Rhodes Station Precinct Traffic and Transport Review

Canada Bay Council

Final Report

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1. Introduction

1.1 Background

Jacobs Group Australia Pty Limited (Jacobs) has been commissioned by the City of Canada Bay Council (Council) to undertake a review of two planning proposals for sites on the western side of Rhodes Station on the Rhodes Peninsula. These DAs are for the following sites:

- Walker Street Developments Pty Ltd (Billbergia Pty Ltd):
  - 34 Walker Street.
  - 6 – 16 Walker Street.
  - 21 Marquet Street.
  - 23 – 25 Marquet Street.
  - 29 Marquet Street.
  - Oulton Avenue (separate site to those listed above).
- IProsperity Group:
  - 1-9 Marquet Street.
  - 4 Mary Street.

The Walker Street development site proposes 1,705 high rise residential apartments, retail developments, hotel and recreational facilities and the Oulton Avenue development is located further south of Station Street precincts and this includes 400 high rise residential apartments.

The IProsperity development, located on Marquet Street, consists of 399 high rise residential apartments, retail and commercial developments

The details of the above land uses are provided in Sections 3, 4 and 5 of this report.

Council has requested Jacobs to undertake a peer review of the traffic and transport implications of these two developments on the transport network within the Rhodes Peninsula.

This review is based on the following documents provided by Council:

- Billbergia: *Rhodes Station Precinct Proposed Uplift Traffic Assessment Report* (GTA Consulting, 25 August 2016)
- IProsperity Group: *Rhodes Transport Assessment* (Henson Consulting, October 2016).
- Oulton Avenue: *Oulton Avenue, Rhodes Proposed Residential Development Traffic and Access Investigation Report* (GTA Consulting, August 2016).
- Billbergia: *Rhodes East – Summary of Transport Impacts and Proposed Improvements* (Arup, 7 November 2016).

The information in this review is dependent on the adequacy of information and assumptions provided in the traffic and transport assessment reports of the corresponding DAs, presents an evaluation of the impacts in terms of the individual and cumulative impacts, and place these within the context of the broader existing and future transport network surrounding the Rhodes Peninsula.

1.2 Strategic Context

1.2.1 A Plan for Growing Sydney and the role of Rhodes

A Plan for Growing Sydney was released by the NSW Government in December 2014 and identifies a hierarchy of centres across the Sydney Metropolitan Region. Rhodes is identified in the plan as a strategic centre with specific actions to:

> *"Work with council to protect capacity for long-term employment growth in Rhodes"; and*

> *"Work with council to provide capacity for additional mixed-use development in Rhodes including offices, retail, services and housing".*

The plan defines a strategic centre as:

> *"The largest centres in the Sydney Metropolitan Area, when developed. They contain mixed-use activity of an amount, density and diversity that is of metropolitan significance, including commercial (office, business and retail), civic and cultural uses; government services; and higher density housing. They are typically on the passenger rail network or serviced by other high frequency public transport. Strategic centres typically contain at least 10,000 jobs, with the potential to accommodate ongoing jobs growth over the long-term. They are priority locations for employment and retail activity".*

As articulated in the above definition, strategic centres are priority locations for employment. The role of Rhodes as a significant employment centre is an important consideration when reviewing development proposals within the area. The cumulative effect of a number of residential development proposals on Rhodes' ability to provide long-term employment growth needs to be considered. This consideration is also relevant when reviewing the impact to the transport network as maintaining mixed-use activity and density will ensure the use of more sustainable modes and facilitate people living and working within the area, reducing the impact to the surrounding transport network.

1.2.2 Current Land Uses

Rhodes is located approximately 12 kilometres west of the Sydney CBD and approximately 8 kilometres east of Parramatta. Rhodes sits on a peninsula on the southern bank of the Parramatta River and is also located approximately 3 kilometres from Sydney Olympic Park. Ryde and Macquarie Park are located to the north of Rhodes, while Burwood and Strathfield are located to the south along with the industrial areas of Chullora, Enfield, Villawood, Clyde, Silverwater and Camellia.

1.2.3 Interface with Rhodes East Precinct

The proposed developments reviewed in this report have an interface with Rhodes East on the eastern side of the rail line. The Rhodes East area was nominated as a potential Priority Precinct by the City of Canada Bay Council. It includes land on the Rhodes Peninsula, on the eastern side of the Northern Rail Line and within walking distance of Rhodes train station.

The Department of Planning and Environment is working with the City of Canada Bay Council to investigate opportunities to revitalise Rhodes East. This includes ways to maintain and create new jobs in the area, and provide new homes, shops, cafes and foreshore access. This will likely result in an increased population on the eastern side of Rhodes Peninsula and any future developments on the western side will need to also consider this future population increase.

Work is currently occurring on Rhodes East as part of this process, which is expected to be publically exhibited in early 2017, and will set the future direction for the precinct; however also outline further investigations, and subsequent rezoning and planning determinations at a later stage after the exhibition period. For this report, it is important to consider that the overall structure and urban form of Rhodes East could increase the number of trips to and from the area.

1.3 Report Structure

This report is structured as follows:

- Section 2 – outlines the existing and future transport network.
- Section 3 – a review of the Billbergia proposal.
- Section 4 – a review of the IPropserity proposal.
- Section 5 – a review of the Oulton Avenue proposal.
- Section 6 – cumulative traffic impacts.
- Section 7 – summary of key findings.

2. Broader Transport Network

The following section outlines the existing conditions for Rhodes and the wider Rhodes Peninsula across different transport modes. Committed transport improvements are also presented to provide a more complete picture of future conditions. The section provides an overview of the current and future transport network to provide the context of more regional transport demands and constraints.

2.1 Walking and Cycling

2.1.1 Existing Conditions

Rhodes generally has an urban form that is walkable with a fairly permeable street layout. Walkability also leads to easier cycling opportunities with a simpler street network and better connectivity. The level of amenity in most local streets within Rhodes is good and most are suitable for cycling on-road, with pedestrian infrastructure (footpaths, kerb ramps, street crossings) complemented with urban landscaping.

There is an existing separated cycle network, including shared paths, in and around the Rhodes Peninsula. A 4.0 – 7.5 metre wide shared pedestrian and cyclist bicycle path runs along the eastern foreshore of Homebush Bay and connects the John Whitton Bridge with Bicentennial Park (Sydney Olympic Park) at Homebush Bay Drive/ Oulton Avenue. This path is well connected to the surrounding road network and adjacent residential developments by a series of paths aligned in an east-west direction. An additional 3 metre wide shared pedestrian and cyclist bicycle path also runs parallel to the main foreshore path.

A 3.5 metre wide shared pedestrian and cyclist bicycle path is located on the eastern side of the John Whitton rail bridge. This path provides a link across the Parramatta River and connects the northern end of the Rhodes peninsula with Meadowbank, North Ryde, Macquarie Park and beyond. There is an off-road shared path connection south to Rhodes Station on Blaxland Road and on-road along Walker Street and Rider Boulevard in the Rhodes town centre.

A 3.5 metre wide shared pedestrian and cyclist bicycle path is located on the eastern side of the Ryde Bridge. This path provides another link across the Parramatta River, however is next to the heavily trafficked lanes. Bicycle access to the Ryde Bridge path from the eastern foreshore path is via Leeds Street, Uhrs Point Reserve and a shared path under the bridge deck. On-road cycle logos are present on Llewellyn Street through the eastern part of Rhodes.

The Bennelong Bridge was opened in May 2016 and caters for buses, pedestrians and cyclists. Private vehicles (including taxis, hire cars and motorbikes) are not allowed to use the bridge.

The bridge has been developed as part of the planning for residential communities at Wentworth Point and Rhodes. The Homebush Bay Bridge is intended to connect these two growing communities, by providing a dedicated bus route and shared cycling and pedestrian path across the bay. The Bridge now provides improved connections for pedestrians connecting from Wentworth Point and Sydney Olympic Park to Rhodes, helping to create a regional walking and cycling connection.

2.2 Rail

2.2.1 Existing Conditions

Rail patronage at Rhodes Station has experienced significant growth over the past 10 years due to the development of high density residential precincts on remediated industrial lands. As a result, the number of journeys to and from Rhodes by rail has increased from 122,000 journeys per year in 2004 to 1,813,000 journeys per year in 2014. There has been a corresponding increase in the number of station barrier movements, where the total number of daily entries and exits increased from approximately 2,360 in 2004 to 13,300 in 2014.

Given the continued growth in demand along the T1 Northern Line including Rhodes, the majority of AM and PM peak rail services already reached their loading capacity in 2015. Inbound T1 Northern Line trains via Strathfield have an average load of 135% (or 148% without the express services) of their nominal capacity when they reach the city during the AM peak hour, with a maximum load of 162%. Similarly, outbound trains have an average load of 100% leaving the city during the PM peak hour, with a maximum load of 153%. This means that during peak periods, some passengers travelling to or from Rhodes are unable to board trains as they are overloaded.

2.2.2 Future Conditions

The planned new 2018 timetable driven by Sydney Metro Northwest would see change in stopping pattern as well as service frequency for T1 Northern Line. The existing AM peak half hourly Epping to City via Strathfield express services would start from Hornsby instead and the service frequency would increase to 15 minutes, potentially all stopping at Rhodes Station. The Epping all stations to Strathfield and then express to City services would likely remain unchanged.

Although the new timetable could see 2 additional services stopping at Rhodes during the AM peak hour, extending Epping express services from Hornsby would add more patronage to the already crowded T1 Northern Line during the peak periods, including additional growth close to the rail line north of Rhodes at locations such as Meadowbank.

2.3 Road

2.3.1 Existing Conditions

Rhodes is served by an established road network featuring a major north-south arterial corridor (Homebush Bay Drive/Concord Road) that facilitates inter-regional movement and local north-south and east-west routes that provide local access. Concord Road / Homebush Bay Drive is an arterial road that forms part of a metropolitan freight route and runs north-south through Rhodes. The priority movement along the corridor is north-south and signal priority along Concord Road through Rhodes is generally provided at the expense of east-west movements across Concord Road experiencing a higher degree of delay.

High delays are experienced on the existing road network around Rhodes on the Concord Road / Homebush Bay Drive corridor, which is currently operating close to capacity for vehicles. Through Rhodes, the corridor carries an average of 77,500 vehicles (bi-directional) per weekday. Key capacity constraints along the corridor include:

- Ryde Bridge and the Church Street / Devlin Street / Blaxland Road intersection in the northbound direction – this section experiences high delays, particularly during the AM peak; significant traffic volumes entering the corridor from Victoria Road where the northbound carriageway drops from two to three lanes to accommodate a dedicated lane from Victoria Road.
- Concord Road / Averill Street intersection – this intersection is currently constrained due to limited storage length on Averill Street, resulting in limited capacity.
- Concord Road / Mary Street intersection – long pedestrian crossing phase lengths and inefficient split-approach signal phasing limit capacity at this intersection.
- Homebush Bay Drive / Oulton Avenue / Rider Boulevard intersection – this intersection is constrained due to multiple merges within a short distance, resulting in conflicts with through traffic; and reduced capacity on Homebush Bay Drive to accommodate signal phases for vehicles turning into and out of Rider Boulevard.
- Concord Road / Homebush Bay Drive and Homebush Bay Drive / M4 Motorway – the convergence of these primary arterial roads results in high turning movements which compete for available green time.

2.3.2 Future Conditions

Overall there are limited opportunities to provide large scale major road upgrades on the existing higher order road network in Rhodes, particularly on the Concord Road / Homebush Bay Drive corridor. Substantial growth in traffic demand could have adverse impacts on the wider road network as well as the speed and reliability of bus services along Concord Road and Church Street.

2.4 Bus

2.4.1 Existing Conditions

Rhodes is served by a variety of different bus routes, including a cross-regional Metrobus route, and local routes. The major north-south corridor through Rhodes is Concord Road which is used by the Metrobus M41 service connecting north to Ryde and Macquarie Park and south to Burwood and Hurstville. The lack of east-west services is a function of the peninsular environment and limited crossing opportunities.

2.4.2 Future Conditions

Sydney's Bus Future identified a Rapid bus route from Hurstville to Macquarie Park via Burwood (the existing M41 Metrobus route) via Concord Road, which the Government has committed to improving service levels.

Other opportunities have been enhanced by the Bennelong Bridge. The bridge provides a bus and active transport connection from Rhodes to Wentworth Point. Bus services using the bridge act as feeder services for Wentworth Point residents accessing Rhodes Station, as well as providing connections to other employment centres such as Olympic Park and Ryde, and to local destinations such as the Rhodes Shopping Centre. With improved access by bus from Wentworth Point to Rhodes, this may place additional pressure on the Rhodes Train Station.

2.5 Ferry

2.5.1 Existing Conditions

There is no ferry wharf at Rhodes, however there are wharves at Meadowbank and Sydney Olympic Park.

2.5.2 Future Conditions

Sydney's Ferry Future indicated in 2012 that there would be a potential future wharf at Rhodes, which would be introduced as an additional stop on the Parramatta River route. The NSW Government is currently investigating this new ferry wharf at Rhodes.

3. Review of Billbergia Proposal

3.1 Outline of Billbergia Station Precinct Proposal

The Planning Proposal submitted for Billbergia developments includes the lands within the Station Precinct and Oulton Avenue site.

The Station Precinct is located to the immediate west of Rhodes Railway Station. The development site within the Station Precinct consists of the following properties:

- 34 Walker Street.
- 6-16 Walker Street.
- 21 Marquet Street.
- 23-25 Marquet Street.
- 29 Marquet Street.

The proponent seeks an amendment to the maximum building height and floor space ratio (FSR) standards under the *Canada Bay Local Environmental Plan 2013*. The purpose of the planning proposal is to amend the Canada Bay LEP 2013 to allow redevelopment of the sites in the Rhodes Station Precinct for high rise housing adjacent to the Rhodes train station and worker housing in a residential development on Oulton Avenue.

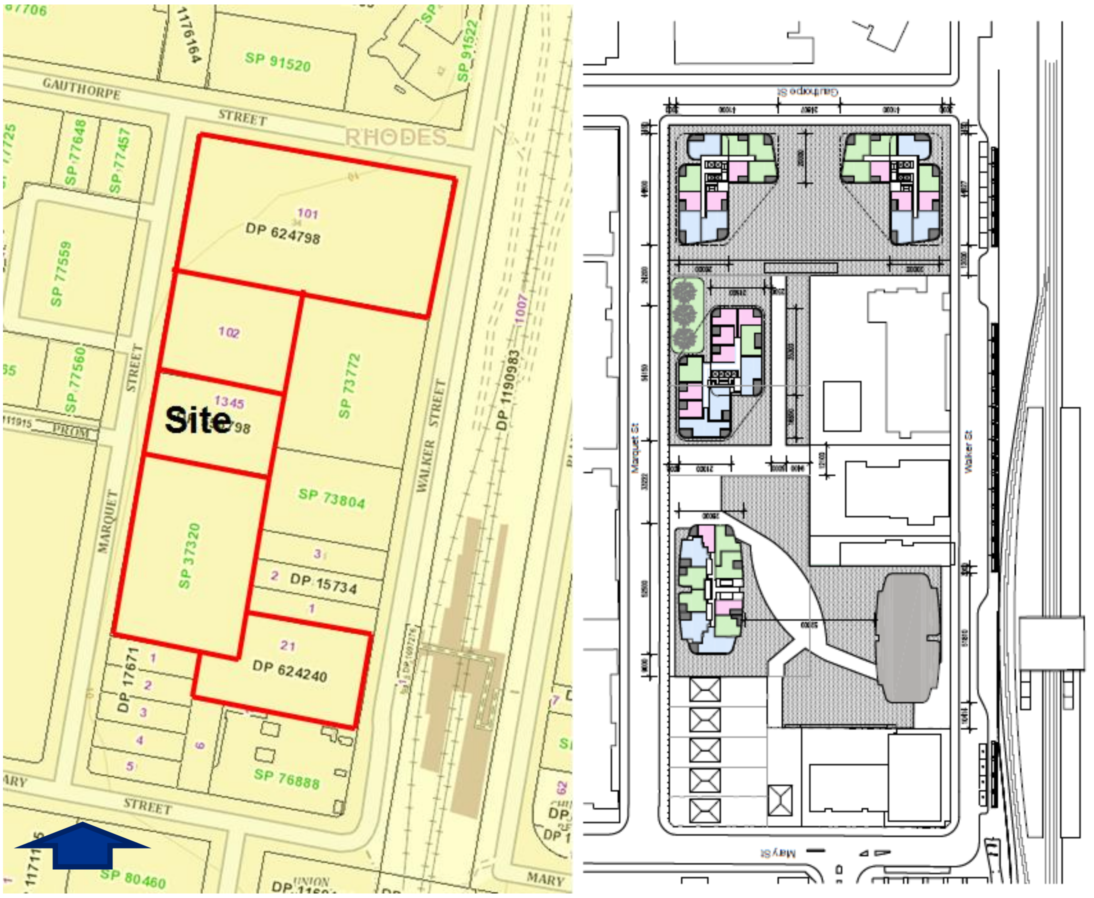
The above development site will provide the following land uses indicated in Table 3-1 as part of Billbergia's Planning Proposal 1 and Planning Proposal 2:

Table 3-1: Planning Proposal 1 and Planning Proposal 2 development summaries

Planning Proposal 1 (already has been approved)	Planning Proposal 2 (seeking approval)	Difference in developments
• 794 residential apartments • 6,314m^2 of retail development (including a 3,500m2 supermarket) • 5,156m^2 commercial development • 5,500m2 (96 room) hotel • 8,536m^2 of recreational facilities (with 250 car parking spaces).	• 1,705 residential apartments • 8,325m^2 of retail development (including a 3,500m^2 supermarket and a 4,000m2 discount department store) • 1,601m2 (28 room) hotel • 4,000m^2 of registered club • 8,536m^2 of recreational facilities (with 300 car parking spaces)	• +911 apartments • + 2,011 m^2 retail area • -5,156 m^2 commercial area • +50 car spaces for leisure • -68 hotel rooms • +4,000 m^2 registered club

Source: GTA report (25 / 08 / 2016)

Figure 3-1: Billbergia Station Precinct development site



Source: Jacobs / GTA report (25 / 08 / 2016)

3.2 Review of Traffic and Transport Proposal- Planning Proposal 2

3.2.1 Travel Mode split

As documented in Section 2, the majority of the surrounding road and rail networks are operating at or close to capacity. Even with the future transport interventions outlined, it is expected that access on to the strategic road network (Concord Road) and capacity on the rail line (Northern Line) will not change in the short-medium term without substantial improvements. As discussed, a small amount of rail line relief could be expected due to the opening of the Sydney North West Metro link.

The development proposal assesses Journey to Work data from the 2011 Census, which indicates car driver and train travel to work around 40% each, with an additional approximately 5% for travel as a car passenger. These travel percentages correspond to available information, however the data will now be out of date as there are now a much higher number of residents in high density apartments in the area.

As noted in the GTA traffic report, train services are also at capacity, with services operating at up to and over 135% capacity. A 100% load means there is a seat available for each passenger on the train. A load factor of 135% is the benchmark beyond which passengers start to experience crowding and dwell times start to impact on-time running. This benchmark percentage of 135% is typically used for planning purposes.

Issue 1

The GTA traffic report indicates that the train services at Rhodes are already at capacity, and they have referenced 2011 journey to work numbers, which will have increased in the last 5 years due to more high density residential apartments being built in Rhodes West, potentially under-estimating trips by rail.

The GTA traffic report also suggests that a future proposed ferry wharf at Rhodes could accommodate 300 additional trips from the development that would be unable to be catered for on the rail network. The suggestion that additional ferry services would relieve this demand seems unrealistic given the capacity, service frequencies and destinations of the Parramatta River ferries.

3.2.2 Traffic generation

The *Rhodes Station Precinct Proposed Uplift Traffic Assessment Report* by GTA Consulting (dated 25 August 2016) indicates that the RMS traffic generation rates (mainly based on parking spaces) have been applied to the development, which has been applied. However, the total estimation of trips generated by this development is not provided.

The trip generation rates provided in the GTA traffic report are shown in Figure 3.2.

Figure 3.2 : Provided trip 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 - Specialty	0.51 trips per peak hour per car space	1.02 trips per peak hour per car space
Retail – Discount Department Store	0.64 trips per peak hour per car space	1.28 trips per peak hour per car space
Retail – Supermarket	1.85 trips per peak hour per car space	3.69 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
Registered Club	0.8 trips per peak hour per 100m^2	1.9 trips per peak hour per 100m^2

Source: Rhodes Station Precinct Proposed Uplift Traffic Assessment Report *by GTA Consulting*

Issue 2

The total number of trips generated by the development is not given in the *Rhodes Station Precinct Proposed Uplift Traffic Assessment Report* by GTA Consulting (dated 25 August 2016), instead the report has provided a difference in traffic generation from the approved PP1 to proposed PP2.

In order to assess the trip generation of the development, Jacobs has estimated the total trips using the traffic generation rates identified in the GTA report, which are the same as the RMS rates. These trip rates were adopted for the land uses in Planning Proposal 2 (PP2) development and it is identified that the PP2 development will potentially generate 633 trips in morning peak hour and 967 trips in evening peak hour. The PP2 development trips are an increase of approximately 156 trips in the morning peak hour and 101 trips in the evening peak hour compared to the forecast PP1 trips. The above trip rates reflect the mode share (40% by car) for the Rhodes West area.

3.2.3 Car parking rates

The development application for PP2 developments comprises of the following land uses:

- Residential (high rise).
- Retail.

- Leisure central.
- Hotel.
- Registered club.

Canada Bay Council's Rhodes West DCP parking rates includes the following:

- Residential - Max 1 space per dwelling (all dwelling types).
- Commercial – Max 1 space per 40m^2 Gross Floor Area.
- Retail – 1 space per 40m2 Gross Floor Area.

Issue 3
The developer has only provided the proposed number of parking spaces for residential, retail and recreational facilities (2,214 spaces). No parking provision has been proposed for Hotel and Registered Club.

In order to identify the required parking provisions, Jacobs has estimated the requirements of parking space allocations as per Rhodes West DCP and identified that approximately 2300 spaces are required for residential, retail and leisure developments. Additional spaces required for the hotel and registered club on top of this. In order to reduce the proposed trips in the area, it is suggested that the Council review car parking rates for Rhodes West to match with proposed Rhodes East proposed rates.

According to the *RMS Guide to Traffic Generation*, the rates for hotels are 1 space for each unit plus 1 space per 2 employees, which are not considered suitable for Rhodes West, due to the site's close proximity to the train station. As an example, Randwick Council's suggested rate for hotels is 1 space per 4 beds plus 1 space per 2 employees. The rates mentioned for the registered club is 1 space per 10 persons plus 1 pace per 3 staff/manager and additional spaces for taxi pick up. Adoption of lower rates such as the Randwick DCP rates may be more reasonable for Rhodes West developments.

Issue 4
In order to reduce the trips from the future developments and minimise the impacts of additional car trips on the surrounding road network, it is suggested that Council review the Rhodes West parking rates.

3.2.4 Intersection analysis

The *Rhodes Station Precinct Proposed Uplift Traffic Assessment* report contains a number of modelling scenarios which include the PP1 and PP2 development scenarios. The modelling results of the Mary Street / Rider Boulevard intersection under the PP2 development scenario indicates that the intersection would operates at Level of Service (LoS) B with 16 seconds of average delay. Refer to Section 3.3 for the references to modelling performance elements being used.

Issue 5
The modelling results of the Rider Boulevard / Mary Street intersection under the PP2 development scenario are not consistent with the results of the modelling undertaken by Jacobs. Refer to Section 3.3 for Jacobs modelling results. The future traffic volume inputs in the models appear low as these do not reflect the trips generated from the Billbergia and other future developments (including Rhodes East) in the area. The cumulative impact of traffic generated by all developments in the station precinct indicates that this development will significantly impact the already congested local and state road network.

Issue 6

The intersections modelled as part of the assessment submission examined the affected intersections in isolation. The Mary Street / Rider Boulevard and Mary Street / Marquet Street intersections are closely spaced intersections with less than 60 metres between them and the operational efficiency of these intersections would influence one another. In this case, the isolated intersection analysis approach undertaken would not show the actual operational efficiency and would likely underestimate future delays.

Additionally, an assessment of the Gauthorpe Street / Marquet and Mary Street / Marquet Street intersections in the vicinity of the Station Street Precinct were not provided in the traffic report.

To the north of the development site, with the additional development traffic, the queue on the western approach on the Walker Street / Leeds Street / Blaxland Road intersection would likely to increase due to the constrained right turn storage capacity under the rail line and would block the through traffic movements. This intersection would require widening of the railway underpass with additional traffic lane capacity.

Furthermore, an upgrade of the Averill Street / Concord Road intersection may also be required to cater for the additional development traffic from both the station precinct and Rhodes East.

3.2.5 Car park access

The locations of the proposed access driveways for each land uses are located on:

- Access to retail land uses are via Gauthorpe Street.
- Access for service vehicles are via Walker Street.
- Residential driveways are located along Marquet Street, and
- One of the residential driveways is located next to the IProsperity development driveway.

Issue 7

The proposed residential access driveway from Marquet Street is located next to the IProsperity development driveway. Located adjacent to each other, the wide driveway access could be a potential safety issue for pedestrians due to a high number of entering/existing vehicles and long crossing distances for pedestrians. The Walker Street loading dock access driveway could also impact on pedestrian safety due to vehicles entering /existing onto a road with high pedestrian activity.

The Council DCP recommends vehicular access provision from rear or side lanes or secondary streets wherever possible. As such, Walker Street is not a suitable location for loading dock / residential driveways as it performs a major distribution function within Rhodes West. Therefore, these access locations on other streets e.g Marquet Street or Gauthorpe Street should be considered.

3.2.6 Traffic management and safety

The *Rhodes Station Precinct Proposed Uplift Traffic Assessment* Report recommends a concept of revising the Mary Street traffic priority to Rider Boulevard in order to reduce travel speed on Mary Street and to reduce the delays on Rider Boulevard. This has potential flow-on effects across the precinct.

Issue 8

A concept of reversing the priority at the Rider Boulevard / Mary Street intersection (currently a stop sign for Rider Boulevard) would result in long queues on both the east and west approaches of Mary Street.

Installation of the roundabout at this location is considered unsuitable as it would change the priority of Walker Street. It would also be a safety issue for pedestrians as roundabouts are not suitable crossing points in high pedestrian environments.

3.3 Intersection analysis

3.3.1 Outline and Terminology

In order to identify the network effects and cumulative impacts, SIDRA intersection analysis for the morning peak has been undertaken by Jacobs.

The intersections were tested for three scenarios:

- 2016 Existing – using the combination of 2013/ 2016 traffic counts from the GTA / Henson reports.
- 2036 Planning Proposal 1 (PP1) traffic – using PP1 trips, background traffic growth and trips from Rhodes East (note: traffic growth is based on 2036 STM Model forecast).
- 2036 Planning Proposal 2 (PP2) traffic - using PP2 trips, trips from IProsperity, background traffic growth and trips from Rhodes East.

The Roads and Maritime *Traffic Modelling Guidelines* (version 1.0, February 2013) state that the following core performance elements should be assessed when modelling using *SIDRA Intersection*:

- Degree of Saturation (DoS).
- Level of Service (LoS).
- 95 per cent back of queue distance.

With roundabouts and priority - control intersections, the critical criteria for assessment is the movement with the highest delay per vehicle.

These performance measures are described in the following sections.Degree of Saturation (DoS)

DoS is defined as the ratio of demand (arrival) flow to capacity (also known as volume to capacity ratio). A DoS above 1.0 represent oversaturated conditions (the demand flow exceeds capacity), and a DoS below 1.0 represents under saturated conditions (demand flows are below capacity).

Table 3.2 shows practical DoS for different intersection types. If the value is greater than the corresponding values shown subsequently in Table 3.4 for any lane, then the intersection requires appropriate treatment to maintain the acceptable level of DoS.

Table 3.2 : Maximum practical degree of saturation

Intersection type	Maximum practical DoS
Traffic signals	0.90
Roundabouts	0.85
Give way and stop signs	0.80
Continuous lanes	0.98

Source: Traffic Modelling Guidelines (RMS, version 1.0, February 2013)

Level of Service (LoS)

LoS is a qualitative measure describing operational conditions within a traffic stream and their perception by drivers and / or passengers. This measure is used in planning, design and operation of roads. It also provides a basis for determining the number of lanes to be provided on the road network. The road operational conditions in terms of LoS criteria are classified into six categories as shown in Table 3.3.

Table 3.3 : LoS criteria for intersections

LoS	Average delay per vehicle (seconds / vehicle)	Traffic signals and roundabouts	Give way and stop signs
A	Less than 15	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	Operating near capacity	Near capacity, and accident study required
E	57 to 70	At capacity; at signals, incidents will cause delays. Roundabouts require other control mode	At capacity, requires other control mode
F	Over 70	Extra capacity required	Extreme delay, traffic signal or other major treatment required

Source: Guide to Traffic Generating Developments (RMS, version 2.2, 2002)

The average delay assessed for signalised intersections is for all movements, and for priority (sign-controlled) intersections the intersection approach subsequently indicated in Table 3.4 is for the worst movement, and is expressed in seconds per vehicle.

95 per cent back of queue distance and mean max queue

The 95 per cent back of queue distance is the value below which 95 per cent of all observed cycle queue lengths fall, or five per cent of all observed queue lengths exceed. This value also represents the storage length of a lane.

3.3.2 Intersection Assessment

The intersections assessed are as listed below:

- Mary Street / Marquet Street.
- Gauthorpe Street / Marquet Street.
- Mary Street / Rider Boulevard.

Additional modelling scenarios were undertaken to identify the impacts associated with the priority control change concept recommended at the Mary Street / Rider Boulevard intersection. Refer to Table 3.4 for the modelling results.

Table 3.4 : AM peak modelling results

Existing / Future	DoS	Average Delay (seconds)	LoS	95% back of queue (metres)	Approach with maximum delay	Approach with maximum queue
1. Mary Street / Marquet Street - Existing intersection layout						
Existing Traffic	0.21	6.0	A	6	Marquet St (N)	Marquet St (N)
2036 Traffic with PP1 developments	0.25	5.0	A	9	Marquet St (N)	Marquet St (N)
2036 Traffic with PP2 developments	0.36	5.6	A	15	Marquet St (N)	Marquet St (N)
2. Gauthorpe Street / Marquet Street - Existing intersection layout						
Existing Traffic	0.1	5.2	A	3	Marquet St (S)	Marquet St (S)
2036 Traffic with PP1 developments	0.18	5.7	A	5	Marquet St (S)	Marquet St (S)
2036 Traffic with PP2 developments	0.3	5.2	A	9	Marquet St (S)	Marquet St (S)
3. Mary Street / Rider Boulevard - Existing intersection layout						
Existing Traffic	0.41	12	A	16	Rider Blvd (S)	Rider Blvd (S)
2036 Traffic with PP1 developments	0.77	24	B	50	Rider Blvd (S)	Rider Blvd (S)
2036 Traffic with PP2 developments	0.98	60	E	150	Rider Blvd (S)	Rider Blvd (S)
4. Mary Street / Rider Boulevard – Mary Street priority change scenario						
Existing Traffic	0.41	12	A	16	Rider Blvd (S)	Rider Blvd (S)

Existing / Future	DoS	Average Delay (seconds)	LoS	95% back of queue (metres)	Approach with maximum delay	Approach with maximum queue
2036 Traffic with PP1 developments	0.98	47	D	140	Mary St (W)	Mary St (W)
2036 Traffic with PP2 developments	1.25	250	F	150	Mary St (W)	Mary St (W)
5. Mary Street / Marquet Street – Mary Street priority change scenario						
Existing Traffic	0.21	5.5	A	6	Marquet St (N)	Marquet St (N)
2036 Traffic with PP1 developments	0.43	54	D	90	Marquet St (N)	Marquet St (N)
2036 Traffic with PP2 developments	0.7	124	F	570	Marquet St (N)	Marquet St (N)

Source: Jacobs, 2016

3.3.3 Key Findings

The modelling assessment for priority controlled intersections is based on the results of the worst performing movement with the highest delay. The key finding of the morning peak SIDRA modelling assessment are listed below:

- With the PP1 developments, the modelling indicates that all the intersections would operate satisfactorily under the existing layout, but would not perform satisfactorily with the priority control change option.
- The morning peak modelling results indicate that Mary Street / Rider Boulevard is the most affected intersection due to the additional development traffic from PP2 developments.
- As a result of the additional PP2 developments, the Mary Street / Rider Boulevard intersection would reach capacity with a Degree of Saturation (DoS) over 0.98 and a Level of Service (LoS) E. It would also result in a queue over 150 metres on the Rider Boulevard approach.
- The GTA Station Precinct report proposed a concept of revising the Mary Street priority to Rider Boulevard in order to reduce travel speeds on Mary Street and to reduce the delays on Rider Boulevard. Network modelling of the intersections of Mary Street / Rider Boulevard and Mary Street / Marquet Street has been undertaken to identify the impacts of this arrangement.
  The network modelling results indicate that this proposal would further deteriorate the operational performance of this intersection. This would result in long queues and delays on the western approach of Mary Street at the Mary Street / Rider Boulevard intersection and then the Marquet Street approach at the Marquet Street / Mary Street intersection and both intersections would operate at LoS F. As such, this option is not feasible.
- It is noted that the evening peak trips are higher than the morning peak. Therefore, the result of the evening peak is expected to be worse than the morning peak results.

Issue 9

The morning peak modelling results of the Mary Street / Rider Boulevard intersection indicate that the intersection operates at LoS E, with 60 seconds delay and a 150 metre queue on Rider Boulevard. The results outlined in the GTA Station Precinct report indicates that the intersection performs with LoS B and results in 16 seconds delays and a 20 metre queue on Rider Boulevard, which are inconsistent with our findings. The proponent has provided insufficient traffic generation and trip distribution data in their proposals to adequately demonstrate the local road network would perform satisfactorily under the future conditions.

Overall, it is identified that the operational performance of the intersections, especially the Mary Street / Rider Boulevard intersection would deteriorate with the additional traffic from PP2 developments. However, the intersections would operate satisfactorily with the trips from the PP1 developments.

Other intersections such as Averill Street / Concord Road and Leeds Street / Blaxland Road would be significantly impacted as a result of Rhodes East and the Station Precinct developments. Upgrading of these intersections with additional lane capacity / change of intersection controls would be required in order to achieve better operational performance.

4. Review of IProsperity Proposal

4.1 Outline of IProsperity Proposal

The Development Application submitted for the IProsperity developments includes the lands within the Station Precinct. The Station Precinct is located to the immediate west of Rhodes Railway Station. The development site within the Station Precinct consists of the following properties:

- 4 Mary Street.
- 1-9 Marquet Street.

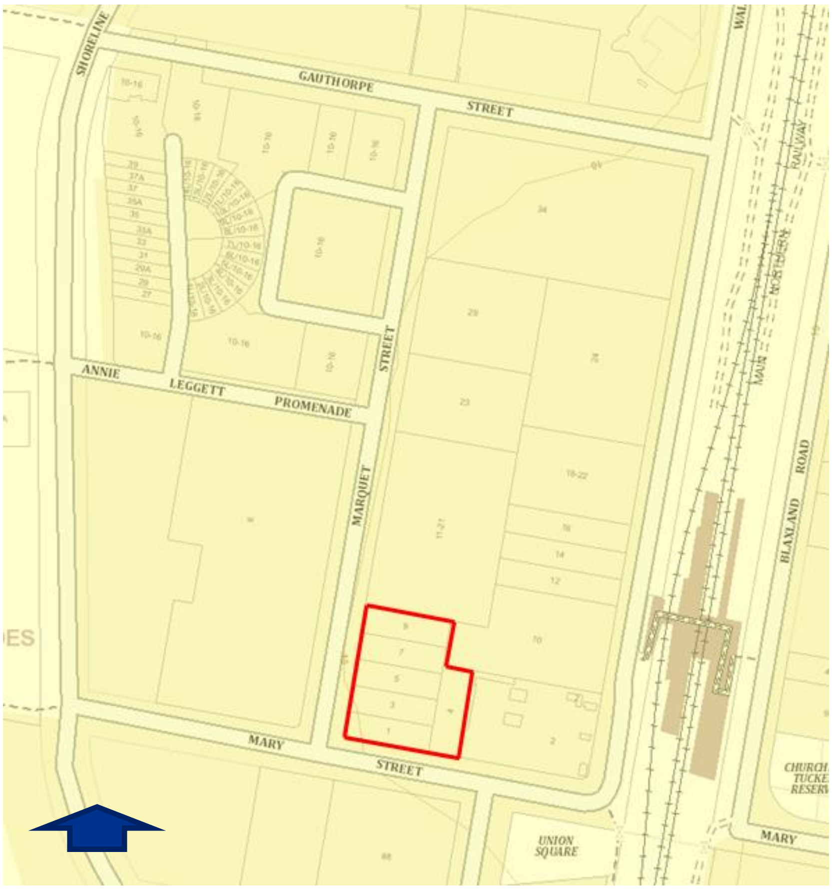
The above development site will provide the following developments indicated in the below table:

Table 4-1: Planning Proposal development summary

Previously submitted planning proposal (rejected)	Amended Planning Proposal (seeking approval)	Difference in developments
• 100 000m^2 for residential (1300 units) • 20 000m^2 for retail and commercial • 5 000m^2 for hotel (96 rooms) • 8 500m^2 for recreation centre • In addition to on-site parking for the above uses, a 250 space public car park was to be provided under the recreation centre at 34 Walker Street.	• 399 residential apartments • 1404m^2 GFA for retail development • 3861 for commercial development • On-site parking for the above uses with 400 basement car parks and additional 250 car parking spaces • Driveway on northern boundary of Marquet Street	• -901apartments • -14,755 m^2 GFA for both retail and commercial • +8500 m^2 GFA for recreational centre • +250 additional car parking for recreational

Source: GTA report (25/08/2016)

Figure 4-1: Prosperity Station Precinct development site



4.2 Review of Traffic and Transport Proposal

4.2.1 Travel Mode split

As per the previous review and as documented in Section 2, the majority of the surrounding road and rail networks are operating at or close to capacity. Even with the future transport interventions outlined, it is expected that access on to the strategic road network (Concord Road) and capacity on the rail line (Northern Line) will not increase in the short-medium term without substantial improvements.

The development proposal includes Journey to Work data from the 2011 Census, which indicates car driver and train travel to work around 40% each, with an additional approximately 5% for travel as a car passenger. These travel percentages correspond to available information, however the data will now be out of date.

While vehicle driver percentages could be expected to decrease slightly for the area based on high density residential apartments, due to the constrained road and rail network, the rail network is unlikely to be able to accommodate substantial numbers of additional passengers as train services are also at capacity, with services operating at up to and over 135% capacity.

4.2.2 Traffic generation

The IProsperity *Rhodes Transport Assessment* report by Henson Consulting (October 2016) indicates that the RMS traffic generation rates have been applied. Our findings indicate that the total trips from this development result in approximately 200 trips in the morning peak hour and 240 trips in the evening peak hour. When considering the potential IProsperity trips in isolation, these trips would not be expected to impact on the existing road network and intersections.

Issue 10
The trips from the IProsperity development are not consistent with Jacobs' estimated trips. Only evening trips are provided (106 trips) and retail development trips have not been provided. However, when considering the cumulative trips from both Billbergia development, it will produce a total of 833 trips in the morning peak and 1,206 trips in the evening peak. The large number of trips generated by the new developments will significantly impact the already congested surrounding road network.

4.2.3 Intersection analysis

No traffic modelling has been undertaken for this proposal; the same traffic analysis results from the Billbergia development proposal (the GTA Station Precinct report) have been used in the IProsperity transport assessment by Henson Consulting. Despite no traffic modelling, the report concludes that the additional traffic generated from the uncompleted approved developments, including the subject site, would not impact the intersection performance and would continue to be operated satisfactorily, except the intersection of Averill Street / Concord Road.

Refer to Section 3.3 for the details of the Jacobs modelling analysis.

4.2.4 Car parking rates

The Henson Consulting transport assessment indicates that the proposed development will have a total car parking supply of 492 car spaces provided for residential, retail and commercial facilities. The car parking rates are derived from the Rhodes West DCP / RMS rates. The report indicates that the development is consistent with the Council DCP to increase public transport, walking, and cycling in Rhodes West.

A total of 400 car parking spaces have been proposed. The required spaces as per the RMS / DCP rates would be 492 spaces. The proponent's report states that the shortfall is acceptable and consistent with the Rhodes West DCP objective to improve transport mode share- more walking, cycling and public transport. The proponent's proposed reduction in parking provision is acceptable as it meets council's larger goal of reducing parking in the Rhodes West precincts and it would encourage less car use.

4.2.5 Car park access

The proposed residential access driveway from Marquet Street is located next to the Billbergia development driveway.

See previous Issue 7
The proposed residential access driveway from Marquet Street is located next to the IProsperity development driveway. Located adjacent to each other, the wide driveway access could be a potential safety issue for pedestrians due to a high number of entering/existing vehicles and long crossing distances for pedestrians. The Walker Street loading dock access driveway also could impact on pedestrian safety due to vehicles entering /existing on a road with high pedestrian activity. *The Council DCP recommends vehicular access provision from rear or side lanes or secondary streets wherever possible. As such, Walker Street is not a suitable location for loading dock / residential driveways as it performs a major distribution function within Rhodes West. Council should clarify with the proponents the access provisions for the car parks and loading docks.*

4.3 Intersection Analysis

Intersection analysis using the SIDRA Intersection network tool has been undertaken by Jacobs on Rider Boulevard / Mary Street, Mary Street / Marquet Street and Gauthorpe Street / Marquet Street intersections with the inclusion of both the Billbergia PP2 and IProsperity developments. In this scenario, the Mary Street / Rider Boulevard intersection was the worst performing intersection with a Degree of Saturation (DoS) over 0.98, a Level of Service (LoS) E and queue over 150 metres on the Rider Boulevard approach.

When considering IProsperity trips in isolation, these trips would not be expected to impact on this intersection. In this case, the additional traffic at the Mary Street / Rider Boulevard intersection is considered as minor and it is anticipated that the intersection would continue to operate with minimal delays and queue lengths, similar to the existing situation. However, consideration of the cumulative trips from Billbergia development, IProsperity and Rhodes East is required in order to identify the likely future situation.

For intersection analysis for the cumulative scenario, see Section 3.3.

5. Review of Oulton Avenue development proposal

5.1 Outline of the Proposal

The Oulton Avenue site proposed by Billbergia is located on the northern side of Oulton Avenue between the Homebush Bay Drive southbound main carriageway and southbound off ramp. The site is situated within 750 metres walking from Rhodes Station.

The proponent is seeking to retain the current land use zoning, but increase the height of buildings and the floor space ratio (FSR) controls applicable to the site under the *Canada Bay Local Environmental Plan 2013*. The development site is proposed to have up to 400 apartments.

The Oulton Avenue transport assessment is an appendix to the GTA report titled *Oulton Avenue, Rhodes Proposed Residential Development Traffic and Access Investigation Report* (August 2016).

Figure 5-1: Oulton Avenue development site

Jacobs, 2016

5.2 Review of Traffic and Transport Proposal- Oulton Avenue

5.2.1 Travel Mode split

The GTA traffic report has not included any mode split targets or assumptions.

Issue 11

Up to 400 apartments are proposed on the Oulton Avenue site, and while indicating potential traffic generation, the GTA traffic report does not indicate how other transport customers / users would access the site or travel to and from their destinations.

5.2.2 Traffic generation

The GTA traffic report indicates that the RMS traffic generation rates have been applied to the development. The provided trips for 400 apartments are consistent with Jacobs' analysis (approximately 80 trips in AM peak and 60 trips in PM peak hour).

Issue 12

The trips proved for this development are generally consistent for this size development. However, it is unclear that whether the traffic growth and cumulative trips from other developments has been considered.

5.2.3 Car parking rates

No car parking rates and parking space allocations have been provided in the report. According to Rhodes West DCP, a maximum of 400 parking spaces would need to be provided as part of this development.

5.2.4 Intersection analysis

Intersection modelling has been undertaken for the surrounding intersections such as Oulton Avenue / Rider Boulevard, Oulton Avenue / Homebush Bay Drive, Oulton Avenue / Access Road and Oulton Avenue / Wentworth Drive. The results of the modelling provided in the report indicate the intersections would operate satisfactorily. Based on the information provided, Jacobs have been unable to determine if appropriate background traffic and cumulative development traffic has been considered in the GTA traffic report, meaning that the traffic modelling results may under-represent future traffic, and as a consequence the intersections may perform worse than reported.

5.2.5 Car park access

The plan shows that the location of the proposed access driveways of the development is via Oulton Avenue. This may result in queue and conflict issues on Oulton Avenue due to high number of entering / leaving vehicles.

5.2.6 Traffic management and safety

The GTA traffic report indicates that access to the site is only possible via Oulton Avenue and two vehicle access options have been proposed in the report. Option 1 involves the addition of a fourth leg to the existing signalised intersection at Oulton Avenue and Option 2 involves the conversion of the existing priority intersection at Oulton Avenue / Wentworth Drive into a single lane roundabout with an additional fourth leg to provide site access. The access provisions potentially results in queues and conflicts on Oulton Avenue due to high number of entering and leaving vehicles at this location. In light of this, it is unlikely that RMS / Council would approve both options.

Issue 13

The report indicates Option 1 as the preferred option. However, the proponent does not appear to have consulted with Council and / or RMS regarding this option. It is unlikely that RMS/Council would approve either option.

6. Cumulative Transport Impacts

6.1 Cumulative Transport Impacts Review and Summary

The cumulative impacts associated with the Billbergia and IProsperity developments are listed as follows:

- The cumulative trips from both the IProsperity and Billbergia developments will result in a total of 833 trips in the morning peak and 1,206 additional vehicle trips in the evening peak. The SIDRA network modelling undertaken by Jacobs has considered the cumulative trips from Station Precincts and potential Rhodes East developments. The results of morning peak models of the Mary Street / Rider Boulevard intersection indicate that the intersection operates at LoS E, with 60 seconds delay and a150 metre queue on Rider Boulevard. This is an indication that the large number of vehicle trips from the new developments will significantly impact the already congested road network in the area.
- Averill Street - Walker Street - Rider Boulevard is the major traffic distribution route through the western side of Rhodes, which provide access to the broader arterial road network such as Concord Road, Homebush Bay Drive, M4 Motorway and Victoria Road. A major proportion of the city bound traffic from the western side of Rhodes uses the Walker Street – Leeds Street – Averill Road route to access Concord Road and traffic to Homebush Bay Drive uses Rider Boulevard.
- The Concord Road and Averill Street intersection is already operating at capacity with LoS E and with extensive queues on Concord Road and delays on Averill Street during peak periods. This is due to downstream / upstream congestion on Concord Road, which indicates that there is little spare capacity, and this additional traffic would worsen regional traffic flows. The intersections of Concord Road and Victoria Road, and Homebush Bay Drive and M4 Motorway are also at or near capacity under the existing conditions.
- The additional PP2 development traffic would further impact on these already congested roads. The local intersections such as Leeds Street / Blaxland and Leeds Street / Cavell Avenue and Rider Boulevard / Mary Street also would be significantly impacted. Upgrading of these intersections with additional lane capacity / change of intersection controls would be required in order to achieve a better intersection operational performance, however may require additional land take around the intersections.
- Intersection modelling has been undertaken for the surrounding intersections such as Oulton Avenue / Rider Boulevard, Oulton Avenue / Homebush Bay Drive, Oulton Avenue / Access Road and Oulton Avenue / Wentworth Drive. The results of the modelling provided in the report indicate the intersections would operate satisfactorily. Based on the information provided, Jacobs have been unable to determine if appropriate background traffic and cumulative development traffic has been considered in the GTA traffic report, meaning that the traffic modelling results may under-represent future traffic, and as a consequence the intersections may perform worse than reported.
- The additional proposed developments and associated population growth on the western side of Rhodes (and with any future development of the Rhodes East precinct) is anticipated to substantially increase pedestrian activities on Rider Boulevard, Mary Street, Walker Street, Gauthorpe Street and Leeds Street routes and intersections. The current intersection arrangements on these routes may suffer a decrease in pedestrian amenity and could potentially see increased pedestrian safety risks. Commensurate with these population increases, there would also need to be the consideration of installing appropriate pedestrian facilities on these routes to cater for the additional pedestrian growth in the area, including widening of footpaths, installation of marked pedestrian crossings, kerb extensions and refuge islands to facilitate the pedestrian movements in the area.

7. Key Findings / Summary

Canada Bay Council has requested Jacobs to undertake a peer review of the traffic and transport implications of Billbergia and IProsperity developments on the transport network within the Rhodes Peninsula.

This review therefore focuses on the adequacy of information and assumptions provided in the traffic and transport assessment reports of the corresponding DAs, presents an evaluation of the impacts in terms of the individual and cumulative impacts, and place these within the context of the broader existing and future transport network surrounding the Rhodes Peninsula.

The following key issues have been identified:

7.1 Billbergia Proposal

- The GTA traffic report indicates that the train services at Rhodes are already at capacity, and they have referenced 2011 journey to work numbers, which will have increased in the last 5 years due to more high density residential apartments being built in on the western side of Rhodes, potentially under-estimating trips by rail.

- The GTA traffic report also suggests that a future proposed ferry wharf at Rhodes could accommodate 300 additional trips from the development that would be unable to be catered for on the rail network. The suggestion that additional ferry services would relieve this demand seems unrealistic given the capacity, service frequencies and destinations of the Parramatta River ferries.

- The modelling results of the Rider Boulevard / Mary Street intersection provided in the traffic report for the PP2 development scenario are not consistent with the results of the modelling undertaken by Jacobs. This is due to the traffic volume inputs which do not reflect the trips generated from the Billbergia, IProsperity and Rhodes East developments in the area. Additionally, the intersections were modelled as isolated intersection scenarios. Mary Street / Rider Boulevard and Mary Street / Marquet Street are closely spaced intersections with less than 60 metres apart and the operational efficiency of these intersections would influence each other. In this case, isolated intersection analysis approach does not show the actual operational efficiency.

- The morning peak modelling results of the Mary Street / Rider Boulevard indicate that the intersection operates at LoS E, 60 seconds delay and 150 meters queue on Rider Boulevard. The results outlined in the Station Precinct traffic report indicates that the intersection performs with LoS B and result in 16 seconds delays and 20 meters queue on Rider Boulevard, which are inconsistent with Jacobs modelling reports. The proponent has provided insufficient traffic generation and trip distribution data in their proposals to adequately demonstrate the local road network would perform satisfactorily under the future conditions. As the evening peak trips are higher than the morning peak trips, the traffic impacts of evening peak period is expected to be worse than the morning peak.

- Other intersections such as Concord Road / Homebush Bay Drive, Averill Street / Concord Road and Leeds Street / Blaxland Road which are already at or near capacity and these intersections would be significantly impacted as a result of Rhodes East and Station Precinct developments. Upgrading of these intersections with additional lane capacity / change of intersection controls would be required for these intersections to be capable of carrying additional traffic in the future. Further intersection analysis with mitigation scenario option testings of these intersections would be required in order to identify possible solutions.

- The Council DCP recommends a vehicular access provision from rear or side lanes or a secondary street wherever possible. As such, Walker Street is not a suitable location for loading dock / residential driveways as it is a major distribution route within on the western side of Rhodes. Therefore, these access locations on other streets e.g. Marquet Street or Gauthorpe Street should be considered.

- A concept of reversing the priority at Rider Boulevard / Mary Street intersection would result in long queues on both east and west approaches of Mary Street.

- Installation of the roundabout at this location is considered unsuitable as it would change the priority of Walker Street. It would also be a safety issue for pedestrians as roundabouts are not suitable crossing points in high pedestrian environments.

- Located adjacent to each other, the wide driveway accesses of both developments could be a potential safety issue for pedestrians due to a high number of entering/existing vehicles and long crossing distances.

- To the north of the development site, with the additional development traffic, the queue on the western approach on the Walker Street / Leeds Street / Blaxland Road intersection would likely to increase due to the constrained right turn storage capacity under the rail line and would block the through traffic movements. This intersection would require widening of the railway underpass with additional traffic lane capacity. Furthermore, an upgrade of the Averill Street / Concord Road intersection may also be required to cater for the additional development traffic on the on the western side of Rhodes.

- With the Billbergia PP2 development generated traffic along with IProsperity and Rhodes East traffic in the station precinct would significantly impact the local streets identified in Rhodes and in particular impact on Concord Road. The intersections of Concord Road and Victoria Road, and Homebush Bay Drive and M4 Motorway are also at or near capacity under the existing conditions. These additional developments would result in further impacts on these major arterial road intersections.

- Overall, it was identified that the performance of the intersections, especially Mary Street / Rider Boulevard would deteriorate with the additional traffic from PP2 developments. However, the intersections would operate satisfactorily with the additional trips from PP1 developments.

7.2 IProsperity Proposal

- The trips from IProsperity development are not consistent with the estimated trips by Jacobs. The provided trip estimation does not include morning peak trips. The evening peak trips (106 trips) do not contain the trips from retail developments. Our findings indicate that the total trips from this development result in approximately 200 trips in the morning peak hour and 240 trips in the evening peak hour. However, when considering the IProsperity trips in isolation, these trips are not expected to impact on the existing road network and intersections.

- When considering the IProsperity trips in isolation, the additional traffic at Mary Street / Rider Boulevard is considered as minor and it is anticipated that the intersection would continue to operate with minimal delays and queue lengths, similar to the existing situation. However, consideration of the cumulative trips from the Billbergia development, IProsperity and Rhodes East is required in order to identify the likely future situation.

- In order to reduce the trips from the future developments, it is suggested that Council review the Rhodes West parking rates.

7.3 Oulton Avenue Proposal

- Intersection modelling has been undertaken for the surrounding intersections such as Oulton Avenue / Rider Boulevard, Oulton Avenue / Homebush Bay Drive, Oulton Avenue / Access Road and Oulton Avenue / Wentworth Drive. The results of the modelling provided in the report indicate the intersections would operate satisfactorily. Based on the information provided, Jacobs have been unable to determine if appropriate background traffic and cumulative development traffic has been considered in the GTA traffic report, meaning that the traffic modelling results may under-represent future traffic, and as a consequence the intersections may perform worse than reported.

- The GTA traffic report indicates that access to the site is only possible via Oulton Avenue and two vehicle access options have been proposed in the report. The GTA traffic report recommends a preferred option. However, the proponent does not appear to have consulted with Council and / or RMS regarding this option.

Appendix A. Modelling Results

SIDRA Modelling Results – 2016 Existing

Site: Mary St / Marquet St AM Existing

Network: Marquet- Mary-Rdr Blvd -Existing

Mary St / Marquet St AM Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Mary St E													
5	T1	56	0.0	56	0.0	0.045	0.3	LOS A	0.1	1.0	0.18	0.17	48.6
6	R2	24	2.0	24	2.0	0.045	5.1	LOS A	0.1	1.0	0.18	0.17	47.7
Approach		80	0.6	80	0.6	0.045	1.7	NA	0.1	1.0	0.18	0.17	48.3
North: Marquet St N													
7	L2	23	1.0	23	1.0	0.209	4.9	LOS A	0.8	5.6	0.28	0.58	43.4
9	R2	206	2.0	206	2.0	0.209	5.5	LOS A	0.8	5.6	0.28	0.58	45.6
Approach		229	1.9	229	1.9	0.209	5.4	LOS A	0.8	5.6	0.28	0.58	45.4
West: Mary St W													
10	L2	92	2.0	92	2.0	0.092	4.6	LOS A	0.0	0.0	0.00	0.28	47.9
11	T1	82	1.0	82	1.0	0.092	0.0	LOS A	0.0	0.0	0.00	0.28	46.9
Approach		174	1.5	174	1.5	0.092	2.4	NA	0.0	0.0	0.00	0.28	47.6
All Vehicles		483	1.6	483	1.6	0.209	3.7	NA	0.8	5.6	0.16	0.41	46.6

Site: Rdr Blvd / Mary- AM Existing

Network: Marquet- Mary-Rdr Blvd -Existing

Rdr Blvd / Mary St AM
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rider Blvd S													
1	L2	55	4.0	55	4.0	0.411	8.9	LOS A	2.2	16.0	0.22	1.00	44.4
3	R2	256	6.0	256	6.0	0.411	12.0	LOS A	2.2	16.0	0.22	1.00	49.0
Approach		311	5.6	311	5.6	0.411	11.5	LOS A	2.2	16.0	0.22	1.00	48.5
East: Mary St E													
4	L2	276	3.0	276	3.0	0.165	5.6	LOS A	0.0	0.0	0.00	0.53	53.9
5	T1	25	0.0	25	0.0	0.165	0.0	LOS A	0.0	0.0	0.00	0.53	51.5
Approach		301	2.7	301	2.7	0.165	5.1	NA	0.0	0.0	0.00	0.53	53.7
West: Mary St W													
11	T1	46	1.0	46	1.0	0.206	1.2	LOS A	1.1	7.5	0.43	0.53	52.6
12	R2	242	2.0	242	2.0	0.206	5.4	LOS A	1.1	7.5	0.43	0.53	49.4
Approach		288	1.8	288	1.8	0.206	4.8	NA	1.1	7.5	0.43	0.53	49.9
All Vehicles		900	3.5	900	3.5	0.411	7.2	NA	2.2	16.0	0.21	0.69	50.8

Site: Gauthorpe St / Marquet St AM Existing

Network: Marquet-Gauthorp-Walker - Existing

Marquet St / Gauthorpe St
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Marquet St S													
1	L2	37	2.0	37	2.0	0.098	4.6	LOS A	0.3	2.5	0.04	0.55	46.3
3	R2	79	2.0	79	2.0	0.098	5.4	LOS A	0.3	2.5	0.04	0.55	43.9
Approach		116	2.0	116	2.0	0.098	5.2	LOS A	0.3	2.5	0.04	0.55	45.0
East: Gauthorpe St E													
4	L2	68	2.0	68	2.0	0.041	4.6	LOS A	0.0	0.0	0.00	0.48	46.9
5	T1	7	3.0	7	3.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.48	47.3
Approach		76	2.1	76	2.1	0.041	4.1	NA	0.0	0.0	0.00	0.48	46.9
West: Gauthorpe St W													
11	T1	9	4.0	9	4.0	0.102	0.2	LOS A	0.5	3.5	0.18	0.50	44.0
12	R2	161	2.0	161	2.0	0.102	4.8	LOS A	0.5	3.5	0.18	0.50	45.9
Approach		171	2.1	171	2.1	0.102	4.6	NA	0.5	3.5	0.18	0.50	45.9
All Vehicles		362	2.1	362	2.1	0.102	4.7	NA	0.5	3.5	0.10	0.51	45.9

Site: Gauthorpe St / Walker AM Existing

Network: Marquet-Gauthorp-Walker - Existing

Gauthorpe St / Walker St AM PP2+Iprosp
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Walker St S													
1	L2	37	3.0	37	3.0	0.158	3.6	LOS A	0.0	0.0	0.00	0.09	40.7
2	T1	265	2.0	265	2.0	0.158	0.1	LOS A	0.0	0.0	0.00	0.09	41.4
Approach		302	2.1	302	2.1	0.158	0.6	NA	0.0	0.0	0.00	0.09	41.3
North: Walker St N													
8	T1	282	3.0	282	3.0	0.177	0.2	LOS A	0.3	2.4	0.13	0.07	53.9
9	R2	39	2.0	39	2.0	0.177	5.8	LOS A	0.3	2.4	0.13	0.07	48.6
Approach		321	2.9	321	2.9	0.177	0.9	NA	0.3	2.4	0.13	0.07	53.5
West: Gauthorpe St W													
10	L2	77	4.0	77	4.0	0.078	5.4	LOS A	0.3	2.1	0.36	0.57	45.3
12	R2	12	2.0	12	2.0	0.078	7.5	LOS A	0.3	2.1	0.36	0.57	40.9
Approach		88	3.7	88	3.7	0.078	5.7	LOS A	0.3	2.1	0.36	0.57	44.6
All Vehicles		712	2.7	712	2.7	0.177	1.4	NA	0.3	2.4	0.10	0.14	46.5

SIDRA Modelling Results 2036 PP1 development

Site: Mary St / Marquet St AM -PP1 only

Network: Marquet Mary -Rdr Blvd PP1

Mary St / Marquet St AM Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Mary St E													
5	T1	56	0.0	56	0.0	0.058	0.5	LOS A	0.2	1.7	0.28	0.22	38.9
6	R2	41	2.0	41	2.0	0.058	4.4	LOS A	0.2	1.7	0.28	0.22	38.7
Approach		97	0.8	97	0.8	0.058	2.2	NA	0.2	1.7	0.28	0.22	38.8
North: Marquet St N													
7	L2	339	1.0	339	1.0	0.252	3.7	LOS A	1.2	8.5	0.21	0.46	36.6
9	R2	28	2.0	28	2.0	0.252	4.9	LOS A	1.2	8.5	0.21	0.46	38.0
Approach		367	1.1	367	1.1	0.252	3.8	LOS A	1.2	8.5	0.21	0.46	36.8
West: Mary St W													
10	L2	159	2.0	159	2.0	0.132	3.4	LOS A	0.0	0.0	0.00	0.30	39.2
11	T1	88	1.0	88	1.0	0.132	0.0	LOS A	0.0	0.0	0.00	0.30	38.2
Approach		247	1.6	247	1.6	0.132	2.2	NA	0.0	0.0	0.00	0.30	39.0
All Vehicles		712	1.2	712	1.2	0.252	3.0	NA	1.2	8.5	0.15	0.37	38.1

Site: Rdr Blvd / Mary AM - PP1 only

Network: Marquet Mary -Rdr Blvd PP1

Rdr Blvd / Mary St AM
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rider Blvd S													
1	L2	75	4.0	75	4.0	0.772	15.0	LOS B	6.7	49.4	0.29	1.10	35.4
3	R2	321	6.0	321	6.0	0.772	23.7	LOS B	6.7	49.4	0.29	1.10	43.0
Approach		396	5.6	396	5.6	0.772	22.1	LOS B	6.7	49.4	0.29	1.10	42.0
East: Rider Bld E													
4	L2	453	3.0	453	3.0	0.262	5.6	LOS A	0.0	0.0	0.00	0.55	53.7
5	T1	25	0.0	25	0.0	0.262	0.0	LOS A	0.0	0.0	0.00	0.55	51.3
Approach		478	2.8	478	2.8	0.262	5.3	NA	0.0	0.0	0.00	0.55	53.6
West: Mary St W													
11	T1	67	1.0	67	1.0	0.440	3.4	LOS A	3.2	23.1	0.63	0.76	49.7
12	R2	438	2.0	438	2.0	0.440	7.6	LOS A	3.2	23.1	0.63	0.76	46.9
Approach		505	1.9	505	1.9	0.440	7.1	NA	3.2	23.1	0.63	0.76	47.3
All Vehicles		1379	3.3	1379	3.3	0.772	10.8	NA	6.7	49.4	0.31	0.78	47.7

Site: Gauthorpe St / Marquet St AM - PP1 only

Network: Marquet-Gathorpe-Walker PP1

Marquet St / Gauthorpe St
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Marquet St S													
1	L2	61	2.0	61	2.0	0.174	4.6	LOS A	0.7	4.7	0.08	0.55	46.1
3	R2	138	2.0	138	2.0	0.174	5.7	LOS A	0.7	4.7	0.08	0.55	43.6
Approach		199	2.0	199	2.0	0.174	5.4	LOS A	0.7	4.7	0.08	0.55	44.8
East: Gauthorpe St E													
4	L2	108	2.0	108	2.0	0.068	4.6	LOS A	0.0	0.0	0.00	0.46	47.0
5	T1	17	3.0	17	3.0	0.068	0.0	LOS A	0.0	0.0	0.00	0.46	47.4
Approach		125	2.1	125	2.1	0.068	4.0	NA	0.0	0.0	0.00	0.46	47.0
West: Gauthorpe St W													
11	T1	27	4.0	27	4.0	0.114	0.4	LOS A	0.6	4.0	0.25	0.46	44.2
12	R2	158	2.0	158	2.0	0.114	5.0	LOS A	0.6	4.0	0.25	0.46	46.0
Approach		185	2.3	185	2.3	0.114	4.3	NA	0.6	4.0	0.25	0.46	45.9
All Vehicles		509	2.1	509	2.1	0.174	4.6	NA	0.7	4.7	0.12	0.49	45.9

Site: Gauthorpe St / Walker AM - PP1 only

Network: Marquet-Gathorpe-Walker PP1

Gauthorpe St / Walker St AM PP2+Iprosp
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Walker St S													
1	L2	37	3.0	37	3.0	0.209	3.5	LOS A	0.0	0.0	0.00	0.07	40.5
2	T1	364	2.0	364	2.0	0.209	0.1	LOS A	0.0	0.0	0.00	0.07	41.1
Approach		401	2.1	401	2.1	0.209	0.4	NA	0.0	0.0	0.00	0.07	41.1
North: Walker St N													
8	T1	453	3.0	453	3.0	0.403	1.4	LOS A	2.5	18.0	0.40	0.22	52.3
9	R2	195	2.0	195	2.0	0.403	7.2	LOS A	2.5	18.0	0.40	0.22	46.1
Approach		647	2.7	647	2.7	0.403	3.1	NA	2.5	18.0	0.40	0.22	51.1
West: Gauthorpe St W													
10	L2	172	4.0	172	4.0	0.190	6.0	LOS A	0.8	5.5	0.46	0.65	45.1
12	R2	15	2.0	15	2.0	0.190	13.2	LOS A	0.8	5.5	0.46	0.65	40.7
Approach		186	3.8	186	3.8	0.190	6.6	LOS A	0.8	5.5	0.46	0.65	44.7
All Vehicles		1235	2.7	1235	2.7	0.403	2.8	NA	2.5	18.0	0.28	0.23	46.1

JACOBS

SIDRA Modelling Results 2036 PP2 + IProsperity development

Site: Mary St / Marquet St AM -PP2+IProsp

Network: Marquet-Mary-Rdr Blvd network- PP2+IProsp

Mary St / Marquet St AM Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows 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
East: Mary St E													
5	T1	56	0.0	56	0.0	0.090	0.7	LOS A	0.4	3.1	0.33	0.32	37.5
6	R2	86	2.0	86	2.0	0.090	4.4	LOS A	0.4	3.1	0.33	0.32	38.4
Approach		142	1.2	142	1.2	0.090	2.9	NA	0.4	3.1	0.33	0.32	38.2
North: Marquet St N													
7	L2	460	1.0	460	1.0	0.366	4.1	LOS A	1.9	13.4	0.33	0.51	36.3
9	R2	39	2.0	39	2.0	0.366	5.6	LOS A	1.9	13.4	0.33	0.51	36.3
Approach		499	1.1	499	1.1	0.366	4.2	LOS A	1.9	13.4	0.33	0.51	36.3
West: Mary St W													
10	L2	81	2.0	81	2.0	0.126	3.4	LOS A	0.0	0.0	0.00	0.16	39.4
11	T1	159	1.0	159	1.0	0.126	0.0	LOS A	0.0	0.0	0.00	0.16	34.0
Approach		240	1.3	240	1.3	0.126	1.2	NA	0.0	0.0	0.00	0.16	38.2
All Vehicles		881	1.2	881	1.2	0.366	3.2	NA	1.9	13.4	0.24	0.38	37.0

Site: Rdr Blvd / Mary St AM - PP2+ I Prosp

Network: Marquet-Mary-Rdr Blvd network- PP2+IProsp

Rdr Blvd / Mary St AM
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows 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: Rider Blvd S													
1	L2	124	4.0	124	4.0	0.983	47.7	LOS D	20.4	149.7	0.26	1.33	21.2
3	R2	327	6.0	327	6.0	0.983	60.3	LOS E	20.4	149.7	0.26	1.33	30.5
Approach		452	5.4	452	5.4	0.983	56.8	LOS E	20.4	149.7	0.26	1.33	28.5
East: Rider Bld E													
4	L2	453	3.0	453	3.0	0.262	5.6	LOS A	0.0	0.0	0.00	0.55	53.7
5	T1	25	0.0	25	0.0	0.262	0.0	LOS A	0.0	0.0	0.00	0.55	51.3
Approach		478	2.8	478	2.8	0.262	5.3	NA	0.0	0.0	0.00	0.55	53.6
West: Mary St W													
11	T1	82	1.0	82	1.0	0.539	4.2	LOS A	4.9	34.6	0.68	0.83	48.8
12	R2	537	2.0	537	2.0	0.539	8.5	LOS A	4.9	34.6	0.68	0.83	46.0
Approach		619	1.9	619	1.9	0.539	7.9	NA	4.9	34.6	0.68	0.83	46.4
All Vehicles		1548	3.2	1548	3.2	0.983	21.4	NA	20.4	149.7	0.34	0.89	40.3

Site: Gauthorpe St / Marquet St AM - PP2+IProsp

Network: Marquet- Gathorpe-Walker network AM- PP2+IProsp

Marquet St / Gauthorpe St
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Marquet St S													
1	L2	106	2.0	106	2.0	0.300	3.5	LOS A	1.3	9.0	0.09	0.50	38.2
3	R2	225	2.0	225	2.0	0.300	5.2	LOS A	1.3	9.0	0.09	0.50	36.4
Approach		332	2.0	332	2.0	0.300	4.6	LOS A	1.3	9.0	0.09	0.50	37.2
East: Gauthorpe St E													
4	L2	139	2.0	139	2.0	0.085	4.6	LOS A	0.0	0.0	0.00	0.47	46.9
5	T1	17	3.0	17	3.0	0.085	0.0	LOS A	0.0	0.0	0.00	0.47	47.4
Approach		156	2.1	156	2.1	0.085	4.1	NA	0.0	0.0	0.00	0.47	46.9
West: Gauthorpe St W													
11	T1	27	4.0	27	4.0	0.139	0.5	LOS A	0.7	4.9	0.29	0.48	44.0
12	R2	192	2.0	192	2.0	0.139	5.1	LOS A	0.7	4.9	0.29	0.48	41.7
Approach		219	2.3	219	2.3	0.139	4.5	NA	0.7	4.9	0.29	0.48	41.8
All Vehicles		706	2.1	706	2.1	0.300	4.5	NA	1.3	9.0	0.13	0.49	41.1

Site: Gauthorpe St / Walker St AM - PP2+IProsp

Network: Marquet- Gathorpe-Walker network AM- PP2+IProsp

Gauthorpe St / Walker St AM PP2+Iprosp
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Walker St S													
1	L2	37	3.0	37	3.0	0.233	3.5	LOS A	0.0	0.0	0.00	0.06	40.5
2	T1	409	2.0	409	2.0	0.233	0.1	LOS A	0.0	0.0	0.00	0.06	41.0
Approach		446	2.1	446	2.1	0.233	0.4	NA	0.0	0.0	0.00	0.06	41.0
North: Walker St N													
8	T1	478	2.0	478	2.0	0.480	2.3	LOS A	4.0	28.8	0.51	0.29	51.5
9	R2	255	3.0	255	3.0	0.480	8.1	LOS A	4.0	28.8	0.51	0.29	44.7
Approach		733	2.3	733	2.3	0.480	4.3	NA	4.0	28.8	0.51	0.29	49.9
West: Gauthorpe St W													
10	L2	259	4.0	259	4.0	0.289	6.5	LOS A	1.3	9.1	0.51	0.71	44.9
12	R2	15	2.0	15	2.0	0.289	17.0	LOS B	1.3	9.1	0.51	0.71	40.6
Approach		274	3.9	274	3.9	0.289	7.1	LOS A	1.3	9.1	0.51	0.71	44.7
All Vehicles		1453	2.6	1453	2.6	0.480	3.6	NA	4.0	28.8	0.35	0.30	45.5

SIDRA Modelling Results 2036 PP2 + IProsperity development, Priority change scenario

Site: Mary St / Marquet St AM -PP2+IProsp

Network: Marquet-Mary-Rdr Bvld -priority change network-PP2+IProps

Mary St / Marquet St AM Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total (veh/h)	Demand Flows HV (%)	Arrival Flows Total (veh/h)	Arrival Flows 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)
East: Mary St E													
5	T1	56	0.0	56	0.0	0.090	0.7	LOS A	0.4	3.1	0.33	0.32	37.5
6	R2	86	2.0	86	2.0	0.090	4.4	LOS A	0.4	3.1	0.33	0.32	38.4
Approach		142	1.2	142	1.2	0.090	2.9	NA	0.4	3.1	0.33	0.32	38.2
North: Marquet St N													
7	L2	460	1.0	460	1.0	0.702	123.7	LOS F	80.6	569.3	1.00	2.14	11.0
9	R2	39	2.0	39	2.0	0.702	107.9	LOS F	80.6	569.3	1.00	2.14	11.9
Approach		499	1.1	499	1.1	0.702	122.4	LOS F	80.6	569.3	1.00	2.14	11.1
West: Mary St W													
10	L2	81	2.0	81	2.0	0.210	3.4	LOS A	17.5	123.9	0.00	0.16	39.3
11	T1	159	1.0	159	1.0	0.210	0.0	LOS A	17.5	123.9	0.00	0.16	34.0
Approach		240	1.3	240	1.3	0.210	1.2	NA	17.5	123.9	0.00	0.16	38.2
All Vehicles		881	1.2	881	1.2	0.702	70.1	NA	80.6	569.3	0.62	1.31	15.5

Site: Rdr Blvd / Mary St AM - PP2+ I Prosp -priority

Network: Marquet-Mary-Rdr Bvld -priority change network-PP2+IProps

Rdr Blvd / Mary St AM
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total (veh/h)	Demand Flows HV (%)	Arrival Flows Total (veh/h)	Arrival Flows 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: Rider Blvd S													
1	L2	124	4.0	124	4.0	0.253	5.6	LOS A	0.0	0.0	0.00	0.59	50.9
3	R2	327	6.0	327	6.0	0.253	5.5	LOS A	0.0	0.0	0.00	0.59	52.8
Approach		452	5.4	452	5.4	0.253	5.6	NA	0.0	0.0	0.00	0.59	52.5
East: Rider Bld E													
4	L2	453	3.0	453	3.0	0.275	5.6	LOS A	2.3	16.5	0.56	0.28	51.5
5	T1	25	0.0	25	0.0	0.275	55.1	LOS D	2.3	16.5	0.56	0.28	47.4
Approach		478	2.8	478	2.8	0.275	8.2	LOS A	2.3	16.5	0.56	0.28	51.4
West: Mary St W													
11	T1	82	1.0	82	1.0	1.254	242.5	LOS F	21.0	149.1	1.00	5.60	7.2
12	R2	537	2.0	537	2.0	1.254	252.0	LOS F	21.0	149.1	1.00	5.60	7.1
Approach		619	1.9	619	1.9	1.254	250.7	LOS F	21.0	149.1	1.00	5.60	7.1
All Vehicles		1548	3.2	1548	3.2	1.254	104.4	NA	21.0	149.1	0.57	2.50	18.5