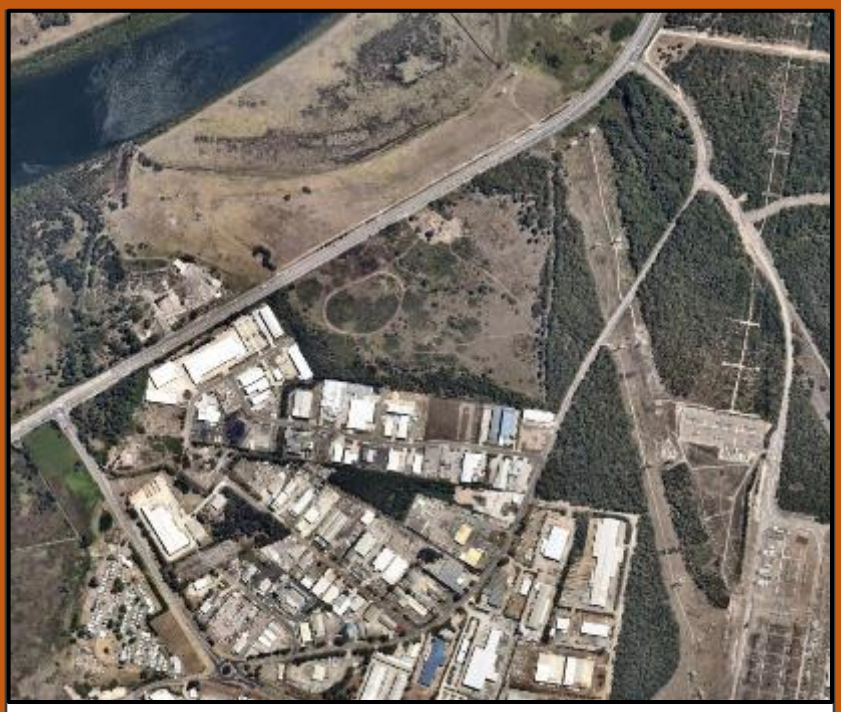
Appendix K Traffic Impact Assessment



Newcastle

Power Station

AGL Energy Ltd

Traffic Impact Assessment

October 2019

SECA solution

Newcastle Power Station

Traffic Impact Assessment

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Client: AGL Energy Ltd C/- Aurecon Group
Issue: Ver05/ 29.10.2019
Reference: P1451
29 October 2019

Quality Review and Document History

Version	Date	Description	Prepared By	Reviewed / Approved
Ver01	10/5/19	Draft	S. Morgan T. Neve	C. Thomas
Ver02	16/7/19	Draft	S. Morgan T. Neve	C. Thomas
Ver03	6/9/19	Final	S. Morgan T. Neve	C. Thomas
Ver04	2/10/19	Final	S. Morgan T. Neve	C. Thomas
Ver05	29/10/19	Final	S. Morgan T. Neve	C. Thomas

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Contents

1. Introduction

1.1 Background

Seca Solution Pty Ltd (Seca Solution) has been commissioned by Aurecon on behalf of AGL Energy Limited (AGL) to provide a Traffic Impact Assessment to support the Environmental Impact Statement for the proposed Newcastle Power Station (the project) located in Tomago, New South Wales (NSW).

The project involves construction and operation of an approximately 250 MW dual fuel power station (gas or diesel), with ancillary infrastructure including connection to gas supply, gas compression facilities, fuel storage tanks, water management facilities and grid connection.

As part of the project, Seca Solution has utilised current traffic data and observed the traffic operations at the key intersections in the locality of the site during peak periods to assess the potential impacts of the project on the road network.

1.2 Scope of Report

The scope of this report is to review the external traffic movements associated with the proposed development, with a focus on the construction traffic impacts (noting that the traffic generated by the development once operational is expected to be lower).

The report provides advice on the operation and capacity of key intersections in the locality, taking into account the impact of the future M1 Pacific Highway extension to Raymond Terrace (M12RT), the preferred route for which includes a Tomago Interchange that shall incorporate proposed road infrastructure within the subject site.

1.3 Scope and Objectives of the study

- The scope of the study included: Assessing additional traffic flows associated with the development, during both the construction phase and operational phase and any likelihood of impact on the local road network;
- Reviewing the proposed access arrangements for the development;
- Assessing the likelihood of the development affecting any other transport modes/vehicles, including cumulative impacts associated with other proposed and existing projects in the area.

The objective of the report is to document any likely impacts the proposed development may have and confirm the capacity of the road network can adequately to cater for the development.

1.4 Planning Context

In preparing this document, the following guides and publications have been considered:

- Roads Maritime Services (RMS) Guide to Traffic Generating Developments, Version 2.2 Dated October 2002
- Austroads Guide to Traffic Management Part 12: Traffic Impacts of Project
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections
- Port Stephens Development Control Plan 2014
- Port Stephens Local Environment Plan 2013
- Australian / New Zealand Standard – Parking Facilities Part 1: off-street car parking (AS2890.1:2004)

1.5 Authority Requirements

The Department of Planning Industry and Environment (DPIE) have provided a set of SEARs (Secretary's Environmental Assessment Requirements) that provide advice on what is to be assessed for the project and the information that is required to be provided in the Environmental Impact Statement (EIS). Relevant to traffic and transport are the requirements outline in Table 1-1 to follow.

Table 1-1: Department of Planning and Environment SEARs

Requirement	Response / Section of Seca Solution report
An assessment of the transport impacts of the project on the capacity, condition, safety and efficiency of the local and State road network including consideration of the future M1 Motorway extension to Raymond Terrace;	Section 2.3.2, Section 2.4.6, Section 4.3, Section 4.4
An assessment of the site access point and rail safety issues;	Section 3.2.1, No current railway plans proposed so no impact.
A description of the measures that would be implemented to mitigate any impacts during construction;	Section 4.4
A description of any proposed road upgrades developed in consultation with the relevant road authorities (if required);	None required, consultation has been undertaken with RMS regarding the impact of the M12RT upgrade.

The Roads and Maritime Services have provided separate details on their requirements for the project which are provided in Table 1-2.

Table 1-2: Roads and Maritime Services requirements

Requirement	Response / Section of Seca Solution report
Assessment of all relevant vehicular traffic routes and intersections for access to and from the site, including current traffic counts.	Section 2.4.1, Section 2.4.6, Appendix B
Assessment of trip generation of the proposed power station. As a power station is not a defined use in the RMS Guide to Traffic Generating Developments, it is recommended that an assessment of the peak hour trip generation be made relative to the expected employees and visitors driving to and from the site during the AM and PM peak hours.	Section 4.1
The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation.	Section 4.2
Identify any necessary road network infrastructure upgrades that are required to maintain existing levels of service on both the local and classified road network for the development. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Roads and Maritime and Council.	Section 4.4.2
In relation to the M1 Motorway extension in addition to the above requirements, Roads and Maritime request the following: • **Key Issue Transport –include reference to the future M1 Motorway extension to Raymond Terrace in the list of roads that should be assessed for capacity, condition, safety and efficiency.** • **Key Issue Transport –include a requirement to demonstrate consultation with Roads and Maritime to support the objective of the delivery of the M12RT within the site.**	The M12RT project has been referenced in the report, with commentary provided regarding the impact of this on the road network surrounding the subject site. Section 1.6

1.6 Consultation with RMS

In order to satisfy the SEARS requirement, consultation between Seca Solution, AGL and RMS Hunter was undertaken with a meeting conducted on the 8/5/19. Further consultation between AGL and RMS has been completed on a regular basis to discuss co-location, with meetings on 11/7/18. 21/9/18, 5/3/19, 5/4/19, 8/5/19, 5/6/19 and 23/7/19. The proponent shall continue to engage with RMS to support the delivery of both the proposed development and the M12RT project.

The key item discussed at the meeting for which Seca Solution was in attendance related to the approval and timing of the project works. RMS indicated that based on the funding allocated by the federal government it is now very likely to proceed. RMS also noted however that implementation of the M12RT works were in a state of flux, with this being dependent upon final funding approval and the completion of the EIS. The subsequent approvals process will determine the timing of the construction works at the intersection of Tomago Road and Old Punt Road, with RMS unable to confirm an indicative time frame at this stage of the process. The RMS website is consistent with the above stating timing for construction is not confirmed and would be dependent on planning approval, future traffic needs and funding availability.

Based on the discussions undertaken and the timeframes outlined for the proposed Newcastle Power Station it was considered that construction works pertaining to the proposed development would likely be completed prior to works proceeding for the M12RT. At the time of the meeting RMS were unable to provide any further detail regarding concurrent construction.

The proposed access location for the site was also discussed, with RMS identifying no safety or capacity issue regarding the nominated access location in the south-west corner. This location provides the only direct access to the subject lands off Old Punt Road. It was discussed that the detailed design for the M12RT could see changes to the proposed road layout in this location as the detailed design progresses, however no clear indication of these works could be provided at the time of the meeting.

2. Existing Situation

2.1 Site Description and Proposed Activity

The subject site is located to the south east of the Pacific Highway between the Highway and Old Punt Road, Tomago, NSW, incorporating Lot 2 and Lot 3 DP 1043561 (Figure 2-1). The site currently has a single domestic dwelling which is to be removed unless it is repurposed for the project, with the remainder being vacant land that has historically been used for agricultural purposes.

The proposed development involves the construction and operation of an approximately 250 MW dual fuel power station (gas or diesel) with ancillary infrastructure including connection to gas supply, gas compression facilities, fuel storage tanks, water management facilities and grid connection.

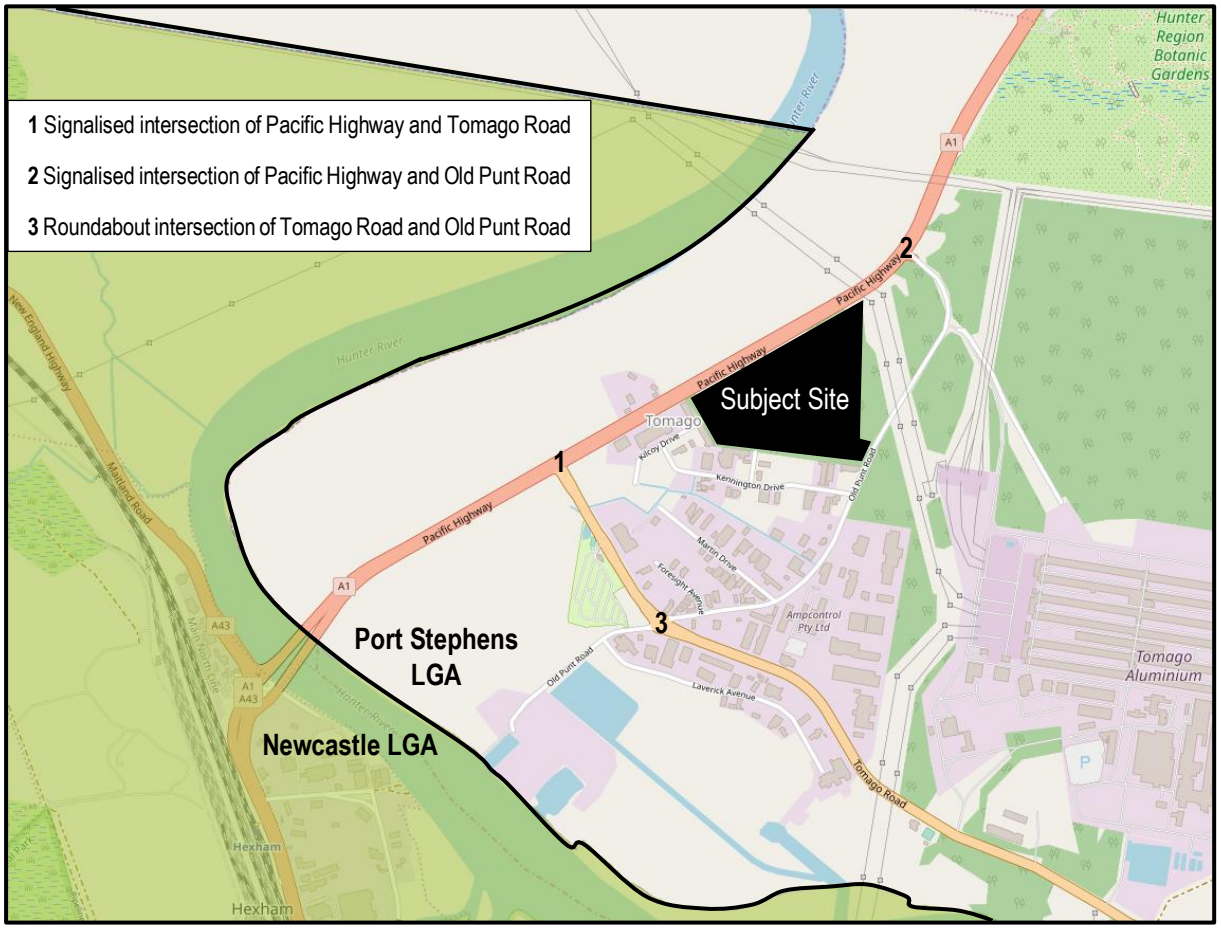


Figure 2-1: Site location in the context of the Local Government Areas (LGA), showing the location of major intersections

2.1.1 Zoning and Adjacent Land Use

The land pertaining to the subject site is zoned for general industrial use per the Port Stephens Local Environment Plan (2013). Surrounding land uses in the vicinity to the east of the Pacific Highway are also zoned for general industrial use, with a wide range of industrial developments in operation in the surrounding area including the Newcastle Gas Storage Facility and the Tomago Aluminium smelter.

2.2 Site Access

The site has access via an existing domestic driveway off the Pacific Highway, associated with the single dwelling currently located on the site. In addition, there are two further informal access locations with one located off the Pacific Highway in the north east corner adjacent to the transmission easement and the remaining in the south-east corner off Old Punt Road.

2.2.1 Road Hierarchy

2.2.1.1 Pacific Highway

The main road through the locality is the **Pacific Highway** (HW10) which forms part of the state road network providing the major connection along the east coast between Sydney/Newcastle and northern NSW through to Queensland. In the locality of Tomago, it provides a dual carriageway allowing for two lanes of travel in both directions separated by a vegetated central median. A sealed shoulder/breakdown lane is provided in each direction with an unsealed verge, with no kerb and guttering provided. The posted speed limit on the Pacific Highway is 80 km/hr in this location.

2.2.1.2 Tomago Road

Tomago Road forms part of the state road network (MR302) providing connection between Nelson Bay Road to the east and the Pacific Highway to the west. The intersection with the Pacific Highway is a T-intersection, controlled by traffic signals, with left turns only available out of Tomago Road. Two turning lanes are provided for this movement. The Pacific Highway operates as a dual carriageway through the intersection, with a channelised left turn lane provided for southbound vehicles to turn into Tomago Road and two channelised right turn lanes provided on the northbound approach. The layout of this intersection is shown in Figure 2-2.

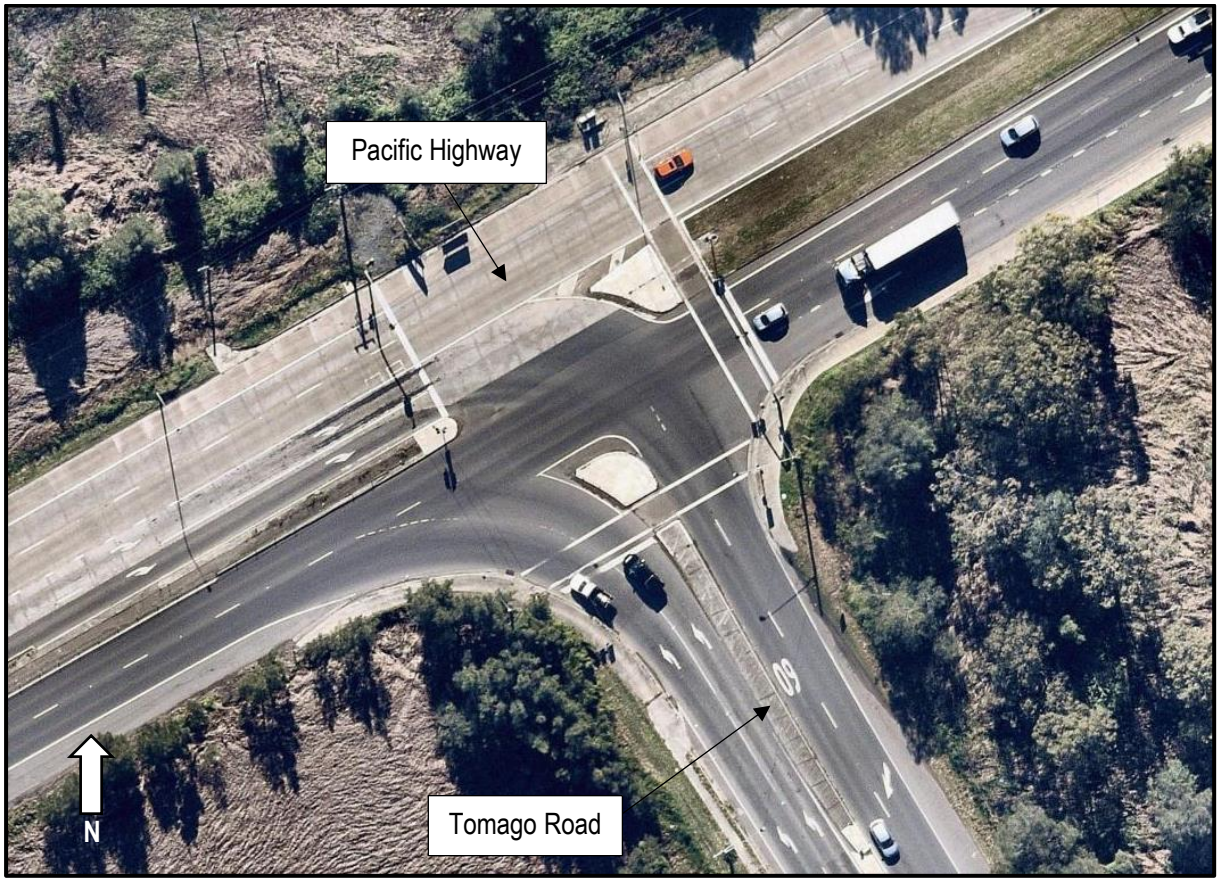


Figure 2-2: Aerial view of the intersection of the Pacific Highway and Tomago Road (Source: Nearmap)

Tomago Road provides one lane of travel in each direction along the majority of its length, with widening at intersections to provide increased capacity. In the vicinity of the roundabout intersection with Old Punt Road (700 metres south-east of the Pacific Highway) it operates under the posted speed limit of 60 km/hr, with two lanes provided on both the eastbound and westbound approaches allowing for left turn/through movements and right turn/through movements. The layout of this intersection is shown in Figure 2-3 to follow.

Figure 2-3: Aerial view of the intersection of the Tomago Road and Old Punt Road (Source: Nearmap)

2.2.1.3 Old Punt Road

Old Punt Road provides a single lane of travel in each direction on the northbound and southbound approaches to the intersection with Tomago Road. To the north of the intersection it has a sealed pavement in the order of 11 metres wide and an unsealed verge. It operates under the posted speed limit of 60 km/hr.

At its northern end, Old Punt Road intersects with the Pacific Highway at a signalised T-intersection. The Pacific Highway operates as a dual carriageway in this location with a dedicated left turn lane provided for southbound vehicles to turn into Old Punt Road and a sheltered right turn lane provided for northbound vehicles to turn into Old Punt Road. These turning movements are both controlled by traffic signals at the Pacific Highway.

On Old Punt Road a left turn slip lane is provided for southbound travel along the Pacific Highway. This movement is not controlled by the traffic signals. The intersection layout provides an acceleration lane approximately 150 metres in length (including taper) to allow for efficient merging into the traffic stream. The right turn out of Old Punt Road onto Pacific Highway is controlled by the traffic signals. The layout of this intersection is shown in Figure 2-4 to follow.

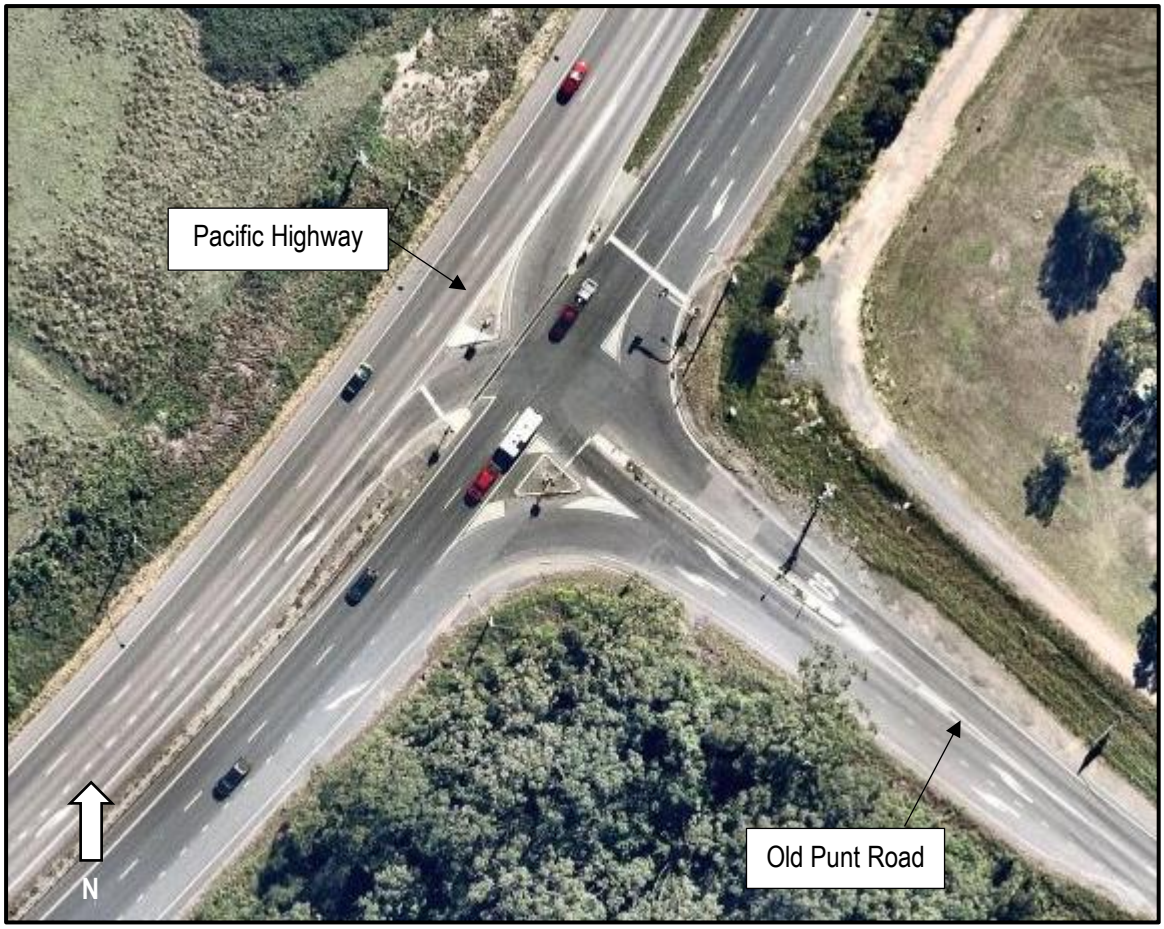


Figure 2-4: Aerial view of the intersection of the Pacific Highway and Old Punt Road

2.2.2 Roadworks and Traffic Management Works

A review of the Port Stephens Council website indicates that there are currently no road upgrades or traffic management works occurring in the immediate vicinity of the site.

Planning is currently underway for the future extension of the M1 Pacific Motorway from its existing termination at Beresfield through to Raymond Terrace (M12RT). This project has been declared critical State Significant Infrastructure (SSI 7319), as it is considered essential to the State for economic, environmental or social reasons. RMS is currently carrying out an environmental assessment of the project through the completion of an EIS.

The construction of this road link will result in significant changes to the traffic flows in the locality, with a positive impact on the existing intersections of Tomago Road / Pacific Highway as well as Old Punt Road / Pacific Highway. There is currently no timetable available for the construction work to commence, with this being dependent on planning approval, future traffic needs and funding availability. The Infrastructure Priority List compiled by Infrastructure Australia lists the project as a Priority Initiative, with a near term delivery timescale (0-5 years).

To date the project has received the below funding allocation:

- The NSW Government has committed $200 million from Rebuilding NSW towards getting the project ready for construction.
- The 2019-20 Federal Budget allocated $1.6 billion towards the project which will see funding contributions each year between FY2021-22 and FY2027-28.
- The 2019-20 NSW Budget provided $4.3 million to continue planning for the future extension of the M1 Pacific Motorway to the Pacific Highway at Raymond Terrace.

The environmental assessment of the project was released in 2017, whilst the concept design is still being finalised. The preferred route is proposed to bypass Hexham and Heatherbrae providing approximately 15 kilometres of dual carriageway motorway with two lanes in each direction, with a number of interchanges including one providing connection to Tomago (refer to Figure 2-5). This connection would include road infrastructure located within the proposed development site including the New link road running between the proposed motorway and Old Punt Road with an east-west orientation (refer to Figure 2-6).

Consultation between the proponent and RMS is ongoing to ensure smooth delivery of both major infrastructure projects across the subject site. The location of utilities and road infrastructure on the conceptual site layout for the power station have been based on an alternative future road alignment of the interchange per discussions between RMS and the proponent.

From the consultation undertaken to date it is expected that construction works pertaining to the proposed power station development would be completed prior to works proceeding for the M12RT. In the event overlap of construction works may occur, on-going consultation with the RMS with regards to the planning for the project would continue to ensure the cumulative impacts of these project works are allowed for.

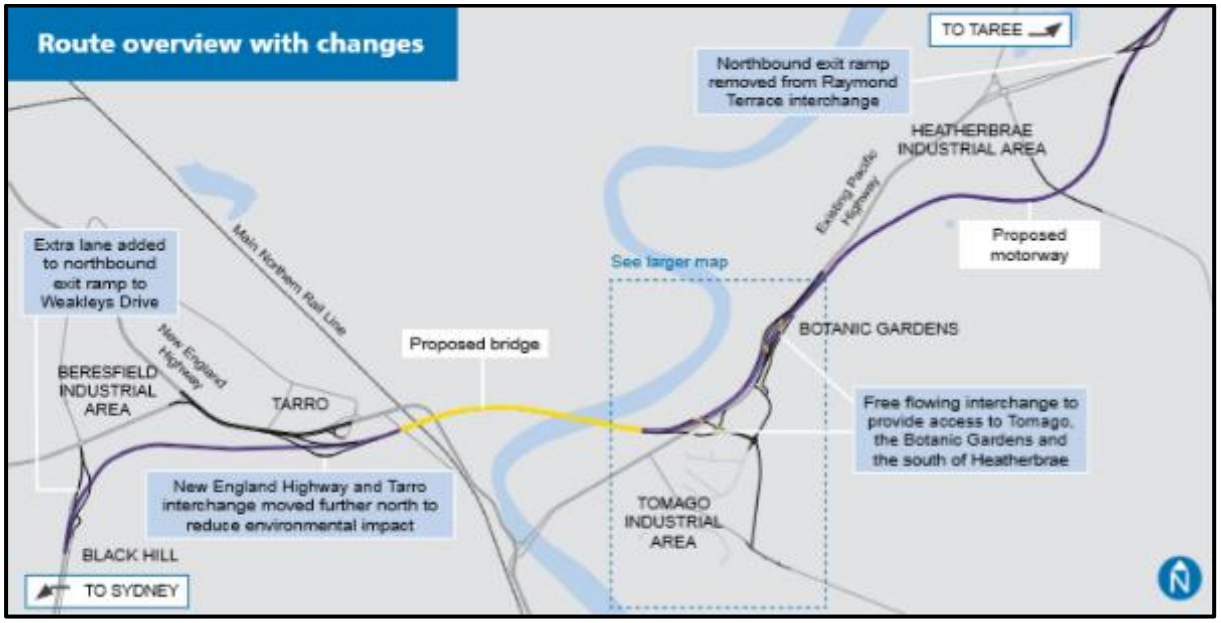


Figure 2-5: Preferred Route Overview of M1 Pacific Motorway extension to Raymond Terrace (Source RMS Community Consultation 2017)

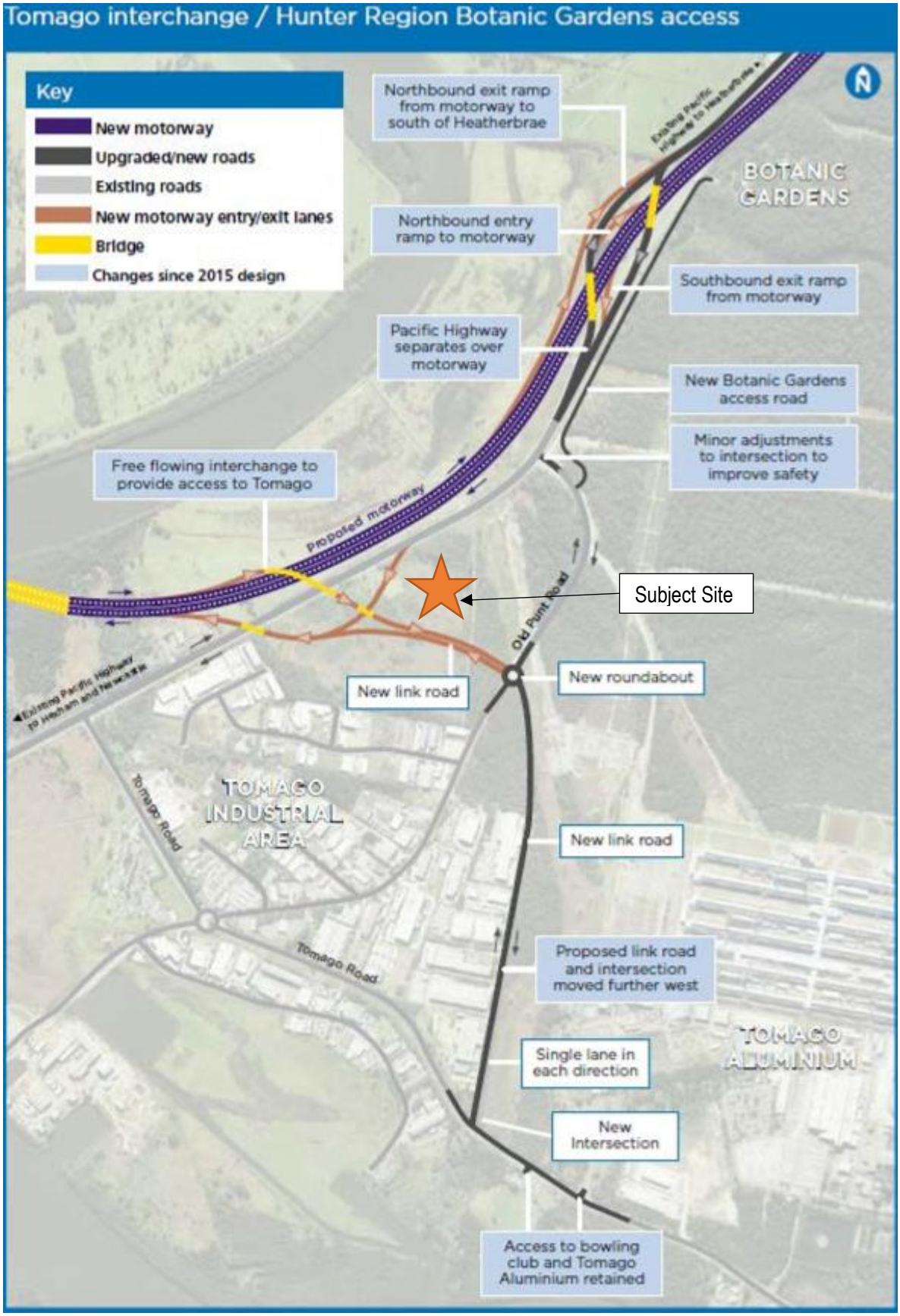


Figure 2-6: Indicative location of Tomago Interchange on M1 Pacific Motorway extension to Raymond Terrace (Source RMS Community Consultation 2017)

2.2.3 Pedestrian and Cycling Facilities

There are no pedestrian facilities providing connectivity across the local roads and no designated pedestrian pathways, reflecting the isolated nature of the area. Pedestrian demands observed during the surveys were very low.

There are no specific cycling facilities or cycling lanes provided along the local roads surrounding the site with cyclists required to travel within the vehicle lanes. Cyclist are able to utilise the shoulder/breakdown lane along the Pacific Highway.

2.3 Traffic Flows

2.3.1 Peak Hour Flows

Seca Solution completed manual traffic surveys to collected current vehicle and pedestrian volumes at intersections. Traffic data was collected at the roundabout intersection of Tomago Road and Old Punt Road to determine the road operation and traffic volumes. Traffic surveys were undertaken during the morning (6:00am to 8:30am) and afternoon (2:00pm to 5:00pm) on Tuesday 6th February 2018, with these times identified to encompass the typical busiest traffic generation periods for the Tomago Industrial area. From the surveys, the peak hours were determined as 6:00am – 7:00am and 4:00pm – 5:00pm.

A summary of the peak hour flows is shown in Figure 2-7 (AM) and Figure 2-8 (PM). The survey data is provided in **Appendix B.**

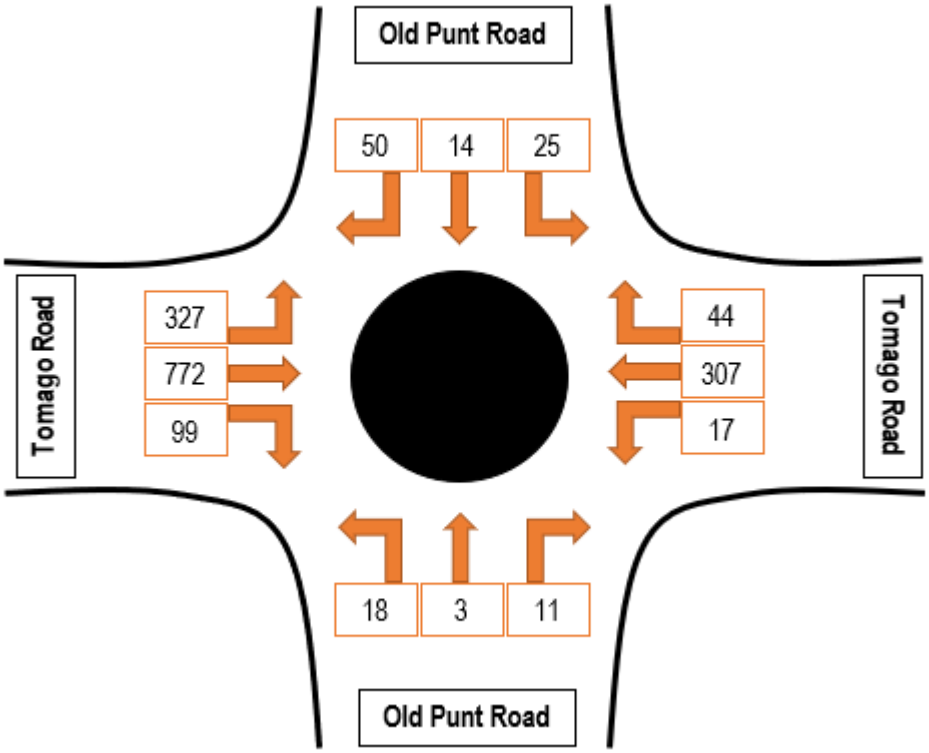


Figure 2-7: AM peak hour flows at Old Punt Road and Tomago Road

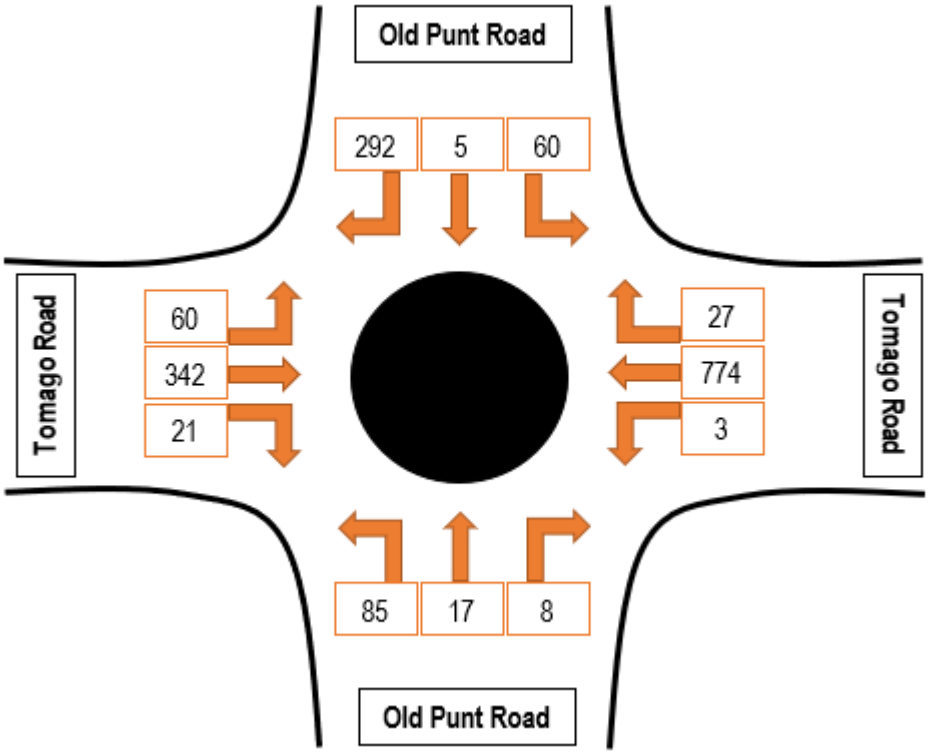


Figure 2-8: PM peak hour flows at Old Punt Road and Tomago Road

A summary of the peak hour traffic flows is provided in Table 2-1.

Table 2-1: Peak Hour Traffic Flows

Location		Peak Flow	
		AM	PM
Tomago Road (West of Old Punt Road)	Eastbound	1,198	433
	Westbound	375	1,151
Old Punt Road (North of Tomago Road)	Northbound	374	104
	Southbound	89	357
Tomago Road (East of Old Punt Road)	Eastbound	808	410
	Westbound	368	804
Old Punt Road (South of Tomago Road)	Northbound	32	110
	Southbound	132	29

It can be determined from Table 2-1 that the peak traffic demands along Tomago Road are eastbound in the AM and westbound in the PM, with 1,198 and 1,151 vehicles respectively. The RMS Guide to Traffic Generating Developments provides advice on urban road peak hour flows per direction. For one lane per direction the peak traffic flows (1,198 vehicles) along Tomago Road are classified as Level of Service (LoS) D. This indicates that drivers are restricted in their freedom to select desired speed and to manoeuvre within the traffic stream during this peak traffic flow period.

The peak demands on Old Punt Road are for 374 vehicles northbound in the AM peak and 357 vehicles southbound in the PM peak, indicating a LoS A with the limit for LoS B being 380 vehicles per hour based on RMS guidelines.

2.3.2 Daily Traffic Flows

Peak hour flows typically represent 10% of the daily traffic volumes. Taking the average of the total AM and PM peak hour traffic flows this equates to the following daily traffic volumes:

- Daily flows along Tomago Road (west of Old Punt Road) in the order of 15,800 vehicles per day.
- Daily flows along Old Punt Road (north of Tomago Road) are in the order of 4,600 vehicles per day.

RMS sample classifier data is available on Tomago Road, 180 metres north-west of Old Punt Road (Station Id: 05590). Data recorded in 2010 (the most recent data supplied) shows that the weekday daily flows of 13,401 vehicles evenly distributed in both directions with 12% heavy vehicles. Based on the 2018 daily traffic volumes of 15,780 vehicles obtained from the survey data, there has been a 17.8% increase in traffic flows along Tomago road in this location between 2010 and 2018 (in the order of 2.2% per annum).

There is also a permanent counter installed on the Pacific Highway, 380 metres south-west of Tomago Road (Station Id: 05001). Data from 2018 indicates weekday daily traffic flows in this location of 52,680 vehicles per day. The weekday daily flows recorded along the Pacific Highway in 2010 were 43,801 vehicles per day, equating to a 20.3% increase in traffic flows between 2010 and 2018 (in the order of 2.5% per annum).

2.3.3 Daily Traffic Flow Distribution

In the morning peak, the dominant movement is to the east along Tomago Road. These would represent employees for the extensive range of developments in the area including through traffic to Williamtown airport and RAAF base. Traffic flows are tidal with the majority of vehicles observed to travel westbound along Tomago Road in the PM.

Based on the AM and PM survey data, traffic flows along Old Punt Road to the north of Tomago Road also experience a tidal pattern with a northbound bias in the morning peak and a southbound bias in the evening peak.

2.3.4 Vehicle Speeds

No speed surveys were completed as part of the survey work, however, observations completed by Seca Solution staff during the traffic survey indicate that drivers lower their speed in the proximity of the roundabout, as appropriate. It was further observed that traffic flows during the peak appeared to be generally at or below the speed limit and it is assumed that this is due to the volume of traffic.

2.3.5 Heavy Vehicle Flows

Based on the traffic survey data heavy vehicle movements represented just under 12% (195 heavy vehicles) of the total vehicle flows in the AM and around 8% (140 heavy vehicles) in the PM.

Given the industrial development positioned along Tomago Road and Old Punt Road there is a requirement for these roads to provide vehicular access to accommodate a demand for a range of heavy vehicles up to and including B-double combinations.

2.3.6 Current Road Network Operation

Traffic observations were conducted at the two major connections onto the Pacific Highway in the vicinity of the project, being the intersection of the Pacific Highway and Tomago Road and the intersection of the Pacific Highway and Old Punt Road. Observations were also conducted at the intersection of Tomago Road and Old Punt Road. These observations were completed on Tuesday the 30th April 2019 with the following noted:

2.3.6.1 Intersection of the Pacific Highway and Tomago Road

The observations for this intersection confirm that this signal-controlled intersection operates well and manages the delays and queues. The volume of traffic through this intersection during peak periods does see long queues on the southbound approach to the traffic lights.

- The major traffic movement is along the Pacific Highway and the delays and queues for the southbound movement are low outside of the morning and afternoon peak periods. In the peak periods there are long queues southbound crested by the high demand for right turning traffic in and out of Tomago Road. With these traffic signals are vehicle actuated the capacity is maximised.
- The traffic signals do not stop the northbound through movement on the Pacific Highway.
- The right turn demand appeared high prior to 6am and associated with the operational hours of a number of industrial users located along Tomago Road. As the traffic demands on the Pacific Highway were lower at this time, the delays and congestion are acceptable.
- A second morning peak occurs at 8 am to 9 am which is most likely associated with general commuter demands.
- During the afternoon peak the queue for the left turn onto the Pacific Highway was observed to extend back to the roundabout intersection with Old Punt Road. This queue clears quickly on the green phase for this movement at the signals so as not to cause congestion.

2.3.6.2 Intersection of the Pacific Highway and Old Punt Road

Observations on site show that this intersection works effectively, with very low delays.

- This intersection is controlled by signals with right turns into and out of Old Punt Road controlled on demand
- Current delays and congestion are very low
- At peak periods generally between 7.00 & 8.00 southbound traffic can queue up to 300 metres. The queue dissipates within one phase of the signals with this only occurring every 3-4 minutes typically in the peak periods. The traffic signals timings at this location are vehicle actuated and the signal timings adjust to reflect the varying traffic demands through this intersection
- The queue for the right turns in and out of Old Punt Road are typically one vehicle only and all vehicles clear the lights in one phase.

2.3.6.3 Intersection of Tomago Road and Old Punt Road

Observations during the morning and afternoon traffic surveys indicate that the roundabout intersection of Tomago Road and Old Punt Road operates with minimal delays or congestion.

- In the evening peak, queueing was observed on Tomago Road to the west of the roundabout, with vehicles temporarily backed up into the roundabout. These queues related to the signalised T-intersection of the Pacific Highway 700 metres to the west. The queue cleared quickly in conjunction with the green phase of the signals.

The Sidra Intersection 8, which is a lane based micro-modelling software package recognised by the RMS for the modelling of single intersections and simple linear networks, was utilised to model the current operation of the intersection of Tomago Road/Old Punt Road. A summary of the results of this assessment are outlined in Table 2-2, with the Sidra outputs provided in **Appendix C.**

Table 2-2: Sidra Results - Existing Situation 2018 (AM/PM)

Approach	Movement	Level of Service	Average Delay (s)	95% Queue (m)
Tomago Road (West of Old Punt Road)	Left	A / A	4.4 / 5.4	5.1 / 11.8
	Through	A / A	4.7 / 5.6	10.5 / 27.0
	Right	A / A	11.4 / 12.8	10.5 / 27.0
Old Punt Road (North of Tomago Road)	Left	A / A	8.9 / 5.1	8.5 / 11.1
	Through	A / A	8.4 / 5.2	
	Right	B / A	15.0 / 9.4	
Tomago Road (East of Old Punt Road)	Left	A / A	3.4 / 3.7	11.5 / 4.4
	Through	A / A	3.9 / 3.8	31.3 / 8.3
	Right	A / A	10.8 / 11.0	31.3 / 8.6
Old Punt Road (South of Tomago Road)	Left	A / A	5.5 / 7.1	1.2 / 5.5
	Through	A / A	4.9 / 7.2	
	Right	A / A	9.5 / 11.5	

The results indicate that the roundabout intersection currently operates well with very minimal delays and queuing on all approaches during the peak hours, consistent with observations on site. Each approach operates well within its capacity, with individual movements providing an overall level of service A or B.

2.3.7 Traffic Safety and Accident History

A review of accident data provided by the RMS (**Appendix A)** indicates that in the period between July 2012 and June 2017 no accidents were recorded near the site along Old Punt Road.

Near the intersection of Tomago Road and Old Punt Road three accidents were recorded during the same 5 year period. One accident occurred at the intersection relating to a cross-traffic collision between a vehicle travelling westbound in Tomago Road and a southbound vehicle out of Old Punt Road. A second accident related to an overtaking manoeuvre along Old Punt Road 50 metres south of the Tomago Road intersection. The third accident, relating to a rear end collision, occurred on Tomago Road 20 metres to the south-east of the roundabout.

During this 5-year period there were no repeating causes for accidents at this intersection. Given the high volume of traffic and the subsequent low number of accidents recorded, it is evident that this intersection provides a good level of safety for road users.

2.4 Parking Supply and Demand

2.4.1 On-street Parking Provision

There is no formal on-street parking available along Old Punt Road near the site, however, there is an informal verge with sufficient width to allow vehicles to pull over safely along the eastern boundary of the site.

2.4.2 Off-Street Parking Provision

There are no public off-street parking opportunities in the vicinity of the subject site. Parking is provided on-site for a number of industrial developments in the surrounding area.

2.4.3 Parking Demand and Utilisation

There was no demand observed for parking along the site boundary on Old Punt Road during the survey work.

2.4.4 Short term Set down or pick up areas

There are no set down or pick up areas in the vicinity of the site.

2.5 Public Transport

2.5.1 Rail Station Locations

The site is not serviced by rail, with the nearest railway station in Hexham some 2.3km to the south-west of the subject site.

2.5.2 Bus Service Frequencies

Hunter Valley Buses operate one service through the locality being the 140 from Raymond Terrace to Newcastle. This route provides connection along Tomago Road/Old Punt Road with limited services from Monday to Friday during the periods below. The bus route map is outlined in Figure 2-9.

- Services every 30 minutes on average in the AM between 6:28am to 9:44am from Newcastle to Raymond Terrace.
- Services every 30 minutes on average in the PM between 3:24pm – 6:30pm from Raymond Terrace to Newcastle.

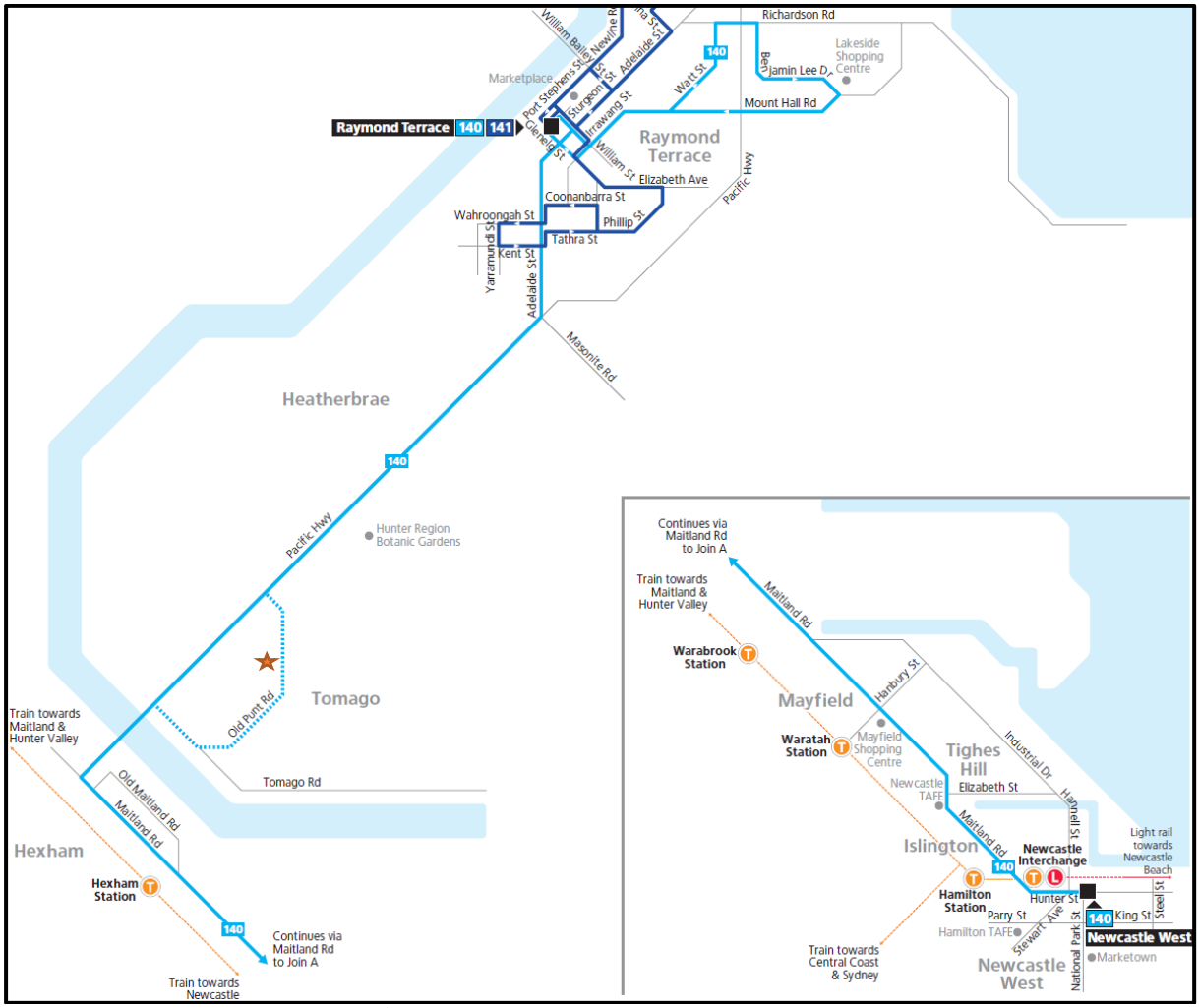


Figure 2-9: Bus route 140 (Subject site★)

2.5.3 Bus Routes and Associated Facilities

The bus route 140 Raymond Terrace to Newcastle utilises the road network in the vicinity of the project site. There are bus stops either side of the Pacific Highway to the east of the intersection with Tomago Road. Both of these provide seating and shelter.

There are informal bus stops along Old Punt Road located to the south of Kennington Drive. There are bus stops located on Tomago Road 400 metres to the west of the roundabout intersection with Old Punt Road, near the Tomago Village Van Park. The eastbound stop provides seating and shelter, whilst there are no facilities provided for the westbound stop.

2.6 Other Proposed Developments

A review of the Port Stephens Council DA tracker has determined the following significant development applications have been recently approved or are currently under assessment in the locality:

- DA (16-2019-181) for an Industrial warehouse, workshop, ancillary office and associated works including car parking and landscaping at 15 Old Punt Rd, Tomago.
- DA (16-2018-817-1) Heavy industry - Galvanizing plant (use of existing warehouse) capable of processing up to 50,000 tonnes of steel per annum, 13A Old Punt Rd, Tomago 2322 NSW
- DA (16-2018-752-1) Depot – construction of Industrial building and associated office, car parking, landscaping and site works at 9 Kennington Dr, Tomago.
- DA (16-2016-794-3) – S4.55 modification to caravan park at 1824 Pacific Hwy, Tomago 2322 NSW

As discussed in Section 2.3.2 the M1 extension to Raymond Terrace is to include a Tomago Interchange that will incorporate new road links in the surrounding area, including within the subject site.

3. Proposed Development

3.1 The Development

The proposed development involves the construction and operation of an approximately 250 MW dual fuel power station (gas or diesel) with ancillary infrastructure including connection to gas supply, gas compression facilities, fuel storage tanks (2x 750kL), water management facilities and grid connection. This includes the construction and operation of a gas pipeline and an electricity transmission line. The main elements of the project are as follows:

- Power station comprising reciprocating engine generators/aero-derivate gas turbine generators, necessary supporting ancillary equipment and supporting infrastructure.
- 132kV electricity transmission line to the existing Tomago switching yard, operated by TransGrid.
- Gas transmission/storage pipeline(s) and receiving station, compressor units, and ancillary infrastructure.
- Storage tanks and laydown areas.
- Water management infrastructure including pond(s), a connection to Hunter Water potable and non-potable service and discharge infrastructure in line with Hunter Water requirements.
- Diesel storage and truck unloading facilities.
- Site access road.
- Office / administration, amenities, workshop / storage areas and carparking.

The project has a capital investment value of approximately $400 million.

3.1.1 Phasing and Timing

Construction of the power station is expected to begin in 2021, with construction expected to take approximately two years, allowing for full operation by 2022. Key construction activities include:

- Clearing of vegetation at the proposed power station site and as required along the electrical transmission and gas pipeline(s) easements.
- Demolition of existing house if not repurposed during construction.
- Installation of gas pipeline(s) and electrical transmission line infrastructure.
- Earthworks to prepare the power station site and construction areas.
- Installation of foundations and underground services.
- Installation of civil, mechanical and electrical plant and equipment.
- Commissioning and testing.

3.1.2 Working Hours

The power station, whilst designed to operate 24 hours per day, 7 days per week, is expected to run at a capacity factor of around 14%. That is, it is expected to be operational 14% of the year.

Staffing during operation would be minimal (circa 23 staff).

Staff on site may be higher during periods of maintenance and visitors could see a further seven people on site across the day.

3.1.3 Design vehicles for access and circulation requirements

Operationally the largest vehicle that may require access to the site would be tankers associated with the delivery of diesel and removal of wastewater, with this to be completed by 50m^3 B-Doubles. Movement of large pieces of equipment or pipes may be necessary during the construction period or maintenance. These would be infrequent, with access requirements for any oversize vehicles to be accommodated within the Construction Traffic Management Plan (CTMP) to be completed as part of the detailed design.

Port Stephens Council requires all vehicles to enter and exit the site in a forward direction. The on-site traffic management plan will cater for this requirement.

3.2 Access

3.2.1 Access Location

Access to the development is proposed off Old Punt Road along the eastern boundary of the subject site, with a new access road to be constructed. This access is to be located in the south-east corner of the subject site, approximately 110 metres north of the intersection of Kennington Drive and Old Punt Road (Figure 3-1). A secondary access to the site is to be allowed for emergency evacuation exit onto the Pacific Highway. This access will be gated and will only be utilised if required in the event of an emergency.

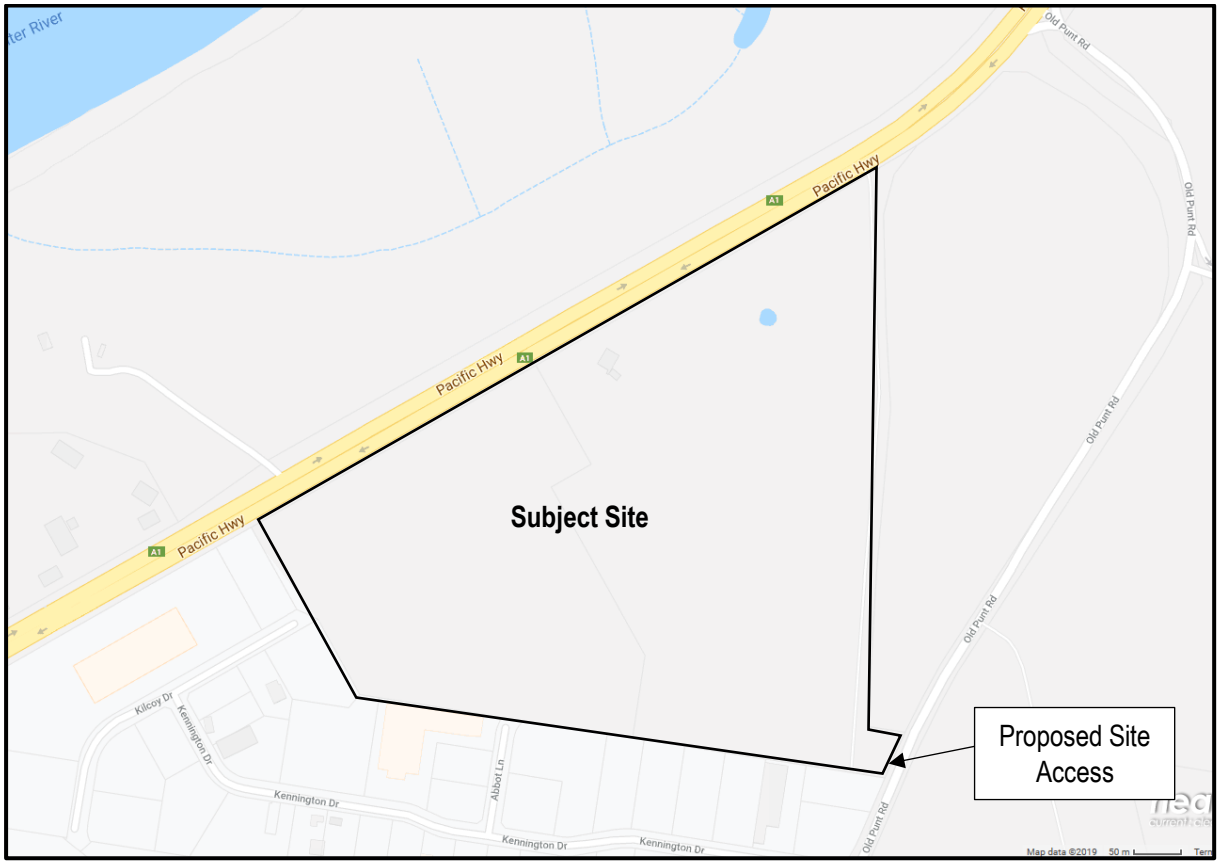


Figure 3-1: Site access location off Old Punt Road

RMS identified no safety or capacity issue with the nominated access location. RMS have indicated that the detailed design for the M12RT could see changes to the proposed road layout in this location that may impact upon the project access, however no clear indication of future works could be provided at this stage. As such, the proposed access may be impacted upon by the final design of the M12RT and so would be the subject of ongoing discussions with the RMS as the detailed design of the M12RT progresses.

3.2.2 Sight Distance

The intersection of the proposed access road with Old Punt Road has been assessed against the requirements of the Austroads Guide to Road Design Part 4A. The critical requirement for this intersection is Safe Intersection Sight Distance (SISD). For the posted speed limit of 60 km/hr along Old Punt Road, a SISD of 114 metres is specified. Sight distance has been assessed on site, with visibility to the left being in the order of 140 metres (Photo 1), whilst visibility to the right is in the order of 340 metres (Photo 2). As such, sight distance requirements are satisfied at the proposed sight access.

Photo 1: Sight distance to the left (north) out of the proposed site access

Photo 2: Sight distance to the right (south) out of the proposed site access

3.2.3 Service Vehicle Access

The design of the internal access road would allow appropriate circulation for service vehicles. This road would provide access for construction vehicles as well as the truck loading/unloading facilities during the initial period of operation. The road network in Tomago is adequate to cater for heavy vehicles, with these roads already servicing the surrounding industrial developments. During construction oversized or heavy items would be transported along the Pacific Highway and Old Punt Road.

3.2.4 Queuing at entrances

No vehicle queues are anticipated at the new access road for the project when operational, with no potential hold point along the access road for at least 100 metres, allowing free flow into the site.

3.2.5 Access to Public Transport

Only a small number of bus services operate through the locality. This reflects the minimal local demand for these services. There are no formal pedestrian pathways and pedestrians are able to walk along the road verge and reserve where required.

3.3 Circulation

3.3.1 Pattern of circulation

The internal road network would allow for appropriate circulation in accordance with the requirements of Port Stephens Council DCP and AS2890.

3.3.2 Internal Road width

The width of the parking aisles and internal roads would be provided in accordance with AS2890 allowing for the two-way movement of vehicles, including construction traffic. This would be confirmed in conjunction with the detailed design for the site.

3.3.3 Internal Bus Movements

No internal bus movements are anticipated for the project during the operation phase.

3.3.4 Service Area Layout

Truck loading/unloading facilities are incorporated as part of the project design, with proposed vehicular turning circles to accommodate the largest design vehicle. This would also be confirmed as part of the detailed design for the site.

3.4 Parking

3.4.1 Proposed Supply

The site is large and so during construction, all staff would be able to park on site with no impact on the external road network. Appropriate laydown areas for heavy vehicles would also be provided on site.

Once operational, on-site parking would be provided to cater for the operational demands for the development. The parking layout would be confirmed as part of the detailed design.

3.4.2 Council code and local parking policies and plans

Port Stephens Council DCP does not specify a parking rate for this type of land use.

Industrial uses would typically allow 1 parking space per employee with sufficient parking to cater for shift changeover and the operational requirements of the facility.

3.4.3 Pedestrian and Bicycle Facilities

Given the locality of the site and the type of development, it is considered there is no requirement for pedestrian or bicycle facilities. Any pedestrian and cyclist movements would be catered for per the existing situation using the surrounding roads and road reserve, with very low demands expected within the immediate area.

4. Transportation Analysis

4.1 Traffic Generation

Traffic generation has been determined from first principles in conjunction with advice from the study team on the anticipated demands for the development, as well as comparison to similar developments. This assessment has allowed for traffic associated with the construction and operational phases of the development, with the extent of activities associated with its construction phase to generate the greater impact on the road network albeit for a short period only (approximately 2 years).

4.1.1 Construction Traffic

The majority of construction traffic demand is expected to occur in the morning, coinciding with the AM peak. As such, the following assessment of construction traffic impacts focuses on the AM peak, as the worst case.

The major construction tasks for the power station include:

- Dual fuel power station;
- Gas pipeline;
- Transmission line;
- Access road/utility corridor.

The traffic demands associated with construction will vary significantly across the life of the project, depending on the stage of construction and associated works required. An allowance for the highest anticipated demand for construction staff and delivery movements for a single day has been applied in order to assess the worst-case impact upon the local road network. This has been determined as follows:

- Total construction workforce to peak at approximately 300 per day during the latter part of construction and an estimated 270 during the first year;
- Deliveries per day of up to 50 trucks during the first year of construction, dropping to approximately 30 per day during the final year.

To allow for a robust assessment of the impact during the critical morning peak hour, the following assumptions have been made:

- Two thirds of all daily material deliveries to occur during the AM peak, with these trucks to enter and exit within the peak hour;
- All inbound staff movements will occur during the AM peak.

Allowing for the distribution outlined above, the project would generate the following AM peak hour construction traffic during the absolute peak of construction (year 1):

- Up to 66 truck movements (33 inbound / 33 outbound);
- Up to 270 staff movements, all inbound.

Following construction, it is expected there would be two 750kL tanks that would likely be empty. Upon commissioning there would be a one-off requirement to fill these tanks, which would generate demand for 30 tanker movements with a capacity of 50m^3 (50kL). This is less than the heavy vehicle demands outlined above that will be generated during the peak construction period. Once operational these tanks would be kept up to volume on an as needed basis.

The project would require Over Size Over Mass vehicles to access the site. These vehicles are controlled under separate approval from the road authority and would have specific controls with regard to access and turn movements. These vehicles, depending on their size, would have escort vehicles and potentially Police cars that can control other road users as required under RMS Guidelines. These would be determined as part of the detailed CTMP for the project.

4.1.2 Operational Traffic

Once operational, the development would generate daily traffic associated with staff movements, as well as heavy vehicles (Tankers) associated with the regular removal of wastewater and delivery of diesel on an as needed basis. Other servicing would be minimal with general waste collection and water removal being the only regular demand.

4.1.2.1 Staff Movements

The operational stage may have up to 23 staff at any time including management, administration and maintenance personnel on rotating shifts. Visitors during the day shift could see a further 7 people, with these arrivals/departures likely to occur outside of the peak periods on the road network. The peak demand would be during shift cross over either in the morning or afternoon, which as a worst case could see:

- Up to 23 inbound / 23 outbound movements, in the AM and PM.

4.1.2.2 Tanker movements

In order to determine the number of tanker movements required, the study team has provided projections of the wastewater volumes and diesel fuel usage for the site. This assessment has allowed for two scenarios:

Peaking operation – This is the planned operational frequency across the whole of a year, which is 14%. This means the power station is expected to operate 14% of the time.

- During peaking operation there will be no tankers required for the removal of wastewater, with all wastewater to be evaporated.
- The typical peaking operation will utilise gas fuel, requiring no tanker movements. Peaking operation using diesel fuel could see up to 60 B-Double tanker one-way movements per day, with a capacity of 50m^3 (50,000L).

Unconstrained base load operation – This refers to operation 24 hours per day, or 100% of the time and as such, is the absolute worst-case scenario.

- During unconstrained operation the removal of wastewater could see up to 34 x 20m^3 capacity one-way tanker movements per day (34 inbound 34 outbound).
- Continuous operation using diesel fuel could see up to 60 B-Double tanker movements (one-way) per day (60 inbound 60 outbound).
- In total this operation would see 94 inbound trucks and 94 outbound trucks per day.

4.1.2.3 Combined Operational Movements

Combining the above staff movements and tanker movements during peaking operation gives the traffic demands summarised in Table 4-1. This allows for peaking operation using gas fuel and diesel fuel, noting however that operation using diesel fuel will not occur on a regular basis.

Table 4-1: Traffic demands during peaking operation

	Deliveries (HGV)			Workforce and visitors (LV)	
	Trucks per day	**Trucks per peak hour**	**Truck movements per peak hour**	**AM peak hour**	**PM peak hour**
Gas Fuel	0	0	0	46	46
Diesel Fuel	60	6	12	46	46

Combining the staff movements and tanker movements during unconstrained continuous operation using diesel fuel gives the traffic demands summarised in Table 4-2.

Table 4-2: Traffic demands during peaking operation

Deliveries (HGV)			Workforce and visitors (LV)	
Trucks per day	**Trucks per peak hour**	**Truck movements per peak hour**	**AM peak hour**	**PM peak hour**
94	10	20	46	46

As the traffic demands associated with the construction phase are significantly higher during the peak periods, the balance of the assessment has focused primarily on the impact of peak construction traffic volumes.

4.1.3 Daily and Seasonal Factors

Traffic movements for deliveries and staff would vary over the course of the construction phase depending on the scope of works, with the peak movements outlined above.

Once operational, there would be limited daily and seasonal variation in light vehicle movements associated with the development. The demand for heavy vehicles would vary depending on the operation of the power station, as outlined in Section 4.1.2.2. This demand can also be impacted upon by heavy rainfall requiring additional pump outs from the waste water pond. This would vary based upon the extent of rainfall and during dry spells there will be no need for additional truck movements.

4.1.4 Pedestrian Movements

It is considered that the proposed development would not generate additional pedestrian demands. This is consistent with the isolated nature of the area and limited public transport. There are also limited short or long-term residential accommodation options within walking distance of the proposed power station which would restrict construction or operation employees walking to/from work.

4.2 Traffic Distribution and Assignment

The distribution of construction related traffic on the external road network has been assessed as this allows for the critical impact of the development on the road network to be understood, with the impact of the operational traffic to be less by comparison.

4.2.1 Origin / Destinations Assignment

As discussed in Section 4.1.1, the project would generate the following AM peak hour construction traffic during the absolute peak of construction (year 1):

- Up to 66 truck movements (33 inbound / 33 outbound);
- Up to 270 staff movements, all inbound.

The origin/destination of the above movements is outlined below.

Heavy Vehicles

- 90% to/from the south (Sydney / Newcastle) along the Pacific Highway.
- 10% to/from the north (Raymond Terrace / Brisbane) along the Pacific Highway.

It is anticipated that all heavy vehicle movements will utilise the intersection of the Pacific Highway / Old Punt Road to access the subject site, thereby approaching the site access road from the north.

Construction Staff

It is anticipated that the majority of the construction workforce would come from Newcastle and its surrounds and would travel to the site by private and/or shared vehicle. Based on the extent of development and population density in each direction:

- 20% to/from the north. Utilising the intersection of the Pacific Highway / Old Punt Road to access the subject site.
- 70% to/from the south along the highway, distributed equally between the intersection of the Pacific Highway / Old Punt Road (northern intersection) and the Pacific Highway / Tomago Road (southern intersection) approach the site access road equally from the north and south along Old Punt Road.
- 10% to/from the east. Utilising the intersection of Tomago Road / Old Punt Road to approach the subject site from the south

Applying the above distributions to the peak construction traffic, sees the origin/destination outlined in Table 4-3.

Table 4-3: Construction traffic origin/destination (Inbound/Outbound)

	Light Vehicles		Heavy Vehicles	
	AM	**Daily**	**AM**	**Daily**
To/from the North	54/0	54/54	3/3	5/5
To/from the South	189/0	189/189	30/30	45/45
To/from the East	27/0	27/27	-	-
TOTAL	270/0	270/270	33/33	50/50

The distribution of this traffic on the local road network through the key intersections proving access to the project site during the AM peak period is outlined in Figure 4-1.

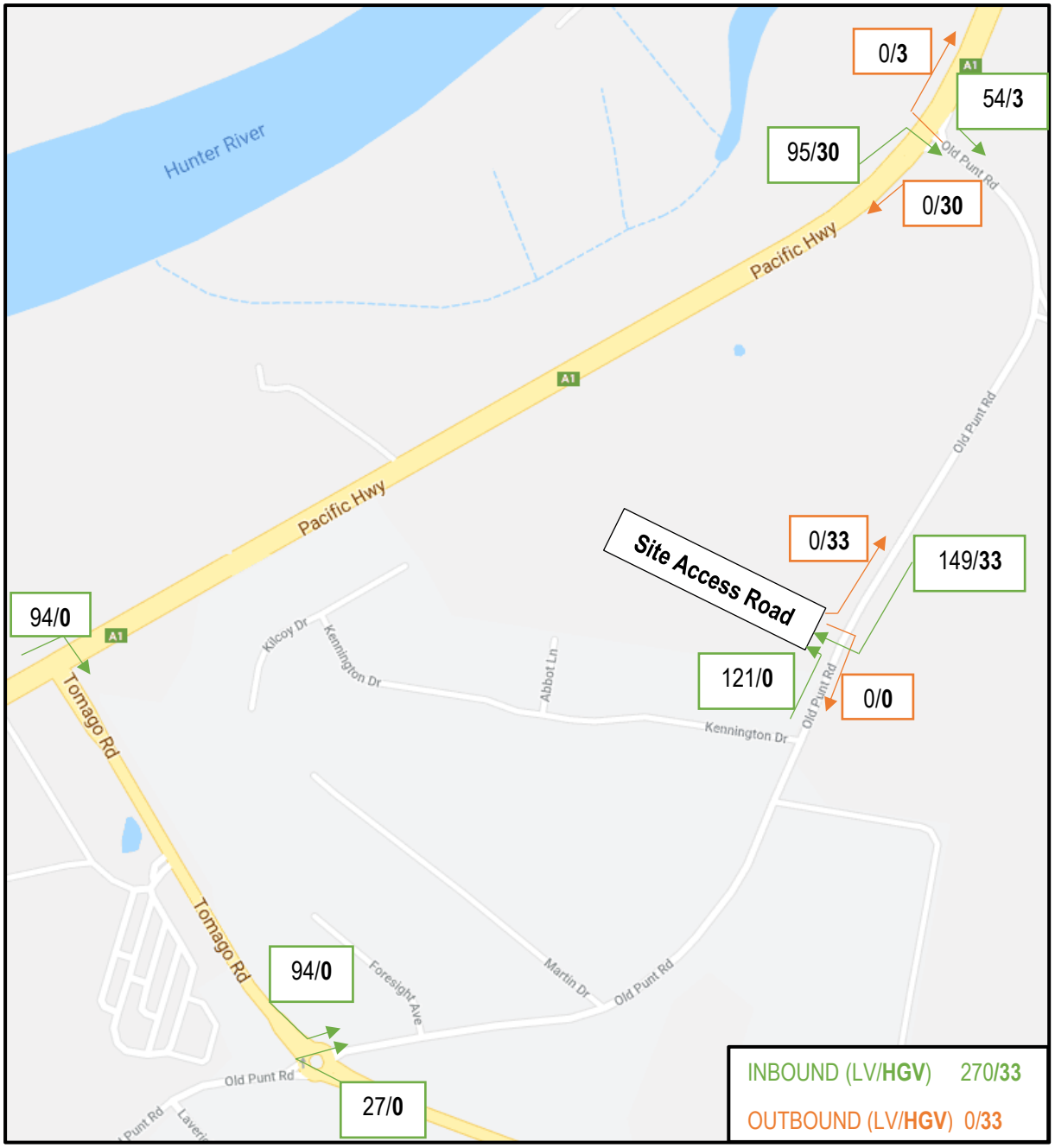


Figure 4-1 - Distribution of construction traffic on the road network during the critical AM peak period

It is noted that access to the subject site is available via the Pacific Highway frontage. Any use of this access for construction traffic would be subject to traffic management and RMS approval. Per the assignments outlined above, the signalised intersection of the Pacific Highway and Old Punt Road would accommodate primary access to the subject site and would be the identified transport route for haulage and site vehicles during construction and operation. For heavy vehicles this route would be controlled by the Driver's Code of Conduct for the site, prepared in conjunction with the Construction Certificate approvals for the project. If the intersection of Old Punt Road and the Pacific Highway is blocked then these heavy vehicles can divert to use the intersection of Tomago Road and the Pacific Highway. Construction staff accessing the site from the Pacific Highway would be able to do so via either of the abovementioned routes, with this assessment allowing for an even distribution. This reflects drivers' behaviour in selecting routes they perceive to be the quickest at the time and in doing so sees vehicles movements distributed over both intersections.

4.3 Impact on Road Safety

It is considered that the additional traffic volumes associated with the project would have a minimal impact on traffic safety in the locality, which accommodates high traffic demands during the peak periods.

The majority of traffic would have an origin/destination along the Pacific Highway, with the key intersections in the locality controlled by traffic signals. All heavy vehicles would be directed to access the site via the intersection of the Pacific Highway / Old Punt Road, which allows for all turning movements in/out of Old Punt Road. Observations on site indicate this intersection operates efficiently and is currently utilised by a number of heavy vehicles (including B-doubles) utilising Old Punt Road to access surrounding industrial developments. It is considered this intersection currently operates at an acceptable level of safety given the high volume of traffic, with the traffic signal control providing the highest level of road safety for intersections. The additional traffic flows associated with the development would have minor and acceptable impact upon the existing operation.

Similarly, it is considered the intersection of the Pacific Highway / Tomago Road would continue to provide an adequate level of road safety, with only light vehicles associated with the site utilising this intersection. The additional trips are low relative to the exiting traffic flows at this intersection and would see negligible change to its existing operation. The traffic associated with the construction, whilst significantly higher than the operational traffic, is for a relatively short period (2-3 years) and is consistent with other major industrial developments that have been constructed within the Tomago industrial precinct (E.g. WesTrac, Newcastle Gas Storage Facility).

A review of the accident data provided by the RMS at the intersection of Tomago Road and Old Punt Road shows there were 3 accidents recorded in the 5-year period between 2012 and 2017, with no repeating causes. Allowing for the traffic flows associated with the development, it is considered this intersection can continue to operate to its existing standard which provides a safe environment for road users. The operation of this intersection has been confirmed by modelling using Sidra Intersection 8, with the result outlined in Section 4.4.2.

In order to allow for right turns into the site access to occur in a safe manner (which includes all heavy vehicle movements), the provision of a channelised right turn treatment (CHR(S)) on Old Punt Road southbound is considered appropriate. This access control will be designed in accordance with Austroads Guidelines and will accommodate the swept path movements of B-doubles. This is discussed further in Section 4.4.2.

Any requirement for oversize vehicles to access the site will be governed by a Traffic Control Plan (TCP), with this included as part of a CTMP to be completed as part of the detailed design. This shall ensure road safety is maintained for these movements. The TCP will detail the route for such vehicles, which may differ from the construction routes identified above if required.

4.4 Impact of Generated Traffic

4.4.1 Impact on Daily Traffic Flows

The additional daily traffic that would be generated during the peak construction phase of the development has been estimated at 640 trips (320 inbound / 320 outbound). All heavy vehicles would arrive/depart to the north via the intersection of the Pacific Highway / Old Punt Road. Construction staff vehicles would be distributed along Old Punt Road in each direction, with the majority of vehicles accessing the Pacific Highway.

Based on the assignments outlined previously in Section 4.2.1, there would be an increase of approximately:

- 398 daily trips along Old Punt Road, north of the site access;
- 242 daily trips along Old Punt Road, south of the site access;

The current traffic flows along Old Punt Road to the north of the site are lower than those to the south, given there is a greater number of developments accessed off this road to the south. Based on the surveyed flows to the immediate north of the roundabout intersection with Tomago Road, the development would see daily flows increase up to 4,862 vehicles per day over the current 4,620, equating to just over a 5% increase.

The distribution of traffic would also see an additional expected:

- 188 vehicles along Tomago Road (west of Old Punt Road), to 15,968 vehicles per day (approximately 1% increase);
- 458 vehicles along the Pacific Highway (south of Tomago Road) to 53,100 vehicles per day (approximately 1% increase).

The short-term increase in the daily traffic flows during construction would be acceptable and represent negligible impacts on the existing operation of the local road network, which currently carries high traffic volumes.

Operational traffic would have a minimal impact on daily traffic flows. It is noted that the M12RT project would see traffic volumes along the Pacific Highway decrease significantly, thereby having a positive impact upon traffic flows in this locality. It would also provide additional routes for traffic accessing the broader road network.

4.4.2 Peak Hour Impacts on Intersections

As discussed previously the key intersections of the Pacific Highway / Old Punt Road and the Pacific Highway / Tomago Road are controlled by traffic signals, which offer the highest level of road safety and control for drivers. It is considered these intersections have the capacity to cater for the increased flows associated with the construction of the development in a safe manner. All heavy vehicles accessing the site would do so via the intersection of the Pacific Highway / Old Punt Road, with this intersection considered to have spare capacity and offer an adequate level of road safety to accommodate these movements, noting that once operational the development would generate lower traffic demands. In the future, the M12RT project would see significant improvements in the operational efficiency of these intersections having removed significant through traffic.

The proposed site access shall be able to operate efficiently, with the through traffic volumes along Old Punt Road in this location being relatively low and turning movements into the site completed with acceptable delays and queuing. The traffic accessing the site is expected to peak at 640 vehicles per day (320 inbound, 320 outbound), however, across the majority of the construction phase it is expected traffic movements would be significantly lower. Once operational, the traffic demands will be lower.

The provision of a channelised right turn (CHR) treatment on Old Punt Road is considered appropriate for the site access on the grounds of road safety to cater for the higher traffic flows during construction. All heavy vehicles would approach the site from the north, thereby turning right into the site, with up to 50 trucks per day undertaking this manoeuvre the majority of which would occur in the morning peak period. The provision of a CHR(S) turn treatment at the site access would allow any vehicles turning right into the site to do so with negligible impact upon through traffic flows along Old Punt Road. Opposing traffic flows are low in this location so queuing would be minimal. The design of this turn treatment would be undertaken in accordance with Austroads Guidelines, with an indicative layout shown in Figure 4-2.

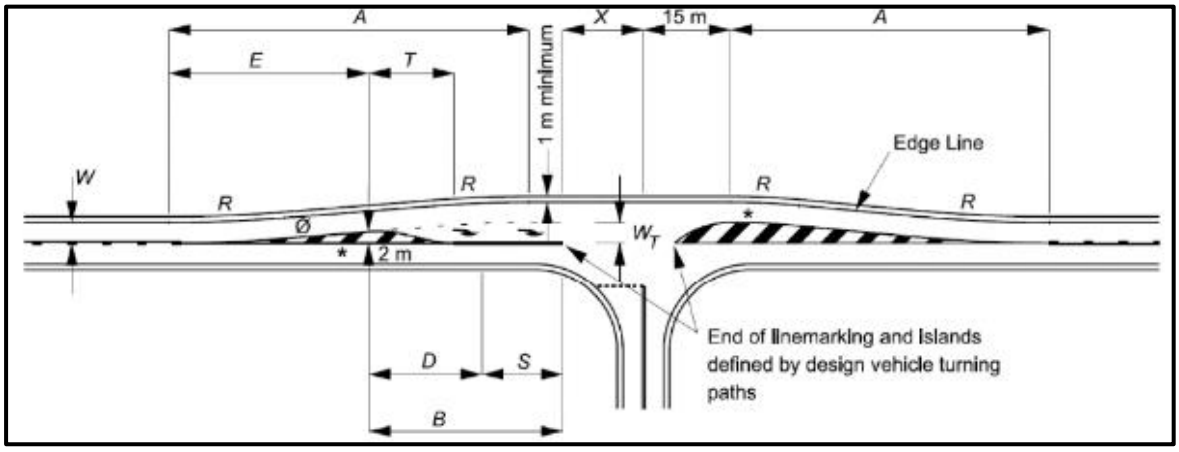


Figure 4-2: Indicative CHR(S) turn treatment (Source: Austroads Guide to Road Design Part 4 (2017) - Appendix A)

It is considered that vehicles turning left into the site from Old Punt Road (light vehicles only) would be able to do so in a safe manner with minimal impact upon northbound through movements, given there is only a small number of vehicles passing the site access on Old Punt Road. As such no left turn treatment is proposed for the site access.

The impact of construction staff using the roundabout intersection of Tomago Road and Old Punt Road has been assessed during the critical AM peak period. This intersection has been assessed using Sidra Intersection 8, with the results outlined to follow.

4.4.2.1 Sidra modelling - Tomago Road and Old Punt Road

Sidra modelling has been completed for the roundabout intersection of Tomago Road and Old Punt Road to determine its capacity to support the increased traffic demands associated with the proposed development. Three scenarios were considered in the modelling:

- Existing situation – Detailed previously in Section 2.4.6.3.
- Allowing for the additional traffic associated with the proposed construction.
- Future design year allowing for 2.5% annual growth along Tomago Road over 10 years.

The results of the modelling for the additional traffic associated with the proposed construction is provided in Table 4-4 to follow.

It can be seen allowing for the increase in traffic demands associated with the construction of the proposed development, the roundabout intersection would continue to operate to its current standard with no change to the current level of service on any approach and only very minor increases in the average delays and queuing for some movements.

Table 4-4: Sidra Results - 2018 with full development

Approach	Movement	Level of Service	Average Delay (s)	95% Queue (m)
Tomago Road (West of Old Punt Road)	Left	A	4.4	5.6
	Through	A	4.7	11.3
	Right	A	11.3	11.3
Old Punt Road (North of Tomago Road)	Left	A	11.1	11.7
	Through	A	10.5	
	Right	B	17.3	
Tomago Road (East of Old Punt Road)	Left	A	3.6	15.0
	Through	A	4.1	34.9
	Right	A	11.0	34.9
Old Punt Road (South of Tomago Road)	Left	A	5.6	1.2
	Through	A	5.0	
	Right	A	9.6	

The results of the modelling for the future design year allowing for 2.5% annual growth along Tomago Road over 10 years are provided in Table 4-5. The intersection would continue to operate well within its capacity providing level of service A or B on all approaches. Increased traffic demands would see some approaches experience increases in the average delays with a possibility of some additional queuing, however, these remain within acceptable limits and would not have a noticeable impact on road users.

Table 4-5: Sidra Results - 2028 design year with 25% growth along Tomago Road (AM)

Approach	Movement	Level of Service	Average Delay (s)	95% Queue (m)
Tomago Road (West of Old Punt Road)	Left	A	4.5	7.2
	Through	A	4.9	14.9
	Right	A	11.4	14.9
Old Punt Road (North of Tomago Road)	Left	A	17.9	22.3
	Through	A	17.0	
	Right	B	24.7	
Tomago Road (East of Old Punt Road)	Left	A	3.8	17.9
	Through	A	4.3	57.6
	Right	A	11.3	57.6
Old Punt Road (South of Tomago Road)	Left	A	5.9	1.5
	Through	A	5.3	
	Right	A	9.8	

Overall, the intersection of Tomago Road and Old Punt Road provides sufficient spare capacity to support the proposed development, both in the short term catering for the higher traffic generation during construction and long term for the ongoing operation of the site.

4.4.3 Background traffic and other developments

As discussed previously, the proposed extension of the M1 to Raymond Terrace by RMS would see significant changes to the flow of traffic in the Tomago area, with a Tomago Interchange included as part of the preferred option. Traffic flows along the Pacific Highway would decrease as a result of this project, which would see improvements and additional capacity in the operation of the signalised intersections with Old Punt Road and Tomago Road. This would provide capacity for the ongoing growth in traffic over time through this area.

Changes to Old Punt Road would occur as part of these works, with the impact of these to be assessed by RMS in the detailed design of the M12RT. It has been noted that the access to the proposed development may be impacted upon by this development which would be determined in conjunction with RMS.

Whilst there is on-going funding for this project, there is no timeframe for the construction of these works to commence.

4.4.4 Impact of Construction Traffic

The construction traffic has been identified as having the key impact of the proposed development on the road network. The capacity of the road network has been assessed in section 4.4.2 above.

All construction work would be contained within the site with parking associated with construction staff to be managed within the site, given the large site area. The site will require the movement of heavy vehicles in and out of the site which would need to be safely managed. A CTMP would be prepared as part of the detailed design for the project. This CTMP would include any required TCP to control traffic movements and maintain safety during the construction works. This would include allowance for the transport of any oversize loads required, which are controlled under separate approvals. There is the opportunity for vehicle access via the Pacific Highway frontage, with use of this to be to subject to traffic management and RMS approval.

4.5 Public Transport

4.5.1 Options for improving services

It is considered that the development would not require the provision of any upgrade of public transport.

4.5.2 Pedestrian Access to Bus Stops

No upgrade is required as a result of this development given the minimal local demand for bus services in the area.

5. Summary and Recommendations

5.1 Summary

From the site survey work undertaken and the review of the proposed development and associated plans against the requirements of the RMS Guide to Traffic Generating Developments and Austroads Guide to Traffic Management, it is considered that there are no impediments for approval by the road authority on the grounds of traffic, parking and access.

The critical impact of the development relates to the extent of activities associated with the construction phase. During this short period (2-3 years) the number of heavy vehicles associated with deliveries and light vehicles associated with construction staff would vary significantly depending on the stage of works. An allowance for the maximum number of vehicles anticipated to access the site across a day has been made as part of the traffic assessment, with this determined as approximately 270 light vehicles and 50 heavy vehicles. It is noted that traffic demands across the majority of the construction period would be much lower, with the above allowing for the worst case. The impact of the peak construction flows on the road network has been assessed allowing for the flows during the critical AM peak hour which would see the bulk of delivery movements, as well as construction staff arrivals. Impacts during the afternoon are less given less heavy vehicle movements and the distribution of construction staff departing across a wider time horizon.

All heavy vehicle demands for the development are to be controlled via a Driver Code of Conduct, to be prepared in conjunction with the Construction Certificate approvals for the project. This will allow for drivers to approach/depart via the existing intersection of the Pacific Highway / Old Punt Road. This intersection allows for all turning movements and has been determined, based on observations, to operate efficiently with spare capacity. This intersection is currently being utilised by a number of heavy vehicles accessing industrial developments in the Tomago area. It is considered this intersection can accommodate the peak traffic flows associated with the development, with the additional delivery and construction staff movements to have an acceptable impact on road safety with signalised intersections offering the highest level of safety for road users.

The intersection of the Pacific Highway / Tomago Road and Tomago Road / Old Punt Road was also assessed based on their capacity to safely accommodate the additional traffic demands to be generated by the proposed development, with construction staff to utilise these routes. The additional traffic generated by the development at the signalised intersection of the Pacific Highway / Tomago Road is minimal compared to the existing traffic volumes, with this increase to have a negligible impact on the exiting operation of this intersection. The unsignalised intersection of Tomago Road / Old Punt Road was assessed using Sidra allowing for the development flows during the critical AM peak period. The modelling determined this intersection would maintain the existing level of service on all approaches as a result of the development flows. Allowing for the development plus background growth of approximately 25% over ten years along Tomago Road would see this intersection continue to operate at an acceptable standard. It is noted that the M12RT project would create changes to the traffic flows in the locality of the subject site, having a positive impact on the signalised intersections on the Pacific Highway identified in this assessment.

The proposed site access off Old Punt Road has been assessed and satisfies the requirements of Austroads in relation to sight distance. A CHR(S) turn treatment on Old Punt Road is required to allow for the safe movement of construction traffic turning right into the site. There is no requirement for a left turn treatment. The site access and internal access road would be designed to allow for the movements of heavy vehicles. The proposed M12RT project may impact on the site access for this development. This would be subject to ongoing consultation with the RMS in conjunction with the design of this road upgrade.

Once constructed, the additional traffic movements generated by the development during operation would have a minimal impact on the surrounding road network. Typical traffic generation for the peaking operation (expected site operation for 14% of the year) will relate to the arrival and departure of staff, with approximately 23 staff on site at any one time. During the unconstrained base load operation (assuming 100% of the year) the removal of

wastewater could see up to 34 tankers per day, as well as up to 60 B-Double tankers. This traffic generation is lower than the peak traffic assessed for the site during construction and can therefore be accommodated on the road network.

There is sufficient site area to allow for all construction vehicles to be parked within the site. Once operational, parking would be provided to cater for the peak staffing demands for the proposed development, as appropriate.

5.2 Recommendations

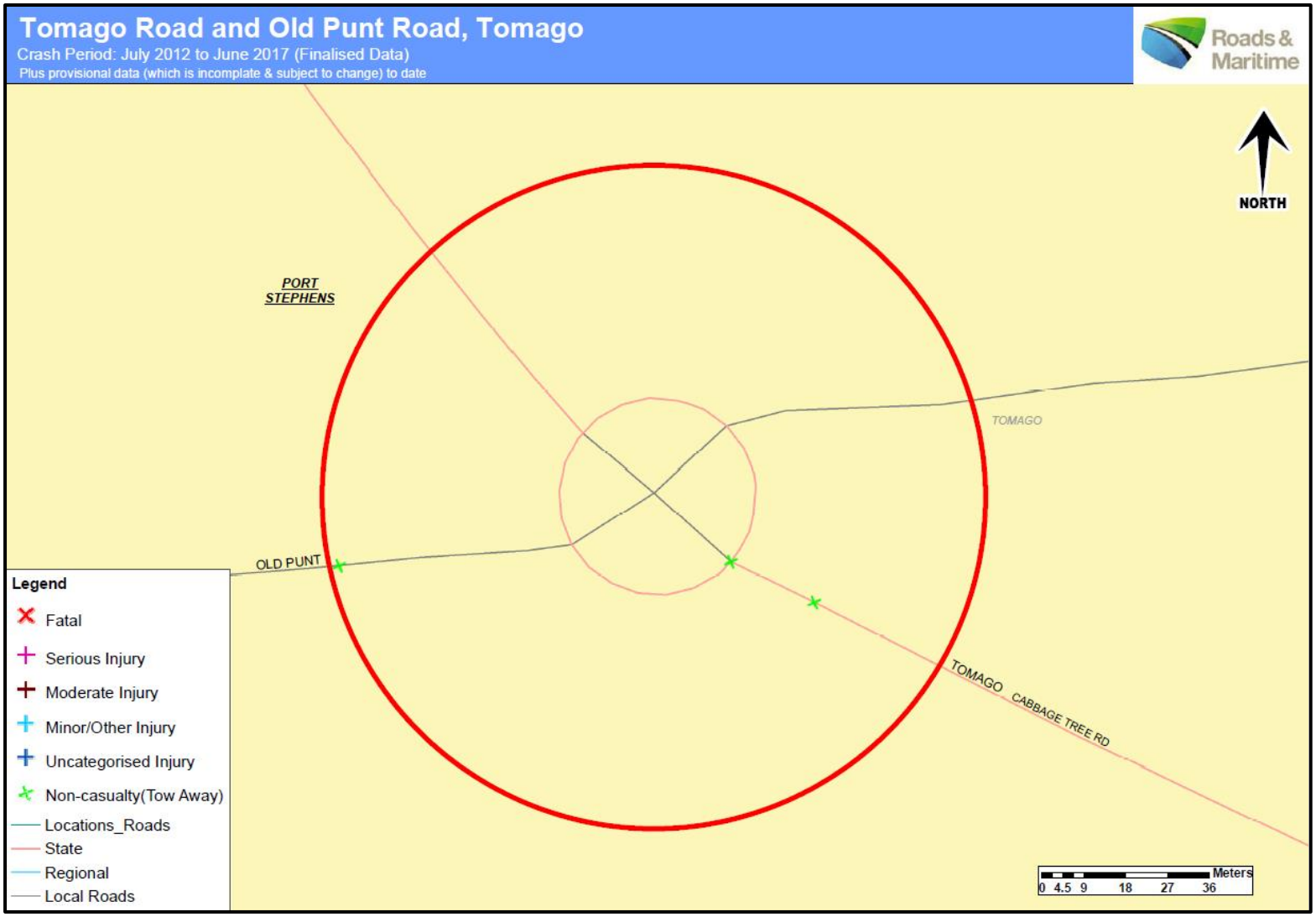
The overall conclusion from the investigations is that traffic, parking and access arrangements for the project are satisfactory and that there are no traffic or parking impediments to the development.

It is recommended a Construction Traffic Management Plan be prepared, required as part of the detailed design for the project, to provide for the safe movement of heavy vehicles into and out of the site.

As part of the Drivers Code of Conduct, it is recommended that all heavy vehicles associated with the construction work access the site via the signal-controlled intersection of Old Punt Road and the Pacific Highway. It is also recommended that the heavy vehicle movements associated with the operational activities utilise this route to access the subject site.

It is recommended a channelised right turn treatment be provided at the intersection of Old Punt Road with the site access. This is to allow for safe turning movements into the site during the construction phase, including heavy vehicles which would all access the site to/from the north. This turn treatment would be designed in accordance with the Austroads Guidelines.

Appendix A Accident Data



Detailed Crash Report - sorted

Transport for NSW – Centre for Road Safety

Crash No. / Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				S F
Hunter Region			**Port Stephens LGA**				**Tomago**							**Old Punt Rd**						
1035397 P	31/07/2014	Thu	07:00	50 m S	TOMAGO RD	2WY	STR	Fine	Dry	60	2	CAR	M37	W in OLD PUNT RD	15 Pull out opposite		N	0	0	
E55119044			Daylight			RUM:	53	Overtake turning				WAG	F42	W in OLD PUNT RD	5 Turning right					
Hunter Region			**Port Stephens LGA**				**Tomago**							**Tomago Rd**						
1042025 P	05/08/2014	Tue	15:00	at	OLD PUNT RD	RDB	STR	Fine	Dry	60	2	CAR	M65	W in TOMAGO RD	Unk Proceeding in lane		N	0	0	
E55840477			Daylight			RUM:	10	Cross traffic				CAR	M23	S in OLD PUNT RD	Unk Proceeding in lane					
Hunter Region			**Port Stephens LGA**				**Tomago**							**Tomago Rd**						
1075528 S	17/07/2015	Fri	06:30	20 m S	OLD PUNT RD	2WY	STR	Overcast	Dry	60	2	TRK	M20	N in TOMAGO RD	Unk Proceeding in lane		N	0	0	
E253286294			Dawn			RUM:	32	Right rear				CAR	M33	N in TOMAGO RD	Unk Turning right					

Report Totals: Total Crashes: 3 Fatal Crashes: 0 Injury Crashes: 0 Killed: 0 Injured: 0

Crashid dataset Tomago Road and Old Punt Road, Tomago - July 2012 to 2018*

Note: *Ordered by: Crash Date.*

Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Summary Crash Report

Transport for NSW – Centre for Road Safety

# Crash Type		
Car Crash	3	100.0%
Light Truck Crash	1	33.3%
Rigid Truck Crash	0	0.0%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	*(0)*	*(0.0%)*
Bus Crash	0	0.0%
"Heavy Vehicle Crash	*(0)*	*(0.0%)*
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	1	33.3%
Non intersection	2	66.7%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	0	0.0%
Multi Vehicle	3	100.0%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	2	66.7%
Unclassified Road	1	33.3%

Contributing Factors		
Speeding	0	0.0%
Fatigue	0	0.0%

Weather		
Fine	2	66.7%
Rain	0	0.0%
Overcast	1	33.3%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	0	0.0%
Dry	3	100.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	1	33.3%
Daylight	2	66.7%
Dusk	0	0.0%
Darkness	0	0.0%

Crash Movement		
Intersection, adjacent approaches	1	33.3%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	0	0.0%
U-turn	0	0.0%
Rear-end	1	33.3%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	1	33.3%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	0	0.0%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	0	0.0%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	3	100.0%	100 km/h zone	0	0.0%
70 km/h zone	0	0.0%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less		~ School Travel Time Involvement		
	0	0.0%		1	33.3%

Day of the Week												
Monday	0	0.0%	Wednesday	0	0.0%	Friday	1	33.3%	Sunday	0	0.0%	WEEKEND	0	0.0%
Tuesday	1	33.3%	Thursday	1	33.3%	Saturday	0	0.0%	WEEKDAY	3	**********			

CRASHES	3	
Fatal	0	0.0%
Serious inj.	0	0.0%
Moderate inj.	0	0.0%
Minor/Other inj.	0	0.0%
Uncategorised inj.	0	0.0%
Non-casualty	3	100.0%

Self Reported Crash	1	33.33%

Time Group		% of Day	
00:01 - 02:59	0	0.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	1	33.3%	4.2%
07:00 - 07:59	1	33.3%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	0	0.0%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	0	0.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	0	0.0%	4.2%
15:00 - 15:59	1	33.3%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	0	0.0%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
0	of 0	in Dark 0.0%

CASUALTIES	0	
Killed	0	0.0%
Seriously inj.	0	0.0%
Moderately inj.	0	0.0%
Minor/Other inj.	0	0.0%
Uncategorised inj.	0	0.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

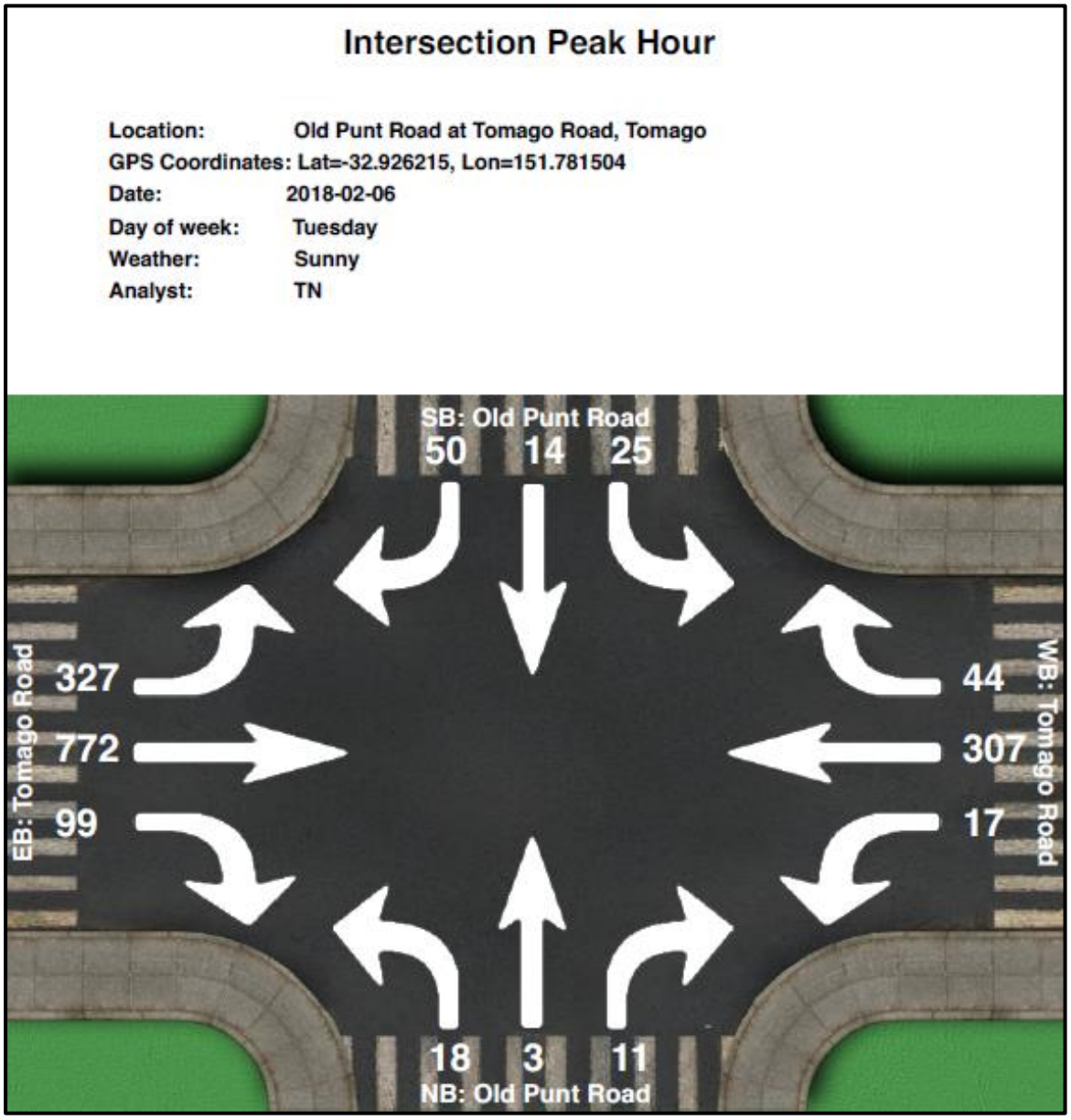
Crashes		Casualties
1	2015	0
2	2014	0

McLean Periods		% Week	
A	2	66.7%	17.9%
B	0	0.0%	7.1%
C	0	0.0%	17.9%
D	0	0.0%	3.5%
E	0	0.0%	3.6%
F	1	33.3%	10.7%
G	0	0.0%	7.1%
H	0	0.0%	7.1%
I	0	0.0%	12.5%
J	0	0.0%	10.7%

#Holiday Periods												
New Year	0	0.0%	Easter	0	0.0%	Queen's BD	0	0.0%	Christmas	0	0.0%	Easter SH	0	0.0%	Sept./Oct. SH	0	0.0%
Aust. Day	0	0.0%	Anzac Day	0	0.0%	Labour Day	0	0.0%	January SH	0	0.0%	June/July SH	0	0.0%	December SH	0	0.0%

Appendix B Traffic Data

AM Peak



Intersection Peak Hour

06:00 - 07:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	25	14	50	17	307	44	18	3	11	327	772	99	1687
Factor	0.62	0.50	0.66	0.71	0.83	0.79	0.56	0.75	0.69	0.70	0.87	0.63	0.94
Approach Factor	0.74			0.86			0.62			0.88			

Peak Hour Vehicle Summary

Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	17	12	10	16	245	38	8	2	8	318	728	90	1492
Truck	8	2	40	1	62	6	10	1	3	9	44	9	195

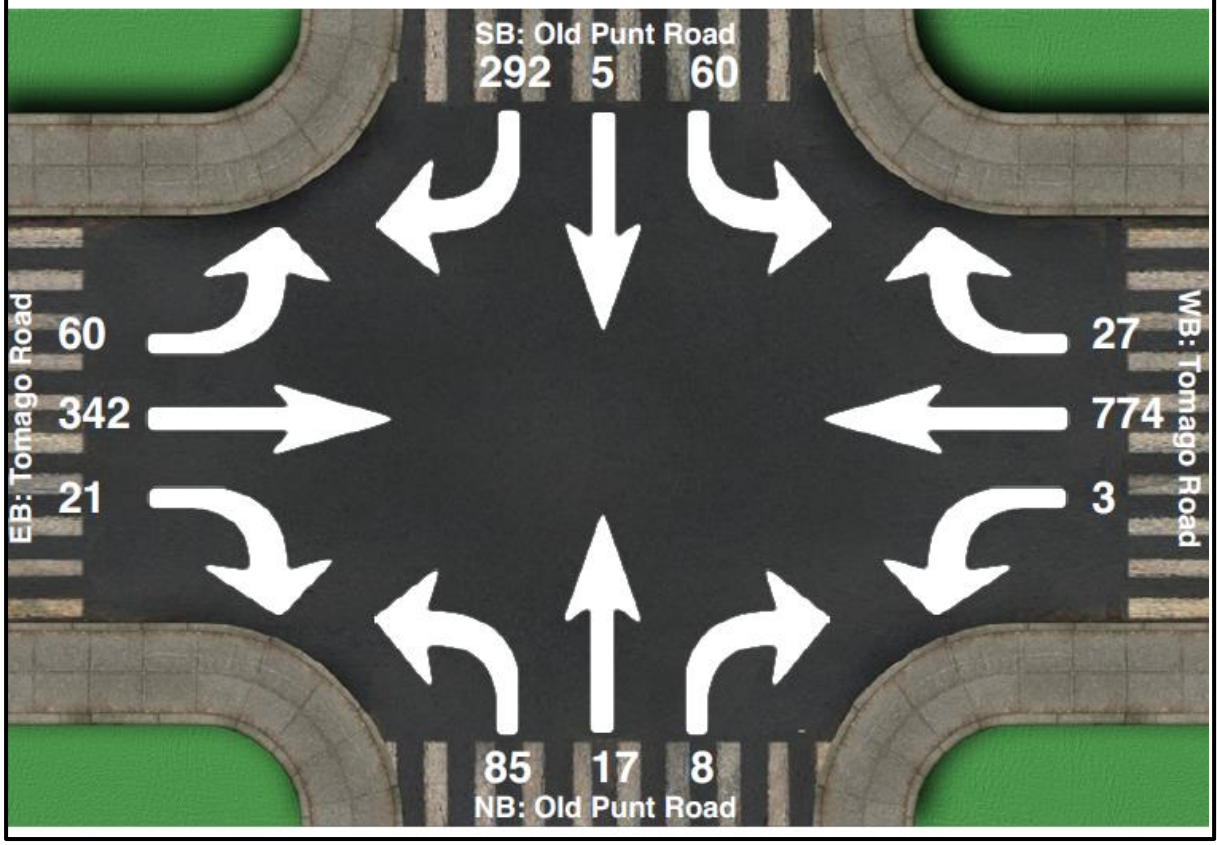
Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

PM Peak

Intersection Peak Hour

Location: Old Punt Road at Tomago Road, Tomago
GPS Coordinates: Lat=-32.926215, Lon=151.781504
Date: 2018-02-06
Day of week: Tuesday
Weather: Sunny
Analyst: TN



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	60	5	292	3	774	27	85	17	8	60	342	21	1694
Factor	0.75	0.62	0.82	0.75	0.94	0.75	0.62	0.71	0.67	0.71	0.99	0.66	0.91
Approach Factor	0.81			0.94			0.65			0.93			

Peak Hour Vehicle Summary

Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	52	4	278	3	733	21	83	16	8	34	308	14	1554
Truck	8	1	14	0	41	6	2	1	0	26	34	7	140

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

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.

Existing Situation

MOVEMENT SUMMARY

Site: 101 [2018 AM Existing Situation]

Tomago Road / Old Punt Road
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Tomago Road												
1a	L1	18	5.9	0.109	4.4	LOS A	0.6	5.1	0.42	0.45	0.42	55.5
2	T1	323	20.2	0.196	4.7	LOS A	1.3	10.5	0.41	0.47	0.41	55.3
3b	R3	46	13.6	0.196	11.4	LOS A	1.3	10.5	0.41	0.48	0.41	56.0
Approach		387	18.8	0.196	5.5	LOS A	1.3	10.5	0.41	0.47	0.41	55.4
NorthEast: Old Punt Road												
21b	L3	26	32.0	0.165	8.9	LOS A	0.8	8.5	0.67	0.78	0.67	49.9
22	T1	15	14.3	0.165	8.4	LOS A	0.8	8.5	0.67	0.78	0.67	52.7
23a	R1	53	80.0	0.165	15.0	LOS B	0.8	8.5	0.67	0.78	0.67	50.0
Approach		94	56.2	0.165	12.2	LOS A	0.8	8.5	0.67	0.78	0.67	50.4
West: Tomago Road												
7a	L1	344	2.8	0.277	3.4	LOS A	1.6	11.5	0.22	0.36	0.22	57.1
8	T1	813	5.7	0.520	3.9	LOS A	4.2	31.3	0.26	0.40	0.26	56.5
9b	R3	104	9.1	0.520	10.8	LOS A	4.2	31.3	0.26	0.41	0.26	57.3
Approach		1261	5.2	0.520	4.3	LOS A	4.2	31.3	0.25	0.39	0.25	56.7
SouthWest: Old Punt Road												
27b	L3	19	55.6	0.041	5.5	LOS A	0.1	1.2	0.38	0.61	0.38	51.5
28	T1	3	33.3	0.041	4.9	LOS A	0.1	1.2	0.38	0.61	0.38	54.9
29a	R1	12	27.3	0.041	9.5	LOS A	0.1	1.2	0.38	0.61	0.38	54.1
Approach		34	43.8	0.041	6.8	LOS A	0.1	1.2	0.38	0.61	0.38	52.7
All Vehicles		1776	11.6	0.520	5.0	LOS A	4.2	31.3	0.31	0.43	0.31	56.0

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

MOVEMENT SUMMARY

Site: 101 [2018 PM Existing Situation]

Tomago Road / Old Punt Road
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Tomago Road												
1a	L1	3	0.0	0.250	5.4	LOS A	1.6	11.8	0.59	0.57	0.59	54.6
2	T1	815	5.3	0.449	5.6	LOS A	3.7	27.0	0.63	0.56	0.63	54.8
3b	R3	28	22.2	0.449	12.8	LOS A	3.7	27.0	0.65	0.55	0.65	55.0
Approach		846	5.8	0.449	5.9	LOS A	3.7	27.0	0.63	0.56	0.63	54.8
NorthEast: Old Punt Road												
21b	L3	63	13.3	0.354	5.1	LOS A	1.5	11.1	0.42	0.69	0.42	51.3
22	T1	5	20.0	0.354	5.2	LOS A	1.5	11.1	0.42	0.69	0.42	53.5
23a	R1	307	4.8	0.354	9.4	LOS A	1.5	11.1	0.42	0.69	0.42	53.3
Approach		376	6.4	0.354	8.6	LOS A	1.5	11.1	0.42	0.69	0.42	53.0
West: Tomago Road												
7a	L1	63	43.3	0.105	3.7	LOS A	0.5	4.4	0.19	0.35	0.19	56.3
8	T1	360	9.9	0.196	3.8	LOS A	1.1	8.3	0.18	0.37	0.18	57.2
9b	R3	22	33.3	0.196	11.0	LOS A	1.1	8.3	0.18	0.37	0.18	57.1
Approach		445	15.8	0.196	4.1	LOS A	1.1	8.3	0.18	0.37	0.18	57.1
SouthWest: Old Punt Road												
27b	L3	89	2.4	0.169	7.1	LOS A	0.8	5.5	0.68	0.81	0.68	52.5
28	T1	18	5.9	0.169	7.2	LOS A	0.8	5.5	0.68	0.81	0.68	54.9
29a	R1	8	0.0	0.169	11.5	LOS A	0.8	5.5	0.68	0.81	0.68	54.6
Approach		116	2.7	0.169	7.5	LOS A	0.8	5.5	0.68	0.81	0.68	53.0
All Vehicles		1783	8.3	0.449	6.1	LOS A	3.7	27.0	0.48	0.55	0.48	54.8

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

Organisation: SECA SOLUTION | Processed: Wednesday, 8 May 2019 4:00:17 PM
Project: C:\Sidra folders\P1451 AGL Tomago Power Station.sip8

2018 with Construction Traffic – AM

MOVEMENT SUMMARY

Site: 101 [2018 AM with Development]

Tomago Road / Old Punt Road
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Tomago Road												
1a	L1	18	5.9	0.117	4.4	LOS A	0.7	5.6	0.42	0.45	0.42	55.4
2	T1	323	20.2	0.211	4.7	LOS A	1.4	11.3	0.42	0.49	0.42	55.0
3b	R3	78	8.1	0.211	11.3	LOS A	1.4	11.3	0.42	0.51	0.42	55.7
Approach		419	17.3	0.211	5.9	LOS A	1.4	11.3	0.42	0.49	0.42	55.2
NorthEast: Old Punt Road												
21b	L3	26	32.0	0.191	11.1	LOS A	1.1	11.7	0.78	0.82	0.78	48.4
22	T1	15	14.3	0.191	10.5	LOS A	1.1	11.7	0.78	0.82	0.78	51.0
23a	R1	53	80.0	0.191	17.3	LOS B	1.1	11.7	0.78	0.82	0.78	48.5
Approach		94	56.2	0.191	14.5	LOS A	1.1	11.7	0.78	0.82	0.78	48.9
West: Tomago Road												
7a	L1	455	2.1	0.341	3.6	LOS A	2.1	15.0	0.29	0.39	0.29	56.8
8	T1	813	5.7	0.554	4.1	LOS A	4.7	34.9	0.33	0.43	0.33	56.1
9b	R3	104	9.1	0.554	11.0	LOS A	4.7	34.9	0.33	0.43	0.33	57.0
Approach		1372	4.8	0.554	4.5	LOS A	4.7	34.9	0.32	0.42	0.32	56.4
SouthWest: Old Punt Road												
27b	L3	19	55.6	0.042	5.6	LOS A	0.1	1.2	0.39	0.62	0.39	51.5
28	T1	3	33.3	0.042	5.0	LOS A	0.1	1.2	0.39	0.62	0.39	54.8
29a	R1	12	27.3	0.042	9.6	LOS A	0.1	1.2	0.39	0.62	0.39	54.1
Approach		34	43.8	0.042	6.9	LOS A	0.1	1.2	0.39	0.62	0.39	52.6
All Vehicles		1918	10.7	0.554	5.3	LOS A	4.7	34.9	0.37	0.46	0.37	55.6

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