

Macksville Hospital

Health Infrastructure

Traffic Impact Assessment

May 2018



# Macksville Hospital

## Traffic Impact Assessment

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## 1. Introduction

### 1.1 Background

Seca Solution Pty Ltd has been commissioned by NSW Health Infrastructure to prepare a traffic, access and parking assessment for the proposed development of Macksville Hospital on a greenfield site north of the Nambucca River adjacent to the Pacific Highway.

The project will enhance patient care while also improving ambulatory care and outpatient treatments including improved facilities in emergency, community health, operating theatres, maternity and inpatient units.

Roadworks associated with the development will include a new access road to the site from the old Pacific Highway (now Giinagay Way), Old Coast Road and Letitia Close, an at-grade carpark, ambulance parking, bus stop and access for servicing and deliveries. The new access road however is the subject of a separate DA and does not form part of this SSDA.

As part of the project, Seca Solution has reviewed traffic conditions at the key locations and have observed the traffic operations in the locality of the site.

### 1.2 Scope of Report

The scope of this report is to review the external traffic movements associated with the proposed development and to review the parking demands. The report provides advice on access issues and green travel opportunities.

### 1.3 Issues and Objectives of the study

The issues relative to the proposal are:

- Assess impact on the local road network due to the additional traffic flows;
- Assess the impact of the additional parking generated by the proposed development;
- Review the access arrangements for the development;
- Review the service arrangement for the development; and
- Assess any other transport impacts associated with the development.

The objective of the report is to document the impacts of the proposed development and provide advice on any infrastructure work required as part of the development.

### 1.4 Planning Context

In preparing this document, the following guides and publications were used:

- RTA Guide to Traffic Generating Developments, Version 2.2 Dated October 2002;
- RMS TDT 2013/04 "Update Traffic surveys August 2013".
- Nambucca Shire Council Development Control Plan
- Australian / New Zealand Standard – Parking Facilities Part 1: off-street car parking (AS2890.1:2004);

## 1.5 Authority Requirements

| MACKSVILLE HOSPITAL DEVELOPMENT - SEARS ANALYSIS                                                                                                                                                                                      |                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Transport for NSW                                                                                                                                                                                                                     | SECA Report 29 March 2018                     |
| Accurate details of the current daily and peak hour vehicle, public transport, pedestrian and cycle movement and existing traffic and transport facilities provided on the road network located adjacent to the proposed development. | Section 2.4 Existing traffic Conditions       |
| An assessment of the operation of existing and future transport networks including the bus network and their ability to accommodate the forecast number of trips to and from the development.                                         | Section 2.5.6 Current Road Network Operation: |
| Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips.                                                                                    | Section 4.1 Traffic generation:               |
| The adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development.                                                                                    | Section 4.5 Public Transport                  |
| The impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site and identify measures to integrate the development with the transport network.                          | Section 4.5 Public Transport                  |
| Details of any upgrading or road improvement works required to accommodate the proposed development.                                                                                                                                  | Section 2.4 Existing traffic Conditions       |
| Details of travel demand management measures to encourage sustainable travel choices and details of programs for implementation                                                                                                       | Section 5 Sustainable Travel Opportunities    |

|                                                                                                                                                                                                                                                                                                |                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| The impact of trips generated by the development on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvement works, if required.                                 | Section 4.4 Impact on daily Traffic Flows:                                                     |
| The proposed active transport access arrangements and connections to public transport services.                                                                                                                                                                                                | Section 4.5 Public Transport                                                                   |
| The proposed access arrangements, including car and bus pick-up/drop-off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones. | Section 3.2 Access                                                                             |
| Measures to maintain road and personal safety in line with Crime Prevention through Environmental Design principles.                                                                                                                                                                           | Section 4.3 Impact on Road Safety                                                              |
| The proposed car and bicycle parking provision, including end-of-trip facilities, which must be taken into consideration of the availability of public transport and the requirements of Council's relevant parking codes and Australian Standards.                                            | Section 5 Sustainable Travel Opportunities                                                     |
| Proposed bicycle parking facilities in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance.                                                                                                                                             | Section 3.4 Pedestrian and Cyclist Facilities                                                  |
| Details of the proposed number of car parking spaces and compliance with appropriate parking codes and justify the level of car parking provided on-site.                                                                                                                                      | Section 3.4 Parking                                                                            |
| Details of emergency vehicle access arrangements.                                                                                                                                                                                                                                              | Section 3.1.2 Selection of appropriate design vehicles for access and circulation requirements |
| An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures.                                                                                                                                                             | Section 4.3 Impact on Road Safety                                                              |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times).                                                                                                                                                                                                                                                                                                                                                                                        | Section 3.3.4 Service Area Layout         |
| <b>In relation to construction traffic:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                           |
| Assessment of cumulative impacts associated with other construction activities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Section 6. Construction Activities        |
| An assessment of road safety at key intersections and locations subject to heavy vehicle construction traffic movements and high pedestrian activity.                                                                                                                                                                                                                                                                                                                                                                                                         | Section 6.3.2 Existing traffic conditions |
| Details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process.                                                                                                                                                                                                                                                                                                                                                                                 | Section 6.1.2 Timing                      |
| Details of anticipated peak hour and daily construction vehicle movements to and from the site.                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Section 6.2 Traffic Management Assessment |
| Details of access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle.                                                                                                                                                                                                                                                                                                                                                                                                                   | Section 6.2 Traffic Management Assessment |
| Details of temporary cycling and pedestrian access during construction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Section 6.3.3 Pedestrians and Cyclists    |
| Details of proposed construction vehicle access arrangements at all stages of construction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Section 6.2 Traffic Management Assessment |
| Traffic and transport impacts during construction, including cumulative impacts associated with other construction activities, and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact (which must include vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures for all demolition/construction activities). | Section 6.2 Traffic Management Assessment |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                           |
| <b>Roads and Maritime Services</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |
| The total impact of existing and proposed development on the surrounding road network with consideration for a 10 year horizon.                                                                                                                                                                                                                                                                                                                                                                                                                               | Section 4.4 Impact of Generated Traffic   |

|                                                                                                                               |                                                      |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| The volume and distribution of peak hourly trips generated by the proposed development.                                       | 4.1 Traffic generation:                              |
| Intersection analysis of peak hourly impacts on nearby intersections, particularly Old Coast Road / Letitia Close roundabout. | Section 4.4 Impact of Generated Traffic              |
| Concept plans of all proposed improvements to frontage roads and affected intersections.                                      | Appendix A Site Plan                                 |
| Any proposed changes to vehicular access, car parking and servicing arrangements.                                             | As above                                             |
| Any proposed improvements to external connectivity for active and public transport modes.                                     | Section 4.5 Public Transport                         |
| Measures to address the impact of project construction on the surrounding road network.                                       | Section 5.3.4 General Traffic Control Considerations |

## 2. Existing Situation

### 2.1 Site Description and Proposed Activity

The subject site for the development of Macksville Hospital is a greenfield site located 3km north of the township of Macksville on the northern side of the Nambucca River. It is located to the east of the Pacific Highway adjacent to the southbound exit ramp proposed for the Pacific Highway upgrade. An access road to the southern end of the site is proposed to be constructed to provide access to the site from the old Pacific Highway (now Giinagay Way), Old Coast Road and Letitia Close.

### 2.2 Site Location

The location of the new Hospital site is shown below in Figure 2-1.



Figure 2-1 - Site Location (Source: Google maps)

#### 2.2.1 Zoning and Adjacent Land Use

The site for the hospital redevelopment is currently vacant land under the ownership of Roads and Maritime Services and was used for the storage of materials and equipment during the construction of the Pacific Highway.

### 2.3 Site Access

A new access road will be constructed to the southern end of the site from the intersection of Old Coast Road and Letitia Close. The access road will be designed and constructed in accordance with the requirements of the Nambucca DCP and shall be the subject of a separate development application.

### 2.4 Existing Traffic Conditions

#### 2.4.1 Road Hierarchy

##### 2.4.1.1 Pacific Highway

The main arterial road through the Macksville area is the Pacific Highway which was opened to traffic in December 2017, replacing the Pacific Highway between Warrell Creek and Nambucca Heads. It is part of the Federal road

network under the care and control of Roads and Maritime Services (RMS) and forms the western boundary of the site.

RMS has recently completed construction of north facing ramps at North Macksville adjacent to the subject site. These ramps include a northbound on-ramp onto the highway, a southbound off-ramp from the highway and a median cross-over facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel both north and south on the highway. The ramps were not part of the original proposed upgrade and so have been assessed subsequently.

The provision of the north facing ramps also included realignment of Old Coast Road to pass over the highway with the northbound on-ramp commencing from the realigned Old Coast Road. Letitia Close, Old Coast Road and the southbound off-ramp been combined as a roundabout east of the highway, allowing the alignment of the bridge over the highway to be straightened. West of the highway the access onto the northbound on-ramp has priority over traffic from Old Coast Road central. (See Figure 2-2 below).

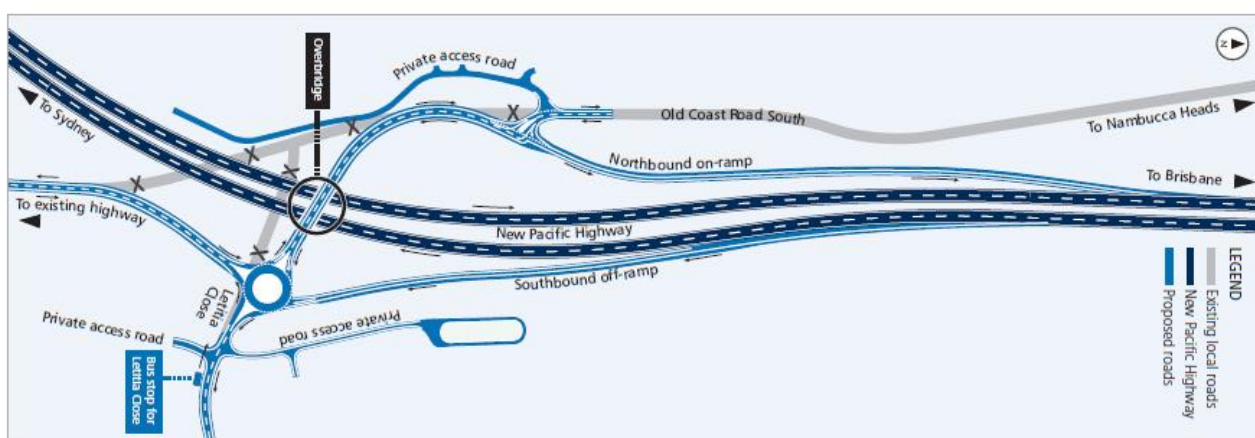


Figure 2-2 Macksville North Facing Ramps and highway upgrade

The existing channelised intersection where Old Coast Road connects to the previous Pacific Highway (Giinagay Way) has been retained in its current form. With the lower volume of traffic on the existing highway the existing layout with right and left turn lanes off the highway will meet capacity requirements.

#### 2.4.1.2 Old Coast Road

Old Coast Road provides a north/south connection between Macksville and Nambucca Heads. At its southern end, where it connects with Giinagay Way, it provides a sealed surface with a width of 5.5-7 metres. The intersection of Old Coast Road and Giinagay Way is well laid out with a sheltered right turn lane for traffic turning in off Giinagay Way and a deceleration lane for left turns in. A sheltered right turn acceleration lane is also provided for vehicles turning right out of Old Coast Road.

As discussed above, the proposal for the north facing ramps includes realignment of the Old Coast Road to pass over the highway with the northbound on-ramp commencing from the realigned Old Coast Road.





*Photo 1 - Old Coast Road looking west along the previous Pacific Highway, now Giinagay Way*



*Photo 2 - Looking east along the previous Pacific Highway (Giinagay Way)*

#### 2.4.1.3 Letitia Close

Letitia Close is a narrow residential road ending in cul-de-sac that provides access to a small number (13) of large lots associated with a residential subdivision. This road carries very low traffic flows associated with these dwellings.

### 2.5 Roadworks and Traffic Management Plans

Following completion of the north facing ramps discussed above there are no further roadworks planned in this area.

### 2.6 Pedestrian and Cycling Facilities

Pedestrian activity is limited in this area as it is sparsely populated with the only concentration of rural residential properties being in Letitia Close. The only existing generator of pedestrian activity are the bus services that run along Giinagay Way past the Old Coast Road intersection (see section 2.7 Public Transport).

Currently, Letitia Close and Old Coast Road do not provide any separated pedestrian or cyclist facilities, however, the proposed realignment of Old Coast Road will include widened shoulders that will provide a safer travel environment for pedestrians and cyclists.

Cyclists are catered for by sealed shoulders along both sides of the Pacific Highway, however, these become non-existent where the highway crosses over Newee Creek creating pinch points at this location.

### 2.7 Traffic Flows

#### 2.7.1 Peak Hour Flows

The site is a greenfield site formerly owned and used by Roads and Maritime Services for the storage of materials and equipment during the construction of the Pacific Highway. Traffic volumes and characteristics have altered significantly following the opening of this section of the highway in December 2017. Consequently, no discussion regarding the road network prior to the opening of the highway has been included in this report.

#### 2.7.2 Daily Traffic Flows

Prior to the opening of the Macksville section of the new roadway the Pacific Highway was carrying approximately 10,000 vehicles per day based on RMS traffic volume data south of Macksville. Following the opening of this section of the highway in December 2017 traffic volumes have reduced significantly, however, data on the current traffic volumes on the Pacific Highway is not yet available.

#### 2.7.3 Heavy Vehicle Flows

RMS traffic volume data indicates that heavy vehicles account for around 28% of total vehicle volumes on the Pacific Highway, consistent with its role as a state freight route. The vast majority of heavy vehicles will now travel on the new Highway significantly reducing the volume of heavy vehicles on Giinagay Way through Macksville.

### 2.8 Current Road Network Operation

The current road network operation is as outlined above in section 2.4.1.1.

### 2.9 Traffic Safety and Accident History

The Pacific Highway will now carry the majority of traffic travelling through the Macksville area which will significantly improve the safety of the local road network, particularly as the volume of heavy vehicles on Giinagay Way will be greatly reduced.

### 2.10 Parking Supply and Demand

The greenfield site for the hospital development was formerly owned and utilised by RMS for construction purposes. Consequently, there is no relevant data available on parking supply and demand.

Observations on site indicate that there is no demand for parking within the vicinity of the site with all land holdings large enough to contain parking for residents and visitors.

## 2.11 Public Transport

### 2.11.1 Rail Station Locations

Macksville railway station is located 3.6km from the intersection of Old Coast Road and Letitia Close, a 7 minute drive via the old Pacific Highway.

### 2.11.2 Bus Routes and Associated Facilities

Regular bus services are provided by Busways along the following routes in the Macksville area:

- 356 – Macksville to Scotts Head and Grassy Head;
- 357R – Macksville to Bowraville via Rodeo Drive;
- 357W – Macksville to Bowraville via Wilson Drive;
- 358 – Macksville to Bellingen via Nambucca Heads and Urunga;
- 360M – Macksville to Coffs Harbour via Nambucca Heads and Urunga.

These routes are shown in Figure 2-3 below.

Routes 358 and 360M both travel along the old Pacific Highway (Giinagay Way) past the Old Coast Road intersection.

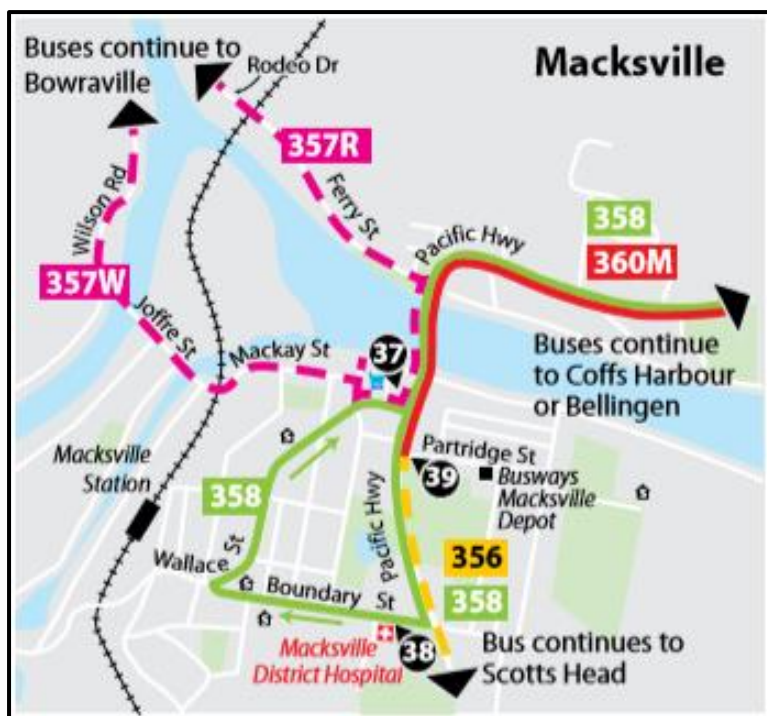


Figure 2-3 Bus routes in the Macksville area.

There are further community transport services provided for people in need. The Health Transport Unit based at Port Macquarie Health Campus provides non-emergency health related transport (NEHRT) for disadvantaged members of the community who need to attend medical appointments at Mid North Coast and Northern New South Wales Local Health facilities. The Health Transport Unit (HTU) provides transport assistance for eligible clients that meet NEHRT criteria, which includes no access to private vehicle use and inability to use public transport.



### 2.11.3 Rail and Bus Service Frequencies

Busways services along Giinagay Way run at varying intervals throughout the day Monday to Friday from 6:25am to 6:35pm. These services also run on Saturdays with less frequency but there are no services on Sundays or public holidays.

Busways route 358:

- Monday to Friday: 7 daily services from Macksville to Bellingen and return between 7.50am and 5.00pm.
- Saturday: 1 morning and 1 afternoon service in each direction.

Busways route 360M:

- Monday to Friday: 6 daily services from Macksville to Coffs Harbour between 7:31am and 5:10pm, with 5 return services entering the hospital site between 10:07am and 4:07pm.
- Saturday: 1 morning and 1 afternoon service in each direction

Macksville Railway Station is part of the North Coast Line which provides services from Sydney to Brisbane, through a number of regional areas. There are 3 daily services through Macksville in each direction.

### 2.12 Pedestrian Network

Currently, Letitia Close and Old Coast Road do not provide any separated pedestrian or cyclist facilities, however, the proposed realignment of Old Coast Road will include widened shoulders that will provide a safer travel environment for pedestrians and cyclists.

### 2.13 Other Proposed Developments

Macksville has been identified as a future growth area in the Mid North Coast Regional Strategy prepared by the Department of Planning in 2009 to guide land use planning in the region over a 25 year period. The Regional Strategy identifies proposed urban release areas and employment lands along Upper Warrell Creek Road near Taylors Arm Road south west of Macksville.

Being located south of Macksville the traffic generated by these future residential and industrial developments will not impact on the safety and efficiency of the road network near the Hospital site.



### 3. Proposed Development

#### 3.1 The Development

The Project represents a further capital investment in health infrastructure for the Mid North Coast Local Health District (MNCLHD) and for regional health services.

The Project will deliver increased service capacity and contemporary models of care to meet the changing and unique health care needs of the community. The scope of the project includes: IPU, Community Health Centre, Emergency Department, Maternity, Perioperative suite, Back of House and Administration/Education and will provide:

- An additional 14 bed inpatient unit that will accommodate both acute and sub-acute patients as required;
- An operating theatre and procedure room with increase in day surgery and recovery spaces;
- A new Emergency Department with additional capacity to provide Primary Health clinic, fast track options and a proposed gazetted mental health service;
- A new Hospital in The Home (HiTH) service;
- A new 6 chair Procedure Room that will include the addition of infusion services; and
- A maternity and birthing unit.

Bed numbers, ancillary services and staff numbers as provided by the study team are as follows:

| Departments              | Bed Numbers                                      |
|--------------------------|--------------------------------------------------|
| IPU (acute and subacute) | 42                                               |
| Maternity                | 6 (including 2 x birthing suites)                |
| Emergency                | 10                                               |
| Operating theatres       | 2 (1 x operating theatre and 1 x procedure room) |
| Recovery beds / bays     | 18                                               |
| Total                    | 76                                               |

Schedule of Accommodation: 6866 sqm.

Indicative Staffing Levels: 180 FTE by 2026/27.

##### 3.1.1 Phasing and Timing

Indicative timeframes for the construction of the new hospital building are that it will be due for completion in 2021.

#### 3.2 Selection of appropriate design vehicles for access and circulation requirements

Roadworks associated with the development will include a new access road from the Old Coast Road / Letitia Close intersection to the southern end of the site, an at-grade parking area, emergency drop-off area, ambulance parking, bus and pedestrian facilities and a loading dock / waste collection area. The new access, parking and servicing arrangements will need to accommodate vehicles up to the size of a 12.5 metre single unit truck and a 12.5 metre bus, a 10.8 metre waste collection vehicle as well as bariatric ambulance and standard light vehicles.

The circulation through the site for each of these vehicles has been assessed against AS/NZS 2890.1:2004 and Autoturn simulations have been completed to ensure that vehicles can safely and appropriately travel through the site, access their destinations and exit in a forward direction as per AS2890 and Council requirements.

#### 3.3 Access

##### 3.3.1 Access Location

A new access road will be constructed from the Old Coast Road / Letitia Close intersection to the southern end of the site. It should be noted that the construction of the access road will be the subject of a separate development

application to Nambucca Shire Council. It will not form part of the State Significant Development Application for the construction of Macksville Hospital and associated facilities.

### 3.3.2 Service Vehicle Access

Service vehicles will enter the site along the new access road, travel past the car park to the loading dock / servicing area that will be located on the northern side of the Hospital.

### 3.3.3 Queuing at entrances

It is expected that there will not be any queuing at the entrance to the site due to the low traffic volumes expected on the local road network.

### 3.3.4 Current access compared with proposed access

As described above a new access road will be constructed to the site. As the Hospital is being developed on a greenfield site there is no existing access.

### 3.3.5 Access to Public Transport

A bus stop will be incorporated in the site adjacent to the at-grade carpark.

## 3.4 Circulation

### 3.4.1 Pattern of circulation

All vehicles will enter and exit the site in a forward direction from the south via the new access road. All internal traffic facilities (carpark, bus stop, emergency drop-off, ambulance drop-off and parking and servicing facilities) will be designed to enable vehicles to enter, circulate and exit in a forward direction.

### 3.4.2 Internal Road width

The new access road will provide two 3.5 metre wide travel lanes and 1 metre wide shoulders to ensure sufficient capacity for traffic entering and exiting the site.

### 3.4.3 Internal Bus Movements

Buses will enter the site from the south via the new access road, enter the new bus stop facility that will be provided adjacent to the carpark, circulate past the emergency drop-off area and return to the access road to exit the site.

### 3.4.4 Service Area Layout

The service area on the northern side of the Hospital has been designed to allow a 12.5 metre single unit truck to enter the area in a forward direction, reverse into the loading dock and exit in a forward direction.

## 3.5 Parking

### 3.5.1 Proposed Supply

The development is proposing to provide a parking area on the western side of the hospital with a total of 150 spaces that includes 1 dedicated "Police" space and 6 accessible spaces. The parking area will be located at the western side of the Hospital adjacent to the main entrance.

### 3.5.2 Parking provision per State Government policy

The RMS Guide provides a rate for parking at Private Hospitals but not for public hospitals.

Peak parking accumulation (PPA)

$$PPA = -26.52 + 1.18 * (\text{no. beds})$$

### 3.5.3 Council code and local parking policies and plans

The parking requirements for hospitals based on the Nambucca DCP is 1 parking space per 4 employees, 1 emergency vehicle bay and 1 per 5 beds (visitor parking).

### 3.5.4 Parking Layout

The site layout will allow for the safe parking of vehicles within the site. The internal parking spaces have been designed in accordance with AS/NZS 2890.1:2004 and the internal circulating aisles allow for two-way movements with a minimum width of 5.5 metres.

Dimensions used for parking are those required under AS/NZS 2890.1:2004. For 90° angle parking the following dimensions are required for a Class 3 facility - visitors and short stay attendees, e.g. doctors:

- 2.6 x 5.4 metre parking spaces;
- 5.8 metre parking aisle widths;
- 5.5 metre circulation roadways;
- Blind aisles (dead end aisles) must extend 1 metre past the last parking space.

Employee parking within the site, if designed separately and nominated as such, should be designed as a Class 1 user category (generally all-day parking) with the following dimensions:

- 2.4 x 5.4 metre parking spaces;
- 6.2 metre parking aisle widths;
- 5.5 metre circulation roadways;
- Blind aisles (dead end aisles) must extend 1 metre past the last parking space

Accessible parking spaces:

- 2.4 x 5.4 metre space with a 2.4 x 5.4 metre shared space.

### 3.5.5 Projected demand

The Project shall require parking to accommodate the future demand.

Applying the DCP rate to the future scenario sees a requirement for 62 car spaces (based on 80 beds and 180 staff).

According to the RTA Guide to Traffic Generating Developments the peak parking accumulation (PPA) at a private hospital may be estimated by:

$$PPA = -19.56 + 0.85 B + 0.27 ASDS$$

For a hospital with 80 beds and 180 staff the parking requirement is:  $-19.56 + (0.85 \times 80) + (0.27 \times 180)$   
= 98 spaces.

Thus, the number of parking spaces required to satisfy the parking demand for the Hospital is 62 to 98 spaces. This has been based on the FTE staffing numbers provided which may be higher than the average number of staff per weekday day shift (ASDS). Once the ASDS can be determined and the parking refined, given the relatively remote location for the site the higher end of the range would be considered appropriate.

The parking requirement of 4 spaces per 100 m<sup>2</sup> gross floor area has been adopted for the Community Health Centre which results in 29 spaces (727m<sup>2</sup> /100 x 4).

The total parking requirement for the site, adopting the higher end of the range, is therefore 98 + 29 = 127 spaces.

Of these 4% (5 spaces) are to be suitable for people with disabilities in accordance with AS/NZS 2890.6.

The proposed parking supply of 150 spaces, including 6 accessible spaces, is in excess of the parking spaces required for this development.

### 3.5.6 Service Vehicle Parking

The largest service vehicle will be a 12.5 metre single unit truck associated with deliveries to the Hospital. The proposed loading dock on the northern side of the Hospital has been designed to accommodate this size of vehicle.

### 3.6 Pedestrian and Bicycle Facilities

Due to the isolated location of the site it is expected that all visitors to the site will either arrive by private vehicles, taxis or buses. Consequently, no dedicated pedestrian facilities will be required from the external road network to the Hospital. Internally, a pedestrian pathway will be provided between the carpark and bus stop to the main entrance of the Hospital that will help to ensure that pedestrian movements can be safely managed and controlled.

The new access road to be constructed to the site includes sealed shoulders that could provide for cyclists travelling to the site. In addition, the upgrade proposed for Old Coast Road includes widened shoulders for cyclists.

The Nambucca DCP specifies bicycle parking requirements for a range of development categories, however, these do not include a requirement for hospitals. The DCP does include an “Other” category with the requirement for an individual assessment at time of Development Application. As a guide, the DCP requirements for bicycle parking range from 5% to 20% of total car spaces. On this basis, the provision of bicycle parking at the hospital could be within the range 8 to 30 spaces.

## 4. Transportation Analysis

### 4.1 Traffic Generation

Traffic generation for this assessment has been calculated at the appropriate rate for hospitals in the RTA Guide to Traffic Generating Developments which states *“The best indicator of peak traffic generation or peak vehicle trips (PVT) was found to be a combination of the number of beds (B) and the number of staff per weekday day shift (ASDS). If the average number of staff per weekday day shift (ASDS) is unknown or unavailable the number of beds (B) alone was found to be a good indicator of peak traffic generation or peak vehicle trips (PVT).”*

Based on the above parameters the additional traffic that could be generated by the proposed expansion can be calculated as follows:

The Project has been assessed based on the upper development numbers for 2026/27. No allowance has been made for the staging of the Project.

Traffic generation for this assessment has been calculated at the appropriate rate for hospitals per the RTA Guide to Traffic Generating Developments which states that “the best indicator of peak traffic generation or peak vehicle trips (PVT) was found to be a combination of the number of beds (B) and the average number of staff per weekday day shift (ASDS)”. On this basis the following formula is used:

$$PVT = -14.69 + 0.69 B + 0.31 ASDS$$

#### Hospital

The hospital has been assessed on the basis of 80 Beds with 180 FTE staff by 2026/27.

It has been assumed that all staff are day shift although it is understood that this staffing projection would encompass all shifts and as such assesses traffic as a worst-case scenario.

- Applying the RMS rate results in 98 trips in the peak hour

#### Community Health Centre

The Study team has indicated that the site will also include a Community Health Centre with a gross floor area of 727 m<sup>2</sup>. The RTA Guide does not have a trip generation rate for this type of facility so the trip rate for an Extended Hours Medical Centre with a peak vehicle trip generation rate of 10.4 veh/hr/100 m<sup>2</sup> gross floor area has been adopted for the Community Health Centre.

- Applying this rate results in 76 peak hour trips

**Total trip generation for the site is calculated at 98 + 76 = 174 peak hour trips (87 inbound, 87 outbound).**

According to RMS traffic surveys peak hour volumes represent about 10% of daily volumes. This being the case, the estimated daily trips generated by the site would therefore be approximately 1,700 vehicles per day.

#### 4.1.1 Daily and Seasonal Factors

Minimal seasonal variation is expected, with weekday flows being typically greater than weekend flows.

#### 4.1.2 Pedestrian Movements

A pedestrian pathway will be provided between the carpark and bus stop to the main entrance of the Hospital that will help to ensure that pedestrian movements can be safely managed and controlled.

## 4.2 Traffic Distribution and Assignment

### 4.2.1 Origin / Destinations Assignment

The location of this greenfield site, in relation to the surrounding hospitals at Kempsey and Bellingen and larger facilities at Port Macquarie (south) and Coffs Harbour (north), has been considered in determining the origin and destination for trips associated with the new hospital. Looking at the catchment as a line mid way between these various hospitals sees a catchment that includes larger centres such as Nambucca Heads to the north and smaller towns and villages, e.g. Scotts Head to the south.

It is recognised that the hospital will provide local facilities to and provide local employment for the town of Macksville as well as further afield so an origin/destination of 50% north and 50% south has been applied.

Future traffic from the north and to the north will primarily use the Pacific Highway having entered via the southbound off-ramp and returning via the north facing on-ramp.

Traffic from the south will most likely be local traffic using the Giinagay Way, Old Coast Road and Letitia Close. Southbound traffic cannot enter the highway at this location as there is no southbound on-ramp so all southbound traffic will travel along Letitia Close and Old Coast Road to connect with Giinagay Way

The 170 peak hour trips will thus be distributed to the road network as shown below.

Table 4-1 Origin/Destination of Peak Trips

| Origin/Destination                          | Inbound | Outbound |
|---------------------------------------------|---------|----------|
| North along Pacific Highway                 | 43      | 44       |
| South along Old Coast Road and Giinagay Way | 44      | 43       |

## 4.3 Impact on Road Safety

It is considered that the additional traffic volumes associated with the project will have a minimal impact upon traffic safety. The new section of the Pacific Highway recently opened to traffic has significantly reduced traffic volumes through Macksville and the associated road upgrades to Old Coast Road will provide a high standard of road safety at this location.

## 4.4 Impact of Generated Traffic

### 4.4.1 Impact on Daily Traffic Flows

The additional peak hour traffic that will be generated at full development in 2026 is estimated to be 174 trips (87 inward and 87 outward) which equates to approximately 1,700 trips per day. The new section of the Pacific Highway recently opened to traffic has significantly reduced traffic volumes through Macksville which means Giinagay Way is now operating well within its capacity. The additional traffic is therefore considered to have a minor impact on daily traffic flows.

Additional flows associated with the hospital that would use the Highway shall have minimal impact given that this road has been designed to carry significant traffic flows with adequate capacity for future growth such as that associated with this site.

### 4.4.2 Peak Hour Impacts on Intersections

Future traffic flows along the Pacific Highway and at the new Macksville interchange are documented in the environmental assessment for the original upgrade project as well as the assessment for the north facing ramps which was a subsequent modification to the road design. These traffic volumes are shown in the table below.

For traffic capacity calculations the 100th Highest Hourly Volumes have been derived from the modelling as shown in the following Table 3-4 below.

**Table 3-4 2036 AADT and 100<sup>th</sup> highest hourly volumes**

| Road               | Section                         | Direction  | 100th Highest Hourly Volumes |     |       |
|--------------------|---------------------------------|------------|------------------------------|-----|-------|
|                    |                                 |            | LV                           | HV  | Total |
| North Facing Ramps | On-Ramp                         | Northbound | 40                           | 0   | 40    |
|                    | Off-Ramp                        | Southbound | 37                           | 5   | 42    |
| New Highway        | Bald Hill to Macksville         | Northbound | 686                          | 170 | 856   |
|                    |                                 | Southbound | 770                          | 140 | 909   |
|                    | North of North Macksville Ramps | Northbound | 726                          | 170 | 896   |
|                    |                                 | Southbound | 806                          | 145 | 951   |
| Existing Highway   | West of North Macksville Ramps  | Northbound | 179                          | 4   | 183   |
|                    |                                 | Southbound | 141                          | 10  | 151   |
|                    | East of North Macksville Ramps  | Northbound | 139                          | 4   | 143   |
|                    |                                 | Southbound | 105                          | 5   | 109   |

These future traffic volumes have been combined with the additional traffic volumes that will be generated by the new hospital development and are illustrated below.

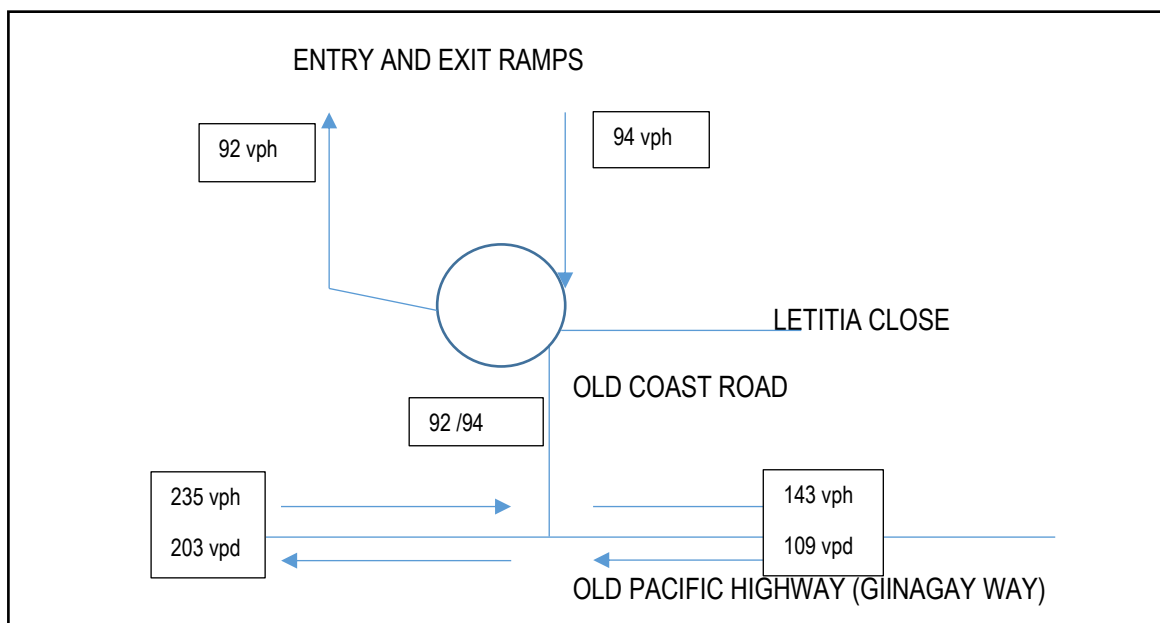


Figure 4.1 Traffic distribution for the Project plus future flows (2036)

The projected traffic flows are based on a 2036 design horizon however to provide a robust assessment these flows have been applied to the Project 2026/27 design year.

The two key intersections that will be impacted by the development have been modelled to assess the impact of the traffic that will be generated by the development.

1. The Roundabout proposed to connect the median cross over facility (Old Coast Road) with the southbound exit ramp, Letitia Close and Old Coast Road (south leg)
2. The T-intersection of Old Coast Road and the previous Pacific Highway



The intersections were assessed using Sidra intersection modelling with the future (2036) flows applied to the proposed layouts to determine the existing situation and the future Project flows then added to assess the impact of the Project traffic on the road network.

The modelling undertaken for the environmental assessment for the new highway north facing ramps demonstrated that both intersections would operate well with a LoS A on all legs. This was confirmed with this intersection modelling.

The tables below show that with the development flows included, both intersections continue to operate at LoS A on all legs with very minimal delays and queuing.

Allowing for significant growth within the road network (100% growth on all legs), both intersections would continue to operate well within their capacity, providing an overall level of service A. There may however be minor delays and queuing associated with the right turn out of Old Coast Road onto Giinagay Way.

*Table 4-2- Sidra Results – Old Coast Road, Letitia Close, Pacific Highway Southbound Off Ramp*

| Approach                    | Level of Service | Average Delay (s) | 95% Queue (m) |
|-----------------------------|------------------|-------------------|---------------|
| S: Old Coast Road           | A                | 7.4               | 4.3           |
| E: Letitia Close            | A                | 2.8               | 4.9           |
| N: Pacific Highway Off Ramp | A                | 4.3               | 4.1           |
| W: Old Coast Road           | A                | 9.1               | 0.6           |

*Table 4-3 - Sidra Results – Old Coast Road, Old Pacific Highway (Giinagay Way)*

| Approach               | Level of Service | Average Delay (s) | 95% Queue (m) |
|------------------------|------------------|-------------------|---------------|
| E: Old Pacific Highway | A                | 0.1               | 0.0           |
| N: Old Coast Road      | A                | 8.6               | 7.2           |
| W: Old Pacific Highway | A                | 2.9               | 0.0           |

#### 4.5 Impact of Construction Traffic

The impact of construction traffic has been considered below in Chapter 6 with the provision of a Draft Construction Traffic Management Plan. This plan shall be refined in conjunction with the contractor as part of the Construction Certification for the proposed development.

#### 4.6 Background traffic and other developments

The Sidra analysis above has included the projected growth in background traffic along Giinagay Way to 2036 to cater for other developments in the Macksville area.

#### 4.7 Public Transport

##### 4.7.1 Options for improving services

It is proposed to include the new hospital in the existing bus routes servicing the Macksville area.

##### 4.7.2 Pedestrian Access to Bus Stops

Direct pedestrian access will be provided between the hospital entrance and the new bus stop adjacent to the carpark without the need to cross any trafficable areas.

## 5. Sustainable Travel Opportunities

### 5.1 Background on Workplace and Sustainable Travel

Supporting active travel, making it easier for employees and visitors to get to and from the workplace and to reduce dependence on private vehicles and parking space is recognised as a positive endeavour for both the environment and participants' health.

Active Workplaces are identified by the Premier's Council for Active Living NSW (PCAL) as a means by which workplace health and wellbeing can be promoted and supported. Investing in workplace health promotion (such as physical activity programs) has the potential to increase economic return for employers through enhanced worker productivity, reduced absenteeism and improved corporate image. (PANORG (2009) *Evidence module: Workplace physical activity and nutrition interventions.*)

Active Travel in the workplace can deliver efficiencies, savings and benefits to an organisation, its operation and its employees. Promotion of 'sustainable' travel choices such as walking, cycling, using public transport and car-sharing, as well as reducing the need to travel by encouraging the use of video-conferencing and remote working can all contribute to an active workplace.

### 5.2 Spheres of Influence

The areas which may be influenced by the promotion and support of active travel include:

- Reduction in parking demand, its associated cost of provision and in turn the cost to employees for parking usage.
- Reduction in private motor vehicle travel by individuals, the impact on the road network and associated environmental costs and costs to the employee.
- Increased walking, cycling and public transport use and its resulting increase in physical exercise and health benefits.
- Parking policy, covering parking pricing and supply.

With regards to the redevelopment of Macksville Hospital the primary spheres of influence are:

- Bus Travel – ensure that new staff and attendees to the hospital who are open to using public transport are supported in this choice.
- Car Pooling - reduce number of individual private car drivers by encouraging car pooling, both to and from work.
- Ensure staff who indicate that they are prepared to cycle are supported in this choice.
- Parking policy – ensure it supports alternative transport options.
- Tele-conferencing and remote work opportunities for meetings etc
- Non-peak period servicing for services and contractors wherever possible.

### 5.3 Opportunities to reduce commuter car dependency

#### 5.3.1 Public transport

The opportunity to encourage bus patronage must be supported, ensuring all people who are open to bus travel have sufficient relevant information supporting this as a positive experience. This can be done by directing attendees to public transport and by including the Transport for NSW Trip Planner link on relevant Macksville Hospital web sites. The web site can also provide some general information on those routes that access the hospital and show how convenient bus travel is to connect with the hospital.

At the hospital suitable signage should be installed directing people to the bus stop along with a display of bus timetables and routes.

The Trip Planner app can also be included on the staff intranet for convenient use.

The hospital has an opportunity to liaise with the local bus provider to enable the travel demands for staff and visitors to the hospital to be taken into consideration in the planning for routes and services.

#### *5.3.1.1 Options for improving services*

It is considered that the development will require the provision of an upgrade of public transport to include the new hospital site in the existing bus routes. Signage and access to up to date bus information is important to support bus travel by both staff and visitors.

#### *5.3.1.2 Pedestrian Access to Bus Stops*

Pedestrian access to the bus stop within the hospital precinct will be provided by a pedestrian pathway from the hospital main entrance. No other works are required except to ensure suitable signage is provided.

### **5.3.2 Car Pooling**

Formal carpooling programs are effectively run by various organisations throughout NSW and can provide a practical alternative to being a single commuter, driving daily. Given the location of residential areas across the Macksville area there may be opportunities through either formal or less formal means to promote carpooling on a regular or semi-regular basis. This willingness to carpool could be encouraged through the instigation of preferred parking for carpooling vehicles.

Informal carpooling can be promoted throughout the workplace through staff newsletters, email intranet enquiries etc.

### **5.3.3 Staff who are open to using bicycles and being pedestrians**

Opportunities for cycling could be investigated. New staff can be buddied up to gain confidence and create social cohesion. Staff may also consider cycling for part of their week through the promotion of appropriate cycle routes and familiarity with end of ride facilities. Information for staff can be included in induction packs.

Transport for NSW has developed a Cycleway Finder, a purpose-built bicycle trip planner, with cyclists able to nominate their route preferences. [http://www.rms.nsw.gov.au/maps/cycleway\\_finder](http://www.rms.nsw.gov.au/maps/cycleway_finder)

Promotion of cycling to work by staff can be encouraged through staff newsletters and Ride to Work days.

Given the remote location of the hospital compared with the main residential areas, opportunities for staff and visitors to walk to the hospital is considered to be low.

### **5.3.4 Tele-conferencing and remote work opportunities**

The use of tele-conferencing and remote access to the workplace reduces the need for staff to travel to and from the hospital to be part of such meetings. Given that Macksville Hospital supports a broad district this strategy should see reduced reliance on staff needing to undertake workplace-based trips.

### **5.3.5 Parking Policy**

If staff take advantage of active travel options even one day a week it provides a 20% improvement in vehicle travel with the resulting environmental and health impacts. The choice not to drive one day per week should be encouraged. If Paid parking policies are implemented it is important that these do not penalise staff for part time use.

## 6. Construction Activities

### 6.1 Methodology

The development of the Macksville Hospital will include an upgrade to expand and reconfigure inpatient and ambulatory care services providing enhanced services, facilities and care to patients. The Project will include enhancements to existing surgical services and operating theatres and a new short stay surgical unit and improvement of the surgical bed base. Ambulatory care and community health services will also be enhanced

Roadworks associated with the redevelopment will include a new access road from the Old Coast Road / Letitia Close intersection, car park, bus stop, ambulance drop-off and parking, and facilities for delivery vehicles and waste collection.

The project will involve site establishment, clearing of the site, bulk earthworks, followed by installation of underground services, stormwater drainage, building construction, pavement construction, kerb and gutter, line marking and signposting.

A site office will be located within the site with parking for construction staff vehicles and machinery as well as a materials storage area.

### 6.2 Timing

The construction on site is due to commence during the second quarter 2019 and be completed by the end of 2020.

### 6.3 Working Hours

**Demolition and Construction hours** would be between 7:00am and 6:00pm Monday to Friday and 8.00 AM to 1.00 PM on a Saturday.

No demolition or construction work is to be carried out on a Sunday or public holiday. No demolition or construction work contributing to unacceptable noise levels or major deliveries are scheduled outside of the weekdays in line with EPA Guidelines.

Work may be undertaken outside these hours where the following occurs:

- The delivery of fill or material may occur outside these hours if required by the Police or other authorities.
- Council providing permission for working out of hours;
- It is required in an emergency to avoid loss of life, damage to property and / or to prevent environmental harm;
- The work is approved from the Construction Noise and Vibration Management Plan;
- Residents likely to be affected by the works are notified of the timing and duration of these works at least 48 hours prior to the commencement of the works.

### 6.4 Construction staff numbers

Peak demand levels will be up to a maximum of 30 staff with 10 during the demolition work based on site. All construction staff vehicles will be parked on-site within an allocated parking area.

### 6.5 Traffic Management Assessment

All construction traffic will travel to and from the site along Giinagay Way and access the site via the new access road to the site. Giinagay Way provides access to the wider road network for delivery of construction materials and the disposal of waste from the site.

Due to the nature of the work the maximum number of trucks through the day could be 20 over an average working day. The type of vehicles accessing the site will include:

- Articulated vehicles for delivery of heavy plant and equipment;
- Heavy and medium rigid trucks for construction material delivery;
- Heavy rigid tankers for fuel delivery for compacting and excavation machinery;
- Rigid trucks for removal of excavated material;
- Mobile cranes;
- Fixed cranes;
- Piling Rigs;
- Concrete delivery trucks and concrete pumps; and
- Light vehicles, including workers' private vehicles.

The number of heavy vehicles associated with the construction work is low and it is considered that the movement of vehicles in and out of the site for construction works can safely occur with minimal delays to traffic and in a safe manner. No limitation on truck access times is considered appropriate for the project.

There will be minimal impact upon public transport services with no diversions required.

There will be minimal impact for emergency vehicles and delivery vehicles with no diversions required for normal work days

Traffic routes in and out of the site will be along the arterial road network which will experience minimal impacts due to the works.

## 6.6 Traffic Control Plan

### 6.6.1 General

This TCP has been prepared to meet the requirements of the RTA Traffic Control at Work Sites Manual 2010 Edition. The plan covers the access requirements to the site and the safe passage of vehicles in and out of the subject site via Giinagay Way and the existing main entry road and for passing traffic in this location during the construction works.

At all times the requirements of the Roads and Traffic Authority's Traffic Control at Work Sites Manual must be adhered to. Please refer to this Manual for traffic control matters not listed in this report.

*Note that the RTA has been renamed Roads and Maritime Services (RMS), however the documents described herein have still retained the RTA as the author.*

### 6.6.2 Existing traffic conditions

The recent and proposed road upgrades in the vicinity of the site will provide safe and efficient access for construction vehicles.

### 6.6.3 Cyclists and Pedestrians

There will be no access to the site for cyclists and pedestrians during construction.

### 6.6.4 General Traffic Control Considerations

The factors that have been considered in preparing this TCP are:

- During the construction, all construction vehicle movements will enter and exit the site along Giinagay Way and the Hospital access road;
- Parking will be available on site for construction staff in an allocated parking area. This will be managed as part of the overall site management and reinforced during the tool box meetings;
- Loading / unloading and deliveries will be completed within the construction site;

- The 15km/h speed zone will be retained along the Hospital access road for the duration of the construction works;
- The construction site will be fenced off with access only to authorised personnel;
- The long-term construction time for the completion of the works; and
- Safety of road users and site personnel.

The RTA Traffic Control at Worksites 2010 manual recommends safety barriers are considered if:

- The location will continue to be a work area for longer than two weeks. (Applicable)
- Traffic speeds are likely to be greater than 80 km/hr. (Not applicable)
- AADT exceeds 5000 vehicles for traffic lane nearest the works. (Not Applicable)
- The work area is less than 3 metres clear of traffic on straights (less on tight curves) (Applicable)
- Personnel do not have other protection, such as operating plant. (Not Applicable)

The construction on site is due to commence during the second quarter 2019 and be completed by the end of 2020.

The location and nature of the work will **NOT** require safety barrier to be installed.

The local speed zone limit of 15 km/hr is considered acceptable as the construction works are all contained within the site.

#### 6.6.5 Traffic Control – Signage and Line Marking

A Traffic Control Plan (TCP) providing work site definition will need to be prepared by the construction contractor. Temporary signage required as part of the works is included due to the nature of the passing traffic and the location and nature of the works.

All signs shall be placed on the road and made secure against wind and shall be covered when not in use and removed outside of working hours. The signs shall be uncovered before any trucks access the site. This can be co-ordinated between the truck driver and the site manager via mobile phone as required.

A copy of the relevant TCP must be on site at all times during the demolition and construction work.

#### 6.6.6 Daily Checklist

In accordance with the Roads and Traffic Authority of New South Wales Traffic Control at Worksites Manual, the site foreman / manager should complete a daily traffic control checklist and this checklist should be filed for future reference. The Proforma Checklist is provided in Appendix E of the Traffic Control at Worksites Manual.



## 6.7 Contractors Contact Details

**Project Manager:** TBA

**Mobile:** TBA

**E-mail:** TBA

## 6.8 TCP Approval

The TCP will be submitted to the road authority for review and approval.

Details for lodging this TCP and the Construction Traffic Management Plan are:

Nambucca Shire Council

44 Princess Street

PO Box 177

Macksville NSW 2447

Phone: (02) 6567 2555

Email: [council@nambucca.nsw.gov.au](mailto:council@nambucca.nsw.gov.au)



## 7. Summary and Recommendations

### 7.1 Summary

Seca Solution Pty Ltd has been commissioned by NSW Health Infrastructure to prepare a traffic, access and parking assessment for the proposed development of Macksville Hospital north of the Nambucca River adjacent to the Pacific Highway.

The project will enhance patient care while also improving ambulatory care and outpatient treatments including improved facilities in emergency, community health, operating theatres, maternity and inpatient units.

The subject site for the development of Macksville Hospital is a greenfield site located 3km north of the township of Macksville on the northern side of the Nambucca River. It is located to the east of the Pacific Highway adjacent to the southbound exit ramp proposed for the highway upgrade.

Roadworks associated with the development will include a new access road to the site from the old Pacific Highway now known as Giinagay Way, Old Coast Road and Letitia Close, an at-grade carpark, ambulance parking, bus stop and access for servicing and deliveries. Roadworks associated with the development will include a new access road including new access arrangements to the adjacent health centre, new parking facilities and new bus and pedestrian facilities.

RMS has recently completed the construction of north facing ramps at North Macksville adjacent to the subject site. The ramps include a northbound on-ramp onto the highway, a southbound off ramp from the highway and a median cross-over facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel both north and south on the highway. The ramps were not part of the original proposed upgrade and so have been assessed subsequently.

The construction of the north facing ramps included realignment of Old Coast Road to pass over the highway with the northbound on-ramp commencing from the realigned Old Coast Road. Letitia Close, Old Coast Road and the southbound off-ramp have been combined as a roundabout east of the highway, allowing the alignment of the bridge over the highway to be straightened. West of the highway the access onto the northbound on-ramp has priority over traffic from Old Coast Road central.

The additional peak hour traffic that will be generated at full development in 2026 is estimated to be 174 trips (87 inward and 87 outward) which equates to approximately 1,700 trips per day. The new section of the Pacific Highway recently opened to traffic has significantly reduced traffic volumes on Giinagay Way through Macksville which means it is now operating well within its capacity. The additional traffic associated with the proposed hospital is therefore considered to have a minor impact on the capacity of the road and its daily traffic flows.

Additional flows associated with the hospital that would use the Highway shall have minimal impact given that this road has been designed to carry significant traffic flows with adequate capacity for future growth such as that associated with this site.

The two key intersections that will be impacted by the development have been modelled to assess the impact of the traffic that will be generated by the development.

1. The Roundabout proposed to connect the median cross over facility (Old Coast Road) with the southbound exit ramp, Letitia Close and Old Coast Road (south leg)
2. The T-intersection of Old Coast Road and Giinagay Way

The intersections were assessed using Sidra intersection modelling with the future (2036) flows applied to the proposed layouts to determine the existing situation and the future Project flows then added to assess the impact of the Project traffic on the road network.

The modelling undertaken for the environmental assessment for the new north facing ramps demonstrated that both intersections would operate well with a LoS A on all legs. This was confirmed with this intersection modelling which demonstrates that with the development flows included, both intersections continue to operate at LoS A on all legs with very minimal delays and queuing.

Allowing for significant growth within the road network (100% growth on all legs), both intersections would continue to operate well within their capacity, providing an overall level of service A. There may however be minor delays and queuing associated with the right turn out of Old Coast Road onto Giinagay Way.

The number of parking spaces required to satisfy the parking demand for the Hospital is 62 to 98 spaces. This has been based on the FTE staffing numbers provided which may be higher than the average number of staff per weekday day shift (ASDS). Once the ASDS can be determined and the parking refined, given the relatively remote location for the site, the higher end of the range would be considered appropriate.

The parking requirement of 4 spaces per 100 m<sup>2</sup> gross floor area has been adopted for the Community Health Centre which results in 29 spaces (727m<sup>2</sup> / 100 x 4).

The total parking requirement for the site, adopting the higher end of the range, is therefore 98 + 29 = 127 spaces.

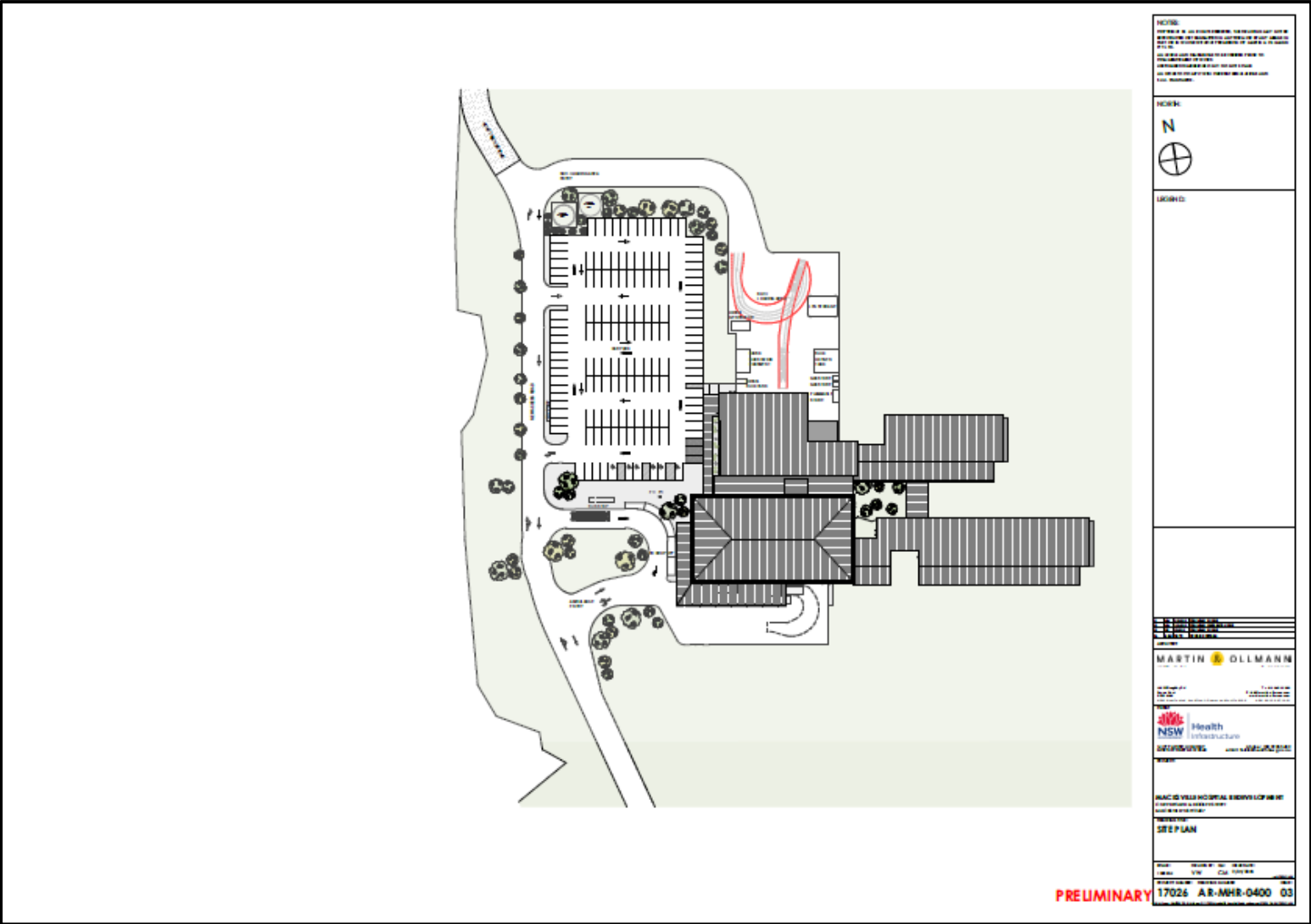
Of these 4% (5 spaces) are to be suitable for people with disabilities in accordance with AS/NZS 2890.6.

The proposed parking supply of 150 spaces, including 6 accessible spaces, is therefore in excess of the parking spaces required for this development.

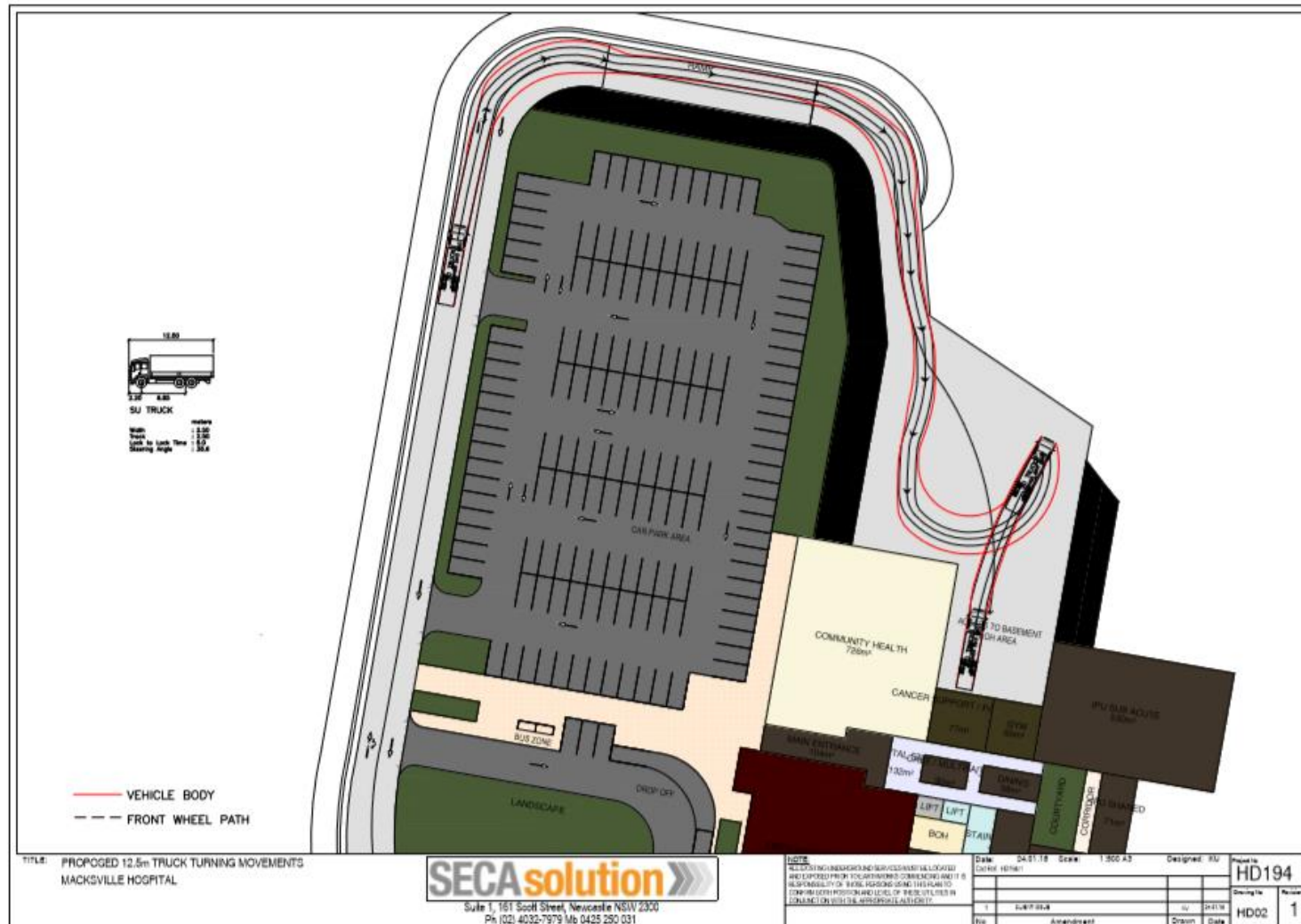
## 7.2 Recommendations

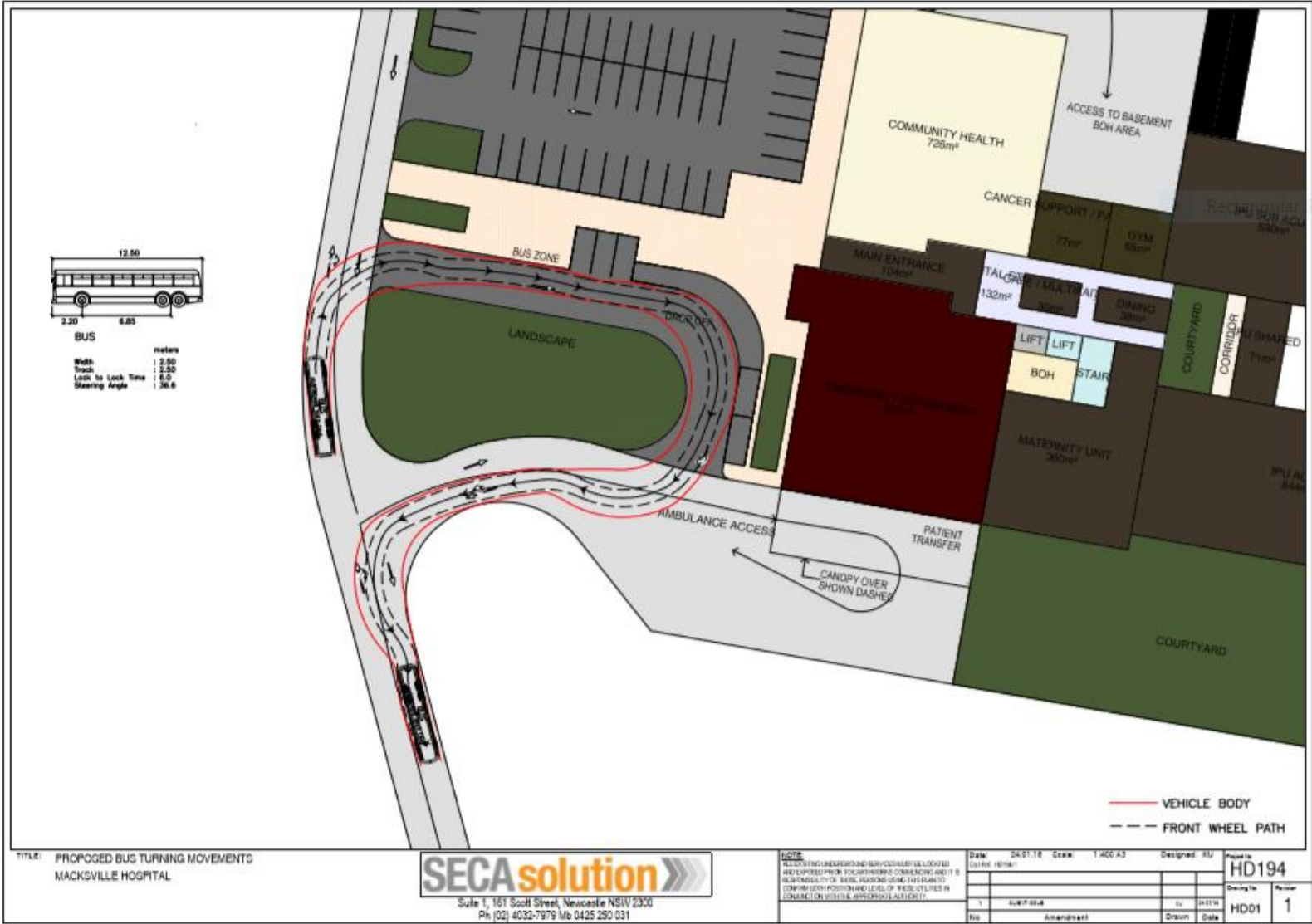
The overall conclusion from the investigations is that traffic, parking and access arrangements for the development proposal are satisfactory and that there is no traffic or parking impediments to the development.

Appendix A Site Plan



## Appendix B Autoturn Simulations











## Appendix C SIDRA Analysis

### Interpreting SIDRA Results:

#### 1-Level of Service (LoS)

| LoS | Traffic Signals and Roundabouts                                        | Give Way and Stop Signs                     |
|-----|------------------------------------------------------------------------|---------------------------------------------|
| A   | Good                                                                   | Good                                        |
| B   | Good, with acceptable delays and spare capacity                        | Acceptable delays and spare capacity        |
| C   | Satisfactory                                                           | Satisfactory, but requires accident study   |
| D   | Operating near capacity                                                | Near capacity and requires accident study   |
| E   | At capacity, excessive delay: roundabout requires other control method | At capacity, requires other control mode    |
| F   | Unsatisfactory, requires other control mode or additional capacity     | Unsatisfactory, requires other control mode |

#### 2-Average Vehicle Delay (AVD)

The AVD is a measure of operational performance of an intersection relating to its LoS. The average delay should be taken as a guide only for an average intersection. Longer delays may be tolerated at some intersections where delays are expected by motorists (e.g. those in inner city areas or major arterial roads).

| LoS | Average Delay / Vehicle (secs) | Traffic Signals and Roundabouts                                       | Give Way and Stop Signs                     |
|-----|--------------------------------|-----------------------------------------------------------------------|---------------------------------------------|
| A   | Less than 15                   | Good operation                                                        | Good operation                              |
| B   | 15 to 28                       | Good with acceptable delays and spare capacity                        | Acceptable delays and spare capacity        |
| C   | 28 to 42                       | Satisfactory                                                          | Satisfactory but accident study required    |
| D   | 42 to 56                       | Operating near capacity                                               | Near capacity, accident study required      |
| E   | 56 to 70                       | At capacity, excessive delays: roundabout requires other control mode | At capacity; requires other control mode    |
| F   | Exceeding 70                   | Unsatisfactory, requires additional capacity                          | Unsatisfactory, requires other control mode |

#### 3-Degree of Saturation (D/S)

The D/S of an intersection is usually taken as the highest ratio of traffic volumes on an approach to an intersection compared with the theoretical capacity and is a measure of the utilisation of available green time. For intersections controlled by traffic signals, both queues and delays increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its D/S is kept below 0.75. When D/S exceeds 0.9, queues are expected.

## MOVEMENT SUMMARY



**Site: 101 [Old Coast Road, Letitia Close, Old Pacific Highway Off Ramp]**

2036 Design Year with Hospital Development  
Roundabout

### Movement Performance - Vehicles

| Mov ID                          | OD Mov | Demand Total<br>veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---------------------------------|--------|-----------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|-----------------------------|--------------------|
| South: Old Coast Road           |        |                       |            |               |                   |                  |                                |            |              |                             |                    |
| 1                               | L2     | 60                    | 0.0        | 0.118         | 4.0               | LOS A            | 0.6                            | 4.3        | 0.24         | 0.56                        | 51.4               |
| 3                               | R2     | 100                   | 0.0        | 0.118         | 9.4               | LOS A            | 0.6                            | 4.3        | 0.24         | 0.56                        | 42.3               |
| Approach                        |        | 160                   | 0.0        | 0.118         | 7.4               | LOS A            | 0.6                            | 4.3        | 0.24         | 0.56                        | 47.0               |
| East: Letitia Close             |        |                       |            |               |                   |                  |                                |            |              |                             |                    |
| 4                               | L2     | 95                    | 0.0        | 0.133         | 2.6               | LOS A            | 0.7                            | 4.9        | 0.21         | 0.40                        | 51.3               |
| 5                               | T1     | 92                    | 0.0        | 0.133         | 3.0               | LOS A            | 0.7                            | 4.9        | 0.21         | 0.40                        | 56.7               |
| Approach                        |        | 187                   | 0.0        | 0.133         | 2.8               | LOS A            | 0.7                            | 4.9        | 0.21         | 0.40                        | 54.4               |
| North: Pacific Highway Off Ramp |        |                       |            |               |                   |                  |                                |            |              |                             |                    |
| 7                               | L2     | 92                    | 0.0        | 0.110         | 4.2               | LOS A            | 0.6                            | 4.1        | 0.28         | 0.45                        | 34.5               |
| 8                               | T1     | 47                    | 10.6       | 0.110         | 4.4               | LOS A            | 0.6                            | 4.1        | 0.28         | 0.45                        | 51.7               |
| 9                               | R2     | 1                     | 0.0        | 0.110         | 9.5               | LOS A            | 0.6                            | 4.1        | 0.28         | 0.45                        | 54.7               |
| Approach                        |        | 140                   | 3.6        | 0.110         | 4.3               | LOS A            | 0.6                            | 4.1        | 0.28         | 0.45                        | 42.5               |
| West: Old Coast Road            |        |                       |            |               |                   |                  |                                |            |              |                             |                    |
| 11                              | T1     | 1                     | 0.0        | 0.017         | 4.2               | LOS A            | 0.1                            | 0.6        | 0.24         | 0.59                        | 38.9               |
| 12                              | R2     | 21                    | 0.0        | 0.017         | 9.3               | LOS A            | 0.1                            | 0.6        | 0.24         | 0.59                        | 51.7               |
| Approach                        |        | 22                    | 0.0        | 0.017         | 9.1               | LOS A            | 0.1                            | 0.6        | 0.24         | 0.59                        | 51.1               |
| All Vehicles                    |        | 509                   | 1.0        | 0.133         | 4.9               | LOS A            | 0.7                            | 4.9        | 0.24         | 0.47                        | 49.0               |

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

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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## MOVEMENT SUMMARY

▽ Site: 101 [Old Coast Road / Old Pacific Highway]

2036 Design Year with Hospital Development  
 Giveway / Yield (Two-Way)

### Movement Performance - Vehicles

| Mov ID                | OD Mov | Demand Flows Total<br>veh/h | Flows HV % | Deg. Satn<br>v/c | Average Delay<br>sec | Level of Service | 95% Back of Queue<br>Vehicles<br>veh | Back of Queue<br>Distance<br>m | Prop. Queued | Effective Stop Rate<br>per veh | Average Speed<br>km/h |
|-----------------------|--------|-----------------------------|------------|------------------|----------------------|------------------|--------------------------------------|--------------------------------|--------------|--------------------------------|-----------------------|
| East: Pacific Highway |        |                             |            |                  |                      |                  |                                      |                                |              |                                |                       |
| 5                     | T1     | 114                         | 4.4        | 0.060            | 0.0                  | LOS A            | 0.0                                  | 0.0                            | 0.00         | 0.00                           | 60.0                  |
| 6                     | R2     | 1                           | 0.0        | 0.001            | 6.7                  | LOS A            | 0.0                                  | 0.0                            | 0.37         | 0.53                           | 50.8                  |
| Approach              |        | 115                         | 4.3        | 0.060            | 0.1                  | NA               | 0.0                                  | 0.0                            | 0.00         | 0.00                           | 59.9                  |
| North: Old Coast Road |        |                             |            |                  |                      |                  |                                      |                                |              |                                |                       |
| 7                     | L2     | 1                           | 0.0        | 0.236            | 5.5                  | LOS A            | 1.0                                  | 7.2                            | 0.04         | 0.59                           | 49.6                  |
| 9                     | R2     | 163                         | 3.1        | 0.236            | 8.6                  | LOS A            | 1.0                                  | 7.2                            | 0.04         | 0.59                           | 49.3                  |
| Approach              |        | 164                         | 3.0        | 0.236            | 8.6                  | LOS A            | 1.0                                  | 7.2                            | 0.04         | 0.59                           | 49.3                  |
| West: Pacific Highway |        |                             |            |                  |                      |                  |                                      |                                |              |                                |                       |
| 10                    | L2     | 160                         | 0.0        | 0.085            | 5.5                  | LOS A            | 0.0                                  | 0.0                            | 0.00         | 0.58                           | 52.3                  |
| 11                    | T1     | 147                         | 2.7        | 0.076            | 0.0                  | LOS A            | 0.0                                  | 0.0                            | 0.00         | 0.00                           | 60.0                  |
| Approach              |        | 307                         | 1.3        | 0.085            | 2.9                  | NA               | 0.0                                  | 0.0                            | 0.00         | 0.30                           | 56.1                  |
| All Vehicles          |        | 586                         | 2.4        | 0.236            | 3.9                  | NA               | 1.0                                  | 7.2                            | 0.01         | 0.32                           | 54.9                  |

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

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

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

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

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

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

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

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