R2	242	0.0	0.912	82.3	LOS F	9.1	63.6	1.00	0.90	26.3
Approach		1334	5.0	0.912	25.1	LOS B	10.7	76.5	0.47	0.51	46.1
North: Balaclava Road N											
4	L2	50	27.3	0.265	39.2	LOS C	2.4	22.1	0.80	0.71	37.3
5	T1	66	9.9	0.610	70.8	LOS F	4.2	29.5	0.98	0.76	28.1
6	R2	62	33.3	0.826	86.4	LOS F	4.7	42.2	1.00	0.88	25.3
Approach		178	22.9	0.826	67.2	LOS E	4.7	42.2	0.94	0.79	28.9
West: Epping Road W											
7	L2	317	4.9	0.295	7.2	LOS A	0.6	4.3	0.03	0.57	56.9
8	T1	1933	1.1	0.883	22.6	LOS B	41.0	288.4	0.70	0.68	48.9
9	R2	96	1.4	0.731	75.8	LOS F	6.7	47.6	1.00	0.81	27.5
Approach		2346	1.6	0.883	22.7	LOS B	41.0	288.4	0.62	0.67	48.3
All Vehicles		5051	3.6	0.912	33.5	LOS C	41.0	288.4	0.67	0.69	41.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P4	South Full Crossing	6	28.9	LOS C	0.0	0.0	0.64	0.64
P1	East Full Crossing	191	55.4	LOS E	0.7	0.7	0.89	0.89
P2	North Full Crossing	3	30.2	LOS D	0.0	0.0	0.66	0.66
P3	West Full Crossing	108	58.8	LOS E	0.4	0.4	0.92	0.92
All Pedestrians		308	55.8	LOS E			0.89	0.89

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

MOVEMENT SUMMARY

Site: S1_PM

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Balaclava Road S											
10	L2	120	21.7	0.593	63.7	LOS E	14.5	111.9	0.88	0.90	30.7
11	T1	143	4.0	0.593	57.9	LOS E	14.5	111.9	0.88	0.90	30.4
12	R2	363	1.5	0.432	55.5	LOS D	9.9	70.5	0.85	0.79	32.2
Approach		626	6.0	0.593	57.6	LOS E	14.5	111.9	0.86	0.83	31.4
East: Epping Road E											
1	L2	713	3.2	0.929	30.0	LOS C	35.9	275.9	0.85	0.99	42.2
2	T1	1389	7.2	0.970	50.0	LOS D	52.5	375.3	0.99	1.07	35.8
3	R2	62	0.0	0.212	69.9	LOS E	2.0	13.7	0.93	0.72	28.9
Approach		2164	5.6	0.970	43.8	LOS D	52.5	375.3	0.95	1.03	37.4
North: Balaclava Road N											
4	L2	215	27.3	0.619	27.3	LOS B	8.1	74.9	0.80	0.76	42.6
5	T1	338	9.9	1.133	196.3	LOS F	38.7	270.6	0.98	1.42	16.2
6	R2	278	33.3	1.128	205.9	LOS F	35.4	318.7	1.00	1.34	13.9
Approach		831	22.2	1.133	155.6	LOS F	38.7	318.7	0.94	1.23	17.1
West: Epping Road W											
7	L2	110	4.9	0.097	6.9	LOS A	0.1	0.8	0.02	0.55	57.3
8	T1	1028	1.1	0.492	23.4	LOS B	13.2	92.8	0.61	0.53	48.4
9	R2	174	1.4	1.204	266.0	LOS F	25.1	177.8	1.00	1.32	11.3
Approach		1312	1.4	1.204	54.2	LOS D	25.1	177.8	0.61	0.64	34.1
All Vehicles		4933	7.4	1.204	67.2	LOS E	52.5	375.3	0.84	0.93	29.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P4	South Full Crossing	6	36.4	LOS D	0.0	0.0	0.72	0.72
P1	East Full Crossing	191	60.8	LOS F	0.7	0.7	0.94	0.94
P2	North Full Crossing	3	37.9	LOS D	0.0	0.0	0.74	0.74
P3	West Full Crossing	108	64.4	LOS F	0.4	0.4	0.96	0.96
All Pedestrians		308	61.4	LOS F			0.94	0.94

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

MOVEMENT SUMMARY

Site: S2_PM

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Balaclava Road S											
10	L2	120	21.7	0.593	63.7	LOS E	14.5	111.9	0.88	0.90	30.7
11	T1	143	4.0	0.593	57.9	LOS E	14.5	111.9	0.88	0.90	30.4
12	R2	363	1.5	0.432	55.5	LOS D	9.9	70.5	0.85	0.79	32.2
Approach		626	6.0	0.593	57.6	LOS E	14.5	111.9	0.86	0.83	31.4
East: Epping Road E											
1	L2	713	3.2	0.929	30.0	LOS C	35.9	275.9	0.85	0.99	42.2
2	T1	1389	7.2	0.970	50.0	LOS D	52.5	375.3	0.99	1.07	35.8
3	R2	62	0.0	0.212	69.9	LOS E	2.0	13.7	0.93	0.72	28.9
Approach		2164	5.6	0.970	43.8	LOS D	52.5	375.3	0.95	1.03	37.4
North: Balaclava Road N											
4	L2	215	27.3	0.620	27.3	LOS B	8.1	74.9	0.80	0.76	42.6
5	T1	338	9.9	1.133	196.3	LOS F	38.7	270.6	0.98	1.42	16.2
6	R2	278	33.3	1.128	205.9	LOS F	35.4	318.7	1.00	1.34	13.9
Approach		831	22.2	1.133	155.6	LOS F	38.7	318.7	0.94	1.23	17.1
West: Epping Road W											
7	L2	110	4.9	0.097	6.9	LOS A	0.1	0.8	0.02	0.55	57.3
8	T1	1037	1.1	0.496	23.5	LOS B	13.4	94.0	0.61	0.53	48.4
9	R2	174	1.4	1.204	266.0	LOS F	25.1	177.8	1.00	1.32	11.3
Approach		1321	1.4	1.204	54.0	LOS D	25.1	177.8	0.61	0.64	34.1
All Vehicles		4942	7.3	1.204	67.2	LOS E	52.5	375.3	0.84	0.93	29.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P4	South Full Crossing	6	36.4	LOS D	0.0	0.0	0.72	0.72
P1	East Full Crossing	191	60.8	LOS F	0.7	0.7	0.94	0.94
P2	North Full Crossing	3	37.9	LOS D	0.0	0.0	0.74	0.74
P3	West Full Crossing	108	64.4	LOS F	0.4	0.4	0.96	0.96
All Pedestrians		308	61.4	LOS F			0.94	0.94

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

MOVEMENT SUMMARY

Site: AM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road S											
1	L2	21	5.3	1.023	117.3	LOS F	31.8	223.8	1.00	1.19	21.2
2	T1	587	0.4	1.023	146.8	LOS F	31.8	223.8	0.99	1.19	17.8
3	R2	423	1.0	1.175	263.3	LOS F	58.7	414.5	1.00	1.46	11.4
Approach		1031	0.8	1.175	194.0	LOS F	58.7	414.5	0.99	1.30	14.5
East: Epping Road E											
4	L2	139	1.2	0.089	5.8	LOS A	0.1	1.1	0.02	0.56	54.1
5	T1	1085	2.1	0.411	11.8	LOS A	8.4	60.0	0.37	0.32	50.4
6	R2	772	1.7	1.132	190.9	LOS F	48.1	341.4	1.00	1.30	14.6
Approach		1996	1.9	1.132	80.6	LOS F	48.1	341.4	0.59	0.72	25.9
North: Herring Road N											
7	L2	286	1.6	0.455	39.3	LOS C	12.8	90.7	0.75	0.77	36.2
8	T1	161	1.6	1.184	205.1	LOS F	18.3	129.5	1.00	1.20	13.9
9	R2	134	1.7	1.184	256.2	LOS F	18.3	129.5	1.00	1.35	11.6
Approach		581	1.6	1.184	135.3	LOS F	18.3	129.5	0.87	1.02	18.7
West: Epping Road W											
10	L2	717	1.0	0.389	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
11	T1	1990	1.2	1.152	189.8	LOS F	91.7	648.4	1.00	1.68	14.7
12	R2	37	4.0	0.478	79.1	LOS F	2.6	18.9	1.00	0.73	25.9
Approach		2744	1.2	1.152	140.2	LOS F	91.7	648.4	0.74	1.37	18.3
All Vehicles		6352	1.4	1.184	129.8	LOS F	91.7	648.4	0.75	1.12	19.3

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

MOVEMENT SUMMARY

Site: AM Sc2

New Site
Signals - Actuated Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road S											
1	L2	21	5.3	1.137	181.7	LOS F	41.5	295.0	0.99	1.31	15.5
2	T1	619	1.7	1.137	212.1	LOS F	41.5	295.0	0.98	1.31	13.6
3	R2	423	1.0	1.270	338.4	LOS F	67.2	474.7	1.00	1.59	9.2
Approach		1063	1.5	1.270	261.7	LOS F	67.2	474.7	0.99	1.42	11.5
East: Epping Road E											
4	L2	139	1.2	0.124	5.8	LOS A	0.2	1.1	0.02	0.56	54.1
5	T1	1085	5.7	0.499	21.0	LOS B	12.8	94.2	0.55	0.48	44.7
6	R2	805	2.7	1.289	326.9	LOS F	65.9	472.1	1.00	1.56	9.5
Approach		2029	4.2	1.289	141.3	LOS F	65.9	472.1	0.69	0.91	18.2
North: Herring Road N											
7	L2	308	3.5	0.425	33.5	LOS C	12.1	87.4	0.64	0.75	38.4
8	T1	192	7.4	0.612	64.8	LOS E	9.5	70.5	0.93	0.74	29.3
9	R2	138	8.5	0.612	71.8	LOS F	9.5	70.5	0.95	0.79	27.6
Approach		638	5.7	0.612	51.2	LOS D	12.1	87.4	0.80	0.75	32.6
West: Epping Road W											
10	L2	730	1.4	0.397	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
11	T1	1990	1.4	1.248	273.0	LOS F	106.3	752.7	1.00	1.96	11.0
12	R2	37	4.0	0.287	73.1	LOS F	2.4	17.4	0.92	0.72	27.1
Approach		2757	1.4	1.248	199.5	LOS F	106.3	752.7	0.73	1.57	14.2
All Vehicles		6487	2.7	1.289	176.9	LOS F	106.3	752.7	0.77	1.26	15.5

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

MOVEMENT SUMMARY

Site: PM Sc1

New Site
Signals - Actuated Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road S											
1	L2	39	2.0	0.631	83.9	LOS F	15.5	110.8	0.93	0.86	26.1
2	T1	318	2.1	0.631	69.8	LOS E	15.5	110.8	0.92	0.80	28.1
3	R2	114	0.0	0.391	65.4	LOS E	6.8	47.5	0.88	0.77	29.0
Approach		471	1.6	0.631	69.9	LOS E	15.5	110.8	0.91	0.80	28.1
East: Epping Road E											
4	L2	314	0.0	0.274	6.1	LOS A	0.5	3.6	0.03	0.56	53.9
5	T1	1872	1.2	1.128	164.6	LOS F	75.3	532.4	1.00	1.54	16.3
6	R2	344	0.8	0.652	63.1	LOS E	10.8	76.2	0.93	0.80	29.4
Approach		2530	1.0	1.128	131.1	LOS F	75.3	532.4	0.87	1.32	19.1
North: Herring Road N											
7	L2	230	2.2	0.217	6.5	LOS A	0.7	4.7	0.05	0.56	53.6
8	T1	534	1.6	1.005	76.5	LOS F	40.0	283.3	0.94	0.96	26.7
9	R2	531	0.6	1.005	93.0	LOS F	40.0	283.3	1.00	1.02	23.9
Approach		1295	1.3	1.005	70.8	LOS F	40.0	283.3	0.81	0.92	27.9
West: Epping Road W											
10	L2	389	1.0	0.211	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
11	T1	1063	1.7	0.664	35.8	LOS C	19.1	135.6	0.79	0.68	37.9
12	R2	127	1.0	0.482	61.3	LOS E	7.6	53.7	0.88	0.77	29.7
Approach		1579	1.4	0.664	30.4	LOS C	19.1	135.6	0.60	0.65	40.1
All Vehicles		5875	1.2	1.128	85.8	LOS F	75.3	532.4	0.79	1.01	25.0

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

MOVEMENT SUMMARY

Site: PM Sc2

New Site
Signals - Actuated Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road S											
1	L2	39	2.0	0.681	85.3	LOS F	18.0	128.5	0.94	0.87	25.9
2	T1	358	2.1	0.681	70.4	LOS E	18.0	128.5	0.93	0.81	28.0
3	R2	114	0.0	0.374	64.3	LOS E	6.7	46.9	0.87	0.77	29.3
Approach		511	1.6	0.681	70.2	LOS E	18.0	128.5	0.91	0.80	28.1
East: Epping Road E											
4	L2	314	0.0	0.274	6.1	LOS A	0.5	3.6	0.03	0.56	53.9
5	T1	1872	1.2	1.157	190.9	LOS F	80.6	569.9	1.00	1.65	14.6
6	R2	390	0.8	0.739	63.9	LOS E	12.6	88.7	0.95	0.81	29.2
Approach		2576	1.0	1.157	149.2	LOS F	80.6	569.9	0.87	1.39	17.5
North: Herring Road N											
7	L2	282	2.2	0.263	6.5	LOS A	0.9	6.1	0.05	0.57	53.6
8	T1	552	1.6	1.039	93.8	LOS F	46.1	326.6	0.94	1.04	23.8
9	R2	550	0.6	1.039	116.8	LOS F	46.1	326.6	1.00	1.10	20.7
Approach		1384	1.3	1.039	85.1	LOS F	46.1	326.6	0.78	0.97	25.1
West: Epping Road W											
10	L2	398	1.0	0.216	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
11	T1	1036	1.7	0.666	36.8	LOS C	18.9	134.4	0.80	0.69	37.6
12	R2	127	1.0	0.482	61.3	LOS E	7.6	53.7	0.88	0.77	29.7
Approach		1561	1.4	0.666	30.9	LOS C	18.9	134.4	0.60	0.65	39.9
All Vehicles		6032	1.2	1.157	97.2	LOS F	80.6	569.9	0.79	1.05	23.3

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

MOVEMENT SUMMARY

Site: AM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road											
1	L2	118	9.9	0.292	28.0	LOS B	3.3	25.0	0.80	0.75	40.1
2	T1	115	5.0	0.332	46.4	LOS D	5.6	40.9	0.86	0.69	34.2
3	R2	329	1.3	0.975	87.3	LOS F	24.9	176.4	1.00	1.07	24.6
Approach		562	3.8	0.975	66.5	LOS E	24.9	176.4	0.93	0.92	28.6
East: Talavera Road (E)											
4	L2	120	1.1	0.174	30.2	LOS C	3.8	26.9	0.58	0.70	39.9
5	T1	302	0.6	0.207	24.9	LOS B	4.9	34.3	0.59	0.49	42.7
6	R2	48	2.8	0.264	68.7	LOS E	1.4	10.2	0.98	0.71	27.9
Approach		470	0.9	0.264	30.7	LOS C	4.9	34.3	0.63	0.56	39.8
North: M2 Ramps											
7	L2	205	2.0	0.192	39.5	LOS C	3.9	28.1	0.70	0.73	35.8
9	R2	103	1.9	0.293	50.8	LOS D	4.9	34.9	0.85	0.76	32.3
Approach		308	2.0	0.293	43.2	LOS D	4.9	34.9	0.75	0.74	34.6
West: Talavera Road (W)											
10	L2	68	1.0	0.947	65.2	LOS E	47.2	336.6	1.00	1.11	29.8
11	T1	1261	2.3	0.947	57.8	LOS E	47.2	336.6	0.99	1.10	30.8
12	R2	32	100.0	0.583	73.9	LOS F	2.0	26.4	1.00	0.77	26.9
Approach		1361	4.5	0.947	58.5	LOS E	47.2	336.6	0.99	1.09	30.6
All Vehicles		2701	3.4	0.975	53.6	LOS D	47.2	336.6	0.89	0.92	31.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	36.1	LOS D	0.1	0.1	0.78	0.78
P2S	East Slip/Bypass Lane Crossing	53	41.8	LOS E	0.1	0.1	0.84	0.84
P3	North Full Crossing	53	33.8	LOS D	0.1	0.1	0.75	0.75
P4	West Full Crossing	53	53.3	LOS E	0.2	0.2	0.94	0.94
All Pedestrians		211	41.3	LOS E			0.83	0.83

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

MOVEMENT SUMMARY

Site: AM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Herring Road											
1	L2	118	9.9	0.272	27.7	LOS B	3.4	25.5	0.77	0.75	40.3
2	T1	115	5.0	0.304	44.4	LOS D	5.4	39.6	0.84	0.67	34.9
3	R2	355	1.3	0.964	82.4	LOS F	26.2	185.5	1.00	1.05	25.4
Approach		588	3.7	0.964	64.0	LOS E	26.2	185.5	0.92	0.92	29.1
East: Talavera Road (E)											
4	L2	166	1.1	0.230	29.1	LOS C	5.2	36.9	0.58	0.71	40.3
5	T1	362	0.6	0.238	23.5	LOS B	5.7	40.2	0.58	0.48	43.3
6	R2	64	2.8	0.352	69.2	LOS E	1.9	13.8	0.99	0.72	27.8
Approach		592	1.0	0.352	30.0	LOS C	5.7	40.2	0.62	0.57	40.1
North: M2 Ramps											
7	L2	208	2.0	0.220	43.2	LOS D	4.3	30.7	0.75	0.74	34.5
9	R2	103	1.9	0.355	55.0	LOS D	5.2	37.3	0.89	0.77	31.2
Approach		311	2.0	0.355	47.1	LOS D	5.2	37.3	0.80	0.75	33.3
West: Talavera Road (W)											
10	L2	68	1.0	0.945	63.2	LOS E	48.7	347.0	1.00	1.11	30.3
11	T1	1308	2.3	0.945	55.5	LOS D	48.7	347.0	0.98	1.08	31.4
12	R2	40	100.0	0.738	76.0	LOS F	2.6	34.3	1.00	0.84	26.5
Approach		1416	5.0	0.945	56.5	LOS D	48.7	347.0	0.98	1.08	31.2
All Vehicles		2907	3.6	0.964	51.6	LOS D	48.7	347.0	0.88	0.91	32.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	34.6	LOS D	0.1	0.1	0.76	0.76
P2S	East Slip/Bypass Lane Crossing	53	40.1	LOS E	0.1	0.1	0.82	0.82
P3	North Full Crossing	53	32.3	LOS D	0.1	0.1	0.73	0.73
P4	West Full Crossing	53	51.5	LOS E	0.2	0.2	0.93	0.93
All Pedestrians		211	39.6	LOS D			0.81	0.81

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

MOVEMENT SUMMARY

Site: PM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Herring Road											
1	L2	143	9.9	0.183	16.0	LOS B	2.6	20.1	0.47	0.69	46.2
2	T1	380	5.0	0.722	42.5	LOS C	18.4	130.9	0.88	0.77	35.2
3	R2	267	1.3	0.722	49.3	LOS D	18.4	130.9	0.92	0.84	33.4
Approach		790	4.6	0.722	40.0	LOS C	18.4	130.9	0.82	0.78	36.1
East: Talavera Road (E)											
4	L2	206	1.1	0.433	45.8	LOS D	9.3	65.9	0.82	0.78	34.1
5	T1	562	0.6	0.560	41.7	LOS C	13.4	94.4	0.86	0.73	35.7
6	R2	398	2.8	0.719	53.1	LOS D	10.2	73.3	0.89	0.82	31.7
Approach		1166	1.4	0.719	46.3	LOS D	13.4	94.4	0.87	0.77	33.9
North: M2 Ramps											
7	L2	59	2.0	0.050	34.0	LOS C	1.0	7.0	0.60	0.68	37.8
9	R2	59	1.9	0.483	67.2	LOS E	3.5	24.8	0.99	0.75	28.2
Approach		118	2.0	0.483	50.6	LOS D	3.5	24.8	0.80	0.71	32.3
West: Talavera Road (W)											
10	L2	112	1.0	0.705	50.9	LOS D	16.7	119.1	0.92	0.86	33.3
11	T1	568	2.3	0.705	44.2	LOS D	17.1	121.7	0.92	0.82	34.6
12	R2	33	100.0	0.144	48.8	LOS D	1.5	19.1	0.78	0.72	32.9
Approach		713	6.5	0.705	45.5	LOS D	17.1	121.7	0.91	0.82	34.3
All Vehicles		2787	3.7	0.722	44.5	LOS D	18.4	130.9	0.86	0.78	34.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	47.8	LOS E	0.2	0.2	0.89	0.89
P2S	East Slip/Bypass Lane Crossing	53	24.1	LOS C	0.1	0.1	0.63	0.63
P3	North Full Crossing	53	45.2	LOS E	0.2	0.2	0.87	0.87
P4	West Full Crossing	53	44.3	LOS E	0.2	0.2	0.86	0.86
All Pedestrians		211	40.3	LOS E			0.81	0.81

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

MOVEMENT SUMMARY

Site: PM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road											
1	L2	143	9.9	0.187	16.8	LOS B	2.8	21.2	0.49	0.69	45.8
2	T1	380	5.0	0.807	47.7	LOS D	21.1	150.1	0.92	0.85	33.5
3	R2	294	1.3	0.807	54.5	LOS D	21.1	150.1	0.97	0.89	31.8
Approach		817	4.5	0.807	44.8	LOS D	21.1	150.1	0.86	0.84	34.5
East: Talavera Road (E)											
4	L2	280	1.1	0.552	45.8	LOS D	13.1	92.4	0.84	0.80	34.1
5	T1	741	0.6	0.721	42.4	LOS C	19.6	137.6	0.91	0.79	35.4
6	R2	441	2.8	0.809	56.0	LOS D	11.9	85.3	0.90	0.87	30.9
Approach		1462	1.4	0.809	47.2	LOS D	19.6	137.6	0.89	0.81	33.7
North: M2 Ramps											
7	L2	67	2.0	0.056	34.1	LOS C	1.1	8.0	0.61	0.68	37.8
9	R2	59	1.9	0.552	68.9	LOS E	3.6	25.4	1.00	0.76	27.9
Approach		126	2.0	0.552	50.4	LOS D	3.6	25.4	0.79	0.72	32.4
West: Talavera Road (W)											
10	L2	112	1.0	0.772	52.8	LOS D	20.7	147.2	0.94	0.90	32.8
11	T1	669	2.3	0.772	45.5	LOS D	20.7	147.2	0.93	0.86	34.2
12	R2	42	100.0	0.179	48.3	LOS D	1.9	24.6	0.78	0.73	33.1
Approach		823	7.1	0.772	46.6	LOS D	20.7	147.2	0.92	0.86	33.9
All Vehicles		3228	3.6	0.809	46.5	LOS D	21.1	150.1	0.89	0.83	33.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	46.0	LOS E	0.2	0.2	0.88	0.88
P2S	East Slip/Bypass Lane Crossing	53	26.1	LOS C	0.1	0.1	0.66	0.66
P3	North Full Crossing	53	43.4	LOS E	0.2	0.2	0.85	0.85
P4	West Full Crossing	53	46.0	LOS E	0.2	0.2	0.88	0.88
All Pedestrians		211	40.4	LOS E			0.82	0.82

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

MOVEMENT SUMMARY

Site: AM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Herring Road											
1	L2	40	9.9	0.071	24.7	LOS B	1.1	8.1	0.61	0.68	41.6
2	T1	104	5.0	0.245	41.2	LOS C	4.6	33.7	0.79	0.63	36.0
3	R2	135	1.3	0.326	47.7	LOS D	6.2	43.7	0.82	0.76	33.5
Approach		279	3.9	0.326	42.0	LOS C	6.2	43.7	0.78	0.70	35.4
East: Talavera Road (E)											
4	L2	261	1.1	0.333	26.9	LOS B	8.1	57.1	0.57	0.72	41.3
5	T1	419	0.6	0.254	20.5	LOS B	6.1	43.1	0.54	0.45	45.0
6	R2	117	2.8	0.321	61.6	LOS E	3.2	23.0	0.94	0.75	29.5
Approach		797	1.1	0.333	28.6	LOS C	8.1	57.1	0.61	0.58	40.7
North: M2 Ramps											
7	L2	34	2.0	0.046	47.1	LOS D	0.7	5.2	0.77	0.68	33.3
9	R2	17	1.9	0.186	68.1	LOS E	1.0	7.1	0.97	0.69	28.1
Approach		51	2.0	0.186	54.1	LOS D	1.0	7.1	0.84	0.69	31.3
West: Talavera Road (W)											
10	L2	22	1.0	0.204	28.6	LOS C	4.5	31.7	0.51	0.49	42.3
11	T1	312	2.3	0.204	21.4	LOS B	4.7	33.7	0.52	0.46	44.3
12	R2	33	100.0	0.301	63.6	LOS E	1.8	23.9	0.94	0.74	29.1
Approach		367	10.9	0.301	25.6	LOS B	4.7	33.7	0.55	0.49	42.2
All Vehicles		1494	4.0	0.333	31.2	LOS C	8.1	57.1	0.63	0.59	39.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	31.6	LOS D	0.1	0.1	0.73	0.73
P2S	East Slip/Bypass Lane Crossing	53	37.7	LOS D	0.1	0.1	0.79	0.79
P3	North Full Crossing	53	29.5	LOS C	0.1	0.1	0.70	0.70
P4	West Full Crossing	53	48.7	LOS E	0.2	0.2	0.90	0.90
All Pedestrians		211	36.9	LOS D			0.78	0.78

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

MOVEMENT SUMMARY

Site: AM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Herring Road											
1	L2	40	9.9	0.079	27.6	LOS B	1.2	8.8	0.66	0.69	40.3
2	T1	104	5.0	0.228	39.3	LOS C	4.5	32.5	0.77	0.61	36.6
3	R2	173	1.3	0.389	46.8	LOS D	7.9	55.8	0.82	0.77	33.7
Approach		317	3.6	0.389	41.9	LOS C	7.9	55.8	0.78	0.71	35.4
East: Talavera Road (E)											
4	L2	323	1.1	0.382	24.4	LOS B	9.5	67.0	0.54	0.72	42.5
5	T1	572	0.6	0.321	18.1	LOS B	8.0	56.2	0.52	0.44	46.3
6	R2	153	2.8	0.840	74.9	LOS F	5.0	35.6	1.00	0.88	26.7
Approach		1048	1.1	0.840	28.3	LOS B	9.5	67.0	0.60	0.59	40.8
North: M2 Ramps											
7	L2	43	2.0	0.078	53.1	LOS D	1.0	7.3	0.84	0.70	31.6
9	R2	17	1.9	0.186	68.1	LOS E	1.0	7.1	0.97	0.69	28.1
Approach		60	2.0	0.186	57.4	LOS E	1.0	7.3	0.88	0.70	30.5
West: Talavera Road (W)											
10	L2	22	1.0	0.268	27.3	LOS B	6.2	44.2	0.49	0.47	43.1
11	T1	450	2.3	0.268	19.5	LOS B	6.3	45.2	0.49	0.44	45.3
12	R2	46	100.0	0.854	79.8	LOS F	3.2	41.2	1.00	0.93	25.8
Approach		518	10.9	0.854	25.3	LOS B	6.3	45.2	0.54	0.49	42.4
All Vehicles		1943	4.1	0.854	30.6	LOS C	9.5	67.0	0.62	0.59	39.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	28.8	LOS C	0.1	0.1	0.69	0.69
P2S	East Slip/Bypass Lane Crossing	53	36.1	LOS D	0.1	0.1	0.78	0.78
P3	North Full Crossing	53	26.7	LOS C	0.1	0.1	0.67	0.67
P4	West Full Crossing	53	46.9	LOS E	0.2	0.2	0.89	0.89
All Pedestrians		211	34.6	LOS D			0.76	0.76

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

MOVEMENT SUMMARY

Site: AM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Waterloo Road E											
4	L2	143	7.3	0.162	21.0	LOS B	3.6	26.6	0.40	0.68	43.6
5	T1	178	2.9	0.566	58.8	LOS E	11.0	78.7	0.94	0.77	30.7
6	R2	300	21.3	0.730	41.6	LOS C	14.7	121.7	0.92	0.84	35.4
Approach		621	12.8	0.730	41.8	LOS C	14.7	121.7	0.81	0.78	35.4
NorthEast: Herring Road N											
7	L2	197	33.3	0.347	36.4	LOS C	8.0	72.3	0.64	0.75	36.8
8	T1	126	19.5	0.222	55.1	LOS D	3.6	29.1	0.86	0.66	31.6
9	R2	106	27.9	0.737	77.3	LOS F	7.5	64.8	1.00	0.84	26.2
Approach		429	27.9	0.737	52.0	LOS D	8.0	72.3	0.79	0.75	32.1
NorthWest: University Avenue W											
10	L2	99	20.3	0.482	62.2	LOS E	8.5	67.4	0.91	0.78	29.8
11	T1	196	2.6	0.482	57.5	LOS E	9.2	65.6	0.92	0.75	30.8
Approach		295	8.6	0.482	59.1	LOS E	9.2	67.4	0.91	0.76	30.5
SouthWest: Herring Road S											
1	L2	217	1.9	0.693	40.5	LOS C	25.4	181.2	0.81	0.77	36.6
2	T1	776	2.2	0.693	36.1	LOS C	25.8	183.8	0.82	0.75	37.4
3	R2	810	0.9	0.732	52.1	LOS D	23.4	165.2	0.91	0.84	32.1
Approach		1803	1.6	0.732	43.8	LOS D	25.8	183.8	0.86	0.79	34.7
All Vehicles		3148	8.0	0.737	46.0	LOS D	25.8	183.8	0.84	0.78	34.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	SouthEast Full Crossing	145	64.5	LOS F	0.6	0.6	0.96	0.96
P3	NorthEast Full Crossing	117	64.4	LOS F	0.4	0.4	0.96	0.96
P4	NorthWest Full Crossing	139	57.9	LOS E	0.5	0.5	0.91	0.91
P1	SouthWest Full Crossing	27	64.2	LOS F	0.1	0.1	0.96	0.96
All Pedestrians		428	62.3	LOS F			0.95	0.95

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

MOVEMENT SUMMARY

Site: AM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Waterloo Road E											
4	L2	190	7.3	0.206	19.5	LOS B	4.5	33.6	0.38	0.68	44.4
5	T1	186	2.9	0.591	59.1	LOS E	11.6	82.8	0.95	0.78	30.6
6	R2	301	21.3	0.809	47.5	LOS D	16.4	135.6	0.97	0.88	33.5
Approach		677	12.3	0.809	42.8	LOS D	16.4	135.6	0.80	0.80	35.0
NorthEast: Herring Road N											
7	L2	228	33.3	0.425	40.2	LOS C	10.2	91.8	0.70	0.77	35.5
8	T1	136	19.5	0.239	55.3	LOS D	3.9	31.6	0.86	0.67	31.6
9	R2	109	27.9	0.704	75.6	LOS F	7.5	65.5	1.00	0.83	26.5
Approach		473	28.1	0.704	52.7	LOS D	10.2	91.8	0.82	0.75	31.9
NorthWest: University Avenue W											
10	L2	106	20.3	0.509	62.5	LOS E	9.1	72.1	0.91	0.78	29.7
11	T1	206	2.6	0.509	57.8	LOS E	9.7	69.7	0.92	0.76	30.7
Approach		312	8.6	0.509	59.4	LOS E	9.7	72.1	0.92	0.77	30.4
SouthWest: Herring Road S											
1	L2	217	1.9	0.729	39.5	LOS C	28.1	199.9	0.82	0.78	37.1
2	T1	800	2.2	0.729	33.9	LOS C	28.1	199.9	0.80	0.72	38.3
3	R2	864	0.9	0.807	52.1	LOS D	29.4	207.1	0.90	0.87	32.1
Approach		1881	1.6	0.807	42.9	LOS D	29.4	207.1	0.85	0.79	35.0
All Vehicles		3343	8.2	0.809	45.8	LOS D	29.4	207.1	0.84	0.79	34.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	SouthEast Full Crossing	145	64.5	LOS F	0.6	0.6	0.96	0.96
P3	NorthEast Full Crossing	117	64.4	LOS F	0.4	0.4	0.96	0.96
P4	NorthWest Full Crossing	139	57.9	LOS E	0.5	0.5	0.91	0.91
P1	SouthWest Full Crossing	27	64.2	LOS F	0.1	0.1	0.96	0.96
All Pedestrians		428	62.3	LOS F			0.95	0.95

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

MOVEMENT SUMMARY

Site: PM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Waterloo Road E											
4	L2	753	7.3	0.952	48.7	LOS D	45.1	330.9	0.75	0.88	33.1
5	T1	214	2.9	0.952	70.5	LOS F	45.1	330.9	1.00	1.04	27.2
6	R2	427	21.3	0.898	45.5	LOS D	22.5	186.1	0.99	0.97	34.2
Approach		1394	10.9	0.952	51.0	LOS D	45.1	330.9	0.86	0.93	32.3
NorthEast: Herring Road N											
7	L2	196	33.3	0.760	40.4	LOS C	8.7	78.0	0.63	0.77	35.4
8	T1	473	19.5	0.832	66.8	LOS E	16.6	135.5	1.00	0.93	28.7
9	R2	138	27.9	0.891	84.8	LOS F	10.5	91.1	1.00	0.94	24.8
Approach		807	24.3	0.891	63.5	LOS E	16.6	135.5	0.91	0.89	29.3
NorthWest: University Avenue W											
10	L2	180	20.3	0.400	43.2	LOS D	9.8	79.3	0.72	0.75	34.9
11	T1	268	2.6	0.400	39.8	LOS C	11.3	80.7	0.75	0.65	36.2
Approach		448	9.7	0.400	41.2	LOS C	11.3	80.7	0.74	0.69	35.7
SouthWest: Herring Road S											
1	L2	46	1.9	0.957	87.3	LOS F	32.6	232.6	1.00	1.11	25.3
2	T1	735	2.2	0.957	81.7	LOS F	32.6	232.6	1.00	1.11	25.7
3	R2	232	0.9	0.419	64.6	LOS E	7.0	49.5	0.92	0.78	28.9
Approach		1013	1.9	0.957	78.1	LOS F	32.6	232.6	0.98	1.03	26.3
All Vehicles		3662	11.2	0.957	60.1	LOS E	45.1	330.9	0.89	0.92	30.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	SouthEast Full Crossing	145	64.5	LOS F	0.6	0.6	0.96	0.96
P3	NorthEast Full Crossing	117	46.6	LOS E	0.4	0.4	0.82	0.82
P4	NorthWest Full Crossing	139	57.9	LOS E	0.5	0.5	0.91	0.91
P1	SouthWest Full Crossing	27	48.9	LOS E	0.1	0.1	0.84	0.84
All Pedestrians		428	56.5	LOS E			0.90	0.90

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

MOVEMENT SUMMARY

Site: PM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Waterloo Road E											
4	L2	909	7.3	1.005	57.0	LOS E	62.2	456.3	0.72	0.92	30.8
5	T1	237	2.9	1.005	93.2	LOS F	62.2	456.3	1.00	1.13	23.3
6	R2	423	21.3	0.994	81.2	LOS F	29.9	247.4	1.00	1.10	25.7
Approach		1569	10.4	1.005	69.0	LOS E	62.2	456.3	0.84	1.00	27.9
NorthEast: Herring Road N											
7	L2	184	33.3	0.381	45.3	LOS D	8.9	80.4	0.74	0.77	33.8
8	T1	406	19.5	0.707	61.2	LOS E	13.1	106.8	0.98	0.83	30.0
9	R2	149	27.9	1.036	136.3	LOS F	14.9	128.9	1.00	1.12	18.4
Approach		739	24.6	1.036	72.4	LOS F	14.9	128.9	0.92	0.88	27.3
NorthWest: University Avenue W											
10	L2	187	20.3	0.346	34.5	LOS C	8.6	69.7	0.62	0.71	38.0
11	T1	279	2.6	0.346	30.8	LOS C	10.1	72.3	0.65	0.57	39.7
Approach		466	9.7	0.346	32.3	LOS C	10.1	72.3	0.63	0.63	39.0
SouthWest: Herring Road S											
1	L2	46	1.9	0.920	77.2	LOS F	29.0	206.8	1.00	1.04	27.2
2	T1	710	2.2	0.920	71.7	LOS F	29.0	206.8	1.00	1.04	27.6
3	R2	350	0.9	0.664	68.3	LOS E	11.4	80.1	0.98	0.82	28.1
Approach		1106	1.8	0.920	70.9	LOS F	29.0	206.8	0.99	0.97	27.7
All Vehicles		3880	10.6	1.036	65.8	LOS E	62.2	456.3	0.87	0.92	28.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	SouthEast Full Crossing	145	64.5	LOS F	0.6	0.6	0.96	0.96
P3	NorthEast Full Crossing	117	39.6	LOS D	0.4	0.4	0.75	0.75
P4	NorthWest Full Crossing	139	57.9	LOS E	0.5	0.5	0.91	0.91
P1	SouthWest Full Crossing	27	41.7	LOS E	0.1	0.1	0.77	0.77
All Pedestrians		428	54.1	LOS E			0.88	0.88

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

MOVEMENT SUMMARY

Site: PM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Waterloo Road E											
4	L2	192	7.3	0.305	25.5	LOS B	5.4	39.2	0.43	0.67	41.8
5	T1	54	2.9	0.305	54.2	LOS D	5.4	39.2	0.86	0.72	31.2
6	R2	84	21.3	0.455	52.6	LOS D	4.6	37.8	0.93	0.76	32.0
Approach		330	10.1	0.455	37.1	LOS C	5.4	39.2	0.63	0.70	36.9
NorthEast: Herring Road N											
7	L2	98	33.3	0.322	52.2	LOS D	6.0	53.6	0.79	0.74	32.1
8	T1	507	19.5	0.598	51.3	LOS D	14.1	115.5	0.89	0.76	32.6
9	R2	63	27.9	0.518	76.0	LOS F	4.3	37.2	0.99	0.76	26.4
Approach		668	22.3	0.598	53.8	LOS D	14.1	115.5	0.89	0.76	31.8
NorthWest: University Avenue W											
10	L2	167	20.3	0.400	52.2	LOS D	8.7	71.6	0.81	0.78	31.8
11	T1	92	2.6	0.292	55.7	LOS D	5.3	37.8	0.88	0.69	31.5
Approach		259	14.0	0.400	53.4	LOS D	8.7	71.6	0.83	0.75	31.7
SouthWest: Herring Road S											
1	L2	111	1.9	0.538	22.1	LOS B	17.1	122.1	0.51	0.52	45.5
2	T1	965	2.2	0.538	16.9	LOS B	17.6	125.5	0.52	0.49	46.7
3	R2	812	0.9	0.604	41.6	LOS C	20.0	141.2	0.78	0.81	35.3
Approach		1888	1.6	0.604	27.9	LOS B	20.0	141.2	0.63	0.63	41.0
All Vehicles		3145	7.9	0.604	36.4	LOS C	20.0	141.2	0.70	0.67	37.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	SouthEast Full Crossing	145	55.2	LOS E	0.5	0.5	0.89	0.89
P3	NorthEast Full Crossing	117	64.4	LOS F	0.4	0.4	0.96	0.96
P4	NorthWest Full Crossing	139	49.2	LOS E	0.5	0.5	0.84	0.84
P1	SouthWest Full Crossing	27	64.2	LOS F	0.1	0.1	0.96	0.96
All Pedestrians		428	56.4	LOS E			0.90	0.90

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

MOVEMENT SUMMARY

Site: PM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Waterloo Road E											
4	L2	337	7.3	0.477	23.7	LOS B	8.9	65.3	0.39	0.67	42.6
5	T1	74	2.9	0.477	56.2	LOS D	8.9	65.3	0.91	0.77	30.6
6	R2	80	21.3	0.446	52.6	LOS D	4.3	36.0	0.94	0.76	32.0
Approach		491	8.9	0.477	33.4	LOS C	8.9	65.3	0.56	0.70	38.3
NorthEast: Herring Road N											
7	L2	71	33.3	0.335	59.0	LOS E	5.5	48.1	0.85	0.75	30.5
8	T1	411	19.5	0.622	57.7	LOS E	11.9	97.4	0.94	0.78	30.9
9	R2	71	27.9	0.535	75.1	LOS F	4.8	41.6	0.99	0.77	26.6
Approach		553	22.3	0.622	60.1	LOS E	11.9	97.4	0.94	0.78	30.2
NorthWest: University Avenue W											
10	L2	179	20.3	0.418	51.7	LOS D	9.3	76.5	0.80	0.78	32.0
11	T1	107	2.6	0.340	56.2	LOS D	6.2	44.5	0.89	0.71	31.4
Approach		286	13.7	0.418	53.4	LOS D	9.3	76.5	0.84	0.75	31.7
SouthWest: Herring Road S											
1	L2	111	1.9	0.535	22.8	LOS B	17.2	122.5	0.52	0.53	45.2
2	T1	946	2.2	0.535	17.6	LOS B	17.6	125.8	0.53	0.50	46.3
3	R2	975	0.9	0.627	35.1	LOS C	22.3	157.1	0.73	0.80	37.7
Approach		2032	1.6	0.627	26.3	LOS B	22.3	157.1	0.62	0.65	41.7
All Vehicles		3362	7.1	0.627	35.2	LOS C	22.3	157.1	0.68	0.68	37.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	SouthEast Full Crossing	145	62.6	LOS F	0.5	0.5	0.95	0.95
P3	NorthEast Full Crossing	117	64.4	LOS F	0.4	0.4	0.96	0.96
P4	NorthWest Full Crossing	139	56.1	LOS E	0.5	0.5	0.90	0.90
P1	SouthWest Full Crossing	27	64.2	LOS F	0.1	0.1	0.96	0.96
All Pedestrians		428	61.1	LOS F			0.94	0.94

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

MOVEMENT SUMMARY

Site: AM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Talavera Rd (SE)											
21	L2	158	3.0	0.662	49.3	LOS D	18.3	131.3	0.88	0.82	33.6
22	T1	524	3.0	0.662	45.4	LOS D	18.4	132.2	0.87	0.77	34.2
23	R2	51	3.0	0.199	25.9	LOS B	1.3	9.0	0.67	0.71	41.2
Approach		733	3.0	0.662	44.8	LOS D	18.4	132.2	0.86	0.78	34.4
NorthEast: Khartoum (NE)											
24	L2	21	3.0	0.603	68.8	LOS E	8.1	58.1	0.98	0.80	28.9
25	T1	146	3.0	0.603	63.8	LOS E	8.3	59.9	0.98	0.80	29.0
26	R2	89	3.0	0.603	70.9	LOS F	8.3	59.9	0.98	0.79	27.8
Approach		256	3.0	0.603	66.7	LOS E	8.3	59.9	0.98	0.80	28.6
NorthWest: Talavera Rd (NW)											
27	L2	358	3.0	0.717	22.0	LOS B	28.5	204.9	0.61	0.67	44.7
28	T1	825	3.0	0.717	15.1	LOS B	28.5	204.9	0.52	0.52	47.3
29	R2	657	3.0	1.284	317.0	LOS F	95.7	687.3	0.96	1.53	9.6
Approach		1840	3.0	1.284	124.2	LOS F	95.7	687.3	0.69	0.91	19.7
SouthWest: Khartoum (SW)											
30	L2	106	3.0	0.235	68.9	LOS E	12.6	90.7	1.00	0.84	28.3
31	T1	86	3.0	0.235	63.3	LOS E	12.6	90.7	1.00	0.84	28.8
32	R2	170	3.0	0.715	71.2	LOS F	11.4	81.8	1.00	0.84	27.5
Approach		362	3.0	0.715	68.6	LOS E	12.6	90.7	1.00	0.84	28.0
All Vehicles		3191	3.0	1.284	95.1	LOS F	95.7	687.3	0.79	0.86	23.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	SouthEast Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P6	NorthEast Full Crossing	53	43.3	LOS E	0.2	0.2	0.79	0.79
P7	NorthWest Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P8	SouthWest Full Crossing	53	47.3	LOS E	0.2	0.2	0.82	0.82
All Pedestrians		211	54.8	LOS E			0.88	0.88

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

MOVEMENT SUMMARY

Site: AM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Talavera Rd (SE)											
21	L2	178	3.0	0.747	54.9	LOS D	24.5	175.8	0.97	0.86	31.9
22	T1	595	3.0	0.747	48.8	LOS D	24.5	175.8	0.96	0.85	33.1
23	R2	51	3.0	0.296	27.4	LOS B	1.5	10.5	0.80	0.74	40.5
Approach		824	3.0	0.747	48.8	LOS D	24.5	175.8	0.95	0.84	33.2
NorthEast: Khartoum (NE)											
24	L2	21	3.0	0.567	68.9	LOS E	8.3	59.5	0.97	0.78	28.8
25	T1	146	3.0	0.567	63.5	LOS E	8.3	59.5	0.97	0.78	29.0
26	R2	89	3.0	0.567	69.7	LOS E	8.2	59.0	0.97	0.79	28.1
Approach		256	3.0	0.567	66.1	LOS E	8.3	59.5	0.97	0.78	28.7
NorthWest: Talavera Rd (NW)											
27	L2	358	3.0	0.595	19.6	LOS B	17.2	123.6	0.50	0.66	45.7
28	T1	861	3.0	0.595	15.8	LOS B	20.3	146.1	0.53	0.54	47.1
29	R2	657	3.0	1.326	353.8	LOS F	102.0	732.4	1.00	1.58	8.8
Approach		1876	3.0	1.326	134.9	LOS F	102.0	732.4	0.68	0.93	18.6
SouthWest: Khartoum (SW)											
30	L2	138	3.0	0.308	47.8	LOS D	11.7	84.0	1.00	0.83	33.7
31	T1	86	3.0	0.308	42.2	LOS C	11.7	84.0	1.00	0.83	34.3
32	R2	200	3.0	0.843	76.4	LOS F	14.3	102.7	1.00	0.90	26.5
Approach		424	3.0	0.843	60.1	LOS E	14.3	102.7	1.00	0.86	30.0
All Vehicles		3380	3.0	1.326	99.3	LOS F	102.0	732.4	0.81	0.89	22.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	SouthEast Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P6	NorthEast Full Crossing	53	43.3	LOS E	0.2	0.2	0.79	0.79
P7	NorthWest Full Crossing	53	64.3	LOS F	0.2	0.2	0.96	0.96
P8	SouthWest Full Crossing	53	47.3	LOS E	0.2	0.2	0.82	0.82
All Pedestrians		211	54.8	LOS E			0.88	0.88

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

MOVEMENT SUMMARY

Site: PM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Talavera Rd (SE)											
21	L2	202	3.0	0.643	29.6	LOS C	23.6	169.2	0.67	0.67	41.2
22	T1	907	3.0	0.643	23.2	LOS B	23.6	169.2	0.65	0.61	43.1
23	R2	55	3.0	0.172	20.8	LOS B	1.4	9.7	0.53	0.68	43.7
Approach		1164	3.0	0.643	24.2	LOS B	23.6	169.2	0.65	0.62	42.8
NorthEast: Khartoum (NE)											
24	L2	26	3.0	0.145	38.5	LOS C	3.6	26.0	0.62	0.56	37.6
25	T1	73	3.0	0.145	34.9	LOS C	3.6	26.0	0.64	0.58	37.5
26	R2	26	3.0	0.145	56.9	LOS E	1.8	13.0	0.80	0.70	31.0
Approach		125	3.0	0.145	40.2	LOS C	3.6	26.0	0.67	0.60	35.9
NorthWest: Talavera Rd (NW)											
27	L2	493	3.0	0.558	26.8	LOS B	18.3	131.5	0.59	0.76	40.8
28	T1	345	3.0	0.371	18.8	LOS B	10.7	77.1	0.50	0.43	45.9
29	R2	211	3.0	0.806	35.2	LOS C	8.1	58.1	0.87	0.87	37.3
Approach		1049	3.0	0.806	25.9	LOS B	18.3	131.5	0.62	0.68	41.5
SouthWest: Khartoum (SW)											
30	L2	189	3.0	0.246	28.1	LOS B	6.3	44.9	0.52	0.71	40.3
31	T1	228	3.0	0.642	47.6	LOS D	17.1	122.9	0.88	0.77	33.3
32	R2	77	3.0	0.642	53.5	LOS D	17.1	122.9	0.88	0.77	32.9
Approach		494	3.0	0.642	41.1	LOS C	17.1	122.9	0.74	0.75	35.6
All Vehicles		2832	3.0	0.806	28.5	LOS B	23.6	169.2	0.65	0.66	40.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	SouthEast Full Crossing	53	41.0	LOS E	0.2	0.2	0.77	0.77
P6	NorthEast Full Crossing	53	24.7	LOS C	0.1	0.1	0.59	0.59
P7	NorthWest Full Crossing	53	42.5	LOS E	0.2	0.2	0.78	0.78
P8	SouthWest Full Crossing	53	27.7	LOS C	0.1	0.1	0.63	0.63
All Pedestrians		211	34.0	LOS D			0.69	0.69

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

MOVEMENT SUMMARY

Site: PM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Talavera Rd (SE)											
21	L2	204	3.0	0.691	29.7	LOS C	26.8	192.3	0.70	0.69	41.2
22	T1	1011	3.0	0.691	23.2	LOS B	26.8	192.3	0.67	0.63	43.1
23	R2	55	3.0	0.197	21.3	LOS B	1.4	9.9	0.54	0.68	43.5
Approach		1270	3.0	0.691	24.1	LOS B	26.8	192.3	0.67	0.64	42.8
NorthEast: Khartoum (NE)											
24	L2	26	3.0	0.157	38.6	LOS C	4.0	28.4	0.63	0.56	37.6
25	T1	73	3.0	0.157	33.1	LOS C	4.0	28.4	0.63	0.56	38.3
26	R2	118	3.0	0.514	57.9	LOS E	6.8	49.1	0.87	0.79	30.4
Approach		217	3.0	0.514	47.2	LOS D	6.8	49.1	0.76	0.69	33.5
NorthWest: Talavera Rd (NW)											
27	L2	512	3.0	0.606	26.7	LOS B	20.8	149.6	0.61	0.76	41.0
28	T1	469	3.0	0.606	19.3	LOS B	20.8	149.6	0.54	0.49	45.4
29	R2	211	3.0	0.922	58.4	LOS E	11.0	79.0	0.98	1.00	30.2
Approach		1192	3.0	0.922	29.4	LOS C	20.8	149.6	0.65	0.70	40.0
SouthWest: Khartoum (SW)											
30	L2	217	3.0	0.278	29.3	LOS C	7.4	53.4	0.54	0.72	39.7
31	T1	228	3.0	0.700	43.4	LOS D	20.0	143.5	0.87	0.79	34.4
32	R2	130	3.0	0.700	49.0	LOS D	20.0	143.5	0.87	0.79	34.0
Approach		575	3.0	0.700	39.3	LOS C	20.0	143.5	0.75	0.76	36.1
All Vehicles		3254	3.0	0.922	30.3	LOS C	26.8	192.3	0.68	0.69	39.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	SouthEast Full Crossing	53	41.0	LOS E	0.2	0.2	0.77	0.77
P6	NorthEast Full Crossing	53	24.1	LOS C	0.1	0.1	0.59	0.59
P7	NorthWest Full Crossing	53	42.5	LOS E	0.2	0.2	0.78	0.78
P8	SouthWest Full Crossing	53	27.1	LOS C	0.1	0.1	0.62	0.62
All Pedestrians		211	33.7	LOS D			0.69	0.69

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

MOVEMENT SUMMARY

Site: AM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Talavera Rd (SE)											
21	L2	19	3.0	0.432	78.3	LOS F	3.0	21.5	0.99	0.74	26.6
22	T1	45	3.0	0.432	73.9	LOS F	3.0	21.5	1.00	0.73	26.8
23	R2	14	3.0	0.432	80.9	LOS F	2.5	17.6	1.00	0.72	26.4
Approach		78	3.0	0.432	76.2	LOS F	3.0	21.5	1.00	0.73	26.7
NorthEast: Lane Cove Road (NE)											
24	L2	93	3.0	0.755	14.2	LOS A	24.0	172.0	0.42	0.44	50.8
25	T1	2688	3.0	0.755	8.5	LOS A	25.1	180.4	0.44	0.42	52.6
26	R2	552	3.0	1.063	119.7	LOS F	23.9	171.6	1.00	1.17	20.2
Approach		3333	3.0	1.063	27.1	LOS B	25.1	180.4	0.53	0.55	41.5
NorthWest: Talavera Rd (NW)											
27	L2	252	3.0	0.539	40.6	LOS C	11.6	83.5	0.85	0.80	35.4
28	T1	108	3.0	1.050	138.1	LOS F	14.4	103.3	1.00	1.17	18.4
29	R2	170	3.0	1.050	144.1	LOS F	14.4	103.3	1.00	1.16	17.9
Approach		530	3.0	1.050	93.7	LOS F	14.4	103.3	0.93	0.99	23.5
SouthWest: Lane Cove Road (SW)											
30	L2	596	3.0	1.033	85.5	LOS F	94.8	680.5	1.00	1.16	25.1
31	T1	2454	3.0	1.033	89.6	LOS F	106.4	764.2	1.00	1.27	24.3
32	R2	118	3.0	0.909	87.7	LOS F	9.1	65.1	1.00	0.95	24.4
Approach		3168	3.0	1.033	88.7	LOS F	106.4	764.2	1.00	1.24	24.4
All Vehicles		7109	3.0	1.063	60.0	LOS E	106.4	764.2	0.77	0.89	30.2

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

MOVEMENT SUMMARY

Site: AM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Talavera Rd (SE)											
21	L2	19	3.0	0.432	78.3	LOS F	3.0	21.5	0.99	0.74	26.6
22	T1	45	3.0	0.432	73.9	LOS F	3.0	21.5	1.00	0.73	26.8
23	R2	14	3.0	0.432	80.9	LOS F	2.5	17.6	1.00	0.72	26.4
Approach		78	3.0	0.432	76.2	LOS F	3.0	21.5	1.00	0.73	26.7
NorthEast: Lane Cove Road (NE)											
24	L2	93	3.0	0.763	15.0	LOS B	25.7	184.3	0.45	0.47	50.3
25	T1	2688	3.0	0.763	9.2	LOS A	26.8	192.5	0.47	0.45	52.0
26	R2	643	3.0	1.125	170.0	LOS F	33.5	240.6	1.00	1.29	15.8
Approach		3424	3.0	1.125	39.6	LOS C	33.5	240.6	0.57	0.61	36.3
NorthWest: Talavera Rd (NW)											
27	L2	319	3.0	0.646	40.5	LOS C	15.2	108.8	0.89	0.82	35.4
28	T1	108	3.0	1.050	138.1	LOS F	14.4	103.3	1.00	1.17	18.4
29	R2	170	3.0	1.050	144.1	LOS F	14.4	103.3	1.00	1.16	17.9
Approach		597	3.0	1.050	87.7	LOS F	15.2	108.8	0.94	0.98	24.4
SouthWest: Lane Cove Road (SW)											
30	L2	596	3.0	1.061	107.6	LOS F	102.9	738.7	1.00	1.23	21.8
31	T1	2454	3.0	1.061	112.1	LOS F	114.9	825.1	1.00	1.37	21.1
32	R2	118	3.0	0.826	81.0	LOS F	8.6	61.6	1.00	0.88	25.5
Approach		3168	3.0	1.061	110.1	LOS F	114.9	825.1	1.00	1.32	21.4
All Vehicles		7267	3.0	1.125	74.7	LOS F	114.9	825.1	0.79	0.95	26.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

MOVEMENT SUMMARY

Site: PM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Talavera Rd (SE)											
21	L2	131	3.0	0.295	48.8	LOS D	7.0	50.3	0.75	0.75	32.9
22	T1	46	3.0	0.295	48.4	LOS D	7.0	50.3	0.81	0.74	32.3
23	R2	80	3.0	0.295	56.2	LOS D	6.1	43.6	0.83	0.73	31.5
Approach		257	3.0	0.295	51.1	LOS D	7.0	50.3	0.79	0.74	32.4
NorthEast: Lane Cove Road (NE)											
24	L2	16	3.0	1.002	54.5	LOS D	58.2	417.9	1.00	1.11	32.7
25	T1	2406	3.0	1.002	55.4	LOS D	71.7	515.0	1.00	1.14	31.5
26	R2	488	3.0	1.566	555.4	LOS F	46.2	331.6	1.00	1.72	5.9
Approach		2910	3.0	1.566	139.3	LOS F	71.7	515.0	1.00	1.23	18.3
NorthWest: Talavera Rd (NW)											
27	L2	373	3.0	0.718	41.6	LOS C	16.8	120.3	0.91	0.88	35.0
28	T1	22	3.0	1.065	158.4	LOS F	28.9	207.4	1.00	1.22	16.4
29	R2	512	3.0	1.065	164.0	LOS F	28.9	207.4	1.00	1.21	16.3
Approach		907	3.0	1.065	113.5	LOS F	28.9	207.4	0.96	1.07	20.8
SouthWest: Lane Cove Road (SW)											
30	L2	138	3.0	1.633	613.9	LOS F	233.3	1675.3	1.00	2.61	5.5
31	T1	2985	3.0	1.633	613.5	LOS F	243.0	1745.0	1.00	2.85	5.4
32	R2	38	3.0	0.488	79.1	LOS F	2.7	19.3	1.00	0.73	25.9
Approach		3161	3.0	1.633	607.1	LOS F	243.0	1745.0	1.00	2.81	5.5
All Vehicles		7235	3.0	1.633	337.3	LOS F	243.0	1745.0	0.99	1.89	9.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

MOVEMENT SUMMARY

Site: PM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Talavera Rd (SE)											
21	L2	131	3.0	0.302	49.0	LOS D	7.1	51.0	0.76	0.75	32.9
22	T1	46	3.0	0.302	48.9	LOS D	7.1	51.0	0.81	0.74	32.1
23	R2	80	3.0	0.302	57.1	LOS E	6.1	43.6	0.84	0.74	31.3
Approach		257	3.0	0.302	51.5	LOS D	7.1	51.0	0.79	0.74	32.2
NorthEast: Lane Cove Road (NE)											
24	L2	16	3.0	1.002	54.8	LOS D	58.6	420.7	1.00	1.11	32.7
25	T1	2406	3.0	1.002	55.5	LOS D	71.7	515.1	1.00	1.14	31.5
26	R2	594	3.0	1.633	616.0	LOS F	59.3	425.7	1.00	1.86	5.4
Approach		3016	3.0	1.633	165.9	LOS F	71.7	515.1	1.00	1.28	16.2
NorthWest: Talavera Rd (NW)											
27	L2	550	3.0	1.033	99.6	LOS F	43.1	309.7	1.00	1.10	22.5
28	T1	22	3.0	1.094	179.2	LOS F	31.0	222.6	1.00	1.27	15.0
29	R2	512	3.0	1.094	184.8	LOS F	31.0	222.6	1.00	1.26	14.9
Approach		1084	3.0	1.094	141.5	LOS F	43.1	309.7	1.00	1.18	18.0
SouthWest: Lane Cove Road (SW)											
30	L2	138	3.0	1.633	613.9	LOS F	233.3	1675.3	1.00	2.61	5.5
31	T1	2985	3.0	1.633	613.5	LOS F	243.0	1745.0	1.00	2.85	5.4
32	R2	38	3.0	0.366	74.8	LOS F	2.6	18.4	0.97	0.73	26.7
Approach		3161	3.0	1.633	607.0	LOS F	243.0	1745.0	1.00	2.81	5.5
All Vehicles		7518	3.0	1.633	343.9	LOS F	243.0	1745.0	0.99	1.89	9.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

MOVEMENT SUMMARY

Site: AM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Waterloo Rd (SE)											
21	L2	42	3.0	0.097	46.2	LOS D	2.1	16.0	0.69	0.68	33.7
22	T1	142	3.0	0.396	54.6	LOS D	8.0	55.8	0.88	0.72	31.8
23	R2	185	3.0	0.570	62.9	LOS E	11.3	81.0	0.93	0.81	29.4
Approach		369	3.0	0.570	57.8	LOS E	11.3	81.0	0.88	0.76	30.7
NorthEast: Lane Cove Road (NE)											
24	L2	416	3.0	1.148	168.6	LOS F	110.3	792.0	1.00	1.43	16.1
25	T1	2406	3.0	1.148	169.5	LOS F	122.9	882.5	1.00	1.62	15.9
26	R2	493	3.0	1.186	245.5	LOS F	34.4	246.7	1.00	1.39	12.0
Approach		3315	3.0	1.186	180.7	LOS F	122.9	882.5	1.00	1.56	15.2
NorthWest: Waterloo (NW)											
27	L2	121	3.0	0.185	32.1	LOS C	4.3	31.2	0.60	0.70	39.0
28	T1	250	3.0	1.220	279.3	LOS F	37.5	269.4	1.00	1.62	10.9
29	R2	125	3.0	0.321	69.4	LOS E	3.9	28.2	0.94	0.75	28.0
Approach		496	3.0	1.220	166.1	LOS F	37.5	269.4	0.89	1.18	16.2
SouthWest: Lane Cove Road (SW)											
30	L2	629	3.0	1.182	193.0	LOS F	123.4	886.2	1.00	1.47	14.6
31	T1	2337	3.0	1.182	198.9	LOS F	135.9	975.7	1.00	1.74	14.1
32	R2	175	3.0	0.702	65.8	LOS E	9.7	69.4	0.96	0.80	28.6
Approach		3141	3.0	1.182	190.3	LOS F	135.9	975.7	1.00	1.63	14.6
All Vehicles		7321	3.0	1.220	177.6	LOS F	135.9	975.7	0.99	1.53	15.4

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

MOVEMENT SUMMARY

Site: AM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Waterloo Rd (SE)											
21	L2	42	3.0	0.115	48.9	LOS D	2.3	18.2	0.72	0.68	33.0
22	T1	217	3.0	0.630	58.2	LOS E	13.1	91.8	0.95	0.79	30.9
23	R2	185	3.0	0.594	64.0	LOS E	11.4	82.1	0.94	0.81	29.1
Approach		444	3.0	0.630	59.7	LOS E	13.1	91.8	0.92	0.79	30.3
NorthEast: Lane Cove Road (NE)											
24	L2	416	3.0	1.166	184.0	LOS F	113.5	815.1	1.00	1.47	15.1
25	T1	2406	3.0	1.166	185.6	LOS F	127.4	915.0	1.00	1.68	14.9
26	R2	493	3.0	1.265	316.2	LOS F	39.5	283.3	1.00	1.53	9.7
Approach		3315	3.0	1.265	204.8	LOS F	127.4	915.0	1.00	1.63	13.8
NorthWest: Waterloo Rd (NW)											
27	L2	121	3.0	0.203	36.6	LOS C	4.8	34.4	0.65	0.72	37.2
28	T1	297	3.0	1.208	267.7	LOS F	43.7	313.8	1.00	1.65	11.3
29	R2	161	3.0	0.344	66.7	LOS E	4.9	35.4	0.92	0.76	28.6
Approach		579	3.0	1.208	163.5	LOS F	43.7	313.8	0.90	1.21	16.4
SouthWest: Lane Cove Road (SW)											
30	L2	661	3.0	1.212	217.6	LOS F	129.0	926.2	1.00	1.50	13.3
31	T1	2337	3.0	1.212	225.3	LOS F	144.6	1037.9	1.00	1.83	12.8
32	R2	175	3.0	0.749	67.8	LOS E	9.9	71.1	0.98	0.81	28.2
Approach		3173	3.0	1.212	215.0	LOS F	144.6	1037.9	1.00	1.71	13.3
All Vehicles		7511	3.0	1.265	197.4	LOS F	144.6	1037.9	0.99	1.58	14.2

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

MOVEMENT SUMMARY

Site: PM Sc1

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Waterloo Rd (SE)											
21	L2	159	3.0	0.291	45.2	LOS D	7.3	52.6	0.72	0.76	33.9
22	T1	112	3.0	0.273	49.4	LOS D	5.9	42.5	0.82	0.65	33.4
23	R2	352	3.0	0.903	75.1	LOS F	26.2	188.2	1.00	0.96	26.8
Approach		623	3.0	0.903	62.8	LOS E	26.2	188.2	0.90	0.85	29.4
NorthEast: Lane Cove Road (NE)											
24	L2	187	3.0	1.066	98.9	LOS F	79.1	568.1	1.00	1.24	23.3
25	T1	2430	3.0	1.066	99.7	LOS F	93.0	668.1	1.00	1.33	22.8
26	R2	143	3.0	0.918	86.6	LOS F	5.5	39.4	1.00	0.89	24.7
Approach		2760	3.0	1.066	99.0	LOS F	93.0	668.1	1.00	1.30	22.9
NorthWest: Waterloo (NW)											
27	L2	431	3.0	0.750	47.2	LOS D	23.2	166.4	0.90	0.88	33.6
28	T1	151	3.0	0.553	61.2	LOS E	9.5	68.2	0.95	0.77	30.2
29	R2	559	3.0	1.076	162.2	LOS F	31.0	222.7	1.00	1.23	16.4
Approach		1141	3.0	1.076	105.4	LOS F	31.0	222.7	0.96	1.04	22.0
SouthWest: Lane Cove Road (SW)											
30	L2	279	3.0	1.056	88.3	LOS F	72.7	522.0	1.00	1.19	25.1
31	T1	2328	3.0	1.056	91.6	LOS F	89.8	644.7	1.00	1.30	24.0
32	R2	29	3.0	0.310	77.7	LOS F	1.7	12.0	0.98	0.70	26.2
Approach		2636	3.0	1.056	91.1	LOS F	89.8	644.7	1.00	1.28	24.1
All Vehicles		7160	3.0	1.076	94.0	LOS F	93.0	668.1	0.98	1.21	23.7

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

MOVEMENT SUMMARY

Site: PM Sc2

New Site
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
SouthEast: Waterloo Rd (SE)											
21	L2	159	3.0	0.362	50.6	LOS D	8.5	63.1	0.79	0.76	32.3
22	T1	266	3.0	0.712	58.2	LOS E	16.4	114.6	0.96	0.82	30.9
23	R2	352	3.0	1.042	135.4	LOS F	36.1	259.1	1.00	1.16	18.6
Approach		777	3.0	1.042	91.6	LOS F	36.1	259.1	0.94	0.96	24.0
NorthEast: Lane Cove Road (NE)											
24	L2	187	3.0	1.102	127.9	LOS F	85.8	615.9	1.00	1.32	19.7
25	T1	2430	3.0	1.102	130.2	LOS F	102.2	734.1	1.00	1.45	19.2
26	R2	143	3.0	0.918	86.6	LOS F	5.5	39.4	1.00	0.89	24.7
Approach		2760	3.0	1.102	127.8	LOS F	102.2	734.1	1.00	1.41	19.4
NorthWest: Waterloo Rd (NW)											
27	L2	431	3.0	0.737	47.9	LOS D	22.1	158.5	0.89	0.92	33.4
28	T1	224	3.0	0.631	57.1	LOS E	13.8	98.9	0.94	0.79	31.2
29	R2	749	3.0	1.109	186.9	LOS F	45.4	326.0	1.00	1.30	14.8
Approach		1404	3.0	1.109	123.5	LOS F	45.4	326.0	0.96	1.10	19.9
SouthWest: Lane Cove Road (SW)											
30	L2	356	3.0	1.121	137.1	LOS F	86.7	622.2	1.00	1.28	18.8
31	T1	2328	3.0	1.121	145.6	LOS F	109.2	783.9	1.00	1.51	17.8
32	R2	29	3.0	0.310	77.7	LOS F	1.7	12.0	0.98	0.70	26.2
Approach		2713	3.0	1.121	143.7	LOS F	109.2	783.9	1.00	1.47	17.9
All Vehicles		7654	3.0	1.121	129.0	LOS F	109.2	783.9	0.99	1.33	19.3

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

Appendix C

Internal Traffic and Parking Report (Colston Budd Rogers & Kafes)

AMP CAPITAL

MACQUARIE CENTRE REDEVELOPMENT STAGE 1 CONCEPT DA INTERNAL TRAFFIC AND PARKING ASSESSMENT

DECEMBER 2015

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TABLE OF CONTENTS

ATTACHMENTS

1. INTRODUCTION

1.1. Colston Budd Rogers & Kafes Pty Ltd has been retained by AMP Capital to prepare a report on the internal traffic and parking aspects of the proposed Stage 1 DA for the expansion of Macquarie Centre. The site location is shown on Figure 1.

1.2. The Stage 1 DA proposes new commercial and/or residential development along the western (Herring Road frontage) of the site and additional retail development. As part of the redevelopment, on-site parking and loading docks will be expanded and reconfigured. Access arrangements will be similar, with some changes to accommodate the additional development, reconfigured parking areas and possible changes to the surrounding road network.

1.3. The traffic, transport and parking effects of the Stage 1 DA have been addressed through the following reports:

- external traffic/transport assessment prepared by ARUP. This has assessed the traffic impacts of the Stage 1 DA on the surrounding road network (using network modelling and intersection analysis tools), public transport implications (including the existing and future operation of the Herring Road bus interchange) and pedestrian impacts; and

- internal traffic and parking assessment prepared by CBRK. This has assessed parking requirements, access arrangements, loading docks, parking layouts and principles of construction management. As the proposal is a Stage 1 DA, the description and assessment of the internal aspects is at a broad level with a more detailed assessment to be provided as part of future development applications. As part of the CBRK work, estimates of future traffic generation

and distribution of existing and future trips were made. These were provided to ARUPS as inputs for their traffic assessment.

1.4. The findings of the internal traffic and parking assessment are set out in the following chapter.

2. INTERNAL TRAFFIC AND PARKING ASSESSMENT

2.1. The internal traffic and parking assessment of the Stage 1 DA is set out through the following sections:

- existing situation;
- proposed Stage 1 DA;
- parking provision;
- access arrangements;
- internal circulation and parking layouts;
- servicing arrangements;
- traffic generation;
- traffic distribution;
- principle of construction management; and
- summary.

Existing Situation

2.2. Macquarie Centre currently comprises some 136,300m^2 GLA and car parking for some 4,755 vehicles. The shopping centre has access directly to and from Herring Road, Waterloo Road and Talavera Road, as well as onto internal service roads linking car parking areas to Talavera Road and Waterloo Road (both traffic signal controlled).

Proposed Stage 1 DA

2.3. The Stage 1 DA proposes new commercial (some 47,450m^2 GFA) and/or residential development (615 or 915 units) along the western (Herring Road

frontage) of the site and additional retail development (some 39,700m^2 GLA). Two options are being considered for residential/commercial components:

- Option 1 – 4 residential towers along the Herring Road frontage; and
- Option 2 – 3 residential and 1 commercial tower along the Herring Road frontage.

2.4. As part of the redevelopment, on-site parking will be expanded (some additional 2,175 spaces) and reconfigured. Tower (commercial and/or residential) parking will be provided on the western part of the site (located beneath the proposed towers). Access arrangements will be similar to the existing situation, with some changes to accommodate the additional development and reconfigured parking. Additional servicing will be accommodated through expansion of existing docks and provision of new docks.

2.5. Although not part of the Stage 1 DA, the traffic and parking assessment takes into the account the possible changes to the Herring Road Bus Interchange (and in particular the closure of Herring Road southbound to general traffic) and how this affects access to/from the site.

Parking Provision

2.6. The existing shopping centre provides some 4,755 parking spaces. With some 136,300m^2 GLA, this is a provision of 3.5 spaces per 100m^2 GLA. In order to determine future parking for the expanded retail area, we have reviewed information provided by the parking guidance system installed within the shopping centre and undertaken surveys of parking demands during peak periods at the centre.

2.7. With the car park guidance system, it is possible to determine the utilisation of the car park for each hour over a given period. Parking guidance systems increase the

practical capacity of car parks (the point at which drivers start to circulate looking for an available parking space) from 95% to 98%. Car park data has been provided for December 2014 and February 2015. A review of the information provided by the car park guidance system shows that:

- peak parking demand in the car park occurred between 10.00am and 2.00pm;
- the peak parking demand in December was observed on Thursday 18 December (prior to Christmas) with a parking utilisation of 97% and on Monday 29 December (Christmas sales) with a parking utilisation of 98%;
- the parking utilisation of the car park exceeded 90% on 20 days out of the 29 trading days in December;
- the peak parking demand in February was observed on Thursday 12 February, Thursday 19 February and Friday 27 February with a parking utilisation of 95%;
- the parking utilisation of the car park exceeded 90% on 5 days out of the 28 trading days in February.

2.8. Thus based on the above information, the practical capacity of car parking at Macquarie Centre is reached only during peak trading periods such as during the Christmas/New Year sales.

2.9. In addition to the review of the parking guidance system data, parking surveys were undertaken on Thursday 12 March and Saturday 14 March 2015. These periods are more representative of typical peak periods during the year. The surveys found a peak parking demand on Saturday of some 4,300 vehicles parked within the centre at 12.00pm. This is equivalent to a parking utilisation of some 90%. The peak parking demand on the Thursday was some 3,625 vehicles, equivalent to a parking utilisation of some 76%.

2.10. The above information indicates that provision of additional retail parking at the existing rate (3.5 spaces/100m^2 GLA) would satisfactorily cater for the parking

generated by the expanded retail area. On this basis the expanded retail area (some 39,700m^2 GLA) would require an additional 1,390 parking spaces. Parking for the expanded retail area will be provided at a rate of 3.5 spaces/100m^2 GLA. Appropriate disabled and bicycle parking will be provided in accordance with Council requirements.

2.11. For the high density residential component parking will be provided in accordance with DCP 2014 rates for a site located adjacent to major public transport services as set out below:

- 0.6 spaces per one bedroom dwelling;
- 0.9 spaces per two bedroom dwelling; and
- 1.4 spaces per three bedroom dwelling.

2.12. Visitor parking would be provided at a rate of 1 space per 10 units. Any additional visitor parking could be accommodated within the main retail car park, noting the sites close proximity to the rail station/bus interchange and that peak visitor parking would occur at night when retail parking demand is lower.

2.13. The residential component will comprise some 915 units (Option 1) or some 615 units (Option 2). For the purpose of estimating parking requirements the following unit mix has been assumed:

- 50% x 1 bed units;
- 40% x 2 bed units; and
- 10% x 3 bed units.

2.14. On this basis the residential component would provide 823 spaces for Option 1 (732 residential and 91 visitor) and 553 spaces for Option 2 (492 residential and 61 visitor). Appropriate disabled and bicycle parking will be provided in accordance with Council requirements.

2.15. For the commercial component 300 on-site parking spaces are proposed, a rate of one space per 158m^2 GFA. This is lower than the maximum rate of 1 space per 80m^2 GFA set out in DCP 2014. Constraining commercial parking for the Stage 1 DA is considered appropriate as it would:

- reduce traffic generation in an area highly accessible by public transport;
- encourage travel to/from work by means other than private car; and
- is consistent with Council's proposal to reduce on-site parking for commercial development within Macquarie Park;

2.16. As for the retail and residential components, appropriate disabled and bicycle parking will be provided in accordance with Council requirements.

Access Arrangements

2.17. Access to the shopping centre will be maintained via the existing driveways onto Herring Road, Talavera Road and Waterloo Road. In association with the proposed expansion to the shopping centre, the following changes to access are proposed:

- a new entry driveway to the residential parking will be provided off Talavera Road east of Herring Road. The driveway would provide access to a set-down area for the northern residential tower and access to basement parking for the new towers. The driveway will provide left in only access from Talavera Road;

- one new loading dock access driveway and a reconfigured existing loading dock access driveway will be provided off Talavera Road, between Herring Road and Link Road. These driveways would cater for service vehicles

ranging from small commercial vehicles to articulated vehicles. The driveways would provide left in/left out access to the new service areas;

- removal of the existing car park exit driveway onto Herring Road, located to the north of Waterloo Road. In association with the proposed development of the centre, this driveway will become redundant. Traffic currently exiting the centre via this driveway will be redistributed to other existing and proposed exit driveways from the centre; and;

- additional capacity on the Link Road approaches to the traffic signal controlled intersections with Waterloo Road and Talavera Road (to accommodate the additional traffic generated by the Stage 1 DA). Details of these upgrades would be detailed as part of this next design stage.

2.18. All new driveways would be designed to comply with the requirements of the Australian Standards for Parking Facilities Part 1: Off-street car parking (AS2890.1-2004) and Part 2: Off-street Commercial Vehicle Facilities (AS2890.2-2002)

Internal Circulation and Parking Layout

2.19. As part of the proposed development, the existing multi-deck car park located on the eastern side of the site will be expanded to provide additional parking. New basement parking levels will be developed adjacent to Herring Road. The roof top car park on the eastern side of the site will be expanded with new car park levels. Some existing parking will be lost to accommodate the additional retail space. These spaces will be relocated into the proposed new car parking areas.

2.20. Within the proposed new parking areas, car parking dimensions, aisle widths, ramp grades and transitions will be provided in accordance with the Australian Standard for Off-Street car parking facilities (AS2890.1-2004) and for Off-street parking for people with disabilities (AS2890.6-2009). Parking spaces will be 2.6

metres wide by 5.4 metres long, clear of structure, with adjacent circulation aisles of at least 6.6 metres wide, or alternatively 2.7 metres wide by 5.4 metres long, clear of structure, with circulation aisles of at least 6.2 metre wide. Spaces with adjacent obstructions will be wider. Columns will be set back 750mm from the front edge of spaces.

2.21. Disabled spaces will be 2.4 metres wide by 5.4 metres long, with an additional 2.4 metre wide adjacent area for wheelchair access. Height clearance will be 2.5 metres above disabled spaces and 2.2 metres elsewhere. These dimensions are considered appropriate, being in accordance with the Australian Standard AS2890.1-2004 and AS2890.6-2009.

2.22. With regards to the internal circulation and connections between the existing parking areas within the centre, the following car park connections will be maintained:

- the existing Herring Road access ramp adjacent to Talavera Road and the connection to the roof top parking area located at the eastern end of the site;
- the Link Road connection between Waterloo Road and Talavera Road through the site;
- the two-way connection located adjacent to the northern boundary of the site, between the multi-deck car park and the silver car park;
- the existing express ramp onto Waterloo Road connecting to/from the multi-deck car park and the roof top parking area at the eastern end of the site;
- the existing left in/left out car park access located on Talavera Road (between the two signalised access points);

- the existing left in/left out car park/service access located on Waterloo Road (between the Link Road and Herring Road); and

- the existing service road and ramp onto Talavera Road connecting to/from the roof top parking area at the eastern end of the site.

2.23. To improve circulation within the existing car parking areas and to provide convenient access to the new parking areas, some modifications will be undertaken. The main changes proposed are:

- extension of the existing express parking area located adjacent to Waterloo Road into the new basement parking areas at the western end of the site;

- provision of new retail and tower parking within the new basement parking areas at the western end of the site and construction of a new access ramp from Talavera Road located adjacent to the western boundary of the site;

- provision of new internal ramps linking the new basement parking levels and providing convenient connection between existing and proposed parking areas, including new connections through the express parking area to Link Road;

- provision of new parking levels on the eastern part of the site to accommodate the new retail area on levels 4 and 5;

- modifications to car park circulation, access controls and provision of new internal ramps, within the existing multi-deck car park at the eastern end of the site, to accommodate the new retail area on levels 4 and 5.

2.24. The above modifications will provide appropriate access to new parking areas and improve access to existing parking areas. All new parking areas will be designed to comply with requirements of AS2890.1-2004 and AS2890.6-2009 with respect to ramp grades, aisle widths, lane widths, height clearances and parking bay dimensions.

Servicing Arrangements

2.25. Existing loading areas will be reconfigured and additional loading areas will be provided as part of the Stage 1 DA to service the additional retail and commercial/residential areas. Whilst the configuration of the loading docks, car parking areas and internal access roads do not form part of the Stage 1 DA, these aspects have been assessed to demonstrate that the building envelopes work and that an appropriate level of parking, access, internal circulation and servicing can be provided to support the Stage 1 DA. These matters would be subject to detailed assessment as part of future DA's.

2.26. Two new loading areas are proposed. These are:

- northern loading area to service the existing department store and new retail area. This loading area would be located immediately west of Link Road and would have left in/left out access from Talavera Road. The loading area will be designed to accommodate large rigid trucks and 19 metre articulated trucks, with vehicles entering and departing the loading area in a forward direction;

- western loading areas to service new retail area located adjacent to Herring Road and the new commercial/residential towers. The western loading areas would extend over three levels with separate loading docks located on each of the levels. Access to these loading areas would be via the reconfigured

existing loading dock access driveway off Talavera Road. The loading areas will be designed to accommodate large rigid trucks and 19 metre articulated trucks, with vehicles entering and departing the loading areas in a forward direction; and

- the existing eastern loading area would be reconfigured to service the new specialty retail to be located within the eastern part of the site. Access to this loading area would be maintained via the existing service road from Talavera Road. Service vehicles accessing this dock would use the existing truck turning area, with vehicles entering and departing the loading area in a forward direction.

2.27. All loading areas would be designed to comply with the requirements of the Australian Standard for Off-street commercial vehicle facilities (AS2890.2-2002) and subject to detailed design.

Traffic Generation

2.28. Estimates of traffic generation of the various components of the Stage 1 DA have been based on RMS Guidelines (residential component) and surveys (retail and commercial components). For the residential component, the traffic generation rates for high density residential development are set out in RMS TDT 2013/04. The TDT suggests the following rates:

- weekday morning peak hour – 0.19 trips per unit (two way); and
- weekday afternoon peak hour – 0.15 trips per unit (two way).

2.29. For the Saturday midday peak hour the weekday afternoon rate of 0.15 trips per unit (two way) has been adopted. Thus Option 1 (915 units) would generate some 180 vehicles per hour (two way) in the weekday morning peak hour and some 140 vehicles per hour (two way) in the weekday afternoon and Saturday

midday peak hours. For Option 2 (615 units) the residential component would generate some 120 vehicles per hour (two way) in the weekday morning peak hour and some 90 vehicles per hour (two way) in the weekday afternoon and Saturday midday peak hours. The split of traffic was assumed to be 30% in/70% out in the morning peak with the reverse in the afternoon peak. For the Saturday peak a 50% in/50% out was assumed.

2.30. For the commercial component a generation rate of 0.5 trips per parking space (two way) has been adopted. This reflects the constrained parking and good access to public transport. Thus Option 2 (300 parking spaces) would generate some 150 vehicles per hour (two way) in the weekday morning and afternoon peak hours. The split of traffic was assumed to be 20% in/80% out in the morning peak with the reverse in the afternoon peak. The commercial component has been assumed to generate no traffic in the Saturday midday peak hour.

2.31. For the retail component the existing shopping centre was found to have a traffic generation of 0.9 trips per 100m^2 GLA in the weekday morning peak hour, 3.0 trips per 100m^2 GLA in the weekday (Thursday) afternoon peak hour and 4.0 trips per 100m^2 GLA in the Saturday midday peak hour. These rates are based on surveys of the shopping centre undertaken in February 2015 and adjusted (using information provided by parking guidance system) to reflect November traffic flows (adopted as the design month). The split of traffic was 55% in/45% out in the weekday morning peak, 48% in/52% out in the weekday afternoon peak and 50% in/50% out in the Saturday midday peak.

2.32. Table 2.1 and 2.2 summarises the additional traffic generation for Options 1 and 2.

Table 2.1	**Summary of Option 1 Traffic Generation**				
Component	Size	Rate	In	Out	Total
Weekday AM					
Retail	40,000m^2	0.9/100m^2	200	160	360
Residential	915 units	0.19/unit	55	125	180
Total			*255*	*285*	*540*
Weekday PM					
Retail	40,000m^2	3.0/100m^2	575	625	1200
Residential	915 units	0.15/unit	100	40	140
Total			*675*	*665*	*1340*
Saturday					
Retail	40,000m^2	4.0/100m^2	800	800	1600
Residential	915 units	0.15/unit	70	70	140
Total			*870*	*870*	*1740*

2.33. Examination of Table 2.1 reveals that Option 1 would generate some 540, 1,340 and 1,740 vehicles per hour in the weekday morning, weekday afternoon and Saturday midday peak hours respectively.

Table 2.2	**Summary of Option 2 Traffic Generation**				
Component	Size	Rate	In	Out	Total
Weekday AM					
Retail	40,000m^2	0.9/100m^2	200	160	360
Residential	615 units	0.19/unit	35	85	120
Commercial	300 spaces	0.5/space	120	30	150
Total			*355*	*275*	*630*
Weekday PM					
Retail	40,000m^2	3.0/100m^2	575	625	1200
Residential	615 units	0.15/unit	65	25	90
Commercial	300 spaces	0.5/space	30	120	150
Total			*640*	*770*	*1440*
Saturday					
Retail	40,000m^2	4.0/100m^2	800	800	1600
Residential	615 units	0.15/unit	45	45	90
Commercial	300 spaces	0/space	0	0	0
Total			*845*	*845*	*1690*

2.34. Examination of Table 2.2 reveals that Option 2 would generate some 630, 1,440 and 1,690 vehicles per hour in the weekday morning, weekday afternoon and Saturday midday peak hours respectively.

Traffic Distribution

2.35. The additional traffic generated by the Stage 1 DA has been distributed to the arrival/departure routes and centre accesses based on surveys of existing shoppers at the centre, counts of traffic movements at the access points, changes in access arrangements to/from the shopping centre and review of existing traffic patterns on the surrounding road network.

2.36. To understand how existing shoppers travel to/from the centre, interviews of shoppers in the weekday morning and afternoon peak periods were undertaken on a Thursday in late October 2015. The interviews asked shoppers for the following information:

- arrival and departure routes;
- ingress and egress points used to access the shopping centre;
- which part of the car park they parked in; and
- was their trip to the centre a destination passing trade?

2.37. Attachment A provides a summary of the arrival/departure routes and ingress/egress points. Using this information, matrices were developed assigning future retail trips from the arrival routes to the ingress points of the shopping centre (making adjustments for the changes in access arrangements and location of new parking areas) for the weekday morning and afternoon peak hours. Similar matrices were developed assigning future retail trips from the egress points to the departure routes. These matrices are provided in Attachment B. The distribution of future Saturday midday peak retail trips is the same as the weekday afternoon distribution as the existing weekday afternoon and Saturday midday distribution of

traffic at the access points was found to be similar. The interviews found that some 15% of trips to the centre were passing trade. This is consistent with RMS Guidelines for a shopping centre of this size,

2.38. Table 2.3 provides a summary of the changes in retail traffic flows at the shopping centre access points in the weekday morning and afternoon peak hours.

Table 2.3:	**Summary of Changes in Retail Traffic Flows at Shopping Centre Access Points (AM and PM Peak Periods) – vehicles per hour (VPH).**			
Access	AM (Existing Road Network)		PM (Existing Road Network)	
	In	Out	In	Out
1. Talavera Road (east) –Traffic Signals	+30	+15	+50	+50
2. Talavera Road (central) - LI/LO	+5	+5	+5	+20
3. Talavera Road (west) – Traffic Signals with Link Road	+60	+80	+160	+305
4. Herring Road (north) – upper level entry/exit from Silver Car Park	+5	+0	+35	+30
5. Herring Road (central) – upper level exit	n/a	+10	n/a	+25
6. Herring Road (south)	n/a	-55	n/a	-250
7. Waterloo Road (west) – entry only	+20	n/a	+15	n/a
8. Waterloo Road (central) – Traffic Signals with Link Road	+55	+80	+245	+285
9. Waterloo Road (east) – LI/LO	+25	+40	+80	+165
4a. Herring Road - tunnel exit to Herring Road	n/a	n/a	n/a	n/a

2.39. Table 2.4 provides a summary of additional traffic generated by the residential and commercial components (for both Options 1 and 2). As noted in the section on access arrangements, the residential/commercial car parks are located on the western part of the site and as such do not have the same accessibility to the adjacent road network as the retail car parks.

Table 2.4:	**Summary of Additional Traffic Generated by Tower Car Park at Shopping Centre Access Points (AM and PM Peak Periods) – vehicles per hour (VPH) - OPTION A (950 units)/Option B (650 units + Commercial Tower).**			
Access	AM (Existing Road Network)		PM (Existing Road Network)	
	In	Out	In	Out
3. Talavera Road (west) – Traffic Signals with Link Road	n/a	+50/+50	n/a	+20/+60
3A. Talavera Road entry to Tower car park (left in only)	+15/+45	n/a	+30/+30	n/a
5. Herring Road (central) – upper level	+10/+30	+40/+35	+20/20	+15/+45
8. Waterloo Road (central) – Traffic Signals with Link Road	+25/+75	+40/+35	+50/+50	+15/+45
4a. Herring Road - tunnel exit to Herring Road	n/a	n/a	n/a	n/a

2.40. The information provided in Attachments A & B and Tables 2.3 & 2.4 was provided to ARUP for use in assessing the traffic impacts on the surrounding road network.

Principles of Construction Management

2.41. At this stage a contractor/builder has not been appointed to carry out the demolition, excavation and construction of the proposed development and hence the construction methodology, process and staging of the development cannot be precisely defined. The contractor/builder will be responsible for the preparation and lodgement of the construction traffic management plan, which will be carried out prior to the commencement of construction.

2.42. Construction of the proposed development will be staged to minimise traffic effects and to maintain the continued operation of the shopping centre during the period of construction. Construction of the development is expected to commence with site establishment/initial enabling works (including services and mechanical plant relocation), erection of construction fencing/hoardings and the commencement of construction of the parking levels at the eastern end of the site.

2.43. Following the completion of the new parking levels at the eastern end of the site, the construction activity will move to the Herring Road, with the demolition and excavation of the western part of the site, and construction of the new basement parking levels, retail area and new residential/ commercial towers. The final stage of construction will involve the infill of new retail area and car parking areas on levels 4 and 5 within the central part of the site.

2.44. In association with the overall construction staging of the development, consideration will be given to the staging and upgrade of the Macquarie Park railway station (associated with the construction of the North West Metro).

2.45. During construction of the development, on-site construction compounds and on-street work zones will be established. Construction and containment fencing will be erected around the perimeter of the site compound, with scaffolding and overhead protection provided where required.

2.46. Access to the construction compound will be provided via temporary construction access driveways onto Talavera Road, Waterloo Road and Herring Road. In order to minimise construction traffic on surrounding streets, trucks will approach and depart the site along designated truck routes, to and from the main road network (M2, Lane Cove Road and Epping road).

2.47. The loading and unloading of demolition, excavation and construction material to/from trucks will be carried out from the on-site construction compounds and

from on-street work zones in Talavera Road and Herring Road. The location and operation of the on-street work zones will need to be agreed with and approved by Ryde City Council's Traffic Committee. Construction material will be stored on-site within designated material handling areas.

2.48. Pedestrian activity on adjacent streets including Talavera Road, Waterloo Road and Herring Road will be protected with the provision of appropriate construction barriers, with overhead protection and Class B hoardings provided where required.

2.49. Openings in the construction fencing and the construction access driveways will be managed and controlled by qualified site personnel. Pedestrian movements across the access driveways and the movement of trucks entering and exiting the construction site compounds will be managed and controlled by traffic controllers. Pedestrian warning signs will be erected adjacent to the driveways and on pedestrian paths adjacent to the construction activity.

2.50. Work associated with the demolition, excavation and construction activity will be carried out in accordance with Council's agreed construction hours.

2.51. The site contractor will be responsible to instruct and control sub-contractors regarding the hours of work. Any work outside the approved construction hours would be subject to prior approval from Council.

2.52. The control of hours of operation avoids truck movements during the early morning and evening periods. To facilitate an efficient program, the arrival and departure of trucks associated with the demolition, excavation and construction activity will be regulated and on-site works will be carefully managed and controlled by site personnel. Trucks will be called onto the site when required. Trucks will enter and exit the construction site compounds, to/from the surrounding road network, in a forward direction.

2.53. The overall principles for traffic management during construction of the development will include:

- take into account the future upgrade of the Macquarie Park railway station and possible future construction of the future Herring Road bus interchange;
- maintain appropriate parking for customers, associated with the on-going operation of the centre;
- maintain access to properties located in the vicinity of the site at all times during the construction process;
- minimise loss of on-site parking;
- maintain access for delivery vehicles associated with the continued operation of the shopping centre;
- manage and control construction traffic movements on the adjacent road network and vehicles movements to and from the construction site;
- trucks to enter and exit the site in a forward direction;
- maintain traffic capacity at intersections and mid-block in the vicinity of the site;
- restrict construction vehicle activity to designated truck routes through the area;
- construction works will be staged to minimise traffic effects and to maintain the continued operation of the shopping centre;
- construction vehicle work zones to be provided adjacent to the construction activity;
- construction access driveways and on-street work zones to be managed and controlled by site personnel;

- provide a convenient and appropriate environment for pedestrians;
- minimise effects on pedestrian movements and amenity;
- maintain appropriate capacity for pedestrians at all times along footpaths adjacent to the shopping centre;
- maintain appropriate pedestrian access to the shopping centre from the various on-site parking areas during construction;
- maintain convenient access and circulation for public transport;
- pedestrian movements adjacent to construction activity, across construction access driveways and to/from public transport facilities along Herring Road and to/from the various on-site car parking areas will be managed and controlled by site personnel;
- traffic marshals will manage and control traffic movements on the surrounding road network adjacent to the shopping centre to ensure appropriate access to adjacent properties and to maintain two-way access at all times during the construction period;
- construction fencing will be erected around the perimeter of the construction sites. Hoardings, scaffolding and overhead protection will be provided where required;
- concrete barriers and containment fencing will be erected adjacent to the construction activity to separate general traffic from the construction work and to protect pedestrians;
- pedestrian warning signs and construction safety signs/devices to be utilised in the vicinity of the site and to be provided in accordance with WorkCover requirements;

- site contractor to be responsible for the management of the site, the movement of trucks on and off the site, signage detail, traffic management and control of pedestrians and management and control of construction vehicles in the vicinity of the site; and

- construction activity to be carried out in accordance with Council's approved hours of work.

2.54. The preparation of the construction traffic management plan, signage detail, control of pedestrians and control and management of construction activity/vehicles in the vicinity of the site will be the responsibility of the appointed builder.

Summary

2.55. In summary the internal traffic and parking assessment of the Stage 1 DA to redevelop Macquarie Centre has found that:

- the Stage 1 DA would allow expansion of the centre to provide an additional 39,700m^2 GLA retail area, four towers on the western part of the site (Herring Road frontage) comprising some 47,450m^2 GFA commercial plus 615 residential units or 915 residential units, additional car parking (some 2,175 spaces) and modifications to car park layouts, loading docks and access arrangements;

- the proposed parking provision is considered appropriate given the sites location adjacent to the bus interchange and rail station;

- retail parking will be provided at the same rate as currently provided for the shopping centre, residential parking at the DCP 2014 rates for sites adjacent to major public transport services, and commercial parking constrained;

- access arrangements will be modified to account for changes in parking layouts, changes to the surrounding road network and to accommodate the additional traffic generated by the Stage 1 DA;

- the major changes in access arrangements are:

    - an additional exit lane on the Link Road approaches to the traffic signal controlled intersections with Waterloo Road and Talavera Road (to be detailed as part of the next design stage);
    - new entry to the tower car park on Talavera Road (between Herring Road and the Link Road);
    - closure of the southern car park exit onto Herring Road.

- to accommodate the additional development, new car parking areas will be required and existing parking areas modified. Tower (residential and commercial) parking will be located on the western part of the site. Interconnection of retail parking will be maintained to allow shoppers to access parking areas once they are within the site.

- all new and modified parking areas will be designed to comply with AS2890.1-2004 and AS2890.6-2009. The existing parking guidance system will be retained to assist in directing shoppers to available parking;

- existing loading areas will be reconfigured and additional loading areas will be provided as part of the Stage 1 DA to service the additional retail and commercial/residential areas. Two new loading areas will be provided on the northern and western parts of the site to service retail and retail/tower components respectively;

- all new loading areas will be designed to comply with the requirements of the Australian Standard for Off-street commercial vehicle facilities (AS2890.2-2002);

- estimates of traffic generation of the various components of the Stage 1 DA have been based on RMS Guidelines (residential component) and surveys (retail and commercial components);

- Option 1 would generate some 540, 1,340 and 1,740 vehicles per hour in the weekday morning, weekday afternoon and Saturday midday peak hours respectively;

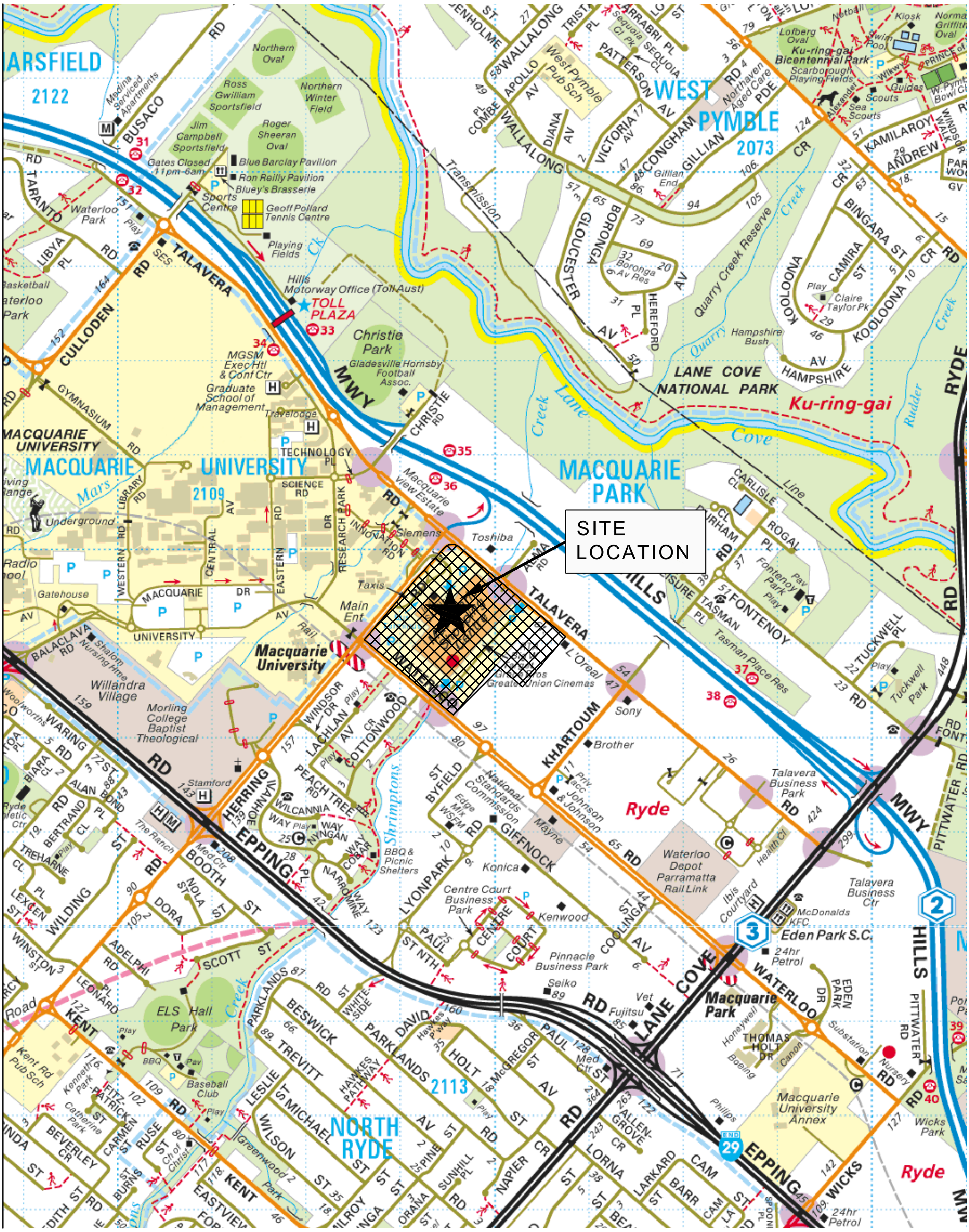
- Option 2 would generate some 630, 1,440 and 1,690 vehicles per hour in the weekday morning, weekday afternoon and Saturday midday peak hours respectively;

- the additional traffic generated by the Stage 1 DA has been distributed to the arrival/departure routes and centre accesses based on surveys of existing shoppers at the centre, counts of traffic movements at the access points, changes in access arrangements to/from the shopping centre and review of existing traffic patterns on the surrounding road network;

- the estimates of traffic generation and distribution were provided to ARUP for use in assessing the traffic impacts of the Stage 1 DA on the surrounding road network;

- the principles of construction traffic management have been set out, noting that construction will need to be staged to minimise impact on the surrounding area, the operation of the shopping centre, and on other major projects in the area (such as the rail station upgrades); and

- the preparation of the construction traffic management plan, signage detail, control of pedestrians and control and management of construction activity/vehicles in the vicinity of the site will be the responsibility of the appointed builder.



Location Plan

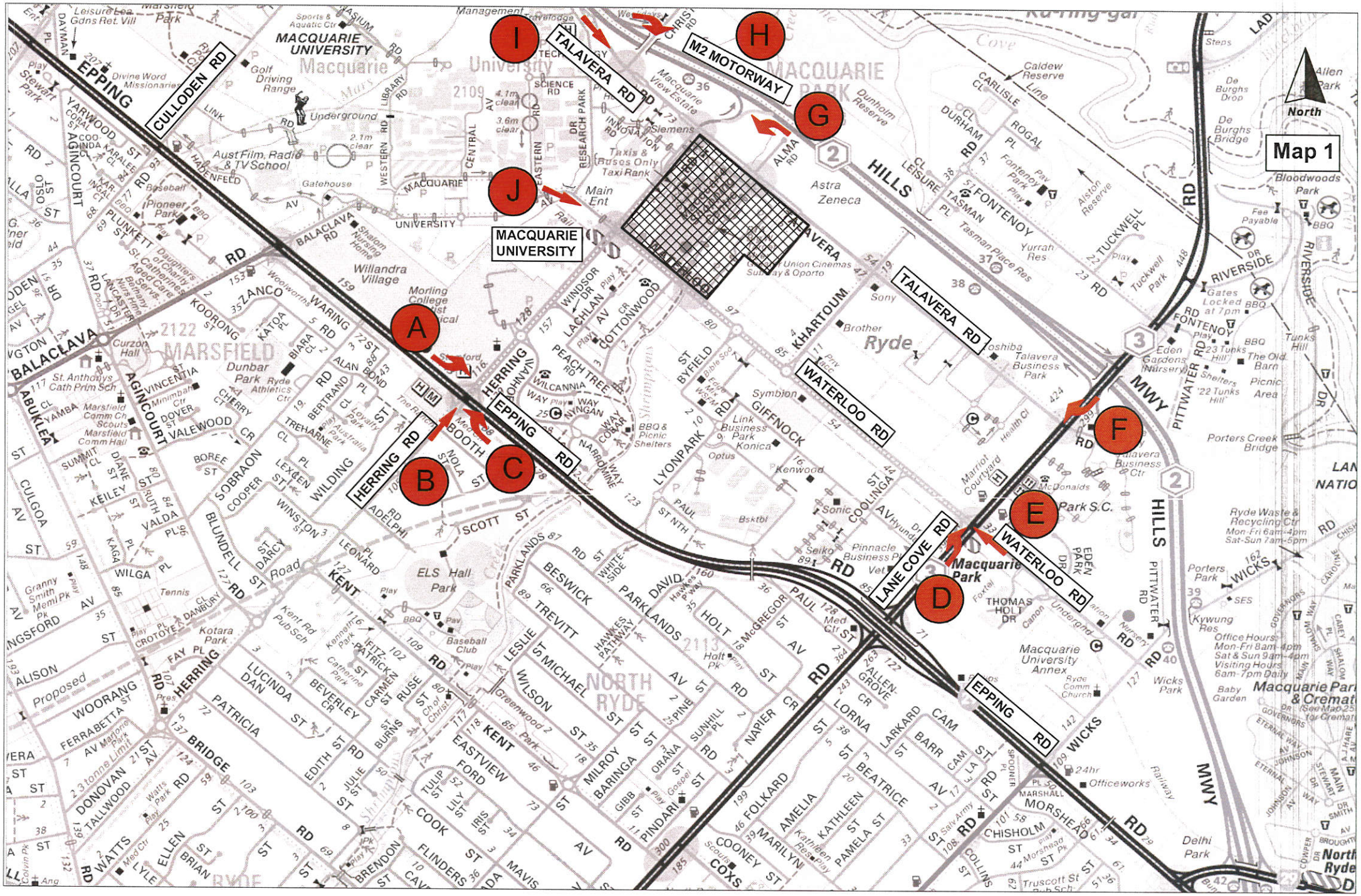
Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_mr Ref: 9925 30 NOVEMBER 2015

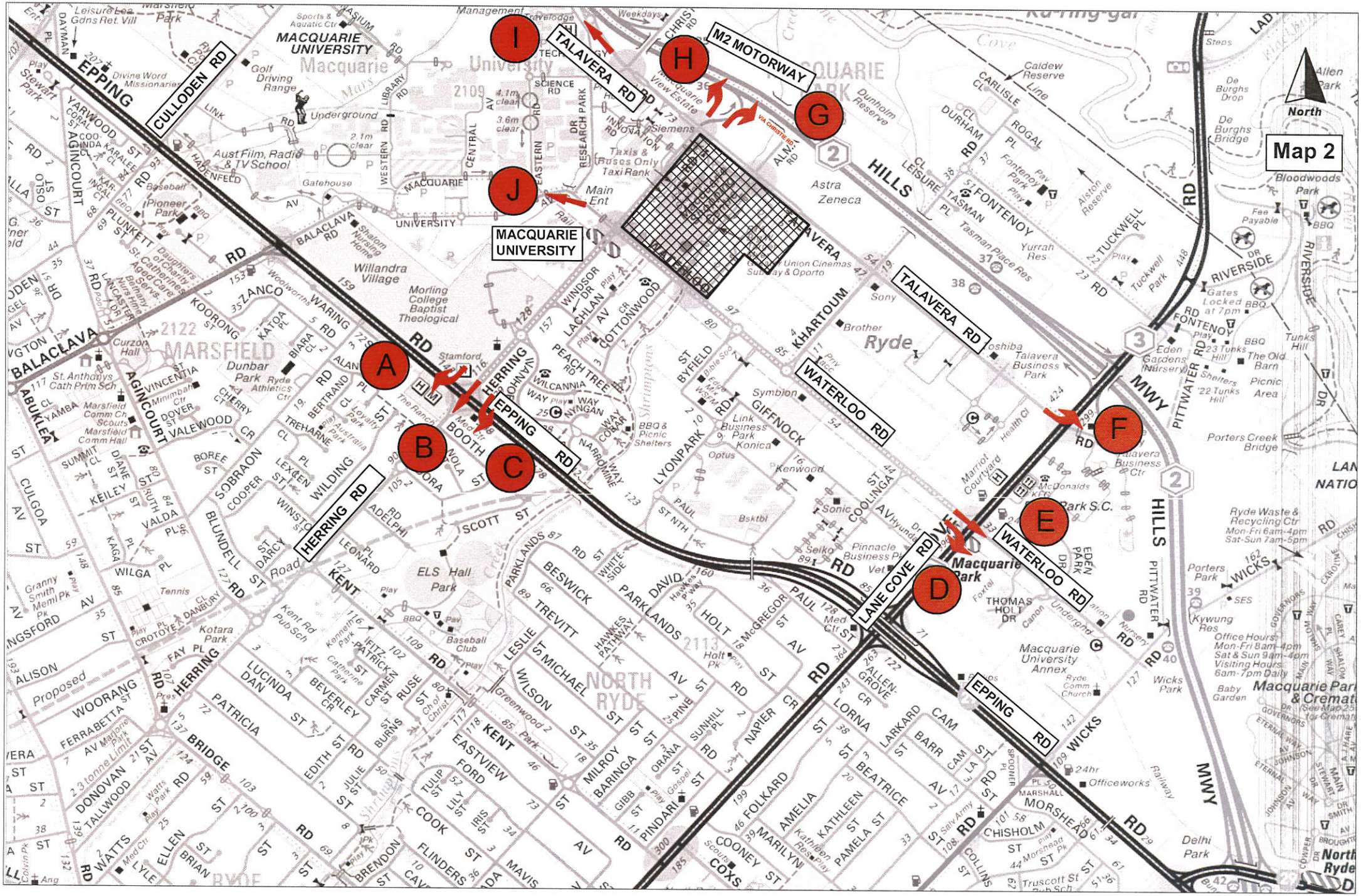
Figure 1

ATTACHMENT A

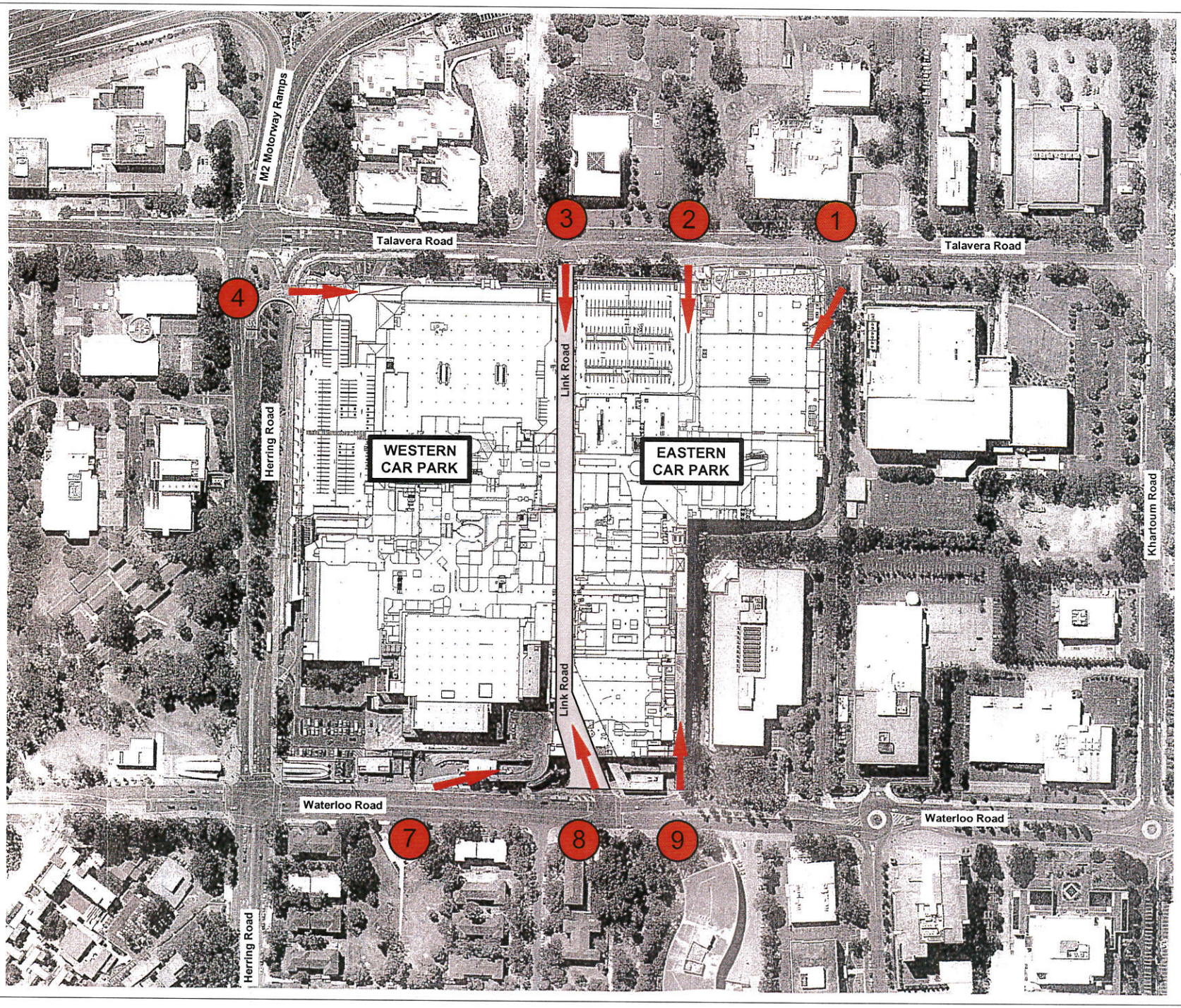
SHOPPING CENTRE ARIVAL/DEPARTURE ROUTES & ACCESS POINTS



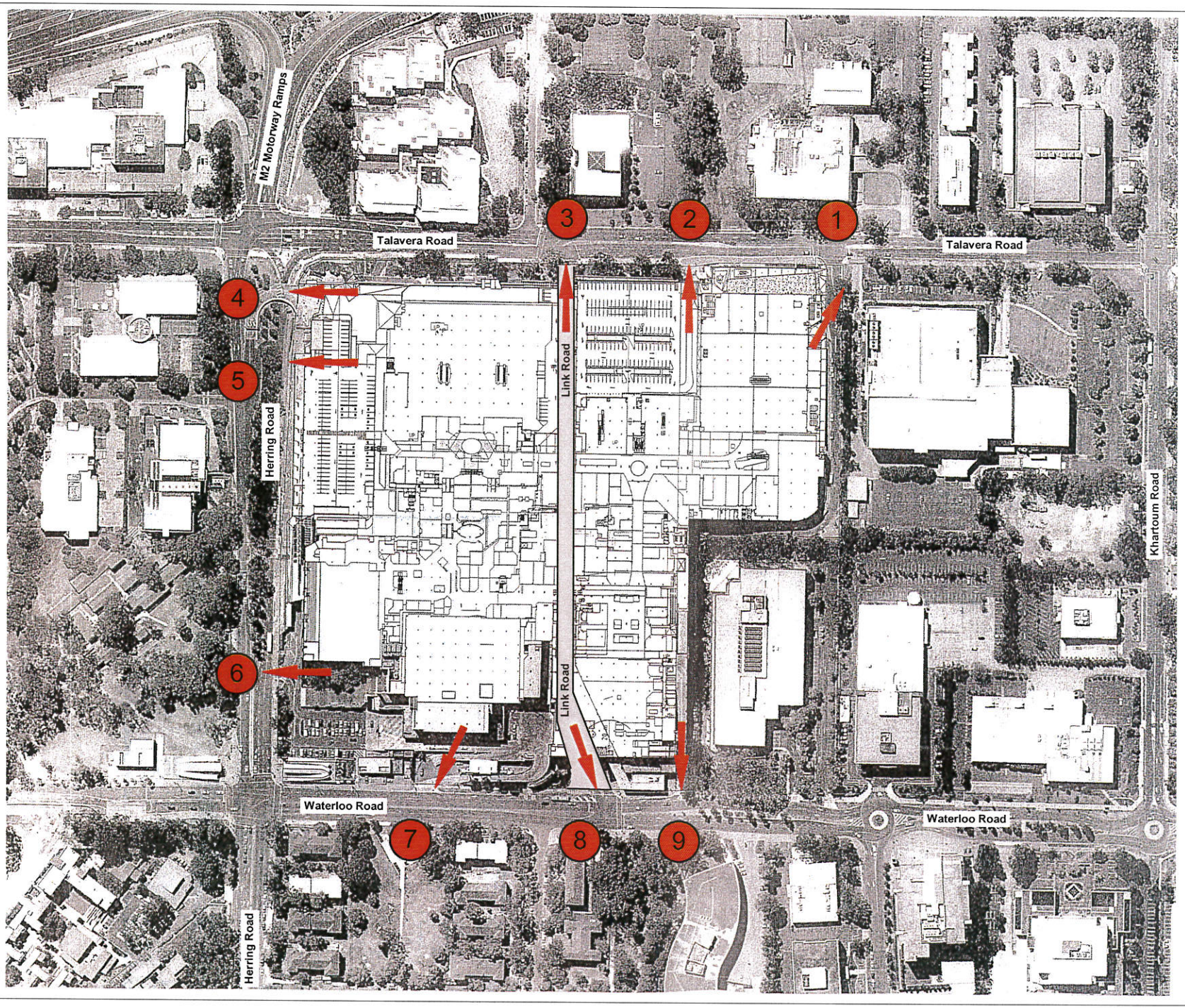
APPROACH ROADS 1



DEPARTURE ROADS 2



ENTRY DRIVEWAYS 3



EXIT DRIVEWAYS 4

ATTACHMENT B

ADDITIONAL RETAIL TRIP DISTRIBUTION MATRICES

Table 1 : AM Peak Hour Distribution of Trips (by Ingress)

Arrival Routes	Entry Gates									
to	1	2	3	4	5	6	7	8	9	Total
A	2%	0%	10%	69%	0%	0%	12%	2%	5%	100%
B	13%	0%	21%	17%	0%	0%	29%	8%	13%	100%
C	12%	6%	18%	29%	0%	0%	0%	35%	0%	100%
D	12%	0%	8%	12%	0%	0%	0%	68%	0%	100%
E	49%	5%	33%	0%	0%	0%	0%	13%	0%	100%
F	0%	0%	67%	0%	0%	0%	33%	0%	0%	100%
G	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
H	13%	0%	80%	0%	0%	0%	3%	3%	3%	100%
I	0%	0%	50%	0%	0%	0%	25%	0%	25%	100%
J	14%	1%	31%	25%	0%	0%	10%	14%	5%	100%

Table 2: AM Peak Hour Distribution of Trips (by Egress)

Departure Routes	Exit Gates									
to	1	2	3	4	5	6	7	8	9	Total
A	2%	6%	15%	17%	13%	28%	0%	19%	0%	100%
B	10%	5%	20%	10%	5%	15%	0%	35%	0%	100%
C	9%	0%	23%	14%	9%	0%	0%	23%	23%	100%
D	13%	0%	13%	10%	0%	0%	0%	30%	33%	100%
E	21%	0%	38%	2%	0%	2%	0%	13%	25%	100%
F	0%	0%	60%	0%	0%	0%	0%	40%	0%	100%
G	25%	0%	50%	0%	0%	0%	0%	25%	0%	100%
H	10%	8%	80%	0%	0%	0%	0%	3%	0%	100%
I	0%	0%	20%	20%	10%	20%	0%	30%	0%	100%
J	10%	3%	33%	9%	5%	10%	0%	19%	11%	100%

Table 3 : PM Peak Hour Distribution of Trips (by Ingress)

Arrival Routes	Entry Gates									
	1	2	3	4	5	6	7	8	9	Total
A	3%	0%	3%	54%	0%	0%	23%	6%	11%	100%
B	9%	0%	0%	32%	0%	0%	36%	14%	9%	100%
C	17%	0%	17%	0%	0%	0%	0%	67%	0%	100%
D	0%	0%	9%	5%	0%	0%	0%	86%	0%	100%
E	22%	3%	50%	6%	0%	0%	0%	19%	0%	100%
F	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
G	33%	0%	67%	0%	0%	0%	0%	0%	0%	100%
H	11%	0%	86%	0%	0%	0%	0%	0%	4%	100%
I	0%	0%	31%	46%	0%	0%	15%	0%	8%	100%
J	9%	1%	30%	21%	0%	0%	12%	22%	5%	100%

Table 4: PM Peak Hour Distribution of Trips (by Egress)

Departure Routes	Exit Gates 1	2	3	4	5	6	7	8	9	Total
A	0%	0%	4%	15%	27%	35%	0%	19%	0%	100%
B	7%	0%	7%	14%	14%	21%	0%	36%	0%	100%
C	0%	0%	8%	0%	0%	0%	0%	25%	67%	100%
D	0%	0%	14%	5%	5%	24%	0%	29%	24%	100%
E	15%	0%	58%	0%	3%	3%	0%	9%	12%	100%
F	0%	25%	75%	0%	0%	0%	0%	0%	0%	100%
G	25%	0%	75%	0%	0%	0%	0%	0%	0%	100%
H	17%	17%	60%	0%	0%	0%	0%	6%	0%	100%
I	0%	0%	33%	50%	0%	17%	0%	0%	0%	100%
J	7%	4%	32%	6%	6%	13%	0%	17%	14%	100%

Appendix D

Framework Travel Plan

D1.1 What is a Framework Travel Plan?

A general community Framework Travel Plan (FTP) is a tool to minimise the negative impact of private vehicle travel on the environment. The Plan is a package of measures put in place to encourage more sustainable travel. FTP describes ways in which the use of sustainable transport may be encouraged. Using public transport, cycling, walking, working from home, carpooling, making business vehicles more fuel efficient and the use alternative fuels are all more sustainable means of transport than single occupant driving.

More generally, the principles of a Framework Travel Plan are applied to all people travelling to and from a site. Government authorities around the nation are placing increasing emphasis on the need to reduce the number and lengths of motorised journeys and in doing so encourage greater use of alternative means of travel which have less environmental impact than cars.

D1.2 Benefits of a Framework Travel Plan

The Framework Travel Plan can bring a number of benefits to Macquarie Centre residents, visitors and staff:

- Residents and employees can enjoy improved health, less stress, a better quality of life, cost and time savings, and greater travel choice;
- Reduced traffic congestion;
- Benefit from improved air quality, less noise and pollutants; and
- Deliver health benefits, tackle obesity and improve residents quality of life

D1.3 Framework Travel Plan Framework

A Framework Travel Plan for the Macquarie Centres will need to address the following issues:

- What are the objectives for the buildings in terms of travel journeys including trips to work, retail and other land uses.
- How are the set objectives going to be met? What measures are going to be implemented and encouraged?
- Who is going to be responsible for the management, implementation and administration of the measures?

D1.4 Framework Travel Plan Objectives

The main objectives of the Framework Travel Plan are to reduce the need to travel and promotion of sustainable means of transport. Specifically for the Macquarie Centre, the primary purpose of the Framework Travel Plan measures is to achieve the target mode split for journey to work trips of 40% public transport / 60% private vehicle for the new residents and commercial workers, as outlined in the Macquarie Park DCP.

D1.4.1 Staff

The more specific objectives to enable staff to adopt the FTP include:

- High modal share for public transport, cycling and walking to work and residential journeys;
- To ensure adequate facilities are provided at the site to enable staff, residents and visitors to commute by sustainable transport modes;
- To reduce the number of car journeys associated with business travel by staff and visitors;
- To facilitate the sustainable and safe travel of new employees;
- To reduce the need to travel for work-related activities, particularly air travel; and
- To raise awareness of sustainable transport amongst staff.

D1.4.2 Residents and visitors

The more specific objectives to enable residents and visitors to adopt the FTP include:

- To reduce the level of single occupancy car borne trips associated with commuting.
- To facilitate the sustainable and safe travel of visitors to the site.
- To reduce site traffic congestion and associated pollution in order to enhance, improve and make safe journeys of minority/sustainable transport mode users.
- To work in partnership with neighbouring organisations/developments, local authorities, retailers and other relevant bodies in achieving the maximum mode shift away from the private car.
- To continually develop, implement, monitor, evaluate and review the progress of the travel plan strategy.
- To facilitate all residents' access to key facilities such as retail, leisure, health and education.

D2 Staff Framework Travel Plan Measures

This section discusses the travel demand measure which can be adopted to reduce the need for staff to travel to work and promote a sustainable means of transport.

A FTP for the Macquarie Centre staff will need to address the following issues:

- What are the objectives for the buildings in terms of travel journeys to and from work, during work hours and other travel to and from the building?
- How are the set objectives going to be met? What measures are going to be implemented and encouraged?
- Who is going to be responsible for the management, implementation and administration of the measures?

D2.1 Framework Travel Plan Objectives

The main objectives of the FTP are to reduce the need to travel and promotion of sustainable means of transport, with focus on altering the travel demand to work.

The more specific objectives include:

- High modal share for public transport, cycling and walking to work and residential journeys;
- To ensure adequate facilities are provided at the site to enable staff, residents and visitors to commute by sustainable transport modes;
- To reduce the number of car journeys associated with business travel by staff and visitors;
- To facilitate the sustainable and safe travel of new employees;
- To reduce the need to travel for work-related activities, particularly air travel; and
- To raise awareness of sustainable transport amongst staff.

D2.2 Framework Travel Plan Measures

In order to meet the objectives and targets of the FTP, the following physical and management measures should be implemented.

D2.2.1 General Marketing and Promotion

The objectives of the FTP will only be achieved with the support of the Macquarie Centre staff. Marketing the benefits and promoting the sustainable alternatives available are therefore crucial in encouraging staff to adopt the FTP measures. It is important that at an early stage, staff are made aware of the need for the FTP, and that it is emphasised that the measures are being introduced to support and encourage people to use cars more wisely. In addition to raising general awareness, any successes achieved will be fully publicised to staff in order to motivate them to use sustainable modes of transport.

D2.2.2 Reducing The Need To Travel

To ensure that sustainable transport options are promoted to staff when making journeys for work purposes, and to reduce the need to travel, the following measures should be implemented. These measures require implementation by staff members across the building.

- Active promotion of the office teleconferencing facilities as an alternative to face to face meetings. This can be achieved by placing ‘reducing the need to travel’ as an item on internal group meeting agendas;
- Include teleconference meetings as a standard option in client proposals in preference to face to face meetings where practical; and
- Consider a more formal approach to working from home and actively encourage staff to consider this option. Include working from home as an item on the agenda for internal group meetings.

D2.2.3 Travel During the Working Day

To provide Macquarie Centre staff with a choice of convenient sustainable transport option for work – related travel during the working day the following initiatives should be promoted:

- Use of the Sydney Trains network to travel to places that are on or near a train line;
- Walk to places that are close by rather than taking the taxi;
- Promotion of the taxi pooling system for the Macquarie Centre Commercial Building which would cross check for common destinations and inform the passenger of possible taxi pooling options.

D2.2.4 Cycling

The Macquarie Centre will have good access to the cycling network and will provide onsite facilities for cyclists i.e. easily accessible bike room/shelter, changing rooms and showers, lockers and good access from those facilities to the office. In order to activate and promote cycling the following measures should be taken:

- Provide Sydney cycle maps to staff;
- Participate in annual events such as 'Ride to Work Day';
- Provide secure bicycle parking and end of trip facilities for Macquarie Centre staff
- Broadcasts in staff areas should have news of events / generic posters promoting cycling;
- Staff who cycle to work should be encouraged to form a Bicycle User Group in order to provide a body of regular cyclists who can discuss issues relating to the provision of on-site cycling facilities and the maintenance of off-site cycle routes; and
- Set up ‘Bike Buddies’ scheme for less confident staff interested in cycling.

D2.2.5 Public Transport

To promote the use of public transport work related trips and journeys to/from the Macquarie Centre.

- Create and maintain an intranet ‘Public Transport links page’ containing useful links to journey planning websites in Sydney;
- Provide useful public transport maps and promotional items to potential and current public transport users; and
- Investigate the possibility of purchasing an Opal Card for general use of building staff for business journeys, in lieu of cars and taxis

D2.2.6 Walking

Specific Travel Plan measures designed to encourage more walking trips to and from work by those employees living within a reasonable distance.

- Produce walking related articles for inclusion in the office newsletter focussing on ‘walking champions’ to highlight best practise in walking to business meetings;
- Participate in Walk to Work day.

D2.2.7 Staff Induction

To ensure new members of staff are aware of the FTP, all new staff members should be made aware of the Plan as part of their induction process. The FTP section of the induction should provide new starters with the following:

- A brief introduction to the FTP and its purpose;
- Tour of the office to include a visit to cycle parking areas and shower and changing facilities; and
- Provision of FTP information which would include information on incentives to use sustainable means of transport e.g. /taxi share system.

D3 Resident Framework Travel Plan Measures

This section discusses travel alternatives and planning policies which can be adopted to reduce the need for residents to travel using single occupancy car borne trips and promote a sustainable means of transport.

A FTP for the Macquarie Centre residents will need to address the following issues:

- What are the **objectives** for the buildings in terms of travel journeys including trips to work, retail and other land uses.
- How are the set objectives going to be met? What **measures** are going to be implemented and encouraged?
- Who is going to be responsible for the management, implementation and administration of the measures?

D3.1 Framework Travel Plan Objectives

The main objectives of the Framework Travel Plan are to reduce the need to travel and promotion of sustainable means of transport.

The more specific objectives include:

- To reduce the level of single occupancy car borne trips associated with commuting.
- To facilitate the sustainable and safe travel of visitors to the site.
- To reduce site traffic congestion and associated pollution in order to enhance, improve and make safe journeys of minority/sustainable transport mode users.
- To work in partnership with neighbouring organisations/developments, local authorities, retailers and other relevant bodies in achieving the maximum mode shift away from the private car.
- To continually develop, implement, monitor, evaluate and review the progress of the travel plan strategy.
- To facilitate all residents' access to key facilities such as retail, leisure, health and education.

D3.2 Framework Travel Plan Measures

In order to meet the objectives and targets of the Framework Travel Plan, the following physical and management measures should be implemented.

D3.2.1 Residents' Travel Packs

A new development provides an opportunity to offer residents advice on travel modes to and from the site. At this time, new travel habits are being established and people may particularly welcome information about the travel services and facilities available to them.

A travel pack could be supplied to all residents. The pack will include information on the development travel plan, bicycle and walking routes, bus and rail timetables, information on car sharing and membership information for the development car club. The pack could also include discount vouchers for a local bicycle retailer and a questionnaire about travel behaviour.

D3.2.2 General Marketing and Promotion

The objectives of the FTP will only be achieved with the support of Macquarie Centre residents. Marketing the benefits and promoting the sustainable alternatives available are therefore crucial in encouraging residents to adopt the FTP measures. It is important that at an early stage, residents are made aware of the need for the FTP, and that it is emphasised that the measures are being introduced to support and encourage people to use cars more wisely. In addition to raising general awareness, any successes achieved will be fully publicised to residents in order to motivate them to use sustainable modes of transport.

- Travel information and poster could be set up at public area, for example, lobby, notice board, or inside the elevators;
- A Framework Travel Plan 'e-flyer' should be distributed to residents during the launch of the Plan. The 'e-flyer' will provide a summary of the benefits to residents of the Travel Plan, its objectives and measures. This could be distributed to residents via the managing strata corporation;
- Events such as National Bike Week, Bike2Work Days, walk to work day should be promoted to residents through notice board posters and email;

D3.2.3 Car Sharing

Car sharing is a proven means of reducing the number of car journeys generated by a development. A recent study on the effectiveness of car sharing schemes across Sydney (e.g. GoGet) shows that every car share space replaces the need for 12 private vehicle spaces[1].

Car share arrangements should form an integral part of new project applications and this can be conditioned at the appropriate time and would form part of a Travel Plan. Information on local car sharing schemes would be provided in the residents travel pack.

The Macquarie Park DCP notes that 1 car share space should be provided for every 50 proposed residential parking spaces. The quantum and location of car share spaces within the Macquarie Centre will be confirmed in subsequent development applications.

D3.2.4 Travel During the Day

To provide Macquarie Centre residents with a choice of convenient sustainable transport options for travelling during the day, the following initiatives should be promoted:

- Provide bus, train and ferry timetable and routes information specific to the building location at lobby;
- Provide walking and cycling maps to the surrounding public transport nodes, recreational area and local attractions; and
- Promote use of bikes for short journeys

D3.2.5 Cycling

The Macquarie Centre will have good access to the cycling network. One secure bicycle parking space will be provided for each residential dwelling in the Macquarie Centres, complying with Green Building Council Green Star requirements.

In order to activate and promote cycling the following measures should be taken:

- Supply a communal bike toolkit-this can consist of puncture repair equipment, a bike pump, a spare lock and lights;
- Come to an arrangement with a local cycle retailer for cheap servicing of resident bikes. Negotiate group buying discount on bicycle, equipment and accessories purchase.
- Provide Sydney cycle maps to residents;
- Participate in annual events such as 'Ride to Work Day';
- Notice boards in public areas should have news of events / generic posters promoting cycling;
- Provide pool bikes for common use by residents of the buildings;

[1] SGS Economics & Planning (2012), Benefit-Cost Analysis of Car Share within the City of Sydney

- The building management should have a transport website specific for their location containing details of bike storage areas, and links containing useful journey planning websites in Sydney;
- Inform residents on public transport cycling carriage policies and cycle storage facilities at rail stations;
- Formation of a Bicycle User Group in order to provide a body of regular cyclists who can discuss on issues relating to the provision of on-site cycling facilities and the maintenance of off-site cycle routes; and

D3.2.6 Public Transport

To promote the use of public transport.

- Provide information of useful website links to journey planning websites in Sydney;
- Provide useful public transport maps and promotional items to potential and current public transport users;
- Notice boards in public areas should have news of events / generic posters promoting public transport;
- provision of bus passes for the initial occupation of the units so that residents would be encouraged to make public transport their modal choice from the day they moved into the unit

D3.2.7 Walking

Specific Travel Plan measures designed to encourage more walking trips for short distance trips.

- Improvements to (and maintenance of) the walking network and signage;
- Formation of local walking group using Heart Foundation Walking Walkers kit (www.heartfoundation.org.au/walking). Hold regular recreational walks for residents;
- Investigating potential participation in www.walksmart.net website; and
- Participate in Walk to Work day and look into holding a ‘healthy breakfast’ as a reward to all those who participate.