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Sydney Polo Club Planning Proposal
Richmond Lowlands
Transport Impact Assessment

Client // Basscave Pty Ltd
Office // NSW
Reference // 15S1501200
Date // 15/04/16

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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1. Introduction

1.1 Background

A Planning Proposal is to be lodged with Hawkesbury City Council for an amendment to the Hawkesbury Local Environmental Plan 2012.

The Planning Proposal is seeking to permit uses including polo facilities, function centres, eco-tourist facilities, industrial retail outlet and other uses associated with the polo industry on land currently classified as RU2 Rural Landscape. The land incorporates 23 allotments and is located in the vicinity of Kurrajong Road, Richmond Lowlands.

Basscave Pty Ltd engaged GTA Consultants to undertake a transport impact assessment of the existing and proposed land uses.

1.2 Purpose of this Report

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

i existing traffic conditions surrounding the subject site
ii the traffic generating characteristics of the proposed development
iii the transport impact of the development proposal on the surrounding road network.

1.3 References

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

- Hawkesbury Development Control Plan (DCP) 2002
- Hawkesbury Local Environmental Plan (LEP) 2012
- Traffic surveys undertaken by Matrix Traffic and Transport Data as referenced in the context of this report (Friday 1 May 2015 between 2:00pm to 6:00pm, Saturday 18 July 2015 between 9:00am and 6:00pm and Sunday 18 October 2015 between 7:00am and 6:00pm)
- Other documents and data as referenced in this report.

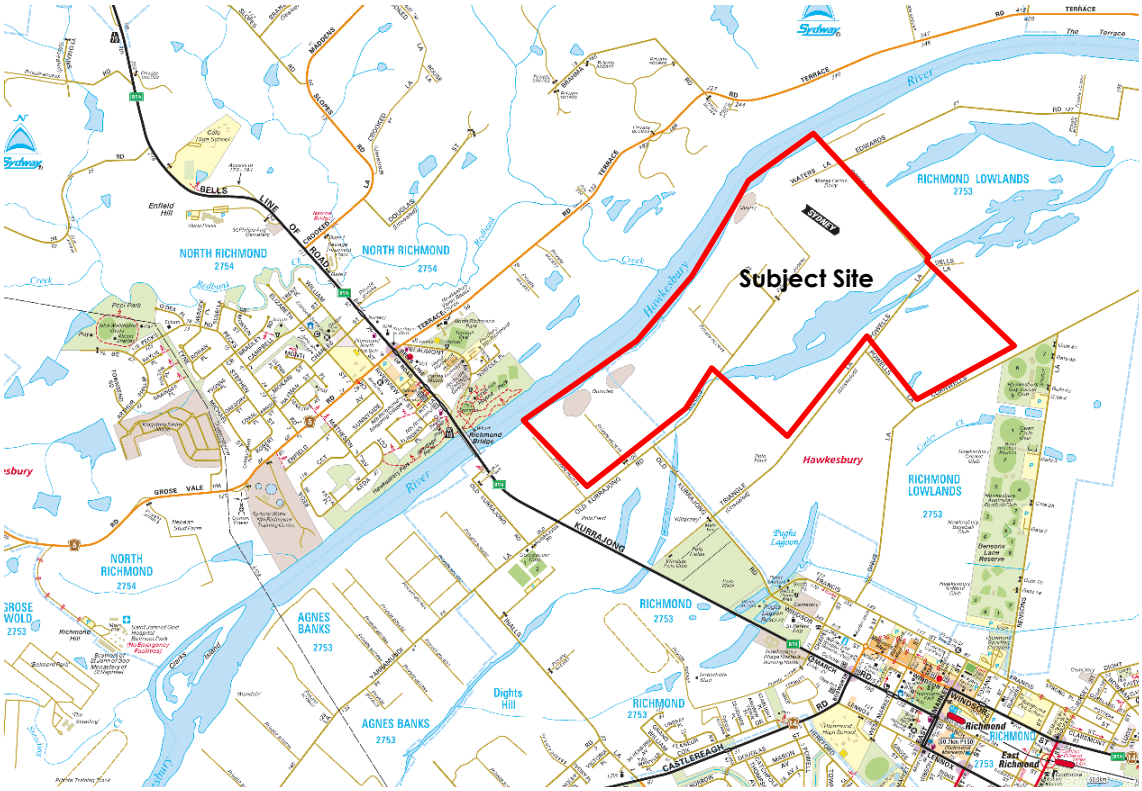
2. Existing Conditions

The subject site is located in Richmond Lowlands and is bound by the Hawkesbury River to the north, Powells Lane to the east, Cornwells Lane, Triangle Lane and Old Kurrajong Road/ Ridges Lane to the south and with private land to the west.

The site has a land use classification of RU2 Rural Landscape and is primarily used for agricultural purposes, polo playing and functions. There is also a tourist accommodation facility located in the south-western section of the site and a turf farm in the centre of the site. The surrounding land uses are primarily used for agricultural purposes.

The location of the subject site and its surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject Site and Its Environs



Base source Sydway Publishing Pty Ltd

2.1 Road Network

Kurrajong Road

Kurrajong Road is classified as a State road (RMS No. 184) and in the vicinity of the site is aligned in a northwest-southeast direction. It is a two-way road configured with a 2-lane, 11 metre wide carriageway, set within an approximately 40 metre wide road reserve. Kurrajong Road carries approximately 29,000 vehicles per day[1].

1 Based on the peak hour traffic counts and assuming a peak-to-daily ratio of 8% for arterial roads.

Old Kurrajong Road

Old Kurrajong Road functions as a local collector road and in the vicinity of the site is aligned in a northeast-southwest direction. It is a two-way road configured with a 2-lane, 6 metre wide carriageway, set within an approximately 16 metre wide road reserve. Old Kurrajong Road, east of Kurrajong Road, carries approximately 1,200 vehicles per day[2].

Ridges Lane

Ridges Lane functions as a local road, and in the vicinity of the site is aligned in a northeast-southwest direction. It is a two-way road configured with a 2-lane, 5 metre wide carriageway, set within an approximately 20 metre wide road reserve. Ridges Lane carries less than 500 vehicles per day[3].

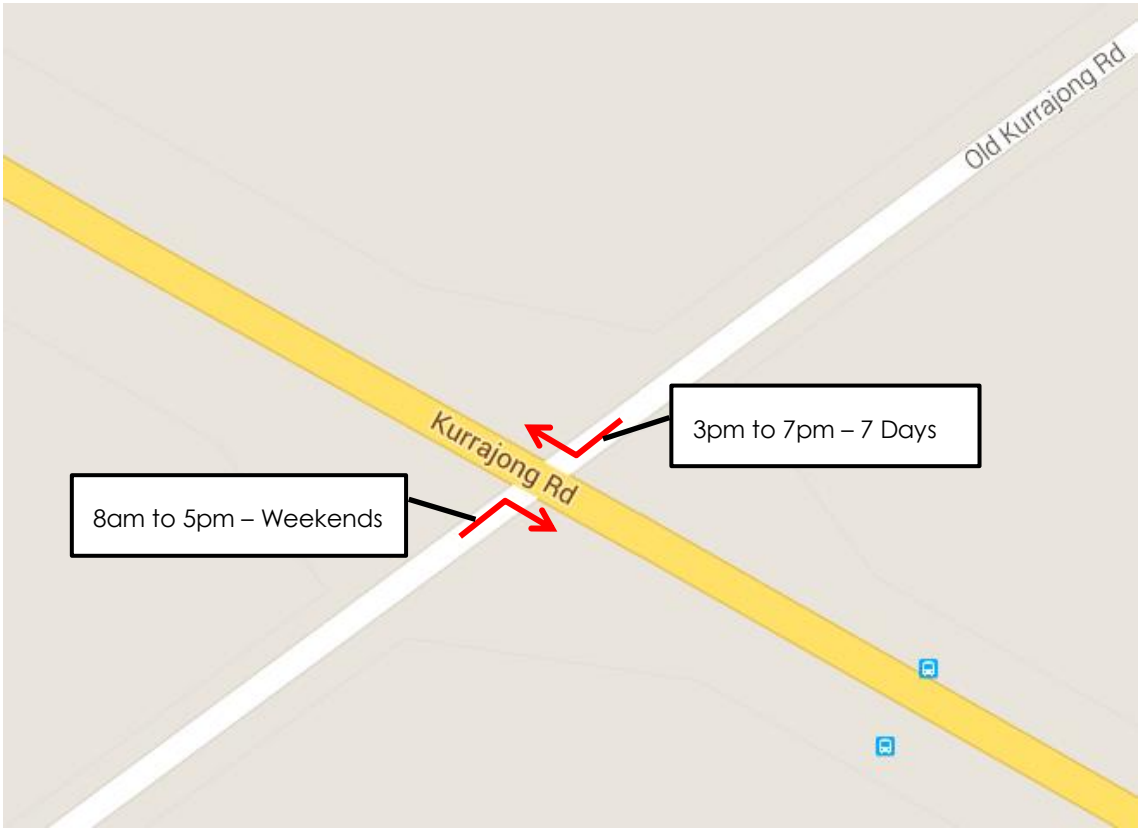
2.1.1 Surrounding Intersections

The following intersections currently exist in the vicinity of the site:

- Kurrajong Road, Old Kurrajong Road and Yarramundi Lane (priority-controlled)
- Old Kurrajong Road and Ridges Lane (priority-controlled).

The right turn movement from Old Kurrajong Road into Kurrajong Road is restricted between 3:00pm and 7:00pm. A right turn restriction also applies from Yarramundi Lane into Kurrajong Road on Weekends from 8:00am to 5:00pm. The restricted right turn movements are shown in Figure 2.2.

Figure 2.2: Kurrajong Road/ Old Kurrajong Road intersection – No Right Turn Restrictions



2 Based on the peak hour traffic counts and assuming a peak-to-daily ratio of 10% for local roads.
3 Based on classified traffic counts undertaken in October 2015

Base source: Google Maps

2.1.2 Richmond Bridge and Approach Upgrades

The study intersection of Kurrajong Road and Old Kurrajong Road was upgraded as part of road improvements being undertaken on Richmond Bridge and the approaches. The works were part of Stage 1 of a two stage program to reduce congestion on the Bridge and the approaches. Stage 2 of the program will include improvements to the following two signalised intersections:

- Bells Line of Road and Grose Vale Road, located north of the Bridge
- Kurrajong Road and Bosworth Street, located south of the Bridge and the study intersection.

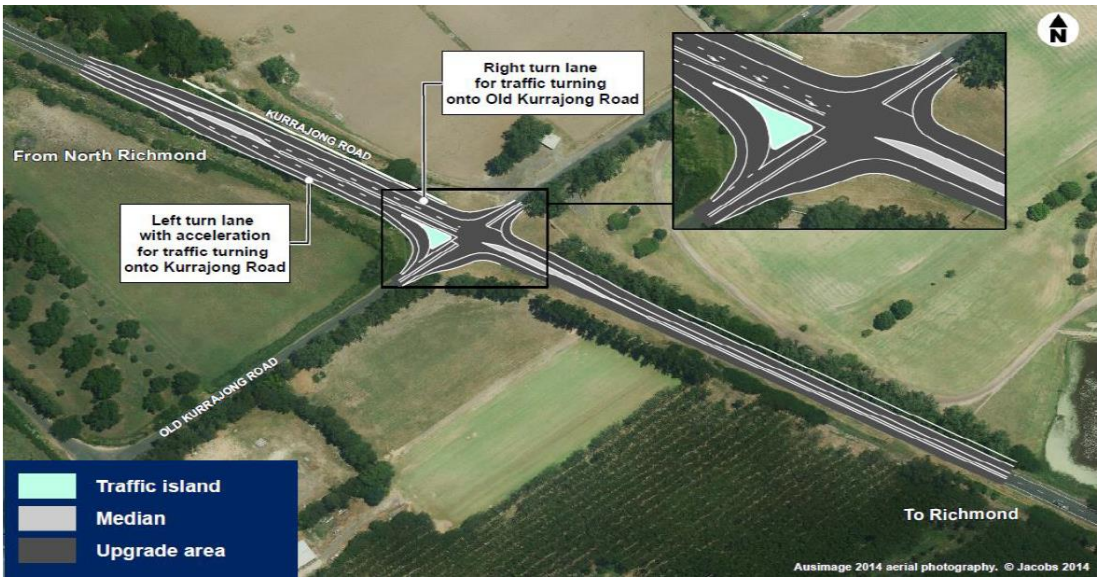
The upgrades to the study intersection were focused on improving the movements between Kurrajong Road (north approach) and Yarramundi Lane, and include:

- dedicated right turn lane from Kurrajong Road into Yarramundi Lane
- dedicated left turn slip lane with acceleration lane from Yarramundi Lane into Kurrajong Road.

The upgrades, shown in Figure 2.3, significantly improve the operation of the intersection, by reducing delay experienced by the through southbound traffic along Kurrajong Road.

Modelling completed for the '*Richmond Bridge and the approaches Congestion Study'*[4] indicated that the delays experienced at the study intersection for the base case (2011 existing conditions) were Level of Service (LOS) B and F during the AM and PM peak hours respectively. As per Table 2.2, an intersection performing at a LOS F experiences "extreme delays and major treatments are required". With the proposed improvements to the intersection, the Level of Service will improve during the PM peak period.

Figure 2.3: Kurrajong Road/ Old Kurrajong Road Intersection Upgrade



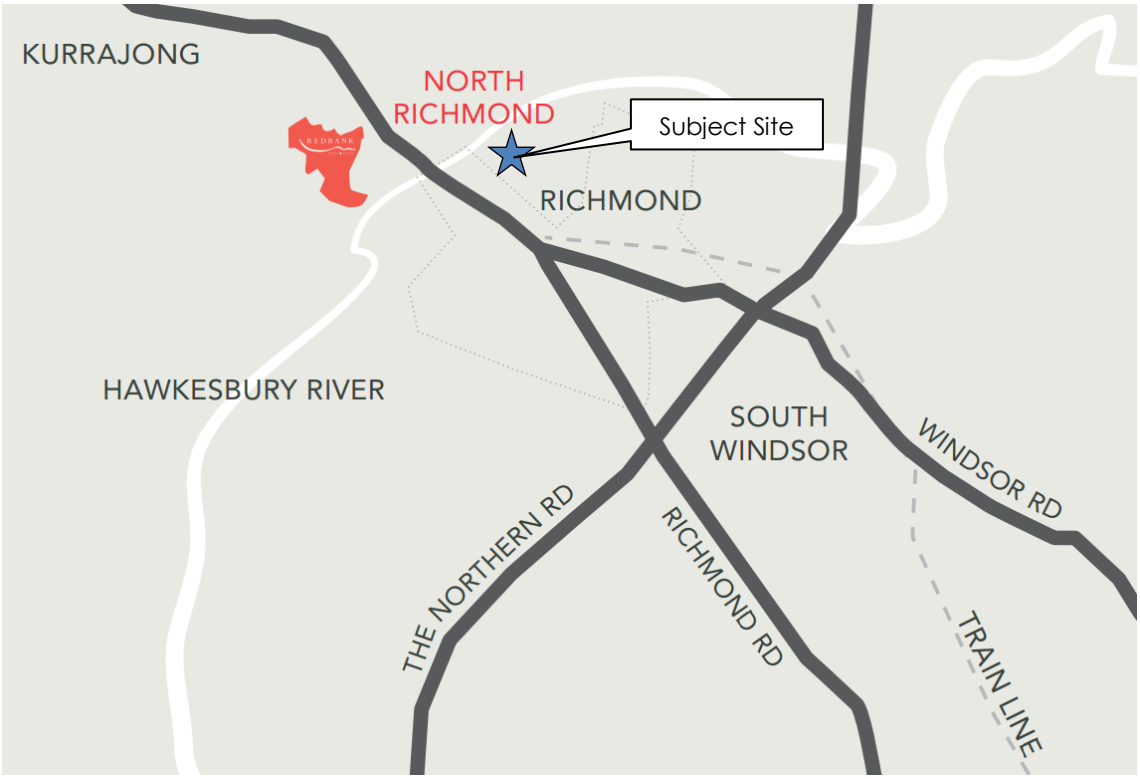
Source: Roads and Maritime Services, February 2015

4 *Richmond Road and Approaches Congestion Study – Preferred Short-Term and Long-Term Options Report*, Roads and Maritime Services 2013

2.2 North Richmond 'Redbank' Development

A residential development known as 'Redbank' has been approved on 147 hectares of land in North Richmond. The development site, shown in Figure 2.4, is to generate a yield of up to 1,400 residential dwellings that will be completed in 7 stages, with full development by 2021.

Figure 2.4: North Richmond 'Redbank' Development



Base source: www.redbankrichmond.com.au visited 06 August 2015.

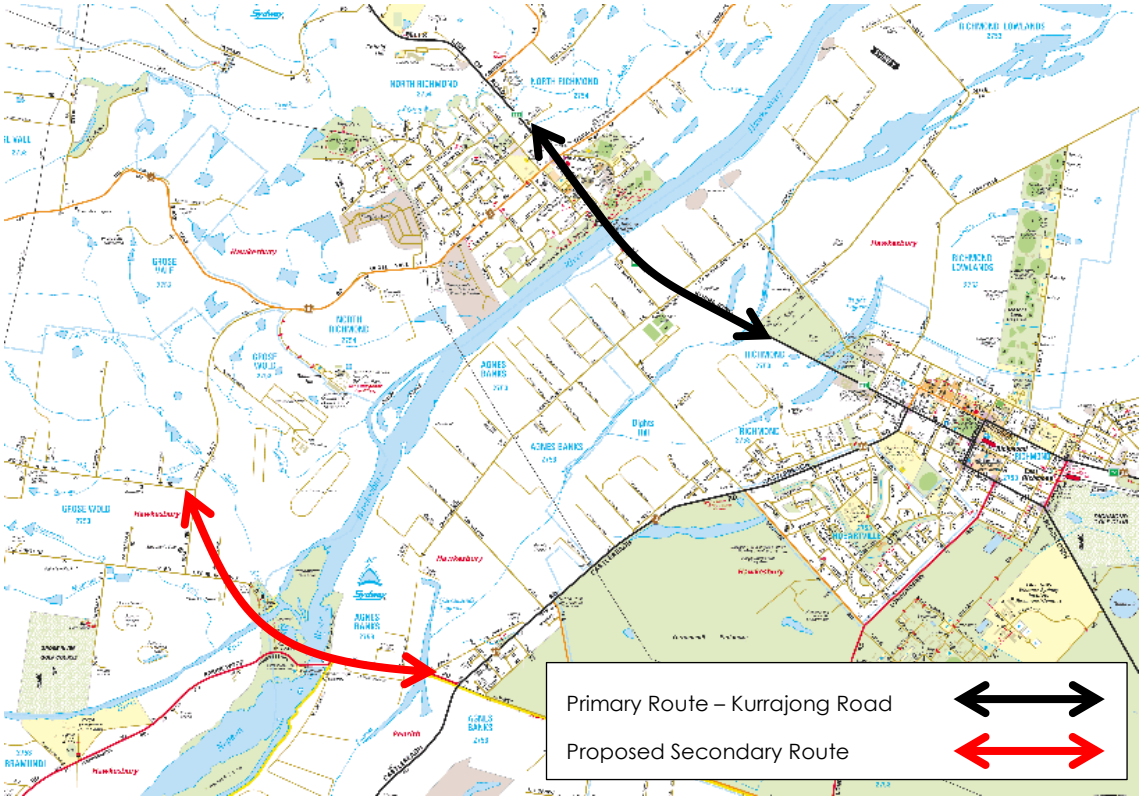
The Redbank Transport Management and Accessibility Plan (TMAP) prepared by AECOM in March 2013, indicates that at full development, 1,130 vehicle trips would be generated from Redbank to the external road network. Approximately 60-65% of the vehicle trips were expected to travel south of Hawkesbury River via Kurrajong Road.

Traffic modelling undertaken for the study was completed for the intersection of Kurrajong Road and Old Kurrajong Road, with the improvements proposed as part of the Richmond Bridge and the approaches works. A review of the results indicates that at full development (2021), the intersection would significantly improve the delays experienced by the high volume movements at the intersection, and as such caters for the development traffic. However, the results show that the low volume movements (less than 20 vehicles per hour) would experience significant delays as a result of the increased traffic for the key movements. The Redbank TMAP study recommended that the intersection be considered for signalisation in 2021.

Proposed Secondary Route between Richmond and North Richmond

The Redbank TMAP traffic assessment considered the provision of the secondary route between Richmond and North Richmond. The secondary route through Yarramundi would be part of the long term solution to relieve congestion experienced along Kurrajong Road. The secondary route, indicatively shown in Figure 2.5, requires a new bridge across Grose River in order to provide a complete route.

Figure 2.5: Proposed Secondary Route



The Redbank TMAP concluded that with the secondary route, no additional intersection improvements are required to the intersection of Kurrajong Road and Old Kurrajong Road above what is proposed as part of the Richmond Bridge and the approaches upgrade works.

2.3 Traffic Volumes

Traffic movement surveys were undertaken on Friday 1 May 2015 between 2:00pm to 6:00pm and Saturday 18 July 2015 between 9:00am and 6:00pm. The surveys provide baseline traffic data in the area on typical days when the polo event and/ or functions would occur. The counts were undertaken at the Kurrajong Road/ Old Kurrajong Road intersection (Friday and Saturday) and the Old Kurrajong Road/ Ridges Lane intersection (Saturday only).

The construction works to upgrade the Kurrajong Road/ Old Kurrajong Road intersection occupied the western corner of the intersection at the time of the Saturday traffic surveys. As a result of the works, the right turn movement from Kurrajong Road into Yarramundi Lane was restricted, in addition to the two permanent right turn restrictions at the intersection. Heavy vehicles were also restricted from turning left from Yarramundi Lane into Kurrajong Road, due to the constrained construction works environment.

As shown in Table 2.1, the traffic volume along Yarramundi Lane during the Saturday survey was significantly lower compared to the volume during the Friday survey as a result of the turn ban. The volumes along Kurrajong Road and Old Kurrajong Road were generally consistent. Overall, the traffic volumes during the Saturday peak hour were within 10% of the traffic volumes during the Friday PM peak hour.

Table 2.1: Kurrajong Road/ Old Kurrajong Road Intersection – Approach Traffic Volumes

Peak Hour	Approach Traffic (one-way vehicles per hour)			
	Kurrajong Road	Yarramundi Lane	Old Kurrajong Road	Overall
Friday PM	1,883vph	434vph	23vph	2,340vph
Saturday AM	1,947vph	217vph	19vph	2,183vph
Saturday PM	1,658vph	208vph	19vph	1,885vph

It is understood that Yarramundi Lane is primarily used to link Richmond North and Lowlands with Penrith, via Castlereagh Road. The Redbank TMAP found that Yarramundi Lane, along with Inalls Lane and Castlereagh Road, are used as a 'rat-run' in the AM peak hour. Vehicles use this route to avoid congestion at the signalised intersection of Kurrajong Road and Bosworth Street, which is the key access point from the north into Richmond Town Centre.

The intersection also connects North Richmond and Richmond Lowlands with the Hills M2 and WestLink M7 motorways via the arterial roads, Richmond Road and Windsor Road.

The right turn movement into Yarramundi Lane on the Saturday was estimated based on the Friday surveys to understand the typical volume expected if construction works were not occurring. Likewise, the traffic volume at the Old Kurrajong Road/ Ridges Lane intersection, which was not surveyed in May, was estimated for the Friday PM peak hour based on the traffic data available.

As such, the estimated existing peak hour traffic volumes on the Friday PM peak and Saturday AM and PM peaks are summarised in Figure 2.6 and Figure 2.7.

Figure 2.6: Existing Friday PM Peak Hour Traffic Volumes

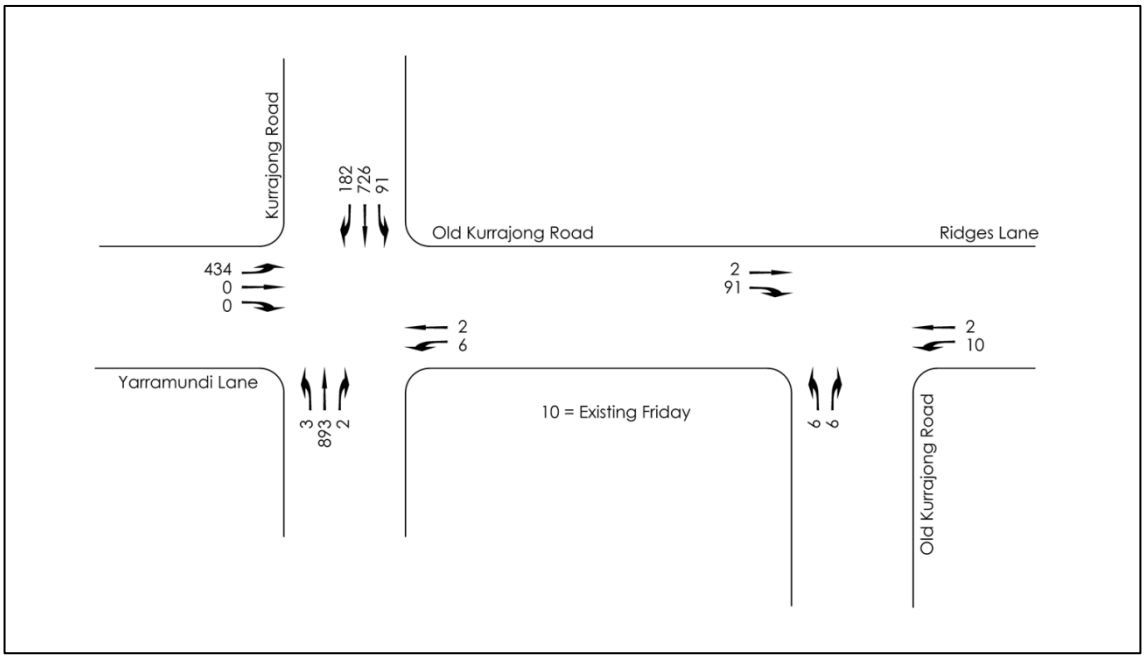
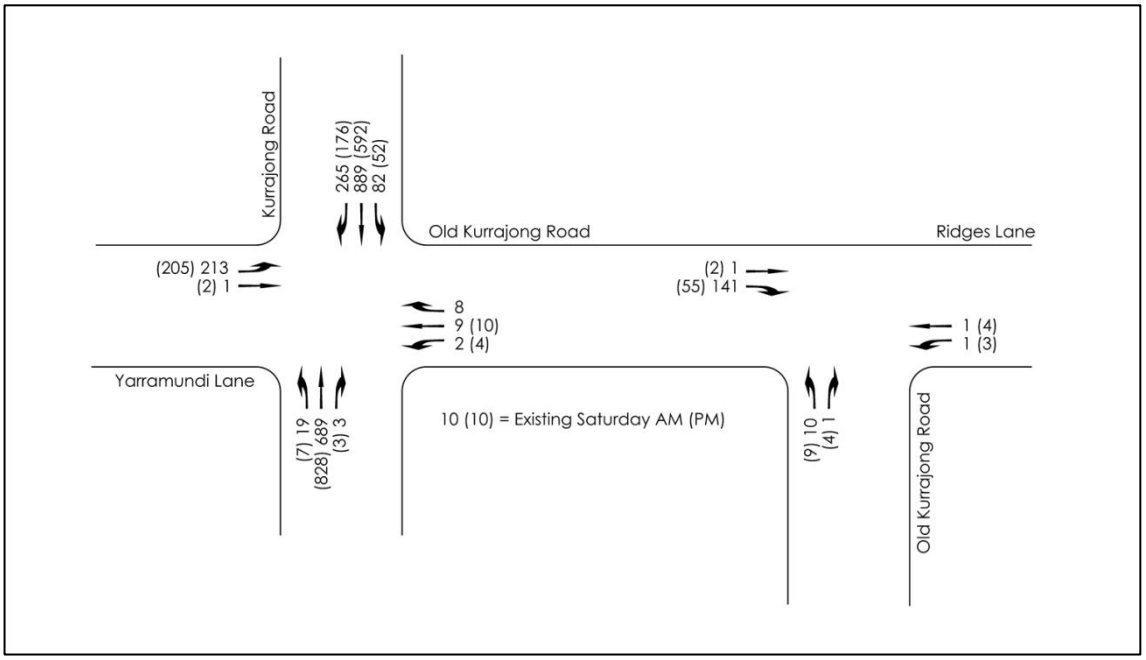


Figure 2.7: Existing Saturday AM / PM Peak Hour Traffic Volumes



The estimated existing peak hour traffic volumes illustrate that Old Kurrajong Road and Ridges Lane currently carry low traffic volumes thus having sufficient capacity to accommodate additional traffic, noting that a typical single traffic lane is generally able to carry up to 900 vehicles per hour.

2.4 Intersection Operation

The operation of the study intersections have been assessed using SIDRA INTERSECTION[5], a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the RMS, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.2 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

[5] Program used under license from Akcelik & Associates Pty Ltd.

Table 2.2: SIDRA INTERSECTION Level of Service Criteria

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

Kurrajong Road/ Old Kurrajong Road Intersection

The surveyed traffic volumes were assessed on the upgraded Kurrajong Road/ Old Kurrajong Road intersection, which was completed in late 2015. A summary of the intersection operation is presented in Table 2.3, with full results presented in Appendix A of this report.

Table 2.3: Kurrajong Road/ Old Kurrajong Road Intersection – Upgraded Layout

Peak	Worst Movement < 15vph			Worst Movement > 15vph		
	Average Delay (sec)	Level of Service (LOS)	Movement/ Vehicles per hour (vph)	Average Delay (sec)	Level of Service (LOS)	Movement/ Vehicles per hour (vph)
Friday PM	51	D	Yarramundi Lane (T) – 1vph	15	B	Kurrajong Road North (R) – 192vph
Saturday AM	144	F	Old Kurrajong Road (R) – 8vph	11	A	Kurrajong Road North (R) – 279vph
Saturday PM	32	C	Yarramundi Lane (T) – 2vph	12	A	Kurrajong Road North (R) – 185vph

Table 2.3 shows that it is typically the movements with less than 15 vehicles per hour that experience the majority of delays during the respective peak periods. These movements are also mostly approaching from Old Kurrajong Road and Yarramundi Lane and turning right or crossing Kurrajong Road. For example, vehicles turning right from Old Kurrajong Road during the Saturday AM peak hour will have a lengthy delay in excess of two minutes and a LOS F.

When considering the major movements, the delays generally less than 15 seconds and acceptable.

Old Kurrajong Road/ Ridges Lane Intersection

The Old Kurrajong Road/ Ridges Lane intersection currently operates satisfactorily with minor delays experienced. The existing operation is summarised in Table 2.4, with full results presented in Appendix A of this report.

Table 2.4: Existing Operating Conditions - Old Kurrajong Road/ Ridges Lane

Peak	Average Delay (sec)	Level of Service (LOS)	Movement
Friday PM	6	A	Ridges Lane (L)
Saturday AM	6	A	Old Kurrajong Road South (R) Ridges Lane (L)
Saturday PM	6	A	Ridges Lane (L)

2.5 Public Transport

2.5.1 Train

The nearest train station is Richmond, located 3 kilometres to the south. Richmond is the terminus of the Richmond line that broadly makes up Sydney's greater western suburban network. All trains departing Richmond go through Sydney's CBD. Trains depart Richmond for Sydney CBD on a half-hourly basis.

2.5.2 Bus

Due to the semi-rural landscape and general reliance on private transport, the Richmond area, and in particular the intersection of Kurrajong Road and Old Kurrajong Road is served by limited bus services. The site is in close vicinity to three irregularly operating buses services summarised below.

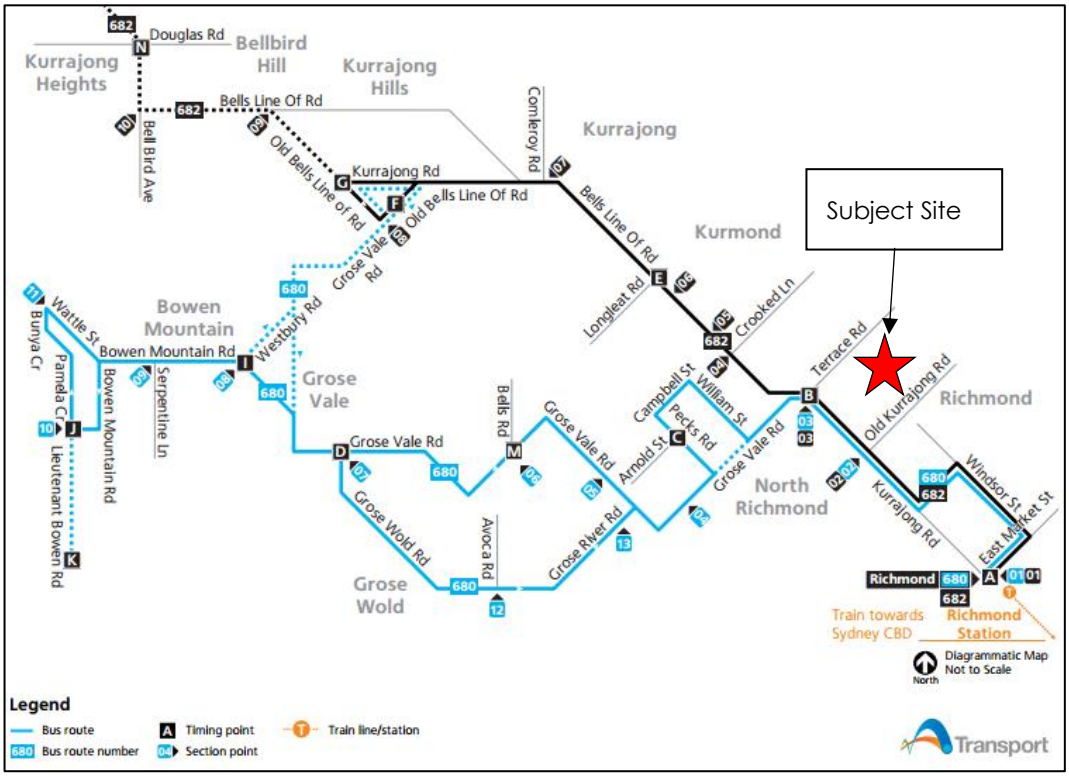
A review of the public transport available in the vicinity of the site is summarised in Table 2.5.

Table 2.5: Public Transport Provision

Service	Route #	Route Description	Location of Stop	Frequency On/Off Peak
Bus	682	Richmond to Kurrajong	Corner of Kurrajong Road and Old Kurrajong Road	30 mins/3hrs
	680	Richmond to Bowen Mtn		30 mins/3hrs
	668	Richmond to Windsor		6 hrs
Train		Richmond to Sydney	March St	30 mins

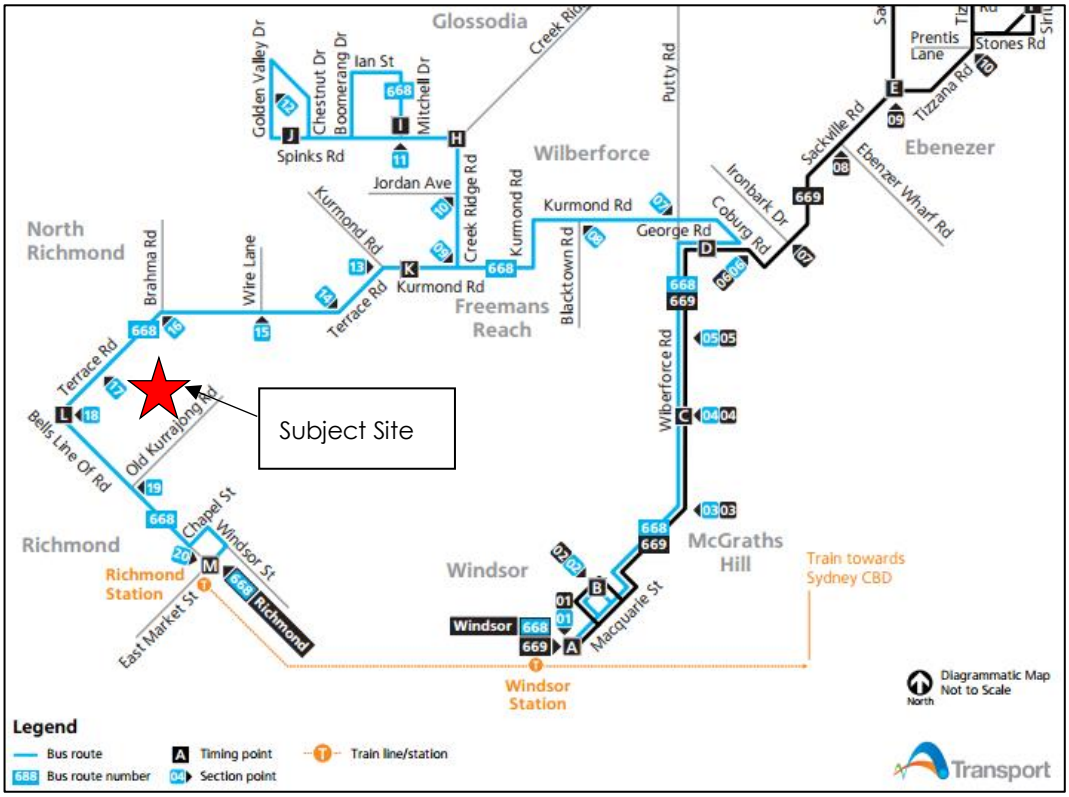
The public transport service network in the vicinity of the site is shown in Figure 2.8.

Figure 2.8: Bus Network (Richmond to Bowen Mountain via Kurrajong or Grose Wold)



Source: Busways viewed 15 June 2015 (http://www.busways.com.au/sites/default/files/network_maps/RichmondBowenMountain_Map.pdf)

Figure 2.9: Bus Network (Richmond to Windsor via Wilberforce)



Source: Busways viewed 15 June 2015 (hhttp://www.busways.com.au/sites/default/files/network_maps/RichmondSackville_map.pdf)

2.6 Pedestrian and Cycle Infrastructure

There are no pedestrian footpath facilities along Kurrajong Road or the surrounding roads given the semi-rural nature of the area.

A road shoulder is present on Kurrajong Road and is approximately 2 metres wide in each direction. On local roads such as Old Kurrajong Road, a road shoulder is not provided.

Under the Hawkesbury City Council *Cycling in the Hawkesbury Guide*, Kurrajong Road and Old Kurrajong Road, as well as many other surrounding roads are suitable for on road cycling.

2.7 The Gold Cup Event

A major polo event, known as The Gold Cup, was held on the weekend of 17-18 October 2015. There were several games played throughout each day, with the last game finishing around 5:00pm.

Surveys were completed during The Gold Cup to understand the traffic generating characteristics of the event.

The surveys were completed on the main event day (Sunday 18 October) between 7:00am and 6:00pm, and included traffic volume counts and vehicle occupancy surveys at the primary site access. A classified midblock traffic count along Ridges Lane was also completed for a total of nine days to capture traffic conditions during a typical week and the event weekend.

The key findings of the surveys are summarised below:

- There were 1,186 and 2,615 daily vehicle movements along Ridges Lane on the Saturday and Sunday of the event weekend respectively. This is compared to 171 and 154 daily vehicle movements on a typical Saturday and Sunday respectively.
- 2,135 spectators attended the event on the Sunday via the main entry, including 1,909 that arrived by private vehicle and 226 by van and/ or bus.
- There was a combined average occupancy of 1.9 people per car and 27 people per van/ bus.
- 20% of vehicles arrived in the peak vehicle arrival period (11:00am to 12:00pm), which included 274 vehicle movements, 80% inbound, 20% outbound.
- The peak spectator arrival period occurred later (12:00pm to 1:00pm), influenced by more bus arrivals during this period.
- The overall peak hour for vehicle movements occurred in the afternoon (4:45pm to 5:45pm), with 353 vehicle movements, 8% inbound and 92% outbound.
- The peak spectator departure period occurred slightly later (5:00pm to 6:00pm), again influenced by more bus departures around 6:00pm.

Turning movement counts were completed at the study intersections on the Sunday. Technical issues were experienced during the survey at the Kurrajong Road/ Old Kurrajong Road intersection that resulted in no data being available between 4:00pm and 6:00pm. The upgrade works occurring at this intersection had been completed at the time of the survey.

The operation of the study intersections during the event peak periods have been assessed using SIDRA INTERSECTION[6]. The traffic volumes at the Kurrajong Road/ Old Kurrajong Road intersection during the event afternoon peak hour was estimated based on traffic data available.

6 Program used under license from Akcelik & Associates Pty Ltd.

A summary of the operation is presented in Table 2.6 and Table 2.7, with full results provided in Appendix A of the report.

Table 2.6: Kurrajong Road/ Old Kurrajong Road Intersection – during The Gold Cup

Peak	Worst Movement < 15vph			Worst Movement > 15vph		
	Average Delay (sec)	Level of Service (LOS)	Movement/ Vehicles per hour (vph)	Average Delay (sec)	Level of Service (LOS)	Movement/ Vehicles per hour (vph)
Sunday AM	167	F	Old Kurrajong Road (R) – 14vph	44	D	Old Kurrajong Road (L) – 34vph
Sunday PM	34	C	Old Kurrajong Road (T) – 32vph	12	A	Old Kurrajong Road (L) – 168vph

Table 2.7: Old Kurrajong Road/ Ridges Lane – during The Gold Cup

Peak	Average Delay (sec)	Level of Service (LOS)	Movement
Sunday AM	6	A	Old Kurrajong Road South (R)
Sunday PM	6	A	Old Kurrajong Road South (R)

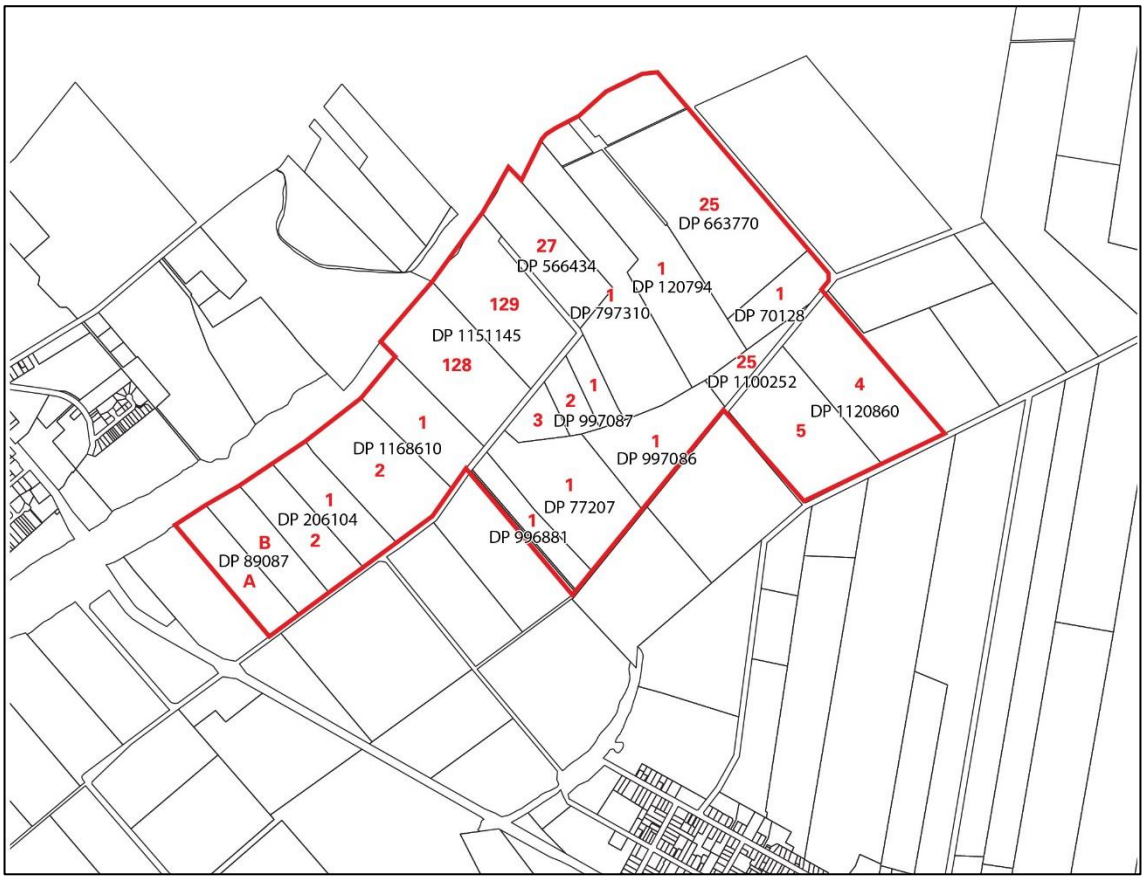
The results of assessment indicate that the intersection generally performed as per the existing operation during the Saturday peak periods. The exception is at the intersection of Kurrajong Road/ Old Kurrajong Road during the AM peak hour. The worst delay for movements greater than 15 vehicles per hour was experienced by the left turn movement from Old Kurrajong Road into Kurrajong Road (LOS D), which is considered to be nearing capacity.

3. Planning Proposal

This Planning Proposal is for a site that incorporates 23 allotments, as shown in Figure 3.1 and includes:

- 1 Powells Lane
- 106 Ridges Land
- 83 Ridges Lane
- 33 Ridges Land
- 7 Ridges Lane
- 1 Cornwells Lane
- 31 Cornwells Lane
- 62-90 Ridges Lane
- 98 Ridges Lane
- 100 Old Kurrajong Road
- 122 Old Kurrajong Road
- 136 Old Kurrajong Road.

Figure 3.1: Subject Site and Allotments



Source: LPI Property Information

The majority of the site is currently used for agricultural purposes, polo playing facilities and two function centres utilising two existing barns on the site. These uses are located on land collectively referred to as the Sydney Polo Club which is owned by Basscave Pty Ltd. There is also a tourist accommodation facility located in the south-western section of the site and a turf farm in the centre of the site.

The polo playing facilities are currently used for weekly polo games with approximately 20 players/ spectators, as well as an annual polo event, hosted by the Sydney Polo Club that attracts approximately 2,500 players/ spectators over two days.

A number of these existing uses are prohibited on land that is classified RU2 Rural Landscape, however are compatible with the objectives of the land zone.

This Planning Proposal seeks to amend the Hawkesbury LEP 2012 to include the following uses as additional permitted uses under Schedule 1 of the LEP, thus legitimising certain operations currently occurring on the site:

- Eco-tourist facilities
- Function centres
- Market
- Medical centre
- Recreation facility (major)
- Recreation facility (outdoor)
- Veterinary hospital
- Industrial retail outlet.

In addition to the existing uses on the site, there are a number of desired future uses for the site that include:

- a third function centre (200 patron capacity, function every fortnight per venue)
- micro-brewery
- markets
- counselling services
- veterinary hospital.

Car parking associated with the uses would be accommodated on the site in the vicinity of each use.

A special events traffic management plan would be prepared for the annual polo event to manage traffic, pedestrians and parking on event day. Formal car parking areas would be provided on the site.

4. Traffic Impact Assessment

4.1 Overview

The key traffic generating uses on the site are expected to be the function centres and the annual polo event.

The other uses are expected to be low traffic generators, especially compared to a function or the annual polo event. These uses would operate outside both the site and the road network peak periods.

It is proposed that each function centre is permitted to hold up to 26 functions a year and therefore three functions are unlikely to occur simultaneously.

Therefore, for the purpose of this study, three scenarios have been assessed that include:

- Scenario 1 – Typical operation
- Scenario 2 – Two functions (e.g. weddings) occurring simultaneously
- Scenario 3 – An annual polo event.

The assessment undertaken in this section is based on existing (2015) traffic volumes only and does not consider traffic generated by the North Richmond 'Redbank' development, which is anticipated to be completed in 2021.

As discussed, the North Richmond 'Redbank' development study recommended that the intersection of Old Kurrajong Road and Kurrajong Road be signalised in 2021 should the secondary route between Richmond and North Richmond and through Yarramundi not be approved.

Once the intersection of Old Kurrajong Road and Kurrajong Road is signalised in 2021, the intersection would operate satisfactorily with development traffic from Redbank and this Planning Proposal.

4.2 Traffic Generation

4.2.1 Scenario 1 – Typical Operation

As indicated, the function centres and the annual polo event are expected to be the key traffic generators on the site. On a typical day that does not include a function or polo event, the other uses are expected to generate less traffic, particularly during the road network peak periods.

The veterinary hospital, counselling services and microbrewery are expected to be the main traffic generators on a typical day. The full details of the size and operation of these uses are not known at this stage.

Notwithstanding, the following assumptions have been adopted in order to assess the anticipated traffic generation of the uses during the road network peak periods (weekday or weekend):

- 1 practitioner/ professional each at the veterinary hospital and counselling services
- 5 trips per hour for each practitioner/ professional (based on GTA empirical data)
- 10 trips per hour for the micro-brewery.

Based on the above assumptions, the combined traffic generation during typical operation would be in the order of **20 vehicle movements per hour** (or 10 vehicles). This equates to an additional vehicle movement every three minutes in the road network.

It is assumed these uses would be operational during the Friday PM, Saturday AM and PM peak periods. The directional split is assumed to be 60% inbound/ 40% outbound during the AM peak period and reversed during the respective PM peak periods.

4.2.2 Scenario 2 – Two Functions

Roads and Maritime Service's Guide to Traffic Generating Developments 2002 does not provide a traffic generation rate for function centres.

As such, vehicle occupancy surveys were completed at the Sydney Polo Club during a wedding event on Friday 1 May 2015.

During the survey period, 128 people arrived via 59 private vehicles, which equates to an average vehicle occupancy of 2.2 people per vehicle.

A bus carrying 18 people also arrived in the hour leading up to the ceremony, indicating a travel model split of approximately 17% (i.e. 83% by private vehicle).

On the basis the venue has a maximum capacity for 200 seats, 166 people would arrive by private vehicle and 34 people by bus. Therefore, the anticipated arrivals to a function would be 76 private vehicle trips and 2 bus trips (assuming 17 people per bus).

The surveys also indicated that 75% of vehicles arrived in the hour leading up to the ceremony (i.e. the peak hour). Based on the anticipated traffic generation, 59 vehicles (including a bus) would arrive in the peak hour.

In the hour leading up to the ceremony, there was a split of 77% arrivals and 23% departures. As such, the total two-way traffic generation of a function in the event peak hour, would be **73 vehicle movements per hour** (59 arrivals/ 14 departures).

For two functions occurring simultaneously, the anticipated traffic generation during the peak hour would be in the order of 130 inbound vehicle trips per hour. Taking into account attendees being dropped off, there would be in the order of **146 vehicle movements per hour** (118 arrivals / 28 departures).

Two functions (e.g. weddings) could occur simultaneously on a Friday afternoon or a Saturday afternoon. Traffic volumes during the Saturday road network PM peak hour are 20% less than during the Friday road network PM peak hour, as illustrated in in Table 2.1. As such, only the Friday afternoon peak period has been assessed.

4.2.3 Scenario 3 – Annual Polo Event

The traffic generation characteristics of an annual polo event have been based on the findings of the 2015 The Gold Cup event. To represent a 'worst case' scenario, the findings for the Sunday event day have been tested for a Saturday. As such, the traffic generation for the Saturday morning and afternoon peak periods are summarised below:

- Morning peak period – 274 vehicle movements per hour (80% inbound/ 20% outbound)
- Afternoon peak period – 353 vehicle movement per hour (8% inbound/ 92% outbound).

4.3 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

i configuration of the arterial road network in the immediate vicinity of the site
ii existing operation of intersections providing access between the local and arterial road network
iii distribution of households in the vicinity of the site
iv surrounding employment centres, retail centres and schools in relation to the site
v configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed:

- North – 30%
- South – 70%.

4.4 Traffic Impact

The peak hour operation of the study intersections has been assessed with the traffic generated by each scenario.

The scenarios that were assessed are as follows:

- Existing Friday PM, Saturday AM or PM traffic volumes + Scenario 1 (typical operation)
- Existing Friday PM + Scenario 2 (two functions)

Existing Saturday AM or PM + Scenario 3 (annual polo event). It is assumed that during functions or the annual polo event, all other uses on site would not be operating and/ or would be ancillary to these events.

Kurrajong Road/ Old Kurrajong Road Intersection

Table 4.1 presents a summary of the operation of the Kurrajong Road/ Old Kurrajong Road intersection, with full results presented in Appendix A of this report.

Table 4.1: Anticipated Operating Conditions - Kurrajong Road/ Old Kurrajong Road

Peak	Scenario	Worst Movement < 15vph			Worst Movement > 15vph		
		Average Delay (sec)	Level of Service (LOS)	Movement/ Vehicles per hour (vph)	Average Delay (sec)	Level of Service (LOS)	Movement/ Vehicles per hour (vph)
Friday PM	1. Typical	52	D	Yarramundi Lane (T) – 1vph	15	B	Kurrajong Road North (R) – 192vph
	2. Functions	63	E	Yarramundi Lane (T) – 1vph	19	B	Kurrajong Road South (R) – 54vph
Saturday AM	1. Typical	154	F	Old Kurrajong Road (R) – 11vph	13	A	Kurrajong Road South (L) – 20vph
	3. Polo Event	>100	F	Old Kurrajong Road (T) – 9vph	>100	F	Old Kurrajong Road (L,R) – 25vph each
Saturday PM	1. Typical	32	C	Old Kurrajong Road (T) – 11vph	12	A	Kurrajong Road North (R) – 185vph
	3. Polo Event	46	D	Old Kurrajong Road (T) – 11vph	15	B	Kurrajong Road North (R) – 185vph

The following conclusions are made regarding the additional traffic generated by the scenarios tested:

- The intersection would continue to operate the same as existing under Scenario 1 (typical operation) in any of the assessed peak periods.
- The key movements (more than 15 vehicles per hour) would experience a minor increase in delays during the Friday PM peak under Scenario 2 (functions). It is noted there is a decrease in level of service from LOS D to LOS E for the through movement from Yarramundi Lane (the worst delay for movements less than 15 vehicles per hour).
- The Old Kurrajong Road approach continues to experience notable delays during the Saturday AM peak hour (LOS F) under Scenario 3 (annual polo event). The delays are a result of the right turn that is permitted before 3:00pm. Nonetheless, the traffic conditions along Kurrajong Road remain as per existing.
- There are increases in delays experienced under Scenario 3 (annual polo event) during the Saturday PM peak hour, with the worst level of service experienced by the key movements (more than 15 vehicles per hour) being LOS B, with LOS D for the minor movements (less than 15 vehicles per hour).

Old Kurrajong Road/ Ridges Lane Intersection

The Old Kurrajong Road/ Ridges Lane intersection is anticipated to operate satisfactorily with minor delays experienced. The operation is summarised in Table 4.2, with full results presented in Appendix A of this report.

Table 4.2: Anticipated Operating Conditions - Old Kurrajong Road/ Ridges Lane

Peak	Scenario	Average Delay (sec)	Level of Service (LOS)	Movement
Friday PM	1. Typical	6	A	Old Kurrajong Road South (L)
	2. Functions	6	A	Old Kurrajong Road South (L)
Saturday AM	1. Typical	6	A	Ridges Lane (L)
	3. Polo Event	7	A	Old Kurrajong Road South (LR)
Saturday PM	1. Typical	6	A	Ridges Lane (L)
	3. Polo Event	6	A	Old Kurrajong Road South (R) Ridges Lane (L)

Summary

Overall, there is adequate capacity within the surrounding road network to accommodate the additional traffic generated by the site under typical operation and during Scenario 2 (two functions).

The impacts of the additional traffic generated by the annual polo event on the surrounding road network on a Saturday are generally acceptable. Vehicles exiting Old Kurrajong Road at Kurrajong Road during the Saturday AM peak, will continue to experience similar delays as per existing conditions.

Considering that the annual polo event is not a regular event, it is recommended that a Special Event Traffic Management Plan be prepared and submitted to Hawkesbury City Council for approval. The TMP should address all event details, timing, anticipated traffic and associated mitigation measures.

In addition, carpooling and/ or travel by coaches/ shuttle buses to major events should be encouraged at all times. Variable car parking rates (that further encourages carpooling) are also beneficial in reducing the actual number of vehicles travelling to the event.

5. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

i The Planning Proposal is to permit uses such as polo facilities, function centres, medical and veterinary facilities as well as other uses associated with the polo industry on land currently zoned for RU2 Rural Landscape.

ii Car parking associated with the uses would be accommodated on-site in the vicinity of each use.

iii Under typical operation, the site is expected to generate approximately 20 vehicle movements in any peak hour.

iv The key traffic generating uses are expected to be the function centres and the annual polo event.

v Based on the 2015 Gold Cup event, the site is expected to generate between 275 and 350 vehicle movements in any peak hour.

vi A Special Event TMP should be prepared for the annual polo event to manage traffic, pedestrians and parking on the event day.

vii Traffic generation associated with two simultaneous functions, such as weddings are expected to generate a combined 150 vehicle movements during any peak hour.

viii There is adequate capacity in the surrounding road network to cater for typical operations plus the additional traffic associated with the two simultaneous functions.

Appendix A

SIDRA INTERSECTION Results

Existing Conditions Results

MOVEMENT SUMMARY

Site: Old Kurrajong Road/ Ridges Lane - Friday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	6	0.0	0.007	5.7	LOS A	0.0	0.2	0.17	0.52	53.1
23	R2	6	0.0	0.007	5.7	LOS A	0.0	0.2	0.17	0.52	52.6
Approach		13	0.0	0.007	5.7	NA	0.0	0.2	0.17	0.52	52.9
East: Ridges Lane											
24	L2	11	0.0	0.009	5.8	LOS A	0.0	0.2	0.18	0.53	53.2
25	T1	2	0.0	0.009	4.5	LOS A	0.0	0.2	0.18	0.53	53.4
Approach		13	0.0	0.009	5.6	LOS A	0.0	0.2	0.18	0.53	53.3
West: Old Kurrajong Road											
31	T1	2	0.0	0.053	0.0	LOS A	0.0	0.0	0.00	0.59	55.1
32	R2	96	1.1	0.053	5.5	LOS A	0.0	0.0	0.00	0.59	53.2
Approach		98	1.1	0.053	5.3	NA	0.0	0.0	0.00	0.59	53.2
All Vehicles		123	0.9	0.053	5.4	NA	0.0	0.2	0.04	0.58	53.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - Saturday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	11	0.0	0.006	5.6	LOS A	0.0	0.0	0.05	0.55	53.5
23	R2	1	0.0	0.006	5.9	LOS A	0.0	0.0	0.05	0.55	52.9
Approach		12	0.0	0.006	5.6	NA	0.0	0.0	0.05	0.55	53.4
East: Ridges Lane											
24	L2	1	0.0	0.002	5.9	LOS A	0.0	0.0	0.24	0.51	53.4
25	T1	1	0.0	0.002	4.7	LOS A	0.0	0.0	0.24	0.51	53.6
Approach		2	0.0	0.002	5.3	LOS A	0.0	0.0	0.24	0.51	53.5
West: Old Kurrajong Road											
31	T1	1	0.0	0.081	0.0	LOS A	0.0	0.0	0.00	0.60	55.1
32	R2	148	0.7	0.081	5.5	LOS A	0.0	0.0	0.00	0.60	53.1
Approach		149	0.7	0.081	5.4	NA	0.0	0.0	0.00	0.60	53.1
All Vehicles		163	0.6	0.081	5.4	NA	0.0	0.0	0.01	0.59	53.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - Saturday PM

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
South: Old Kurrajong Road											
21	L2	9	0.0	0.008	5.6	LOS A	0.0	0.2	0.09	0.54	53.4
23	R2	4	0.0	0.008	5.6	LOS A	0.0	0.2	0.09	0.54	52.8
Approach		14	0.0	0.008	5.6	NA	0.0	0.2	0.09	0.54	53.2
East: Ridges Lane											
24	L2	3	0.0	0.005	5.7	LOS A	0.0	0.1	0.14	0.51	53.8
25	T1	4	0.0	0.005	4.4	LOS A	0.0	0.1	0.14	0.51	54.0
Approach		7	0.0	0.005	4.9	LOS A	0.0	0.1	0.14	0.51	53.9
West: Old Kurrajong Road											
31	T1	2	0.0	0.033	0.0	LOS A	0.0	0.0	0.00	0.58	55.2
32	R2	58	1.8	0.033	5.5	LOS A	0.0	0.0	0.00	0.58	53.2
Approach		60	1.8	0.033	5.3	NA	0.0	0.0	0.00	0.58	53.3
All Vehicles		81	1.3	0.033	5.3	NA	0.0	0.2	0.03	0.57	53.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - Friday PM

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
South: Kurrajong Rd											
4	L2	2	0.0	0.501	14.7	LOS B	0.2	1.2	0.02	0.00	58.2
5	T1	940	4.1	0.501	0.1	LOS A	0.2	1.2	0.02	0.00	59.8
6	R2	3	0.0	0.501	16.6	LOS B	0.2	1.2	0.02	0.00	57.6
Approach		945	4.1	0.501	0.2	NA	0.2	1.2	0.02	0.00	59.8
East: Old Kurrajong Rd											
7	L2	6	16.7	0.037	10.5	LOS A	0.1	0.8	0.80	0.87	44.2
8	T1	2	0.0	0.037	45.5	LOS D	0.1	0.8	0.80	0.87	45.1
Approach		8	12.5	0.037	19.3	LOS B	0.1	0.8	0.80	0.87	44.5
North: Kurrajong Rd											
10	L2	96	2.2	0.457	5.6	LOS A	0.0	0.0	0.00	0.07	57.6
11	T1	764	4.8	0.457	0.1	LOS A	0.0	0.0	0.00	0.07	59.2
12	R2	192	4.4	0.392	15.0	LOS B	1.8	13.0	0.81	0.99	47.0
Approach		1052	4.5	0.457	3.3	NA	1.8	13.0	0.15	0.24	56.4
West: Yarramundi Lane											
1	L2	457	2.8	0.251	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
2	T1	1	0.0	0.015	51.1	LOS D	0.0	0.3	0.95	0.97	32.3
Approach		458	2.8	0.251	5.8	LOS A	0.0	0.3	0.00	0.53	54.7
All Vehicles		2463	4.1	0.501	2.6	NA	1.8	13.0	0.07	0.20	57.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - Saturday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	20	0.0	0.396	9.7	LOS A	0.3	1.9	0.03	0.02	57.9
5	T1	725	2.6	0.396	0.2	LOS A	0.3	1.9	0.03	0.02	59.5
6	R2	3	0.0	0.396	19.0	LOS B	0.3	1.9	0.03	0.02	57.3
Approach		748	2.5	0.396	0.5	NA	0.3	1.9	0.03	0.02	59.4
East: Old Kurrajong Rd											
7	L2	2	0.0	0.421	34.9	LOS C	1.1	8.0	0.97	1.02	22.7
8	T1	9	0.0	0.421	71.6	LOS F	1.1	8.0	0.97	1.02	22.8
9	R2	8	0.0	0.421	143.8	LOS F	1.1	8.0	0.97	1.02	22.7
Approach		20	0.0	0.421	98.1	LOS F	1.1	8.0	0.97	1.02	22.8
North: Kurrajong Rd											
10	L2	86	1.2	0.533	5.6	LOS A	0.0	0.0	0.00	0.05	57.7
11	T1	936	2.0	0.533	0.1	LOS A	0.0	0.0	0.00	0.05	59.4
12	R2	279	0.0	0.371	11.0	LOS A	1.9	13.5	0.69	0.93	49.7
Approach		1301	1.5	0.533	2.8	NA	1.9	13.5	0.15	0.24	56.9
West: Yarramundi Lane											
1	L2	224	0.9	0.122	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
2	T1	1	0.0	0.016	54.4	LOS D	0.0	0.3	0.95	0.98	31.4
Approach		225	0.9	0.122	5.9	LOS A	0.0	0.3	0.00	0.53	54.7
All Vehicles		2295	1.8	0.533	3.2	NA	1.9	13.5	0.10	0.20	56.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - Saturday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	7	14.3	0.463	8.2	LOS A	0.1	0.9	0.01	0.01	57.5
5	T1	872	2.8	0.463	0.1	LOS A	0.1	0.9	0.01	0.01	59.8
6	R2	3	0.0	0.463	11.8	LOS A	0.1	0.9	0.01	0.01	57.6
Approach		882	2.9	0.463	0.2	NA	0.1	0.9	0.01	0.01	59.8
East: Old Kurrajong Rd											
7	L2	4	0.0	0.086	8.2	LOS A	0.2	1.7	0.86	0.91	42.0
8	T1	11	0.0	0.086	31.0	LOS C	0.2	1.7	0.86	0.91	42.3
Approach		15	0.0	0.086	24.5	LOS B	0.2	1.7	0.86	0.91	42.2
North: Kurrajong Rd											
10	L2	55	1.9	0.355	5.6	LOS A	0.0	0.0	0.00	0.05	57.8
11	T1	623	2.9	0.355	0.0	LOS A	0.0	0.0	0.00	0.05	59.5
12	R2	185	0.0	0.313	12.4	LOS A	1.4	9.7	0.75	0.94	48.7
Approach		863	2.2	0.355	3.0	NA	1.4	9.7	0.16	0.24	56.7
West: Yarramundi Lane											
1	L2	216	3.4	0.119	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
2	T1	2	0.0	0.017	31.8	LOS C	0.0	0.3	0.91	0.96	39.0
Approach		218	3.4	0.119	5.9	LOS A	0.0	0.3	0.01	0.53	54.6
All Vehicles		1978	2.6	0.463	2.2	NA	1.4	9.7	0.08	0.17	57.6

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - 2015 The Gold Cup - Sunday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	24	0.0	0.076	6.4	LOS A	0.4	2.5	0.36	0.55	52.6
23	R2	88	0.0	0.076	6.3	LOS A	0.4	2.5	0.36	0.55	52.1
Approach		113	0.0	0.076	6.4	NA	0.4	2.5	0.36	0.55	52.2
East: Ridges Lane											
24	L2	32	0.0	0.050	5.8	LOS A	0.2	1.3	0.21	0.55	53.5
25	T1	29	0.0	0.050	5.3	LOS A	0.2	1.3	0.21	0.55	53.7
Approach		61	0.0	0.050	5.6	LOS A	0.2	1.3	0.21	0.55	53.6
West: Old Kurrajong Road											
31	T1	177	1.2	0.140	0.0	LOS A	0.0	0.0	0.00	0.20	58.3
32	R2	87	4.8	0.140	5.5	LOS A	0.0	0.0	0.00	0.20	55.9
Approach		264	2.4	0.140	1.8	NA	0.0	0.0	0.00	0.20	57.5
All Vehicles		438	1.4	0.140	3.5	NA	0.4	2.5	0.12	0.34	55.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - 2015 The Gold Cup - Sunday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	29	10.7	0.029	5.8	LOS A	0.1	0.8	0.11	0.53	52.9
23	R2	18	17.6	0.029	5.8	LOS A	0.1	0.8	0.11	0.53	52.0
Approach		47	13.3	0.029	5.8	NA	0.1	0.8	0.11	0.53	52.5
East: Ridges Lane											
24	L2	178	3.0	0.256	5.7	LOS A	1.2	8.5	0.15	0.53	53.6
25	T1	173	1.2	0.256	4.6	LOS A	1.2	8.5	0.15	0.53	53.8
Approach		351	2.1	0.256	5.2	LOS A	1.2	8.5	0.15	0.53	53.7
West: Old Kurrajong Road											
31	T1	16	26.7	0.030	0.0	LOS A	0.0	0.0	0.00	0.42	56.3
32	R2	36	8.8	0.030	5.6	LOS A	0.0	0.0	0.00	0.42	53.8
Approach		52	14.3	0.030	3.9	NA	0.0	0.0	0.00	0.42	54.6
All Vehicles		449	4.7	0.256	5.1	NA	1.2	8.5	0.13	0.52	53.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - 2015 The Gold Cup - Sunday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	2	0.0	0.696	19.8	LOS B	10.5	74.8	1.00	0.16	52.0
5	T1	866	1.7	0.696	5.6	LOS A	10.5	74.8	1.00	0.16	53.3
6	R2	139	0.8	0.696	19.7	LOS B	10.5	74.8	1.00	0.16	51.5
Approach		1007	1.6	0.696	7.6	NA	10.5	74.8	1.00	0.16	53.1
East: Old Kurrajong Rd											
7	L2	34	0.0	0.603	43.7	LOS D	2.0	13.7	0.94	1.09	25.6
8	T1	2	0.0	0.603	91.7	LOS F	2.0	13.7	0.94	1.09	25.8
9	R2	14	0.0	0.603	167.0	LOS F	2.0	13.7	0.94	1.09	25.6
Approach		49	0.0	0.603	79.9	LOS F	2.0	13.7	0.94	1.09	25.6
North: Kurrajong Rd											
10	L2	94	0.0	0.467	5.6	LOS A	0.0	0.0	0.00	0.06	57.7
11	T1	808	0.8	0.467	0.1	LOS A	0.0	0.0	0.00	0.06	59.3
12	R2	198	2.1	0.332	12.5	LOS A	1.5	10.8	0.75	0.95	48.6
Approach		1100	1.0	0.467	2.8	NA	1.5	10.8	0.13	0.22	56.9
West: Yarramundi Lane											
1	L2	149	0.7	0.081	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
2	T1	8	0.0	0.149	64.6	LOS E	0.4	2.8	0.96	0.98	28.9
Approach		158	0.7	0.149	8.8	LOS A	0.4	2.8	0.05	0.55	52.4
All Vehicles		2315	1.2	0.696	6.9	NA	10.5	74.8	0.52	0.24	53.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - 2015 The Gold Cup - Sunday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	4	0.0	0.389	11.7	LOS A	0.3	1.9	0.04	0.01	58.0
5	T1	729	0.9	0.389	0.2	LOS A	0.3	1.9	0.04	0.01	59.6
6	R2	7	0.0	0.389	12.9	LOS A	0.3	1.9	0.04	0.01	57.4
Approach		741	0.9	0.389	0.4	NA	0.3	1.9	0.04	0.01	59.6
East: Old Kurrajong Rd											
7	L2	168	0.0	0.449	12.4	LOS A	2.0	14.2	0.77	1.00	46.6
8	T1	32	0.0	0.449	33.8	LOS C	2.0	14.2	0.77	1.00	47.0
Approach		200	0.0	0.449	15.8	LOS B	2.0	14.2	0.77	1.00	46.7
North: Kurrajong Rd											
10	L2	42	0.0	0.415	5.6	LOS A	0.0	0.0	0.00	0.03	58.0
11	T1	758	1.4	0.415	0.1	LOS A	0.0	0.0	0.00	0.03	59.6
12	R2	154	0.0	0.198	9.5	LOS A	0.8	5.7	0.63	0.84	50.6
Approach		954	1.1	0.415	1.8	NA	0.8	5.7	0.10	0.16	57.9
West: Yarramundi Lane											
1	L2	188	0.6	0.102	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
2	T1	3	0.0	0.022	28.1	LOS B	0.1	0.5	0.90	0.95	40.6
Approach		192	0.5	0.102	6.0	LOS A	0.1	0.5	0.01	0.54	54.6
All Vehicles		2086	0.9	0.449	3.0	NA	2.0	14.2	0.14	0.22	56.8

Level of Service (LOS) Method: Delay (RTA NSW).
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.

Post Development Results

MOVEMENT SUMMARY

Site: Old Kurrajong Road/ Ridges Lane - Friday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	6	0.0	0.009	5.8	LOS A	0.0	0.3	0.19	0.52	53.1
23	R2	8	0.0	0.009	5.7	LOS A	0.0	0.3	0.19	0.52	52.6
Approach		15	0.0	0.009	5.7	NA	0.0	0.3	0.19	0.52	52.8
East: Ridges Lane											
24	L2	18	0.0	0.018	5.8	LOS A	0.1	0.5	0.19	0.53	53.4
25	T1	7	0.0	0.018	4.5	LOS A	0.1	0.5	0.19	0.53	53.5
Approach		25	0.0	0.018	5.4	LOS A	0.1	0.5	0.19	0.53	53.4
West: Old Kurrajong Road											
31	T1	8	0.0	0.056	0.0	LOS A	0.0	0.0	0.00	0.56	55.4
32	R2	96	1.1	0.056	5.5	LOS A	0.0	0.0	0.00	0.56	53.4
Approach		104	1.0	0.056	5.0	NA	0.0	0.0	0.00	0.56	53.6
All Vehicles		144	0.7	0.056	5.2	NA	0.1	0.5	0.05	0.55	53.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - Saturday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	11	0.0	0.009	5.8	LOS A	0.0	0.2	0.17	0.51	53.1
23	R2	5	0.0	0.009	5.9	LOS A	0.0	0.2	0.17	0.51	52.6
Approach		16	0.0	0.009	5.8	NA	0.0	0.2	0.17	0.51	52.9
East: Ridges Lane											
24	L2	4	0.0	0.008	6.0	LOS A	0.0	0.2	0.24	0.52	53.5
25	T1	6	0.0	0.008	4.7	LOS A	0.0	0.2	0.24	0.52	53.7
Approach		11	0.0	0.008	5.2	LOS A	0.0	0.2	0.24	0.52	53.6
West: Old Kurrajong Road											
31	T1	9	0.0	0.085	0.0	LOS A	0.0	0.0	0.00	0.57	55.3
32	R2	148	0.7	0.085	5.5	LOS A	0.0	0.0	0.00	0.57	53.4
Approach		158	0.7	0.085	5.1	NA	0.0	0.0	0.00	0.57	53.5
All Vehicles		184	0.6	0.085	5.2	NA	0.0	0.2	0.03	0.56	53.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - Saturday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	9	0.0	0.009	5.6	LOS A	0.0	0.2	0.12	0.53	53.3
23	R2	6	0.0	0.009	5.6	LOS A	0.0	0.2	0.12	0.53	52.8
Approach		16	0.0	0.009	5.6	NA	0.0	0.2	0.12	0.53	53.1
East: Ridges Lane											
24	L2	11	0.0	0.014	5.7	LOS A	0.1	0.4	0.14	0.52	53.7
25	T1	9	0.0	0.014	4.4	LOS A	0.1	0.4	0.14	0.52	53.9
Approach		20	0.0	0.014	5.1	LOS A	0.1	0.4	0.14	0.52	53.8
West: Old Kurrajong Road											
31	T1	8	0.0	0.036	0.0	LOS A	0.0	0.0	0.00	0.53	55.6
32	R2	58	1.8	0.036	5.5	LOS A	0.0	0.0	0.00	0.53	53.6
Approach		66	1.6	0.036	4.8	NA	0.0	0.0	0.00	0.53	53.9
All Vehicles		102	1.0	0.036	5.0	NA	0.1	0.4	0.05	0.53	53.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - Friday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	2	0.0	0.510	16.0	LOS B	0.4	2.7	0.04	0.01	58.0
5	T1	943	4.1	0.510	0.2	LOS A	0.4	2.7	0.04	0.01	59.6
6	R2	7	0.0	0.510	16.8	LOS B	0.4	2.7	0.04	0.01	57.4
Approach		953	4.1	0.510	0.4	NA	0.4	2.7	0.04	0.01	59.6
East: Old Kurrajong Rd											
7	L2	12	9.1	0.045	10.0	LOS A	0.1	1.0	0.75	0.86	46.4
8	T1	2	0.0	0.045	46.8	LOS D	0.1	1.0	0.75	0.86	47.1
Approach		14	7.7	0.045	15.7	LOS B	0.1	1.0	0.75	0.86	46.5
North: Kurrajong Rd											
10	L2	98	2.2	0.458	5.6	LOS A	0.0	0.0	0.00	0.07	57.5
11	T1	764	4.8	0.458	0.1	LOS A	0.0	0.0	0.00	0.07	59.2
12	R2	192	4.4	0.394	15.1	LOS B	1.8	13.1	0.81	1.00	46.9
Approach		1054	4.5	0.458	3.3	NA	1.8	13.1	0.15	0.24	56.4
West: Yarramundi Lane											
1	L2	457	2.8	0.251	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
2	T1	1	0.0	0.016	52.3	LOS D	0.0	0.3	0.95	0.98	32.0
Approach		458	2.8	0.251	5.8	LOS A	0.0	0.3	0.00	0.53	54.7
All Vehicles		2478	4.0	0.510	2.7	NA	1.8	13.1	0.08	0.21	57.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - Saturday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	20	0.0	0.406	13.0	LOS A	0.6	4.1	0.07	0.02	57.5
5	T1	725	2.6	0.406	0.5	LOS A	0.6	4.1	0.07	0.02	59.0
6	R2	7	0.0	0.406	19.3	LOS B	0.6	4.1	0.07	0.02	56.9
Approach		753	2.5	0.406	1.0	NA	0.6	4.1	0.07	0.02	59.0
East: Old Kurrajong Rd											
7	L2	5	0.0	0.506	43.2	LOS D	1.4	10.0	0.97	1.03	22.0
8	T1	9	0.0	0.506	80.5	LOS F	1.4	10.0	0.97	1.03	22.1
9	R2	11	0.0	0.506	154.1	LOS F	1.4	10.0	0.97	1.03	22.0
Approach		25	0.0	0.506	103.4	LOS F	1.4	10.0	0.97	1.03	22.0
North: Kurrajong Rd											
10	L2	91	1.2	0.535	5.6	LOS A	0.0	0.0	0.00	0.05	57.7
11	T1	936	2.0	0.535	0.1	LOS A	0.0	0.0	0.00	0.05	59.3
12	R2	279	0.0	0.371	11.0	LOS A	1.9	13.5	0.69	0.93	49.7
Approach		1305	1.5	0.535	2.8	NA	1.9	13.5	0.15	0.24	56.9
West: Yarramundi Lane											
1	L2	224	0.9	0.122	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
2	T1	1	0.0	0.017	55.3	LOS D	0.0	0.3	0.95	0.98	31.2
Approach		225	0.9	0.122	5.9	LOS A	0.0	0.3	0.00	0.53	54.7
All Vehicles		2308	1.8	0.535	3.6	NA	1.9	13.5	0.12	0.21	56.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - Saturday PM

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
South: Kurrajong Rd											
4	L2	7	14.3	0.470	9.9	LOS A	0.3	1.9	0.03	0.01	57.4
5	T1	875	2.8	0.470	0.1	LOS A	0.3	1.9	0.03	0.01	59.7
6	R2	7	0.0	0.470	11.9	LOS A	0.3	1.9	0.03	0.01	57.5
Approach		889	2.8	0.470	0.3	NA	0.3	1.9	0.03	0.01	59.7
East: Old Kurrajong Rd											
7	L2	9	0.0	0.094	8.2	LOS A	0.3	1.9	0.81	0.88	43.9
8	T1	11	0.0	0.094	31.7	LOS C	0.3	1.9	0.81	0.88	44.3
Approach		20	0.0	0.094	20.6	LOS B	0.3	1.9	0.81	0.88	44.1
North: Kurrajong Rd											
10	L2	57	1.9	0.357	5.6	LOS A	0.0	0.0	0.00	0.05	57.8
11	T1	623	2.9	0.357	0.0	LOS A	0.0	0.0	0.00	0.05	59.5
12	R2	185	0.0	0.315	12.4	LOS A	1.4	9.8	0.75	0.94	48.7
Approach		865	2.2	0.357	3.1	NA	1.4	9.8	0.16	0.24	56.7
West: Yarramundi Lane											
1	L2	216	3.4	0.119	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
2	T1	2	0.0	0.018	32.4	LOS C	0.1	0.4	0.91	0.96	38.7
Approach		218	3.4	0.119	5.9	LOS A	0.1	0.4	0.01	0.53	54.6
All Vehicles		1993	2.6	0.470	2.3	NA	1.4	9.8	0.09	0.18	57.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - Friday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	6	0.0	0.032	6.1	LOS A	0.1	1.0	0.29	0.55	52.8
23	R2	43	0.0	0.032	6.0	LOS A	0.1	1.0	0.29	0.55	52.3
Approach		49	0.0	0.032	6.0	NA	0.1	1.0	0.29	0.55	52.4
East: Ridges Lane											
24	L2	27	0.0	0.031	5.8	LOS A	0.1	0.8	0.20	0.54	53.4
25	T1	15	0.0	0.031	4.9	LOS A	0.1	0.8	0.20	0.54	53.6
Approach		42	0.0	0.031	5.5	LOS A	0.1	0.8	0.20	0.54	53.5
West: Old Kurrajong Road											
31	T1	89	0.0	0.098	0.0	LOS A	0.0	0.0	0.00	0.32	57.3
32	R2	96	1.1	0.098	5.5	LOS A	0.0	0.0	0.00	0.32	55.2
Approach		185	0.6	0.098	2.8	NA	0.0	0.0	0.00	0.32	56.2
All Vehicles		277	0.4	0.098	3.8	NA	0.1	1.0	0.08	0.39	55.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - Saturday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	11	0.0	0.059	6.6	LOS A	0.3	1.9	0.40	0.58	52.5
23	R2	71	3.0	0.059	6.6	LOS A	0.3	1.9	0.40	0.58	51.9
Approach		81	2.6	0.059	6.6	NA	0.3	1.9	0.40	0.58	52.0
East: Ridges Lane											
24	L2	18	5.9	0.055	6.1	LOS A	0.2	1.5	0.31	0.57	53.2
25	T1	41	2.6	0.055	5.5	LOS A	0.2	1.5	0.31	0.57	53.5
Approach		59	3.6	0.055	5.7	LOS A	0.2	1.5	0.31	0.57	53.4
West: Old Kurrajong Road											
31	T1	163	1.3	0.165	0.0	LOS A	0.0	0.0	0.00	0.29	57.5
32	R2	148	0.7	0.165	5.5	LOS A	0.0	0.0	0.00	0.29	55.4
Approach		312	1.0	0.165	2.6	NA	0.0	0.0	0.00	0.29	56.5
All Vehicles		452	1.6	0.165	3.7	NA	0.3	1.9	0.11	0.38	55.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Old Kurrajong Road/ Ridges Lane - Saturday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Kurrajong Road											
21	L2	9	0.0	0.013	5.7	LOS A	0.1	0.4	0.17	0.52	53.2
23	R2	13	8.3	0.013	5.8	LOS A	0.1	0.4	0.17	0.52	52.3
Approach		22	4.8	0.013	5.8	NA	0.1	0.4	0.17	0.52	52.6
East: Ridges Lane											
24	L2	208	1.0	0.250	5.8	LOS A	1.2	8.3	0.18	0.54	53.5
25	T1	141	1.5	0.250	4.6	LOS A	1.2	8.3	0.18	0.54	53.6
Approach		349	1.2	0.250	5.3	LOS A	1.2	8.3	0.18	0.54	53.5
West: Old Kurrajong Road											
31	T1	23	4.5	0.044	0.0	LOS A	0.0	0.0	0.00	0.43	56.3
32	R2	58	1.8	0.044	5.5	LOS A	0.0	0.0	0.00	0.43	54.3
Approach		81	2.6	0.044	3.9	NA	0.0	0.0	0.00	0.43	54.8
All Vehicles		453	1.6	0.250	5.1	NA	1.2	8.3	0.15	0.52	53.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Kurrajong Road/ Old Kurrajong Road - Friday PM

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
South: Kurrajong Rd											
4	L2	2	0.0	0.596	18.9	LOS B	2.9	20.9	0.26	0.04	55.7
5	T1	948	4.1	0.596	2.1	LOS A	2.9	20.9	0.26	0.04	57.1
6	R2	54	0.0	0.596	18.9	LOS B	2.9	20.9	0.26	0.04	55.1
Approach		1004	3.9	0.596	3.0	NA	2.9	20.9	0.26	0.04	57.0
East: Old Kurrajong Rd											
7	L2	19	5.6	0.060	9.9	LOS A	0.2	1.3	0.73	0.86	47.4
8	T1	2	0.0	0.060	53.9	LOS D	0.2	1.3	0.73	0.86	48.0
Approach		21	5.0	0.060	14.3	LOS A	0.2	1.3	0.73	0.86	47.5
North: Kurrajong Rd											
10	L2	133	1.6	0.476	5.6	LOS A	0.0	0.0	0.00	0.09	57.4
11	T1	764	4.8	0.476	0.1	LOS A	0.0	0.0	0.00	0.09	59.0
12	R2	192	4.4	0.399	15.3	LOS B	1.8	13.3	0.82	1.00	46.8
Approach		1088	4.4	0.476	3.4	NA	1.8	13.3	0.14	0.25	56.2
West: Yarramundi Lane											
1	L2	457	2.8	0.251	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
2	T1	1	0.0	0.019	63.4	LOS E	0.1	0.4	0.96	0.98	29.2
Approach		458	2.8	0.251	5.8	LOS A	0.1	0.4	0.00	0.53	54.7
All Vehicles		2572	3.9	0.596	3.8	NA	2.9	20.9	0.17	0.22	56.2

Level of Service (LOS) Method: Delay (RTA NSW).
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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: Kurrajong Road/ Old Kurrajong Road - Saturday AM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	20	0.0	0.654	25.4	LOS B	11.0	78.7	1.00	0.13	49.7
5	T1	725	2.6	0.654	8.5	LOS A	11.0	78.7	1.00	0.13	50.9
6	R2	96	2.2	0.654	26.0	LOS B	11.0	78.7	1.00	0.13	49.2
Approach		841	2.5	0.654	10.9	NA	11.0	78.7	1.00	0.13	50.7
East: Old Kurrajong Rd											
7	L2	25	4.2	1.288	379.4	LOS F	12.6	89.6	1.00	1.86	7.0
8	T1	9	0.0	1.288	436.1	LOS F	12.6	89.6	1.00	1.86	7.0
9	R2	25	0.0	1.288	549.7	LOS F	12.6	89.6	1.00	1.86	7.0
Approach		60	1.8	1.288	460.0	LOS F	12.6	89.6	1.00	1.86	7.0
North: Kurrajong Rd											
10	L2	156	0.7	0.570	5.6	LOS A	0.0	0.0	0.00	0.09	57.4
11	T1	936	2.0	0.570	0.1	LOS A	0.0	0.0	0.00	0.09	59.0
12	R2	279	0.0	0.371	11.0	LOS A	1.9	13.5	0.69	0.93	49.7
Approach		1371	1.5	0.570	3.0	NA	1.9	13.5	0.14	0.26	56.7
West: Yarramundi Lane											
1	L2	224	0.9	0.122	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
2	T1	1	0.0	0.024	77.5	LOS F	0.1	0.4	0.97	0.98	26.2
Approach		225	0.9	0.122	6.0	LOS A	0.1	0.4	0.00	0.53	54.6
All Vehicles		2497	1.8	1.288	16.9	NA	12.6	89.6	0.44	0.28	46.7

Level of Service (LOS) Method: Delay (RTA NSW).
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Kurrajong Road/ Old Kurrajong Road - Saturday PM

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kurrajong Rd											
4	L2	7	14.3	0.533	12.4	LOS A	0.7	4.7	0.06	0.01	57.1
5	T1	974	2.5	0.533	0.3	LOS A	0.7	4.7	0.06	0.01	59.4
6	R2	16	6.7	0.533	13.6	LOS A	0.7	4.7	0.06	0.01	56.8
Approach		997	2.6	0.533	0.6	NA	0.7	4.7	0.06	0.01	59.3
East: Old Kurrajong Rd											
7	L2	141	1.5	0.279	9.2	LOS A	1.1	7.6	0.65	0.88	49.1
8	T1	11	0.0	0.279	45.9	LOS D	1.1	7.6	0.65	0.88	49.6
Approach		152	1.4	0.279	11.7	LOS A	1.1	7.6	0.65	0.88	49.1
North: Kurrajong Rd											
10	L2	63	1.7	0.360	5.6	LOS A	0.0	0.0	0.00	0.05	57.7
11	T1	623	2.9	0.360	0.0	LOS A	0.0	0.0	0.00	0.05	59.4
12	R2	185	0.0	0.384	15.0	LOS B	1.7	12.1	0.82	0.99	47.1
Approach		872	2.2	0.384	3.6	NA	1.7	12.1	0.17	0.25	56.2
West: Yarramundi Lane											
1	L2	216	3.4	0.119	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
2	T1	2	0.0	0.024	41.7	LOS C	0.1	0.5	0.94	0.97	35.3
Approach		218	3.4	0.119	6.0	LOS A	0.1	0.5	0.01	0.53	54.5
All Vehicles		2238	2.4	0.533	3.1	NA	1.7	12.1	0.14	0.22	56.8

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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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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