66-82 TALAVERA ROAD, MACQUARIE PARK

TRAFFIC IMPACT ASSESSMENT

FOR

HOLDMARK

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1. INTRODUCTION

1.1 BACKGROUND

Bitzios Consulting has been commissioned by Holdmark to prepare a Traffic Impact Assessment (TIA) to support a planning proposal which involves change to the permissible use at 66–82 Talavera Road, Macquarie Park from B7 (Business Park) to B4 (Mixed Use); increasing the floor-space-ratio from 1:1 to 3.7:1 and increasing the height limit from 30m to 120m, with a single tower of up to 154m in height.

The site is on the south-east corner of Alma Road and Talavera Road (see Figure 1.1), and borders the south-east corner of the Herring Road (Epping and Macquarie Park Urban Renewal Area). It is also located across the road from the Macquarie Shopping Centre with bus station located at the shopping centre on Herring Street and 500m walking distance to the Macquarie University Train Station.

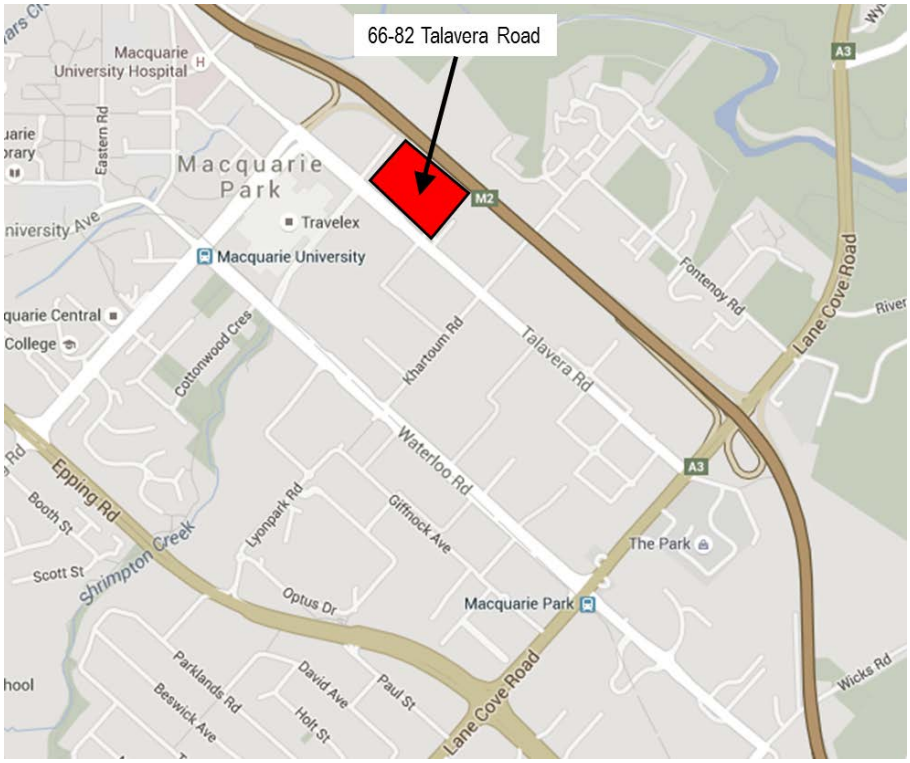


Figure 1.1 Locality Map

There are currently several buildings occupying the site, including the existing Astra Zeneca office premises on Alma Road, from which the existing employees will be relocated to a Council approved proposed new six (6) storey office/ commercial development located in the south-eastern corner of the study area.

1.2 SCOPE

The purpose of this report is to assess the traffic and transport impacts of the planning proposal on the operation of the road and transport network. Specifically, this report includes:

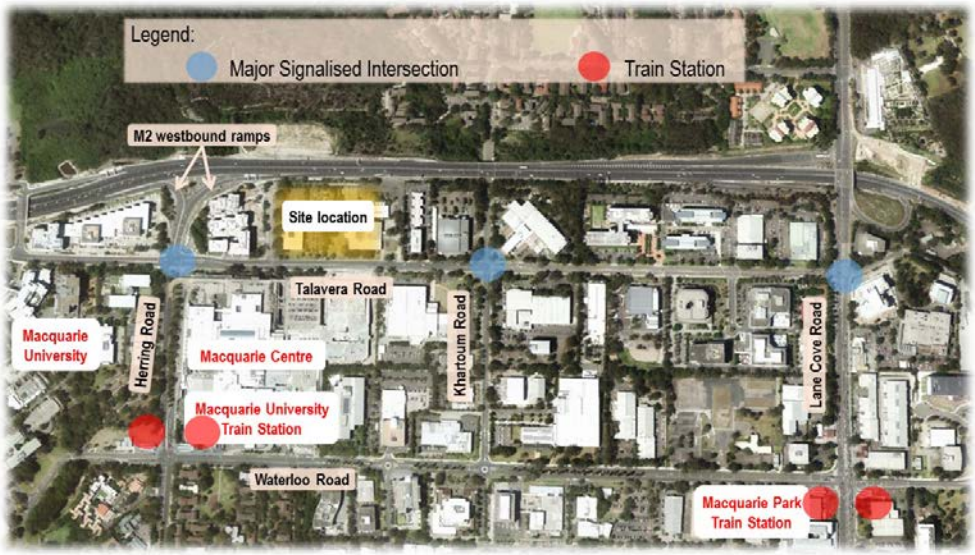
- Identification of potential impacts on the road network;
- Proposed access points and arrangements; and
- Parking provisions.

2. EXISTING CONDITION

2.1 ROAD NETWORK

The site (66-82 Talavera Road, Macquarie Park) is accessed via Talavera Road with an access also off Alma Road. The nearest *Roads and Maritime* state controlled roads are accessed via the Herring Road/ Talavera Road and Lane Cove Road/Talavera Road signalised intersections. There is an alternative access point to Lane Cove Road at Fontenoy Road (accessed via Khartoum Road), north of Lane Cove Road/M2 Motorway access ramps.

M2 entry and exit ramps are located at Herring Road and Christie Road, allowing direct access to the site from the M2 via the western leg of Talavera Road. Figure 2.1 shows existing major roads and key trip generating areas near the site.



Source: NSW Globe (google earth)

Figure 2.1 Existing Major Roads and Trip Generators

The existing premises within the site are accessed via a driveway on Alma Road. The premises may also be accessed directly from Talavera Road in the east. The Alma Road intersection with Talavera Road is a left-in/ left-out priority intersection and a median strip is located on Talavera Road at Alma Road restricting right turn movement in and out of Alma Road. The existing access arrangements are shown in Figure 2.2.

Source: NSW Globe (google earth)

Figure 2.2 Existing Access Arrangements

Talavera Road is a two-way sub-arterial road with a posted speed limit of 50km/h. Restricted "6P Ticket" sign-posted parking zone controls the parking demand on both sides of the road outside the AM and PM peak periods. Alma Road bordering the site is essentially a local access road with a 50kph speed limit and on street parking.

2.2 EXISTING TRAFFIC VOLUMES

The intersection counts for Talavera Road/Lane Cove Road and Talavera Road/ Khartoum Road signalised intersections were extracted from the previous report titled "*Astra Zeneca Office, Macquarie Park Traffic Impact Assessmen*t" dated 25 June 2015 (Bitzios Consulting).

Surveys for the other nearby intersections were undertaken on 3 September 2015. The following AM and PM peak periods were included in the traffic surveys:

- AM Peak – 7.15am-9.15am; and
- PM Peak – 4.15am-6.15pm.

According to the traffic survey data, the following AM and PM peak hours were determined for the study area:

- AM Peak – 8.15am-9.15am; and
- PM Peak – 4.45am-5.45pm.

Figure 2.3 presents the existing traffic volumes for these peak hours.

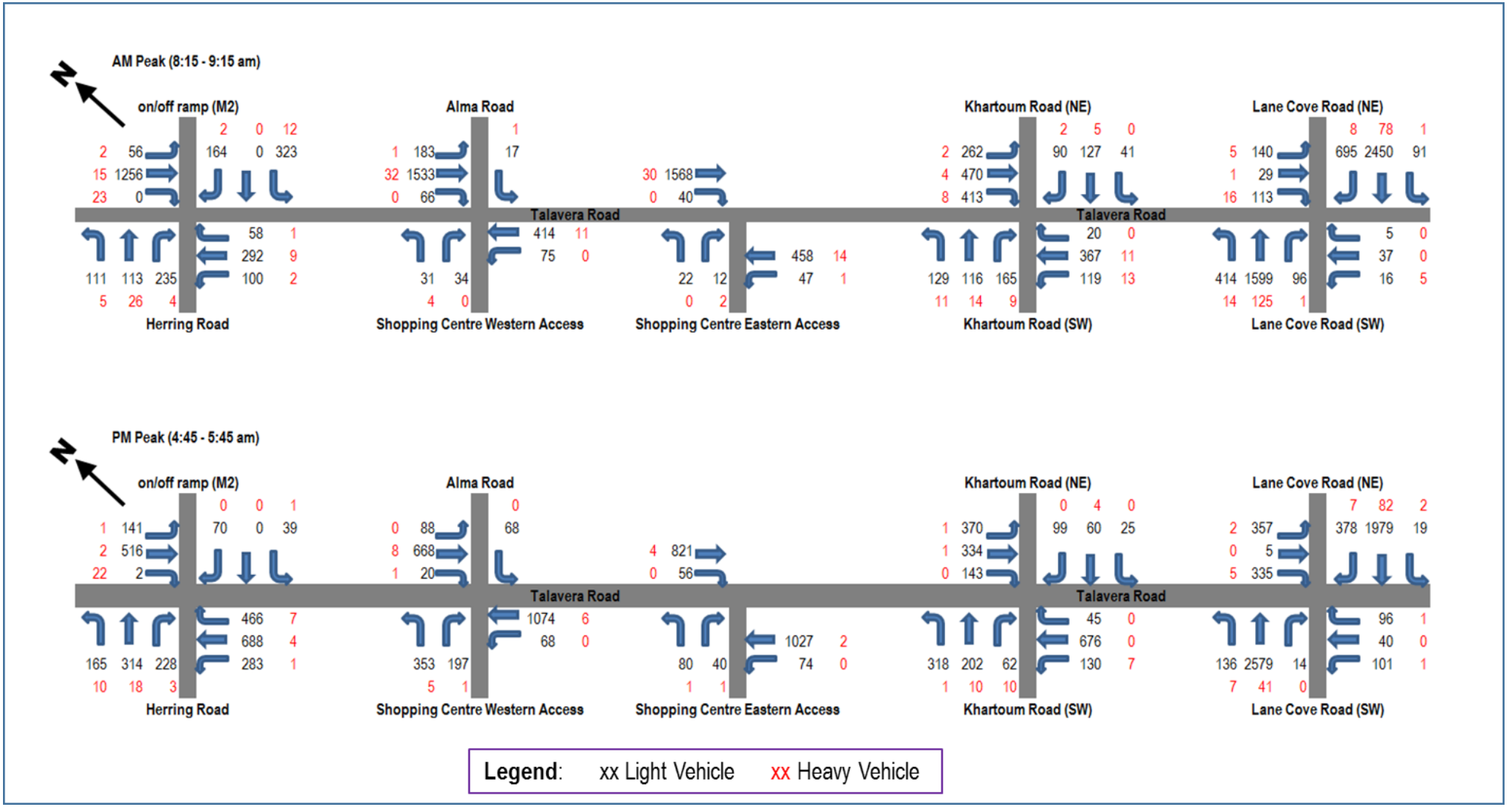


Figure 2.3 Existing AM and PM Peak Traffic Volumes

3. PLANNING PROPOSAL

3.1 PROPOSAL DETAILS

The Planning Proposal for 66-82 Talavera Road, Macquarie Park comprises of 1,271 apartments and approximately 20,000 m^2 of non-residential floorspace.

Macquarie Park, now one of the premier business centres of "Global Sydney", is facing a severe deficiency in accessible open space as it continues to grow. In view of offering appropriate community benefit, a Voluntary Planning Agreement (VPA) has been established as part of the Macquarie Park Planning Proposal.

The VPA seeks to provide an outdoor recreational park with underground public car park and an indoor sports facility consisting of three courts, with approximately 270m^2 in three commercial tenancies (cafes, offices, or commercial), which would be ancillary and complementary to the use of open space and indoor courts. The remainder of this part would include an option for key worker housing. This facility would be separated from the residential and commercial traffic through its proposed access via Alma Road (see Figure 3.1).

Based on this proposal, there is a need to apply for a rezoning from B7 (business park) to B4 (mixed use).

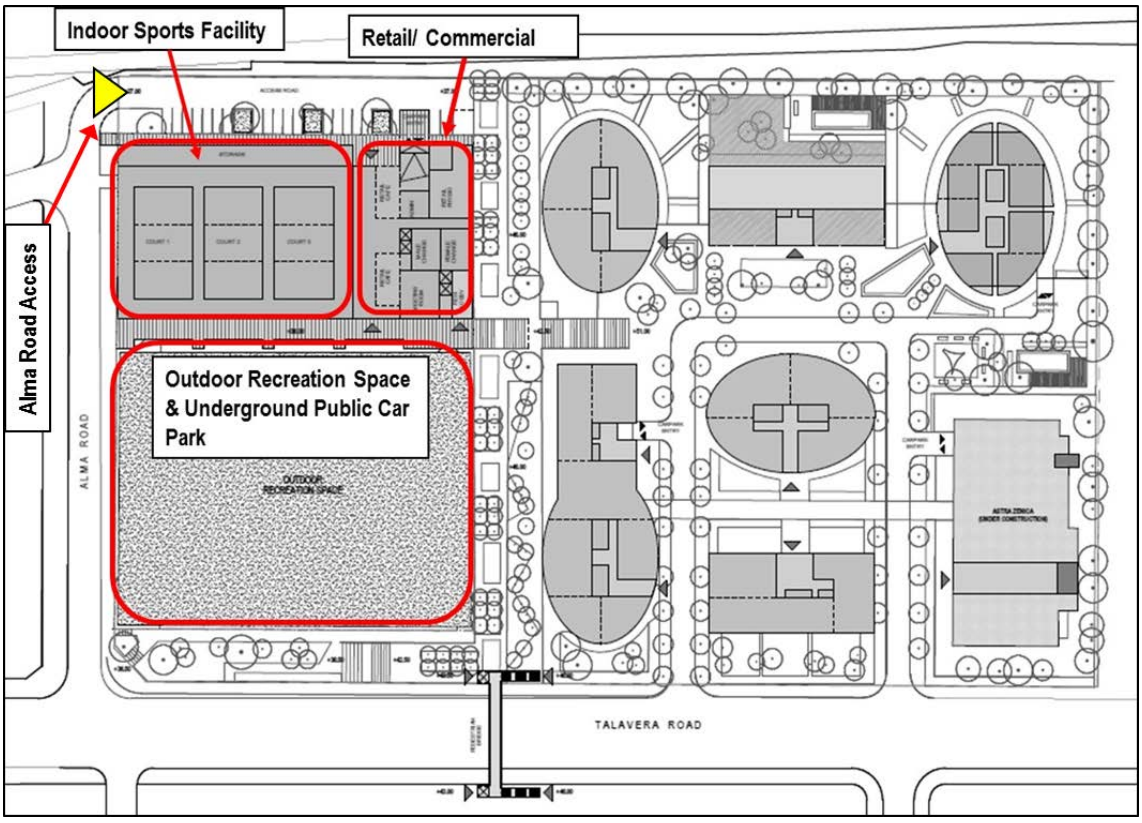


Figure 3.1 Indoor/ Outdoor Recreation Facility

The concept Master Plan can be summarised as:

- 1,271 apartments;
- 20,000 m^2 of non-residential floorspace, with the combination of:
  - Council approved Astra Zeneca building (8,982m^2);
  - Retail / restaurant approximately 4,000m^2; and
  - Commercial / office approximately 7,000m^2.
- Recreation centre 3,500m^2;
- Dedicated public open space 6,100m^2; and
- Key worker dwellings (affordable housing): 56 units.

The study area is proposed to comprise of three (3) access points:

- Alma Road,
- Western Access and
- Eastern Access.

The Western and Eastern Access points are proposed to be interlinked within the site, and would offer direct vehicular access to the Residential and Commercial developments. The Alma Road access would be the only vehicular access for VPA parking, but would also provide access for residential and commercial parking. The access points are described in Table 3.1.

Table 3.1 Summary of the Three Access Points

Access	Present Arrangement	Proposed Modification	Concerned Traffic
Alma Road	Left-in/left-out	-	Public Car Park, Indoor Sports Facilities, Key Workers Housing, Residential, Commercial (including Astra Zeneca)
Western Access	Proposed new	Left-in/left-out	Residential, Commercial (including Astra Zeneca)
Eastern Access	Left-in/left-out	Align with shopping centre access to form a four-leg signalised intersection	Residential, Commercial (including Astra Zeneca)

The access points, as well as the ground level and podium level of the proposed development are presented in Figure 3.2 and Figure 3.3.

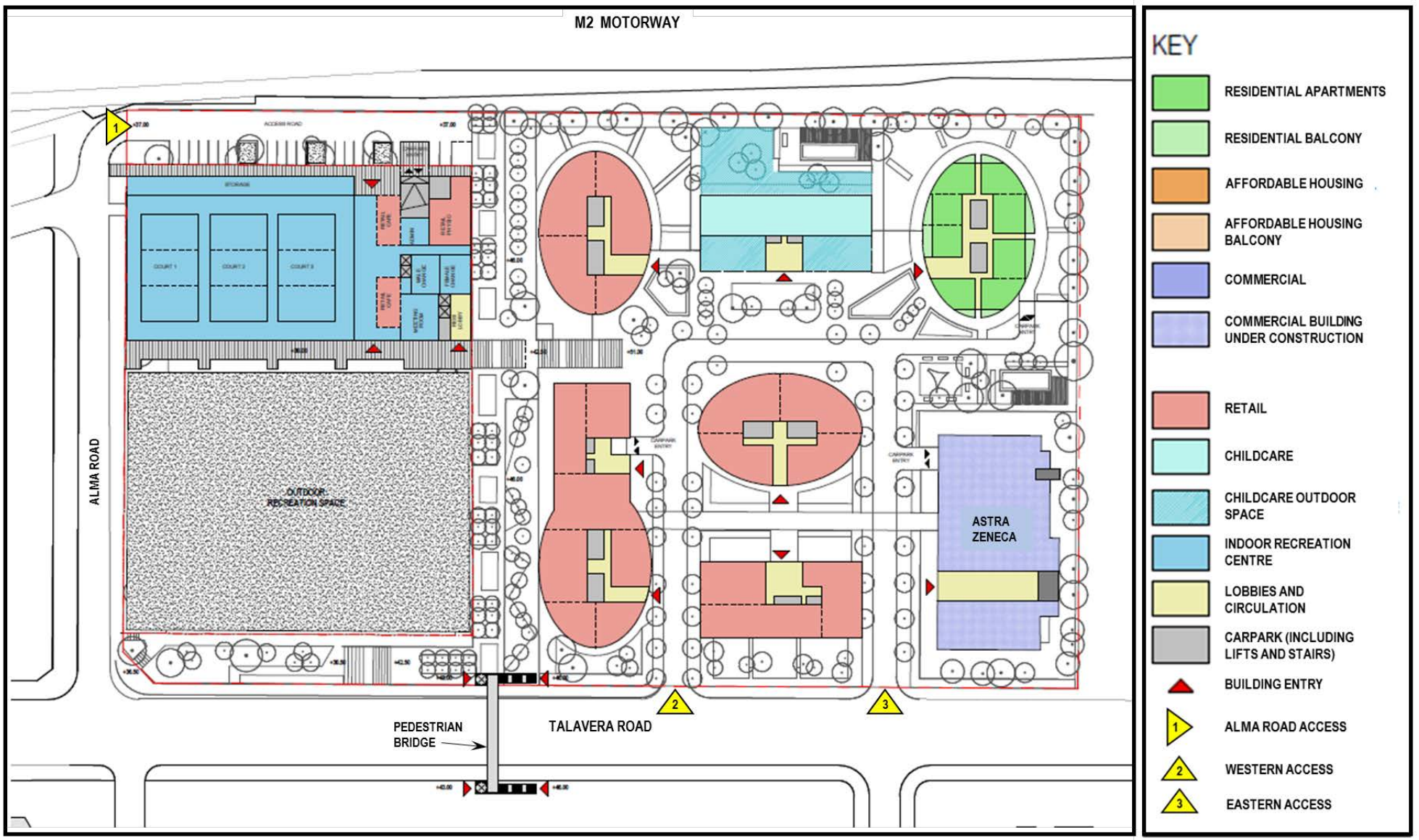


Figure 3.2 Ground Level of Proposed Development

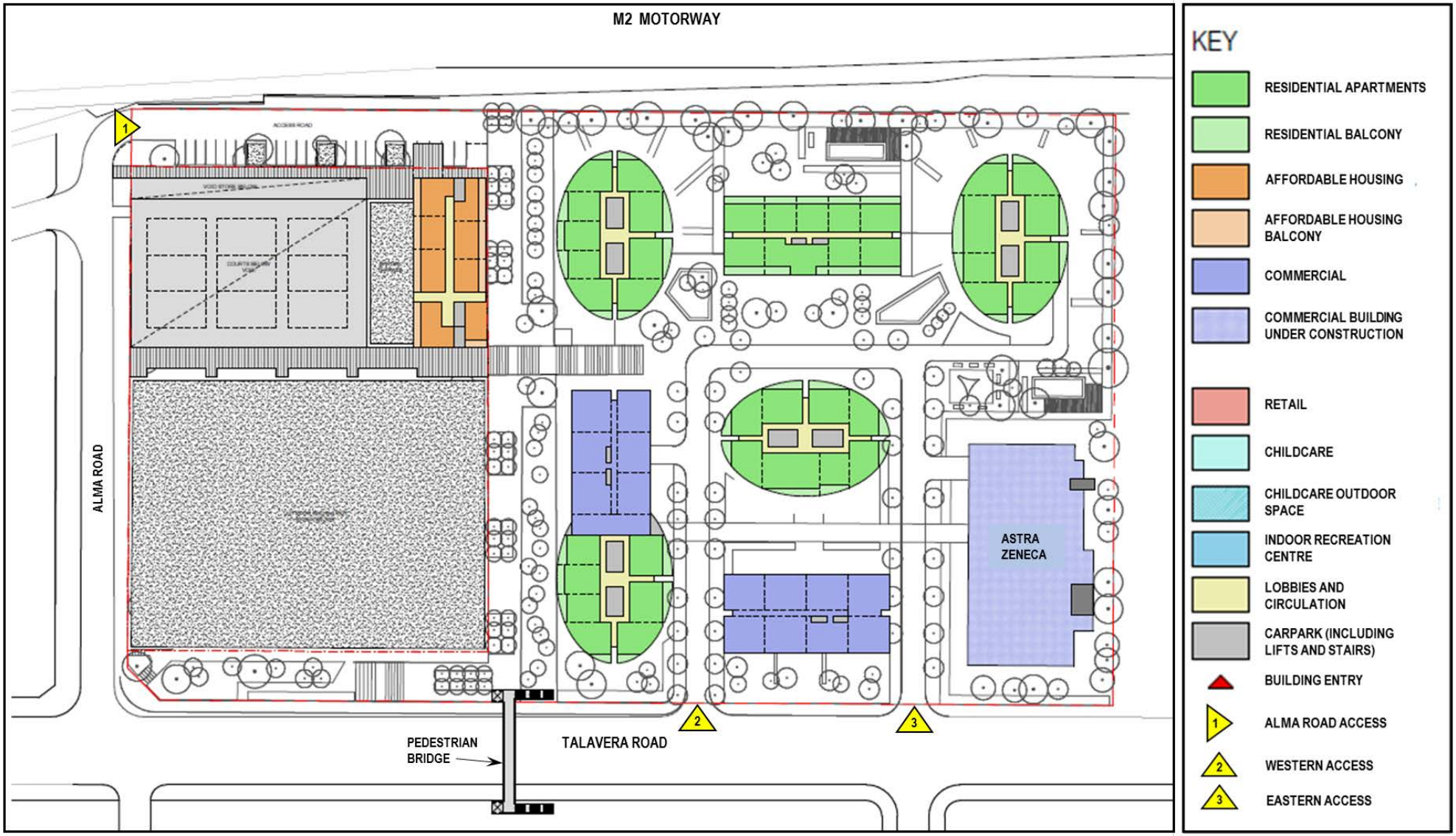


Figure 3.3 Podium Level of Proposed Development

3.2 PARKING REQUIREMENTS

3.2.1 Residential and Commercial Parking (Eastern and Western Access)

The State Environmental Planning Policy No.65 (SEPP65) – Design Quality of Residential Apartment Development recommends the minimum amount of car parking for a residential apartment in accordance with the Roads and Maritime's "Guide to Traffic Generating Development", as follows:

- 0.6 space per 1-bedroom unit;
- 0.9 space per 2-bedroom unit;
- 1.4 spaces per 3-bedroom unit; and
- 1 visitor space per 5 units.

With the proposed change of land use to the study area, the residential parking requirement would be slightly different to the existing according to the Macquarie Park Corridor Development Control Plan (DCP) 2014. The maximum parking rates for residential development are as follows:

- 0.6 space per 1-bedroom unit;
- 0.9 space per 2-bedroom unit;
- 1.4 space per 3-bedroom unit;
- 1 visitor space per 10 units; and
- 1 car share space per 50 proposed parking spaces.

These parking provision rates are similar to the *Roads and Maritime* rates with the exception of fewer visitor parking spaces required and provision for car share spaces. It is recommended the parking provision to be in accordance with the DCP parking rates.

The ratio of residential mix for the master plan is as follows:

- 25% one-bedroom (including 5% Studio apartments);
- 65% two-bedroom; and
- 10% three-bedroom.

On this basis, the maximum permissible parking spaces for the proposed residential development under the master plan for a total of 1,271 apartments are shown in Table 3.2.

Table 3.2 Parking Spaces Required for Residential Development

Total number of apartments	Type	Percentage	Number of apartments	Parking Space Requirement	Allowable Maximum number of Parking spaces
1,271	One bedroom (including Studio apt.)	25%	318	0.6 space per unit	191
	Two bedroom	65%	826	0.9 space per unit	744
	Three bedroom	10%	127	1.4 space per unit	178
	Visitors	-	-	1 for every 10 units	127
	Car Share	-	-	1 for every 50 spaces	25
				Total	1,265

Table 3.3 Parking Spaces Required for Commercial Development

Commercial	Area (m^2)	Parking Space Requirement	Maximum Number of Parking Spaces	Remarks
Astra Zeneca	8,982	-	-	Approved
Other	11,000	1 space per 46m^2 GFA	239	

For commercial development, 20,000m^2 GFA could provide a maximum of 434 parking spaces. A maximum of 1,699 spaces (1,265 + 434) would be reasonable for the Residential and Commercial developments, including the spaces for Astra Zeneca. The approved Astra Zeneca development has 184 parking spaces, so there is capacity for provision of 1,515 extra spaces.

3.2.2 VPA Parking (Alma Road access only)

Additional spaces for the indoor sports facility have been calculated based on first principle approach of a typical evening practice session for all three courts to be occupied (see Table 3.4). No additional visitor parking provision was calculated for the 270m^2 retail/commercial, assuming most journeys to the retail/commercial component at the community centre would be shared journey trips from either the recreation facility or the residential towers.

- Maximum players: 12 per team
- Coach: 2 per team
- Referee: 2 per game
- Total per court: 30 person x 3 courts = 90 persons

- Typical car share rate of 1.2 person per vehicle = 75 private vehicles
- Maximum vehicle per practise session (1 person per vehicle) = 90 private vehicles

Parking for the Affordable Housing component has been calculated as recommended in SEPP 2009.

Table 3.4 Required Parking for the community benefit area

Development	Size/Type	Rates	Required Number of Parking Spaces
Indoor Sports Facility	3 courts	1 space for 1.2 person/ 1space for 1 person	75 (Minimum) 90 (Maximum)
Retail/ Commercial	3 shops; total 270m^2	1 per shop / 1 per 46m^2 (Ryde LEP)	3 (Minimum) 6 (Maximum)
Affordable Housing (total 56 units)	1 bedroom (inc. Studio): 14 units	0.5 space per unit	7
	2 bedroom: 36 units	1 space per unit	36
	3 bedroom: 6 units	1.5 spaces per unit	9

The number of parking spaces proposed for the community benefit area is:

- 1,030 off-street spaces for public car park, under the open space for recreation;
- Of these 1,030 spaces, 180 spaces would be made available for the users of indoor sports facility and adjacent retail/commercial spaces; and
- 20 on-street spaces for public car park.

In addition to the car parking spaces, it is recommended to provide two bus parking spaces for local/school hire competition purposes. The existing width of Alma Road would not allow for parking a 24-seater coach, and would require decommissioning some existing on-street parking and widening of the road. The existing road reserve is wide enough to accommodate the required road widening.

A turnaround bay would be required on Alma Road for buses. The turning circle for a coach is approximately 27m without reversing. The road reserve appears to be approximately 20m in Alma Road. Therefore, a land dedication would be required to provide a turnaround bay. Detailed design for provision of a coach turning-circle and widening of Alma Road would be subject to further detailed design at later stages and may necessitate a change in the design of the indoor recreation centre / open space area.

It is recommended to provide a stop on the eastern side of Alma Road near the outdoor recreation space.

3.3 DEVELOPMENT TRAFFIC GENERATION AND DISTRIBUTION

3.3.1 Traffic Generation Rates

Traffic volumes were generated in accordance with the *RTA Guide to Traffic Generating Developments* and the Roads and Maritime's "Technical Direction with Updated Traffic Surveys". These rates are as follows:

- High density residential:
  - AM Peak: 0.19 trips per unit; and
  - PM Peak: 0.15 trips per unit.
- Office block:
  - AM Peak: 1.6 trips per 100m^2 GFA; and
  - PM Peak: 1.2 trips per 100m^2 GFA.
- Retail (shopping centre rate 0 – 10,000m^2):
  - AM Peak: n/a;
  - Thursday PM Peak: 12.3 trips per 100m^2 GLFA; and
  - Friday PM Peak: 12.5 trips per 100m^2 GLFA.

The residential development is within walking distance to major shopping, education, recreational opportunities and mass public transport and hence using the high density rate is entirely appropriate in this location. This rate was checked against a first principles assessment considering access to other uses and public transport and correlated very well with the surveyed *Roads and Maritime* rates.

3.3.2 Generated Traffic by Development Component

A traffic impact assessment was recently undertaken for the Astra Zeneca building within the study area. This proposal has been approved by Council and is currently under construction. The relevant data from the traffic assessment for that development was extracted and used in this assessment.

The retail/restaurant type uses (approximately 4,000m^2) within the main development are expected to provide services for the residential and commercial development in the area primarily, and restaurant-generated traffic is outside the commuter peak hours in any event. Therefore, the retail/restaurant traffic generation has been assumed as half of the *RTA Guide to Traffic Generating Developments* rate for a shopping centre; i.e., 6.15 trips per 100m^2 GLFA for Thursday PM Peak and 6.25 trips per 100m^2 GLFA for Friday PM Peak. The *RTA Guide to Traffic Generating Developments* states 100m^2 of GFA equals 75m^2 GLFA.

The community centre proposed parking consists of parking for the indoor sports facility, retail/ commercial and for the affordable housing in the same building. This traffic generally coincides with the PM peak hour, but would occur outside the AM peak hour. A maximum of approximately 90 additional vehicle trips are expected to be generated from the indoor sports facility accessing Alma Road during the PM peak hours. The affordable housing would generate 11 vehicle trips in the AM peak and 8 vehicle trips in the PM peak.

As part of the development, it is proposed to provide 1,030 off-street (under the open space facility) and 20 on-street spaces for public car parking. The proposed public car park is intended to replace the existing

12P on-street parking when/ if it is revised by the Council and to provide public car parking for people using the outdoor recreation facility. The total number of on-street parking spaces controlled with a 12P restriction, which are likely to be impacted, is in the order of 416 spaces. The rest of road side lanes in the vicinity of the site, such as along Talavera Road and Waterloo Road have clearway restrictions.

The public car park under the outdoor facility would be open to the public, and the operator would provide shuttle buses to transport commuters to the other precincts around Macquarie Park. The frequency of the buses would be assessed at a later date and would require surveys of the demand and be revised accordingly.

Given the possibility the Council would consider altering long-term on-street parking restrictions in Macquarie Park, it is envisaged the public car park would be used by the existing long-term on-street parking users. A maximum shift from the long-term on-street parking would be 416 users. In a worst case scenario, all of the 416 additional vehicle trips would access the public car park via Alma Road in the AM peak and exit in the PM peak. Although other visitors to Macquarie Park and/ or university students might use the car park, by the nature of these trips, it is unlikely a large proportion of these would occur during the AM and PM peak hours. Since the parking in the 1,030 off-street public parking spaces consists of mixed patronage, the overall proportion expected to arrive or leave in the peak hours is less than 75 percent of the capacity, or a maximum of 773 vehicle trips per peak hour. Cars would arrive at or depart from the remaining spaces outside peak hours.

These additional vehicle trips are expected to be a re-distribution of the existing traffic within Macquarie Park rather than the development attracting additional vehicles trips into the Macquarie Park network. Therefore, a maximum of 773 additional vehicle trips would be expected to enter Alma Road in the AM peak and 773 additional vehicle trips to exit in the PM peak. No traffic generation analysis was undertaken for weekend peak, this is due to the weekday AM and PM peak being considered as the more critical peak hours with higher existing traffic volumes.

The public open space is expected to be used by local residents and commercial tenants, as well as attracting some traffic from outside the area. However, the amount of traffic is expected to be negligible in the peak hours since the facilities in the public open space are generally passive recreation. Facilities such as market stalls are expected to generate traffic outside the peak hours only.

The proposed changes to the land use type on site are to generate traffic volumes in the peak hours as outlined in Table 3.5.

Table 3.5 Peak Hour Traffic Generation

Development Type	Size	Traffic Generated	
		AM Peak	PM Peak
Apartments	1,271 units (total 119,978m^2)	241	191
Astra Zeneca*	8,982m^2	150	122
Commercial (excluding restaurants)	7,000m^2	112	84
Retail in main development	4,000m^2	-	185 (Thursday) 188 (Friday)
Public Car Park	-	773	773
Indoor Courts	3 courts	-	90 (included in 773 from public car park)
Retail in VPA	3 shops (total 270m^2)	-	3 (included in 773 from public car park)
Key Worker Dwellings	56 units (total 5,296m^2)	11	8

**Council approved development adopted from the Astra Zeneca traffic impact assessment report*

This proposal replaces a "business park" development type, which is heavily private car dependent with a mixed-use development relying heavily on local travel, public transport, walking and cycling for its accessibility.

The traffic generated by an office block development on the same site would be based on a traffic generation rate of 1.6 trips per 100m^2 GFA in the AM peak hour and 1.2 trips per 100m^2 GFA in the PM peak hour. The theoretical floor area of an office block on the site under the current applicable planning controls allowing an FSR of 1.5:1 would deliver a total Gross Floor Area of 56,748m^2. Therefore, the traffic generation for a compliant commercial development could be 908 trips per hour in the AM peak and 681 trips per hour in the PM peak, which is 71% and 50%, of the traffic generation for the proposal in the AM and PM peaks, respectively.

3.3.3 Traffic Distribution Splits

The *RTA Guide to Traffic Generating Developments* assumes for residential development that 80% of morning peak movements are outbound and 20% inbound. The split is reversed in the evening peak. For commercial development the RTA Guide assumes 80% of employees are inbound and 20% outbound in the morning peak, with the reverse occurring in the afternoon peak.

The distribution of the development traffic from the proposed has been assumed to match the movement patterns identified in the previous Herring Road Urban Activation Precinct (UAP) Transport Strategy, with:

- 65% of the trips to/from the east;
- 14% of the trips to/from the west;
- 11% of trips to/from the north; and
- 10% of trips to/from the south.

Additionally, in accordance with the planning proposal, the following assumptions were adopted by *Bitzios Consulting*:

- The 773 vehicle trips to/from the public car park would be 100% inbound at morning peak and 100% outbound at evening peak;
- Trips to/from the retail use in the main development would be 50% inbound and 50% outbound;
- Vehicle trips related to the community open space, indoors courts and retail/café would not coincide with morning peak hours. However, they would be 100% outbound during the evening peak.
- 100% of traffic generated by the community benefit area (Key workers' dwellings, open space, indoor courts and retail) would use Alma Road Access only, as it would offer vehicular access to the internal road within the commercial and residential developments.
- Similarly, trips to/from commercial and residential developments would use the Western and Eastern access. Eastbound and Westbound traffic is presumed to be 70% and 30%, respectively.
- Due to presence of an internal road within the premises, and to avoid queueing at the signalised intersection of the Eastern Access, the majority of the eastbound traffic (60% of the total traffic) would enter into the main premises through the Western Access. The rest of the eastbound traffic (10% of total traffic) would enter through the Eastern Access. All westbound traffic will use the Eastern access as this is the only available right turn entry.
- Alma Road would offer a left in/left out arrangement only. For a right turn out of Alma Road, 10% of the outbound traffic is assumed to enter the main premises through the Western Access and turn right at the signalised Eastern gateway.

Based on these assumptions, the peak hour inbound and outbound development traffic movements are:

- AM Peak
  - Inbound – 1,048 vehicle trips; and
  - Outbound – 239 vehicle trips.
- PM Peak
  - Inbound – 280 vehicle trips; and
  - Outbound – 1,082 vehicle trips.

3.4 ACCESS TRAFFIC

Figure 3.4 shows the estimated development-generated peak period traffic with the distribution assumptions described above.

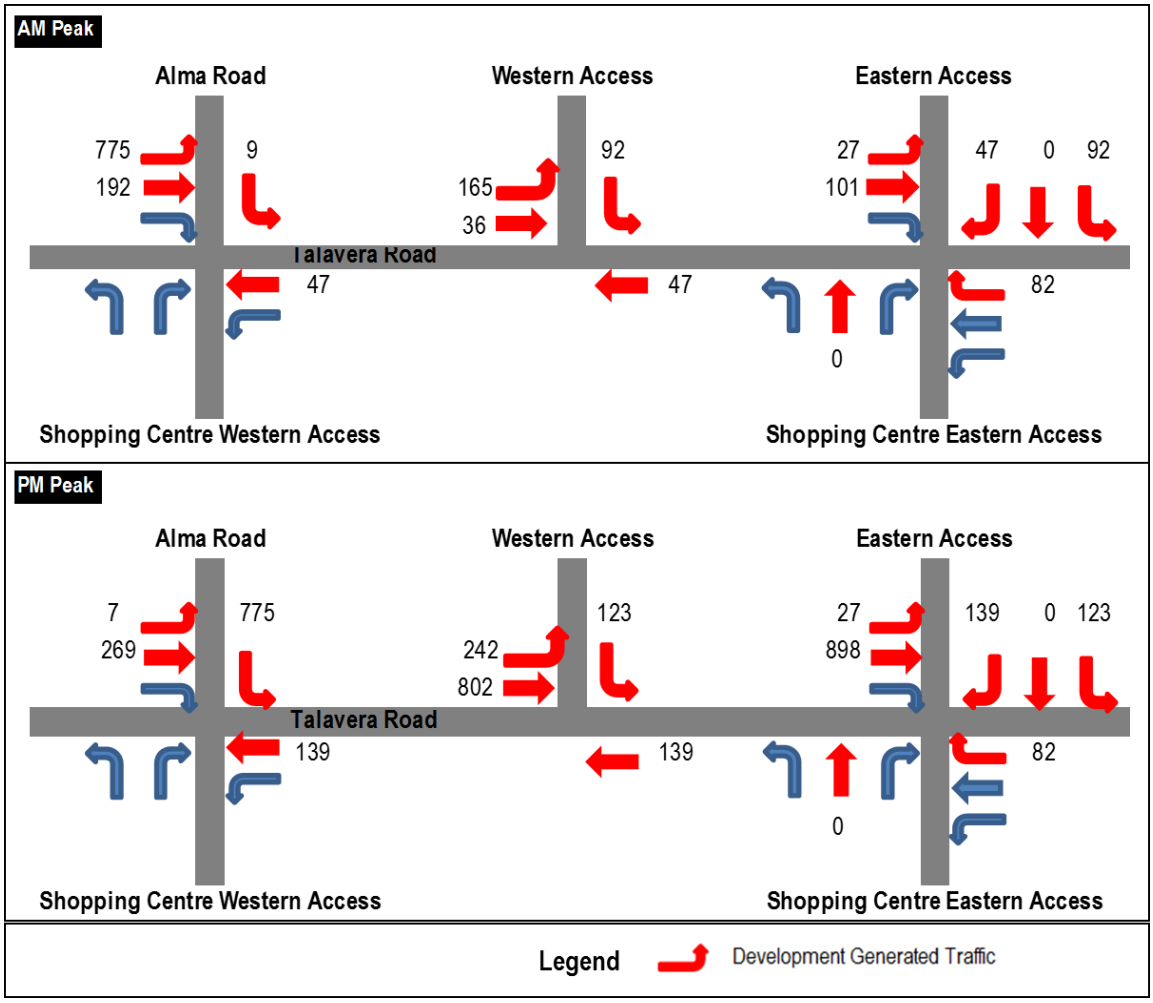


Figure 3.4 Expected Development Generated Traffic Turning Volumes

4. INTERSECTION ANALYSIS

4.1 PERFORMANCE MEASURES

Key intersections near the site were analysed using SIDRA Intersection Analysis Software to assess the predicted traffic conditions as a result of the development. The results of the analysis are reported in terms of Level of Service (LoS) based on the average delay per vehicle, as shown in Table 4.1.

Table 4.1 Level of Service Measurement

Level of Service	Average Delay per Vehicle (sec/veh)	Description
A	> 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity
F	70 and above	Unsatisfactory

Source: RTA Guide to Traffic Generating Developments 2002

For signalised intersections, the LoS is based on the average delay per vehicle for the whole intersection. For priority intersections (Give Way and Stop controlled) the LoS is based on the average delay for the worst movement. Similarly, the LoS for a roundabout is based on the average delay for the worst movement.

The Degree of Saturation (DoS) is the ratio of the actual or modelled traffic volumes compared to the theoretical capacity of the intersection or traffic movement. A DoS of less than 0.5 indicates that the intersection has spare capacity and queues would be expected to be relatively short. A DoS above 0.85 (priority intersection) and 0.9 (signalised intersection) indicates that the intersection may be unstable at times with long queues and delays as the traffic volumes approach practical capacity. Intersections with DoS greater than 1.0 are considered to be over capacity and have a LoS F.

Queue lengths are based on the 95th percentile back of queue, defined as meaning that the queue length is exceeded only 5% of the time. The queue lengths presented in the following sections represent the longest queue on each approach at the intersection.

4.2 EXISTING INTERSECTION PERFORMANCE

Using Council's TIA process for Macquarie Park developments identifies the location of the site as 'Location Type 3' and at a traffic generation 'Level 2' (> 50 trips per peak hour). This requires a 'Level 2' assessment, which is a localised assessment of the nearest key intersections within 400m of the site. On this basis, there are five (5) relevant intersections requiring assessment using the SIDRA intersection analysis package. The intersections are:

- Talavera Road/ Herring Road/ M2 on/off ramp signalised intersection;
- Talavera Road/ Alma Road/ Shopping Centre West Access signalised intersection;
- Talavera Road/ Shopping Centre East Access signalised intersection;
- Talavera Road/ Khartoum Road signalised intersection; and
- Talavera Road/ Lane Cove Road signalised intersection.

The summary of results of the intersection analysis is shown in Table 4.2. Site investigations suggest that most of the intersections assessed along Talavera Road are currently at practical capacity with a degree of saturation above 0.8 and the Lane Cove Road/ Talavera Road signalised intersection operates at a degree of saturation above 1.0. This implies the intersection is currently over saturated and delays would increase without any upgrades being implemented.

Table 4.2 Existing Intersection Performance Summary

Intersection	Degree of Saturation	Average Delay (s)	LOS	95th% Back of Queue (m)
AM Peak				
Talavera Road/ Herring Road/ M2 on/off ramp	0.90	45	LOS D	270
Talavera Road/ Alma Road/ Shopping Centre West Access	0.84	29	LOS C	278
Talavera Road/ Shopping Centre East Access	0.84	22	LOS B	205
Talavera Road/ Khartoum Road	1.00	42	LOS C	148
Talavera Road/ Lane Cove Road	1.00	54	LOS D	558
PM Peak				
Talavera Road/ Herring Road/ M2 on/off ramp	0.77	37	LOS C	104
Talavera Road/ Alma Road/ Shopping Centre West Access	0.88	40	LOS C	190
Talavera Road/ Shopping Centre East Access	0.77	19	LOS B	127
Talavera Road/ Khartoum Road	0.81	36	LOS C	147
Talavera Road/ Lane Cove Road	1.1	114	LOS F	992

4.3 Access Intersection Analysis for Proposed Development

The intersections of Talavera Road with Herring Road, Khartoum Road, and Lane Cove Road would require future upgrades in any event if the intersections are expected to operate under capacity. This finding is independent of the planning proposal's impacts. Therefore, only the three (3) direct accesses to the development were analysed with the proposed development traffic volumes. Intersections associated with these access points are described below:

- Alma Road Access: Talavera Road/ Alma Road/ Shopping Centre Western intersection (adjacent to the Alma Road/Talavera Road left-in / left-out arrangement);
- Western Access: A new proposed left-in / left-out central access that would form a T-intersection with Talavera Road (Figure 4.1); and
- Eastern Access: Connects to the Talavera Road/ Macquarie Centre Eastern Access signalised intersection with all movements allowed (Figure 4.2).

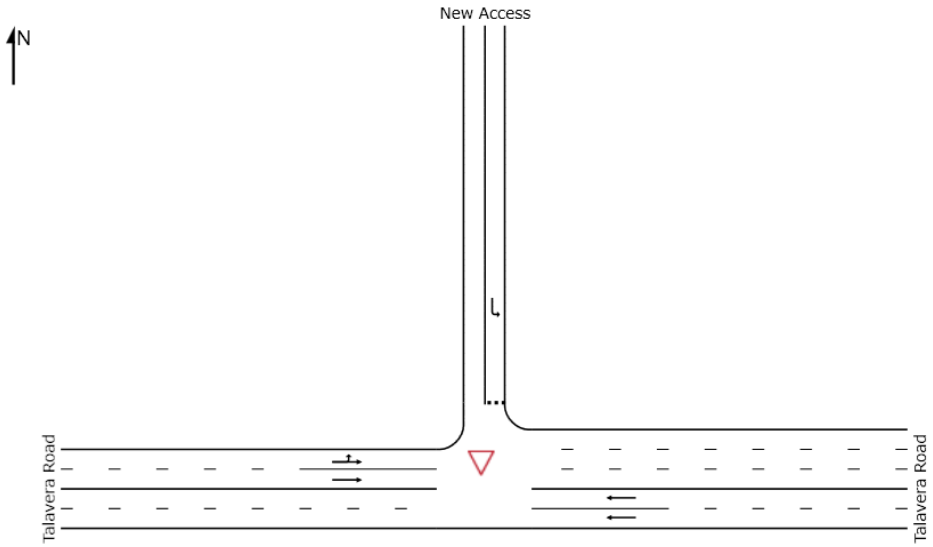


Figure 4.1 Layout of proposed Western Access / Talavera Road Intersection

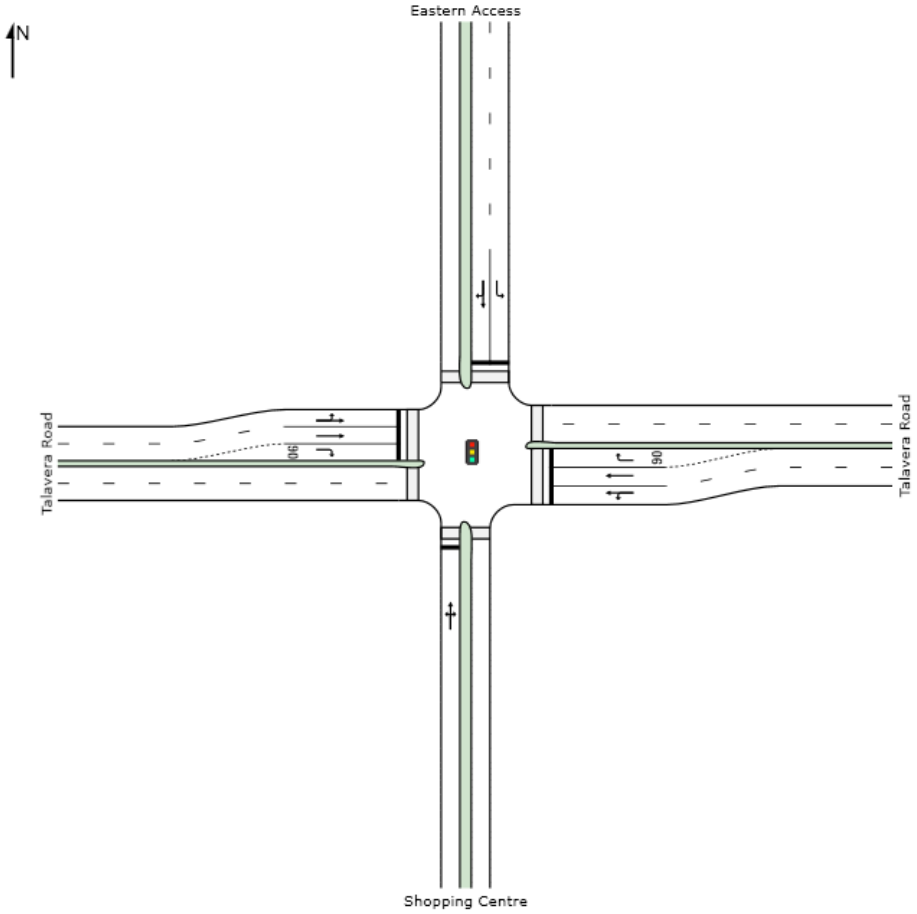


Figure 4.2 Layout of proposed Eastern Access / Talavera Road/ Shopping Centre Intersection

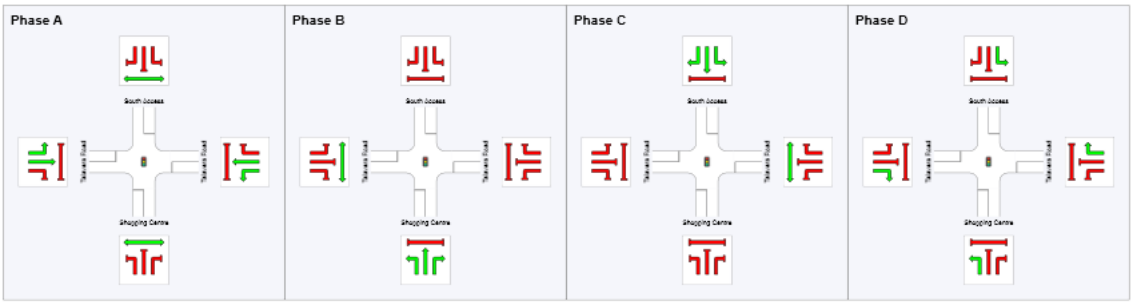


Figure 4.3 Signal Phasing of proposed Eastern Access / Talavera Road/ Shopping Centre Intersection

Details of the SIDRA 7.0 analysis results can be found in Appendix A.

Table 4.3 presents the analysis summary of the intersections adjacent to 66-82 Talavera Road for existing traffic. The results show all three intersections operate at an acceptable level of peak hour performance.

Table 4.3 Performance Summary of Intersections (for Existing Traffic)

Peak	Approach	Demands (Vehicle / Hour)	Average Delay (s)	Level of Service	95th% Back of Queue (m)
AM	Alma Road / Talavera Road Intersection				
	Alma Road (N)	18	8	A	0.5
	Talavera Road (E)	460	0	A	0
	Talavera Road (W)	1,815	6	A	0
	Shopping Centre Western Access / Talavera Road Intersection				
	Talavera Road (E)	500	11	A	29
	Shopping Centre (S)	69	27	B	8
	Talavera Road (W)	1,649	6	A	94
	Shopping Centre Eastern Access / Talavera Road Intersection				
	Talavera Road (E)	520	15	B	34
	Shopping Centre (S)	36	19	B	4
	Talavera Road (W)	1773	13	A	124
PM	Alma Road / Talavera Road Intersection				
	Alma Road (N)	68	6	A	2
	Talavera Road (E)	1,438	0	A	0
	Talavera Road (W)	785	6	A	0
	Shopping Centre Western Access / Talavera Road Intersection				
	Talavera Road (E)	1,148	14	A	84
	Shopping Centre (S)	556	26	B	65
	Talavera Road (W)	785	6	A	0
	Shopping Centre Eastern Access / Talavera Road Intersection				
	Talavera Road (E)	1103	17	B	91
	Shopping Centre (S)	122	23	B	19
	Talavera Road (W)	893	6	A	35

Performance analysis was undertaken for the future intersections using projected future traffic including of the proposed development and proposed Macquarie Centre Redevelopment Stage 1, which were taken from Arup's *Macquarie Centre Redevelopment Stage 1 Concept DA Transport Management and Access Plan*. Table 4.4 shows the Macquarie Centre Redevelopment Stage 1 traffic at the relevant intersections. The assessment assumes the distribution of this traffic is proportional to the current traffic distribution.

Table 4.4 Macquarie Centre Redevelopment Stage 1 Traffic

Access	AM Peak Hour IN	AM Peak Hour OUT	PM Peak Hour IN	PM Peak Hour OUT
Talavera Road/Shopping Centre West Access	90	115	180	355
Talavera Road entry to Tower car park (left in only)	45	0	30	0
Talavera Road/Shopping Centre Central Access – LI/LO	5	5	5	20
Talavera Road/Shopping Centre East Access	30	15	50	50

Source: Table 11 of Arup's *Macquarie Centre Redevelopment Stage 1 Concept DA Transport Management and Access Plan*.

The results of the performance analysis summarised in Table 4.5 and Table 4.6 showing all four intersections would mostly operate at an acceptable level of peak hour performance. The results for the Eastern Access show it would operate near capacity with increased delays and queuing. However, minor upgrades such as lengthening the right turn lanes in the SIDRA model result in improved performance, so it is expected the access will operate at an acceptable level of peak hour performance.

Furthermore, the proposed re-alignment of the eastern access to align with the recently constructed traffic signals would be expected to benefit the network by providing alternate routes for site traffic rather than the more circuitous existing routes due to the absence of right turn opportunities.

Table 4.5 Performance Summary of Intersections - AM Peak (including Proposed Development traffic)

Peak	Approach	Demands (Vehicle / Hour)	Average Delay (s)	Level of Service	95th% Back of Queue (m)
AM	Alma Road / Talavera Road Intersection				
	Alma Road (N)	27	6	A	0
	Talavera Road (E)	487	0	A	0
	Talavera Road (W)	2,730	2	A	0
	Shopping Centre Western Access / Talavera Road Intersection				
	Talavera Road (E)	655	14	A	37
	Shopping Centre (S)	184	23	B	21
	Talavera Road (W)	1,906	10	A	117
	Western Access / Talavera Road Intersection				
	Western Access (N)	97	12	A	5
	Talavera Road (E)	683	0	A	0
	Talavera Road (W)	1,993	1	A	0
	Eastern Access / Talavera Road / Shopping Centre Eastern Access				
	Eastern Access (N)	140	56	D	35
	Talavera Road (E)	716	27	B	79
	Shopping Centre (S)	52	42	C	17
	Talavera Road (W)	1,840	13	A	236

Table 4.6 Performance Summary of Intersections - PM Peak (including Proposed Development traffic)

Peak	Approach	Demands (Vehicle / Hour)	Average Delay (s)	Level of Service	95th% Back of Queue (m)
PM	Alma Road / Talavera Road Intersection				
	Alma Road (N)	843	12	A	104
	Talavera Road (E)	1,272	0	A	0
	Talavera Road (W)	1,062	1	A	0
	Shopping Centre Western Access / Talavera Road Intersection				
	Talavera Road (E)	1,509	20	B	136
	Shopping Centre (S)	911	26	B	133
	Talavera Road (W)	1,871	12	A	159
	Western Access / Talavera Road Intersection				
	Western Access (N)	129	14	A	8
	Talavera Road (E)	1,545	0	A	0
	Talavera Road (W)	2,247	1	A	0
	Eastern Access / Talavera Road / Shopping Centre Eastern Access				
	Eastern Access (N)	263	69	E	71
	Talavera Road (E)	1,399	29	C	244
	Shopping Centre (S)	173	52	D	71
	Talavera Road (W)	1,939	16	B	306

5. CAR PARK ACCESS

The car park access for the public car park, as well as the other components of VPA, is off Alma Road. Therefore, Alma Road would predominantly be used for access by visitors to the public car park, either to use the shuttle bus facility or the indoor/outdoor recreation facility.

A turnaround facility should be provided at the end of Alma Road adjacent to the site access for vehicles aiming to turn around without entering the site (Figure 5.1). This would also facilitate a turnaround area for charter coaches/buses during a competition event when required. Alternatively, the turnaround facility could be located half way along Alma Road to avoid encroaching on the available space for the indoor recreation facility.

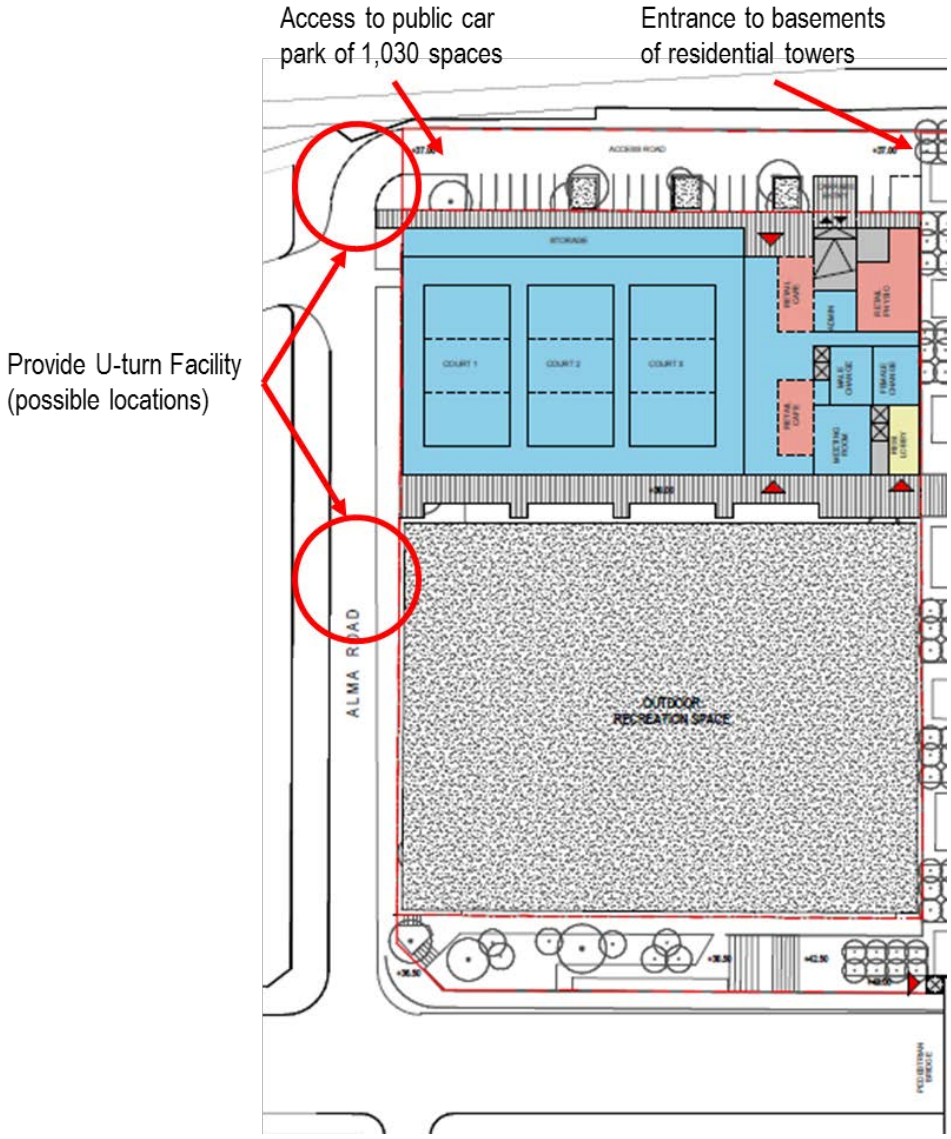


Figure 5.1 Car Park Access Layout

Having separate access points to the recreation facility/public car park and the residential tower basements reduces the likelihood of queues within the car parks and creates a better liveable environment for the residential tower. It also provides some privacy for the residential precinct. It is recommended to provide signage for the separate access points to avoid any confusion about which areas are accessible by the public.

6. PEDESTRIAN OVERHEAD BRIDGE

An overhead pedestrian bridge has been proposed as part of the plans. The pedestrian overhead bridge design requirements are:

- The desirable minimum width required to allow for two wheelchairs to pass each other is 1.8m. A minimum of 2.4m is recommended to be provided at high pedestrian volume areas such as shopping centres. The minimum clearance height above the pedestrian bridge is 2.5m to any overhang object, such as lights and signage.
- The vertical clearance from the road to the underside of the bridge would be a desirable minimum of 5.5m. However, this would be dependent on the height of the shopping centre entrance if the south end of the bridge is to connect directly with the shopping centre.
- Lifts would be required on both ends of the bridge to allow people with a disability and parents with prams to access the pedestrian bridge.

The proposed pedestrian bridge concept design shown in Figure 6.1 is generally in accordance with the guidelines stated above. However, it does not show the connectivity from the bridge to the shopping centre, nor the gradient of the walkway.

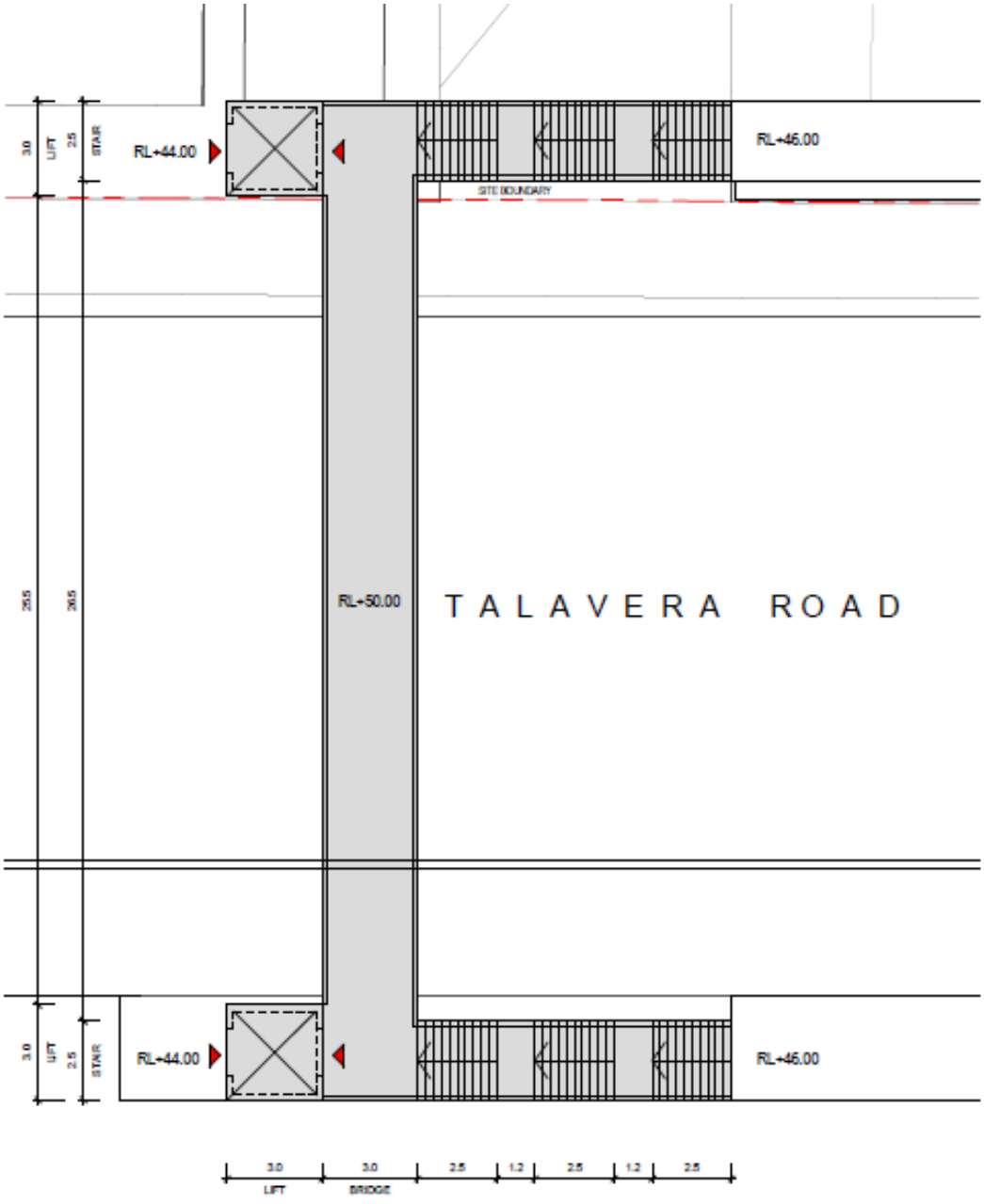


Figure 6.1 Pedestrian Bridge Concept Design

7. CONCLUSIONS

The proposal involves change to the permissible use of the proposed site from B7 (Business Park) to B4 (Mixed-Use), increasing the floor-space-ratio from 1:1 to 3.7:1 and the height limit from 30m to 120m; and also offers a community benefit area as part of the Voluntary Planning Agreement (VPA) with City of Ryde Council.

The key findings from the traffic impact assessment for the proposed development are:

- A maximum of 1,515 parking spaces is permissible in accordance with the relevant LEP and DCP for the proposed Residential and Commercial developments, although there may be opportunities to reduce this requirement considering shared usage and high levels of alternative mode usage;
- There are some traffic accessibility advantages of allowing unrestricted access between the three proposed accesses (i.e. underground) to assist with the potential for shared parking and reducing the length of travel of the external road system;
- During the morning peak one hour, the development is estimated to generate a total of 1,048 inbound vehicle trips and 239 outbound vehicle trips;
- During the afternoon peak one hour, however, the estimated numbers of inbound and outbound vehicle trips generated by the development are 280 and 1,082, respectively;
- The full potential of the existing B7 zoning would be expected to generate 71% and 50% of the traffic volumes during the AM and PM peak hours, respectively, compared to the planning proposal;
- The proposed three (3) accesses to the development were assessed and shown to operate within acceptable *Roads and Maritime* guidelines for intersection performance; and
- The existing major intersections east of the study area such as Talavera Road/ Khartoum Road and Lane Cove Road/ Talavera Road intersections were found to be at capacity in peak periods already and would require future upgrades in any event for these intersections operate under capacity. This finding is independent of the planning proposal's impacts.

The assessment of the Voluntary Planning Agreement (VPA) components of the 66-82 Talavera Road masterplan has revealed the following considerations:

- This part of the proposal consists of a community centre with an open space recreational area, three indoor courts facility, retail/commercial component, key workers' dwellings and public car parking area, and the area would only be accessible through Alma Road;
- The public car park would offer a substantial total of 1,030 off-street and 20 on-street spaces, of which 180 spaces would be available for the users of indoor courts and retail shops;
- This area would also be served by a shuttle bus service throughout Macquarie Park;
- The concept design of the pedestrian bridge over Talavera Road is generally in accordance with the guidelines, with the exception of the connectivity from the bridge to the shopping centre was not shown. Besides, the gradient of the walkway was not included in the plans; and
- The SIDRA 7.0 analysis of the Alma Road give way intersection and the shopping centre signalised intersection (with the development) shows the intersection performance would worsen slightly with acceptable level of service.

It is recommended:

- a U-turn facility be provided at the end of (or half way along) Alma Road to provide better internal circulation as well as catering for buses transporting participants to sports events on site; and
- Alma Road be widened to provide a bus/coach stop on the eastern side of Alma Road near the outdoor recreation space.

APPENDIX A

SIDRA SUMMARY SHEETS

MOVEMENT SUMMARY

Site: Talavera Road / Herring Road AM

Talavera Road / Herring Road AM
Signals - Fixed Time Cycle Time = 100 seconds (Practical 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											
1	L2	116	4.3	0.322	43.1	LOS D	4.9	35.8	0.90	0.78	34.5
2	T1	139	18.7	0.490	38.3	LOS C	6.0	49.0	0.92	0.74	29.7
3	R2	239	1.7	0.685	48.0	LOS D	11.3	80.3	0.99	0.85	33.4
Approach		494	7.1	0.685	44.1	LOS D	11.3	80.3	0.95	0.80	32.9
East: Talavera Road											
4	L2	102	2.0	0.151	28.1	LOS B	3.3	23.5	0.70	0.73	40.7
5	T1	301	3.0	0.202	21.6	LOS B	4.8	34.6	0.70	0.57	44.4
6	R2	59	1.7	0.268	57.3	LOS E	1.5	10.4	0.99	0.72	17.5
Approach		462	2.6	0.268	27.6	LOS B	4.8	34.6	0.74	0.63	38.7
North: On/Off Ramp											
7	L2	335	3.6	0.771	56.5	LOS D	8.7	62.5	1.00	0.89	23.3
9	R2	166	1.2	0.820	59.4	LOS E	8.9	62.7	1.00	0.93	22.7
Approach		501	2.8	0.820	57.4	LOS E	8.9	62.7	1.00	0.90	23.1
West: Talavera Road											
10	L2	58	3.4	0.899	50.1	LOS D	38.1	269.5	1.00	1.08	19.4
11	T1	1271	1.2	0.899	44.5	LOS D	38.1	269.5	1.00	1.08	34.7
12	R2	23	100.0	0.354	60.3	LOS E	1.2	15.7	0.99	0.72	29.8
Approach		1352	3.0	0.899	45.0	LOS D	38.1	269.5	1.00	1.07	33.9
All Vehicles		2809	3.6	0.899	44.2	LOS D	38.1	269.5	0.95	0.92	32.6

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	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	35.4	LOS D	0.1	0.1	0.84	0.84
P2S	East Slip/Bypass Lane Crossing	50	13.0	LOS B	0.1	0.1	0.51	0.51
P3	North Full Crossing	50	28.2	LOS C	0.1	0.1	0.75	0.75
P4	West Full Crossing	50	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		200	30.2	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: Talavera Road / Herring Road PM

Talavera Road / Herring Road PM
Signals - Fixed Time Cycle Time = 90 seconds (Practical 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											
1	L2	175	5.7	0.487	34.0	LOS C	6.2	45.8	0.85	0.78	37.7
2	T1	332	5.4	0.724	32.9	LOS C	12.4	88.4	0.91	0.82	31.6
3	R2	231	1.3	0.724	43.0	LOS D	12.4	88.4	0.98	0.88	35.4
Approach		738	4.2	0.724	36.3	LOS C	12.4	88.4	0.92	0.83	34.6
East: Talavera Road											
4	L2	284	0.4	0.373	25.4	LOS B	8.7	60.9	0.74	0.77	42.0
5	T1	692	0.6	0.594	27.3	LOS B	13.8	97.2	0.88	0.75	41.5
6	R2	473	1.5	0.772	48.5	LOS D	10.9	76.9	1.00	0.90	18.8
Approach		1449	0.8	0.772	33.9	LOS C	13.8	97.2	0.89	0.81	32.7
North: On/Off Ramp											
7	L2	40	2.5	0.164	51.0	LOS D	0.9	6.3	0.97	0.70	24.7
9	R2	70	0.0	0.565	53.2	LOS D	3.2	22.7	1.00	0.78	24.3
Approach		110	0.9	0.565	52.4	LOS D	3.2	22.7	0.99	0.75	24.4
West: Talavera Road											
10	L2	142	0.7	0.772	44.5	LOS D	14.5	102.1	1.00	0.92	20.0
11	T1	518	0.4	0.772	38.9	LOS C	14.8	104.1	1.00	0.92	36.4
12	R2	22	100.0	0.304	54.1	LOS D	1.0	13.4	0.99	0.72	31.4
Approach		682	3.7	0.772	40.5	LOS C	14.8	104.1	1.00	0.91	32.5
All Vehicles		2979	2.3	0.772	36.7	LOS C	14.8	104.1	0.93	0.83	32.8

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
P1	South Full Crossing	50	39.3	LOS D	0.1	0.1	0.94	0.94
P2S	East Slip/Bypass Lane Crossing	50	14.5	LOS B	0.1	0.1	0.57	0.57
P3	North Full Crossing	50	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	50	34.7	LOS D	0.1	0.1	0.88	0.88
All Pedestrians		200	31.9	LOS D			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: Talavera Road / Alma Road AM

Network: Talavera Road / Alma Road / Shopping Centre AM

Talavera Road / Alma Road AM

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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
East: Talavera Road													
5	T1	460	3.3	460	3.3	0.120	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		460	3.3	460	3.3	0.120	0.0	NA	0.0	0.0	0.00	0.00	60.0
North: Alma Road													
7	L2	18	5.6	18	5.6	0.022	7.6	LOS A	0.1	0.5	0.43	0.63	28.7
Approach		18	5.6	18	5.6	0.022	7.6	LOS A	0.1	0.5	0.43	0.63	28.7
West: Talavera Road													
10	L2	184	0.5	184	0.5	0.316	5.6	LOS A	0.0	0.0	0.00	0.18	53.2
11	T1	1631	2.0	1631	2.0	0.316	0.0	LOS A	0.0	0.0	0.00	0.05	59.1
Approach		1815	1.8	1815	1.8	0.316	0.6	NA	0.0	0.0	0.00	0.06	58.3
All Vehicles		2293	2.1	2293	2.1	0.316	0.5	NA	0.1	0.5	0.00	0.05	58.5

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

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model 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.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: Talavera Road / Alma Road PM

Network: Talavera/Alma PM

Talavera Road / Alma Road PM

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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
East: Talavera Road													
5	T1	1438	0.8	1438	0.8	0.371	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1438	0.8	1438	0.8	0.371	0.0	NA	0.0	0.0	0.00	0.00	59.9
North: Alma Road													
7	L2	68	0.0	68	0.0	0.060	6.2	LOS A	0.2	1.5	0.27	0.57	30.7
Approach		68	0.0	68	0.0	0.060	6.2	LOS A	0.2	1.5	0.27	0.57	30.7
West: Talavera Road													
10	L2	88	0.0	88	0.0	0.136	5.6	LOS A	0.0	0.0	0.00	0.20	53.0
11	T1	697	1.3	697	1.3	0.136	0.0	LOS A	0.0	0.0	0.00	0.05	59.1
Approach		785	1.1	785	1.1	0.136	0.6	NA	0.0	0.0	0.00	0.07	58.2
All Vehicles		2291	0.9	2291	0.9	0.371	0.4	NA	0.2	1.5	0.01	0.04	58.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model 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.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: Talavera Road / Shopping Centre AM

Network: Talavera Road / Alma Road / Shopping Centre AM

Talavera Road / Shopping Centre AM
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Shopping Centre													
1	L2	35	11.4	35	11.4	0.167	47.1	LOS D	2.4	17.8	0.88	0.74	23.8
3	R2	34	0.0	34	0.0	0.167	54.6	LOS D	2.4	17.8	0.93	0.72	31.2
Approach		69	5.8	69	5.8	0.167	50.8	LOS D	2.4	17.8	0.91	0.73	28.2
East: Talavera Road													
4	L2	75	0.0	75	0.0	0.082	21.2	LOS B	2.1	14.7	0.56	0.70	43.6
5	T1	425	2.6	425	2.6	0.226	17.0	LOS B	6.4	46.0	0.61	0.51	38.7
Approach		500	2.2	500	2.2	0.226	17.6	LOS B	6.4	46.0	0.60	0.54	39.8
West: Talavera Road													
11	T1	1583	2.1	1583	2.1	0.838	29.4	LOS C	39.0	277.7	0.94	0.90	40.4
12	R2	66	0.0	66	0.0	0.652	65.5	LOS E	3.8	26.5	1.00	0.80	28.5
Approach		1649	2.0	1649	2.0	0.838	30.9	LOS C	39.0	277.7	0.94	0.89	39.8
All Vehicles		2218	2.2	2218	2.2	0.838	28.5	LOS C	39.0	277.7	0.86	0.81	39.4

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
P1	South Full Crossing	50	20.4	LOS C	0.1	0.1	0.61	0.61
P4	West Full Crossing	50	49.3	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		100	34.9	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: Talavera Road / Shopping Centre PM

Network: Talavera/Alma PM

Talavera Road / Shopping Centre PM
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Shopping Centre													
1	L2	358	1.4	358	1.4	0.876	52.9	LOS D	18.2	128.8	1.00	0.99	22.1
3	R2	198	0.5	198	0.5	0.875	57.8	LOS E	10.1	71.0	1.00	1.01	30.4
Approach		556	1.1	556	1.1	0.876	54.7	LOS D	18.2	128.8	1.00	1.00	25.8
East: Talavera Road													
4	L2	68	0.0	68	0.0	0.114	28.6	LOS C	2.1	14.7	0.74	0.73	40.1
5	T1	1080	0.6	1080	0.6	0.874	41.0	LOS C	27.0	190.1	1.00	1.05	25.7
Approach		1148	0.5	1148	0.5	0.874	40.3	LOS C	27.0	190.1	0.98	1.04	26.8
West: Talavera Road													
11	T1	744	1.1	744	1.1	0.596	27.8	LOS B	13.8	97.7	0.89	0.77	41.2
12	R2	21	4.8	21	4.8	0.175	51.1	LOS D	0.9	6.8	0.97	0.70	32.1
Approach		765	1.2	765	1.2	0.596	28.4	LOS B	13.8	97.7	0.90	0.77	40.9
All Vehicles		2469	0.9	2469	0.9	0.876	39.8	LOS C	27.0	190.1	0.96	0.94	31.2

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 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	50	28.9	LOS C	0.1	0.1	0.80	0.80
P4	West Full Crossing	50	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		100	34.1	LOS D			0.87	0.87

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: Talavera Road / Shopping Centre East-AM

Talavera Road / Shopping Centre AM
Signals - Fixed Time Cycle Time = 70 seconds (Practical 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: Shopping Centre											
1	L2	22	0.0	0.064	22.0	LOS B	0.8	6.2	0.71	0.69	38.1
3	R2	14	14.3	0.064	22.1	LOS B	0.8	6.2	0.71	0.69	37.9
Approach		36	5.6	0.064	22.1	LOS B	0.8	6.2	0.71	0.69	38.0
East: Talavera Road											
4	L2	48	2.1	0.692	34.8	LOS C	8.7	62.2	0.98	0.87	34.8
5	T1	472	3.0	0.692	30.2	LOS C	9.0	64.3	0.98	0.87	35.2
Approach		520	2.9	0.692	30.6	LOS C	9.0	64.3	0.98	0.87	35.2
West: Talavera Road											
11	T1	1733	1.7	0.835	19.5	LOS B	28.9	205.1	0.90	0.91	39.4
12	R2	40	0.0	0.084	26.1	LOS B	1.0	7.3	0.79	0.70	36.5
Approach		1773	1.7	0.835	19.7	LOS B	28.9	205.1	0.89	0.90	39.3
All Vehicles		2329	2.0	0.835	22.2	LOS B	28.9	205.1	0.91	0.89	38.3

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
P1	South Full Crossing	50	29.3	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	50	29.3	LOS C	0.1	0.1	0.92	0.92
All Pedestrians		100	29.3	LOS C			0.92	0.92

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: Talavera Road / Shopping Centre East-PM

Talavera Road / Shopping Centre PM
Signals - Fixed Time Cycle Time = 70 seconds (Practical 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: Shopping Centre											
1	L2	81	1.2	0.209	23.1	LOS B	3.0	21.6	0.76	0.74	37.7
3	R2	41	2.4	0.209	23.1	LOS B	3.0	21.6	0.76	0.74	37.6
Approach		122	1.6	0.209	23.1	LOS B	3.0	21.6	0.76	0.74	37.7
East: Talavera Road											
4	L2	74	0.0	0.769	28.0	LOS B	17.8	124.8	0.94	0.90	37.3
5	T1	1029	0.2	0.769	23.4	LOS B	18.1	126.6	0.94	0.89	37.7
Approach		1103	0.2	0.769	23.7	LOS B	18.1	126.6	0.94	0.90	37.7
West: Talavera Road											
11	T1	837	0.5	0.397	10.0	LOS A	8.3	58.5	0.62	0.54	43.9
12	R2	56	0.0	0.352	39.6	LOS C	1.9	13.6	0.98	0.74	32.1
Approach		893	0.4	0.397	11.9	LOS A	8.3	58.5	0.65	0.56	42.9
All Vehicles		2118	0.4	0.769	18.7	LOS B	18.1	126.6	0.81	0.74	39.7

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
P1	South Full Crossing	50	19.4	LOS B	0.1	0.1	0.74	0.74
P4	West Full Crossing	50	29.3	LOS C	0.1	0.1	0.92	0.92
All Pedestrians		100	24.3	LOS C			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: Talavera_Ex_AM

Talavera Road/Khartoum Road Signalised Intersection

Signals - Fixed Time Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Talavera Raod											
4	L	139	9.8	0.839	54.2	LOS D	12.3	91.1	1.00	1.02	22.9
5	T	398	2.9	0.839	46.0	LOS D	13.8	99.0	1.00	1.02	22.7
6	R	21	0.0	0.170	52.6	LOS D	0.9	6.5	0.97	0.70	22.9
Approach		558	4.5	0.839	48.3	LOS D	13.8	99.0	1.00	1.01	22.8
North East: Khartoum Road											
7	L	43	0.0	0.343	40.8	LOS C	3.5	25.1	0.88	0.79	28.1
8	T	139	3.8	0.472	33.9	LOS C	7.3	52.5	0.91	0.73	28.9
9	R	97	2.2	0.472	41.6	LOS C	7.3	52.5	0.92	0.82	27.7
Approach		279	2.6	0.472	37.7	LOS C	7.3	52.5	0.91	0.77	28.4
North West: Talavera Road											
10	L	278	0.8	0.827	41.0	LOS C	17.3	121.8	1.00	1.03	26.4
11	T	616	0.8	0.827	36.9	LOS C	21.0	148.3	1.00	0.99	25.1
12	R	326	1.9	1.000[3]	48.6	LOS D	14.9	105.7	1.00	0.85	23.9
Approach		1220	1.2	1.000	41.0	LOS C	21.0	148.3	1.00	0.96	25.0
South West: Khartoum Road											
1	L	147	7.9	0.318	20.0	LOS B	2.6	19.6	0.77	0.77	37.8
2	T	137	10.8	0.829	42.4	LOS C	15.0	112.1	0.99	0.97	25.7
3	R	183	5.2	0.829	50.8	LOS D	15.0	112.1	1.00	0.98	24.7
Approach		467	7.7	0.829	38.6	LOS C	15.0	112.1	0.93	0.91	28.0
All Vehicles		2524	3.3	1.000	41.8	LOS C	21.0	148.3	0.98	0.94	25.3

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 used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

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
P3	Across SE approach	50	39.2	LOS D	0.1	0.1	0.93	0.93
P5	Across NE approach	50	30.4	LOS D	0.1	0.1	0.82	0.82
P7	Across NW approach	50	39.2	LOS D	0.1	0.1	0.93	0.93
P1	Across SW approach	50	39.2	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		200	37.0	LOS D			0.91	0.91

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: Talavera_Ex_PM

Talavera Road/Khartoum Road Signalised Intersection

Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Talavera Raod											
4	L	144	5.1	0.807	46.2	LOS D	19.3	137.5	0.99	0.96	25.1
5	T	712	0.0	0.807	38.5	LOS C	20.9	146.5	0.99	0.95	24.8
6	R	47	0.0	0.404	56.7	LOS E	2.3	15.9	1.00	0.74	21.9
Approach		903	0.8	0.807	40.7	LOS C	20.9	146.5	0.99	0.94	24.7
North East: Khartoum Road											
7	L	26	0.0	0.258	42.1	LOS C	2.6	18.6	0.87	0.78	27.7
8	T	67	6.3	0.355	35.2	LOS C	5.4	38.1	0.88	0.69	28.4
9	R	104	0.0	0.355	43.2	LOS D	5.4	38.1	0.91	0.79	26.7
Approach		198	2.1	0.355	40.3	LOS C	5.4	38.1	0.89	0.76	27.4
North West: Talavera Road											
10	L	391	0.3	0.521	18.0	LOS B	8.0	55.8	0.77	0.81	36.1
11	T	353	0.3	0.521	27.0	LOS B	12.5	87.9	0.86	0.74	29.1
12	R	151	0.0	0.770	56.8	LOS E	7.5	52.3	1.00	0.90	21.9
Approach		894	0.2	0.770	28.1	LOS B	12.5	87.9	0.85	0.80	30.0
South West: Khartoum Road											
1	L	336	0.3	0.792	30.3	LOS C	9.9	69.3	0.97	0.89	31.6
2	T	223	4.7	0.814	44.9	LOS D	14.7	109.2	1.00	0.96	25.4
3	R	76	13.9	0.814	52.6	LOS D	14.7	109.2	1.00	0.96	24.7
Approach		635	3.5	0.814	38.1	LOS C	14.7	109.2	0.98	0.93	28.2
All Vehicles		2629	1.4	0.814	35.8	LOS C	20.9	146.5	0.93	0.88	27.4

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 used.

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
P3	Across SE approach	50	41.7	LOS E	0.1	0.1	0.94	0.94
P5	Across NE approach	50	28.8	LOS C	0.1	0.1	0.78	0.78
P7	Across NW approach	50	41.7	LOS E	0.1	0.1	0.94	0.94
P1	Across SW approach	50	32.0	LOS D	0.1	0.1	0.82	0.82
All Pedestrians		200	36.1	LOS D			0.87	0.87

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: LCR_Ex_AM

Talavera Road/Lane Cove Road Signalised Intersection
Signals - Fixed Time Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Talavera Road											
4	L	22	23.8	0.058	55.3	LOS D	1.2	10.4	0.80	0.72	23.3
5	T	39	0.0	0.137	57.3	LOS E	2.8	19.3	0.89	0.67	20.3
6	R	5	0.0	0.137	64.6	LOS E	2.8	19.3	0.89	0.76	21.6
Approach		66	7.9	0.137	57.2	LOS E	2.8	19.3	0.86	0.69	21.4
North East: Lane Cove Road											
7	L	97	1.1	0.873	18.3	LOS B	30.6	219.6	0.49	1.15	45.3
8	T	2661	3.1	0.873	7.5	LOS A	30.6	219.6	0.45	0.43	54.5
9	R	740	1.1	1.004	146.4	LOS F	42.1	297.5	1.00	1.17	11.8
Approach		3498	2.6	1.004	37.2	LOS C	42.1	297.5	0.57	0.60	31.9
North West: Talavera Road											
10	L	153	3.4	0.332	36.8	LOS C	6.5	47.2	0.86	0.78	28.5
11	T	32	3.3	0.901	91.2	LOS F	7.2	54.0	1.00	1.05	15.0
12	R	136	12.4	0.901	99.3	LOS F	7.2	54.0	1.00	1.05	16.2
Approach		320	7.2	0.901	68.7	LOS E	7.2	54.0	0.93	0.92	20.3
South West: Lane Cove Road											
1	L	451	3.3	0.991	105.4	LOS F	75.9	553.0	1.00	1.15	15.5
2	T	1815	7.3	0.991	70.2	LOS E	75.9	557.6	1.00	1.17	21.5
3	R	102	1.0	0.831	91.8	LOS F	8.1	57.3	1.00	0.90	17.0
Approach		2367	6.2	0.991	77.8	LOS F	75.9	557.6	1.00	1.16	20.0
All Vehicles		6252	4.3	1.004	54.4	LOS D	75.9	557.6	0.75	0.83	25.3

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 used.

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
P3	Across SE approach	50	18.3	LOS B	0.1	0.1	0.49	0.49
P7	Across NW approach	50	33.3	LOS D	0.1	0.1	0.67	0.67
P1	Across SW approach	50	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		150	40.2	LOS E			0.71	0.71

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: LCR_Ex_PM

Talavera Road/Lane Cove Road Signalised Intersection
Signals - Fixed Time Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Talavera Road											
4	L	107	1.0	0.273	60.6	LOS E	6.6	46.2	0.88	0.78	22.0
5	T	42	0.0	0.462	61.3	LOS E	9.6	67.7	0.95	0.77	19.3
6	R	102	1.0	0.462	68.6	LOS E	9.6	67.7	0.95	0.80	20.6
Approach		252	0.8	0.462	64.0	LOS E	9.6	67.7	0.92	0.79	21.0
North East: Lane Cove Road											
7	L	22	9.5	0.713	15.6	LOS B	15.3	111.0	0.32	1.27	47.5
8	T	2169	4.0	0.713	6.1	LOS A	15.3	111.0	0.31	0.28	57.2
9	R	405	1.8	1.036	187.9	LOS F	25.5	181.2	1.00	1.27	9.6
Approach		2597	3.7	1.036	34.6	LOS C	25.5	181.2	0.42	0.44	33.4
North West: Talavera Road											
10	L	378	0.6	1.021	133.3	LOS F	36.8	258.9	1.00	1.27	12.9
11	T	5	0.0	1.063	219.7	LOS F	25.7	182.1	1.00	1.54	7.7
12	R	358	1.5	1.063	218.2	LOS F	25.7	182.1	1.00	1.51	8.8
Approach		741	1.0	1.063	174.9	LOS F	36.8	258.9	1.00	1.39	10.5
South West: Lane Cove Road											
1	L	151	4.9	1.072	187.2	LOS F	137.8	981.6	1.00	1.65	9.8
2	T	2758	1.6	1.072	172.3	LOS F	139.8	991.8	1.00	1.68	11.1
3	R	15	0.0	0.198	88.0	LOS F	1.1	7.7	1.00	0.69	17.6
Approach		2923	1.7	1.072	172.7	LOS F	139.8	991.8	1.00	1.68	11.0
All Vehicles		6513	2.4	1.072	113.7	LOS F	139.8	991.8	0.76	1.12	15.3

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 used.

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
P3	Across SE approach	50	19.3	LOS B	0.1	0.1	0.51	0.51
P7	Across NW approach	50	28.2	LOS C	0.1	0.1	0.61	0.61
P1	Across SW approach	50	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		150	38.9	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: 2 [Talavera Road / Alma Road AM - w dev]

Talavera Road / Alma Road AM

Giveway / Yield (Two-Way)

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
East: Talavera Road											
5	T1	487	2.3	0.127	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		487	2.3	0.127	0.0	NA	0.0	0.0	0.00	0.00	60.0
North: Alma Road											
7	L2	27	3.7	0.021	5.6	LOS A	0.0	0.0	0.00	0.57	49.9
Approach		27	3.7	0.021	5.6	LOS A	0.0	0.0	0.00	0.57	49.9
West: Talavera Road											
10	L2	959	0.1	0.517	5.6	LOS A	0.0	0.0	0.00	0.58	49.0
11	T1	1771	1.8	0.459	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		2730	1.2	0.517	2.0	NA	0.0	0.0	0.00	0.20	56.8
All Vehicles		3244	1.4	0.517	1.7	NA	0.0	0.0	0.00	0.17	57.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model 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: 2 [Talavera Road / Alma Road PM - w dev]

Talavera Road / Alma Road PM

Giveway / Yield (Two-Way)

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
East: Talavera Road											
5	T1	1272	0.5	0.327	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1272	0.5	0.327	0.0	NA	0.0	0.0	0.00	0.00	59.9
North: Alma Road											
7	L2	843	0.0	0.811	12.4	LOS A	14.9	104.2	0.76	1.05	43.4
Approach		843	0.0	0.811	12.4	LOS A	14.9	104.2	0.76	1.05	43.4
West: Talavera Road											
10	L2	95	0.0	0.183	5.6	LOS A	0.0	0.0	0.00	0.16	31.1
11	T1	967	0.8	0.183	0.0	LOS A	0.0	0.0	0.00	0.04	59.6
Approach		1062	0.8	0.183	0.5	NA	0.0	0.0	0.00	0.05	56.7
All Vehicles		3177	0.4	0.811	3.5	NA	14.9	104.2	0.20	0.30	54.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model 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: 1 [Talavera Road / Shopping Centre AM - w dev]

Talavera Road / Shopping Centre AM
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

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: Shopping Centre											
1	L2	90	4.4	0.274	20.2	LOS B	2.8	20.5	0.85	0.67	27.3
3	R2	94	0.0	0.274	24.9	LOS B	2.8	20.5	0.91	0.70	25.7
Approach		184	2.2	0.274	22.6	LOS B	2.8	20.5	0.88	0.69	26.5
East: Talavera Road											
4	L2	168	0.0	0.147	14.1	LOS A	2.1	14.5	0.45	0.81	33.7
5	T1	487	2.3	0.331	14.3	LOS A	5.1	36.5	0.75	0.63	48.6
Approach		655	1.7	0.331	14.2	LOS A	5.1	36.5	0.67	0.67	45.4
West: Talavera Road											
11	T1	1798	1.8	0.700	6.7	LOS A	16.5	117.3	0.68	0.62	54.0
12	R2	108	0.0	0.167	15.8	LOS B	1.6	10.9	0.60	0.80	32.7
Approach		1906	1.7	0.700	7.3	LOS A	16.5	117.3	0.67	0.63	52.9
All Vehicles		2745	1.7	0.700	10.0	LOS A	16.5	117.3	0.69	0.64	49.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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	50	19.2	LOS B	0.1	0.1	0.80	0.80
P4	West Full Crossing	50	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		100	21.8	LOS C			0.85	0.85

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: 1 [Talavera Road / Shopping Centre PM - w dev]

Talavera Road / Shopping Centre PM
Signals - Fixed Time Isolated Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

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: Shopping Centre											
1	L2	586	0.9	0.806	23.1	LOS B	18.9	133.4	0.95	0.99	15.1
3	R2	325	0.3	0.806	31.2	LOS C	18.9	133.4	1.00	1.09	14.6
Approach		911	0.7	0.806	26.0	LOS B	18.9	133.4	0.97	1.02	15.0
East: Talavera Road											
4	L2	237	0.0	0.176	11.9	LOS A	2.4	16.5	0.34	0.81	16.4
5	T1	1272	0.5	0.788	21.0	LOS B	19.4	136.4	0.93	0.90	44.6
Approach		1509	0.4	0.788	19.6	LOS B	19.4	136.4	0.84	0.89	35.1
West: Talavera Road											
11	T1	1809	0.4	0.775	11.9	LOS A	22.7	159.3	0.81	0.77	50.2
12	R2	62	1.6	0.201	28.1	LOS B	1.6	11.1	0.85	0.78	15.3
Approach		1871	0.5	0.775	12.4	LOS A	22.7	159.3	0.81	0.77	46.7
All Vehicles		4291	0.5	0.806	17.8	LOS B	22.7	159.3	0.85	0.86	29.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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	50	18.5	LOS B	0.1	0.1	0.76	0.76
P4	West Full Crossing	50	26.8	LOS C	0.1	0.1	0.91	0.91
All Pedestrians		100	22.7	LOS C			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: 1 [Western Access AM - w dev]

Talavera Rd and Access Road AM peak
Giveway / Yield (Two-Way)

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
East: Talavera Road											
5	T1	683	2.2	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		683	2.2	0.178	0.0	NA	0.0	0.0	0.00	0.00	60.0
North: Access Road											
7	L2	97	0.0	0.207	12.3	LOS A	0.7	5.0	0.70	0.88	48.8
Approach		97	0.0	0.207	12.3	LOS A	0.7	5.0	0.70	0.88	48.8
West: Talavera Road											
10	L2	174	0.0	0.519	5.6	LOS A	0.0	0.0	0.00	0.10	57.3
11	T1	1819	2.0	0.519	0.1	LOS A	0.0	0.0	0.00	0.05	59.4
Approach		1993	1.8	0.519	0.6	NA	0.0	0.0	0.00	0.05	59.2
All Vehicles		2773	1.8	0.519	0.8	NA	0.7	5.0	0.02	0.07	58.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model 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: 1 [Western Access PM - w dev]

Talavera Rd and Access Road AM peak
Giveway / Yield (Two-Way)

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
East: Talavera Road											
5	T1	1545	1.0	0.399	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1545	1.0	0.399	0.1	NA	0.0	0.0	0.00	0.00	59.9
North: Access Road											
7	L2	129	0.0	0.296	13.8	LOS A	1.1	7.9	0.74	0.93	47.8
Approach		129	0.0	0.296	13.8	LOS A	1.1	7.9	0.74	0.93	47.8
West: Talavera Road											
10	L2	255	0.0	0.581	5.6	LOS A	0.0	0.0	0.00	0.14	57.0
11	T1	1993	0.5	0.581	0.1	LOS A	0.0	0.0	0.00	0.06	59.2
Approach		2247	0.4	0.581	0.7	NA	0.0	0.0	0.00	0.07	59.0
All Vehicles		3922	0.6	0.581	0.9	NA	1.1	7.9	0.02	0.07	58.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model 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: 1 [Eastern Access AM - w dev]

Talavera Road / Shopping Centre AM
Signals - Fixed Time Coordinated Cycle Time = 130 seconds (Practical 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: Shopping Centre											
1	L2	32	0.0	0.257	41.9	LOS C	2.4	17.0	0.95	0.74	31.6
2	T1	1	0.0	0.257	37.3	LOS C	2.4	17.0	0.95	0.74	31.8
3	R2	19	10.5	0.257	42.0	LOS C	2.4	17.0	0.95	0.74	31.6
Approach		52	3.8	0.257	41.8	LOS C	2.4	17.0	0.95	0.74	31.6
East: Talavera Road											
4	L2	64	1.6	0.310	22.1	LOS B	10.8	77.2	0.59	0.56	39.6
5	T1	570	2.5	0.310	17.5	LOS B	11.0	78.8	0.59	0.53	40.1
6	R2	82	0.0	0.957	96.6	LOS F	6.5	45.6	1.00	1.16	21.4
Approach		716	2.1	0.957	27.0	LOS B	11.0	78.8	0.64	0.61	36.4
North: Eastern Access											
7	L2	92	0.0	0.258	52.9	LOS D	5.0	34.9	0.89	0.76	28.9
8	T1	1	0.0	0.210	56.3	LOS D	2.8	19.5	0.94	0.74	27.3
9	R2	47	0.0	0.210	60.8	LOS E	2.8	19.5	0.94	0.74	27.2
Approach		140	0.0	0.258	55.6	LOS D	5.0	34.9	0.91	0.75	28.3
West: Talavera Road											
10	L2	27	0.0	0.891	15.9	LOS B	33.2	235.9	0.57	0.57	42.8
11	T1	1759	1.7	0.891	11.1	LOS A	33.2	235.9	0.53	0.53	43.4
12	R2	54	0.0	0.640	75.9	LOS F	3.7	25.6	1.00	0.79	24.3
Approach		1840	1.6	0.891	13.0	LOS A	33.2	235.9	0.54	0.53	42.4
All Vehicles		2748	1.7	0.957	19.4	LOS B	33.2	235.9	0.59	0.57	39.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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	50	16.8	LOS B	0.1	0.1	0.51	0.51
P2	East Full Crossing	50	59.3	LOS E	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	18.3	LOS B	0.1	0.1	0.53	0.53
P4	West Full Crossing	50	59.3	LOS E	0.2	0.2	0.96	0.96
All Pedestrians		200	38.4	LOS D			0.74	0.74

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: 1 [Eastern Access PM - w dev]

Talavera Road / Shopping Centre PM
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Practical 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: Shopping Centre											
1	L2	114	0.9	0.736	52.1	LOS D	10.0	70.7	1.00	0.85	23.8
2	T1	1	0.0	0.736	47.5	LOS D	10.0	70.7	1.00	0.85	24.0
3	R2	58	1.7	0.736	52.1	LOS D	10.0	70.7	1.00	0.85	23.8
Approach		173	1.2	0.736	52.0	LOS D	10.0	70.7	1.00	0.85	23.8
East: Talavera Road											
4	L2	102	0.0	0.656	29.9	LOS C	34.6	243.9	0.77	0.72	32.1
5	T1	1215	1.2	0.656	24.7	LOS B	34.6	243.9	0.75	0.69	37.2
6	R2	82	0.0	0.736	85.1	LOS F	6.3	44.4	1.00	0.85	23.0
Approach		1399	1.0	0.736	28.6	LOS C	34.6	243.9	0.76	0.70	35.6
North: Eastern Access											
7	L2	123	0.0	0.343	60.9	LOS E	7.8	54.6	0.91	0.78	27.1
8	T1	1	0.0	0.665	70.9	LOS F	10.1	71.0	1.00	0.82	19.4
9	R2	139	0.0	0.665	75.5	LOS F	10.1	71.0	1.00	0.82	24.5
Approach		263	0.0	0.665	68.7	LOS E	10.1	71.0	0.96	0.80	25.6
West: Talavera Road											
10	L2	27	0.0	0.919	18.3	LOS B	43.6	305.8	0.60	0.61	41.7
11	T1	1850	0.2	0.919	13.5	LOS A	43.6	305.8	0.54	0.55	42.1
12	R2	62	0.0	0.565	82.4	LOS F	4.7	32.6	1.00	0.76	18.2
Approach		1939	0.2	0.919	15.8	LOS B	43.6	305.8	0.56	0.56	41.0
All Vehicles		3774	0.5	0.919	25.9	LOS B	43.6	305.8	0.68	0.64	36.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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	50	18.3	LOS B	0.1	0.1	0.49	0.49
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	19.8	LOS B	0.1	0.1	0.51	0.51
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	44.2	LOS E			0.73	0.73

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.