Issue History

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Technical Note Title

1. INTRODUCTION

Location	2-14 Tennyson Road
Application for	Planning Proposal for a mixed residential, retail and aged care development

Bitzios Consulting has been commissioned by the City of Ryde as an independent reviewer of the planning proposal for a mixed use development at the above address. This technical document summarises our review of the traffic aspects of the planning proposal.

In particular this technical note has reviewed:

- reliability of baseline data;
- traffic generation;
- use of traffic discounts;
- traffic distribution;
- investigation of extensive queuing in Tennyson Rd affecting the local road network and the efficacy of the roundabout;
- parking provision;
- access and egress;
- SIDRA input, assumptions and outputs;
- recommendations for traffic mitigation measures;
- any other relevant issues in the planning report identified by the consultant; and
- high level assessment of the cumulative traffic impacts within the context of the developments in Gladesville.

2. APPRECIATION OF THE APPLICATION

2.1 BACKGROUND

The planning proposal seeks to allow the rezoning of a light industrial site for a mixed use residential and retail development including a supermarket and speciality shops. The development is also to include:

- 269 Residential units;
- 5800m^2 of retail GFA or 4640 GLFA;
- 400m^2 of retail / commercial GFA;
- 149 Seniors Housing units.

2.2 DEVELOPMENT CONTEXT

The development is in context of some major developments in the area as shown in Figure 2.1 below. Significantly there is a proposed Bunnings Hardware store whose main access is proposed at the existing Tennyson Road / Victoria Road intersection. Other developments include:

- Aldi Supermarket in Monash Road; and
- Medium density residential developments.

Further there are a number of known developments in the Gladesville area and the current DCP allows for higher density developments along the Victoria Road Corridor in Gladesville.

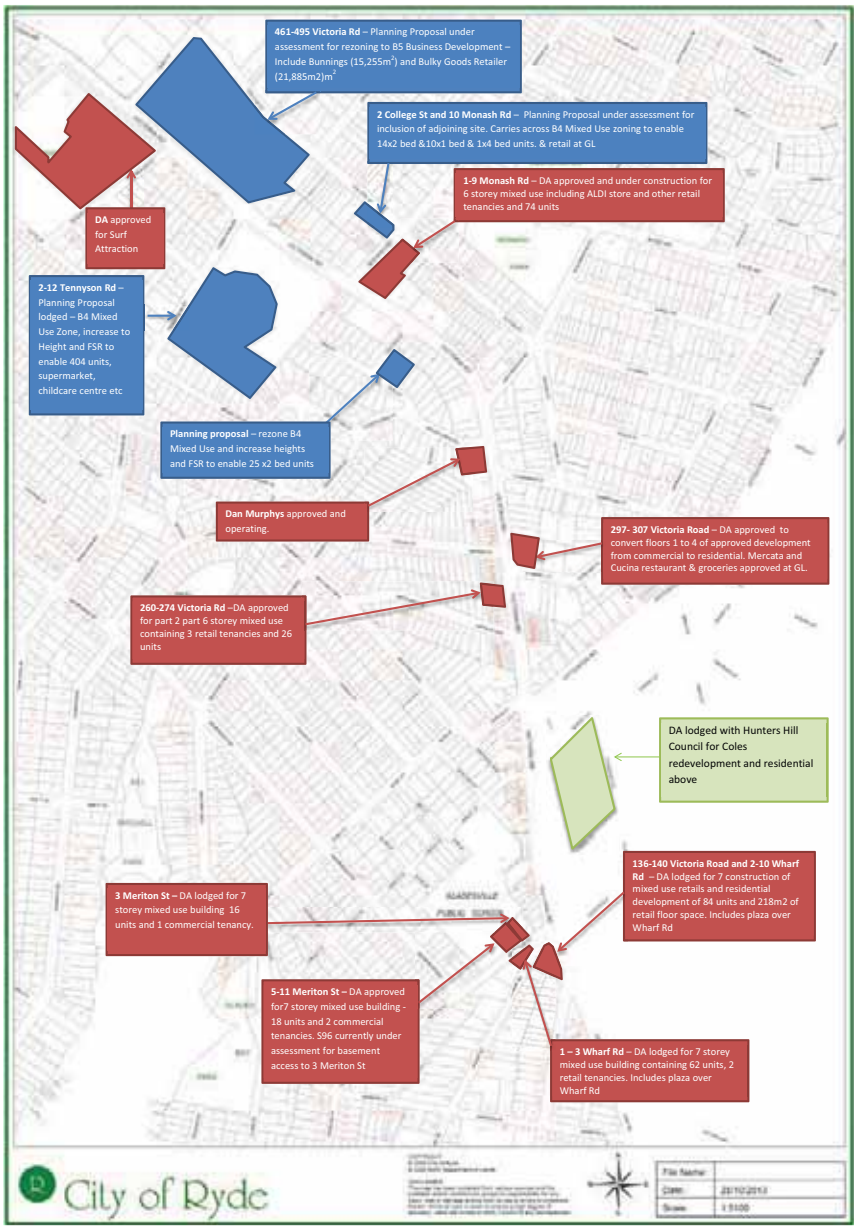


Figure 2.1: Future Developments

3. DOCUMENTS REVIEWED

The primary documents and information supplied by the City of Ryde were:

- (Appendix 10) Traffic Impact Assessment, Tennyson Village 2-12 and 14 Tennyson Road, Gladesville Planning Proposal, Traffix, 9 October 2013.
- 2-14 Tennyson Road, Gladesville, Planning Proposal for a Mixed Use Development

4. REVIEW

4.1 TRAFFIC DATA

Evening Peak Traffic Data was presented Figure 8 of the report (see Figure 4.1). The volumes surveyed appear to be reasonable. No date or source was provided for the traffic surveys. Without further evidence from where the data was sourced it is assumed that the data was accurately surveyed. Further, traffic data supplied by Council indicates that the traffic volumes are reasonably consistent with counts from November 2012.

The report suggests that the existing access was surveyed (see Section 3.6 of the Traffix report). The data (Figure 8) shows almost exactly 60% to and from Victoria Road and 40% to and from Morrison Road, as well as a split of 80% from the site and 20% to the site. It is noted that these values are used consistently in the study.

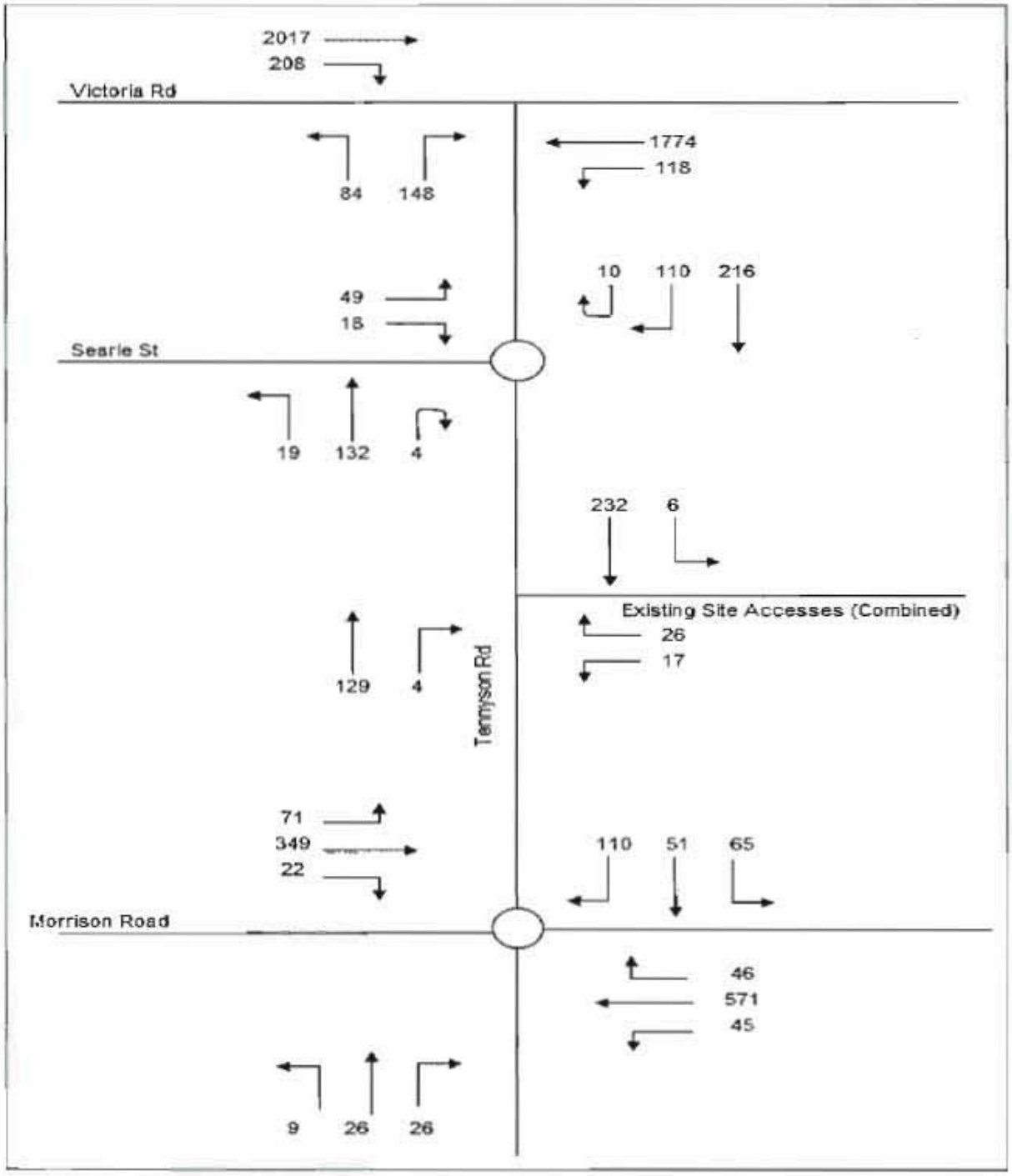
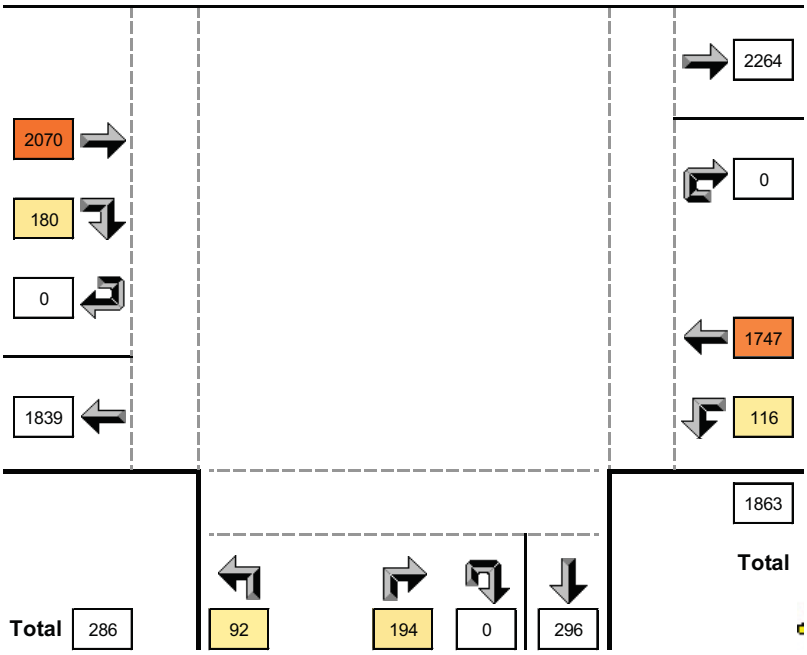


Figure 4.1: Traffic Report Figure 8 Existing PM Peak



Source: City of Ryde Traffic Data collected by TTM November 2012

Figure 2: TTM PM Peak November 2012

The report also references traffic forecast predictions for the Bunnings Development, which is part of the Bunnings Development traffic report produced by TTPA.

4.2 TRAFFIC GENERATION

The following assesses the traffic generation calculations and assumptions used in the report.

4.2.1 Residential:

- Rate applied: 0.15 trips per unit (RMS TDT 2013 /04)

This rate is consistent with the average of Sydney, based on the latest surveys indicated in the RMS technical direction. However, given that:

- the site, although near to public buses, is not close to a train station; and
- the site is not located in an existing high density town centre;.

the traffic generation rate that would be expected would be much higher. Seven of the eight developments that were surveyed and from which the rates are derived, are located within walking distance of a train station or within walking distance of the Sydney CBD. The proposed development is on a bus route and is not near a major city centre.

Therefore our professional opinion is that a more conservative rate of say 0.30 trips per dwelling would be more realistic for this location.

4.2.2 Commercial

- Rate applied 1.2 trips per 100m^2

This rate is consistent with the RMS Technical Direction.

4.2.3 Seniors Housing Trips

- Rate applied 0.14 trips per unit (derived from the survey data tables in TDT 2013/04)

This rate is consistent with the RMS Guidelines.

It should be noted that the Seniors Housing rate (0.14) is approximately half of the more reasonable Residential rate (0.3, as explained in Section 4.2.1 above). If the eventual development did not include Seniors Housing but rather normal Residential, the number of trips from this component would be more than doubled.

4.2.4 Childcare

- Rate Applied 0.35 trips per child

It is unclear how this rate was derived from the *RTA Guide to Traffic Generating Developments*. Our reading of the relevant table indicates there should be a peak of 0.7 trips per child per hour.

Table 3.6
Traffic generation rates

Centre Type	Peak Vehicle Trips / Child		
	7.00-9.00am	2.30-4.00pm	4.00-6.00pm
Pre-school	1.4	0.8	-
Long-day care	0.8	0.3	0.7
Before/after care	0.5	0.2	0.7

Source: RTA Guide to Traffic Generating Developments.

4.2.5 Retail Trip Generation

- Rate Applied 1.27 trips per car parking space;
- 20% linked trips; and
- 20% Multi-purpose trips.

The trip rates that have been applied are interpolated from the RMS survey data. Traffix's basis for this methodology is that:

- Only the latest survey data should be used;
- The latest survey data only applies to very large shopping centres and cannot be directly applied to this development;
- There is a linear relationship between trips per car space and floor area.

It is unclear that there is a linear relationship between the number of car spaces and the trip rate, which is one of the key assumptions. The previous data indicates that trip rates increase exponentially with the reduction in GLFA.

Our professional opinion is that the RMS rates should still be applied unless traffic surveys of similar developments can justify the difference. Further the major tenant, a supermarket, would most likely attract much higher traffic generation than a general shopping centre.

Applying the rates from the TDT 2013/04 would result in 590 vehicle trips per hour as opposed to 305 vehicle trips as calculated in the Traffix report.

The assumption that there are some multi-purpose trips is reasonable given that many of the residents would use the supermarket within the building. But there is no evidence provided for the 20% rate used. *RTA Guide to Traffic Generating Developments* does not provide guidance for 'new free standing' centres and these discounts have not been adequately substantiated (see below). It is more than likely that the surveys of shopping centres would already account for multi-purpose trips and therefore no discount should be applied.

> The incidence of linked and multi-purpose trips can reduce overall trip generation rates. A linked trip is a trip taken as a side-track from another trip, for example, a person calling in to the centre on the way home from work. A multi-purpose trip is where more than one shop or facility is visited. Any trip discounts would apply differently in new free-standing centres and for new shops within existing centres. Discounts in the former case vary depending on the nature of the adjacent road network. With the latter case, an average discount of about 20% is suggested, with this figure reducing with increasing centre size, with rates of 25% (less than 10,000 m^2 GLFA), 20% (10,000-30,000 m^2 GLFA) and 15% (over 30,000 m^2 GLFA) indicative. Note that these discounts apply to trip generation but not to parking demand. Discounts of this nature should not apply without adequate substantiation.

Source: RTA Guide to Traffic Generating Developments

In addition, the 20% of the retail trips (61 veh/hr) that has been applied equates to 70% of trips for all other uses. This seems an unreasonable amount without justification.

Linked trips have also been assumed at 20% of the generated traffic to and from Victoria Road. Concessions for passing trade are commonly used for retail developments and this is a reasonable assumption. Again this discount should be substantiated, given the site is not on Victoria Road directly.

4.3 SUMMARY

The following Table 4.1 summarises the trip generation rates as discussed previously.

Table 4.1: Summary of Trip Generation

Use	Proponent Traffic Generation Rate		RMS Guidelines (TDT 2013/04)		Comment
	Rate	Trips Veh /hour	Rate	Trips	
Residential	0.15 per dwelling	40	0.15 per dwelling	40	Site is not close to a train station but has better access to public transport than Liberty Grove, therefore a 0.30 trips per dwelling resulting in 80 trips is considered more appropriate.
Commercial Trips	1.2 per trips per 100m^2 GFA	5	1.2 per trips per 100m^2 GFA	5 trips	No Comment
Seniors Housing	0.14 per unit	21	0.14 per unit	21 45	The peak generation for seniors housing would occur outside the normal commuter peak. This rate is derived from published survey data from RMS. If normal residential replaced Seniors Housing, trips would be 45 – see Section 4.2.3.
Child Care	0.35 trips per child	21	0.7 trips per child	42	RTA guide rate is 0.7 trips per child. No justification for the changed rate has been given
Retail	1.27 trips per space	305	12.3 trips per 100m^2 GLFA	570	Significantly lower than the published rates.
Discounting (multi purpose)		244		570*	No discounting should be applied to new shopping centres unless it can be substantiated.
Total		310		678	Difference of 368 vehicle trips if RMS guidelines were used. There could be a

					difference of 408 vehicles/hour if a more realistic residential component was used, or 432 if Seniors Housing was replaced by normal Residential.

The proponents estimate traffic generation is at least 368 vehicle trips less than those recommended in the RMS Guidelines. Traffic surveys should be used to justify the variation from the published rates. This is largely attributable to the assumptions for the retail shopping rates and the discounts for multi-purpose trips.

4.4 TRAFFIC ASSIGNMENT / DISTRIBUTION

The proportion of trips into the site and out of the site appears to be reasonable in the absence of other data.

The traffic has been distributed 40% to Morrison Road and 60% to Victoria Road. This is consistent with the traffic data presented in Figure 8 of the report. It is noted that these proportions are remarkably round numbers for observed data.

The proponent estimates an additional 111 vehicle trips per hour to Morrison Road and 168 trips to Victoria Road. (With more defendable traffic generation rates, these volumes would be double.)

These assumptions on traffic distribution appear to be reasonable and consistent with the proportions from the traffic data. The road network configuration would also support these assumptions.

4.5 CAR PARKING

The range of car parking rates used is directly consistent with the City of Ryde DCP.

4.6 INTERSECTION PERFORMANCE

The key intersections were modelled in Sidra. The priority and roundabout intersections appear to be performing at an acceptable level of service. The results for the key intersection of Tennyson Road and Victoria Road are summarised in the Table 4.2 below.

Table 4.2: Tennyson Road / Victoria Road Intersection Analysis

	Average Delay (Sec)	Level of Service (LoS)	Degree of Saturation (DoS)
Existing	8.8	A	0.786
Future Committed	35.9	C	0.971
Future Committed + Development	55.8	D	1.045

Source: Traffix 2013

The results indicate that with the Bunnings development the intersection performance will drop from level of service A to C and with the proposed development, a further drop from C to D. It should be noted that Level of Service is based on bands of Average Delay. The Average Delay for the future committed (36 seconds) is in the middle of the band for LoS C (29 to 42 seconds). However, for the 'with development' scenario the average delay is 56 seconds which is the upper limit of Level of Service D (43 to 56 seconds). The next band, Level of Service E, is considered an unacceptable level of delay.

The models also showed high Degrees of Saturation (DoS). Degree of Saturation is the comparison of the theoretical capacity to the proposed traffic flows. When the Degree of Saturation is greater than 0.9, this could indicate that the intersection may be unstable with large queues sometimes appearing. The modelling for the Bunnings development at the Tennyson Road / Victoria Road intersection indicates that the Degree of Saturation would be 0.971 which is close to capacity. With the proponent's development traffic in addition, the Degree of Saturation would be greater than 1, which indicates the intersection is over capacity.

Traffix has argued that the results are for isolated intersection operation and that in reality there would be benefits of the signal coordination along Victoria Road which would create bunching of vehicles and reduced delays. This is true, and signalised intersections are located some 250m either side of Tennyson Road.

Notwithstanding the above, the results presented in the Traffix report do not demonstrate acceptable intersection operation as a result of the development. The Sidra models have made allowance for favourable arrival patterns (see Section 4.9 below).

4.7 SITE ACCESS

The site accesses proposed in the report have been based on two separate accesses, one opposite Searle Street and the other closer to Potts Street. A second access arrangement has been developed that would separate the access for 14 Tennyson Road and provide a total of three access points for the development.

Car parking for each access is divided relatively evenly between the two access points under the preferred scheme.

Given the existing traffic volumes on Tennyson Road and results of the Sidra analysis, these proposed access points appear to be reasonable.

4.8 QUEUING IN TENNYSON ROAD

Queuing has not been observed on site as the timing of this review was not during normal traffic conditions. Based on the Sidra modelling in the Traffix report, the queues on Tennyson Road are predicted to be 78m under existing conditions.

With the proposed development and the Bunnings development, the Sidra model indicated a queue of 107m which would extend almost to the Searle Street roundabout. However, the degree of saturation at the Victoria / Tennyson intersection was predicted to be greater than 1, indicating the intersection was over capacity and therefore it is highly likely that the queues would be significantly longer than 107m on a regular basis.

If the queue were to extend through the Searle Street roundabout this would have significant impacts on traffic leaving the development as well as on general road congestion. Once a roundabout is blocked, other (generally light) traffic movements are significantly delayed. This would impact traffic entering and leaving Searle Street, in all directions. In turn, this could lead to more traffic filtering though adjacent residential streets like Potts Street and Weaver Street.

4.9 IMPACTS ON ADJACENT LOW DENSITY RESIDENTIAL AREAS

In addition to the likely impacts at the Searle Street roundabout (as outlined in Section 4.8), the predicted additional 111 vehicle trips to Morrison Road would pass by the low density residences on Tennyson Road and would need to be accommodated at the Morrison Road / Tennyson Road roundabout. We note that Spencer Street and Warner Street are culs-de-sac. Brereton Street and Osgathorpe Road do not facilitate eastbound access to Victoria Road (for outbound trips), and we are aware that Council intends to install traffic management devices to discourage excessive through traffic in these roads. These measures would discourage inbound trips to the development site.

4.10 SIDRA TRAFFIC MODELS

Sidra models were supplied by Traffix. The inputs of the models were assessed and are summarised in Table 4.9.

Table 4.9: Sidra Inputs

Item	Approach	Comments	Acceptability
General Layout	Overall	The kerb side lane citybound on Victoria Road has not been modelled. This lane is a bus lane in the AM peak but a clearway open to general traffic in the PM peak. While this would affect the model outputs in terms of average delays it may not affect the degree of saturation. The future outbound bus lanes have also been ignored in the future models. This may have been done to model the lower utilisation of the bus lane and is considered an acceptable solution. A preferred solution would be to model the correct number of lanes but apply lane utilisation factors to the kerbside lanes.	No
Model Geometry	Widths	*a) Victoria Road/Tennyson Road* The model indicates that Victoria Road width used was 3m and Tennyson Road 3.3m. *b) Tennyson Road/Searle Street* Lane width in the model is 4m. Appropriate for roundabouts. *c) Tennyson Road/Southern Access (New Intersection)* Lane width in the model is 3.3m. Appropriate for this type of intersection. *d) Tennyson Road/Morrison Road* Lane width appear to be consistent with Google Map Aerials	Yes
	Lengths	*a) Victoria Road/Tennyson Road* Short left turn lane on Tennyson Road modelled as 50m, actual measurement is approximately 40m. *b) Tennyson Road/Searle Street* Appear to be consistent with Google Map Aerials *c) Tennyson Road/Southern Access (New Intersection)* Appear to be consistent with Google Map Aerials *d) Tennyson Road/Morrison Road* Appear to be consistent with Google Map Aerials	Yes
	Grades	*a) Victoria Road/Tennyson Road* Grade settings were applied to the intersection. 1.5% and 2% grade on Victoria Road east and west approach respectively and 3% on Tennyson Road. *b) Tennyson Road/Searle Street* No grade settings were applied to the intersection. *c) Tennyson Road/Southern Access (New Intersection)* No grade settings were applied to the intersection. *d) Tennyson Road/Morrison Road* No grade settings were applied to the intersection.	Yes
Movements	Overall	*a) Victoria Road/Tennyson Road* Movement settings are consistent, Victoria Road is signal coordinated with arrival type being favourable. *b) Tennyson Road/Searle Street* Default settings were used. *c) Tennyson Road/Southern Access (New Intersection)* Default settings were used. *d) Tennyson Road/Morrison Road* Default settings were used.	Yes

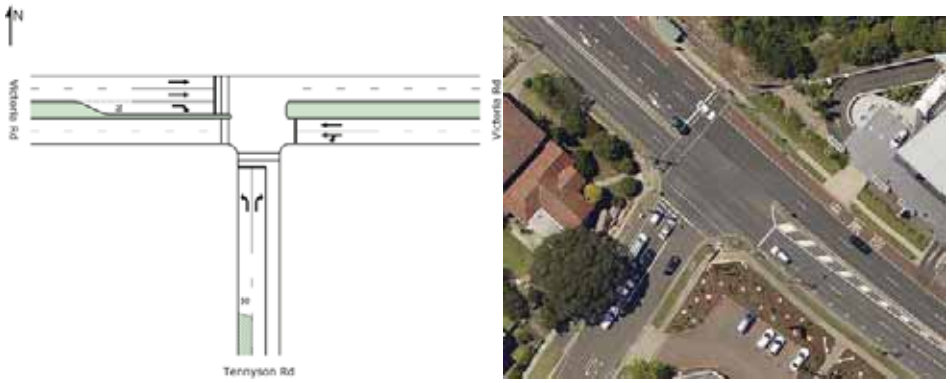
Approach Lane Data	Overall	*a) Victoria Road/Tennyson Road* Bunching on Victoria Road was used for Victoria Road, both 20% and 15% for east and west of Victoria Road as recommended. Default settings were used for saturation flow capacity adjustment. *b) Tennyson Road/Searle Street* Default settings were used. *c) Tennyson Road/Southern Access (New Intersection)* Default settings were used. *d) Tennyson Road/Morrison Road* Default settings were used.	Yes
Volumes	Overall	All modes appear to be consistent with the schematic diagram in the report	Yes
	Heavy Vehicles	*a) Victoria Road/Tennyson Road* 2% on Tennyson Road, 5% on Victoria Road (Consistent with traffic counts) *b) Tennyson Road/Searle Street* In the model, 2% heavy vehicles on Searle Street. Vehicles 3t and over are not allowed on Searle Street. *c) Tennyson Road/Southern Access (New Intersection)* *2% heavy vehicle on all approaches.* *d) Tennyson Road/Morrison Road* *2% heavy vehicle on all approaches.*	Yes
Peak flow factor (%)	Overall	Adopted 95% (default settings). Consistent over all models	Yes
Speed Environment	Overall	*a) Victoria Road/Tennyson Road* 60km/h Victoria Road, 50km/h Tennyson Road *b) Tennyson Road/Searle Street* 50km/h Tennyson Road, 50km/h Searle Street *c) Tennyson Road/Southern Access (New Intersection)* 50km/h on all approaches. *d) Tennyson Road/Morrison Road* 50km/h on all approaches.	Yes
Phasing		*Victoria Road/Tennyson Road* Undetected movements were applied to some left turns.	Yes
Gap Acceptance		Default settings were used in all models	Yes
Pedestrian Effects	Overall	No pedestrian effect adopted. While minimum clearance times would be maintained, the delays to turning vehicles caused by pedestrians have not been applied.	No
Modelling Method	Overall	RTA Delay Method	Yes

The Sidra models inputs were found to be generally acceptable but the following deficiencies were noted:

- A city-bound lane on Victoria Road was not modelled (see Figure 3 below);
- Delays to left turning traffic due to pedestrians were not applied;

The net effect of these deficiencies may slightly improve the results in terms of average delay butit is unlikely to improve the degree of saturation since it does not affect the critical movements.

The outputs from the models supplied were consistent with those in the Traffix Report.



Sidra Nearmap

Figure 3: Missing Lane on Victoria Road

5. ADJACENT DEVELOPMENTS

The proposed development should be considered in the context of adjacent developments (see Figure 5.1). It is noted that Traffix has adopted the predicted traffic volumes from the Bunnings Development. As shown in Figure 5.1 there are a number of other developments that would generate additional traffic in the future, including medium to high density housing developments and a supermarket on Monash Road.

From our previous reviews of developments in the area, it is estimated that the cumulative effects of these other developments could increase the background traffic growth in the area by some 5 to 10 % in the peak traffic periods. Further, the Gladesville DCP allows for higher density developments along the Victoria Road corridor. This would have a significant effect on the operation of traffic on Victoria Road in peak periods and should be considered in the context of this development.

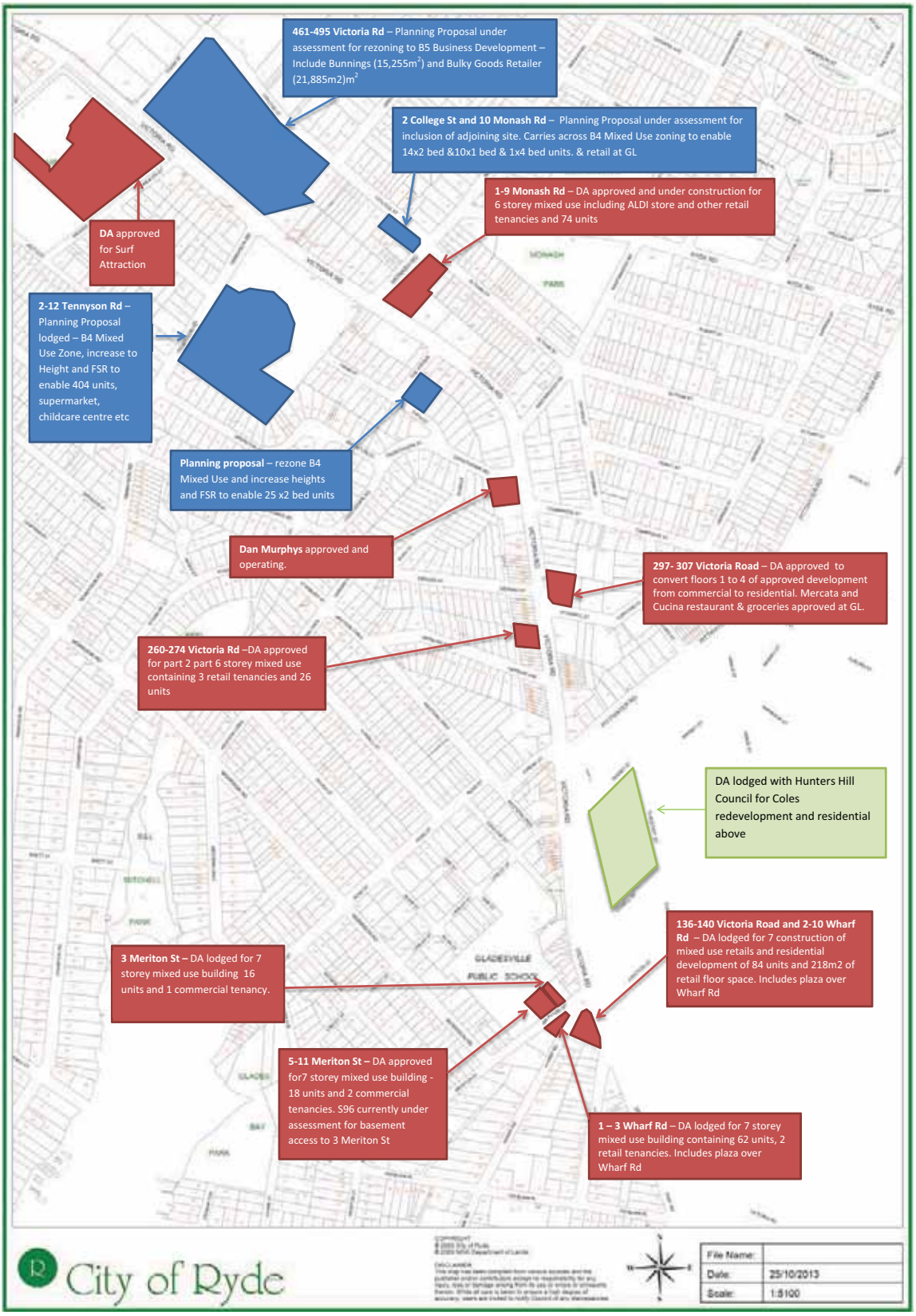


Figure 5.1: Future Development

6. ASSESSMENT

A summary of our review is shown in Table 6.1 below.

Table 6.1: Summary of Assessment

Issue	Comment
Reliability of Baseline data	The traffic data provided for the Tennyson Road / Victoria Road intersection appears consistent with other data. It is noted that the report does not reference the source of the data or when the surveys were undertaken.
Traffic Generation	The traffic generation appears to have been underestimated, without adequate justification for diverging from the RMS Guidelines. - Residential generation has used rates more applicable to developments near train stations and in city centres; - Child care traffic generation rates appear to be half those in the *RTA Guide to Traffic Generating Developments*; - Retail traffic is based on a linear relationship between trips per car space and floor area, which has not been adequately justified.
Traffic Distribution	The traffic distribution is consistent with the data purported to be observed. However, we note that the distribution between Morrison Road and Victoria Road fits neatly as round numbers of 40% and 60%. That said, given the road network layout these proportions are considered reasonable.
Use of traffic discounts	The assumption of multipurpose trips, while reasonable in principle, appears to have been overestimated the extent. No justification was given for the 20% reduction. The *RTA Guide to Traffic Generating Developments* does not provide guidance for new freestanding developments. The assumption that there are some linked trips is reasonable but again it has not been substantiated with any evidence other than 'common practice'.
Queuing in Tennyson Road	The Victoria Road / Tennyson Road intersection is predicted to be over capacity and queues on Tennyson Road from Victoria Road may extend past the Searle Street roundabout on a regular basis.
Parking Provision	The parking provisions are consistent with the City of Ryde DCPs
Access and Egress	The location of the proposed driveways appears to be reasonable.
Sidra Results	The Sidra modelling indicates the Tennyson Road / Victoria Road intersection would be over capacity and the average delay some 56 seconds, which is the upper limit of Level of Service D. LoS E is considered unacceptable. The models do not demonstrate that the proposed development will not have adverse effects on the road network.

Sidra inputs and assumptions	A city bound lane on Victoria Road was not modelled. If modelled correctly, this would improve the average delay for all scenarios. Delays due to vehicles turning though a pedestrian crossing were not applied. If applied this would increase the delays to some left turning movements in the models. Overall the models were considered to be acceptable but could have been made more accurate.

Our assessment of the traffic impacts of the proposed development, based on the information provided in the Traffix report and other planning documents, is that:

- The traffic generation has been underestimated;
- Discounts as a result of linked trips have been over estimated;
- The predicted intersection operation is not acceptable and would have higher delays were less generous traffic generation assumptions used.

It is therefore considered that the proposed development would most likely significantly increase the traffic delays at the Tennyson Road / Victoria Road intersection.

7. CONCLUSION

Bitzios Consulting has reviewed the traffic report of the planning proposal for 2 – 14 Tennyson Road, Gladesville. From our review we conclude that:

- Traffic generation has been significantly underestimated without adequate justification;
- Discounting for linked and multi-purpose trips has not been adequately substantiated and therefore should not be used for new standalone developments;
- The modelling shows unacceptable increases in delays; and
- The Victoria Road / Tennyson Road intersection would be over capacity according to the Sidra results.

Should the estimated traffic generation be increased then the intersection average delay is likely to be higher than that reported in the Traffix report. No road improvements have been proposed in the report to ameliorate the issues.

We therefore do not agree with the conclusions of the Traffix report and consider the likely traffic impacts to be greater than those reported. It is concluded that the proposed development would significantly increase traffic congestion.