



# Wallacia Memorial Park, 13 Park Road, Wallacia Transport Impact Assessment

Prepared for:  
Catholic Metropolitan Cemeteries Trust  
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# Wallacia Memorial Park, 13 Park Road, Wallacia Transport Impact Assessment

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# 1 Introduction

## 1.1 Background

This report relates to an assessment of the traffic and parking aspects of a proposed cemetery, located at 13 Park Road, Wallacia. The development application seeks to provide a cemetery, within the boundary of the existing site, with associated crematorium and function room facilities.

A development plan has been developed for the development proposal, with consideration given to access arrangements and internal road configurations.

The Transport Planning Partnership (TPPP) was commissioned by Catholic Metropolitan Cemeteries Trust (CMCT) to undertake a transport impact assessment (TIA) for the proposed development. The assessment will accompany a Development Application (DA) to Council, seeking approval for the proposed development.

## 1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including a consideration of the following:

- existing transport conditions surrounding the site
- the traffic generating characteristics of the proposed development
- suitability of the proposed parking provision and access arrangements
- the transport impact of the development on the surrounding road network.

## 1.3 Reference

In preparing this report, reference has been made to the following:

- AS2890.1 Off-street Car Parking
- AS2890.6 Off-Street Parking for People with Disabilities
- Austroads Guide to Traffic Design Part 4A: Unsignalised Intersections
- RMS Guide to Traffic Generating Developments, 2002

## 2 Existing Transport Conditions

This section presents the existing transport conditions of the surrounding road network.

### 2.1 Site Location

The subject site is located at the existing Panthers Wallacia golf club. The site measures approximately 44ha in size and fronts onto Park Road. The approximate location of the site is shown in below in Figure 1.

**Figure 1: Subject Site and Its Surrounding Environs**



Basemap Source: Google Maps. Viewed Online: 20/09/17

### 2.2 Road Network

Access to the existing Panthers Wallacia golf club is permitted via Park Road, which also provides access onto Silverdale Road and Mulgoa Road within the immediate vicinity of the site.

**Park Road** is a local road under the jurisdiction of Penrith City Council and provides single lanes in east and west directions, with a posted speed limit of 60km/h. The majority of Park Road is marked with double continuous white lining, restricting vehicles to no overtaking. Some sections of Park Road do permit overtaking when broken white dividing lines and double white lines with a broken line are shown.

**Silverdale Road** is a local road under the jurisdiction of Penrith City Council and provides a route between Wallacia and Silverdale, with links to Warragamba via Warradale Road and Farnsworth Avenue. Silverdale Road has a posted speed limit of 60km/h and is marked by double continuous white lining. Silverdale Road meets Park Road and Mulgoa Road via a three-arm priority roundabout intersection, just west of the development site.

**Mulgoa Road** is located north-west of the development site and provides travel in north and south directions, via single lanes. Within proximity of the site, Mulgoa Lane has a school zone, resulting in a reduced speed limit of 40km/h for 380 metres, between the hours of 8am-9:30am and 2:30pm-4pm. Beyond this, the speed limit is increased to 60km/h.

### 2.3 Existing Traffic Volumes

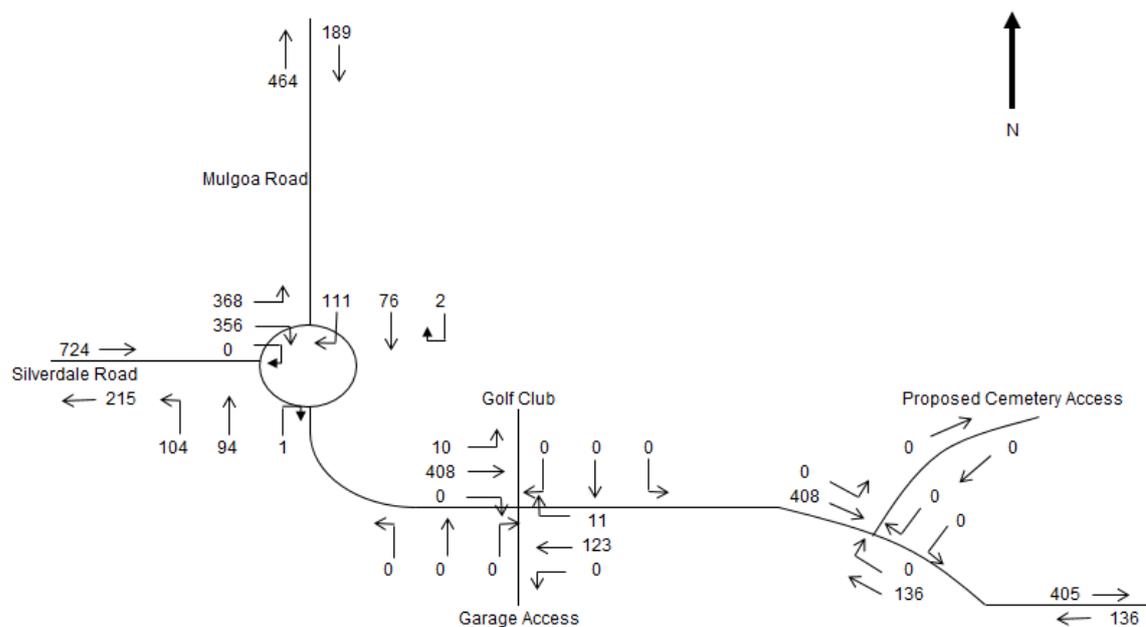
Traffic surveys were undertaken on Thursday 7<sup>th</sup> and Sunday 10<sup>th</sup> September 2017 at the following intersections:

- Park Road / Silverdale Road / Mulgoa Road – 3 Arm Priority Roundabout Intersection
- Panther Wallacia Gold Club House Entrance / Park Road – Priority access

The survey days were selected as being the likely busiest weekday and weekend day as a result of TTPP having organised surveys on similar cemetery sites.

The existing peak traffic flows, for both the Thursday and Sunday surveys are shown in the figures below. All traffic flow diagrams can be found in Appendix A, with the recorded traffic survey data appended in Appendix B.

**Figure 2: Existing AM Peak Traffic Flows – Thursday 7<sup>th</sup> September 2017**





## 2.4 Public Transport Services

The subject site is situated approximately 145 metres from northbound bus services and approximately 185 metres from southbound and eastbound services, located on Mulgoa Road. Bus service 795 is the only service which stops at these bus stops and provides travel between McCarthy High School, Emu Plains and Weir Road at Ninth Street, Warragamba. A timetable of the 795 services, from Penrith to Warragamba, is shown below.

Figure 5: 795 Bus Service – Penrith to Warragamba

<b>Monday to Friday</b>										
Service Information	69									
McCarthy High School, Emu Plains	-	-	-	-	-	-	15:42	-	-	-
Gascoigne St near Brell Pl, Kingswood	-	-	-	-	-	15:18	-	-	-	-
Penrith Temporary Interchange - Stand C, Penrith	06:27	07:24	08:28	09:47	14:09	15:32	15:51	16:33	17:57	18:57
Station St at Jamison Rd, Penrith	06:30	07:28	08:32	09:52	14:14	15:37	15:56	16:38	18:02	19:01
Nepean Shores Resort Tench Av, Jamisontown	-	-	-	09:56	14:18	-	16:00	-	-	-
Regentville Auto Mulgoa Rd near Spencer St, Regentville	06:35	07:33	08:37	10:01	14:23	15:44	16:06	16:45	18:07	19:05
Nepean District Christian School, Mulgoa	-	-	08:45	-	-	-	-	-	-	-
Mulgoa Public School Mulgoa Rd, Mulgoa	10606:43	10607:41	08:51	10:08	14:32	15:53	16:13	16:52	18:14	19:12
Davenport Dr before Kadiera Cl, Wallacia	-	-	08:58	10:15	14:40	16:01	16:21	17:00	18:21	19:19
Silverdale Rural Fire Brigade, Marsh Rd, Silverdale	-	10607:53	09:10	10:27	14:55	16:16	16:35	17:13	18:34	19:32
Weir Rd at Ninth St, Warragamba	13706:57	08:00	09:17	10:34	15:03	16:24	16:43	17:21	18:42	19:40
<b>Saturday</b>										
Penrith Temporary Interchange - Stand C, Penrith	09:47	13:47	15:47	18:47						
Station St at Jamison Rd, Penrith	09:52	13:52	15:52	18:52						
Nepean Shores Resort Tench Av, Jamisontown	-	13:55	15:55	18:55						
Regentville Auto Mulgoa Rd near Spencer St, Regentville	09:56	14:00	16:00	19:00						
Mulgoa Public School Mulgoa Rd, Mulgoa	10610:04	14:08	16:08	19:08						
Davenport Dr before Kadiera Cl, Wallacia	-	14:16	16:16	19:16						
Silverdale Rural Fire Brigade, Marsh Rd, Silverdale	-	14:28	16:28	19:28						
Weir Rd at Ninth St, Warragamba	13710:19	14:35	16:35	19:35						
<b>Sunday &amp; Public Holidays</b>										
Penrith Temporary Interchange - Stand C, Penrith	10:10	16:10								
Station St at Jamison Rd, Penrith	10:14	16:14								
Nepean Shores Resort Tench Av, Jamisontown	-	16:17								
Regentville Auto Mulgoa Rd near Spencer St, Regentville	10:19	16:23								
Mulgoa Public School Mulgoa Rd, Mulgoa	10610:27	16:31								
Davenport Dr before Kadiera Cl, Wallacia	-	16:40								
Silverdale Rural Fire Brigade, Marsh Rd, Silverdale	-	16:51								
Weir Rd at Ninth St, Warragamba	13710:41	16:58								

Source: Transport for NSW Website: Viewed online: 20/09/17

There are no additional public transport links within the vicinity of the site.

## 2.5 Pedestrian and Cyclists Facilities

Footpaths are present within the vicinity of the site on both sides of Park Road, however, footpath provision is not available east of the Panther Wallacia golf club access. Footpaths continue northbound on Mulgoa Road providing access to amenities and dwellings on both sides of the road. Limited footpath provision is available on Silverdale Road, with paths extending west as far as the residential dwellings.

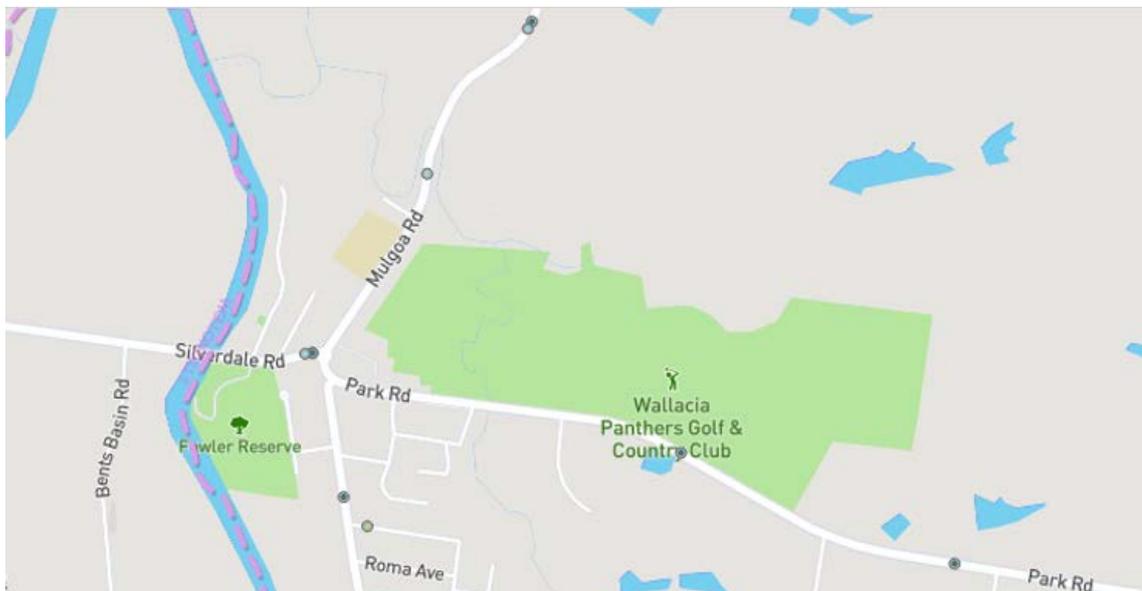
A number of crossing facilities are also present within the area, with pedestrian refuge islands present on Park Road and Mulgoa Road. A pedestrian zebra crossing is also present on Mulgoa Road.

There are no formal cycle routes within the immediate vicinity of the development site. The closest cycle route is located approximately 4.5km east of the golf club on The Old Northern Road. The RMS cycleway finder classifies this route as 'high difficulty' and the route extends to South Penrith to the north and Narellan to the south.

## 2.6 Road Safety Review

TTPP has obtained RMS vehicle crash data and the accident reports have been utilised to determine any vehicle accidents, within a 1km driving distance of the site. The crash and casualty reports identified the frequency and contributory causes of crashes around the site, within the past 5 years. The location of the recorded vehicle accidents, within a 1km driving distance of the site, are shown below.

**Figure 6: Location of Vehicle Accidents**



Source: RMS 'Crash and Casualty Statistics' Online Viewer (viewed online: September 2017)

The RMS crash data and reports note that there were 9 vehicle accidents, within a 1km driving distance of the site, between 1<sup>st</sup> January 2012 and 31<sup>st</sup> December 2016.

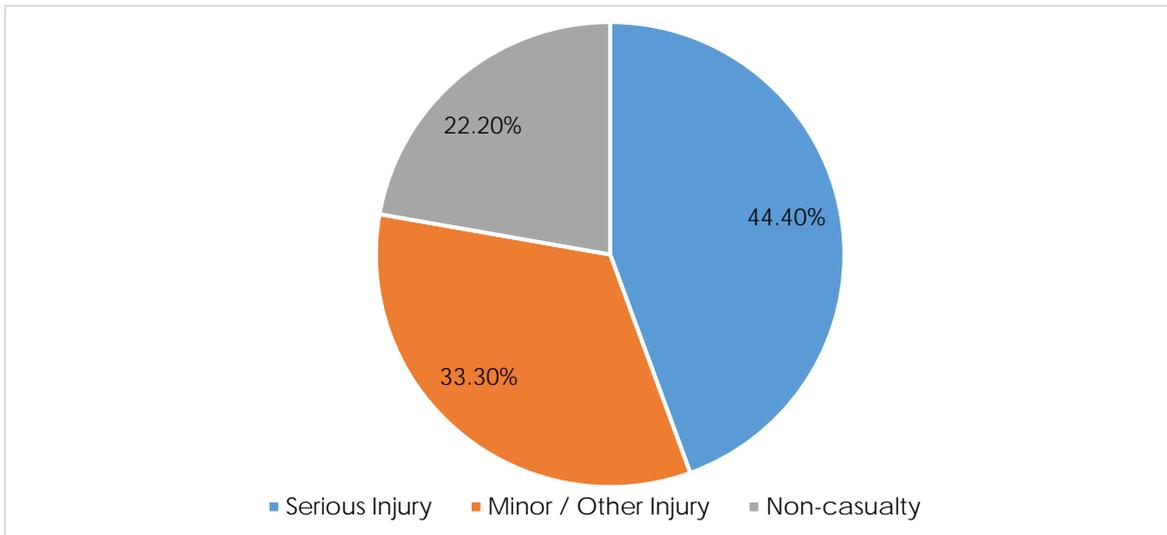
The RMS crash data reports demonstrate the degree of vehicle accidents, which include:

- Non-Casualty (Towaway)
- Minor / Other Injury
- Moderate Injury
- Serious Injury
- Fatal

Of the 9 recorded accidents, 44% of accidents (4 total) were noted to result in serious injuries. 33% of accidents (3 total) were noted to result in minor or other injury with the remaining 22% (2 total) being identified as non-casualty (towaway).

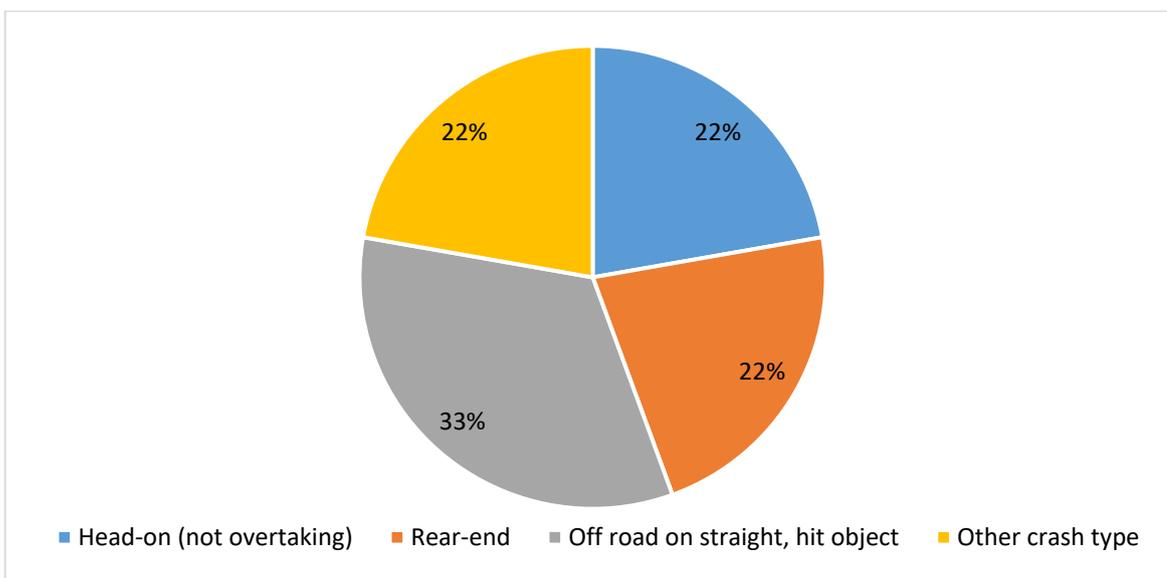
It was recorded that there were no fatal or moderate injury accidents. The severity of recorded accidents is shown in Figure 7.

**Figure 7: Accident Severity**



Of the recorded vehicle accidents, it was reported that the most common cause (33% of all accidents) was vehicles travelling off the road, on a stretch of straight road and hitting an object. Head on collisions, rear-ended shunts and other crash types were all recorded as the remaining accident factors. The percentage of accident types discussed, are shown in the figure below.

**Figure 8: Accident Type**



There does not appear to be any location where there is a significant cluster of crashes. The full RMS crash data and report can be found in Appendix C.

## 2.7 Journey to Work Data

Table 1 provides a summary of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data, for area 4969.

**Table 1: Existing Mode Share to and from Wallacia (Travel Zone 4969)**

Trips	Train	Bus	Car (Driver and Passenger)	Walked Only	Other	Total
Residents outbound work trips to other destinations	3%	1%	91%	2%	3%	100%
Workers inbound work trips from other destinations	2%	NA	88%	6%	4%	100%

Source: Bureau of Transport Statistics (BTS) Journey to Work (JTW) data. Viewed online: 20/09/17

Table 1 indicates that residents with the Wallacia area travel to work predominately by car, with an overall mode share of 91%. Most workers inbound to the Wallacia area are made also by car, with a mode share of 88%. This high level of car usage is due to the limited public transport provision within the area. The data suggests that a higher percentage of workers walk to work in comparison to using public transport.

## 3 Development Proposal

### 3.1 Overview

It is proposed that the cemetery element of the development will occupy two thirds of the available land (approximately 29ha) and will be developed on an 'as needed' basis, in 5 – 10 year increments.

Ultimately the proposed development has the capacity to provide 88,000 plots, with 60,000 graves being implemented over 1 – 50 years and 28,000 graves implemented over 51 – 100 years.

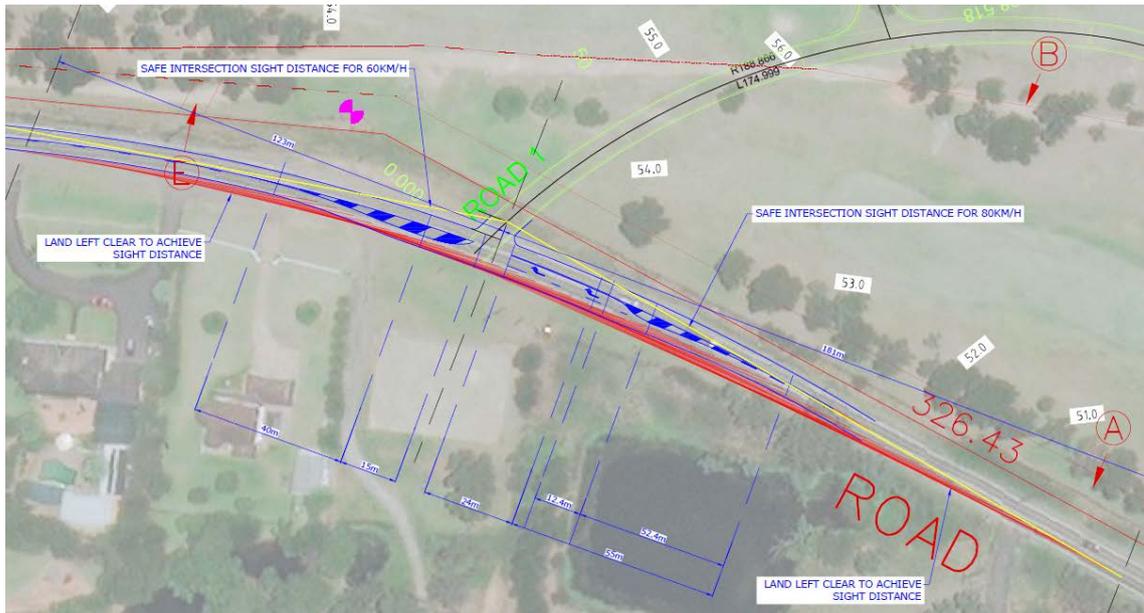
The design of the development essentially involves the following features:

- Gatehouse where funeral processions exchange paperwork and are led to the burial site,
- Function room to welcome families after a funeral or service, located at the existing Panthers Golf Club,
- Chapel with a combined capacity to accommodate 100 visitors,
- Administration office for public enquiries and administrative staff,
- Mortuary facilities for funeral preparation, located close to the main chapel,
- Ground staff facilities with material and equipment storage.

## 3.2 External Access

Access to the site will be permitted primarily via Park Road, as shown in Figure 9, with suitable intersection treatments provided.

**Figure 9: Concept Design of Access Road – Channelised T-junction – Short Lane Type CHR(s)**



The proposed access point to and from Park Road, will be the main access point to the cemetery. The concept design shown above, has been developed showing the proposed Channelised T-junction (CHR(s)). Due to the road width available at the proposed access point, the road is to be widened to maintain traffic lanes in both direction and provide the CHR(s). The proposed priority intersection has been designed in accordance with the Austroads Guide to Road Design Part 4A (2017).

The available site distance from the proposed access point towards the east and west, is considered to provide sufficient Safe Intersection Sight Distance (SISD), between Park Road (major road) and the site (minor road). This means that there is sufficient distance for motorists travelling on Park Road, to observe a vehicle from the internal road approach moving into a collision situation and to decelerate to a stop before reaching the collision point. Adopting the SISD, the required SISD as specified in the Austroads Guide is:

- 123m in a road with a speed limit of 60km/h,
- 181m in a road with a speed limit of 80km/h.

The available SISD at the proposed site access is sufficient to meet the required visibility splays demonstrated in the Austroads Guide, with 135m of visibility available to the west of the access and 183m of visibility available to the east.

### 3.3 Internal Roads

The proposed widths of the internal roads have been designed in accordance with the Planning for Bushfire Protection specifications.

The primary internal roads will measure 8 metres in width, between the kerbs, allowing two-way access and parallel parking on both sides of the road. A concept plan of the proposed internal layout is shown in the figure below.

**Figure 10: Concept Design of Internal Roads**



It is also proposed to provide a localised 'one-way' internal road, (shown at location A above) which links the existing Panthers golf club (which is likely to be used as function rooms/condolence rooms) to Mulgoa Road.

Access to the proposed work shop will be provided via the internal road network (at Location B) with a separate emergency access provided onto Park Road. Access to the cemetery at this point would not be permitted for the general public.

### 3.4 Parking Provision

A number of on-site car parking spaces will be provided to accommodate visitors and staff. The proposed parking provision of the site is shown in Table 2. This has been based upon the operational requirements of Catholic Cemeteries.

**Table 2: Car Parking Provision**

<b>Building</b>	<b>Parking Provision</b>
Chapel Building / Mortuary	41
Administration Office	11
Ground Staff Facilities (Workshop)	6
Function Room (to be located at existing Panthers Golf Club)	61 (Existing)

The site will provide a total of 119 formal parking spaces, consisting of 58 spaces within the proposed cemetery plus kerbside parking available throughout the internal road network and utilising the existing 61 parking spaces at the Panthers Golf Club. Overall the site will provide sufficient parking to accommodate the development.

### 3.5 Number of Staff

Based on the information provided by the client, the proposed memorial park would have 5 members of administrative staff, including a manager. Additional staff would involve 4 members of ground staff, 2 mortuary staff and 3 gatehouse employees, plus 1 funeral director.

### 3.6 Opening Hours

The proposed cemetery will operate between the hours of 07:00am and 17:00pm, Monday to Friday and between 07:00am and 12:00pm on a Saturday. Visiting opening hours will be between sunrise and sunset, seven days a week.

### 3.7 Traffic Management

An internal road network has been proposed to allow access between facilities and graves within the site. The development plan indicates the following measures for traffic management within the development:

- All intersections within the subject site will be priority control with traffic on primary internal road having high priority over secondary roads, except for the internal roundabout.
- The primary internal roads will have their own material (e.g. concrete), whilst minor roads will be laid in a different material (e.g. asphalt).
- The intersection between primary and secondary internal roads will have a threshold treatment of natural stone set into the pavement, acting as a 'rumble strip' and marking the transition between these road types.

- The internal roads would be signposted at a maximum of 20km/h to produce a low speed environment.
- Wayfinding signage will be provided in the internal roads for directional guidance to various key locations.

## 4 Parking Assessment

Parking will be provided through on site car parks as well as kerbside parking in the internal road network. Two-way roads are proposed to provide parallel parking on both sides and one-way roads to provide parallel parking on one side.

The key parking generators of the proposed development consist of:

- Cemetery
  - General visitation in the cemetery
  - Staff parking surrounding the offices and other work areas
  - Chapel that holds funerals and ceremonies with a combined seating capacity of 100.
  - Existing 61 parking spaces at the Panthers Golf Club, to accommodate functions.

The assessment of proposed parking provision is provided below in Table 3.

**Table 3: Parking Assessment for Key Parking Generators`**

Key Parking Generator	GFA (m <sup>2</sup> )	Parking Requirement		Parking Requirement	Proposed Parking Provision
		DCP Parking Rate	First Principle Approach		
Chapel	-	-	<ul style="list-style-type: none"> <li>• Maximum seating capacity 100</li> <li>• With a typical average of 2.5 people per car, given people tend to rave in groups for funeral attendance.</li> </ul>	40	40
Offices and work areas	-	<ul style="list-style-type: none"> <li>• 1 space per 40m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• According to the Masterplan, a total of 5 members of staff (4 general office staff and 1 manager) and 3 grounds keepers, will be present on site, assuming 1 p/car.</li> </ul>	15	15

These key parking generators would require 55 spaces and the provision of 58 spaces plus ample kerbside parking would sufficiently accommodate these parking needs. Any overflow parking that may occur when the chapel is used at full capacity, the parking demand could be accommodated by kerbside parking around the facilities.

For other facilities within the proposed development, the parking needs and provision are discussed as follows:

- **The mortuary facilities:** Expected to generate a small number of delivery vehicles per day, with typically one to two vehicles occurring concurrently. As such, the provision of two parking spaces is considered sufficient to accommodate the anticipated parking needs.
- **The function rooms:** Are designed to welcome families after a funeral or service, and therefore only a proportion of the family members / visitors are required to be catered for. It is not anticipated that exclusive or additional trips would be generated by the function room itself, however, some parking spaces will be occupied by members of the Golf Club. In addition, family members / visitors may leave their cars at the car park adjacent to the chapel and join other people cars (i.e. higher car occupancy) and reduce the parking demand associated with the use of the function room. Notwithstanding, any overflow parking can be provided on the kerbside, within a short walking distance.

#### 4.1.1 Service Vehicles

Given the nature of the development proposal, a number of service vehicles are expected to access the site on a regular basis, for refuse collection and delivery to the mortuary facilities.

Service vehicles would enter the site via the main access from Park Road, located on the southern boundary of the site. The internal roads would be of sufficient width to accommodate a fire truck with passing traffic (if any).

## 5 Traffic Assessment

This section assesses the potential traffic generation and impacts associated with the development proposal.

### 5.1 Estimated Mode Split

As discussed in Section 2.7, the JTW data demonstrates that workers' mode of travel to zone 4969 was 88% by vehicles, either as a driver or passenger. The utilisation of public transport was noted to be 2%.

Given the nature of the cemetery, it is assumed all staff and visitor trips, to and from the site, would be solely dependent on private vehicles. It is anticipated that given the low accessibility to the site, via public transport, buses and trains would not be utilised. The table below demonstrates the expected mode share to and from the site.

**Table 4: Estimated Mode Share to and from the Proposed Site**

Trips	Train	Bus	Car (Driver and Passenger)	Walked Only	Other	Total
Workers inbound work trips from other destinations	0%	0%	100%	0%	0%	100%
Visitors inbound trips	0%	0%	100%	0%	0%	100%

A typical car occupancy rate of 2.5 people per vehicle has been adopted for cemetery visitors for analytical purposes. This rate is considered reasonable given the nature of the proposed land use as families and friends tend to travel together for grave visitation and funeral ceremonies.

### 5.2 Traffic Generation

There is no current traffic generation guidance given within the RMS "Guide to Traffic Generating Developments" (2002) that outlines the traffic generation by cemeteries. However, the traffic generation can be determined through comparison with a similar site at the Liverpool and Rockwood Cemeteries where access to public transport is limited. Table 5 outlines their land size and chapel capacity as follows:

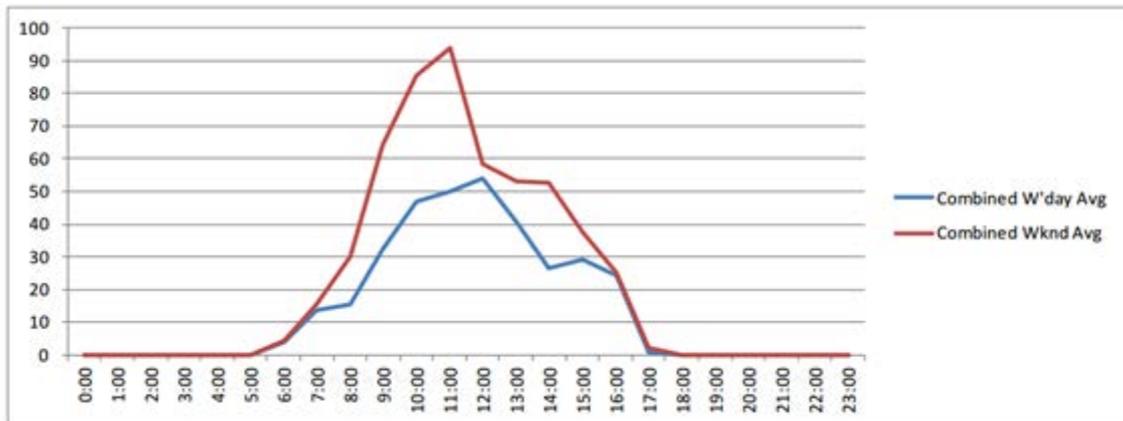
**Table 5: Overview of the Similar Cemeteries and the Proposed Cemetery**

Site	Size (Ha)	Burial Plots	Chapel Capacity
Liverpool Cemetery	8	24,000	Seated: 180 Standing: 70
Rookwood Cemetery	286	189,400	Crematorium / Chapel: 162 seats SACRED Heart: 80 seats St Michaels: 60 seats Mausoleum: 200 seats Total: 502 seats
Proposed Wallacia Cemetery	44	Stage 1: 1 – 60,000 Stage 2: 60,000 – 88,000	Seated: 100

### 5.2.1 Sample Site: Liverpool Cemetery

A separate Traffic Impact Assessment, undertaken by GTA Consultants, provided traffic counts at the access point of the Liverpool Cemetery, as shown below in Figure 11.

**Figure 11: Existing Two-way Traffic Volumes at Liverpool Cemetery**



Source: GTA Consultants

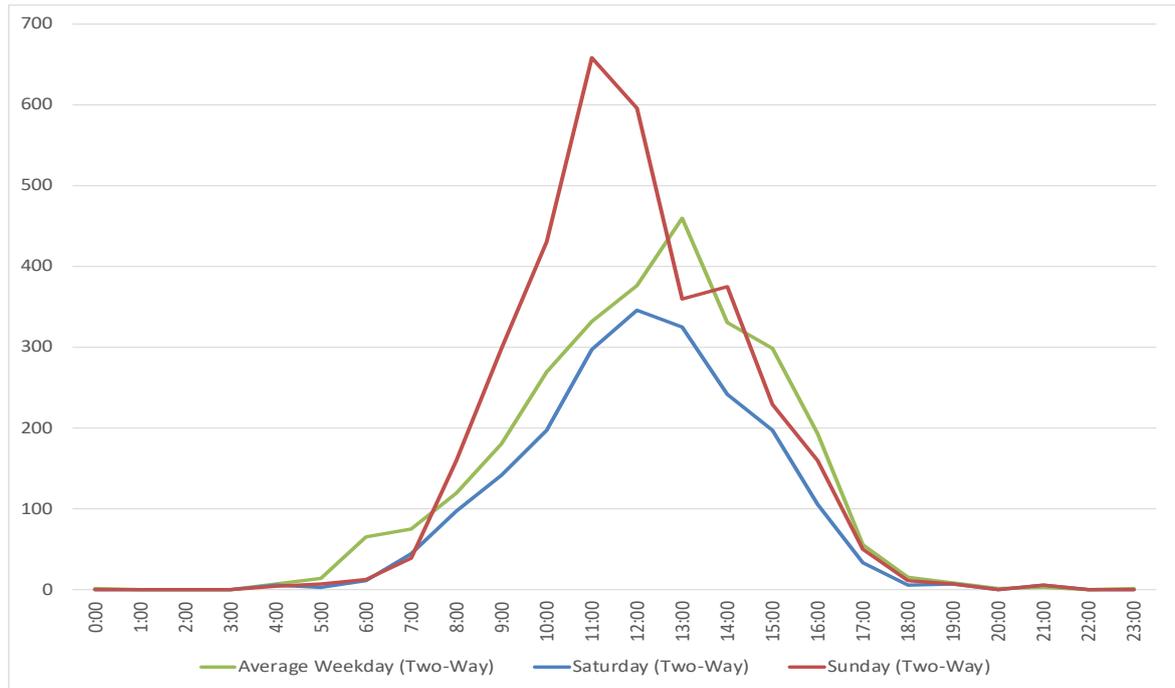
Traffic surveys undertaken at the Liverpool cemetery indicate that the traffic generation was in the order of 30-40 trips during the network AM and PM peak periods. These traffic volumes include staff trips, service vehicles and grave visitation etc, before and after the busiest operational hours of the cemetery.

Typically, funeral ceremonies are held anytime between 10am and 2pm. This is demonstrated above, in Figure 11 above, where site activity peaked between 12pm and 1pm, with 50-60 trips recorded. These traffic volumes would include visitors to the graves, chapels and function room.

## 5.2.2 Sample Site: Rookwood Cemetery

The Transport Planning Partnership undertook automatic tube counts at the access points of another cemetery, with chapels holding a similar capacity to that proposed. Figure 12 demonstrates the two-way vehicle movements at Rookwood Cemetery.

**Figure 12: Existing Two-way Traffic Volumes at Rookwood Cemetery**



Traffic surveys undertaken at the Rookwood cemetery indicate the traffic generation was in the order of 460 trips during the site peak hour on an average weekday and 660 trips on Sunday. These traffic volumes would involve visitors to the graves, chapels and function hall.

Traffic survey data for both the Liverpool and Rockwood sites is included in Appendix D.

## 5.2.3 Wallacia Cemetery

### 5.2.3.1 Stage 1: 1 – 60,000 Graves

#### Weekday

Correlating the data shown in Figure 11 and Figure 12, enables a preliminary estimate using a pro-rata method for the likely traffic generation, based on the chapel capacity and number of burial plots in the Liverpool and Macarthur sites.

On this basis, the preliminary estimates of traffic generation for mid-day peak hour is estimated to be:

- 75 - 100 trips (two-way) based on the rate derived using the number of burial plots. This is calculated on the proposed cemetery providing approximately 2.5 times the number of graves provided by the Liverpool Cemetery (2.5 X 30 - 40 two-way trips = 75 - 100 two-way trips).
- 20 - 24 trips (two-way) based on the rate derived using the capacity of the chapels. The proposed cemetery has a reduced capacity of approximately 60% compared to Liverpool Cemetery and a reduced capacity approximately of 80% compared to Rookwood Cemetery. Based on the rates shown above for the Liverpool cemetery (50-60 trips recorded) a reduced chapel area of 60% would result in 20 - 24 two-way trips.

However, the above estimates are understated when compared with the estimates using the first principles approach which is discussed below:

- At Rookwood Cemetery, assuming all 500 visitors attending the funeral(s) would arrive in private vehicles, with a car occupancy of 2.5 people per car, the chapel would generate 200 vehicles. Arrival trips would occur within an hour prior to the start of the funeral, and departure trips would occur over 1-2 hours after the event, depending on the length of the funeral ceremony and the length of stay at the function room after the funeral. This results in a total of 200 inbound trips and 80 outbound trips occurring during the first hour of the event (given the capacity of the function room is 60% of the chapels, thus 40% of the visitors are likely to leave the site). The remaining 120 outbound trips would leave the site during the second hour of the event. The Rookwood Cemetery has a provision of 189,400 graves, resulting to approximately 189 two-way trips per 1000 graves.
- As such, based on the capacity of the proposed chapel, with a car occupancy of 2.5 people per car, the chapel would generate approximately 40 inbound trips during the first service with, say, 60% of people staying to travel to the function room (24 trips) and the remaining 40% being outbound trips (16 vehicles).
- Given the Liverpool site generates 30-40 trips (two-way) during the network peak hours in relation to the staff and grave visitation trips. Projecting these trips based on the number of burial plots in the Liverpool site, it is estimated that 75 - 100 trips (two-way) may occur in relation to visitation at the graves, as demonstrated in the calculations above. It is also assumed that these visitors would leave the site within one hour.

Comparing the pro-rata method and the first principles method, the higher, more conservative estimate is taken as 124 two-way trips, for the site activity peak hour that would occur around mid-day.

For the road network AM and PM peaks, it is estimated 100 trips (50 inbound trips and 50 outbound trips) would occur in relation to grave visitation and staff trips. This has been based on the number of burial plots in the Liverpool cemetery (24,000 burial plots). The proposed Wallacia has nearly 2.5 times as more burial plots, in Stage 1, in comparison to the Liverpool site, therefore trip generation has been increased.

Table 6 provides a summary of the weekday traffic generation.

**Table 6: Weekday Traffic Generation**

Peak Hour	Inbound	Outbound	Two-Way
AM Peak (Grave visitation)	50	50	100
AM Peak (Services)	31	9	40
PM Peak (Grave visitation)	50	50	100
PM Peak (Services)	20	20	40
Midday peak (Grave visitation)	50	50	100
Midday peak (Services)	24	16	40

### Weekend

The weekend traffic generation has been estimated using surveyed peak hour traffic volumes at the Rookwood Cemetery access points. Table 7 provides a summary of the weekend traffic generation. The peak hour traffic generation for the Rookwood site was in the order of 600 to 660 to-way movements within the AM and PM peak hours, on a Sunday. Given that the proposed Wallacia development is much smaller in scale (approximately 3 times smaller), a conservative estimate of 220 two-way trips has been estimated for the Sunday peak.

**Table 7: Weekend Traffic Generation**

Peak Hour	Inbound	Outbound	Two-Way
Sunday Peak	116	103	220

N.B the Proposed weekend peak does not include any services.

#### 5.2.3.2 Full Development

It is proposed to provide a total of 88,000 burial sites over the next 100 years. Assuming a worst-case project traffic generation growth in which all burial plots are built in years 51 - 100 over the development period, traffic generation by 2117 would be:

- 180 two-way trips during the network AM / PM peak hours and 180 trips during the site activity peak hour around mid-day on a weekday.
- 330 trips during the network AM / PM peak hours, and 330 trips during the site activity peak hour around mid-day on a weekend.

However, these estimates do not take into account any proposed increase to the chapel capacity so it is assumed that the chapel will continue to provide a total capacity of 100 people even in 100 years.

#### 5.2.3.3 Modelling Assumptions

For the purposes of traffic modelling, only the Stage 1 development which has 60,000 burial plots (to be developed by 2067) was assessed based on the following assumptions:

- A ten-year planning horizon is a realistic timeframe for the assessment, although the traffic generation considers the stage 1 total of 60,000 burial plots, for completion in 2067.
- All vehicular trips associated with grave yard visitation, chapel attendance, staff arrival and departure to be superimposed on the relatively higher background traffic volume in the network AM and PM peak hours. The sum of the network AM and PM peak hour traffic volumes and the mid-day traffic generation is considered a conservative approach to assess the operational conditions of the key intersections:

##### **Weekday**

- Superimpose 140 trips (81 inbound and 59 outbound) associated with chapel attendance and grave visitation to the network AM peak hour background traffic volumes.
- Superimpose 140 trips (70 inbound and 70 outbound) associated with the grave visitation and the visitor's departure from the function room to the network PM peak hour background traffic volumes.

##### **Weekend**

- Superimpose 220 trips (116 inbound and 103 outbound) associated with chapel attendance and grave visitation to the network Sunday peak hour background traffic volumes.
- Only the main access point has been assessed so an assumption has been made that all site related inbound and outbound traffic would be concentrated at this point on the southern boundary of the site onto Park Road.
- The surrounding network is assumed to be the same as per the existing conditions apart from the proposed right turn treatment.
- 40 of the outbound vehicles have been diverted to the Panthers Golf Club, to represent visitors attending functions.

## 5.3 Traffic Distribution

Traffic surveys undertaken on Thursday 7<sup>th</sup> September and Sunday 10<sup>th</sup> September 2017, identified the following peak hours:

- Weekday AM Peak: 07:00am – 08:00am
- Weekday PM peak: 15:30pm – 14:30pm
- Sunday Peak: 11:30am – 12:30pm

Based on the wider road network, the following directional distributions have been assumed. These distributions represent the worst-case scenario:

- At the proposed site access
- During the Sunday Peak, 40 vehicles departing the Cemetery have been diverted into the Panthers Golf Club car park, to represent vehicles travelling to functions.
- All arriving and departing vehicles have been distributed on existing distribution percentages.

The figures below show the anticipated increases in turning movements near the subject site, as a result of the cemetery.

**Figure 13: Proposed Weekday AM Peak Traffic Flows**

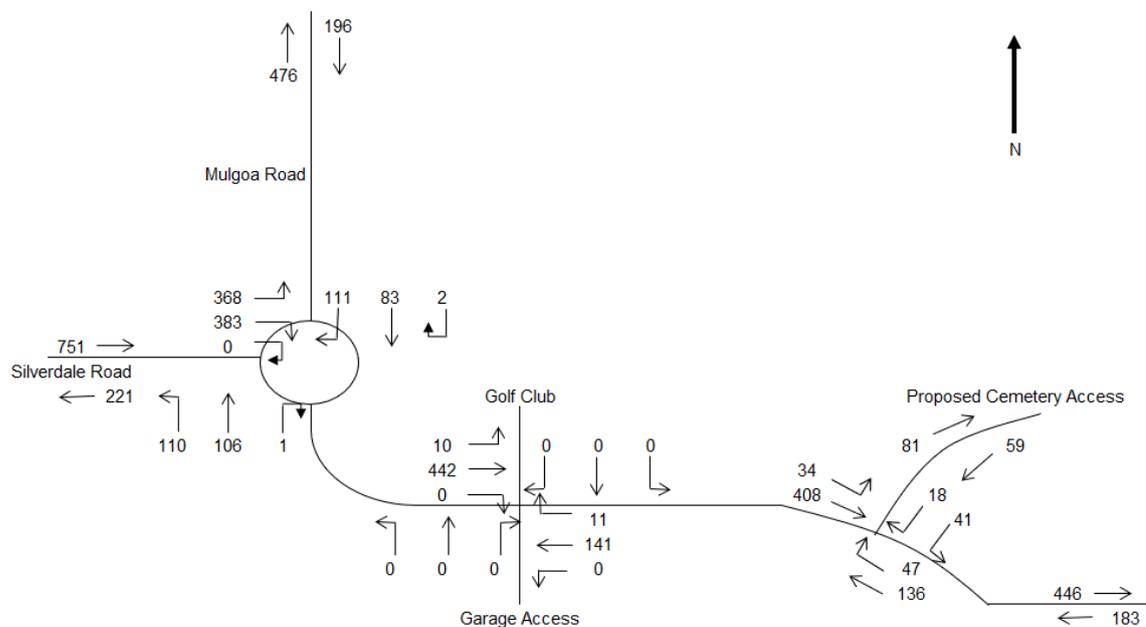


Figure 14: Proposed Weekday PM Peak Traffic Flows

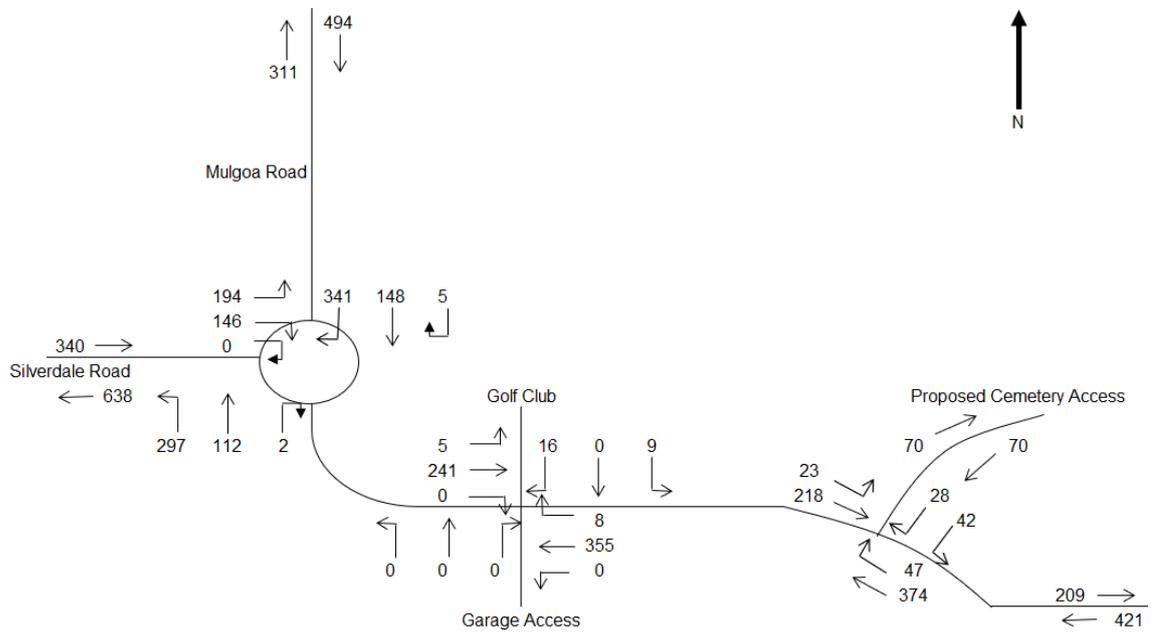
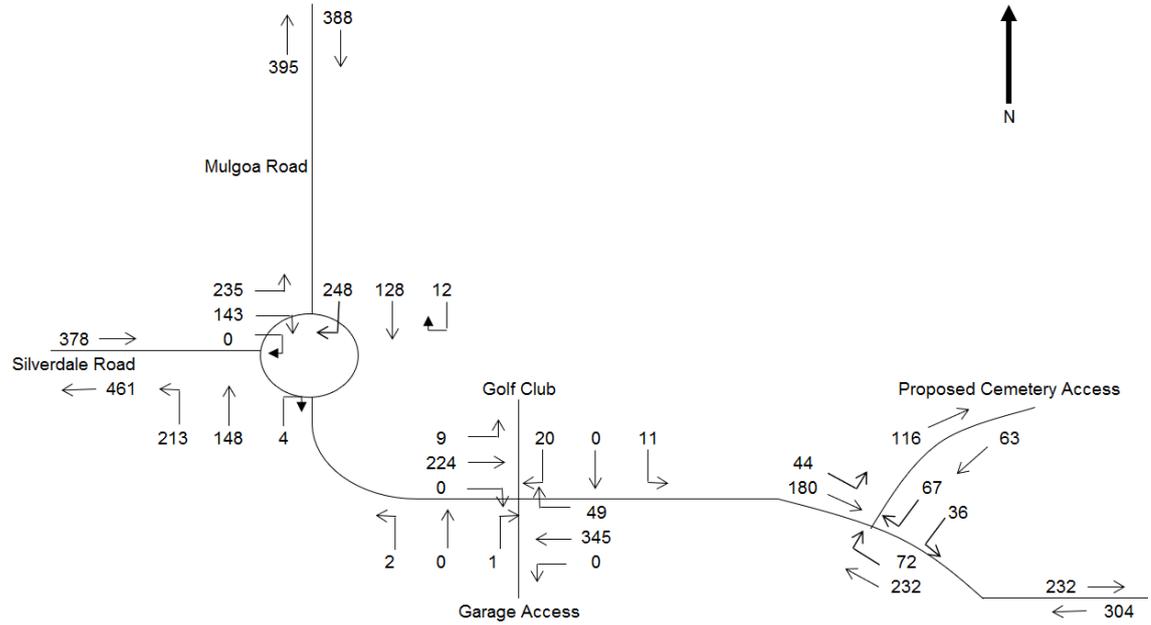


Figure 15: Proposed Sunday Peak Traffic Flows



As mentioned previously, all flow diagrams can be found in Appendix A.

## 5.4 Performance of Key Intersections

The operation of key intersections has been assessed using SIDRA Intersection 7, a computer based modelling package which assesses intersection performance under prevailing traffic conditions.

## 5.4.1 Model Performance Indicators

SIDRA Intersection 7 modelling provides several useful indicators to determine the level of intersection performance.

### 5.4.1.1 Level of Service (LoS)

LoS is a basic performance parameter used to describe the operation of an intersection. Levels of service indicators range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement. The level of service criteria for intersections can be found below in Table 8.

**Table 8: Level of Service Criteria for Intersections**

Level of Service	Average Delay (seconds per vehicle)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	good operation	good operation
B	15 to 28	good with acceptable delays and spare capacity	acceptable delays and spare capacity
C	29 to 42	satisfactory	satisfactory, but accident study required
D	43 to 56	operating near capacity	near capacity and accident study required
E	57 to 70	at capacity At signals, incidents will cause excessive delays.	at capacity, requires other control mode
F	Greater than 71	unsatisfactory with excessive queuing	unsatisfactory with excessive queuing; requires other control mode

Source: RMS Guide to Traffic Generating Developments, 2002

### 5.4.1.2 Average Delay

Delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. At priority controlled intersections and roundabouts, the average delay for the most delayed movement is usually reported.

## 5.4.2 Existing and Future Scenarios

Intersection analysis was conducted for the intersections of:

- Proposed Site Access
- Park Road / Silverdale Road / Mulgoa Road – 3 Arm Priority Roundabout Intersection
- Panther Wallacia Golf Club House Entrance / Park Road – Priority Access

The analysis assessed the intersections operating under existing and future conditions, using the peak hour flows presented in Table 6 and Table 7. The average delay and Level of Service, for the worst arm on the intersection has been demonstrated.

Network peak traffic flows, which were identified during the traffic surveys, have been utilised when determining traffic already travelling on the network. It is noted that the network peaks differ from the anticipated peak hours of the cemetery (i.e. Existing AM peak on Park Road identified between 7:00am – 8:00am). To ensure a ‘worst case’ scenario is demonstrated within the traffic modelling, these flows have been utilised within the modelling.

**Table 9: SIDRA Intersection Modelling Results**

Weekday/Weekend	Intersection	Scenario	AM Peak Hour		PM Peak Hour	
			Delay (Seconds)	Level of Service	Delay (Seconds)	Level of Service
Weekday	Site Access/ Park Road	Existing	0	A	0	A
		Existing + Proposed	1.6	A	1.4	A
	Panthers Golf Club / Park Road	Existing	0	A	1	A
		Existing + Proposed	0	A	1	A
	Park Road Roundabout	Existing	7	A	8	A
		Existing + Proposed	7	A	8	A
Weekend	Intersection	Scenario	Sunday Peak Hour			
			Delay (Seconds)		Level of Service	
	Site Access/ Park Road	Existing	0		A	
		Existing + Proposed	2.5		A	
	Panthers Golf Club / Park Road	Existing	1		A	
		Existing + Proposed	1		A	
	Park Road Roundabout	Existing	7		A	
		Existing + Proposed	7		A	

The modelling analysis results demonstrate that all intersections currently operate good, with a Level of Service (A) and low delays. The proposed development shows that there would not be any impacts to intersection Level of Service, with minimal increase in delay at the proposed site access. The SIDRA outputs of the scenarios demonstrated above can be found in Appendix E.

## 6 Conclusions

This transport impact assessment report accompanies a development application for the proposed new cemetery located at 13 Park Road, Wallacia.

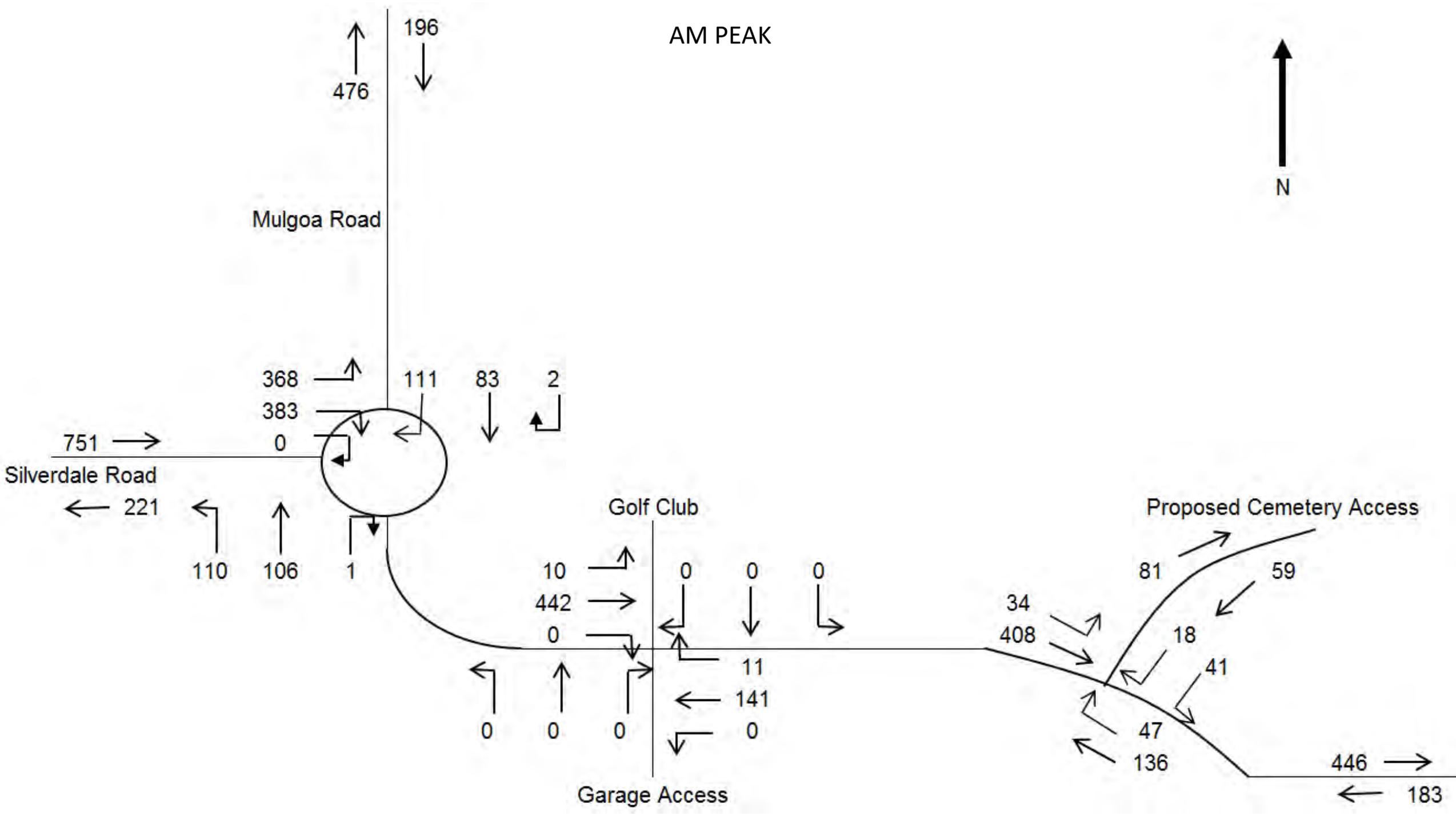
The key findings from this report are provided below:

- There is sufficient SISD at the proposed site access point. It is considered that vehicles egressing the site would have sufficient visibility to exit the site safely.
- Internal road widths satisfy NSW Rural Fire Services requirements.
- There are sufficient internal car parking spaces for visitors and staff, with additional kerbside parking within the internal road layout, providing appropriate parking provision.
- Both Park Road and the proposed site access have sufficient capacity to accommodate expected traffic volumes anticipated from the development. The existing Panthers Golf Club intersection also has appropriate spare capacity to cope with vehicles entering the site in relation to the proposed 'Function Room' facility.
- The proposed development is expected to generate moderate levels of traffic and would not have a detrimental impact on the existing road network.
- Overall, there will be no adverse traffic and parking implications associated with the proposal.

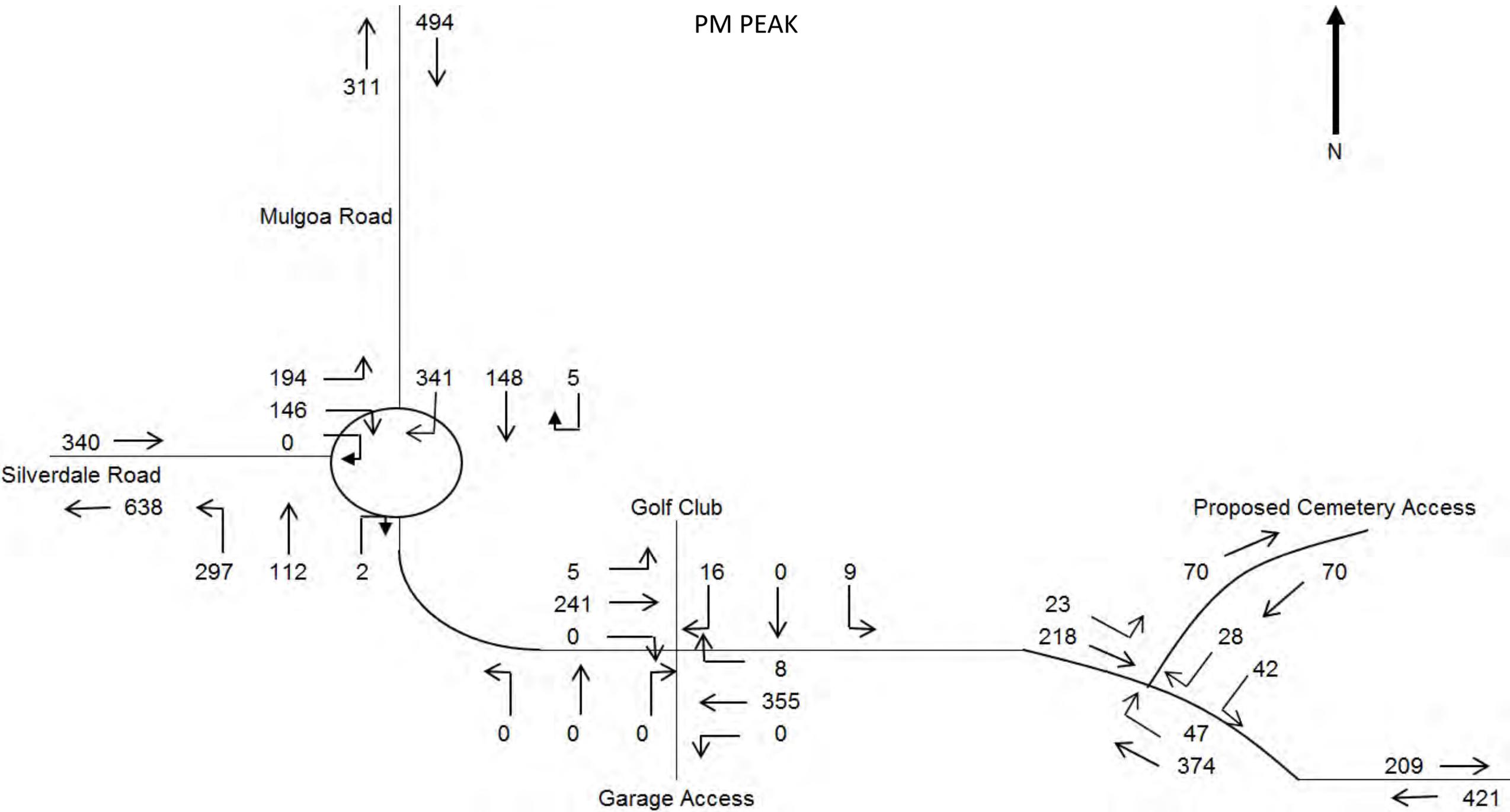
# Appendix A

## Traffic Flow Diagrams

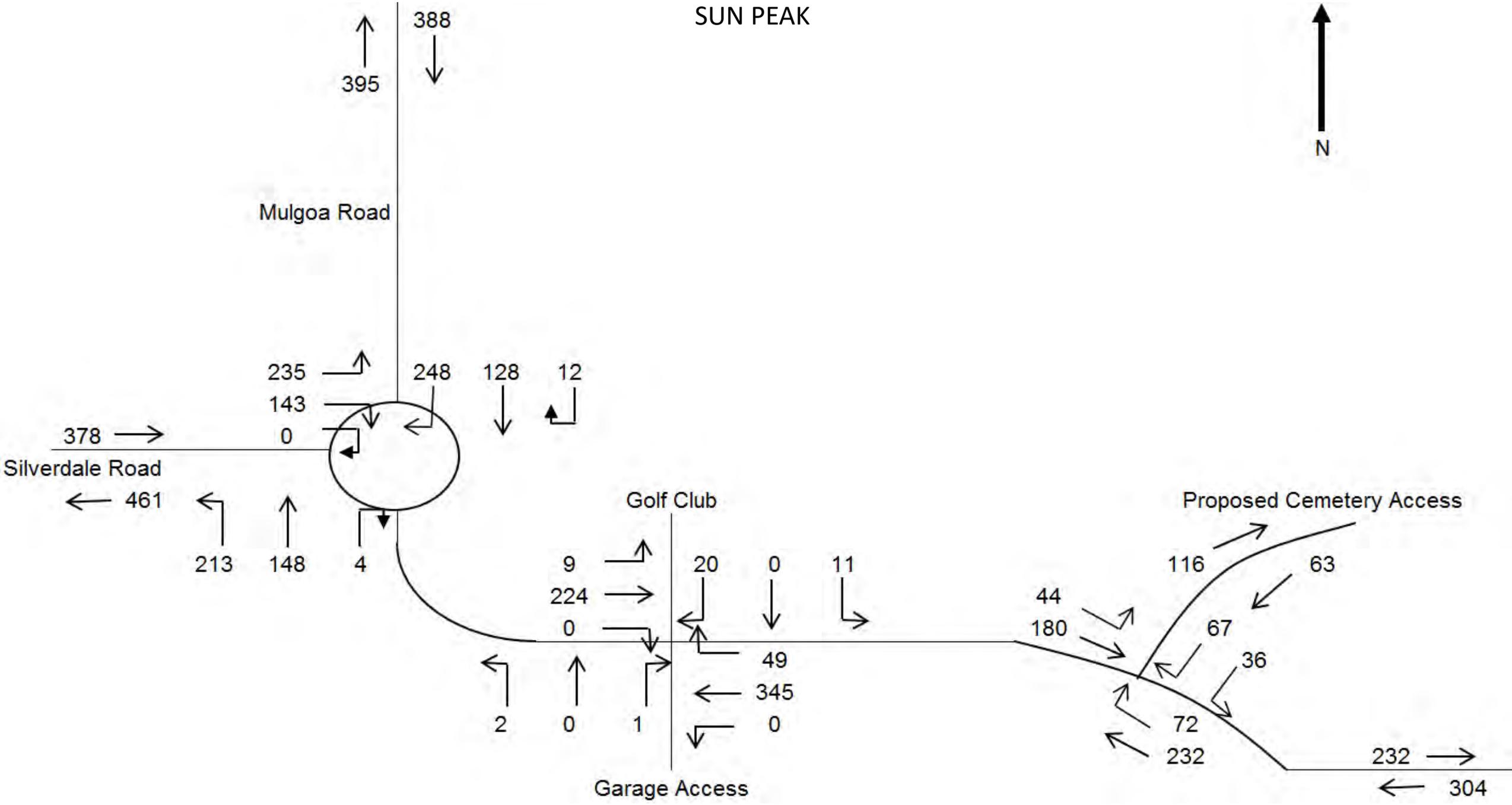
AM PEAK



PM PEAK



SUN PEAK



# Appendix B

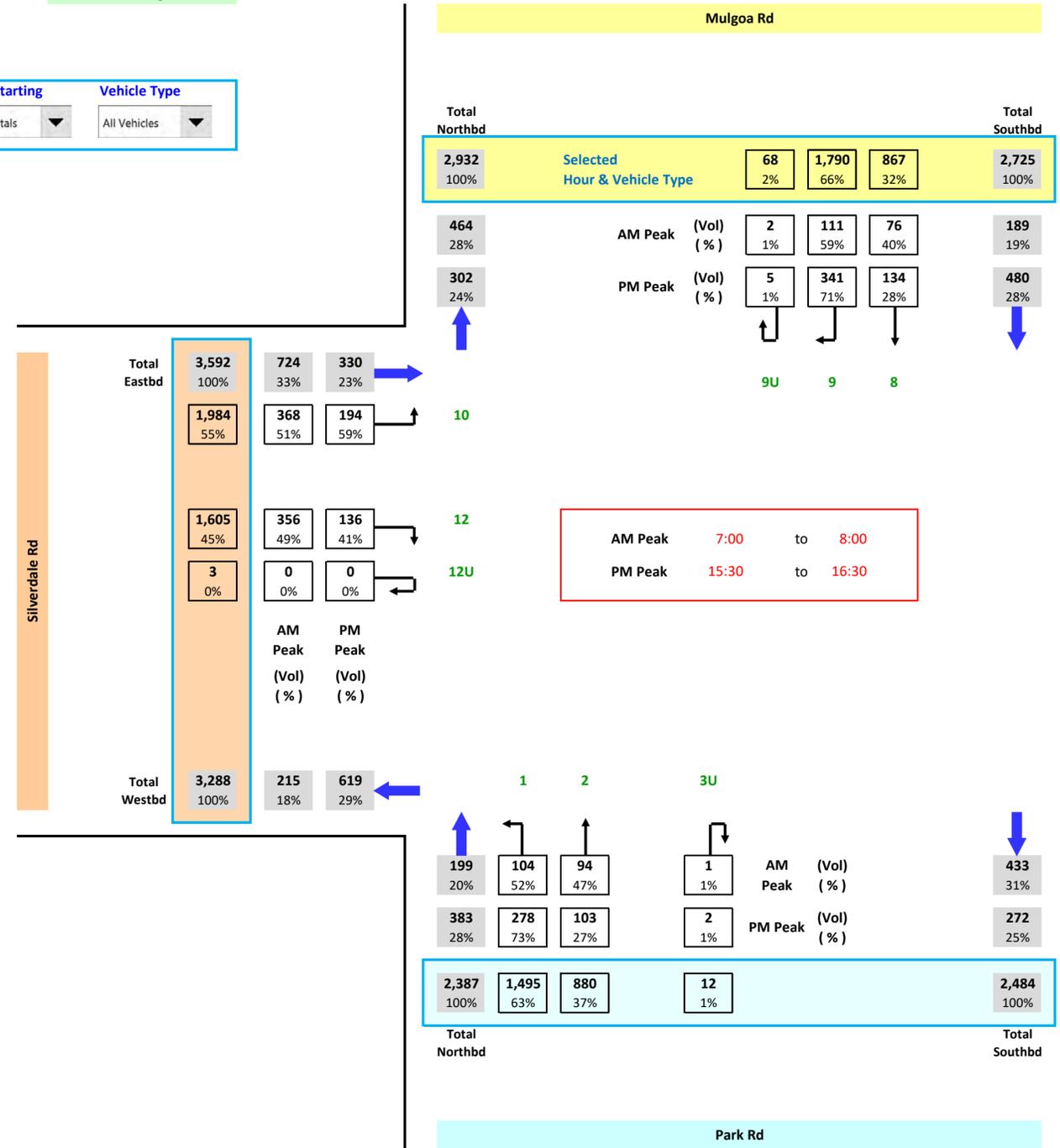
## Traffic Surveys

**Job No.** : N3530  
**Client** : TTPP  
**Suburb** : Wallacia  
**Location** : 1. Park Rd / Silverdale Rd / Mulgoa Rd

**Day/Date** : Thu, 7th September 2017  
**Weather** : Fine  
**Description** : Classified Intersection Count  
 : Intersection Diagram



**Hour Starting** : 10hr Totals  
**Vehicle Type** : All Vehicles

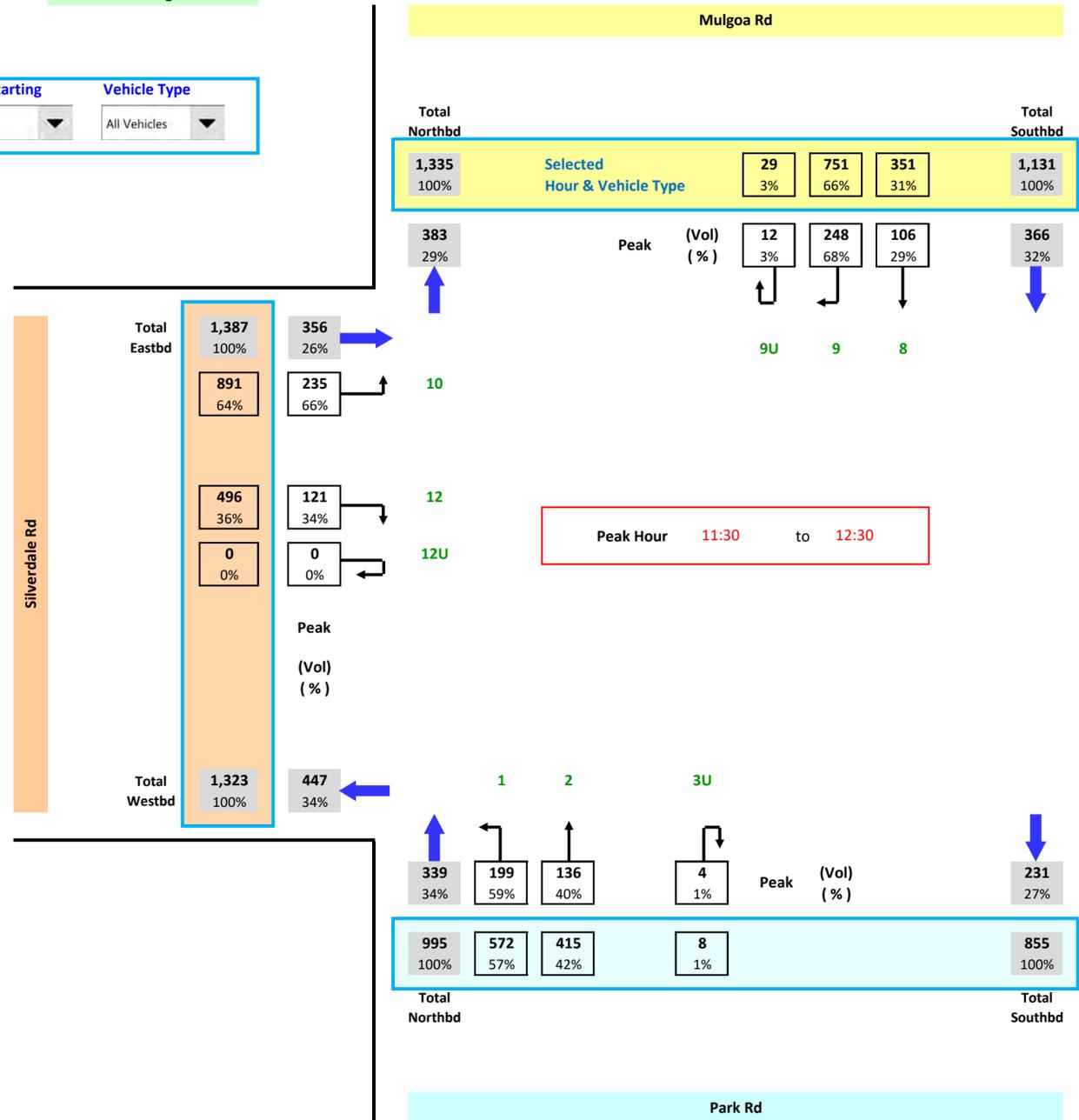


**Job No.** : N3530  
**Client** : TTPP  
**Suburb** : Wallacia  
**Location** : 1. Park Rd / Silverdale Rd / Mulgoa Rd

**Day/Date** : Sun, 10th September 2017  
**Weather** : Fine  
**Description** : Classified Intersection Count  
 : Intersection Diagram



**Hour Starting** : Totals  
**Vehicle Type** : All Vehicles

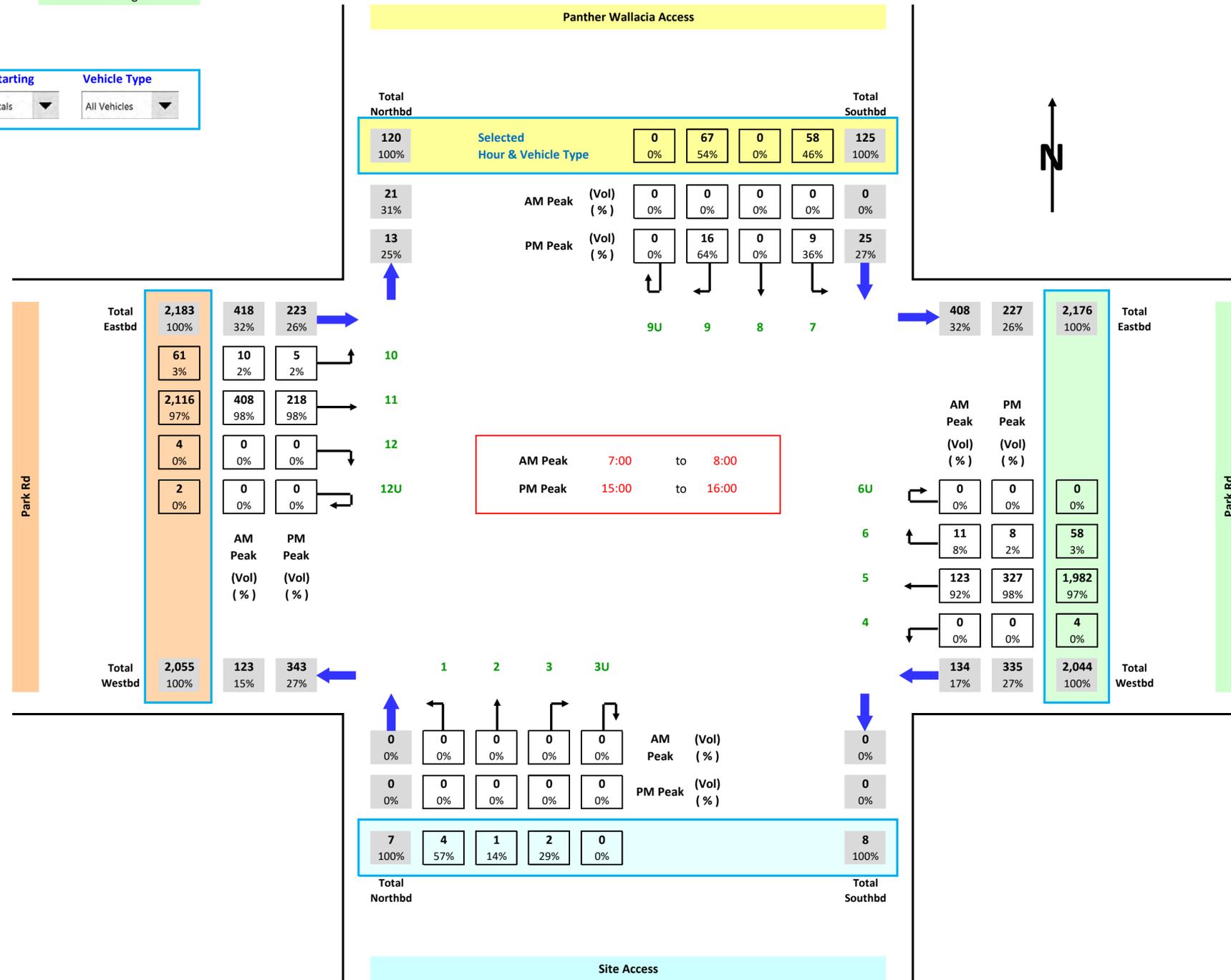


Job No. : N3530  
 Client : TTPP  
 Suburb : Wallacia  
 Location : 2. Park Rd / Panther Wallacia Gold Club House Access

Day/Date : Thu, 7th September 2017  
 Weather : Fine  
 Description : Classified Intersection Count  
 : Intersection Diagram



Hour Starting: 10hr Totals  
 Vehicle Type: All Vehicles

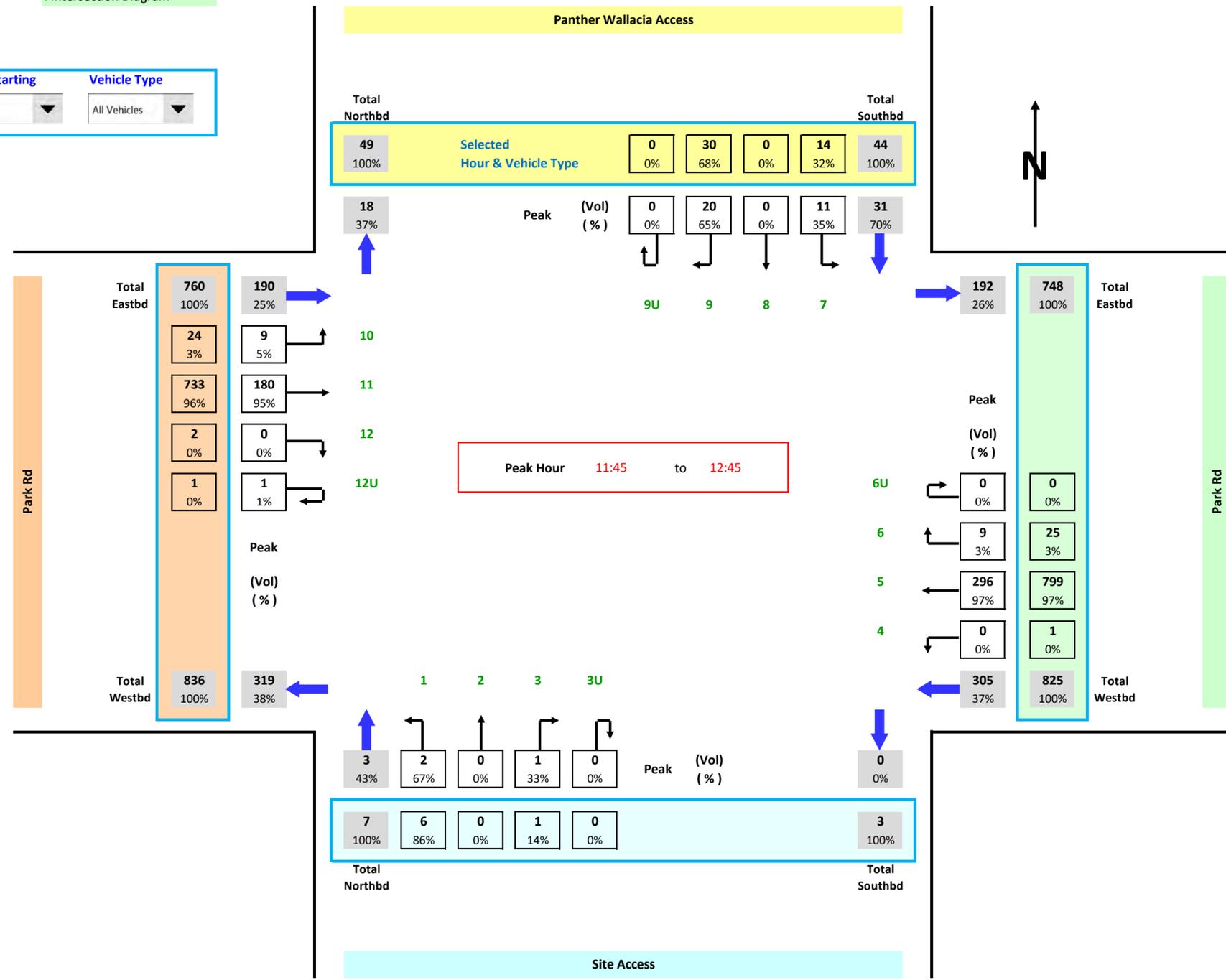


**Job No.** : N3530  
**Client** : TTPP  
**Suburb** : Wallacia  
**Location** : 2. Park Rd / Panther Wallacia Gold Club House Access

**Day/Date** : Sun, 10th September 2017  
**Weather** : Fine  
**Description** : Classified Intersection Count  
 : Intersection Diagram



**Hour Starting** : Totals  
**Vehicle Type** : All Vehicles



# Appendix C

## RMS Vehicle Accident Data

# Detailed Crash Report

NOTES: 7360 - Park Road - Panther Wallacia Golf Club Crash Data - 1 Jan 2012 to 31 Dec 2016

Crash No.	Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash-Detailed Killed	Seriously Inj.	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors		
<b>Sydney Region</b>																									
<b>Penrith LGA</b>																									
<b>Mulgoa</b>																									
<b>Mulgoa Rd</b>																									
1112296	P	02/07/2016	Sat	11:30	966 m	N GREENDALE RD	2WY	CRV	Fine	Dry	80	2	M/C	M58	N in MULGOA RD	65	Incorrect side	SC	0	1	0	0	0		
E62163143							RUM	20	Head on						S in MULGOA RD	65	Proceeding in lane								
843955	P	04/07/2013	Thu	16:30	500 m	N PARK RD	2WY	STR	Fine	Dry	80	2	CAR	M30	S in MULGOA RD	70	Proceeding in lane	OC	0	0	0	3	0		
E100787302							RUM	32	Right rear						S in MULGOA RD	0	Wait turn right								
802028	P	28/06/2012	Thu	16:10	950 m	N SILVERDALE RD	2WY	CRV	Fine	Dry	80	2	BUS	F46	S in MULGOA RD	10	Pulling out	OC	0	0	0	1	0	S	
E50894381							RUM	43	Entering parking						S in MULGOA RD	55	Proceeding in lane								
<b>Wallacia</b>																									
<b>Greendale Rd</b>																									
802312	P	30/06/2012	Sat	22:40	300 m	S PARK RD	2WY	STR	Fine	Dry	50	2	CAR	M38	S in GREENDALE RD	Unk	Proceeding in lane	SC	0	1	0	0	0	S	
E49185739							RUM	73	Off rd rght => obj						S in GREENDALE RD	0	Parked								
<b>Park Rd</b>																									
1057440	P	20/11/2014	Thu	09:25	400 m	W JAMES ST	2WY	STR	Fine	Dry	80	2	TRK	M72	W in PARK RD	20	Perform U-turn	SC	0	1	0	0	0		
E56465957							RUM	42	Leaving parking						CAR	F41	E in PARK RD	80	Proceeding in lane						
<b>Peter Pan Ave</b>																									
842244	P	16/06/2013	Sun	18:50	50 m	E GREENDALE RD	2WY	STR	Fine	Dry	50	2	UTE	M27	E in PETER PAN AVE	80	Proceeding in lane	NC	0	0	0	0	0	S F	
E50785560							RUM	71	Off rd left => obj						TRK		E in PETER PAN AVE	0	Parked						
<b>Silverdale Rd</b>																									
1055875	S	11/01/2015	Sun	11:50	20 m	W MULGOA RD	2WY	STR	Raining	Wet	60	1	CAR	F28	W in SILVERDALE RD	Unk	Proceeding in lane	NC	0	0	0	0	0		
E56532552							RUM	71	Off rd left => obj						Utility pole										
1058285	P	16/01/2015	Fri	14:00	20 m	W MULGOA RD	2WY	CRV	Fine	Dry	60	3	LOR	M61	W in SILVERDALE RD	50	Incorrect side	SC	0	1	0	0	0		
E57229058							RUM	20	Head on						CAR	M41	E in SILVERDALE RD	50	Proceeding in lane						
															CAR	M57	E in SILVERDALE RD	50	Proceeding in lane						
1119514	S	11/11/2016	Fri	15:50		at NUMBER 2 HN	2WY	STR	Fine	Dry	60	2	CAR	M18	W in SILVERDALE RD	Unk	Proceeding in lane	OC	0	0	0	1	0		
E63314628							RUM	31	Left rear						CAR	F29	W in SILVERDALE RD	Unk	Turning left						
<b>Report Totals:</b> Crashes: 9      Fatal Crashes(FC): 0      Serious Injury Crashes(SC): 4      Moderate Injury Crashes(MC): 0      Minor/Other Injury Crashes(OC): 3      Uncategorised Injury Crashes(UC): 0      Non-Casualty Crashes(NC): 2																									
Killed(K): 0      Seriously Injured(S): 4      Moderately Injured(M): 0      Minor/Other Injured(O): 5      Uncategorised Injured(U): 0																									

Crashid dataset 7360 - Park Road - Panther Wallacia Golf Club Crash Data - 1 Jan 2012 to 31 Dec 2016

**Crash self reporting, including self reported injuries began Oct 2014. Trends from 2014 are expected to vary from previous yrs. More unknowns are expected in self reported data.**

## Detailed Crash Report

Crash No.	Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash-Detailed Killed	Seriously Inj.	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors
-----------	-------------	------	-------------	------	----------	------------	----------	-----------	---------	-------------------	-------------	------------	-------------	---------	-------------------	------------------	-----------	---------------------------------	----------------	-----------------	------------------	----------------	---------

Reporting yrs 1996-2004 and 2017 onwards contain uncategorised inj crashes.

# Summary Crash Report

<b># Crash Type</b>		<b>Contributing Factors</b>		<b>Crash Movement</b>		<b>CRASHES</b>	<b>9</b>	<b>CASUALTIES</b>	<b>9</b>
Car Crash	8 88.9%	Speeding	3 33.3%	Intersection, adjacent approaches	0 0.0%	Fatal	0 0.0%	Killed	0 0.0%
Light Truck Crash	2 22.2%	Fatigue	1 11.1%	Head-on (not overtaking)	2 22.2%	Serious inj.	4 44.4%	Seriously inj.	4 44.4%
Rigid Truck Crash	2 22.2%			Opposing vehicles; turning	0 0.0%	Moderate inj.	0 0.0%	Moderately inj.	0 0.0%
Articulated Truck Crash	0 0.0%			U-turn	0 0.0%	Minor/Other inj.	3 33.3%	Minor/Other inj.	5 55.6%
'Heavy Truck Crash	(2) (22.2%)	<b>Weather</b>		Rear-end	2 22.2%	Uncategorised inj.	0 0.0%	Uncategorised inj.	0 0.0%
Bus Crash	1 11.1%	Fine	8 88.9%	Lane change	0 0.0%	Non-casualty	2 22.2%	^ Unrestrained	0 0.0%
"Heavy Vehicle Crash	(2) (22.2%)	Rain	1 11.1%	Parallel lanes; turning	0 0.0%			^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn	
Emergency Vehicle Crash	0 0.0%	Overcast	0 0.0%	Vehicle leaving driveway	0 0.0%	<b>Self Reported Crash</b>	2 22.22%		
Motorcycle Crash	1 11.1%	Fog or mist	0 0.0%	Overtaking; same direction	0 0.0%	<b>Time Group</b>	<b>% of Day</b>	<b>Crashes</b>	<b>Casualties</b>
Pedal Cycle Crash	0 0.0%	Other	0 0.0%	Hit parked vehicle	0 0.0%	00:01 - 02:59	0 0.0% 12.5%	2 2016	2
Pedestrian Crash	0 0.0%			Hit railway train	0 0.0%	03:00 - 04:59	0 0.0% 8.3%	2 2015	1
		<b>Road Surface Condition</b>		Hit pedestrian	0 0.0%	05:00 - 05:59	0 0.0% 4.2%	1 2014	1
		Wet	1 11.1%	Permanent obstruction on road	0 0.0%	06:00 - 06:59	0 0.0% 4.2%	2 2013	3
		Dry	8 88.9%	Hit animal	0 0.0%	07:00 - 07:59	0 0.0% 4.2%	2 2012	2
		Snow or ice	0 0.0%	Off road, on straight	0 0.0%	08:00 - 08:59	0 0.0% 4.2%		
				Off road on straight, hit object	3 33.3%	09:00 - 09:59	1 11.1% 4.2%		
		<b>Natural Lighting</b>		Out of control on straight	0 0.0%	10:00 - 10:59	0 0.0% 4.2%		
		Dawn	0 0.0%	Off road, on curve	0 0.0%	11:00 - 11:59	2 22.2% 4.2%		
		Daylight	7 77.8%	Off road on curve, hit object	0 0.0%	12:00 - 12:59	0 0.0% 4.2%		
		Dusk	0 0.0%	Out of control on curve	0 0.0%	13:00 - 13:59	0 0.0% 4.2%		
		Darkness	2 22.2%	Other crash type	2 22.2%	14:00 - 14:59	1 11.1% 4.2%		
						15:00 - 15:59	1 11.1% 4.2%		
		<b>Speed Limit</b>				16:00 - 16:59	2 22.2% 4.2%		
		40 km/h or less	0 0.0%			17:00 - 17:59	0 0.0% 4.2%		
		50 km/h zone	2 22.2%			18:00 - 18:59	1 11.1% 4.2%		
		60 km/h zone	3 33.3%			19:00 - 19:59	0 0.0% 4.2%		
		70 km/h zone	0 0.0%			20:00 - 21:59	0 0.0% 8.3%		
						22:00 - 24:00	1 11.1% 8.3%		
		~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less	0 0.0%	~ School Travel Time Involvement	3 33.3%			
		<b>Day of the Week</b>				<b>Street Lighting Off/Nil</b>	<b>% of Dark</b>		
Monday	0 0.0%	Wednesday	0 0.0%	Friday	2 22.2%	Sunday	2 22.2%	WEEKEND	4 44.4%
Tuesday	0 0.0%	Thursday	3 33.3%	Saturday	2 22.2%	WEEKDAY	5 55.6%		
						1 of	2 in Dark	50.0%	
		<b>#Holiday Periods</b>							
New Year	0 0.0%	Easter	0 0.0%	Queen's BD	0 0.0%	Christmas	0 0.0%	Easter SH	0 0.0%
Aust. Day	0 0.0%	Anzac Day	0 0.0%	Labour Day	0 0.0%	January SH	2 22.2%	June/July SH	3 33.3%
								Sept./Oct. SH	0 0.0%
								December SH	0 0.0%

Crashid dataset 7360 - Park Road - Panther Wallacia Golf Club Crash Data - 1 Jan 2012 to 31 Dec 2016

**Note: Crash self reporting, including self reported injuries began Oct 2014. Trends from 2014 are expected to vary from previous yrs. More unknowns are expected in self reported data. Reporting yrs 1996-2004 and 2017 onwards contain uncategorised inj crashes.**

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

# Appendix D

## Liverpool and Rockwood Cemetery Site Survey Data

Job No N3325  
 Client TTPP  
 Site St Andrews Rd - north of Spitfire rd  
 Location Varroville  
 Site No 1  
 Start Date 9-Jun-17  
 Description Volume Summary  
 Direction NB

Hour	Day of Week							W'Day	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun		
AM Peak	14	41	33	28	57	50	194	Ave	Ave
PM Peak	15	42	55	56	49	73	24	279	325
0:00	2	1	1	1	0	0	6	3	2
1:00	4	1	1	2	0	4	3	2	2
2:00	0	0	2	0	0	4	0	1	1
3:00	0	0	1	0	1	0	1	0	0
4:00	0	1	0	1	2	0	1	1	1
5:00	1	0	2	1	0	0	1	1	1
6:00	8	6	2	8	12	2	1	7	6
7:00	12	17	14	15	8	10	14	13	13
8:00	11	41	33	28	57	16	62	34	35
9:00	9	15	26	12	48	21	194	21	46
10:00	11	18	14	16	18	30	67	15	26
11:00	14	16	17	12	12	38	20	14	18
12:00	11	20	22	14	13	24	24	16	18
13:00	12	16	13	18	15	18	14	15	15
14:00	12	62	21	13	26	16	16	23	21
15:00	15	25	55	56	49	16	13	40	33
16:00	12	11	20	25	15	22	16	17	17
17:00	12	16	15	15	24	73	10	16	24
18:00	10	15	19	15	19	38	3	16	17
19:00	3	5	17	14	9	14	5	10	10
20:00	5	6	6	8	9	12	5	7	7
21:00	2	6	5	4	7	6	3	5	5
22:00	1	6	2	3	6	8	4	4	4
23:00	2	0	1	5	1	5	1	2	2
Total	169	284	309	286	346	393	487	279	325

Job No N3325  
 Client TTPP  
 Site St Andrews Rd - north of Spitfire rd  
 Location Varroville  
 Site No 1  
 Start Date 9-Jun-17  
 Description Volume Summary  
 Direction SB

Hour	Day of Week							W'Day	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun		
AM Peak	19	30	29	32	32	19	67	Ave	Ave
PM Peak	15	47	45	63	56	64	202	276	327
0:00	3	0	0	0	0	0	9	1	2
1:00	1	0	0	0	0	2	4	0	1
2:00	1	1	3	0	0	0	5	1	1
3:00	0	0	1	1	1	0	5	1	1
4:00	0	4	3	4	2	1	0	3	2
5:00	2	3	4	4	2	1	0	3	2
6:00	4	8	5	9	5	9	3	6	5
7:00	8	16	10	14	18	7	6	13	11
8:00	10	30	27	32	27	12	22	25	23
9:00	15	20	25	15	26	19	87	22	28
10:00	13	22	23	7	16	15	31	16	18
11:00	14	16	20	13	32	16	51	19	23
12:00	12	18	14	13	13	16	202	14	41
13:00	13	13	17	18	12	24	34	15	19
14:00	9	67	17	16	49	21	21	28	26
15:00	11	30	45	63	56	53	18	41	39
16:00	15	10	18	21	18	41	12	16	19
17:00	11	11	19	17	15	27	9	15	16
18:00	7	13	11	8	11	31	5	10	12
19:00	9	4	12	14	12	64	5	10	17
20:00	5	6	12	8	7	10	6	8	8
21:00	2	3	10	3	13	3	1	6	5
22:00	2	3	1	4	3	13	3	3	4
23:00	1	1	0	4	2	7	0	2	2
Total	172	279	301	288	340	388	519	276	327

Job No N3325  
 Client TTPP  
 Site St Andrews Rd - north of Spitfire rd  
 Location Varroville  
 Site No 1  
 Start Date 9-Jun-17  
 Description Volume Summary  
 Direction Combined

Hour	Day of Week							W'Day	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun		
AM Peak	28	71	60	60	84	65	263	Ave	Ave
PM Peak	27	89	100	119	105	100	226	555	652
0:00	5	1	1	1	0	0	15	2	3
1:00	5	1	1	2	0	0	6	7	3
2:00	1	1	5	0	0	0	9	1	2
3:00	0	0	2	1	2	0	6	1	2
4:00	0	5	3	5	4	1	1	3	3
5:00	3	3	6	5	2	1	0	4	3
6:00	12	14	7	17	12	5	4	13	11
7:00	20	33	24	29	26	17	20	26	24
8:00	21	71	60	60	84	28	84	59	58
9:00	28	35	55	27	89	40	263	43	74
10:00	24	40	37	23	34	65	98	32	46
11:00	28	32	37	25	44	54	71	33	42
12:00	23	38	36	27	26	40	226	30	59
13:00	25	29	36	36	27	42	48	29	34
14:00	21	89	38	29	75	89	37	50	47
15:00	26	55	100	119	105	69	31	81	72
16:00	27	21	38	46	33	63	28	33	37
17:00	23	27	34	32	39	100	19	31	39
18:00	17	28	30	23	30	69	8	26	29
19:00	12	9	29	28	21	78	10	20	27
20:00	10	12	18	16	16	22	11	14	15
21:00	4	9	15	7	20	9	4	11	10
22:00	3	9	3	7	9	21	7	6	8
23:00	3	1	1	9	3	12	1	3	4
Total	341	563	610	574	686	781	1006	555	652

Client TTPP  
 Site Rookwood - all access points  
 Location Rookwood  
 Site No 2  
 Start Date 9-Jun-17  
 Description Volume Summary  
 Direction INBOUND

Hour Starting	Day of Week							W'Day	7 Day
	Mon 12-Jun	Tue 13-Jun	Wed 14-Jun	Thu 15-Jun	Fri 16-Jun	Sat 17-Jun	Sun 18-Jun		
0:00	0	0	2	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	3	5	3	3	3	2	3	3	3
5:00	2	9	11	10	15	2	4	9	8
6:00	7	56	44	58	43	6	8	42	32
7:00	12	49	46	57	60	25	24	45	39
8:00	43	60	65	66	68	53	92	64	67
9:00	83	49	87	118	163	71	159	100	104
10:00	131	59	124	250	188	109	238	150	157
11:00	176	67	196	186	213	152	346	168	191
12:00	167	105	217	238	264	197	267	202	211
13:00	165	141	174	239	439	134	186	232	211
14:00	166	127	100	146	166	117	177	141	143
15:00	140	144	65	87	178	89	108	123	116
16:00	83	142	51	78	74	52	70	66	79
17:00	11	28	20	32	25	14	20	25	23
18:00	4	7	9	6	6	2	4	6	5
19:00	4	4	4	6	3	3	3	4	4
20:00	2	0	1	0	0	0	0	1	0
21:00	0	2	1	2	1	2	3	1	2
22:00	0	0	2	0	0	0	0	0	0
23:00	0	0	2	0	0	0	0	0	0
Total	1199	1054	1233	1602	1929	1031	1711	1403	1394

Client TTPP  
 Site Rookwood - all access points  
 Location Rookwood  
 Site No 2  
 Start Date 9-Jun-17  
 Description Volume Summary  
 Direction OUTBOUND

Hour Starting	Day of Week							W'Day	7 Day
	Mon 12-Jun	Tue 13-Jun	Wed 14-Jun	Thu 15-Jun	Fri 16-Jun	Sat 17-Jun	Sun 18-Jun		
0:00	0	0	2	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	3	5	3	3	3	2	3	3	3
5:00	2	4	8	5	6	1	3	5	4
6:00	5	33	21	29	27	5	4	23	18
7:00	9	28	39	36	38	19	15	30	26
8:00	29	59	59	76	53	44	68	55	55
9:00	78	56	79	97	93	70	139	81	87
10:00	123	70	118	175	109	88	193	119	125
11:00	153	81	145	216	229	145	312	165	183
12:00	163	95	168	208	234	149	326	174	192
13:00	166	183	241	247	305	191	173	228	215
14:00	173	154	147	199	273	124	198	189	181
15:00	143	203	105	149	278	108	121	176	158
16:00	105	105	65	103	158	53	90	107	97
17:00	23	35	34	36	28	20	30	31	29
18:00	5	10	11	7	10	3	7	9	8
19:00	4	3	4	8	3	4	4	4	4
20:00	2	0	0	0	0	0	0	0	0
21:00	0	2	3	2	2	3	2	2	2
22:00	0	0	1	0	0	0	0	0	0
23:00	0	0	2	0	0	0	0	0	0
Total	1186	1126	1255	1596	1849	1030	1689	1402	1390

Client TTPP  
 Site Rookwood - all access points  
 Location Rookwood  
 Site No 2  
 Start Date 9-Jun-17  
 Description Volume Summary  
 Direction TWO-WAY

Hour Starting	Day of Week							Ave W'Day	Ave 7 Day
	Mon 12-Jun	Tue 13-Jun	Wed 14-Jun	Thu 15-Jun	Fri 16-Jun	Sat 17-Jun	Sun 18-Jun		
0:00	0	0	4	0	0	0	0	1	1
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	6	10	6	6	6	6	4	7	6
5:00	4	13	19	15	21	3	7	14	12
6:00	12	89	65	87	70	11	12	65	49
7:00	21	77	85	93	98	44	39	75	65
8:00	72	119	124	162	121	97	160	120	122
9:00	161	105	166	215	256	141	298	181	192
10:00	254	129	242	425	297	197	431	269	282
11:00	329	148	341	402	442	297	658	332	374
12:00	330	200	385	446	518	346	595	375	403
13:00	331	324	415	486	744	325	359	460	426
14:00	339	281	247	345	439	241	375	330	324
15:00	283	347	170	236	456	197	229	298	274
16:00	188	247	116	181	232	105	160	193	176
17:00	34	63	68	53	34	50	56	52	52
18:00	9	17	20	13	16	5	11	15	13
19:00	8	7	8	14	6	7	7	9	8
20:00	4	0	1	0	0	0	0	1	1
21:00	0	4	4	4	3	5	5	3	4
22:00	0	0	3	0	0	0	0	1	0
23:00	0	0	4	0	0	0	0	1	1
Total	2385	2180	2488	3198	3778	2061	3400	2806	2784

# Appendix E

## SIDRA Intersection Model Outputs

# MOVEMENT SUMMARY

Site: 101 [EXAM\_ Panthers / Park Road]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Garage Access												
1	L2	1	0.0	0.004	4.7	LOS A	0.0	0.1	0.32	0.55	40.7	
2	T1	1	0.0	0.004	5.9	LOS A	0.0	0.1	0.32	0.55	49.3	
3	R2	1	0.0	0.004	7.7	LOS A	0.0	0.1	0.32	0.55	48.3	
Approach		3	0.0	0.004	6.1	LOS A	0.0	0.1	0.32	0.55	47.0	
East: Park Road (East)												
4	L2	1	0.0	0.075	7.2	LOS A	0.1	0.8	0.10	0.05	54.5	
5	T1	129	0.0	0.075	0.2	LOS A	0.1	0.8	0.10	0.05	58.7	
6	R2	12	0.0	0.075	7.2	LOS A	0.1	0.8	0.10	0.05	57.0	
Approach		142	0.0	0.075	0.9	NA	0.1	0.8	0.10	0.05	58.5	
North: Panthers Gold Club												
7	L2	1	0.0	0.004	7.0	LOS A	0.0	0.1	0.47	0.60	52.0	
8	T1	1	0.0	0.004	7.0	LOS A	0.0	0.1	0.47	0.60	46.9	
9	R2	1	0.0	0.004	8.9	LOS A	0.0	0.1	0.47	0.60	48.8	
Approach		3	0.0	0.004	7.6	LOS A	0.0	0.1	0.47	0.60	49.6	
West: Park Road (west)												
10	L2	11	0.0	0.219	5.6	LOS A	0.0	0.1	0.00	0.02	57.5	
11	T1	429	0.0	0.219	0.0	LOS A	0.0	0.1	0.00	0.02	59.8	
12	R2	1	0.0	0.219	6.0	LOS A	0.0	0.1	0.00	0.02	50.9	
Approach		441	0.0	0.219	0.1	NA	0.0	0.1	0.00	0.02	59.7	
All Vehicles		589	0.0	0.219	0.4	NA	0.1	0.8	0.03	0.03	59.3	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Minor Road Approach LOS values are based on average delay for all vehicle movements.  
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

 Site: 101 [EXAM\_Roundabout]

New Site  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RoadName											
1	L2	109	0.0	0.209	5.1	LOS A	1.1	7.9	0.33	0.52	51.1
2	T1	99	0.0	0.209	5.4	LOS A	1.1	7.9	0.33	0.52	52.5
3u	U	1	0.0	0.209	10.8	LOS A	1.1	7.9	0.33	0.52	49.1
Approach		209	0.0	0.209	5.3	LOS A	1.1	7.9	0.33	0.52	51.8
North: RoadName											
8	T1	80	0.0	0.220	6.9	LOS A	1.3	8.8	0.56	0.71	49.3
9	R2	117	0.0	0.220	10.6	LOS A	1.3	8.8	0.56	0.71	51.7
9u	U	2	0.0	0.220	12.4	LOS A	1.3	8.8	0.56	0.71	52.4
Approach		199	0.0	0.220	9.2	LOS A	1.3	8.8	0.56	0.71	50.9
West: RoadName											
10	L2	387	0.0	0.558	5.0	LOS A	4.1	28.5	0.35	0.59	52.2
12	R2	375	0.0	0.558	8.8	LOS A	4.1	28.5	0.35	0.59	50.6
Approach		762	0.0	0.558	6.9	LOS A	4.1	28.5	0.35	0.59	51.5
All Vehicles		1171	0.0	0.558	7.0	LOS A	4.1	28.5	0.39	0.60	51.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 Roundabout Capacity Model: SIDRA Standard.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [EXAM\_Proposed Site Access]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Park Road (East)											
5	T1	143	0.0	0.061	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		143	0.0	0.061	0.0	NA	0.0	0.0	0.00	0.00	60.0
West: Park Road (West)											
11	T1	429	0.0	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		429	0.0	0.220	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		573	0.0	0.220	0.0	NA	0.0	0.0	0.00	0.00	60.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Minor Road Approach LOS values are based on average delay for all vehicle movements.  
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [EXPM\_ Panthers / Park Road]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Garage Access											
1	L2	1	0.0	0.004	5.4	LOS A	0.0	0.1	0.45	0.58	40.3
2	T1	1	0.0	0.004	5.8	LOS A	0.0	0.1	0.45	0.58	49.0
3	R2	1	0.0	0.004	7.8	LOS A	0.0	0.1	0.45	0.58	48.0
Approach		3	0.0	0.004	6.3	LOS A	0.0	0.1	0.45	0.58	46.7
East: Park Road (East)											
4	L2	1	0.0	0.177	6.4	LOS A	0.1	0.5	0.02	0.02	55.5
5	T1	344	0.0	0.177	0.0	LOS A	0.1	0.5	0.02	0.02	59.7
6	R2	8	0.0	0.177	6.4	LOS A	0.1	0.5	0.02	0.02	57.6
Approach		354	0.0	0.177	0.2	NA	0.1	0.5	0.02	0.02	59.6
North: Panthers Gold Club											
7	L2	9	0.0	0.037	6.2	LOS A	0.1	0.9	0.41	0.66	51.7
8	T1	1	0.0	0.037	7.2	LOS A	0.1	0.9	0.41	0.66	46.4
9	R2	17	0.0	0.037	9.2	LOS A	0.1	0.9	0.41	0.66	48.4
Approach		27	0.0	0.037	8.1	LOS A	0.1	0.9	0.41	0.66	49.7
West: Park Road (west)											
10	L2	5	0.0	0.117	5.8	LOS A	0.0	0.1	0.01	0.02	57.5
11	T1	229	0.0	0.117	0.0	LOS A	0.0	0.1	0.01	0.02	59.7
12	R2	1	0.0	0.117	6.8	LOS A	0.0	0.1	0.01	0.02	50.8
Approach		236	0.0	0.117	0.2	NA	0.0	0.1	0.01	0.02	59.7
All Vehicles		620	0.0	0.177	0.6	NA	0.1	0.9	0.04	0.05	59.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

 Site: 101 [EXPM\_ Roundabout ]

New Site  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RoadName											
1	L2	293	0.0	0.523	8.4	LOS A	3.8	26.3	0.69	0.80	48.6
2	T1	108	0.0	0.523	8.6	LOS A	3.8	26.3	0.69	0.80	50.0
3u	U	2	0.0	0.523	14.1	LOS A	3.8	26.3	0.69	0.80	45.3
Approach		403	0.0	0.523	8.5	LOS A	3.8	26.3	0.69	0.80	49.0
North: RoadName											
8	T1	141	0.0	0.423	5.6	LOS A	3.0	21.1	0.43	0.62	49.7
9	R2	359	0.0	0.423	9.3	LOS A	3.0	21.1	0.43	0.62	52.1
9u	U	5	0.0	0.423	11.1	LOS A	3.0	21.1	0.43	0.62	52.7
Approach		505	0.0	0.423	8.3	LOS A	3.0	21.1	0.43	0.62	51.5
West: RoadName											
10	L2	204	0.0	0.274	4.9	LOS A	1.5	10.6	0.30	0.58	52.6
12	R2	143	0.0	0.274	8.7	LOS A	1.5	10.6	0.30	0.58	51.1
Approach		347	0.0	0.274	6.4	LOS A	1.5	10.6	0.30	0.58	52.1
All Vehicles		1256	0.0	0.523	7.8	LOS A	3.8	26.3	0.48	0.67	51.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 Roundabout Capacity Model: SIDRA Standard.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [EXPM\_Proposed Site Access]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Park Road (East)											
5	T1	394	0.0	0.168	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		394	0.0	0.168	0.0	NA	0.0	0.0	0.00	0.00	60.0
West: Park Road (West)											
11	T1	229	0.0	0.118	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		229	0.0	0.118	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		623	0.0	0.168	0.0	NA	0.0	0.0	0.00	0.00	60.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Minor Road Approach LOS values are based on average delay for all vehicle movements.  
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [EXSUN\_ Panthers / Park Road]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Garage Access											
1	L2	2	0.0	0.005	5.3	LOS A	0.0	0.1	0.41	0.56	41.2
2	T1	1	0.0	0.005	5.4	LOS A	0.0	0.1	0.41	0.56	49.6
3	R2	1	0.0	0.005	7.2	LOS A	0.0	0.1	0.41	0.56	48.7
Approach		4	0.0	0.005	5.8	LOS A	0.0	0.1	0.41	0.56	46.3
East: Park Road (East)											
4	L2	1	0.0	0.161	6.2	LOS A	0.1	0.6	0.03	0.02	55.5
5	T1	312	0.0	0.161	0.0	LOS A	0.1	0.6	0.03	0.02	59.6
6	R2	9	0.0	0.161	6.2	LOS A	0.1	0.6	0.03	0.02	57.6
Approach		322	0.0	0.161	0.2	NA	0.1	0.6	0.03	0.02	59.5
North: Panthers Gold Club											
7	L2	12	0.0	0.043	6.1	LOS A	0.1	1.0	0.38	0.64	52.0
8	T1	1	0.0	0.043	6.7	LOS A	0.1	1.0	0.38	0.64	46.8
9	R2	21	0.0	0.043	8.6	LOS A	0.1	1.0	0.38	0.64	48.7
Approach		34	0.0	0.043	7.7	LOS A	0.1	1.0	0.38	0.64	50.0
West: Park Road (west)											
10	L2	9	0.0	0.099	5.7	LOS A	0.0	0.1	0.01	0.03	57.3
11	T1	189	0.0	0.099	0.0	LOS A	0.0	0.1	0.01	0.03	59.5
12	R2	1	0.0	0.099	6.6	LOS A	0.0	0.1	0.01	0.03	50.4
Approach		200	0.0	0.099	0.3	NA	0.0	0.1	0.01	0.03	59.4
All Vehicles		560	0.0	0.161	0.8	NA	0.1	1.0	0.04	0.07	58.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Minor Road Approach LOS values are based on average delay for all vehicle movements.  
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

 Site: 101 [EXSUN\_Roundabout ]

New Site  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RoadName											
1	L2	209	0.0	0.421	6.7	LOS A	2.5	17.8	0.57	0.67	49.9
2	T1	143	0.0	0.421	6.9	LOS A	2.5	17.8	0.57	0.67	51.4
3u	U	4	0.0	0.421	12.4	LOS A	2.5	17.8	0.57	0.67	47.3
Approach		357	0.0	0.421	6.8	LOS A	2.5	17.8	0.57	0.67	50.5
North: RoadName											
8	T1	112	0.0	0.323	5.4	LOS A	2.1	14.6	0.38	0.61	49.9
9	R2	261	0.0	0.323	9.1	LOS A	2.1	14.6	0.38	0.61	52.2
9u	U	13	0.0	0.323	10.9	LOS A	2.1	14.6	0.38	0.61	52.9
Approach		385	0.0	0.323	8.1	LOS A	2.1	14.6	0.38	0.61	51.7
West: RoadName											
10	L2	247	0.0	0.309	5.1	LOS A	1.7	11.8	0.35	0.60	52.6
12	R2	127	0.0	0.309	8.9	LOS A	1.7	11.8	0.35	0.60	51.1
Approach		375	0.0	0.309	6.4	LOS A	1.7	11.8	0.35	0.60	52.2
All Vehicles		1117	0.0	0.421	7.1	LOS A	2.5	17.8	0.43	0.63	51.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 Roundabout Capacity Model: SIDRA Standard.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [EXSUN\_Proposed Site Access ]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Park Road (East)											
5	T1	244	0.0	0.104	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		244	0.0	0.104	0.0	NA	0.0	0.0	0.00	0.00	60.0
West: Park Road (West)											
11	T1	189	0.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		189	0.0	0.097	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		434	0.0	0.104	0.0	NA	0.0	0.0	0.00	0.00	60.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Minor Road Approach LOS values are based on average delay for all vehicle movements.  
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [PROPAM\_ Panthers / Park Road ]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Park Road (East)											
5	T1	158	0.0	0.089	0.3	LOS A	0.1	0.9	0.10	0.04	58.9
6	R2	12	0.0	0.089	7.7	LOS A	0.1	0.9	0.10	0.04	57.1
Approach		169	0.0	0.089	0.8	NA	0.1	0.9	0.10	0.04	58.7
North: Panthers Gold Club											
7	L2	1	0.0	0.003	7.3	LOS A	0.0	0.1	0.48	0.61	51.8
9	R2	1	0.0	0.003	8.6	LOS A	0.0	0.1	0.48	0.61	48.4
Approach		2	0.0	0.003	8.0	LOS A	0.0	0.1	0.48	0.61	50.3
West: Park Road (west)											
10	L2	11	0.0	0.256	5.5	LOS A	0.0	0.0	0.00	0.01	57.5
11	T1	506	0.0	0.256	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		517	0.0	0.256	0.1	NA	0.0	0.0	0.00	0.01	59.7
All Vehicles		688	0.0	0.256	0.3	NA	0.1	0.9	0.03	0.02	59.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

 Site: 101 [PROPAM\_ Roundabout ]

New Site  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RoadName											
1	L2	116	0.0	0.227	5.1	LOS A	1.2	8.7	0.34	0.52	51.0
2	T1	112	0.0	0.227	5.4	LOS A	1.2	8.7	0.34	0.52	52.5
3u	U	1	0.0	0.227	10.8	LOS A	1.2	8.7	0.34	0.52	49.0
Approach		228	0.0	0.227	5.3	LOS A	1.2	8.7	0.34	0.52	51.7
North: RoadName											
8	T1	87	0.0	0.234	7.2	LOS A	1.4	9.5	0.59	0.72	49.2
9	R2	117	0.0	0.234	10.8	LOS A	1.4	9.5	0.59	0.72	51.6
9u	U	2	0.0	0.234	12.7	LOS A	1.4	9.5	0.59	0.72	52.3
Approach		206	0.0	0.234	9.3	LOS A	1.4	9.5	0.59	0.72	50.8
West: RoadName											
10	L2	387	0.0	0.587	5.1	LOS A	4.5	31.3	0.39	0.60	52.1
12	R2	403	0.0	0.587	9.0	LOS A	4.5	31.3	0.39	0.60	50.4
Approach		791	0.0	0.587	7.1	LOS A	4.5	31.3	0.39	0.60	51.3
All Vehicles		1225	0.0	0.587	7.1	LOS A	4.5	31.3	0.42	0.60	51.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 Roundabout Capacity Model: SIDRA Standard.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

▽ Site: 101 [PROPAM\_Proposed Site Access ]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Park Road (East)											
5	T1	143	0.0	0.073	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6b	R3	49	0.0	0.044	7.8	LOS A	0.2	1.3	0.48	0.68	51.3
Approach		193	0.0	0.073	2.0	NA	0.2	1.3	0.12	0.17	57.5
NorthEast: Cemetery Access											
24b	L3	43	0.0	0.075	8.1	LOS A	0.3	2.0	0.50	0.71	51.6
26a	R1	19	0.0	0.075	10.1	LOS A	0.3	2.0	0.50	0.71	51.0
Approach		62	0.0	0.075	8.7	LOS A	0.3	2.0	0.50	0.71	51.4
West: Park Road (West)											
10a	L1	36	0.0	0.239	5.3	LOS A	0.0	0.0	0.00	0.05	57.3
11	T1	429	0.0	0.239	0.0	LOS A	0.0	0.0	0.00	0.05	59.5
Approach		465	0.0	0.239	0.4	NA	0.0	0.0	0.00	0.05	59.4
All Vehicles		720	0.0	0.239	1.6	NA	0.3	2.0	0.08	0.14	58.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [PROPPM\_Panthers / Park Road]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Park Road (East)											
5	T1	368	0.0	0.188	0.0	LOS A	0.1	0.5	0.02	0.01	59.7
6	R2	8	0.0	0.188	6.5	LOS A	0.1	0.5	0.02	0.01	57.7
Approach		377	0.0	0.188	0.2	NA	0.1	0.5	0.02	0.01	59.6
North: Panthers Gold Club											
7	L2	9	0.0	0.032	6.3	LOS A	0.1	0.7	0.40	0.65	52.0
9	R2	17	0.0	0.032	8.4	LOS A	0.1	0.7	0.40	0.65	48.8
Approach		26	0.0	0.032	7.6	LOS A	0.1	0.7	0.40	0.65	50.1
West: Park Road (west)											
10	L2	5	0.0	0.128	5.5	LOS A	0.0	0.0	0.00	0.01	57.5
11	T1	254	0.0	0.128	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		259	0.0	0.128	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		662	0.0	0.188	0.5	NA	0.1	0.7	0.03	0.04	59.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

 Site: 101 [PROPPM\_Roundabout ]

New Site  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RoadName											
1	L2	313	0.0	0.561	8.9	LOS A	4.4	30.5	0.72	0.82	48.2
2	T1	118	0.0	0.561	9.1	LOS A	4.4	30.5	0.72	0.82	49.5
3u	U	2	0.0	0.561	14.6	LOS B	4.4	30.5	0.72	0.82	44.7
Approach		433	0.0	0.561	9.0	LOS A	4.4	30.5	0.72	0.82	48.6
North: RoadName											
8	T1	156	0.0	0.441	5.7	LOS A	3.2	22.4	0.46	0.63	49.7
9	R2	359	0.0	0.441	9.4	LOS A	3.2	22.4	0.46	0.63	52.0
9u	U	5	0.0	0.441	11.2	LOS A	3.2	22.4	0.46	0.63	52.7
Approach		520	0.0	0.441	8.3	LOS A	3.2	22.4	0.46	0.63	51.5
West: RoadName											
10	L2	204	0.0	0.286	4.9	LOS A	1.6	11.2	0.32	0.59	52.5
12	R2	154	0.0	0.286	8.8	LOS A	1.6	11.2	0.32	0.59	50.9
Approach		358	0.0	0.286	6.6	LOS A	1.6	11.2	0.32	0.59	51.9
All Vehicles		1311	0.0	0.561	8.1	LOS A	4.4	30.5	0.51	0.68	50.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 Roundabout Capacity Model: SIDRA Standard.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [PROPPM\_Proposed Site Access ]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Park Road (East)											
5	T1	394	0.0	0.202	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6b	R3	49	0.0	0.035	6.8	LOS A	0.2	1.1	0.34	0.61	51.8
Approach		443	0.0	0.202	0.8	NA	0.2	1.1	0.04	0.07	58.9
NorthEast: Cemetery Access											
24b	L3	49	0.0	0.085	7.2	LOS A	0.3	2.3	0.39	0.64	51.9
26a	R1	24	0.0	0.085	10.6	LOS A	0.3	2.3	0.39	0.64	51.3
Approach		74	0.0	0.085	8.3	LOS A	0.3	2.3	0.39	0.64	51.7
West: Park Road (West)											
10a	L1	24	0.0	0.130	5.3	LOS A	0.0	0.0	0.00	0.06	57.3
11	T1	229	0.0	0.130	0.0	LOS A	0.0	0.0	0.00	0.06	59.5
Approach		254	0.0	0.130	0.5	NA	0.0	0.0	0.00	0.06	59.3
All Vehicles		771	0.0	0.202	1.4	NA	0.3	2.3	0.06	0.12	58.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [EXSUN\_ Panthers / Park Road ]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Garage Access											
1	L2	2	0.0	0.004	5.5	LOS A	0.0	0.1	0.44	0.58	40.0
3	R2	1	0.0	0.004	8.5	LOS A	0.0	0.1	0.44	0.58	47.9
Approach		3	0.0	0.004	6.5	LOS A	0.0	0.1	0.44	0.58	43.7
East: Park Road (East)											
5	T1	373	0.0	0.221	0.2	LOS A	0.4	3.1	0.11	0.07	58.4
6	R2	52	0.0	0.221	6.5	LOS A	0.4	3.1	0.11	0.07	56.8
Approach		424	0.0	0.221	1.0	NA	0.4	3.1	0.11	0.07	58.1
North: Panthers Gold Club											
7	L2	12	0.0	0.049	6.3	LOS A	0.2	1.1	0.44	0.68	51.2
9	R2	21	0.0	0.049	10.0	LOS A	0.2	1.1	0.44	0.68	47.8
Approach		33	0.0	0.049	8.7	LOS A	0.2	1.1	0.44	0.68	49.2
West: Park Road (west)											
10	L2	9	0.0	0.122	5.5	LOS A	0.0	0.0	0.00	0.02	57.4
11	T1	236	0.0	0.122	0.0	LOS A	0.0	0.0	0.00	0.02	59.7
Approach		245	0.0	0.122	0.2	NA	0.0	0.0	0.00	0.02	59.6
All Vehicles		705	0.0	0.221	1.1	NA	0.4	3.1	0.09	0.09	58.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

 Site: 101 [EXSUN\_Roundabout ]

New Site  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RoadName											
1	L2	224	0.0	0.452	6.7	LOS A	2.8	19.9	0.59	0.68	49.9
2	T1	156	0.0	0.452	7.0	LOS A	2.8	19.9	0.59	0.68	51.3
3u	U	4	0.0	0.452	12.5	LOS A	2.8	19.9	0.59	0.68	47.2
Approach		384	0.0	0.452	6.9	LOS A	2.8	19.9	0.59	0.68	50.4
North: RoadName											
8	T1	135	0.0	0.352	5.6	LOS A	2.3	16.4	0.42	0.62	49.9
9	R2	261	0.0	0.352	9.3	LOS A	2.3	16.4	0.42	0.62	52.2
9u	U	13	0.0	0.352	11.1	LOS A	2.3	16.4	0.42	0.62	52.8
Approach		408	0.0	0.352	8.1	LOS A	2.3	16.4	0.42	0.62	51.6
West: RoadName											
10	L2	247	0.0	0.332	5.2	LOS A	1.9	13.0	0.37	0.61	52.5
12	R2	151	0.0	0.332	9.0	LOS A	1.9	13.0	0.37	0.61	50.9
Approach		398	0.0	0.332	6.6	LOS A	1.9	13.0	0.37	0.61	52.0
All Vehicles		1191	0.0	0.452	7.2	LOS A	2.8	19.9	0.46	0.64	51.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 Roundabout Capacity Model: SIDRA Standard.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

Site: 101 [PROPSUN\_Proposed Site Access ]

New Site  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
East: Park Road (East)												
5	T1	244	0.0	0.125	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
6b	R3	76	0.0	0.052	6.8	LOS A	0.2	1.6	0.33	0.61	51.8	
Approach		320	0.0	0.125	1.6	NA	0.2	1.6	0.08	0.15	57.8	
NorthEast: Cemetery Access												
24b	L3	38	0.0	0.138	7.1	LOS A	0.5	3.8	0.43	0.68	51.9	
26a	R1	71	0.0	0.138	8.9	LOS A	0.5	3.8	0.43	0.68	51.3	
Approach		108	0.0	0.138	8.3	LOS A	0.5	3.8	0.43	0.68	51.5	
West: Park Road (West)												
10a	L1	46	0.0	0.121	5.3	LOS A	0.0	0.0	0.00	0.12	56.8	
11	T1	189	0.0	0.121	0.0	LOS A	0.0	0.0	0.00	0.12	59.0	
Approach		236	0.0	0.121	1.1	NA	0.0	0.0	0.00	0.12	58.5	
All Vehicles		664	0.0	0.138	2.5	NA	0.5	3.8	0.11	0.22	56.9	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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