Appendix I

Traffic Assessment

EMM
EMGA Mitchell McLennan

Traffic Assessment for Rezoning

Proposed Rezoning for the Goulburn Health Hub at 35 Ross Street, Bradfordville

Prepared for Cullingrai Pty Ltd | 10 December 2014

Planning + Environment + Acoustics

Traffic Assessment for Rezoning

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Traffic Assessment for Rezoning

Traffic Impact Assessment

Prepared for Cullingrai Pty Ltd | 10 December 2014

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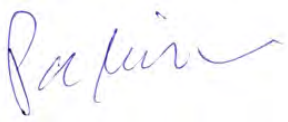
Signature		Signature	
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1 Introduction

1.1 Transport context of the proposal

EMGA Mitchell McLennan Pty Ltd (EMM) has prepared this traffic assessment for rezoning of the subject land to support a proposed health hub including private hospital, aged care, oncology, rehabilitation and medical research facilities. These facilities would operate in a campus style development alongside the recently approved 2,816 m^2 medical centre land uses (Stage 1 development) which will be built at the site.

The existing locality traffic volumes for Ross Street and Taralga Road are investigated and documented in this report and the potential intersection and locality traffic impacts of additional health land uses at the site, corresponding to the proposed rezoning are then assessed, in combination with the existing approved medical centre uses (not yet built) so their additional traffic also needs to be considered in the area in terms of an adjustment to the base locality transport conditions.

The former NSW RTA (now RMS) guidelines for traffic generating developments identify the following relevant peak periods for traffic generation for private hospitals and related facilities:

- A morning commuter peak period e.g. 8.00 am to 9.00 am, when the site traffic generation will be primarily staff and some patients arriving at the site.
- A mid afternoon peak period e.g. 3.00 pm to 4.00 pm, when the site traffic generation will be turnover from staff shift changeover activity with a combination of traffic arriving at and departing from the site during this period.
- A late afternoon or evening peak period e.g. 5.00 pm to 6.00 pm when the site traffic generation will be primarily staff departing from the site, together with some visitors arriving to visit patients at the hospital.

Generally for private hospitals and related medical land uses, the mid-afternoon peak period has more intensive traffic movements than the later afternoon/evening peak period and is adopted as the primary afternoon peak period for traffic impact assessment.

The general layout of likely developments at the site is depicted in the plans in Appendix A.

1.2 The scope of this report

The subject site is located approximately 3.5 kilometres (km) northeast of the centre of Goulburn which is a major regional city in south eastern NSW.

Taralga Road is a sealed urban road in the vicinity of Ross Street, aligned in an east west direction. The intersection of Ross Street/ Taralga Road will be the main road network access point for the development. The site access from Ross Street has three kerb crossings currently. Ross Street in this locality is a wide urban road and will not generally require additional left or right turning deceleration lanes for property access. The site also has an unformed road reserve (Brewer Street) which bisects the land.

This assessment of the proposal's traffic impacts has considered the following general matters which are outlined in the Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (RTA 2002):

- the site locality;
- the existing road network and intersections;
- the likely traffic generating and car parking characteristics of the proposal;
- likely traffic generating and car parking impacts of the proposal; and
- a summary of the identified impacts and required mitigation measures.

2 Existing traffic conditions

2.1 Road network in the locality

The major road network in the Goulburn area, excluding the Hume Highway which now bypasses Goulburn, is shown in Figure 2.1 while other local roads on the road network in the vicinity of Ross Street and Taralga Road in North Goulburn and Bradfordville are shown in Figure 2.2.

Taralga Road (MR 256) is a major road which provides the arterial route connection between Goulburn and Taralga. Within the Goulburn area the route connects via Tarlo Street, Chantry Street and Union Street to the Old Hume Highway route (now MR 676) through Goulburn which is via Auburn Street, Lagoon Street and Sydney Road.

Ross Street is a wide industrial road which has a straight and generally level alignment in the vicinity of the site and rises slightly towards its intersection with Taralga Road. There are no traffic signal controlled intersections in the localities of Bradfordville and North Goulburn, north of the Old Hume Highway access intersection at Union Street.

The vehicular access to major roads and all pedestrian crossing movements in the locality, for all residential, industrial and other access, occurs either at give way/ stop sign intersections or roundabouts.

2.2 Site access

The subject land has a frontage of approximately 150 metres (m) to Ross Street, with the major portion of this street frontage taken up by an approved (but not constructed) medical centre development. The remaining (southern) portion of the site frontage to Ross Street is occupied by the unformed road reserve for Brewer Street which runs east-west through the site.

The main site access traffic will generally utilise Brewer Street and its intersection with Ross Street (refer to the site plan in Appendix A), further details of which are provided in Section 3.1. An additional site access roadway is also potentially able to be constructed along the former easement of the Goulburn to Crookwell Railway Line which connects to Ross Street and runs along the northern site boundary.

All the site traffic which is using Ross Street will travel via the intersection with Taralga Road. The intersection sight distances along Taralga Road to the east and west, for traffic which is departing from the Ross Street (south) approach at the intersection, are illustrated by Photographs 2.1 and 2.2. The intersection is a four way intersection and some site traffic will also cross Taralga Road to travel via Ross Street north of the intersection, which then connects to Queen Street and other residential areas of North Goulburn and also to McDermott Drive, which provides an alternative access route to the Goulburn CBD.

2.3 Traffic volumes

The historic trend in daily traffic volumes for Taralga Road is shown by the RTA/RMS traffic surveys for traffic survey location 94.942 (Taralga Road north of Dalley Street), which is east of Ross Street. The following daily traffic volumes were recorded, which indicate relatively low annual growth between the two survey years:

- 2,731 vehicles per day in the year 2000, and
- 2,836 vehicles per day in the year 2003.

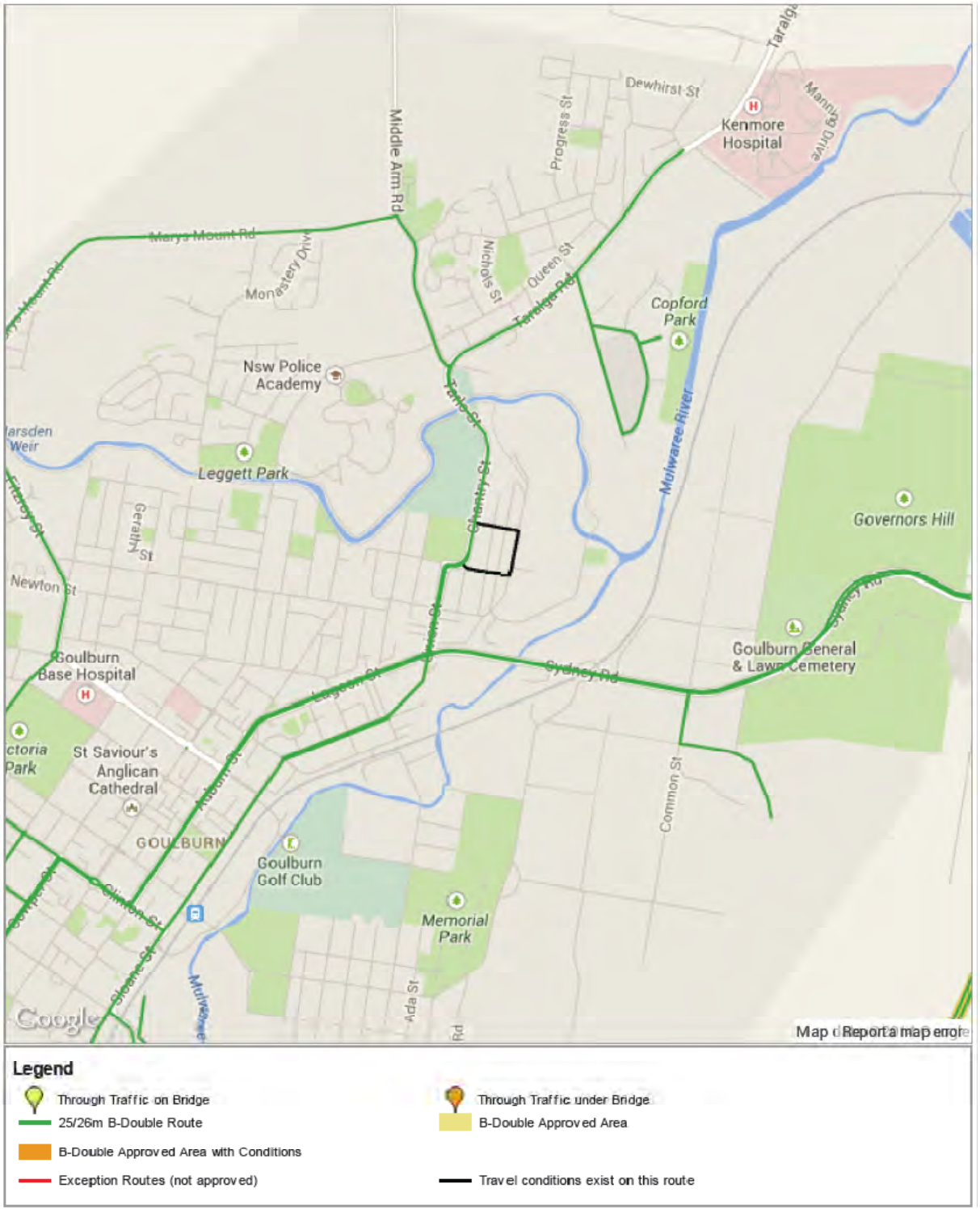


Figure 2.1 Regional road network at Goulburn

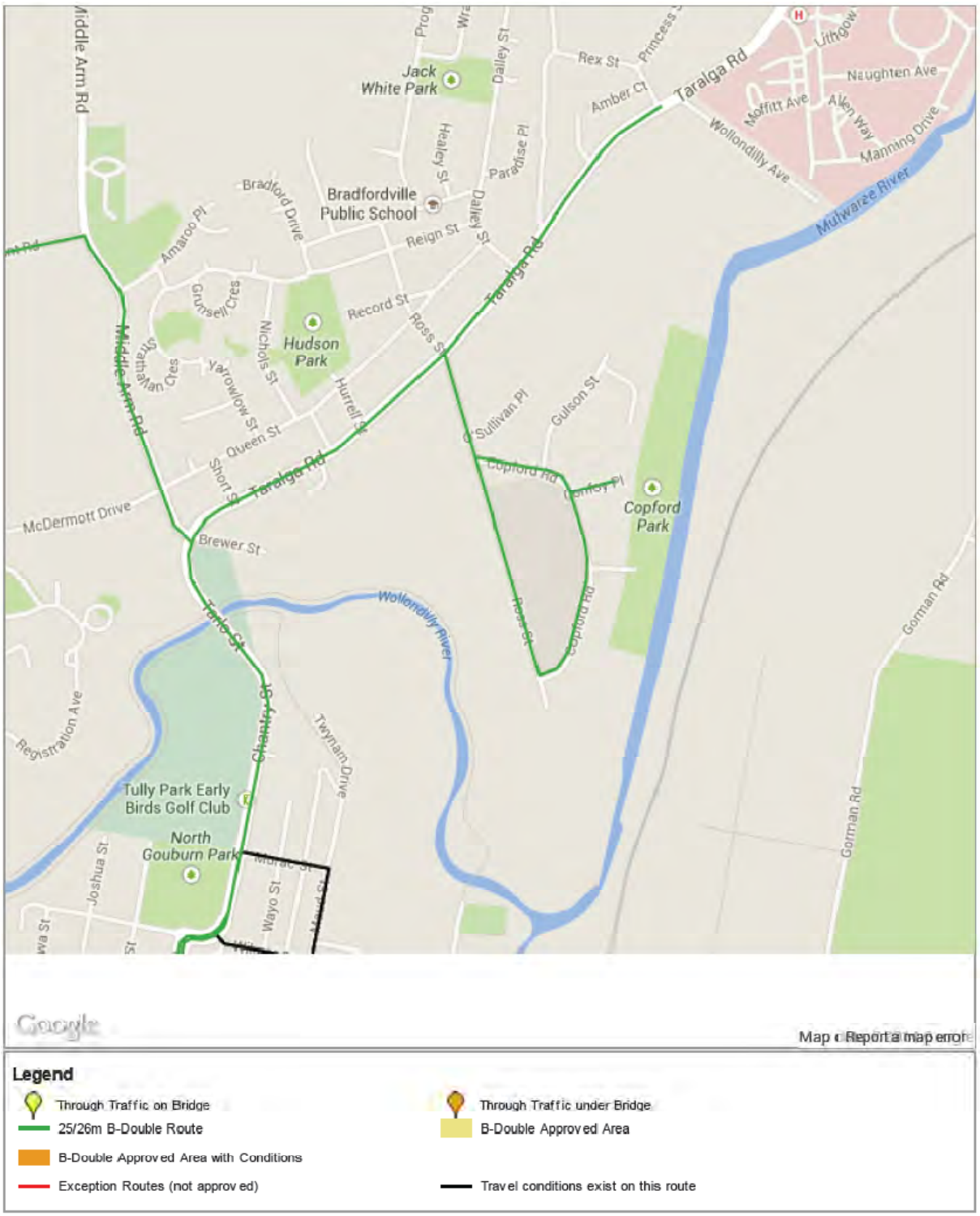


Figure 2.2 Local road network connecting to Ross Street and Taralga Road

A more recent intersection traffic survey was undertaken in October 2012, the results of which are included in Appendix B. The survey recorded the following peak hourly traffic volumes for Taralga Road:

- Taralga Road, east of Ross Street, morning peak hour = 275 vehicles;
- Taralga Road, east of Ross Street, afternoon peak hour = 293 vehicles;
- Taralga Road, west of Ross Street, morning peak hour = 398 vehicles; and
- Taralga Road, west of Ross Street, afternoon peak hour = 428 vehicles.

The peak hourly traffic volumes on most classes of road are normally within the range 8- 10 percent of the daily traffic volume. The peak hourly traffic volumes of 275 – 293 vehicles per hour, which were recorded on Taralga Road east of Ross Street in October 2012, correspond to a daily traffic volume of approximately 3,150 vehicles. This indicates there has been relatively minor traffic growth on Taralga Road in this locality since the last RTA/RMS survey in 2003. The following peak hourly traffic volumes were determined for Ross Street by the October 2012 intersection traffic survey:

- Ross Street, south of Taralga Road, morning peak hour = 160 vehicles;
- Ross Street, south of Taralga Road, afternoon peak hour = 180 vehicles;
- Ross Street, north of Taralga Road, morning peak hour = 127 vehicles; and
- Ross Street, north of Taralga Road, afternoon peak hour = 157 vehicles.

These hourly traffic volumes are consistent with the current light industrial and mixed use/collector road street environment of Ross Street for the two sections of the road on the northern and southern sides of Taralga Road.

Elsewhere within Goulburn, the historic RTA/RMS daily traffic volumes for the year 2003 indicate the following range of daily traffic volumes for other roads which are more heavily trafficked arterial and sub arterial type traffic routes:

- Old Hume Highway east of Taralga Road (Sydney Road) = 8,668 daily vehicles (axle pair count);
- Old Hume Highway south of Taralga Road (Auburn Street) = 13,807 daily vehicles (axle pair count); and
- McDermott Drive, at Wollondilly River Bridge = 9,964 daily vehicles (axle pair count).

2.4 Intersections

Taralga Road/Ross Street will be the main access intersection used by additional traffic travelling to and from the area of the proposed rezoning, after new buildings are constructed for the proposed land uses. The intersection, which is illustrated in Photographs 2.2 and 2.2 and by the road layout plan in Figure 2.3 is an unsignalised four way intersection, with one through traffic lane and one parking lane in each direction, although parking is restricted near the intersection to facilitate turning traffic movements on the major traffic route via Taralga Road.

The most common future route for the site traffic travelling to and from the Ross Street area will be to and from the centre of Goulburn where traffic will generally travel via the intersection of Union Street and the Old Hume Highway, where there are traffic signals currently, Figure 2.4.

Photograph 2.1 Intersection sight distance from Ross Street at Taralga Road looking west

Photograph 2.2 Intersection sight distance from Ross Street at Taralga Road looking east

Figure 2.3 Lane marking of the existing roads at the Ross Street and Taralga Road intersection

Figure 2.4 Lane marking of existing roads at the Old Hume Highway Union Street intersection

2.5 Ross Street

In the vicinity of the site, Ross Street is a wide industrial road, with kerb and gutter constructed on both sides. The road is straight and generally level, which provides good visibility for traffic turning to and from access driveways for adjoining development sites and the future road access easement for Brewer Street which will form the primary vehicular access for the land to be rezoned. The proposed location of Brewer Street is shown on the Site Plan (Appendix A). The typical sight distance visibility for turning traffic on Ross Street is illustrated by Photographs 2.3 and 2.4.

2.6 Traffic safety

Traffic safety conditions for the existing and future site traffic movements will primarily be determined by the intersection traffic safety at the Taralga Road/ Ross Street intersection and future site access intersections with Ross Street.

The intersection sight distance visibility in both directions on Taralga Road at Ross Street and at all locations along Ross Street, is generally at least 120 metres, as illustrated by the views in Photographs 2.1 to 2.4. This meets the recommended Austroads intersection sight distance safety requirements for the current posted speed limits for these roads which are all 60 km/hr.

Photograph 2.3 View along Ross Street opposite the site looking north

Photograph 2.4 View along Ross Street at the site frontage looking south

2.7 Pedestrian and cycle access

Current activity by pedestrians and cyclists to and from areas of Ross Street surrounding the site is minimal due to the primarily industrial nature of land uses. There are also no paved pedestrian footpaths on Ross Street within the industrial area.

The nearest paved pedestrian footpaths are on Taralga Road on the northern side and on Ross Street, north of the intersection with Taralga Road.

2.8 Public transport

Existing regular scheduled public transport services operate on routes 821A and 821B, within the general locality via the intersection of Taralga Road and Ross Street. These bus routes will provide public transport accessibility to and from the locality from a large proportion of the residential area of Goulburn, as shown by the bus routes map in Figure 2.5.

The former Goulburn to Crookwell Railway line corridor runs along the northern boundary of the site (Appendix A). The railway tracks have generally been removed from the easement, although the former railway bridge crossing the Wollondilly River remains in place, as shown in Photograph 2.5.

On 3 July 2014, the applicant applied to Country Rail Network/ John Holland Rail for a lease/ licence to utilise the section of the former railway corridor adjacent to the subject land for tree planting to provide a landscaped buffer zone between the site and residential land to the north.

Figure 2.5 Goulburn map of bus routes

Photograph 2.5 **View of the old railway bridge crossing the Wollondilly River**

3 Traffic and parking demands of the proposal

3.1 Site access and circulation

The proposed internal road layout of the site including future building locations is shown by the site plan in Appendix A. The future site layout will facilitate a campus style development for a private hospital and related facilities including, oncology, rehabilitation, residential aged care and medical research facilities. These facilities would operate in addition to the recently approved medical centre land uses which are to be built at the site along the Ross Street frontage.

The approved medical centre land uses will have a total building floor area of approximately 2,816 m^2 and will be provided with direct driveway access to Ross Street at a central location within the 180 m site frontage.

The future private hospital and related land use developments will generally occupy separate buildings, each of which will have its own access and parking arrangements, with individual driveway access to be provided from Brewer Street, within the site.

The primary internal site road (Brewer Street) will be a private road constructed with a carriageway approximately 6.5 m in width between kerbs. The road will be sealed, with kerb and gutter along both sides, allowing for the safe movement of two-way traffic, assuming no parked vehicles. This road width has been determined to meet AS 2890 Part 2 design guidelines for general access by cars and trucks.

Each internal site access driveway will also be sealed and appropriate in width to meet the relevant Council, RMS and AS 2890: Parts 1 and 2 design guidelines for access to the respective car parking and truck servicing areas which are to be served by the driveway.

For pedestrian safety and access to the site it will also generally be necessary to have a 1.25 m wide paved pedestrian footpath provided along the western side of Ross Street between the site and Taralga Road and along the northern side of Brewer Street, within the site.

3.2 Traffic generation

In terms of traffic generation, the potential traffic impacts of the proposal on the external road network will be directly proportional to the number of additional hospital patients, aged care residents, employees and visitors to the various future facilities at the site.

Additionally the future traffic which will be generated by the approved medical centre land uses at the site will also need to be considered by way of an adjustment to the current surveyed base (October 2012) intersection traffic conditions for the surrounding roads (Ross Street and Taralga Street) as this traffic was not included in the base intersection traffic surveys.

The 'external' traffic movements for the approved 2,816 m^2 medical centre development have been calculated by the previous traffic impact assessment addendum report (GTA, 25 February 2014) using the rates given for Land Use Traffic Generation in the RMS Guide to Traffic Generating Developments for medical centre land uses. These are:

- 10.4 peak hour vehicle trips per 100 m^2 GFA (morning peak hour), and
- 8.8 peak hour vehicle trips per 100 m^2 GFA (afternoon peak hour).

The 'external' traffic movements for the other potential land uses which would result from the proposed rezoning have also been calculated based on the typical rates given for the various comparable land uses in the RMS Guide to Traffic Generating Developments, as follows:

- For a potential private hospital with approximately 120 beds and 50 full time equivalent staff, the RMS standard traffic generation volumes would be calculated according to the following equations, which were determined from traffic generation surveys at 19 private hospitals in the Sydney Metropolitan region:

  - morning peak hour vehicle trips = 0.47(number of beds) + 0.06(number of staff) – 10.21; and

  - afternoon peak hour vehicle trips = 0.69 (number of beds) + 0.31(number of staff) – 14.69.

- For a potential aged and disabled persons residential care facility, with capacity for up to 200 residents, the RMS standard traffic generation volumes would be similar to other residential aged care facilities, namely:

  - morning peak hour vehicle trips = 0.15 per resident ; and

  - afternoon peak hour vehicle trips = 0.15 per resident.

- For a potential private hospital oncology facility with capacity for up to 60 patients and 25 full time equivalent staff, the RMS standard traffic generation volumes would also be calculated according to the private hospital traffic generation equations which are:

  - morning peak hour vehicle trips = 0.47(number of beds) + 0.06(number of staff) – 10.21; and

  - afternoon peak hour vehicle trips = 0.69 (number of beds) + 0.31(number of staff) – 14.69.

- For a potential private hospital rehabilitation care facility with capacity for up to 100 patients and 30 full time equivalent staff, , the RMS standard traffic generation volumes would also be calculated according to the private hospital traffic generation equations which are:

  - morning peak hour vehicle trips = 0.47(number of beds) + 0.06(number of staff) – 10.21; and

  - afternoon peak hour vehicle trips = 0.69 (number of beds) + 0.31(number of staff) – 14.69.

- For a potential medical research facility with a building floor area of up to 3,000 m^2 , the RMS standard traffic generation volumes would be similar to commercial office type development which would be calculated according to the following traffic generation rates: namely;

  - 2 peak hour vehicle trips per 100 m2 GFA (morning peak hour); and

  - 2 peak hour vehicle trips per 100 m2 GFA (afternoon peak hour).

The estimated total additional morning and afternoon peak hour traffic movements for the potential rezoned land developments, in comparison to the existing locality traffic, including the adjustments for the approved medical centre development on the portion of the site fronting Ross Street, are given in Table 3.1.

Table 3.1 Additional traffic volumes generated by potential rezoning developments

Traffic generation source	Development units	Morning peak hour traffic (vehicle trips)	Afternoon peak hour traffic (vehicle trips)
Approved medical centre development	**2,816 m^2**	**288**	**245**
Potential Private Hospital	120 beds + 50 staff	49	84
Aged Care Facility	200 residents	30	30
Potential Oncology Unit	60 patients + 25 staff	20	34
Potential Rehabilitation Unit	100 patients + 30 staff	39	64
Potential Medical Research Facility	3,000 m^2	60	60
Total additional generated traffic		**486**	**517**
Additional rezoning generated traffic (excluding medical centre)		**198**	**272**

The total future site activities would generate approximately 486 and 517 vehicle trips respectively during the main morning and afternoon peak hour traffic periods.

However, a significant proportion of the additional site traffic (approximately half) will be generated by the approved medical centre which will have the most intensive visitation and employee traffic generating activities. The additional vehicle traffic which is likely to be generated by the rezoning of the other site areas for a private hospital and related land uses would be approximately 188 vehicle trips during the morning and 272 vehicle trips during the afternoon peak hours.

The future rezoning site traffic impacts on external road network should be assessed at the main access intersection to the area (which is at Taralga Road/ Ross Street) for the additional private hospital and related traffic volumes, after adjustment to the existing surveyed intersection traffic volumes to account for the additional traffic generated by the now approved medical centre uses.

It is anticipated that the additional external traffic will have a slight bias travelling to and from the south and west via Taralga Road towards the centre of Goulburn (50 per cent) in comparison to other routes to and from the north via Ross Street (35 per cent) and via Taralga Road to and from the east (15 per cent). A similar future traffic distribution was assumed by GTA consultants in their assessment of the traffic impacts of the approved medical centre development GTA uses.

3.3 Traffic circulation and car parking

Employee and visitor car parking for each building within the land area to be rezoned, will generally be provided at ground level within landscaped car parking areas, priority will be given within each car parking area to the need for locating accessible car parking within close proximity to building and appropriate design for ambulance and other emergency vehicle and service vehicle access.

Boom-gates may be installed to control access to car parking areas, where this is appropriate, eg for staff car parking.

Parking for each individual building will generally be provided within the boundary of the lot unless there are benefits to be achieved from the potential provision of shared car parking areas for multiple buildings, eg where the likely times of peak car parking demand are different for different buildings. Bicycle parking, where required, should be provided within close proximity to, or actually within, the individual building where its users would be based.

In addition to the main site access road which will be provided via Brewer Street, additional minor access roads, where provided, will sufficient width to ensure that all vehicles can enter, circulate and depart from the car parking and service vehicle areas of individual buildings in a forward direction.

3.4 Public transport and other travel modes

The existing regular scheduled public transport services operating via the Bradfordville area of Goulburn (via routes 821A and 821B) are generally adequate to provide an adequate public transport connection to the locality of the site which is proposed to be rezoned.

There will be some benefit to the site from extending some or all of the bus services along either or both of the 821A and 821B bus routes (subject to negotiation with the bus operator) to also travel via the section of Ross Street, directly adjacent to the site, as this would reduce the necessary walking distance from the site to access public transport services and the types of proposed land uses at the site are compatible with generating demand for public transport services.

There are also other potential opportunities for additional walking and cycling connections to be provided between the site and other areas of Goulburn, potentially using sections of the disused rail corridor (Figure 2.5) and other walking routes adjacent to the Wollondilly River.

4 Impact assessment

4.1 Traffic volumes on surrounding roads

Current hourly traffic volumes, traffic generated by the approved medical centre development, and the traffic increases generated by site redevelopments following the proposed rezoning, are summarised in Table 4.1 for the four routes north, south, east and west of the Taralga Road and Ross Street intersection.

Table 4.1 Future summary of hourly traffic volumes and traffic increases

Traffic generation route	Existing traffic volume (October 2012)	Additional traffic from the approved development	Future adjusted base hourly traffic	Additional rezoning hourly traffic increase	Percentage traffic increase from rezoning
Ross Street south of Taralga Road (am peak)	160	288	448	198	44%
Ross Street south of Taralga Road (pm peak)	180	245	425	272	64%
Taralga Road west of Ross Street (am peak)	398	144	542	99	18%
Taralga Road west of Ross Street (pm peak)	428	123	551	136	25%
Ross Street north of Taralga Road (am peak)	127	101	228	69	30%
Ross Street north of Taralga Road (pm peak)	157	86	243	95	39%
Taralga Road east of Ross Street (am peak)	275	43	318	30	9%
Taralga Road east of Ross Street (am peak)	293	37	330	41	12%

The results in Table 4.1 show that the peak traffic increases from the proposed rezoning (and subsequent full development of buildings on the site for the range of proposed activities) will be most noticeable on Ross Street immediately north of the site, assuming all the future site traffic movements travel via this route and there will be approximate 44 per cent to 64 per cent increases in the morning and afternoon peak hour traffic volumes, corresponding to an approximate 54 per cent increase in the daily traffic volumes.

The current daily traffic volume using this section of Ross Street is approximately 1,900 vehicle movements daily. This traffic volume will increase to approximately 4,900 vehicle movements daily following the completion of the approved medical centre development. After full development of the land following the proposed rezoning, the future daily traffic volume will further increase to approximately 7,500 vehicle movements daily. However, as the road serves a generally industrial area, there will be no significant future amenity impacts to adjoining properties from this traffic increase.

Elsewhere on the locality road network, where the future site traffic will be distributed onto various other traffic routes (Taralga Road to the west, Ross Street to the north and Taralga Road to the east), there will be:

- approximately 18 to 25 per cent peak hourly traffic increases. corresponding to an approximate 22 per cent daily traffic increase, on Taralga Road to the west;
- approximately 30 to 39 per cent peak hourly traffic increases. corresponding to an approximate 35 per cent daily traffic increase, on Ross Street to the north; and

- approximately 9 to 12 per cent peak hourly traffic increases, corresponding to an approximate 11 per cent daily traffic increase, on Taralga Road to the east.

On Taralga Road, the future daily traffic volumes will increase to approximately 6,700 vehicle movements daily west of Ross Street and 3,600 vehicles daily east of Ross Street. However, as Taralga Road is currently a classified main road and is a major traffic route through the Goulburn area, these future daily traffic volumes should be acceptable on this route and would not generally require widening or other traffic management measures to accommodate the increased traffic usage.

On Ross Street to the north of Taralga Road, which is a local road, the future daily traffic volume would increase to approximately 3,200 vehicle movements daily. Although this section of Ross Street is a local road, the adjoining land uses are generally non-residential so this future daily traffic volume should also not generate any future amenity impacts for adjacent land uses.

Elsewhere within the Goulburn urban area, the future site rezoning traffic increases would travel via a number of other traffic routes, which are primarily main roads, connecting to other parts of Goulburn. The relevant proportions of the future site traffic travelling via routes such as the Old Hume Highway (Lagoon Street, Auburn Street and Sydney Road) and McDermott Drive, where there are significant daily traffic volumes currently (volumes in the range 9,000 to 14,000 vehicle movements daily were recorded by RMS traffic surveys on these routes in 2003) would typically generate peak hour and daily traffic increases of less than ten percent on these routes. These traffic increases would not generally be noticeable or affect intersection traffic capacity on these routes.

4.2 Traffic impacts at intersections

The primary intersection which would be affected by the future rezoning generated traffic increases would be the intersection of Taralga Road and Ross Street, which would be used by all the site traffic effectively as it travels towards other traffic routes via Taralga Road or Ross Street, to the west, north and east.

By the time the future site traffic reaches other intersections on the major road network such as the Old Hume Highway intersection at Union Street (where traffic signals are already provided) the future proportional traffic impacts of the site generated traffic increases would not be significant (peak hour or daily traffic increases of less than ten per cent typically) and detailed analysis of potential intersection traffic impacts at these locations would not generally be required.

The existing intersection of Taralga Road and Ross Street has acceptable levels of visibility and safety for turning traffic, as illustrated by Photographs 2.1 and 2.2. The intersection lane marking is also shown in Figure 2.3. The intersection operations are currently affected by kerbside parking which can restrict the length of the kerbside lane which is available to be used by traffic to a minimum of 10 metres typically on the eastern and western (Taralga Road) approaches and 15 metres typically on the northern and southern (Ross Street) approaches to the intersection. The current intersection kerb side parking restrictions could potentially be reviewed in the future to provide additional intersection capacity and to improve the traffic safety. However no changes to the current kerbside parking restrictions are assumed in the peak hour intersection traffic assessment which has been undertaken for this report.

The SIDRA intersection traffic assessment which has been undertaken considers the effective kerbside lane length typically restricted by parking and the combined volumes of through, left and right turning traffic on the Taralga Road and Ross Street approaches to the intersection during the morning and afternoon peak traffic periods on a typical weekday. The modelled intersection layout is also shown in Appendix C. The intersection traffic operations are primarily reported in terms of the RMS level of service (LoS) limits and their corresponding average vehicle delay (AVD) in seconds (s). These intersection operating standards are summarised in Table 4.2.

The detailed SIDRA program results are included in Appendix C and are summarised in Table 4.3. The intersection modelling results also include the intersection degree of saturation (DOS) which is a measure of the traffic flow volume for each intersection approach, in comparison to the capacity of the intersection to accommodate this traffic under the calculated optimum traffic signal phasing and cycle time which is also determined by the SIDRA analysis program.

Table 4.2 Intersection Level of Service standards

LoS	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
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. Roundabouts require other control mode	At capacity; requires other control mode
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: Guide to Traffic Generating Developments, RTA 2002.

The existing and future intersection SIDRA analysis results are shown in Table 4.3 for the existing intersection operations, the intersection operations with the additional approved medical centre traffic movements (288 additional morning and 245 afternoon peak hourly vehicle movements) and the future site rezoning generated traffic in addition (a further 198 additional morning and 272 additional afternoon peak hourly vehicle movements).

Table 4.3 Existing and Future SIDRA results for Taralga Road and Ross Street intersection

Peak hour	Traffic Day	LOS	DOS	AVD* (seconds)	Maximum traffic queue length (m)	Maximum traffic queue direction
(8.00–9.00 am)	Existing Conditions (2012 Base Traffic)	A	0.118	12.6	4	(Taralga Road east)
	With the Approved Medical Centre traffic	B	0.301	15.8	10	(Ross Street north)
	With the Approved Medical Centre traffic and proposed Rezoning	B	0.478	20.5	20	(Ross Street north)
(3.30–4.30 pm)	Existing Conditions (2012 Base Traffic)	A	0.111	12.8	4	(Ross Street south)
	With the Approved Medical Centre traffic	A	0.248	13.8	8	(Ross Street north)
	With the Approved Medical Centre traffic and proposed Rezoning	B	0.488	18.0	23	(Ross Street south)

*Notes: * The average vehicle delay for the intersection is the highest value for all traffic movements at the intersection.*

The SIDRA analysis results in Table 4.3 show generally minimal changes in the intersection performance at the times considered, in terms of the intersection levels of service, which generally remain at either A or B (which corresponds to good traffic conditions) in all scenarios. The intersection degrees of saturation and maximum traffic queue lengths do increase noticeably in the full rezoning development traffic scenarios in Table 4.3. However as the predicted future maximum traffic queues generally occur on the northern and the southern (Ross Street) approaches to the intersection, these traffic queues would not generally affect the intersection traffic movements on the two major road (Taralga Road) approaches to the intersection.

4.3 Requirement for road improvements

The routes which are likely to be used by additional traffic from the proposed rezoning developments (apart from Ross Street) are generally classified main roads or other major traffic routes through the Goulburn urban area.

The range of predicted future daily traffic volumes for these routes would generally be acceptable and would not generate any requirements for road widening or other traffic management measures to accommodate the increased traffic usage.

At the intersection of Taralga Road and Ross Street, the intersection traffic capacity effects of the proposal have been assessed and found to generate only minor traffic changes (the peak hour intersection level of service would change from A to B) which would not generally require intersection improvements.

The intersection sight distance along Taralga Road to the west is potentially constrained by the elevation of the road to a distance of approximately 120 m which is adequate for 60 km/hr traffic operation.

The proposal will not create any additional need for either road widening or overtaking lanes on either Taralga Road or Ross Street. At the future intersection with Ross Street and Brewer Street, which will be the primary site vehicular access, additional intersection turning lanes can be created by restricting the kerbside parking on the Ross Street approaches to the intersection.

4.4 Site car parking requirements

Employee and visitor car parking for each building within the rezoned land should be provided in accordance with the standard development car parking rates which are specified for land uses in the Goulburn Mulwaree Council DCP 2009. Where no car parking rate is specified, alternative standard car parking provision rates from the RMS Guide and other Councils in the region would also be considered.

The car parking for each building should preferably be provided at ground level within landscaped car parking areas. Accessible car parking should also be provided in accordance the Goulburn Mulwaree Council DCP 2009. These spaces should be located within close proximity to buildings. Boom-gates may also be installed to control access to car parking areas, where this is appropriate, eg for staff car parking.

Bicycle parking, where required, should be provided within close proximity to, or actually within, the individual building where its users would be based.

4.5 Access for public transport, pedestrians and cyclists

The nature of the proposed hospital, residential aged care and related land uses at the site are compatible with generating some demand for future access by walking, cycling and public transport services. These requirements have therefore been considered in this traffic (and transport) assessment for the site.

The existing regular scheduled public transport services operating via the Bradfordville area of Goulburn (via routes 821A and 821B) are generally adequate to provide the primary public transport connection to the locality of the site which is proposed to be rezoned. However, subject to negotiation with the bus operator, some or all of the bus services along these routes should be extended to also travel via the section of Ross Street which is directly adjacent to the site, as this would reduce the necessary walking distances for any persons travelling by public transport to and from the site.

Also, for persons living within the local area, in residential areas which are up to 1 kilometre from the site, it will generally be necessary to provide a 1.25 m wide paved pedestrian footpath provided along the western side of Ross Street between the site and Taralga Road and also along the northern side of the future roadway, Brewer Street, within the site.

5 Summary and conclusions

The traffic and transport impacts from the proposal have been assessed and the key findings are as follows:

- The existing daily traffic volumes using the surrounding roads in the North Goulburn area, including Ross Street, Taralga Road, McDermott Drive and the Old Hume Highway route via Sydney Road, Lagoon Street and Auburn Street have been quantified for this report from RTA/RMS and other traffic surveys. The roads considered are all currently operating well within their general peak hourly and daily traffic capacity thresholds and have relatively free flowing traffic conditions as a result.

- Additional traffic generated by the proposal in the vicinity of the Taralga Road and Ross Street intersection, which will be the primary site access route, will be 198 additional morning and 272 additional afternoon peak hourly vehicle movements. The future intersection operations have been assessed for the proposal with this additional traffic and also with the additional traffic movements from the approved medical centre (288 additional morning and 245 afternoon peak hourly vehicle movements)

- The additional site traffic from both these future land uses which will be distributed approximately 50 per cent via Taralga Road to and from the west, 35 per cent via Ross Street and other routes to and from the north and 15 per cent via Taralga Road to and from the east.

- The future site traffic from the rezoning developments (after adjustment to the base traffic conditions to accommodate the approved medical centre traffic) will generate the following approximate daily traffic increases on various other traffic routes in the immediate locality, an approximate 22 per cent daily traffic increase, on Taralga Road to the west, an approximate 35 per cent daily traffic increase, on Ross Street to the north, and an approximate 11 per cent daily traffic increase, on Taralga Road to the east. These traffic increases are considered to be acceptable in the locality due to the current major road classification, or non residential nature of the traffic routes affected.

- Elsewhere on other traffic routes such as the Old Hume Highway intersection at Union Street (where traffic signals are already provided) the future site generated traffic increases would not be significant (peak hour or daily traffic increases of less than ten per cent typically) and detailed analysis of potential intersection traffic impacts at these locations would not generally be required.

- The existing intersection safety of the Taralga Road and Ross Street intersection, including sight distances, has been reviewed and is considered to be acceptable. The intersection safety would not be adversely affected by additional traffic generated from the proposed rezoning or approved medical centre land uses. No change to car parking in the vicinity of the intersection are assumed for the proposal.

- SIDRA intersection analysis shows generally minimal changes in the intersection levels of service at the times considered, which generally remain at either LoS A or B (which corresponds to good traffic conditions) in all scenarios. The intersection degrees of saturation and maximum traffic queue lengths do increase noticeably in the full rezoning development traffic scenarios. However the future intersection degree of saturation still remains below 0.500 in all the scenarios and the predicted future maximum traffic queues generally occur on the northern and the southern (Ross Street) approaches to the intersection and would not generally affect the traffic movements on the two major road (Taralga Road) approaches to the intersection.

- Employee and visitor car parking (including disabled car parking) and bicycle parking will be provided for each building within the rezoned land in accordance with the standard development car parking rates which are specified for land uses in the Goulburn Mulwaree Council DCP 2009. Where no car parking rate is specified, alternative standard car parking provision rates from the RMS Guide and other Councils in the region should also be considered.

- The existing regular scheduled public transport services operating via the Bradfordville area of Goulburn (via routes 821A and 821B) provide the primary public transport connection to the locality of the site. Subject to negotiation with the bus operator, some or all of the bus services along these routes should be extended to also travel via the section of Ross Street adjacent to the site, as this would reduce walking distances for persons travelling by public transport to and from the site.

- Pedestrian access will generally be feasible to and from the site for persons living in nearby residential areas of North Goulburn and it will generally be necessary to provide a 1.25 m wide paved pedestrian footpath for this access along the western side of Ross Street between the site and Taralga Road and also within the site along the northern side of the future roadway, Brewer Street.

- Brewer Street will be constructed as a private road to meet the design requirements of AS 2890 Part 2, which require a minimum 6.5 m wide roadway for general access including both car and heavy vehicle traffic. This design width assuming no car parking will be permitted along the roadway of Brewer Street and all site car parking will be provided in specific car parking areas for each building when buildings are constructed.

- The roadway of Ross Street will have sufficient width to permit safe cycling access for adults, to and from the locality, so separate paved paths for cycling access should not be required on Ross Street.

Appendix A

Plans of the proposed development

Site location

Proposed Rezoning for the Goulburn Health Hub at 35 Ross Street
Planning proposal
Figure 1.3

Appendix B

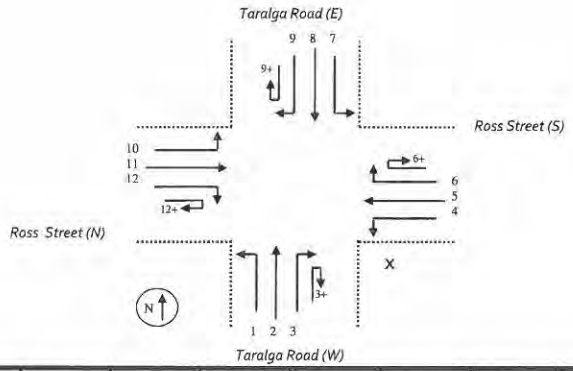
Intersection Traffic Survey

GTAconsultants

Client ID: 109235
Job Name: 35 Ross St, Goulburn, Medical Centre
Supervisor: o
Phone No.: o

Surveyor's Name: Michelle Hughes
Date: 23 October 2012
Weather: Fine & Dry

- STAND WHERE 'X' MARK IS.
COUNT HIGHLIGHTED MOVEMENTS.
DO NOT RESET THE CLICKERS.
RECORD TOTAL NO. EVERY 15MIN .



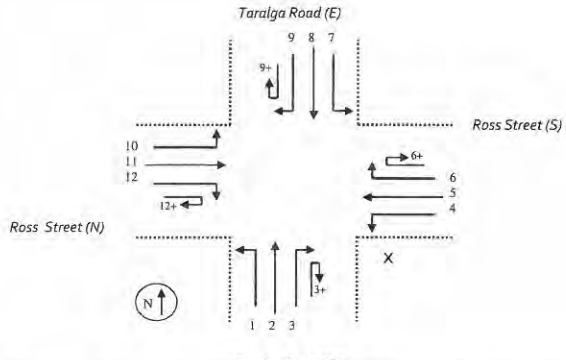
Direction of Traffic												
Movement No	1	2	3	4	5	6	7	8	9	10	11	12
Turn Destination												
Time Interval												
8:00 - 8:15	4	16	12	11	2	1	2	22	4	4	8	5
8:15 - 8:30	6	25	9	15	6	1	5	43	4	1	6	5
8:30 - 8:45	2	16	10	11	5		1	48	4	2	7	12
8:45 - 9:00	14	21	14	20	4	1	4	45	4	1	5	12
Total	**26**	**78**	**45**	**57**	**17**	**3**	**12**	**158**	**16**	**8**	**26**	**34**

GTAconsultants

Client ID: 109235
Job Name: 35 Ross St, Goulburn, Medical Centre
Supervisor: o
Phone No.: o

Surveyor's Name: Michelle Hughes
Date: 23 October 2012
Weather: Fine & Dry

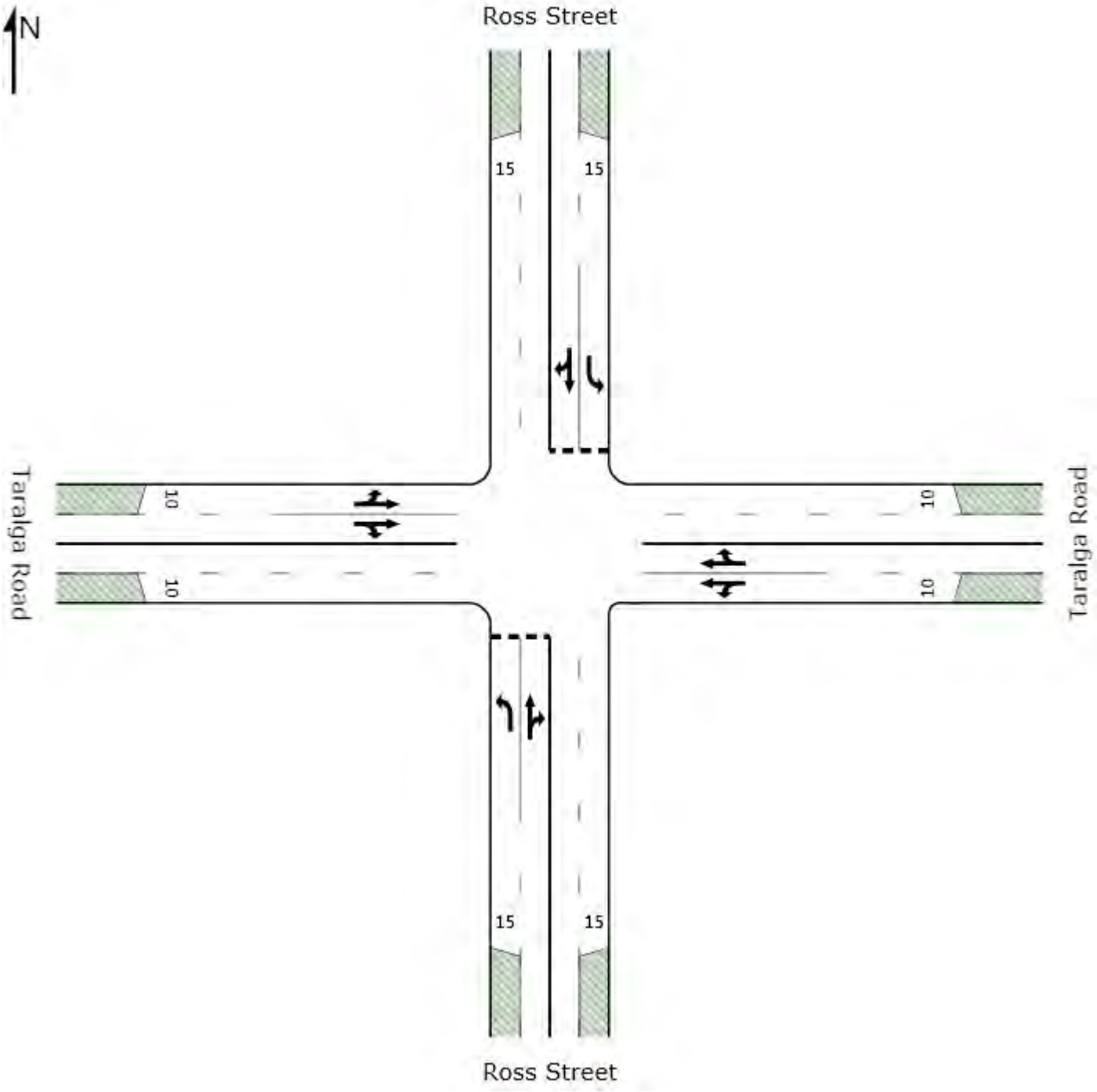
- STAND WHERE 'X' MARK IS.
COUNT HIGHLIGHTED MOVEMENTS.
DO NOT RESET THE CLICKERS.
RECORD TOTAL NO. EVERY 15MIN .



Direction of Traffic												
Movement No	1	2	3	4	5	6	7	8	9	10	11	12
Turn Destination												
Time Interval												
15:30 - 15:45	14	25	11	19	7	1	1	33	1	4	10	3
15:45 - 16:00	8	30	11	14	5	3	0	32	5	5	6	3
16:00 - 16:15	17	31	11	17	9	0	1	31	3	5	5	3
16:15 - 16:30	15	31	11	16	10	3	3	37	3	5	6	5
Total	**54**	**117**	**44**	**66**	**31**	**7**	**5**	**133**	**12**	**19**	**27**	**14**

Appendix C

SIDRA intersection analysis results


N
Ross Street
15
15
Taralga Road
10
10
10
10
Taralga Road
15
15
Ross Street

MOVEMENT SUMMARY

Site: Taralga Road and Ross Street AM Existing

Four Way intersection Give Way Control
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Ross Street											
1	L	60	10.0	0.097	9.5	LOS A	0.2	1.8	0.29	0.64	47.7
2	T	18	10.0	0.037	10.9	LOS A	0.1	1.1	0.49	0.66	46.4
3	R	3	10.0	0.037	12.2	LOS A	0.1	1.1	0.49	0.75	45.6
Approach		81	10.0	0.097	9.9	LOS A	0.2	1.8	0.34	0.65	47.3
East: Taralga Road											
4	L	13	5.0	0.018	8.4	LOS A	0.0	0.0	0.00	0.88	49.0
5	T	166	5.0	0.090	0.4	LOS A	0.5	3.8	0.21	0.00	55.9
6	R	17	5.0	0.090	8.8	LOS A	0.5	3.8	0.24	0.89	49.0
Approach		196	5.0	0.090	1.6	NA	0.5	3.8	0.20	0.13	54.7
North: Ross Street											
7	L	8	5.0	0.012	8.8	LOS A	0.0	0.2	0.19	0.61	48.1
8	T	27	5.0	0.118	11.4	LOS A	0.5	3.4	0.52	0.70	45.6
9	R	36	5.0	0.118	12.6	LOS A	0.5	3.4	0.52	0.81	44.8
Approach		72	5.0	0.118	11.7	LOS A	0.5	3.4	0.48	0.74	45.5
West: Taralga Road											
10	L	27	5.0	0.016	8.4	LOS A	0.0	0.0	0.00	0.69	49.0
11	T	82	5.0	0.082	0.7	LOS A	0.4	3.2	0.29	0.00	54.0
12	R	47	5.0	0.082	9.1	LOS A	0.4	3.2	0.30	0.78	48.6
Approach		157	5.0	0.082	4.6	NA	0.4	3.2	0.24	0.36	51.3
All Vehicles		505	5.8	0.118	5.3	NA	0.5	3.8	0.28	0.37	50.9

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 used.

MOVEMENT SUMMARY

Site: Taralga Road and Ross Street AM With Medical Centre and Rezoning

Four Way intersection Give Way Control
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Ross Street											
1	L	137	5.0	0.209	9.4	LOS A	0.5	4.0	0.32	0.66	47.5
2	T	72	5.0	0.247	15.6	LOS B	1.0	7.5	0.66	0.87	42.0
3	R	26	5.0	0.247	16.9	LOS B	1.0	7.5	0.66	0.92	41.4
Approach		235	5.0	0.247	12.2	LOS A	1.0	7.5	0.46	0.76	45.0
East: Taralga Road											
4	L	66	5.0	0.037	8.4	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	166	5.0	0.101	0.4	LOS A	0.6	4.4	0.24	0.00	55.3
6	R	17	5.0	0.101	8.8	LOS A	0.6	4.4	0.24	0.90	49.0
Approach		249	5.0	0.101	3.1	NA	0.6	4.4	0.18	0.24	53.0
North: Ross Street											
7	L	8	5.0	0.012	8.8	LOS A	0.0	0.2	0.19	0.61	48.1
8	T	154	5.0	0.478	19.2	LOS B	2.8	20.2	0.74	1.01	39.2
9	R	36	5.0	0.478	20.5	LOS B	2.8	20.2	0.74	1.03	38.8
Approach		198	5.0	0.478	19.0	LOS B	2.8	20.2	0.71	1.00	39.5
West: Taralga Road											
10	L	27	5.0	0.043	8.4	LOS A	0.0	0.0	0.00	0.89	49.0
11	T	82	5.0	0.213	0.4	LOS A	1.0	7.4	0.14	0.00	56.6
12	R	226	5.0	0.213	9.5	LOS A	1.0	7.4	0.37	0.69	47.5
Approach		336	5.0	0.213	7.2	NA	1.0	7.4	0.28	0.54	49.6
All Vehicles		1018	5.0	0.478	9.6	NA	2.8	20.2	0.38	0.60	46.9

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 used.

MOVEMENT SUMMARY

Site: Taralga Road and Ross Street AM With Medical Centre

Four Way intersection Give Way Control
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Ross Street											
1	L	105	5.0	0.160	9.3	LOS A	0.4	2.9	0.31	0.65	47.6
2	T	49	5.0	0.140	12.9	LOS A	0.6	4.0	0.59	0.79	44.3
3	R	17	5.0	0.140	14.2	LOS A	0.6	4.0	0.59	0.88	43.6
Approach		172	5.0	0.160	10.8	LOS A	0.6	4.0	0.41	0.71	46.2
East: Taralga Road											
4	L	44	5.0	0.025	8.4	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	166	5.0	0.101	0.4	LOS A	0.6	4.4	0.24	0.00	55.3
6	R	17	5.0	0.101	8.8	LOS A	0.6	4.4	0.24	0.90	49.0
Approach		227	5.0	0.101	2.6	NA	0.6	4.4	0.20	0.20	53.5
North: Ross Street											
7	L	8	5.0	0.012	8.8	LOS A	0.0	0.2	0.19	0.61	48.1
8	T	102	5.0	0.301	14.5	LOS B	1.4	10.3	0.64	0.88	42.9
9	R	36	5.0	0.301	15.8	LOS B	1.4	10.3	0.64	0.93	42.2
Approach		146	5.0	0.301	14.5	LOS B	1.4	10.3	0.61	0.88	43.0
West: Taralga Road											
10	L	27	5.0	0.032	8.4	LOS A	0.0	0.0	0.00	0.84	49.0
11	T	82	5.0	0.158	0.6	LOS A	0.8	5.6	0.21	0.00	55.0
12	R	154	5.0	0.158	9.3	LOS A	0.8	5.6	0.34	0.70	47.9
Approach		263	5.0	0.158	6.5	NA	0.8	5.6	0.26	0.50	50.0
All Vehicles		808	5.0	0.301	7.8	NA	1.4	10.3	0.34	0.53	48.6

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 used.

MOVEMENT SUMMARY

Site: Taralga Road and Ross Street PM Existing

Four Way intersection Give Way Control
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Ross Street											
1	L	69	10.0	0.111	9.3	LOS A	0.3	2.0	0.26	0.64	47.8
2	T	33	10.0	0.075	11.5	LOS A	0.3	2.2	0.52	0.71	45.8
3	R	7	10.0	0.075	12.8	LOS A	0.3	2.2	0.52	0.79	45.0
Approach		109	10.0	0.111	10.2	LOS A	0.3	2.2	0.36	0.67	47.0
East: Taralga Road											
4	L	5	5.0	0.015	8.4	LOS A	0.0	0.0	0.00	0.97	49.0
5	T	140	5.0	0.073	0.6	LOS A	0.4	3.2	0.27	0.00	54.9
6	R	13	5.0	0.073	9.1	LOS A	0.4	3.2	0.32	0.88	49.0
Approach		158	5.0	0.073	1.6	NA	0.4	3.2	0.26	0.10	54.2
North: Ross Street											
7	L	20	5.0	0.030	9.0	LOS A	0.1	0.5	0.25	0.62	47.8
8	T	28	5.0	0.079	11.3	LOS A	0.3	2.2	0.52	0.69	45.8
9	R	15	5.0	0.079	12.5	LOS A	0.3	2.2	0.52	0.81	45.0
Approach		63	5.0	0.079	10.9	LOS A	0.3	2.2	0.43	0.70	46.2
West: Taralga Road											
10	L	57	5.0	0.032	8.4	LOS A	0.0	0.0	0.00	0.67	49.0
11	T	123	5.0	0.102	0.6	LOS A	0.6	4.2	0.28	0.00	54.4
12	R	46	5.0	0.102	9.0	LOS A	0.6	4.2	0.28	0.82	48.7
Approach		226	5.0	0.102	4.3	NA	0.6	4.2	0.21	0.33	51.7
All Vehicles		557	6.0	0.111	5.4	NA	0.6	4.2	0.28	0.38	50.7

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 used.

MOVEMENT SUMMARY

Site: Taralga Road and Ross Street PM With Medical Centre and Rezoning

Four Way intersection Give Way Control
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Ross Street											
1	L	260	5.0	0.387	9.3	LOS A	1.1	8.1	0.31	0.66	47.6
2	T	166	5.0	0.488	16.8	LOS B	3.1	22.8	0.70	1.00	41.0
3	R	64	5.0	0.488	18.0	LOS B	3.1	22.8	0.70	1.03	40.5
Approach		491	5.0	0.488	13.0	LOS A	3.1	22.8	0.49	0.82	44.2
East: Taralga Road											
4	L	31	5.0	0.017	8.4	LOS A	0.0	0.0	0.00	0.67	49.0
5	T	140	5.0	0.085	0.7	LOS A	0.5	3.8	0.32	0.00	54.0
6	R	13	5.0	0.085	9.1	LOS A	0.5	3.8	0.32	0.89	49.0
Approach		183	5.0	0.085	2.6	NA	0.5	3.8	0.27	0.17	52.8
North: Ross Street											
7	L	20	5.0	0.030	9.0	LOS A	0.1	0.5	0.25	0.62	47.8
8	T	85	5.0	0.232	14.3	LOS A	0.9	6.9	0.63	0.83	43.1
9	R	15	5.0	0.232	15.6	LOS B	0.9	6.9	0.63	0.90	42.4
Approach		120	5.0	0.232	13.6	LOS A	0.9	6.9	0.56	0.81	43.7
West: Taralga Road											
10	L	57	5.0	0.034	8.4	LOS A	0.0	0.0	0.00	0.68	49.0
11	T	123	5.0	0.168	0.8	LOS A	0.9	6.7	0.30	0.00	53.5
12	R	128	5.0	0.168	9.2	LOS A	0.9	6.7	0.31	0.75	48.3
Approach		308	5.0	0.168	5.7	NA	0.9	6.7	0.25	0.44	50.4
All Vehicles		1102	5.0	0.488	9.3	NA	3.1	22.8	0.40	0.60	47.0

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 used.

MOVEMENT SUMMARY

Site: Taralga Road and Ross Street PM With Medical Centre

Four Way intersection Give Way Control
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow 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: Ross Street											
1	L	160	5.0	0.238	9.2	LOS A	0.6	4.5	0.28	0.65	47.7
2	T	96	5.0	0.248	12.4	LOS A	1.1	7.8	0.59	0.81	44.7
3	R	34	5.0	0.248	13.7	LOS A	1.1	7.8	0.59	0.88	44.0
Approach		289	5.0	0.248	10.8	LOS A	1.1	7.8	0.42	0.73	46.2
East: Taralga Road											
4	L	18	5.0	0.016	8.4	LOS A	0.0	0.0	0.00	0.78	49.0
5	T	140	5.0	0.079	0.7	LOS A	0.5	3.5	0.29	0.00	54.5
6	R	13	5.0	0.079	9.1	LOS A	0.5	3.5	0.32	0.89	49.0
Approach		171	5.0	0.079	2.1	NA	0.5	3.5	0.26	0.15	53.4
North: Ross Street											
7	L	20	5.0	0.030	9.0	LOS A	0.1	0.5	0.25	0.62	47.8
8	T	56	5.0	0.144	12.6	LOS A	0.6	4.2	0.57	0.76	44.6
9	R	15	5.0	0.144	13.8	LOS A	0.6	4.2	0.57	0.88	43.9
Approach		91	5.0	0.144	12.0	LOS A	0.6	4.2	0.50	0.75	45.2
West: Taralga Road											
10	L	57	5.0	0.032	8.4	LOS A	0.0	0.0	0.00	0.67	49.0
11	T	123	5.0	0.134	0.7	LOS A	0.7	5.4	0.29	0.00	53.9
12	R	85	5.0	0.134	9.1	LOS A	0.7	5.4	0.29	0.77	48.5
Approach		265	5.0	0.134	5.0	NA	0.7	5.4	0.23	0.39	51.0
All Vehicles		816	5.0	0.248	7.2	NA	1.1	7.8	0.33	0.50	49.0

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 used.

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