



Rhodes Station Precinct
Proposed Uplift Traffic Study
Traffic Assessment Report

transportation planning, design and delivery

Rhodes Station Precinct Proposed Uplift Traffic Study

Traffic Assessment Report

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1. Introduction

Rhodes Peninsula is a major urban renewal site at the geographic centre of Sydney. It has continually gone through a renewal process since the early 2000s. This study assesses additional development potential given current conditions and future planned infrastructure provisions (including the proposed Homebush Bay Bridge) and changes in travel behaviour.

Rhodes Peninsula, a former industrial site, comprises a number of individually owned land parcels will be developed to provide some 5,300 residential apartments with some 45,000m² of retail development and 55,000m² of commercial floor area (as assessed in the 2009 masterplan traffic study conducted by consultants Masson Wilson Twiney (MWT)). The site comprises four precincts.

Figure 1.1 shows the location of the Rhodes Peninsula and its sub precincts.

By way of background, in May 2001, consultant MWT prepared a transport management plan¹ assessing the transport implications for the redevelopment of the Rhodes Peninsula site. The 2001 transport assessment relates to development assumptions comprising some 3,000 residential apartments with some 100,000m² of non-residential floor area. The 2001 transport assessment was then relied upon by the then Department of Planning and Urban Affairs (now Department of Planning and Infrastructure) in their approval of the original Masterplan.

A further study² in March 2009 also by consultant MWT assessed the transport implications of additional development sought by the Rhodes Peninsula landowner group for some 787 additional residential units across the entire Rhodes Peninsula site plus 5,450m² of additional commercial floor space and 1,740m² of retail floor area within Precinct A. Following the 2009 transport study, Canada Bay City Council approved additional development consistent with that assessed in the 2009 study.

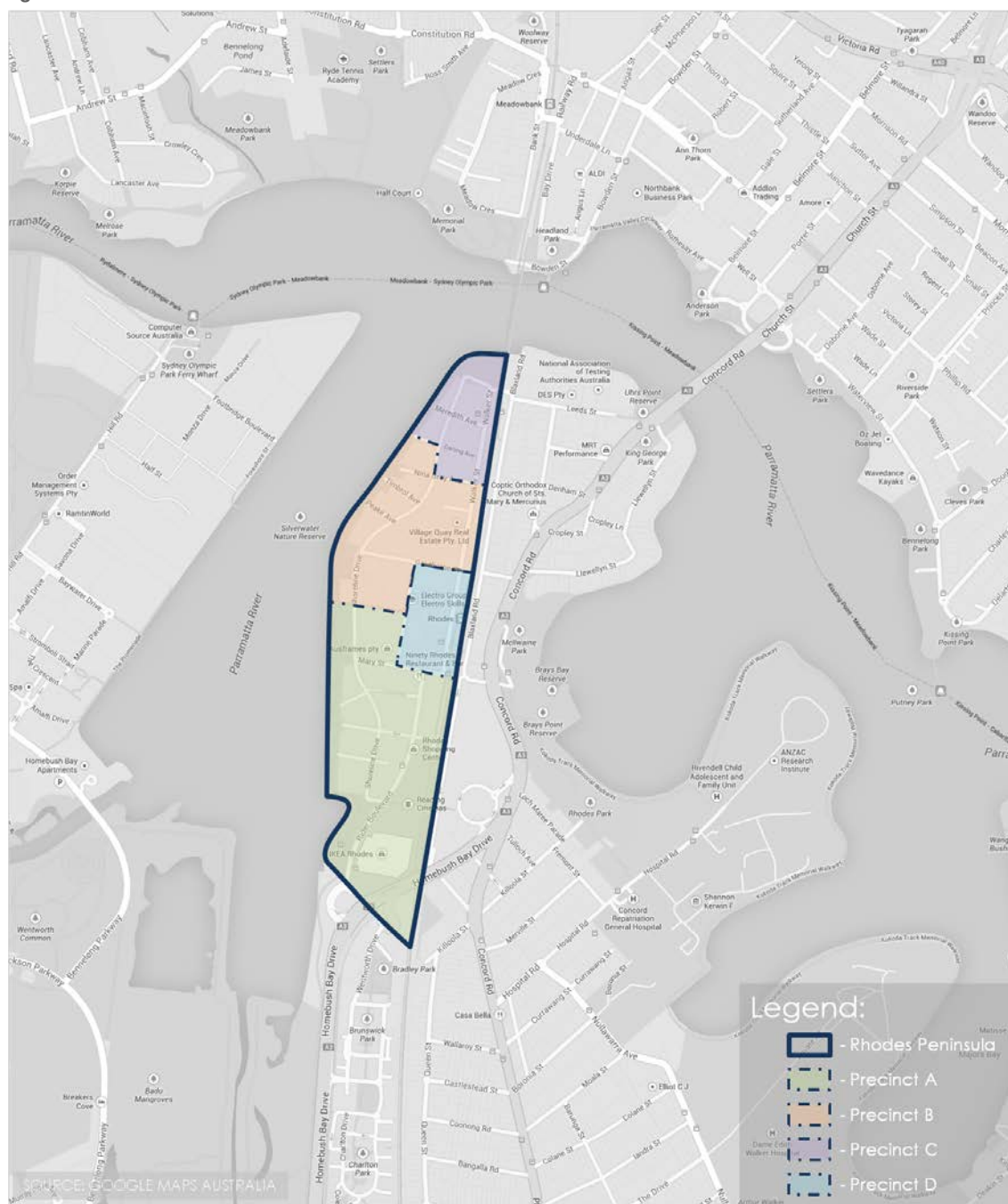
Billbergia is a significant landholder within the Rhodes development site (shown in Figure 1.1). Billbergia owns a number of parcels of land within a sub-precinct at Rhodes known as Precinct D or Station Precinct. The Station Precinct is located to the immediate west of Rhodes Railway Station. Billbergia is proposing additional development uplift for lands within the Station Precinct that are under its control. Billbergia's proposed development uplift is generally consistent with Council's current draft masterplan for the site.

GTA Consultants has been engaged by Billbergia to conduct a transport study to assess the transport implications of the proposed uplift within the Station Precinct.

¹ *Transport Management Plan for the Redevelopment of Rhodes Peninsula*, May 2001

² *Rhodes Peninsula – Traffic and Transport Analysis for Additional Development*, March 2009

Figure 1.1: Rhodes Peninsula Location Plan



The report is set out as follows:

- Chapter 2 reviews the current Rhodes development status
- Chapter 3 describes the proposed development uplift
- Chapter 4 assesses the traffic capacity of the proposed development uplift
- Chapter 5 addresses a number of transport management issues raised by Council, and
- Chapter 6 presents a summary and conclusion of the study.

2. Rhodes Peninsula Development Status

2.1 Existing Approval

Following the completion of the 2001 transport study, the approved level of development within the Rhodes Peninsula (as contained in SREP 29) was as follows:

- 4,494 residential apartments
- 43,548m² of retail floor area, and
- 50,000m² of commercial floor area.

The 2009 transport study assessed the following additional uses above SREP 29 development allowance:

- +787 residential apartments
- +1,740m² of retail floor area, and
- +5,450m² of commercial floor area.

Following the 2009 transport study, Canada Bay City Council subsequently approved additional development consistent with that assessed.

As such, the current approval allows the Rhodes development site to be developed to provide approximately:

- 5,300 residential apartments
- 45,300m² of retail floor area, and
- 55,500m² of commercial floor area.

2.2 Approved Development To Be Completed

Based on records held by Canada Bay City Council, as of November/December 2013 (at the time of the latest round of traffic surveys) the following approved development has yet began to be constructed (including developments that have been completed, but not yet occupied):

- Precinct B
 - 1,167 residential apartments
- Precinct D
 - 494 residential apartments, and
 - 10,020m² of retail floor area.

The above includes the Hossa development site in Precinct D. This site is expected to be developed to provide some 150 residential apartments plus 1,200m² of retail floor area.

Precinct A and Precinct C have been completed and occupied as approved under the 2009 masterplan.

In addition to the uncompleted development at Rhodes, Council also advises the last stage of the Rhodes Corporate Park was recently completed, but not yet occupied. The un-occupied area at Rhodes Corporate Park is some 18,400m² gross floor area.

3. Station Precinct Proposed Uplift

Lands within Station Precinct that are under the control of Billbergia include:

- 34 Walker Street
- 6-16 Walker Street, and
- 21 Marquet Street.

Billbergia is proposing the following additional development on their sites over approved levels:

- 794 residential apartments
- 6,314m² of retail development (including a 3,500m² supermarket)
- 5,156m² commercial development
- 5,500m² (96 room) hotel, and
- 8,536m² of recreational facilities (with 250 car parking spaces).

The above proposed uplift (and the already approved development on sites under the control of Billbergia) is consistent with the scheme presented to City of Canada Bay Council in April 2014.

Other sites within Station Precinct and other precincts within Rhodes Peninsula are either fully developed (under planning or constructed) or have no further potential for redevelopment.

4. Traffic Impact Assessment

4.1 Traffic Generation Assumptions

The following traffic generation rates were adopted in the previous 2001 and 2009 MWT traffic assessments:

- residential use – 0.29 trips per peak hour per unit
- retail use – 4.0 trips per evening peak hour per 100m² NLA (morning peak rate assumed to be 50 per cent of the evening peak rate), and
- commercial use – 1.5 trips per 100m² NLA (1m² GFA assumed to be equivalent to 0.85m² NLA).

RMS (Roads and Maritime Services, formerly RTA) has recently released a Technical Direction (TDT2013/04) providing a summary of trip generation rates for various land uses to replace the suggested trip rates in their *Guide to Traffic Generating Developments*, 2002.

The new traffic generation rates in the Technical Direction for the relevant uses are as follows:

- 0.19 and 0.15 trips per peak hour per apartment for high density residential developments during the morning and evening peak periods respectively, and
- 1.6 and 1.2 trips per peak hour per 100m² of commercial office developments during the morning and evening peak periods respectively.

Traffic generation surveys at two existing residential apartment blocks within Rhodes Peninsula were conducted on Tuesday 17 September 2013. The apartment blocks surveyed were the Vantage South and VQ developments. The survey results revealed average peak hour generation rates of 0.20 and 0.17 trips per peak hour per apartment during the morning and evening peak periods respectively. These rates are generally consistent with the revised RMS generation rates in that traffic generation rates per dwelling have reduced significantly from the previous rates contained in the 2002 guidelines. It is proposed to adopt these surveyed rates (slightly higher than the RMS revised rates) to estimate development traffic for residential apartments.

In relation to retail traffic generation rates, RMS Technical Direction TDT2013/04 did not provide revised generation rates for such uses. Instead it is proposed to continue to use the generation rates contained in RMS 2002 guidelines for specialty retail shops. However, this retail traffic generation rate is proposed to be converted into trip rate relating to car parking spaces provided instead of per development floor area using information from the RMS guidelines. Estimating the retail development traffic this way would better reflect the restrained car parking provision for retail developments in Rhodes which is dictated by Council's DCP. Council's DCP stipulates a parking rate of 1.0 space per 40m² GFA of retail floor area.

The converted rate is 1.02 trips per hour per car space for specialty retail shops. This rate relates to evening peak period. It is assumed that the retail uses during the morning peak period would generate traffic at approximately 50 per cent of the evening peak rates consistent with the original 2001 and 2009 traffic studies.

Trip generation rate for the leisure centre was assumed to be 1.0 trip per peak hour per car space.

For the hotel use, RMS guidelines suggest a trip rate of 0.26 trips per peak hour per room.

The adopted traffic generation rates for this study is summarised in Table 4.1.

Table 4.1: Adopted Traffic Generation Rates

Development Type	Morning Peak Hour	Evening Peak Hour
Residential Apartments	0.20 trips per peak hour per apartment	0.17 trips per peak hour per apartment
Retail	0.51 trips per peak hour per car space	1.02 trips per peak hour per car space
Commercial	1.6 trips per peak hour per 100m ²	1.2 trips per peak hour per 100m ²
Leisure Centre	1.0 trip per peak hour per car space	1.0 trip per peak hour per car space
Hotel	0.26 trips per peak hour per room	0.26 trips per peak hour per room

The above traffic generation rates have been applied to the approved developments that are yet to be completed or occupied (see Section 2) and the proposed development uplift in the Station Precinct (see Section 3).

4.2 Intersection Performance Criteria

Intersection analysis was undertaken using the SIDRA intersection analysis program. SIDRA determines the average delay that vehicles encounter and the level of service (LoS). SIDRA provides analysis of the operating conditions which can be compared to the performance criteria set out in Table 4.2.

Table 4.2: Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Source: RMS' Guide to Traffic Generating Development, 2002

RMS uses level of service as a measure to indicate the operating efficiency of a given intersection. The level of service ranges from A to F. Levels of service between A and D indicate the intersection is operating within capacity with LoS A providing exceptionally good performance to LoS D indicating satisfactory performance. LoS E and F indicate the intersection is operating at or near capacity and would require intersection improvement works to maintain reasonable performance.

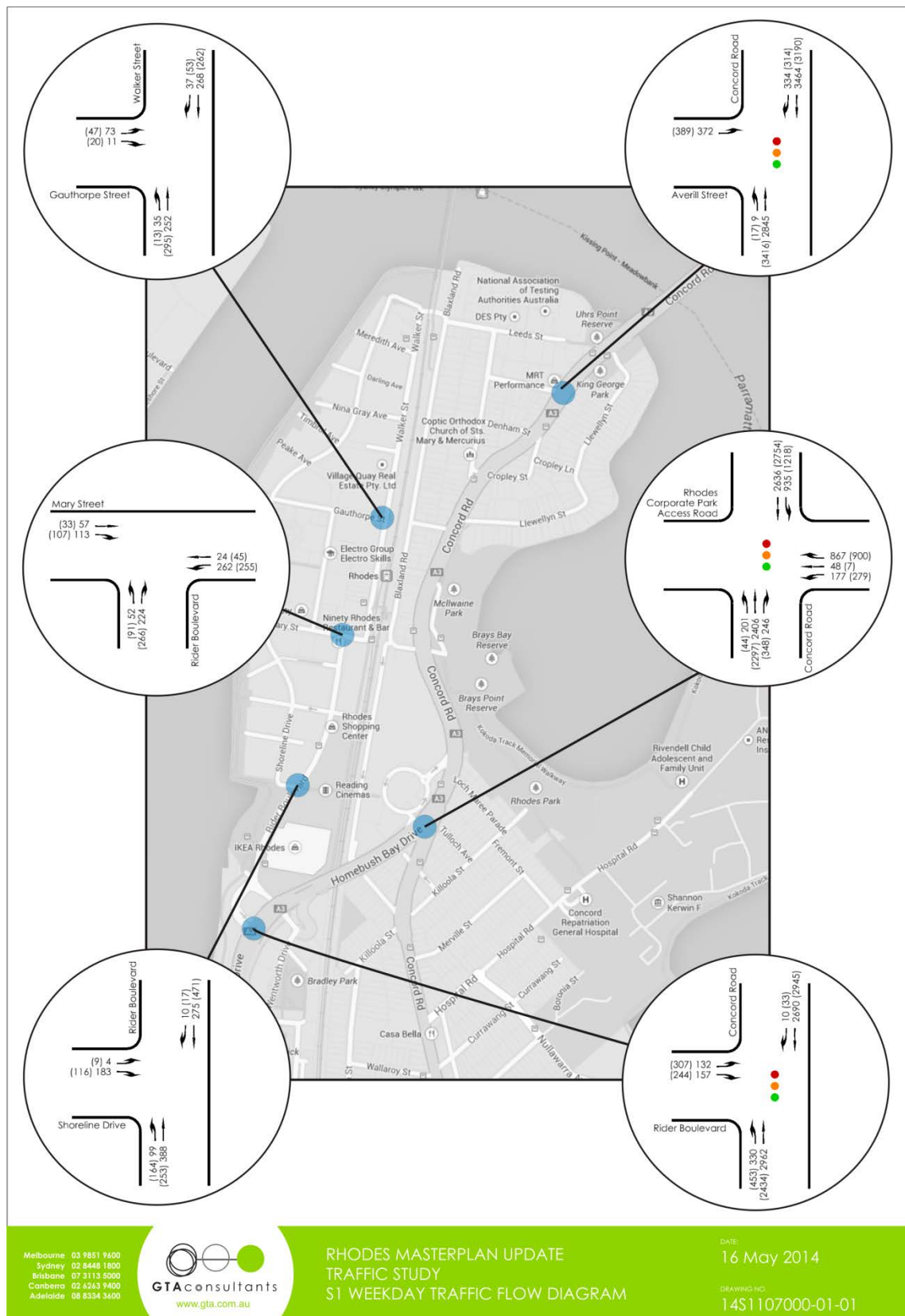
The level of service is directly related to the average delay experience by vehicles travelling through the intersection as presented in Table 4.2. At signalised intersections, the average delay is the volume weighted average of all movements. For roundabouts and priority (give way and stop sign) controlled intersections, the average delay relates to the worst movement.

4.3 Intersection Capacity Analysis

Intersection capacity analysis has been conducted for a number of key intersections in the vicinity of the site to assess the traffic implications of the proposed “uplift” in Station Precinct. Three traffic scenarios have been considered as follows:

- Scenario 1 (S1) – existing base case conditions (using 2013 traffic surveys conducted on 14 November 2013 from 7:00am to 9:00am and from 4:00pm to 6:00pm) – see traffic flows presented in Figure 4.1.
- Scenario 2 (S2) – S1 above plus current approved development (including all developments built, but not yet occupied as advised by Council as discussed in Section 2) – see traffic flows presented in Figure 4.2, and
- Scenario 3 (S3) – S2 above plus proposed uplift development at Precinct D (see Section 3) – see traffic flows presented in Figure 4.3.

Figure 4.1: Existing Peak Hour Traffic Flows (Scenario S1)



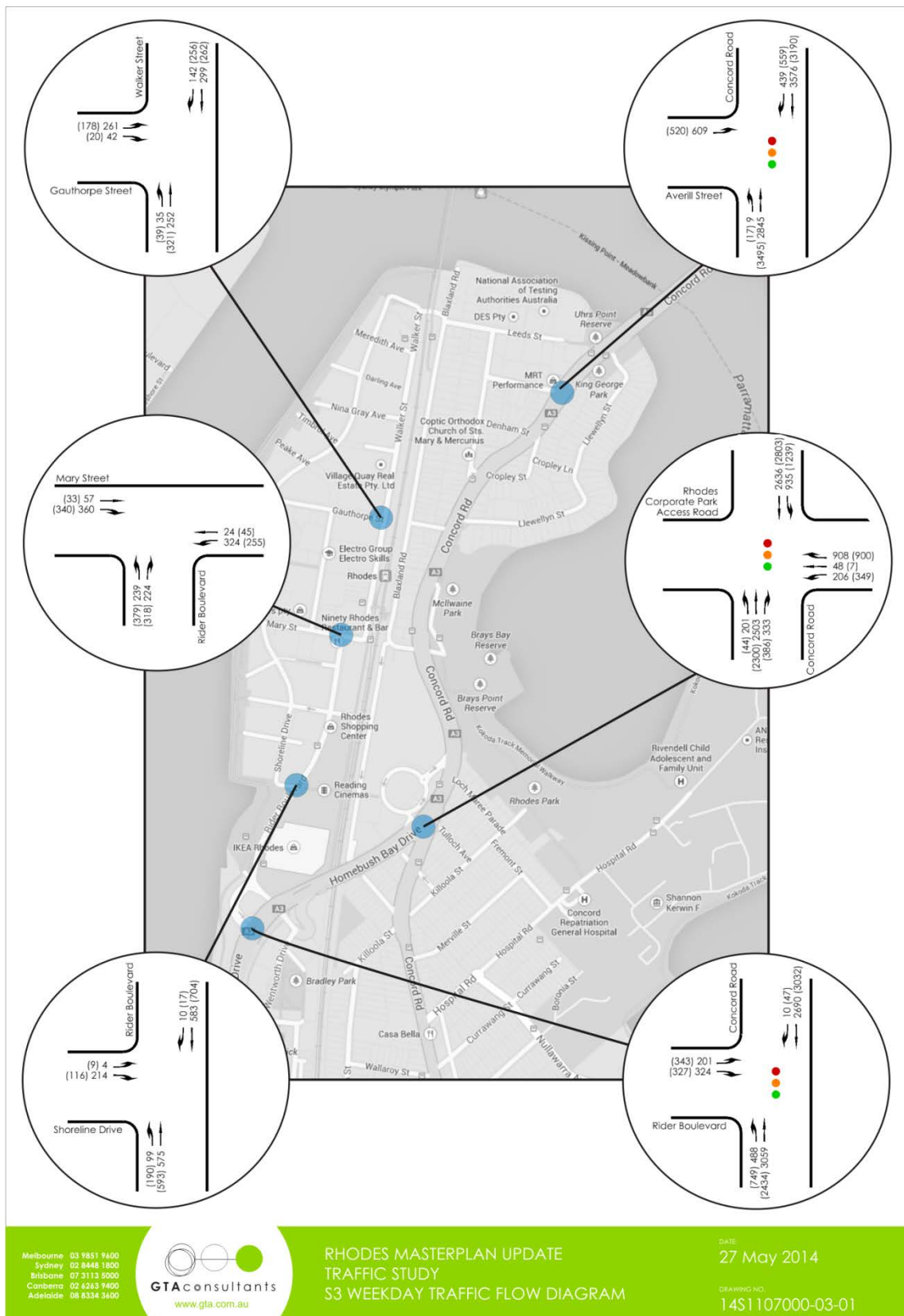
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**RHODES MASTERPLAN UPDATE
 TRAFFIC STUDY
 S2 WEEKDAY TRAFFIC FLOW DIAGRAM**

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Figure 4.3: Future (Approved + Uplift) Peak Hour Traffic Flows (Scenario S3)



The modelling results are presented in Table 4.3 and Table 4.4 for the morning and evening peak periods respectively. The results are also presented in Figure 4.4 graphically.

Table 4.3: Morning Peak Traffic Modelling Results

Intersections	Scenario S1		Scenario S2		Scenario S3	
	Ave. Delay (sec)	LoS	Ave. Delay (sec)	LoS	Ave. Delay (sec)	LoS
Shoreline Dr- Rider Blvd	12	A	15	B	28	B
Mary St- Rider Blvd	10	A	11	A	15	B
Gauthorpe St- Walker St	10	A	10	A	11	A
Homebush Bay Dr- Concord Rd	73	F	80	F	85	F
Homebush Bay Dr- Oulton Ave	8	A	10	A	19	B
Concord Rd- Averill St	87	F	87	F	87	F

Table 4.4: Evening Peak Traffic Modelling Results

Intersections	Scenario S1		Scenario S2		Scenario S3	
	Ave. Delay (sec)	LoS	Ave. Delay (sec)	LoS	Ave. Delay (sec)	LoS
Shoreline Dr- Rider Blvd	12	A	15	B	27	B
Mary St- Rider Blvd	10	A	11	A	16	B
Gauthorpe St- Walker St	10	A	10	A	10	A
Homebush Bay Dr- Concord Rd	86	F	93	F	98	F
Homebush Bay Dr- Oulton Ave	9	A	9	A	10	A
Concord Rd- Averill St	59	E	59	E	60	E

Figure 4.4: Intersection Level of Service



The traffic modelling results indicate the assessed intersections in Scenario S1 are currently operating satisfactorily during both peak periods with the exception of the Homebush Bay Drive and Averill Street intersections with Concord Road. The majority of assessed intersections currently operate with good level of service at LoS B or better with minimal delays, while the Homebush Bay Drive and Averill Street intersections currently operate with LoS F with extensive queues on Concord Road in both peak periods. The extensive queues on Concord Road are a result of downstream congestion located outside of the study area on Church Street near Top Ryde in the morning peak period, and on Homebush Bay Drive at its interchange with the M4 Motorway. It is further noted that the intersection analysis results for the intersections along Homebush Bay Drive/Concord Road are generally consistent with the results from the 2008/2009 traffic study.

Under Scenario S2 where additional development traffic from the uncompleted approved developments is added to the existing traffic (Scenario S1), it was found that future traffic operating conditions would be similar to those found in Scenario S1. That is, all assessed intersections continue to operate satisfactorily with LoS B or better except at the Homebush Bay Drive and Averill Street intersections with Concord Road which are expected to operate with LoS E/F as per existing traffic conditions.

Similarly, traffic conditions in Scenario S3 (i.e. extra traffic arising from the proposed uplift and the uncompleted approved development added to the existing traffic) would continue to be satisfactory. Most of the intersections would continue to have LoS A/B operation. The Shoreline Drive-Rider Boulevard would experience a slight increase in delay, but would continue to operate with acceptable level of service (i.e. LoS B). It is also noted that the Homebush Bay Drive and Averill Street intersections with Concord Road would continue to operate at LoS F, but the performance levels are expected to be very similar to both Scenarios S1 and S2. As indicated above, delays are due to regional traffic effects originated outside of the Rhodes study area.

From the above, our analysis indicates that the traffic arising from the proposed uplift would not result in noticeable adverse traffic impacts when compared with traffic conditions under the approved development.

5. Transport Management Issues

5.1 Council's Comments

Council in their consideration of Billbergia's proposed development uplift for the Station Precinct has a raised number of traffic related items. Council also recommended for these traffic related items to be addressed in the traffic study assessing the development uplift in the Station Precinct.

These are addressed below accordingly.

5.2 High Pedestrian Activity Area

Council requested for this traffic study to investigate the installation of a 40km/hr High Pedestrian Activity Area (HPAA) on Rider Boulevard and Walker Street between Oulton Avenue and Gauthorpe Street and on Shoreline between Rider Boulevard and Gauthorpe Street.

Appendix A contains a detailed assessment of the potential for the installation of a 40km/hr HPAA in Rhodes. A brief summary is provided below.

From the assessment, Rider Boulevard and Walker Street would meet the requirements for the implementation of a 40km/hr high pedestrian activity area. Shoreline Drive does not meet the criteria for the implementation of a 40km/hr high pedestrian activity area, but may be appropriate to provide a 40km/hr local traffic area speed zone.

In all cases, traffic calming devices may be required to reduce existing speed down to an appropriate level.

5.3 Potential "Rat-Run" along Rider Boulevard/Mary Street

Council requested for the study to identify the destination and origin of vehicles travelling along Walker Street and Rider Boulevard to determine if it is being used as a rat run to by-pass congestion of Concord Road/Homebush Bay Drive. The study is also to identify if the travel volumes can be reduced.

To address this, an origin-destination (OD) survey was conducted. The OD survey is used to determine if a trip (i.e. matched vehicle number plates at two given observation stations) is "rat-running" through a local area by comparing the recorded travel time (difference in times the vehicle was observed at each station) and the actual travel time of a through trip i.e. not stopping at other destinations between the two stations.

The OD survey was conducted on Thursday 14 November 2013 from 7:00am to 9:00am and from 4:00pm to 6:00pm. An observation station was set up at Rider Boulevard near Oulton Avenue (South Station) and another one at Walker Street near Meredith Avenue (North Station). Through trip travel time between these two stations was approximately two and a half minutes.

Vehicles travelling from one station to the other (in either direction) were considered a matched trip:

- if the number plates recorded at each station are the same, and
- if the travel time is less than three minutes.

The results from the OD survey are presented in Table 5.1.

Table 5.1: OD Survey Results (3-Minute Travel Time Trip)

	Peak Period	Vehicles Observed	North Station NB	South Station SB
North Station SB	Morning	515	-	71 (14%)
	Evening	739	-	106 (14%)
South Station NB	Morning	833	141 (17%)	-
	Evening	804	54 (7%)	-

From Table 5.1, it can be seen that in the morning peak period there were 515 vehicles observed at the North Station travelling southbound along Walker Street. Of these, there were only 71 vehicles that were also observed at South Station travelling southbound along Rider Boulevard (away from the North Station). That is, there was only 71 vehicles (or 14 per cent of the vehicles observed at North Station) that was determined as a through trip i.e. travel time of three minutes or less the travelling in the southbound direction from the North Station to the South Station. Similarly, the proportion of through trips in the evening period was also 14 per cent.

In the northbound direction, the proportion of through trips was 17 per cent and 7 per cent during the morning and evening peak periods respectively.

Therefore, from the above the proportion of through trip or “rat running” traffic on Rider Boulevard and Walker Street is approximately 15 per cent depending on direction of travel and time of day.

From the above analysis, it appears that there is some evidence “rat running” on Rider Boulevard/Walker Street traffic through Rhodes to by-pass the congestion on Homebush Bay Drive/Concord Road.

However, the proportion of “rat running” is considered to be relatively minor. At this stage as the internal intersections appear to be operating satisfactorily, it is recommended that no immediate actions be undertaken, but to continue to monitor the situation. In addition, it would be difficult to deter traffic from “rat running” through the area given the current traffic conditions on Homebush Bay Drive and Concord Road. It would require some drastic and draconian measures (e.g. full or partial road closures) to be introduced that may not necessarily provide any material benefits to local residents, but instead create un-necessary inconvenience.

5.4 Pedestrian and Traffic Safety

Council requested the study to consider the implications of installing traffic signals at the intersections of Shoreline Drive with Rider Boulevard, Rider Boulevard with Mary Street and adjacent to the train station stairs on Walker Street. The study is also to identify and assess alternative options to address pedestrian and traffic safety at these locations.

Additional intersection capacity analysis was conducted at the intersections of Shoreline Drive with Rider Boulevard and Rider Boulevard with Mary Street. At the intersection of Shoreline Drive with Rider Boulevard, a simple two-phase signal arrangement with a 60 second cycle time was adopted for the analysis. While at the intersection of Rider Boulevard and Mary Street, a typical three-phase signal arrangement for T-junctions was assumed due to the higher turning volumes. The analysis for the Rider Boulevard intersection with Mary Street also adopted a 60 second cycle time. At both intersections, the analysis was conducted using Scenario S3 traffic volumes (see Figure 4.3). The results are presented in Table 5.2.

Table 5.2: Rider Boulevard Signalised Intersections Analysis

Intersections	Morning Peak		Evening Peak	
	Ave. Delay (sec)	LoS	Ave. Delay (sec)	LoS
Shoreline Dr-Rider Blvd	12	A	11	A
Rider Blvd-Mary St	27	B	28	B

Under signals control both Rider Boulevard intersections with Shoreline Drive and Mary Street would operate satisfactorily with good level of service.

At the Shoreline Drive intersection, if the intersection control was converted to signals it would marginally improve when compared with its current and future intersection performance (operating under priority control). However, under signal control it may provide some limited additional deterrence for traffic “rat running” through the area as this traffic would experience additional delays to the new traffic signals.

The Mary Street intersection is expected to operate with good level of service under signal control, but its performance would be worse than under priority control. Similar, signal control at this intersection would provide some form of deterrence to “rat running” traffic.

It is noted that at present the intersection of Rider Boulevard with Jean Wailes Avenue (approximately halfway between Shoreline Drive and Mary Street) is operating under signal control with controlled pedestrian crossing facilities across Rider Boulevard (south of Jean Wailes Avenue) and across Jean Wailes Avenue on both sides of Rider Boulevard.

In addition, there is a marked foot crossing on Rider Boulevard just north of Shoreline Drive. Pedestrian refuge islands are also available on the southern and eastern approaches at the intersection of Rider Boulevard with Mary Street. It is considered that there are sufficient pedestrian crossing facilities along Rider Boulevard.

With all things considered, it is not recommended for signals to be installed at either intersection as it is most likely to fail any cost benefit ratio analysis given the limited benefits they would provide.

In relation to provision of a traffic signal control on Walker Street adjacent to the train station stairs, based on current traffic and pedestrian usage it is unlikely to meet RMS warrants for a traffic signal controlled pedestrian crossing. The warrant for a mid block signalised crossing is provided below:

- (a) for each of four one hour periods of a typical day:
 - (i) the pedestrian flow/hour (P) exceeds 250, AND
 - (ii) the total vehicular flow/hour (V) in both directions exceed 600, or where there is a central pedestrian refuge, 1,000
 OR
- (b) for each of eight one hour periods of a typical day:
 - (i) the pedestrian flow/hour (P) exceeds 175, AND
 - (ii) the total vehicular flow/hour (V) in both directions exceed 600, or where there is a central pedestrian refuge, 1,000, AND
 - (iii) there is no other pedestrian crossing facility within a reasonable distance.

A recent pedestrian survey conducted on Walker Street adjacent to the railway station (conducted 14 November 2013), the top eight hourly volumes range from 81 to 176 pedestrian movements per hour. Similarly, the top eight hourly volumes on Walker Street adjacent to the railway station range from 478 vph to 649 vph.

Based on the current usage, it is unlikely Walker Street would meet the warrant for a mid block signalised pedestrian crossing. However, following the completion of the redevelopment of Rhodes Peninsula, it may have sufficient usage to comply with the warrant.

5.5 Walker Street Pedestrian Friendly Area

Council requested that the traffic study make recommendations on which facilities (if any) would be suitable to make Walker Street pedestrian friendly, whilst keeping in mind that Walker Street/Mary Street/ Rider Boulevard is to be retained as the distributor route.

With consideration of the need to maintain Walker Street as a key distribution route the following measures as presented in Table 5.3 have been considered.

Table 5.3: Treatments to Increase Pedestrian Amenity

Measures	Considerations	Suitable Treatment
40km/hr High Pedestrian Activity Area	See assessment in Appendix A.	Yes
Wombat Crossings	There is already a wombat crossing adjacent to the railway station, however this would mostly be used by pedestrians heading south along Walker Street. An additional wombat crossing may be suitable further north. These should be provided in mid-block locations only. Depending on location, it is likely this would result in a loss of kerbside car parking. Other pedestrian crash studies by GTA have indicated they do not prevent problems at intersections as drivers would tend to focus on other aspects of driving instead of looking out for pedestrians using the crossing.	Yes, but only at mid-block locations
Flat Top Road Humps/Raised Pavements	Assist in reducing vehicle speeds, but require additional design considerations to ensure they are not confused or used as pedestrian crossing facilities. Could be suitable as a 40km/h gateway treatment.	Yes
Lane Narrowing/ Kerb Extensions	Providing narrow points encourage lower vehicle speeds and reduce crossing distance for pedestrians.	Yes
Centre Blister Islands	Reduce traffic speed, however design to accommodate buses may negate the speed reduction intention. Not suitable for a local distributor route.	No
Mid-block Median Treatment	Provides lane narrowing to encourage lower speeds and can provide an informal pedestrian refuge and separate crossing into two staged movements.	Yes
Pedestrian Refuge	As per mid-block median treatment, however designed specifically for pedestrians and caters to all facility user groups.	Yes
10km/h Shared Zone	Provides shared road space where vehicle traffic is required to give way to pedestrian traffic. In addition, there is to be no delineation of separate pedestrian and vehicle areas, and no kerb and gutter is to be provided. Current traffic volumes on Walker Street are too high to support a shared zone. RMS is unlikely to support a shared zone on Walker Street. Finally, it would be relatively expensive to implement.	No
Signalised Mid Block Crossing	See discussion above.	Yes following completion of Rhodes redevelopment

Table 5.3 provides a list of commonly adopted measures. Other measures that prevent two-way vehicle movements were immediately dismissed as potential options given the road hierarchy and prevailing traffic volumes. Any measures implemented will require additional design consideration for bus and cyclist movements along the street.

With consideration to retaining Rider Boulevard/Walker Street as the distributor route within Rhodes, it is recommended for a 40km/hr HPAA on Walker Street between Mary Street and Gauthorpe Street with a mid block signalised crossing adjacent to the railway station to be provided.

5.6 Discourage Non-Residential Traffic from Shoreline Drive

Council requested that the study to identify any measures to discourage non-residential traffic on Shoreline Drive.

Shoreline Drive is a more circuitous route for through traffic compared with Rider Boulevard/Walker Street. It does not provide direct access from one end of the Peninsula to the other whereas the Rider Boulevard/Walker Street route provides a more direct route in particular for traffic entering and/or leave a property off Rider Boulevard.

There are two issues along the Rider Boulevard/Walker Street that would deter non-residential traffic from using it.

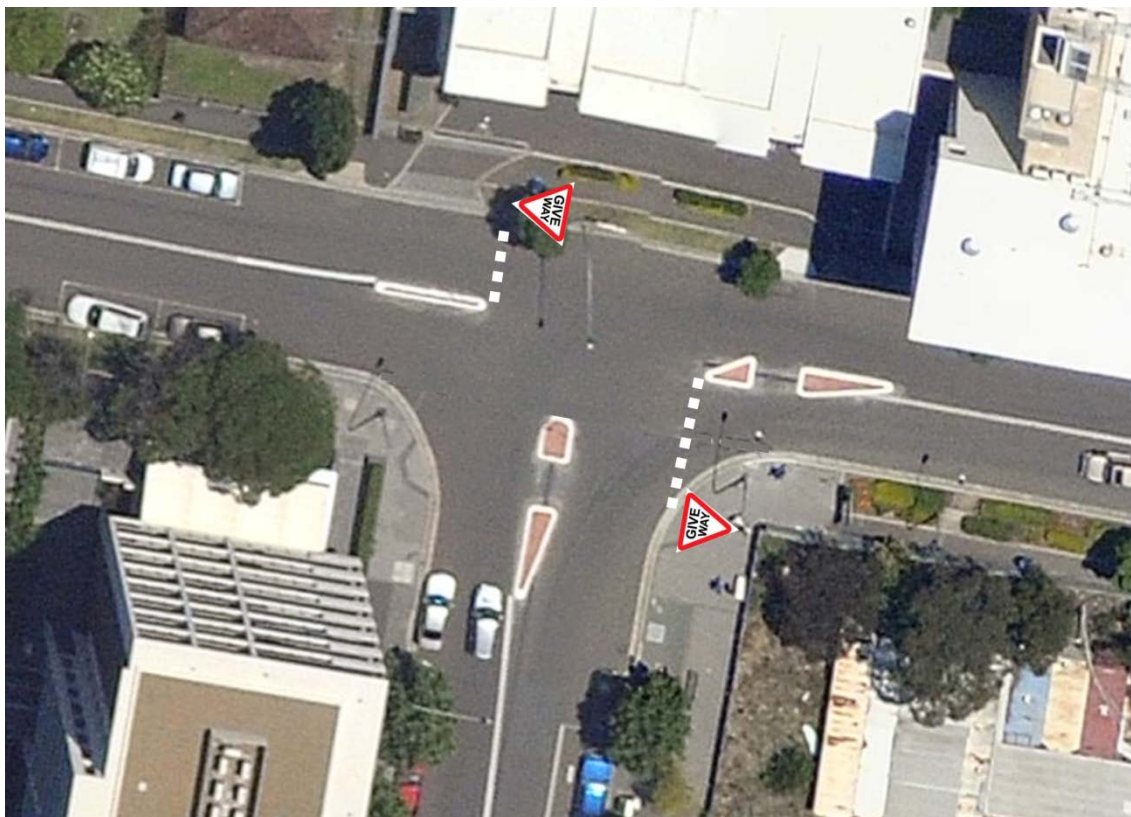
At present, Rider Boulevard forms a priority controlled T-intersection with Mary Street where traffic on Rider Boulevard gives way to traffic on Mary Street including the right turn movement from Rider Boulevard to Mary Street.

In addition, the pedestrian crossing on Walker Street outside the railway station adds further delays to traffic using Walker Street especially after an arrival of a train where a significant volume of pedestrians have been off-loaded.

It is recommended for the Rider Boulevard-Mary Street intersection to have its priority reversed such that traffic on Mary Street gives way to traffic on Rider Boulevard. A concept of such scheme is shown in Figure 5.1. If required, a modified T-junction with the reversed priority could also be provided at this intersection. The modified T-junction option provides splitter islands on Mary Street to channelise and reduce travel speed of vehicles on Mary Street.

To address the issue relating to traffic delays currently experienced by traffic travelling along Walker Street outside of the railway station, the existing marked foot crossing should be considered for upgrade to a signalised crossing. It is noted that the current traffic and pedestrian flows at this location may not meet the warrant for a signalised crossing, but with additional development in the area it may be possible to provide a signalised crossing at this location in the future.

Figure 5.1: Proposed Reversed Priority for Rider Blvd-Mary St Intersection



Source: NearMap

5.7 Gauthorpe and Walker Streets Roundabout

Council requested that the study consider the installation of a roundabout at the intersection of Gauthorpe and Walker Streets, taking into consideration bus movements (including proposed bus movements resulting from the construction of the Homebush Bay Bridge) and impacts on cyclists and pedestrians.

An intersection analysis of this intersection operating under a roundabout control was conducted. The analysis assumed a single lane roundabout with an 8m diameter central island. The analysis was conducted using predicted traffic flows from Scenario S3. Additional traffic flows due to bus movements to/from Wentworth Point were also added to the traffic flows for Scenario S3.

The *Homebush Bay Bridge Traffic Management and Access Report* (prepared by consultant Arup dated 16 January 2012) indicates that future bus movements across the Homebush Bay Bridge would be approximately 20 buses per hour (10 buses in each direction across the bridge).

The analysis allows for an additional 15 bus movements per hour turning left from Walker Street to Gauthorpe Street plus an additional 15 bus movements per hour turning right from Gauthorpe Street to Walker Street i.e. a total of 30 bus movements per hour.

The results are presented in Table 5.4.

Table 5.4: Gauthorpe St and Walker St Intersection Analysis (Roundabout)

Intersections	Morning Peak		Evening Peak	
	Ave. Delay (sec)	LoS	Ave. Delay (sec)	LoS
Gauthorpe St-Walker St	11	A	12	A

From Table 5.4, it can be seen that the Gauthorpe Street-Walker Street operating as a roundabout would operate satisfactorily with LoS A performance for both peak periods. It is noted the results are consistent with those predicted for the same intersection operating under priority control. As such, from a capacity perspective there is no issues if the intersection was to be converted to operate as a roundabout.

From a geometry and design perspective, the roundabout would need to be provided such that it is not possible for vehicles to travel through the roundabout at excessive speed (in particular along the through approaches), while at the same time buses and larger vehicles could still negotiate the roundabout. As such, the roundabout would need to be provided with mounted island to allow large vehicles to negotiate the roundabout.

A roundabout properly designed can be used as a traffic calming device to provide a pedestrian friendly environment along the route the roundabout is located on. In addition, additional lighting would be required to improve visibility between drivers and pedestrians/cyclists.

Therefore, it is not expected that the roundabout would provide any material adverse impacts to pedestrians and cyclists, instead it would provide better outcomes for all road users.

5.8 Access to Rhodes Shopping Centre

Council requested that the study identify means of encouraging vehicles to access the Rhodes shopping centre via the ramp off Homebush Bay Drive rather than local streets.

Rhodes Shopping Centre can be accessed from the south from Homebush Bay Drive at Oulton Avenue or from a northbound ramp off Homebush Bay Drive into the rooftop car park. From the north, the shopping centre can be accessed off Concord Road at Averill Street or off Homebush Bay Drive at Oulton Avenue or via a left turn slip lane off Homebush Bay Drive connecting into Oulton Avenue.

The above accesses are signed with white on blue directional signage on Homebush Bay Drive and Concord Road.

From the analysis (see Section 5.3), there appears to be some 15 per cent of the traffic travelling southbound along Walker Street as through traffic. Traffic destined for the shopping centre from the north would be part of this 15 per cent. From surveys conducted as part of this study, it is indicated that traffic along Walker Street is not travelling at excessive speed (85th percentile speed was about 50km/hr). They generally obey the speed limit.

For the five year period to 31 December 2011, there were a total of 2,495 road crashes in the Canada Bay City Council area. Of the 2,495 crashes, only three occurred on Walker Street. None of the reported road crashes on Walker Street involved pedestrians nor were there any fatalities.

As such, there does not appear to be any anecdotal evidence to suggest that there is a proliferation of road crashes in the area.

As indicated previously, any measures introduced to discourage non-residential traffic through Rhodes would be draconian to the local residents resulting in them being a nuisance to the local residents. It is recommended for the situation to be monitored for any potential issues.

However, one possible simple measure would be the removal of the directional signage on Concord Road at Averill Street or alter this sign to direct shopping centre to continue to use Concord Road/Homebush Bay Drive. However, this is likely to be met with resistance from both the shopping centre owner and Roads and Maritime Services (RMS).

5.9 Recommendations

In relation to the management of internal traffic within Rhodes, it is recommended that the Rider Boulevard/Mary Street/Walker Street route be retained as the distributor route. All non-residential and non-local traffic should be encouraged to use the Rider Boulevard/Mary Street/Walker Street for accessing Rhodes. In addition, the following measures are also recommended:

- install 40km/hr high pedestrian activity area along the distributor route of Rider Boulevard/Mary Street/Walker Street with appropriate gateway treatment
- continue monitoring the internal roads within Rhodes for “rat running” traffic by-passing congestion on Homebush Bay Drive
- the existing priority operation of the Rider Boulevard intersections with Shoreline Drive and Mary Street be retained
- investigate the future possibility of providing a signalised pedestrian crossing on Walker Street outside of the railway station
- the intersection of Rider Boulevard and Mary Street to have its priority reversed such that traffic on Rider Boulevard has priority over Mary Street
- converted the intersection of Gauthorpe Street and Walker Street to operate as a roundabout intersection, and
- removal or modification of the shopping centre directional signage on Concord Road at Averill Street.

6. Summary and Conclusion

This report has been prepared to document the investigation of traffic impacts due to proposed development uplift within Rhodes Peninsula Station Precinct. Billbergia is the predominant land owner with Station Precinct.

Billbergia is proposing the following development uplift within Station Precinct (above existing approvals):

- 794 residential apartments
- 6,314m² of retail development (including a 3,500m² supermarket)
- 5,156m² commercial development
- 5,500m² (96 room) hotel, and
- 8,536m² of recreational facilities (with 250 car parking spaces).

The assessment also assesses the traffic impacts arising from the approved development, but not yet completed (including those completed, but not occupied).

The assessment adopted updated traffic generation rates provided by RMS.

Intersection capacity analysis was conducted for three scenarios as follows:

- Scenario 1 (S1) – existing base case conditions
- Scenario 2 (S2) – S1 above plus current approved development, and
- Scenario 3 (S3) – S2 above plus proposed uplift development at Precinct D.

The analysis indicates that at present (Scenario S1) the intersections operate satisfactorily with good level of service except at the Concord Road intersections with Homebush Bay Drive and Averill Street which have LoS F operation.

Following the completion of existing approved development (Scenario S2), the assessed intersections are expected to have similar performance as existing condition.

With the additional traffic arising from the proposed uplift (Scenario S3), all but one intersection are expected to retain their existing performance. The exception is at Shoreline Drive with Rider Boulevard which is expected to have its level of service deteriorate from LoS A to LoS C which is still considered to be satisfactory.

Canada Bay City Council requested for the traffic study to assess a number of transport management issues. The matters raised by Council have been addressed in this report. The following recommendations are made:

- install 40km/hr high pedestrian activity area along the distributor route of Rider Boulevard/Mary Street/Walker Street with appropriate gateway treatment
- continue monitoring the internal roads within Rhodes for “rat running” traffic by-passing congestion on Homebush Bay Drive
- the existing priority operation of the Rider Boulevard intersections with Shoreline Drive and Mary Street be retained
- investigate the future possibility of providing a signalised pedestrian crossing on Walker Street outside of the railway station
- the intersection of Rider Boulevard and Mary Street to have its priority reversed such that traffic on Rider Boulevard has priority over Mary Street
- converted the intersection of Gauthorpe Street and Walker Street to operate as a roundabout intersection, and

- removal or modification of the shopping centre directional signage on Concord Road at Averill Street.

Overall, the traffic impacts arising from the proposed development uplift would be satisfactory.

Appendix A

Appendix A

40km/hr High Pedestrian Activity Area Assessment

Introduction

RMS implemented the 40km/h High Pedestrian Activity Area (HPAA) to improve the safety for pedestrians in appropriate precincts where relatively high volumes of pedestrian road crossings occur. The program was implemented to reduce the severity and incidence of vehicle pedestrian accidents.

Below is an assessment of providing a 40km/hr HPAA on Rider Boulevard and Walker Street based on RMS guidelines – *40 km/h Speed Limits in High Volume Pedestrian Areas*.

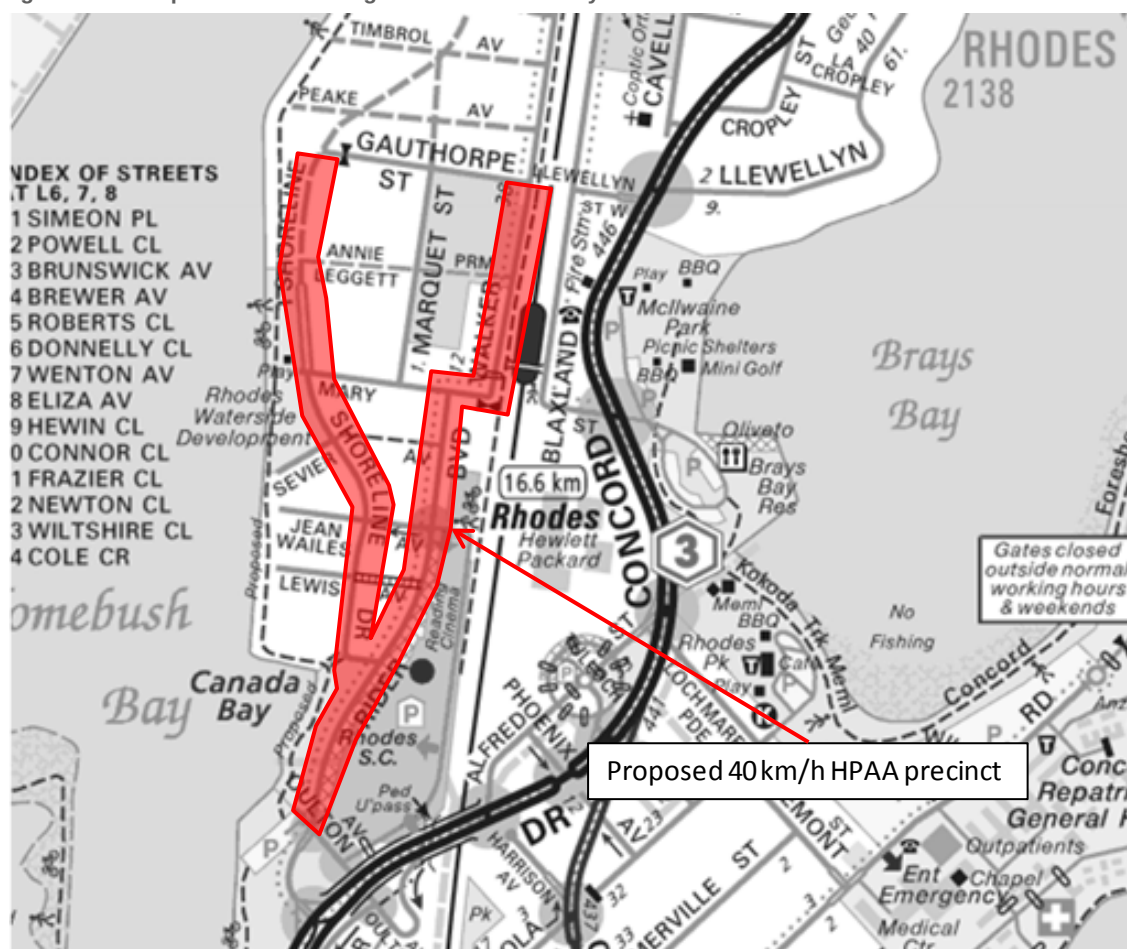
Roads

The proposed roads for inclusion in the scheme are:

- Walker Street between Mary Street and Gauthorpe Street
- Mary Street between Rider Boulevard and Walker Street
- Rider Boulevard between Oulton Avenue and Mary Street, and
- Shoreline Drive Rider Boulevard and Gauthorpe Street.

The sections of roads being considered is presented in Figure A.1.

Figure A.1: Proposed 40 km/h High Pedestrian Activity Area Precinct



Base image reproduced with permission from Sydway Publishing Pty Ltd

All of the subject roads are configured as two-way, two-lane roads. Parking is generally permitted adjacent to the kerbside, but is generally not permitted near intersections as per NSW Road Rules. All roads have a speed limit of 50km/h.

The selected roads form alternate north-south links on the Rhodes peninsula.

Existing Local Area Traffic Calming Treatments

The local area traffic calming treatments and features of each street are noted as follows:

- **Walker Street** – A raised pedestrian crossing is located adjacent to the Rhodes Railway Station. Adjacent to the Rhodes Railway Station the carriageway has been narrowed to facilitate Railway Station related infrastructure and a shared path. Walker Street continues directly on to Mary Street at a right angle corner.
- **Mary Street** – A pedestrian refuge provides carriageway adjacent to the intersection of Mary Street and Rider Boulevard. As previously stated, the right angle corner with Walker Street provides a naturally calming feature.
- **Rider Boulevard** – A signalised intersection is located at Rider Boulevard-Jean Wailes Avenue and a raised pedestrian crossing at the Shoreline Drive intersection.
- **Shoreline Drive** – Minor intersection kerb extensions are provided at the cross intersections with Lewis Avenue, Jean Wailes Avenue, Sevier Avenue, Mary Street and Gauthorpe Street. A central median between Gauthorpe Street and Mary Street provides channelised lanes in each direction. The general curvature of the road between Mary Street and Jean Wailes Avenue reduces sight distance. A right angle curve near the intersection with Rider Boulevard restricts speeds.

Pedestrian Volumes

Pedestrian volume surveys were conducted in the study area on 14 November 2013 between 7:00am and 7:00pm. The surveys separated pedestrian volumes into three areas along Walker Street within the study area including:

- Mid block crossings to the north of the pedestrian crossing
- The pedestrian crossing at Rhodes Railway Station
- Mid-block crossings to the south of the pedestrian crossing

The results of the pedestrian count surveys are summarised in Table A.1.

Table A.1: Pedestrian Volume Summary

Location	Morning Peak Hour	Evening Peak Hour	Daily
Mid-block crossings north of the pedestrian crossing	89	14	314
Pedestrian crossing	176	45	703
Mid-block crossings south of the pedestrian crossing	479	413	2,867

Table A.1 indicates the region experiences relatively high pedestrian crossing movements, particularly to the south of the pedestrian crossing in the study area.

Intersection Peak Period Surveys

In addition to the specific pedestrian surveys, intersection surveys were conducted at selected intersections within the proposed HPAA area. The intersection surveys were conducted between 7:00am – 9:00am and 4:00pm – 6:00pm on 14 November 2013. These surveys captured pedestrian movements across each leg of the relevant intersection and the results are summarised in Table A.2.

Table A.2: Pedestrian Crossings at Intersections

Intersections	Approach	Morning Peak Hour Pedestrian Volumes	Evening Peak Hour Pedestrian Volumes
Walker St-Gauthorpe St	North	1	3
	South	0	0
	West	352	156
Rider Blvd-Mary St	East	11	4
	South	61	43
	West	57	76
Rider Blvd-Shoreline Dr	North	63	205
	South	0	1
	West	13	22

Table A.2 indicates the surveyed intersections accommodate moderate to high pedestrian volumes during the morning and evening peak periods. The surveys indicate the following highest pedestrian movements:

- the western leg at Walker Street-Gauthorpe Street
- the southern and western leg of Rider Boulevard-Mary Street, and
- the zebra crossing on the northern leg of Rider Boulevard-Shoreline Drive which links with a key access to the Rhodes Shopping Centre.

Vehicle Volumes and Speeds

Pneumatic tubes were placed at key locations for seven days from 14 to 20 November 2013 to collect traffic volume and speed data at three locations. The results are summarised in Table A.3.

Table A.3: Surveyed Vehicle Volumes and Speed

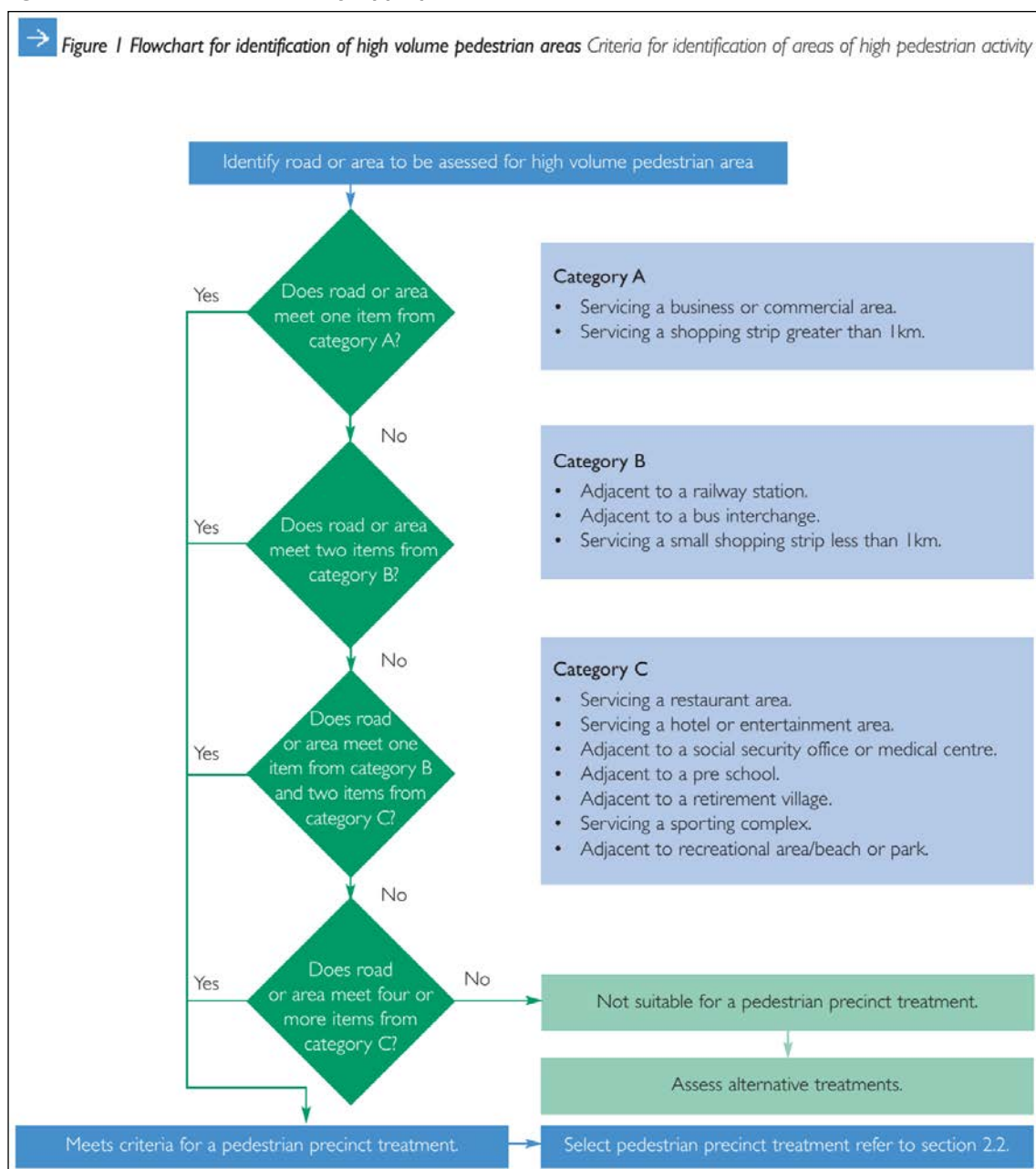
Location	Morning Weekday Peak Hour Flow	Evening Weekday Peak Hour Flow	Weekday Daily Average Flows	85 th Speed	Weekday Daily Average Speed
Walker St (Adjacent to Railway Station)	555 vph	650 vph	8,040 vpd	49km/hr	42km/hr
Rider Blvd (north of Oulton Ave)	925 vph	1,040 vph	13,750 vpd	49km/hr	42km/hr
Shoreline Dr (bet. Gauthorpe St and Mary St)	210 vph	300 vph	3,450 vpd	51km/hr	43km/hr

Of the three roads survey, Rider Boulevard carries the most traffic volume and Shoreline Drive carries the at least volume. This reflects their respective road characteristics. The surveyed speeds on all three roads are essentially the same.

Criteria for Selection

Figure A.2 reproduces a figure from the RMS documentation outlining suitable areas for a 40 km/h HPAA treatment.

Figure A.2: RMS Criteria to Identify Appropriate HPAA Areas



Reproduced from RMS guidelines 40 km/h Speed Limits in High Volume Pedestrian Areas

Selection Assessment

Walker Street meets the two items required in Category B, including areas adjacent to a railway station and adjacent to a bus interchange. As such Walker Street between Gauthorpe Street and Rider Boulevard generally meets the criteria for a pedestrian precinct treatment.

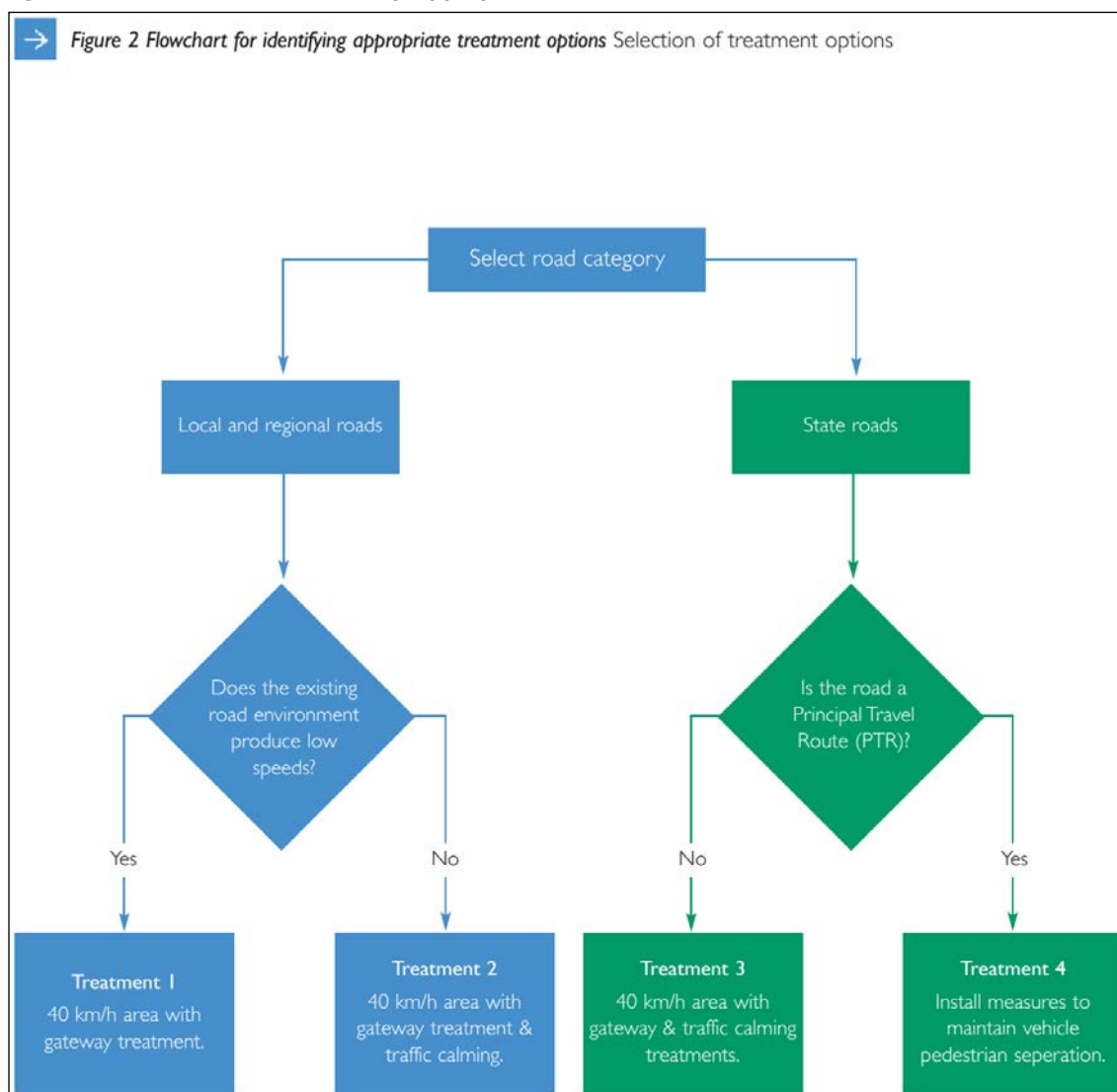
Rider Boulevard meets the Category A requirement, including areas adjacent to a shopping strip and adjacent to a business/ commercial area. There are currently shops that have direct access to Rider Boulevard.

Shoreline Drive does not meet the criteria requirements for a 40km/h HPAA area and as such other alternate treatments should be investigated if Council wishes to implement a lower speed limit.

Criteria for Treatment

Figure A.3 reproduces another flowchart contained in the RMS documentation which identifies appropriate treatment options.

Figure A.3: RMS Flowchart to Identify Appropriate Treatments



Reproduced from RMS guidelines 40 km/h Speed Limits in High Volume Pedestrian Areas

Walker Road and Mary Street are local roads and the surveyed 85th percentile vehicle speed along Walker Street was found to be 49km/h. Given the 85th percentile speed exceeds 40km/h, “Treatment 2” would need to be implemented to create a 40km/h precinct. Suitable traffic calming treatments are located in the south of the precinct, however to the north, between Rhodes Rail Station and Gauthorpe Street, the carriageway is relatively wide and straight and may require a traffic calming device in addition to the gateway treatment.

Rider Boulevard surveyed traffic speeds are relatively high and would also require “Treatment 2” for the implementation of a 40km/h HPAA.

Given Shoreline Drive does not meet the requirement to implement a 40km/h HPAA, Council may wish to implement a 40km/h Local Traffic Area. The requirements in RMS documentation appear to be minimal, with the installation of entry and exit point signage noted in *NSW speed zoning guidelines*. Further liaison with RMS would be required to confirm that the 40km/h HPAA is not suitable and that a 40km/h Local Traffic Area may instead be suitable.

40km/h HPAA Implementation

The design and implementation of a HPAA, including gateway and traffic calming treatments would be subject to further investigation. It is expected that this would integrate existing treatments, to minimise the requirement and cost to implement additional treatments. This would also involve a consultation, safety audits and the full design of the scheme in accordance with the RMS Guidelines.

Summary

It was found that Rider Boulevard, Walker Street and the connecting length of Mary Street generally meet the requirements for the implementation of a 40km/h HPAA.

The proposed roads are local and vehicle speeds are relatively low, however exceed the desired speeds. As such, an investigation should be conducted to determine suitable gateway treatments and any additional traffic calming requirements to encourage lower vehicle speeds in the area.

Shoreline Drive does not meet the standard criteria for the implementation of a 40km/h HPAA and as such it is recommended to confirm this with the RMS and investigate the appropriateness of a 40km/h Local Traffic Area if Council wish to implement a lower speed limit on Shoreline Drive.

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