

## **APPENDIX 11**

### **Traffic Statement (GHD, July 2016)**



19<sup>th</sup> July 2016

Joe Bevacqua  
ESQ1818 Pty Ltd

Our ref: 21/25061  
Your ref: 215474

Dear Joe

### **ESQ1818 at Panthers Traffic Statement**

GHD Pty Ltd (GHD) has been engaged by ESQ1818 Pty Ltd to prepare a Traffic Statement for the ESQ1818 at Panthers development located on Lots 2, 3a and 3b at Penrith Panthers, 123 Mulgoa Road, Penrith.

A Masterplan *Transport Strategy* which comprised a parking and *Transport Strategy* for the entire Panthers Precinct, including Lots 2, 3a and 3b (*Panthers Precinct Master Plan – Transport Strategy [Transport Strategy]*) was previously developed by GHD in July 2014. It is noted that the *Transport Strategy* only included intersection analysis for the PM peak hour, to reflect the vehicle activity associated with the large retail components of the proposed development.

An additional study was prepared by GHD for the proposed ESQ1818 at Panthers development (*Traffic Impact Statement, March 2016 [TIA]*) which provided a comparison between the updated land uses/traffic impacts associated with the proposed ESQ1818 Development and the previously approved land uses for Lots 2, 3a and 3b (as contained in the *Transport Strategy*). It is noted that the amended land uses included a significant reduction in the proposed retail facilities and an increase in residential dwellings.

The land uses for Lots 2, 3a and 3b (as identified in the *TIA*) are proposed to consist of 859 apartments and 3,304m<sup>2</sup> (GFA) of retail. This land use schedule is not proposed to change, however the Client has requested that additional analysis be undertaken to assess the traffic impacts associated with the removal of an internal road (the Riverlink Road) which was included in the analysis undertaken in the *TIA*.

This road was previously proposed to run in a north-south direction through the ESQ1818 at Panthers development and intersect Jamison Road to the south of the subject site at a T-junction. However it is currently uncertain when (or if) this road will be constructed by Council, which in turn will impact the trip distribution patterns of residents and visitors of the proposed development

The layout of the proposed development and the indicative location of the Riverlink Road are displayed below in Figure 1.

This aerial map shows a proposed development area outlined in red. The area is divided into several color-coded zones: a green zone on the left, a blue zone in the center, and a yellow zone on the right. A red dashed line indicates the boundary of the development. Labels with arrows point to specific features: 'Riverlink Road (indicative only)' points to a blue line in the green zone; 'Lots 2, 3a and 3b' points to a yellow area in the yellow zone. Other labels include 'Jamison Road' at the bottom, 'Rockley Avenue' at the top right, and 'Pansley Street' on the right. A 'Pansley Link' is also labeled in the yellow zone.

GHD attended a meeting on the 23<sup>rd</sup> February 2016 with Penrith City Council to discuss the findings of the *TIA* and the potential traffic implications of the removal of the Riverlink Road. During this meeting, Council noted that:

- 21/25061/215474

This Traffic Statement (which is an addendum to the previous studies) addresses Council's request for additional analysis.

The traffic generation rates, background growth and traffic distribution assumptions detailed in this Traffic Statement are consistent with the original *Transport Strategy*. Additionally the trip generation volumes included in the *TIA* (based upon the latest land use schedule) have also been utilised to assess the traffic implications of the removal of the Riverlink Road.

## **1 Assessment of Existing Conditions (2016)**

### **1.1 2016 Traffic Surveys**

In order to obtain the data required to address Council's request that traffic modelling analysis be undertaken in AM periods, classified intersection traffic surveys were conducted on Wednesday 6<sup>th</sup> April 2016 at the following locations:

- Mulgoa Road / Great Western Highway / High Street
- Mulgoa Road / Ransley Street / Retreat Drive
- Retreat Drive Roundabout
- Mulgoa Road / Panther Place
- Mulgoa Road / Jamison Road
- Jamison Road / Harris Street.

The surveys were undertaken at the following times to identify the AM and PM peak hours of road network activity:

- 7:00am – 9:00am
- 4:00pm – 6:00pm.

The PM peak hour surveys were undertaken to identify the change in traffic volumes/growth between 2011 and 2016 on the road network in proximity to the subject site.

### **1.2 Comparison of 2011, 2015 and 2016 PM Peak Hour Traffic Data**

In order to identify the changes in in traffic growth over the preceding 5 years (from 2011) in PM peak periods, the 2016 survey data was compared to the 2011 surveys (undertaken to support the analysis in the *Transport Strategy*).

Additionally GHD sourced traffic survey counts collected by Roads and Maritime Services (Roads and Maritime) in May 2015 on the roads in proximity to the development subject site to provide an additional point of context.

A comparison between the total traffic volumes at Mulgoa Road, Ransley Street and Retreat Drive intersection for 2011, 2015 and 2016 in the PM peak hour are displayed in Figure 2.

**Figure 2 Total PM Traffic at the Mulgoa Road, Ransley Street and Retreat Drive Intersection**

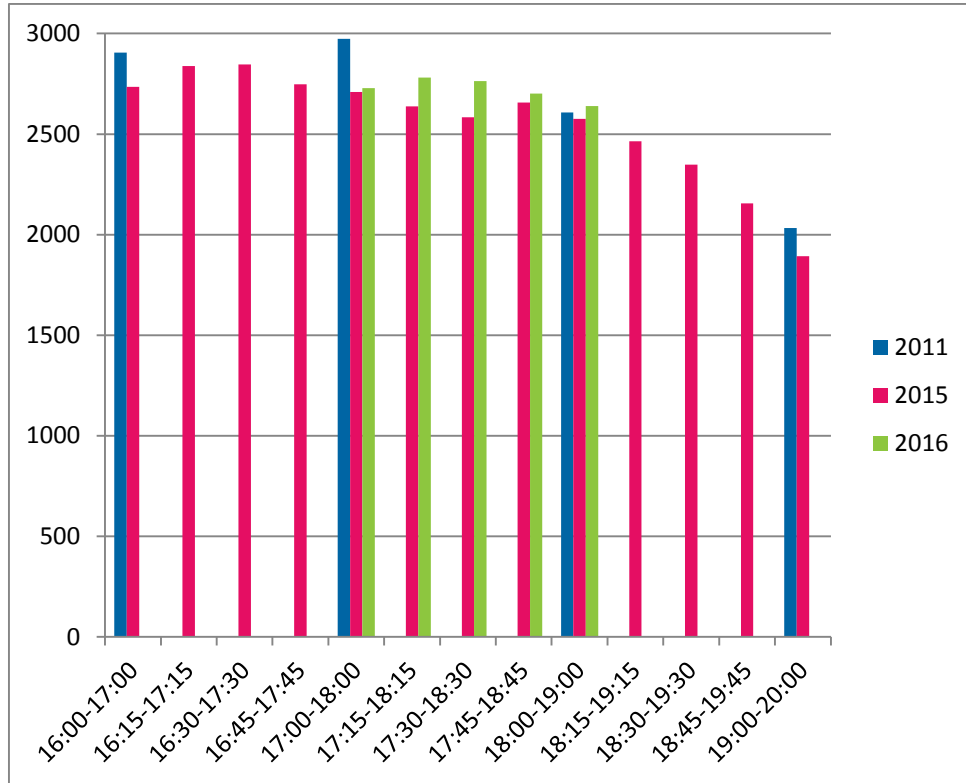


Figure 2 indicates that the traffic volumes on the road network in proximity to the subject site have typically decreased between 2011 and 2015/2016.

The changes in traffic (both in terms of volume and percentage) at the intersection of Mulgoa Road, Ransley Street and Retreat Drive as detailed in the available data sources are displayed below in Table 1.

**Table 1 - Changes in Peak Hour Traffic Volumes (2011 – 2016)**

Peak Hour		2011	2015	2016
16:00 - 17:00	Traffic Volumes	2905	2,735	-
	% Change	-	-6%	-
17:00 - 18:00	Traffic Volumes	2973	2,710	2728
	% Change	-	-10%	-9%
18:00 - 19:00	Traffic Volumes	2607	2,575	2639
	% Change	-	-1%	1%
19:00 - 20:00	Traffic Volumes	2033	1,893	-
	% Change	-	-7%	-

The data in Table 1 indicates that there has been a reduction in traffic volumes of up to 9% - 10% in PM peak traffic volumes on the road network in proximity to the subject site when comparing the 2015/2016 traffic data to the 2011 traffic data.

A review of the video provided by the survey company (for the 2016 surveys) indicates that vehicles typically cleared the intersection within their allocated phase times and there were no observed tail backs from adjoining intersections interrupting traffic flows. Accordingly, there is no evidence to indicate that congested conditions (associated with increased traffic demand) are suppressing traffic throughput and we are unable to identify the reasons for the reduction in traffic volumes between 2011 and 2015/2016.

However, in order to be conservative (where appropriate) the turning movements of the 2016 traffic volumes were scaled up to match the 2011 traffic volumes. This was undertaken to be conservative on the basis that the available data indicates that the 2011 volumes represent the “worst case” scenario. The adjusted 2016 traffic volumes utilised in the assessments undertaken in this Traffic Statement are provided in Appendix A.

### **1.3 Intersection Operation**

The performance of a road network is largely dependent on the operating performance of key intersections, which are critical capacity control points. SIDRA intersection modelling software was used to assess the proposed peak hour operating performance of intersections of interest on the surrounding road network. The criteria for evaluating the operational performance of intersections is provided by the Roads and Maritime Services *Guide to Traffic Generating Developments* (2002) and reproduced in Table 2. The criteria for evaluating the operational performance of intersections is based on a qualitative measure (i.e. Level of Service), which is applied to each band of average vehicle delay. Typically, a Level of Service (LOS) of D or better is considered acceptable.

**Table 2 Single intersection Performance Criteria**

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabouts	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control modes	At capacity, requires other control mode
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

#### 1.4 Intersection Operation

**Table 3** details the SIDRA results for both AM and PM peak periods based upon the 2016 (adjusted) traffic volumes. The outputs of the intersection analysis from the 2011 *Transport Strategy* have also been provided for comparison purposes.

**Table 3 2016 SIDRA Results**

Intersection	2016- SIDRA				2011- <i>Transport Strategy</i>	
	AM Peak		PM Peak		PM Peak	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Mulgoa Rd / Great Western Hwy / High St	44	D	70	E	77	F
Mulgoa Rd / Ransley St	16	B	18	B	7	A
Retreat Dr Roundabout	9	A	9	A	N/A	N/A
Mulgoa Rd / Panther Pl	14	A	17	B	5	A
Mulgoa Rd / Jamison Rd	34	C	37	C	35	C
Jamison Rd / Harris St	8	A	12	B	N/A	N/A

From **Table 3** it can be observed that:

- The 2016 SIDRA results indicate that intersections of interest typically perform at a LOS C or better except the Mulgoa Road, High Street and Great Western Highway intersection which performs at LOS E in the PM peak periods
- The PM peak results for the 2016 outputs are typically comparable with the 2011 modelling outputs included in the *Transport Strategy* which also indicates that the. Mulgoa Road, High Street and Great Western Highway currently operates with a poor LOS in peak periods.

## 2 Trip Generation and Distribution

### 2.1 ESQ1818 mixed use development

As stated previously the proposed development (Lots 2, 3a and 3b) will consist of a total of 859 apartments and 3,304m<sup>2</sup> (GFA) of retail. The traffic generation characteristics for these land uses are displayed below in Table 4.



**Table 4 – Lot 2, Lot 3a and Lot3b PM Trip Generation Characteristics**

Lot	Stage	Land use	No. units/ area	Rate	Trip Gen.		
3A + 3B    2	1	Residential (165 units)	165	0.5 trips/dwelling	82	16	66
	2	Residential (70 units)	70	0.5 trips/dwelling	35	7	28
	3	Residential (373 units)	373	0.5 trips/dwelling	187	37	150
	2	Speciality shops	1,251m <sup>2</sup> GFA / 938m <sup>2</sup> GLFA	2 trips/100m <sup>2</sup> GLFA	19	15	4
	3	Restaurant	2,053m <sup>2</sup> GFA	5 trips/100m <sup>2</sup> GFA	103	82	21
	4	Residential (111 units)	111	0.5 trips/dwelling	56	11	45
	5	Residential (140 units)	140	0.5 trips/dwelling	70	14	56
<b>Total</b>					<b>551</b>	<b>181</b>	<b>370</b>

The data in Table 4 indicates the proposed development is expected to generate approximately 550 vehicle trips during periods of peak road network activity. It is noted that the majority of trips generated by the proposed development (which are associated with the residences) are expected to be tidal, namely outbound in AM peak periods and inbound during PM peak periods.

Given the mixed-use nature of the development it is expected that there will be some internal trips capture, namely trips that both begin and end within the development. This could consist of local residents utilising the retail components of the proposed development. For a development such as ESQ1818 at Panthers, up to 10% - 20% of trips could potentially be internal to the development. However in order to be conservative, no internal capture has been applied to the trip values displayed in Table 4.

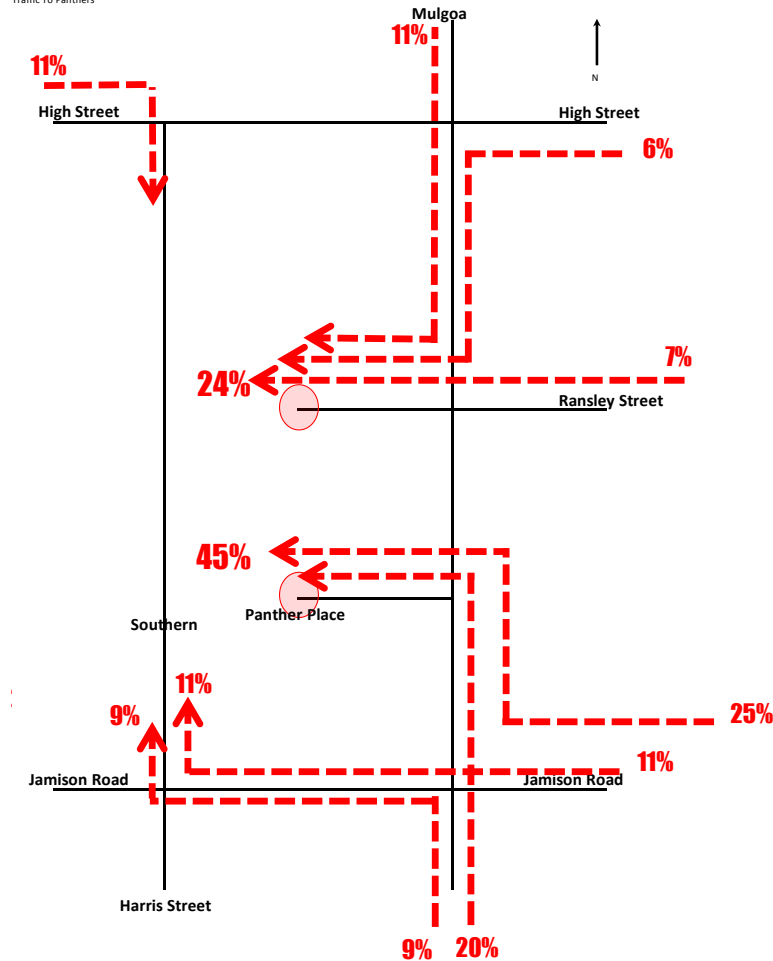
Traffic distribution of the proposed development (with the Riverlink Road) is displayed in Figure 3. The analysis was undertaken on the premise that each land use within the Panthers Precinct was distributed separately according to the shortest path to/from the site.

Additional analysis indicates that the removal of the Riverlink Road will result in slightly higher traffic volumes at intersections along Mulgoa Road, High street, Great Western Highway, Ransley Street and at Panthers Place.

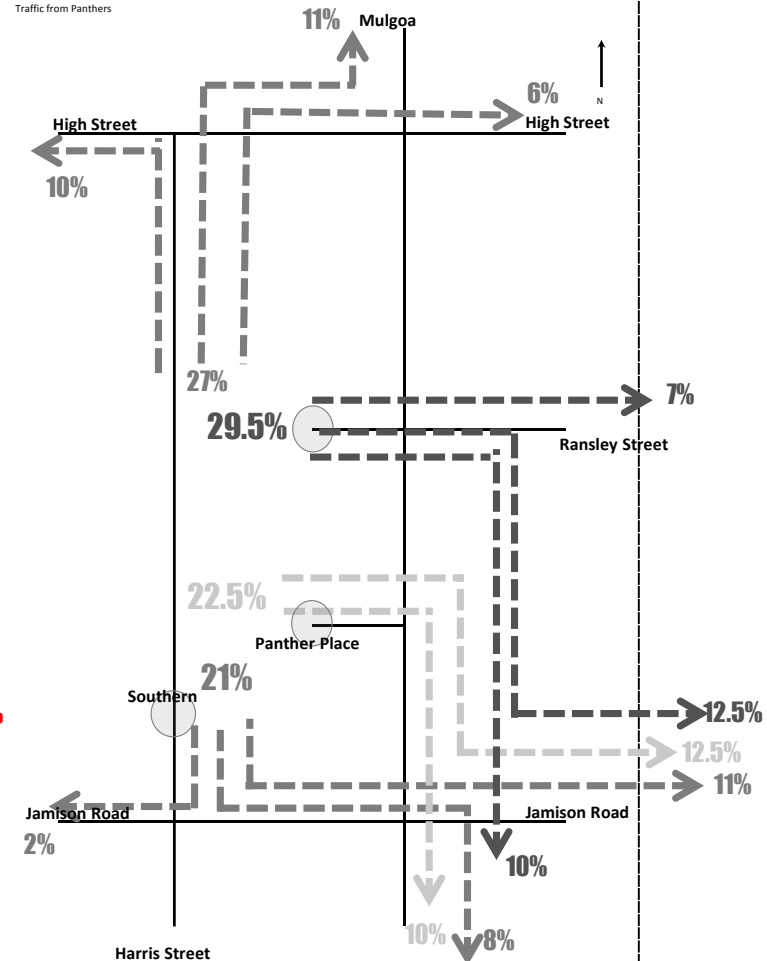


Figure 3 – Proposed Traffic Distribution to and from Panthers Site

2031 Assumed Panthers Traffic Distribution  
Traffic To Panthers



2031 Assumed Panthers Traffic Distribution  
Traffic from Panthers



### 3 Intersection Operation without the proposed development

In order to identify the expected 2031 horizon year background traffic volumes an annual growth rate of (approximately) 1.5% was applied to the existing traffic volumes. The 2031 traffic volumes (both with and without the Riverlink Road) are displayed in Appendix A.

Table 5 details the 2031 horizon year performance of all the intersections of interest in peak AM and PM periods of road network activity without the proposed development. Only the background growth has been accounted for with no development traffic.

**Table 5 2031 SIDRA Results with No Development**

Intersection	AM Peak		PM Peak	
	Delay (sec)	LoS	Delay (sec)	LoS
Mulgoa Rd / Great Western Hwy / High St	58	E	114	F
Mulgoa Rd / Ransley St / Retreat Dr	18	B	19	B
Retreat Dr Roundabout	9	A	9	A
Mulgoa Rd / Panther Pl	4	A	7	A
Mulgoa Rd / Jamison Rd	33	C	36	C
Jamison Rd / Harris St	10	A	15	C

Table 5 indicates that in the 2031 horizon year without the proposed development's trips, the intersections of interest are typically expected to perform at a good LOS C or better with the exception of the Mulgoa Road, Great Western Highway and High Street intersection, which is expected to operate with a LOS F.

The poor operation of this intersection in the 2031 horizon year is consistent with its current poor LOS. It is also consistent with the analysis included in the *Transport Strategy* and *TIA*, which indicates that in 2031 the intersection is expected to continue to perform with a poor LOS.

#### **4 Intersection Operation with the proposed development**

Additional analysis has been undertaken for the 2031 horizon year for the expected background traffic and the trips generated by Lots 2, 3a and 3b (see Table 4).

This analysis includes the intersection that will provide access to Lot 2 and Lot 3. For the purpose of analysis it has been assumed that the access intersection will be priority controlled with a single approach and departure lane in either direction and priority allocated to Retreat Drive.

Due to the close proximity of the Mulgoa Road, Ransley Street and Retreat Drive intersection, the priority controlled intersection providing access to Lot 2 and Lot 3 and the Retreat Drive Roundabout, these three intersections have been assessed using SIDRA Network.

SIDRA Network enables the operation of multiple intersections to be assessed simultaneously and identify if queues from adjoining intersections are expected to adversely affect the operation of each other.

below shows the layout of all three intersections. It is noted that the geometric layout of the Mulgoa Road, Ransley Street and Retreat Drive intersection has accounted for the proposed upgrades identified in the Road Works Planning Agreement (7509852/8) issued under Section 93F of the Environmental Planning Act, 1979 (NSW) as displayed in Appendix B. This has been undertaken on the assumption that the identified road upgrades will be completed prior to the 2031 horizon year of analysis.

Figure 4 - Intersections Layout- 2031

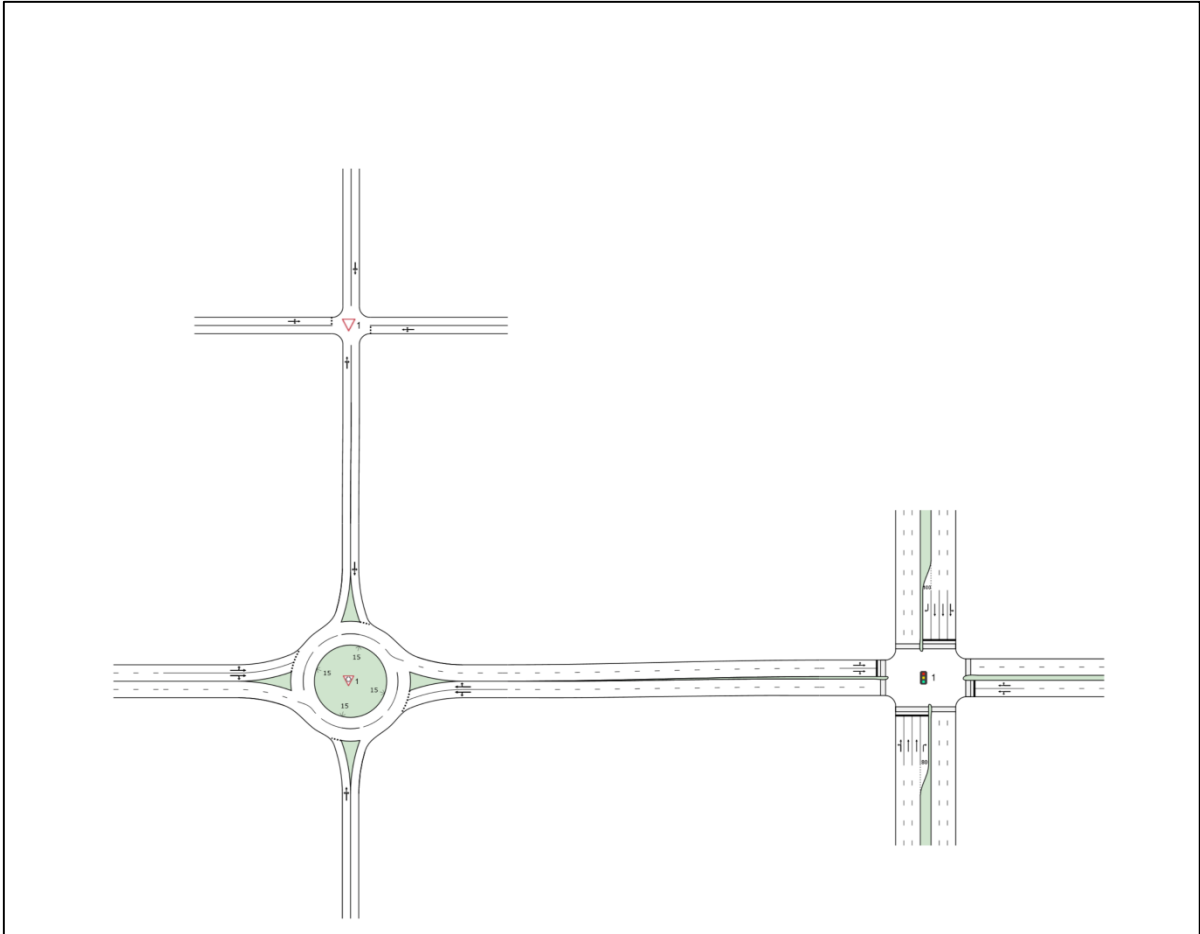


Table 6 below outlines the performance of all the intersections of interest accounting for the expected background traffic growth and the trips generated by Lots 2, 3a and 3b (see Table 4) in peak AM and PM periods of road network activity. This analysis assumes that the Riverlink Road **will** be in operation.

**Table 6      2031 SIDRA Results with development and the Riverlink Road**

Intersection	AM Peak	PM Peak		
	Delay (sec)	LoS	Delay (sec)	LoS
Mulgoa Rd / Great Western Hwy / High St	100	F	131	F
Mulgoa Rd / Ransley St / Retreat Dr	16	B	39	C
Retreat Drive Roundabout	11	B	17	B
Mulgoa Rd / Panther PI	6	A	9	A
Mulgoa Rd / Jamison Rd	53	D	56	D
Jamison Rd / Harris St	17	B	17	B
Great Western Highway / North Access	13	A	17	B
Lot 2 and Lot 3 Access Intersection	7	A	7	A

The data in Table 6 indicates that with the exception of the Mulgoa Road, Great Western Highway and High Street intersection, the intersections of interest in 2031 are expected to continue to operate with an acceptable LOS.

Additional SIDRA analysis has been undertaken for a “with development” scenario **without** the Riverlink Road as displayed in Table 7.

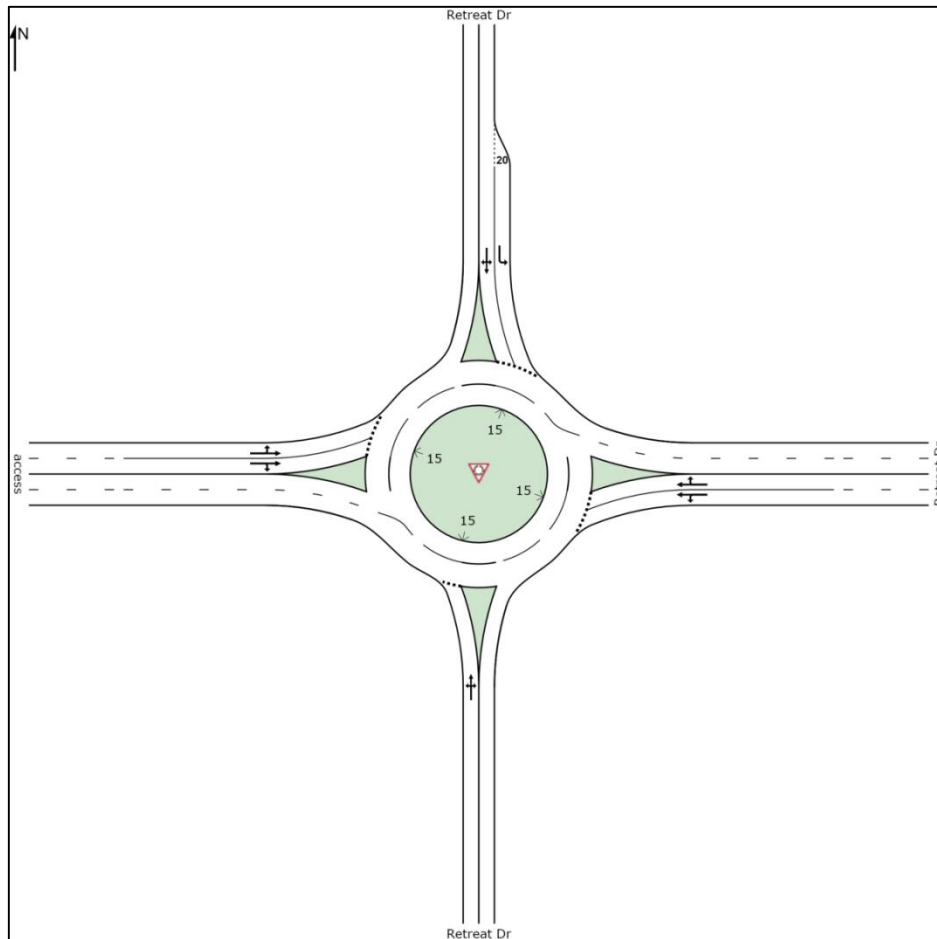
**Table 7 2031 SIDRA Results with development but without the Riverlink Road**

Intersection	AM Peak		PM Peak	
	Delay	LoS	Delay	LoS
Mulgoa Rd / Great Western Hwy / High St	126	F	168	F
Mulgoa Rd / Ransley St / Retreat Dr	22	B	52	D
Retreat Drive Roundabout	12	B	32	C
Mulgoa Rd / Panther Pl	8	A	11	A
Mulgoa Rd / Jamison Rd	64	E	62	E
Jamison Rd / Harris St	10	A	15	C
Lot 2 and Lot 3 Access Intersection	7	A	250	F

From the results included in Table 7 it is observed that:

- In the 2031 horizon year the Mulgoa Road, Great Western Highway and High Street intersection is expected to continue to perform with an unacceptable LOS without the Riverlink Road
- The removal of the Riverlink Road will result in a minor increase in delay at the Mulgoa Road and Jamison Road intersection (less than 11 seconds for both peak periods compared to the inclusion of the Riverlink Road) corresponding to a LOS E. It is noted that the identified delay is marginally higher than the threshold of 57 seconds associated with the LoS D. Additionally it is considered that relatively minor adjustments to the intersections phase times would facilitate an acceptable LOS. Accordingly it is expected that this intersection will perform to an acceptable standard in the 2031 horizon year of analysis
- The Lot 2 and Lot 3 access intersection is expected to operate with a poor LOS during peak PM periods. Analysis of the SIDRA Network outputs indicates that the poor performance of the access intersection is due to eastbound queues on Retreat Drive spilling back from Mulgoa Road across the Retreat Drive Roundabout causing queues on the northern leg, which consequently inhibits the operation of the nearby priority controlled access intersection. To mitigate against this the Retreat Drive Roundabout was remodelled with an additional 20m left turn lane on its northern leg to allow for additional queue storage/capacity (Figure 5). The short left lane will need to be clearly sign posted to indicate that it can only be used by left turning vehicles.

**Figure 5 Proposed Layout at Retreat Drive Roundabout**



The SIDRA outputs for the three intersection included in the network accounting for the proposed mitigation measures displayed in Figure 5 are presented below in Table 8.

**Table 8 Mitigated network performance under 2031 traffic conditions- No Riverlink Road**

Intersection	AM Peak		PM Peak	
	Delay	LoS	Delay	LoS
Lot 2 Road / Retreat Drive	7	A	7	A
Retreat Drive Roundabout	9	A	30	C
Mulgoa Road / Ransley Street intersection	22	B	53	D



Table 8 indicates that in the 2031 horizon year, all three intersections under the mitigated network are expected to operate within acceptable delays during peak periods of AM and PM road network activity.

## 5 Queuing Analysis

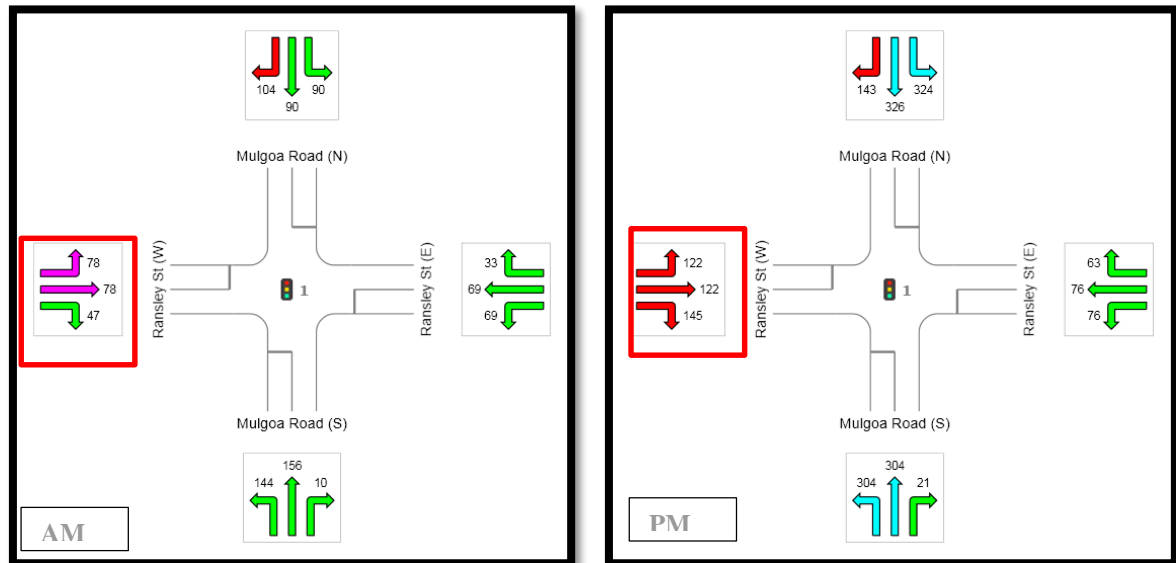
### 5.1.1 Performance of Retreat Drive, Ransley Street and Mulgoa Road Intersection

Additional has been undertaken to verify the SIDRA Network outputs, whereby without the Riverlink Road queues on Retreat Drive at its intersection with Mulgoa Road will inhibit the operation of Retreat Drive Roundabout and the priority controlled access intersection.

Approximately 90m of storage is provided on Retreat Drive between the roundabout and Mulgoa Road.

The 2031 SIDRA outputs of the 95<sup>th</sup> percentile on Retreat Drive at its intersection with Ransley Street and Mulgoa Road (without the Riverlink Road) is displayed in

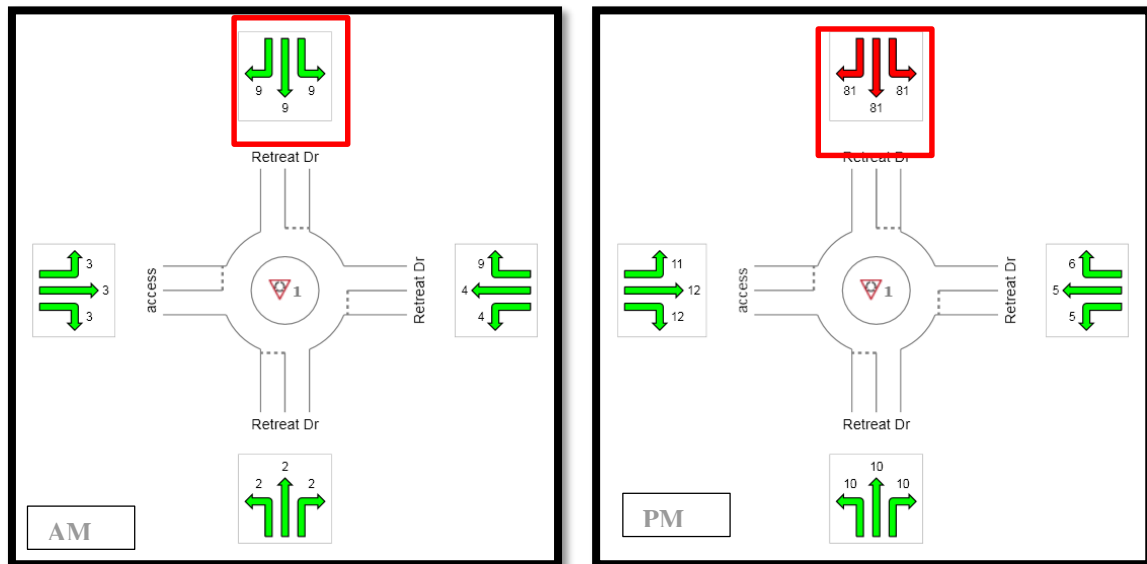
**Figure 6 No Riverlink Road – 95% back of queue in meters**



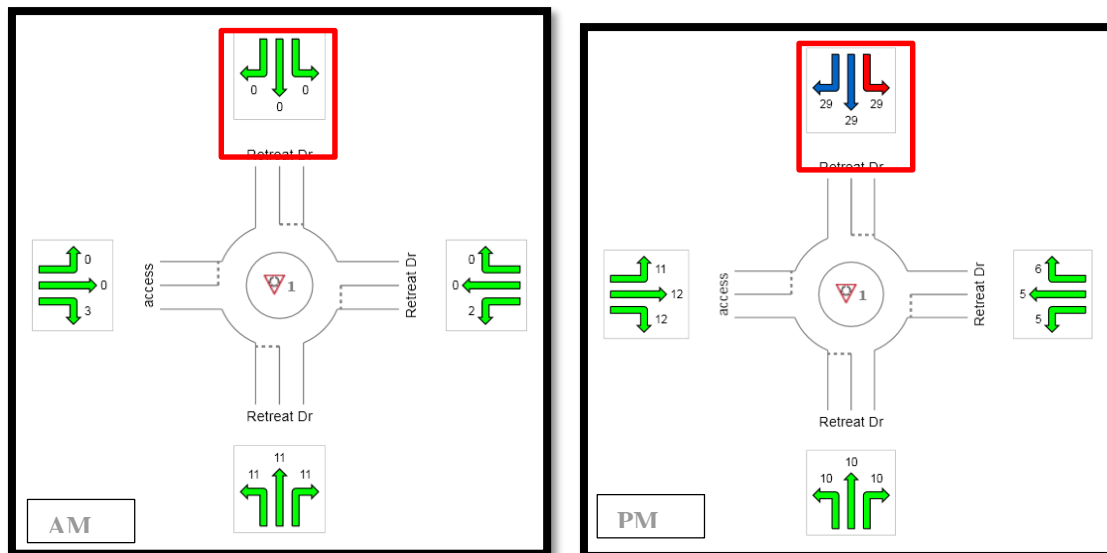
The above SIDRA outputs indicates that eastbound queues at Retreat Drive will extend beyond the Retreat Drive Roundabout in PM peak periods

The 95<sup>th</sup> percentile queuing analysis for the 2031 horizon year has been undertaken both for the current Retreat Drive Roundabout intersection geometry and the proposed mitigated layout (displayed in Figure 5) is displayed in Figure 7 and Figure 8.

**Figure 7 Retreat Drive Roundabout (existing geometry) Without Riverlink Road 95<sup>th</sup> Percentile Queues - 2031**



**Figure 8 – Retreat Drive Roundabout (mitigated layout) Without Riverlink Road 95<sup>th</sup> Percentile Queues - 2031**



Based on the existing intersection layout queues on the northern leg of the Retreat Drive Roundabout are expected to be up to 81m in length, which SIDRA analysis indicates will adversely affect the operation of the access intersection. Accordingly based on the above results it is recommended that the Retreat Drive Roundabout be upgraded in accordance with the proposed mitigation measures.

## 6 Transport Planning

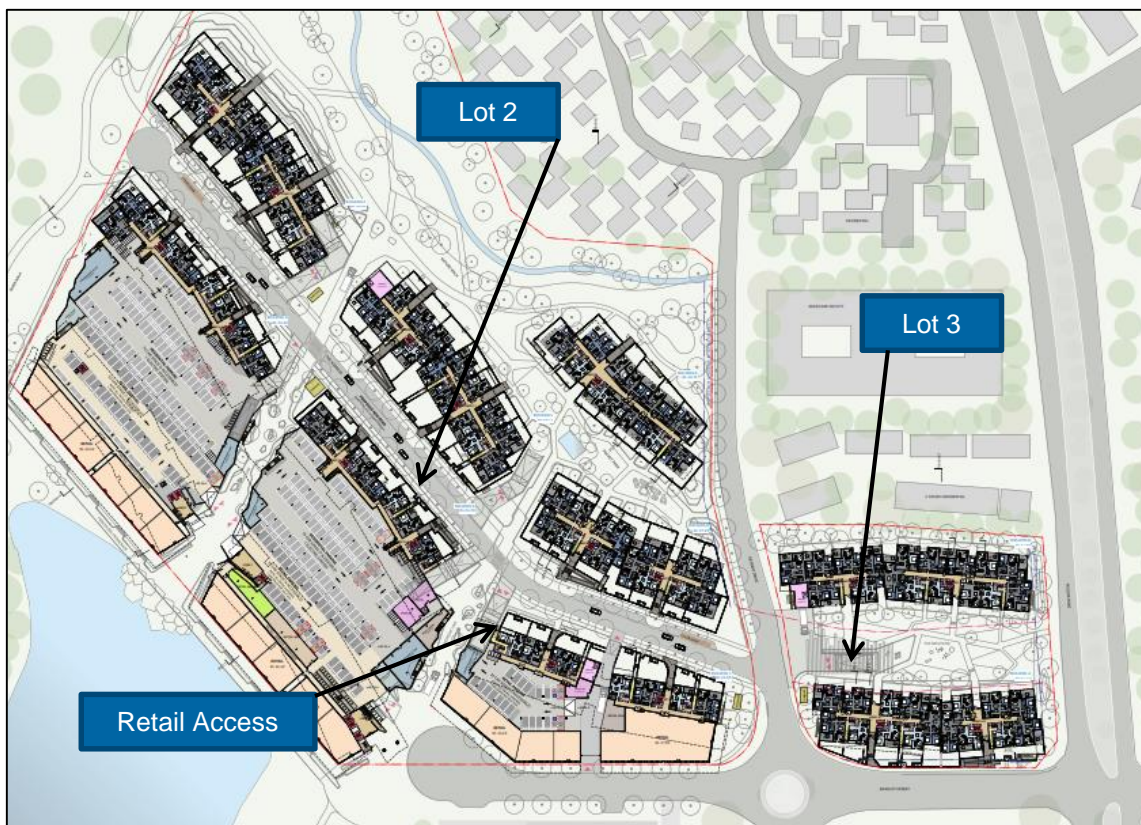
### 6.1 Retail and Residential Access

The Panthers Master Plan focuses on a pedestrian oriented, quality-landscaped and urban public domain that will provide for equitable access for all modes of travel throughout the study area. In designing the internal road network for the proposed development the specific needs of buses, service vehicles and emergency vehicles will be accounted for.

**Service vehicles will generally park in loading bays located as close as possible to their destination points within the precinct, which will primarily be at the existing Panthers Club and the proposed retail facilities. Wherever possible service vehicle activity will be physically separated from general vehicular activity. The internal road network will be designed to accommodate the largest service vehicle expected to traverse the proposed development i.e. large rigid vehicles and articulated vehicles.**

As displayed in Figure 9 it is proposed to provide access to Lot 3 directly from Retreat Drive and access to the Lot 2 developments by a proposed new road that will operate as a cul-de-sac. If at a later time the Riverlink Road is constructed, it is intended that the internal access road will be extended to intersect it.

**Figure 9 – Proposed Access Roads**



Source :Turner, modified by GHD

The Roads and Maritime Guide specifies that access driveways on roads with a speed limit of 50 km/h should provide a minimum sight distance of 45 m. The roads providing access to the proposed development are relatively straight and flat, accordingly it is considered that the required sight distances can be readily achieved.

Vehicle access to the retail facilities (located in Lot 2) will be provided in proximity to the priority controlled access intersection at Retreat Drive. This will minimise the distance vehicle trips generated by the retail facilities will be required to travel on the proposed access road, which will improve the amenity of the nearby residential facilities

It is assumed that the proposed development's access roads and parking facilities will be designed in accordance with Austroads Guidelines, Australian Standards and council's design guidelines.

## **7 Other Transport Planning Considerations**

There are a number of transport planning measures that could potentially be applied at the proposed development to further reduce the impacts of the traffic it will generate and requirements for onsite car parking, these are discussed below.

### ***Parking Rates***

Parking rates should be responsive to location, with lower parking rates being appropriate in areas with good public transport which can encourage non-private vehicle trips.

The provision of parking has a direct correlation with the volumes of traffic an urban area is likely to generate, namely if individuals are unable to locate a parking bay or the cost of parking is too high, the less likely they will be to travel by car and utilise alternative modes of transport.

Parking rates for some councils in Sydney, including City of Sydney, have decreased for residential uses. Additionally the City of Sydney have introduced maximum rather than minimum parking rates whereby developers are required to justify a provision above these proscribed levels.

Given the extensive nature of the nearby public transport facilities including the multiple bus services operating on Mulgoa Road, (some of which provide a direct service to the nearby town centre) and the shuttle service operating between Panthers Precinct with the Penrith City Centre (and the nearby Penrith Station), the application of maximum parking rates within the proposed development may be appropriate as a measure to limit onsite parking and promote sustainable forms of travel.

Other key measures that could be used in order to reduce parking demand could include:

- The provision of shared parking i.e. different land uses utilising parking bays at different times of the day
- Green travel plans, a suite of measures such as carpooling registers, the provision of web based transport information and the provision of end of trip bicycle facilities that are designed to reduce volumes of single occupant car journeys
- The provision of suitable controls applicable to the on-street parking i.e. restricted parking, paid parking etc. that will encourage vehicle turnover (particularly in proximity to key trip generators/attractors) and provide the greatest utility to residents and visitors.

Provision for car share spaces and encouraging the development of a car share scheme within the development would reduce the reliance for parking spaces. Car shares schemes, such as GoGet, which enables individuals to hire a vehicle for short periods of time are increasing in popularity. Participating in a car share scheme is a much cheaper alternative to owning and maintaining a car while providing the same convenience of owning a car. Many councils are allocating on-street parking spaces in residential locations for car share parking. Additionally, the provision of a car sharing scheme within large developments is a potential measure for reducing the required volumes of parking spaces

Residents who participate in a car share scheme are less likely to own a car and may not want to pay additional costs for a property that has a parking space. The provision of car share scheme/spaces can therefore reduce traffic generation as well as the demand for parking spaces.

The proposed development's master plan indicates that a dedicated taxi stand will be provided near key locations, including directly opposite Lot 3a and Lot 3b. These facilities will also encourage an alternative to private motor vehicle trips.

Additionally the current master plan indicates that the proposed development will include charging stations within the basement parking levels for electrical cars, in order to help minimise the environmental impacts associated with vehicle activity it generates.

### ***Provision for Active Transport***

The Panthers site is within walking and cycling distance to Penrith City Centre, located approximately 1 km to the north of the site, along Mulgoa Road.

The proposed master plan incorporates pedestrian and cycle paths throughout the site linking major facilities and venues. Safe crossing locations will be provided throughout the development at regular intervals to assist in providing a safe environment for pedestrians.

Footpaths will be provided along all roads in proximity to the site and provide good and continuous connection to retail and employment facilities in the vicinity of the site, particularly at Penrith City Centre.

It is recognised that Mulgoa Road is a busy road that accommodates relatively high volumes of traffic, particularly in peak periods of operation. However, signal controlled pedestrian crossing facilities are provided at the following intersections to facilitate the safe movement of pedestrians:

- Mulgoa Road/Retreat Drive/ Ransley Street
- Mulgoa Road/Great Western Highway/High Street
- Mulgoa Road/Jamison Road intersection.

Bicycle parking (by type racks, lockers etc.) and where appropriate other end of trip facilities should be provided at secure and prominent locations within the Panthers site in accordance with Council/Roads and Maritime specifications and international best practice. This will encourage travel by bicycle and reduce the volume of private vehicle trips generated by the proposed development.

Bicycle route connections will be made to regional routes, with a particular focus along the nearby lake and, adjoining open spaces. The bicycle network has been developed on the basis of overlaying a 'coarse' regional bike network with a 'fine' local bike network to provide internal connectivity.

### ***Public Transport***

The future bus system within the Master Plan has been developed to minimise conflict wherever possible with private vehicles. Bus set-down and pick-up facilities are already provided at the main entrance to the Panthers Club capable of accommodating up to two buses. The internal road network has been dimensioned to accommodate bus and coach movements. Provision will be made to for approximately 7 coaches to park on-site, in close proximity to the sporting facilities for convenient use in both daily and peak operation.

### ***Supporting Initiatives***

A summary of some initiatives that would support the connectivity and accessibility of the proposed development and reduce private vehicle trips are listed below:

- Parking initiatives such as the introduction of maximum parking rates and the introduction of car share parking bays
- Active transport initiatives such as the provision of world class bicycle parking and end of trip facilities and integrating public transport and active transport facilities
- Travel demand measure initiatives such as a requirement for developers to submit and maintain green/workplace travel plans and the provision of car sharing schemes
- The use of technologies such as active signage that could provide real time information to motorists re traffic conditions and parking availability and provide information to public transport users re the arrival times of bus services.

## **8 Summary**

Based on the analysis included in this Traffic Assessment the following is noted:

- As per Council's request additional analysis has been undertaken to assess the traffic implications associated with the removal of the Riverlink Road
- A comparison of the available traffic data indicates that traffic volumes in proximity to the subject site have decreased between 2011 and 2015/2016 by up to 10%. In order to be conservative (where appropriate) the turning movements of the 2016 traffic volumes were scaled up to match the 2011 traffic volumes
- SIDRA analysis indicates that with the exception of the Mulgoa Road, High Street and Great Western Highway the intersections of interest currently operate with an acceptable LOS
- Additional analysis indicates that the removal of the Riverlink Road will result in slightly higher traffic volumes at intersections along Mulgoa Road, High street, Great Western Highway, Ransley Street and at Panthers Place
- SIDRA analysis indicates that in the 2031 horizon year of analysis the removal of the Riverlink Road will have a negligible impact on the adjoining road network. However the Lot 2 and Lot 3 access intersection is expected to operate with a poor LOS during peak PM periods

- Analysis indicates that the poor performance of the access intersection is due to eastbound queues spilling back from Mulgoa Road causing queues on the northern leg of the Retreat Drive Roundabout which consequently inhibits the operation of the nearby priority controlled access intersection
- Mitigation analysis indicates that an additional 20m left turn lane is proposed on the northern leg of the Retreat Drive Roundabout will facilitate the good operation of the proposed development's internal road network
- The proposed development's internal road network will be designed for the specific needs of buses, service vehicles and emergency vehicles
- A number of key initiatives such as the implantation of maximum parking rates and car sharing schemes could be applied to the proposed development to reduce the impacts of traffic generation and requirements for onsite car parking.

## 9 Conclusion

The proposed development is consistent with previous planning and can operate without a significant impact on the external road network without the construction of the Riverlink.

During the PM peak period, queues within the Panthers site from the Mulgoa Road / Retreat Dr intersection could affect internal flows. To mitigate this (without the Riverlink), an additional 20 metre left turn lane on the northern approach of the Retreat Drive Roundabout is recommended.

Sincerely  
GHD Pty Ltd

**Mark Lucas**

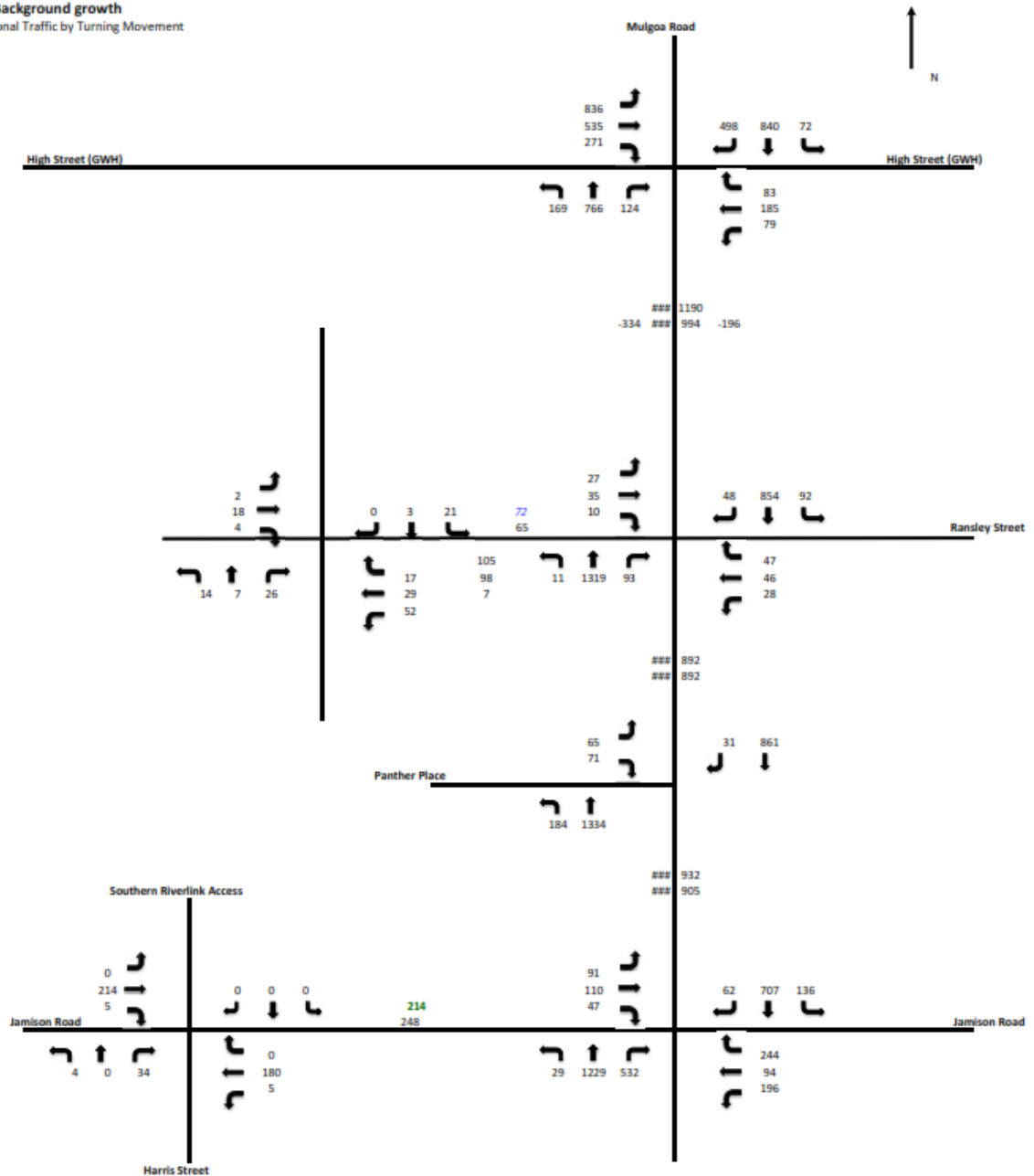
Principal Transport Planner

## Appendix A

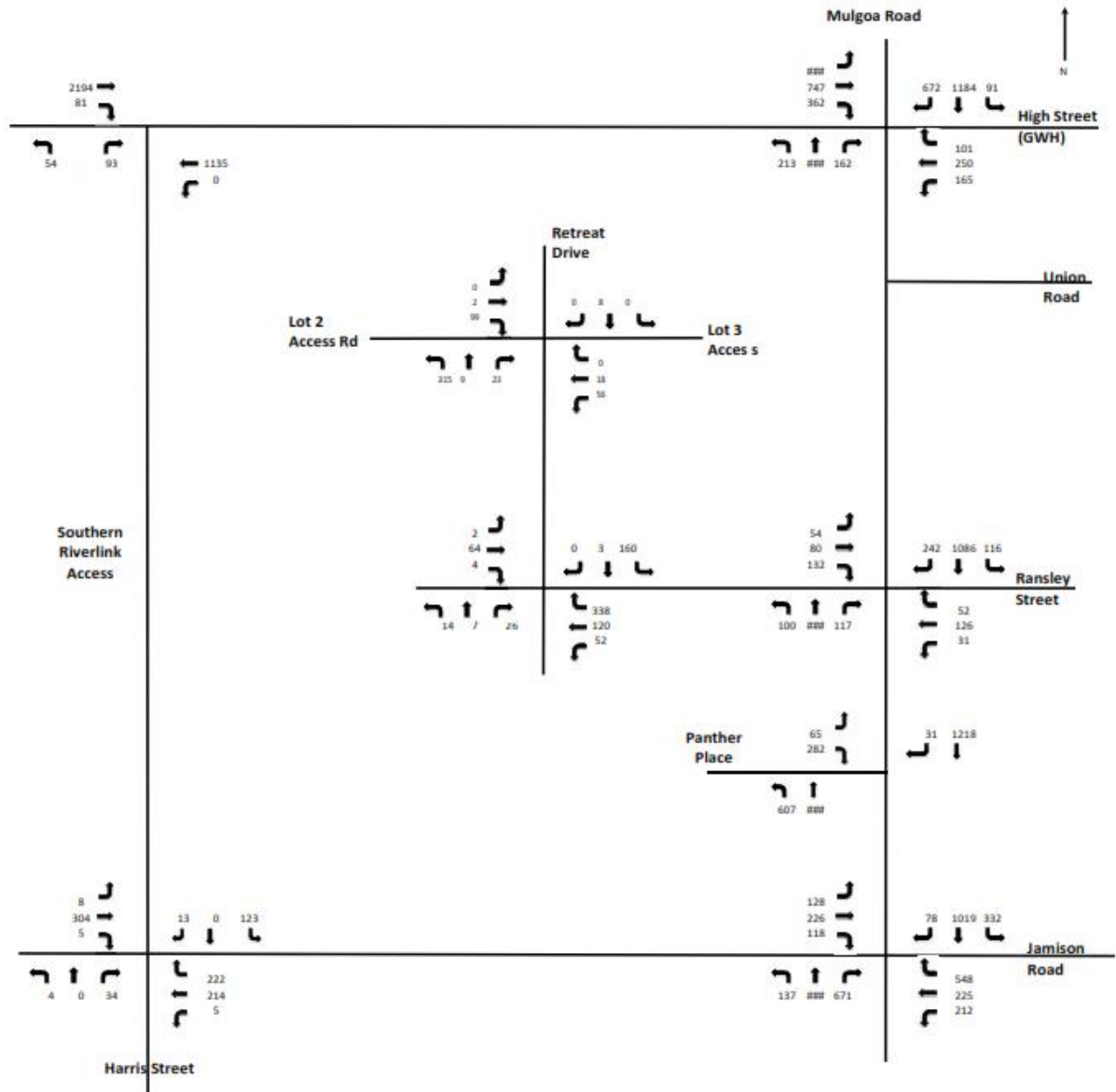
# Traffic Data



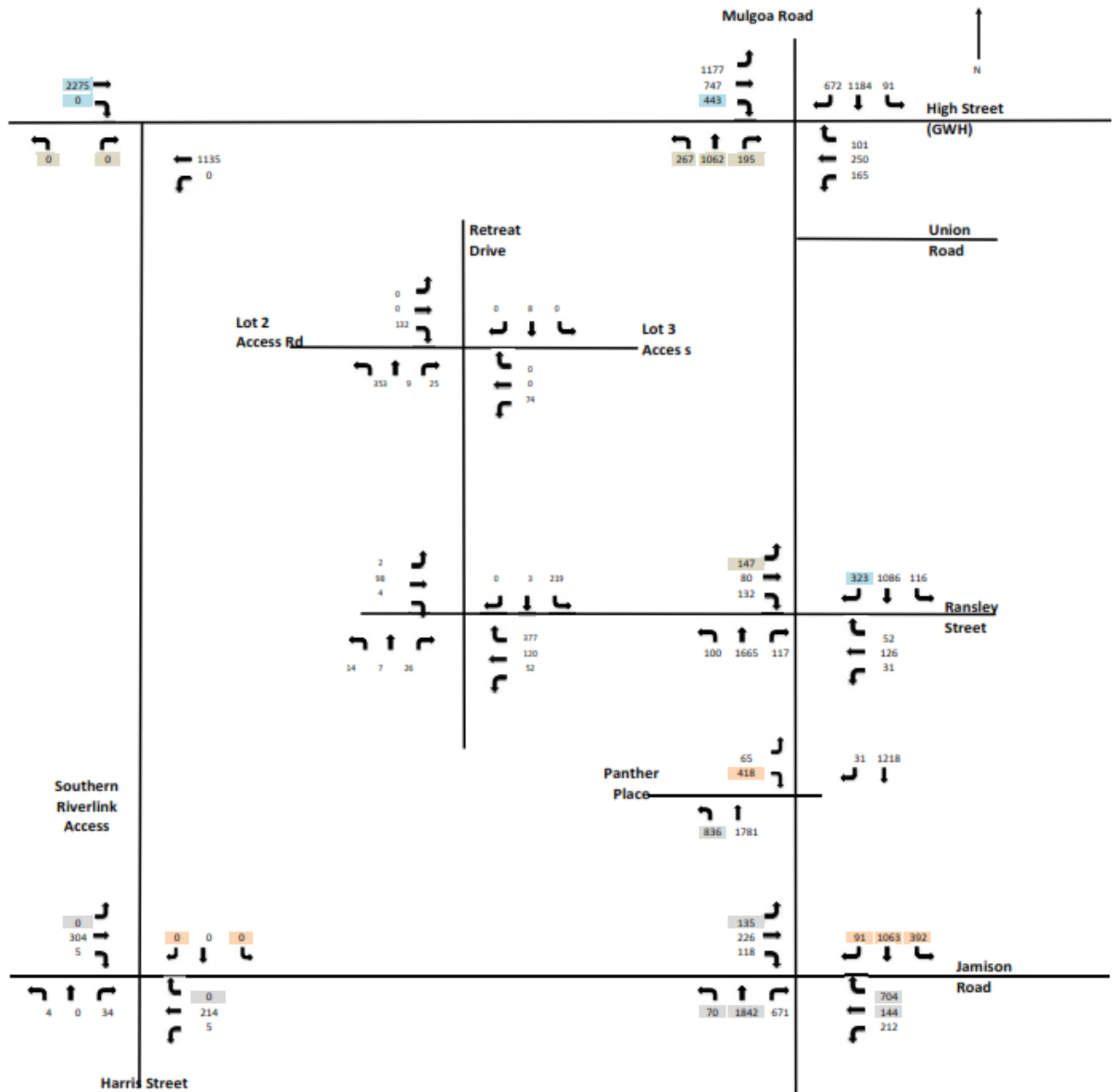
2016 Assumed Traffic Volumes (No Jane Street Extension) - Morning Peak  
 And Background growth  
 Additional Traffic by Turning Movement



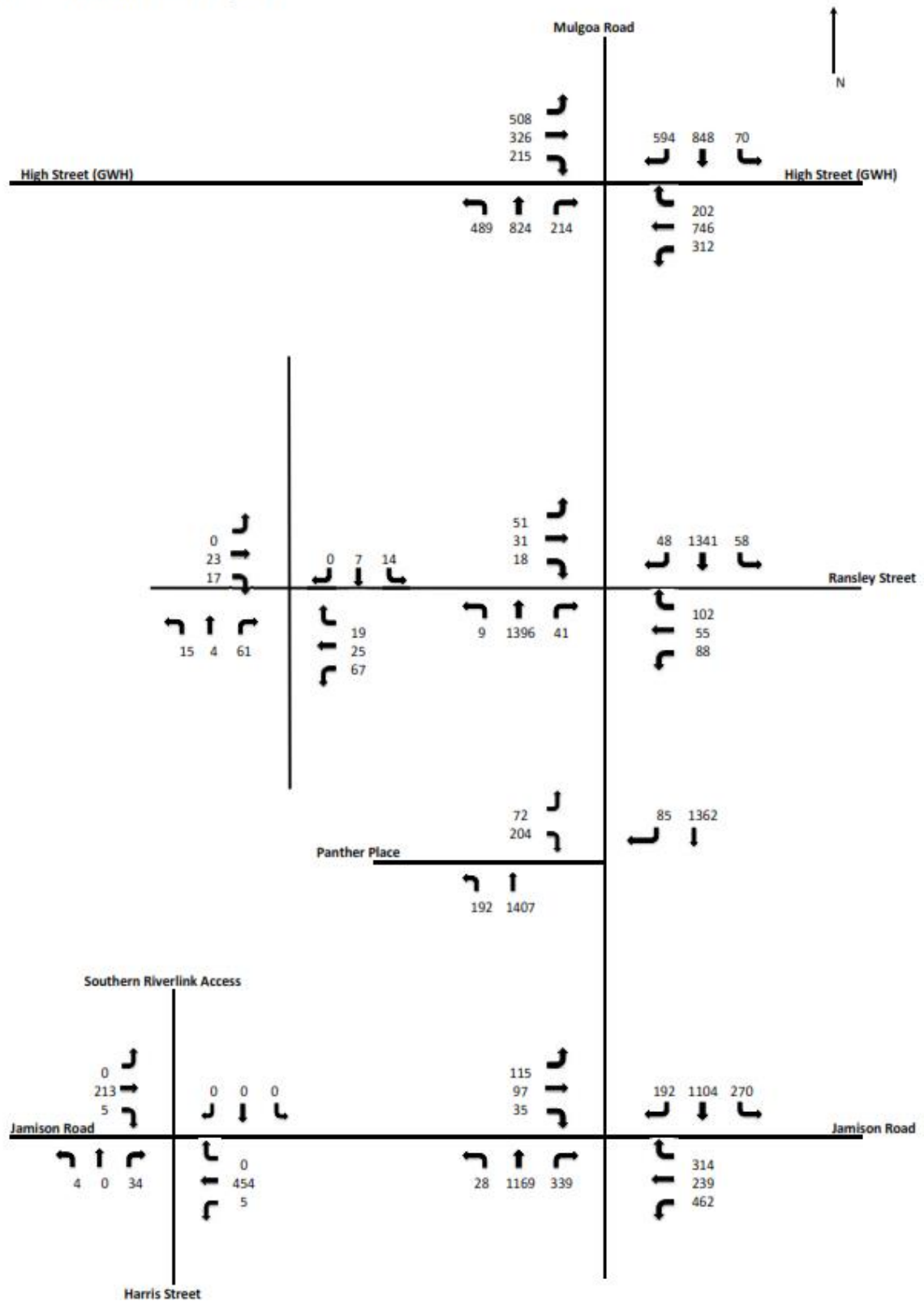
2031 Assumed Traffic Volumes (No Jane Street Extension) - Thursday Evening Peak  
 Additional Traffic by Turning Movement



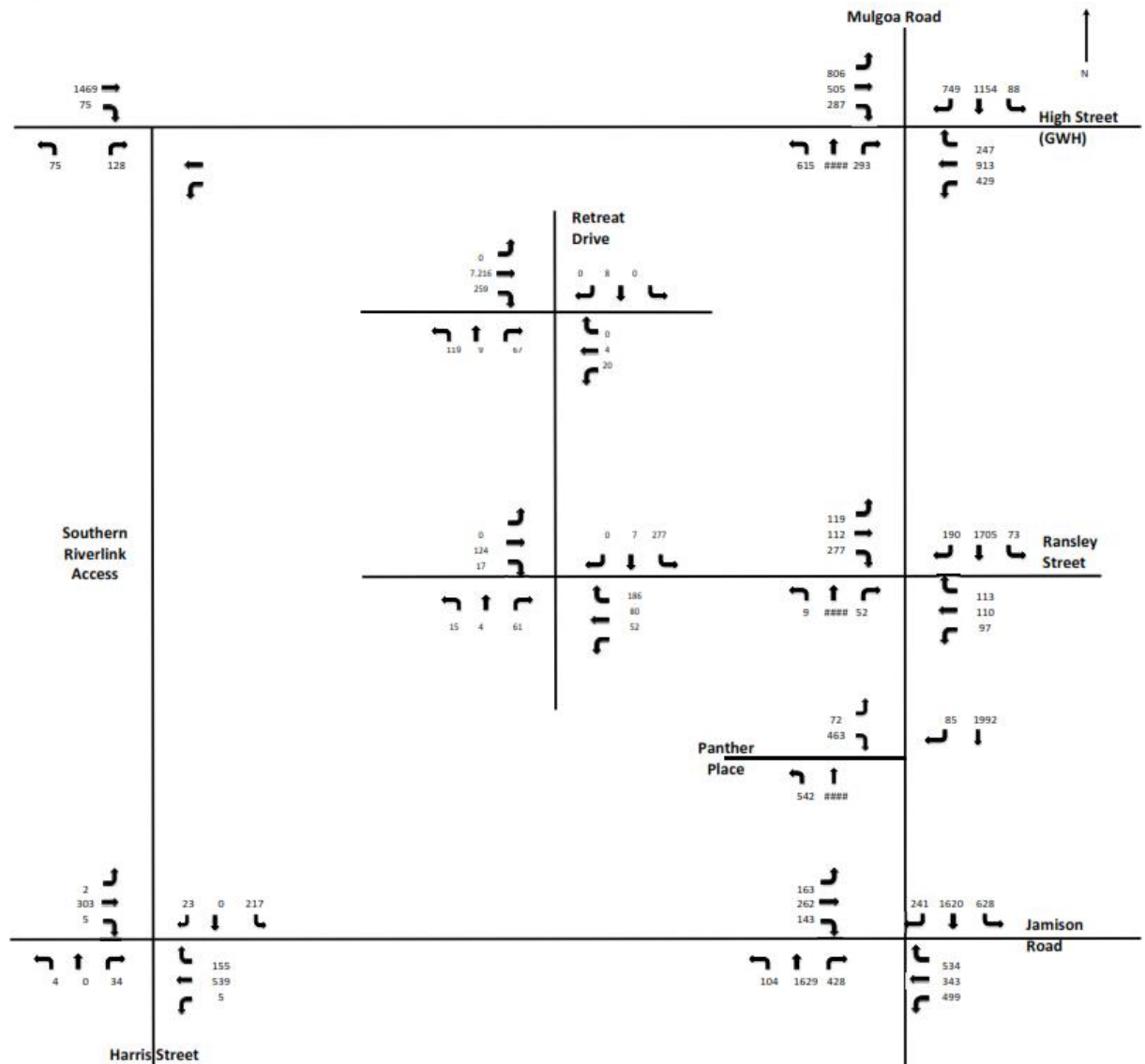
2031 Assumed Traffic Volumes (No Jane Street Extension) - Thursday Evening Peak  
Additional Traffic by Turning Movement



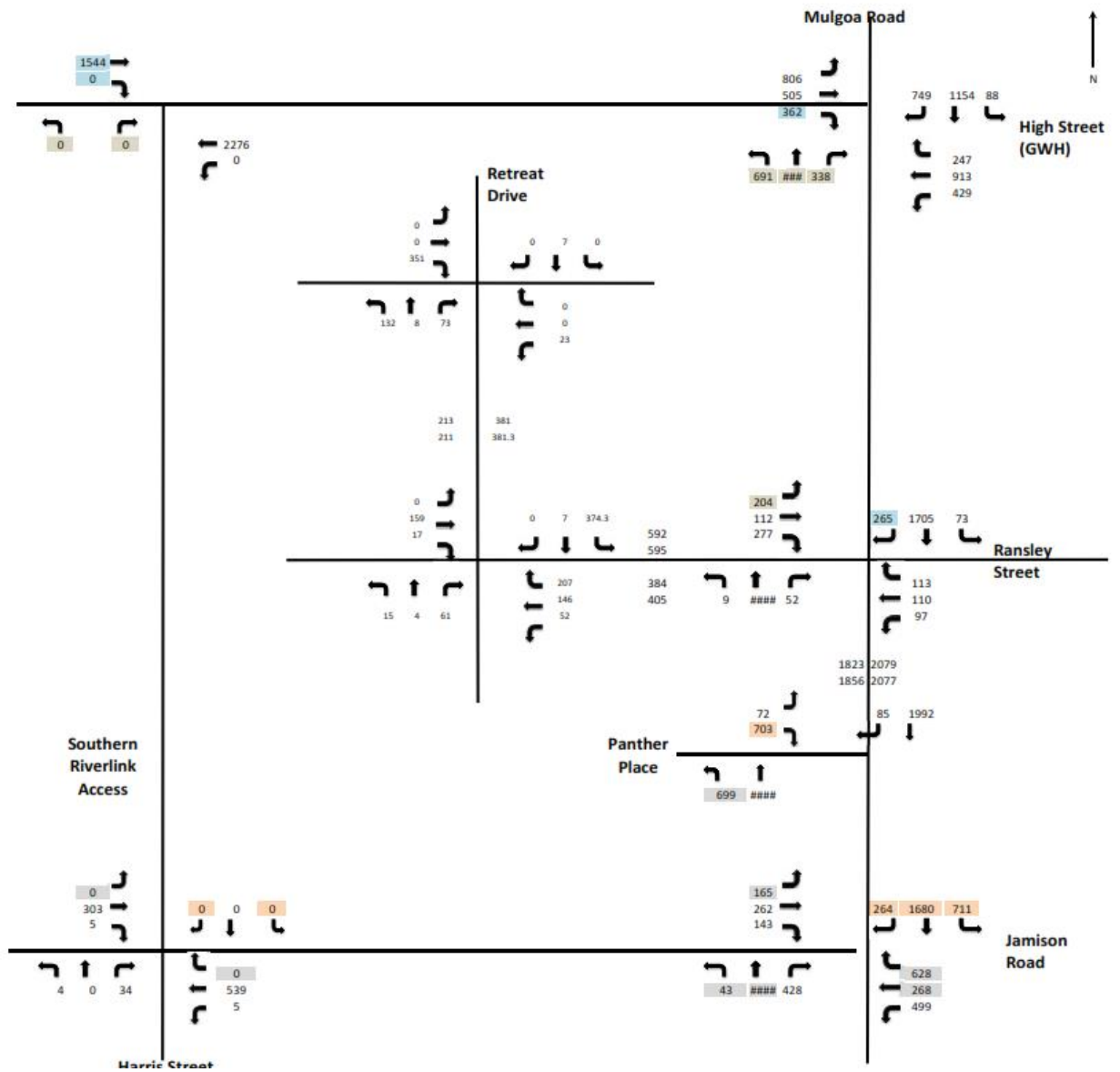
2016 Assumed Traffic Volumes - Evening Peak



2031 Assumed Traffic Volumes (No Jane Street Extension) - Thursday Evening Peak  
Additional Traffic by Turning Movement



#### Additional Traffic by Turning Movement



Appendix B

**Road Works Planning Agreement  
(7509852/8)**

# Schedule 3

## Development Contributions - Road Works

	Column 1	Column 2	Column 3	Column 4
No	Road Works	Road Works Description	Trigger Event	Alternative Trigger Event
1	Jamison/Harris Street Construction of new intersection at Jamison Road, Harris Street and new access road from Panthers development	Construction of intersection at Harris Street and Jamison Road, with provision for a 15 metre long sheltered right turn bay from Jamison Road into Harris Street and a 30 metre long sheltered right turn bay from Jamison Road into the new Southern Riverlink Access and provision of appropriate traffic signals at the Jamison and Harris Street intersection.	The grant of a Construction Certificate in respect of the Multi Use Arena and Exhibition Centre.	The grant of a Construction Certificate in respect of any part of the Development which has the effect that Construction Certificates have been granted for more than 23,000m <sup>2</sup> of the GFA for the Development within the Jamison Precinct calculated on a cumulative basis.
2	Jamison Road between Harris Street and Mulgoa Road	2.1 Widening of Jamison Road between Harris Street and Mulgoa Road to include two continuous eastbound lanes within the existing road reserve.	The grant of a Construction Certificate in respect of the Multi Use Arena and Exhibition Centre.	The grant of a Construction Certificate in respect of any part of the Development which has the effect that Construction Certificates have been granted for more than 23,000m <sup>2</sup> of GFA for the Development within the Jamison Precinct calculated on a cumulative basis.



	Column 1	Column 2	Column 3	Column 4
No	Road Works	Road Works Description	Trigger Event	Alternative Trigger Event
		2.2 Retention and, if necessary reconstruction, of a 2.5m wide shared path along the northern side of Jamison Road between Harris Street and Mulgoa Road.	The grant of a Construction Certificate in respect of the Multi Use Arena and Exhibition Centre.	The grant of a Construction Certificate in respect of any part of the Development which has the effect that Construction Certificates have been granted for more than 23,000m <sup>2</sup> of GFA for the Development within the Jamison Precinct calculated on a cumulative basis.
		2.3 Extension of the existing median along Jamison Road between Mulgoa Road and Harris Street.	The grant of a Construction Certificate in respect of the Multi Use Arena and Exhibition Centre.	The grant of a Construction Certificate in respect of any part of the Development which has the effect that Construction Certificates have been granted for more than 23,000m <sup>2</sup> of GFA for the Development within the Jamison Precinct calculated on a cumulative basis.
3	Jamison Road /Mulgoa Road	Construction of a second right turn bay from Jamison Road eastbound into Mulgoa Road (30m). Existing right turn bay (45m) to be retained.	The grant of a Construction Certificate in respect of Lot 1C.	The grant of a Construction Certificate in respect of any part of the Development which has the effect that Construction Certificates have been granted for more than 28,000m <sup>2</sup> of GFA for the Development within the Jamison Precinct calculated on a cumulative basis.

	Column 1	Column 2	Column 3	Column 4
No	Road Works	Road Works Description	Trigger Event	Alternative Trigger Event
4	Mulgoa Road/Panther Place An additional northbound left slip lane off Mulgoa Road into Panther Place	4.1 Construction of a continuous left slip lane of 50m into Panther Place from Mulgoa Road.  4.2 Construction of a signalised pedestrian crossing across Panther Place at the intersection with Mulgoa Road.	The grant of a Construction Certificate in respect of the Outlet Centre.  The grant of a Construction Certificate in respect of the Outlet Centre.	The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 45,000m <sup>2</sup> of GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.  The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 45,000m <sup>2</sup> of GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.
5	Mulgoa Road/Ransley Street intersection	5.1 Upgrade north bound component of intersection of Mulgoa Road and Ransley Street resulting from the widening of Mulgoa Road to three lanes north bound including associated right hand turn bays.	The grant of a Construction Certificate in respect of the Outlet Centre.	The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 45,000m <sup>2</sup> of GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.

	Column 1	Column 2	Column 3	Column 4
No	Road Works	Road Works Description	Trigger Event	Alternative Trigger Event
		5.2 Upgrade south bound component of intersection of Mulgoa Road and Ransley Street resulting from the widening of Mulgoa Road to three lanes south bound.	The grant of a Construction Certificate in respect of the Campus Style Office Development.	The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 85,000m <sup>2</sup> GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.
6	Widening of Mulgoa Road to provide for three lane carriageway north and south bound	6.1 Widening of Mulgoa Road north bound Widen to three carriageways north bound between Jamison Road to 100m north of Ransley St within the	The grant of a Construction Certificate in respect of the Outlet Centre.	The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 45,000m <sup>2</sup> of GFA for the Development within the Mulgoa Precinct calculated on a

	Column 1	Column 2	Column 3	Column 4
No	Road Works	Road Works Description	Trigger Event	Alternative Trigger Event
		existing kerb-to-kerb alignment through reclamation of median and narrowing of lanes from 3.5m to 3.2m		cumulative basis.
		<p><b>6.2 Widening of Mulgoa Road south bound</b></p> <p>Widen to three carriageways south bound between Jamison Road to 100m north of Ransley St within the existing kerb-to-kerb alignment through reclamation of median and narrowing of lanes from 3.5m to 3.2m</p>	The grant of a Construction Certificate in respect of the Campus Style Office Development.	The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 85,000m <sup>2</sup> GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.
7	Mulgoa Road (North of Jamison Road) and Jamison Road (East of Mulgoa Road)	<p>7.1 Construction of a continuous left slip lane of 100m on the northern approach of Jamison Rd/Mulgoa Rd intersection.</p> <p>7.2 Lengthening of existing right turn bays on Jamison Road</p>	<p>The grant of a Construction Certificate in respect of the Outlet Centre.</p> <p>The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 85,000m<sup>2</sup> of GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.</p>	The grant of a Construction Certificate in respect of the Development which has the effect that

	Column 1	Column 2	Column 3	Column 4
No	Road Works	Road Works Description	Trigger Event	Alternative Trigger Event
		between Station Street and Mulgoa Road to continuous and 130m respectively.	of the Outlet Centre.	Construction Certificates have been granted for more than 45,000m <sup>2</sup> of GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.
		7.3 Change line marking on the eastern leg of Jamison Rd/Mulgoa Rd intersection to show left, left-through, right, right arrangement.	The grant of a Construction Certificate in respect of the Outlet Centre.	The grant of a Construction Certificate in respect of the Development which has the effect that Construction Certificates have been granted for more than 45,000m <sup>2</sup> of GFA for the Development within the Mulgoa Precinct calculated on a cumulative basis.