

Traffic Impact Assessment

Proposed Port Kembla Bulk Liquids Terminal

TQ Reference: PJ-PK-0001-REPT-014

82015103-001/Report 004



Prepared for
TQ Holdings Australia Pty Ltd

4 December 2015



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1 Introduction

1.1 Overview

TQ Holdings Australia Pty Ltd (TQ Holdings) is planning to develop a Bulk Liquids Terminal (PK BLT) with capacity of up to 288 ML of storage for combustible and flammable liquids located in Port Kembla New South Wales. The Terminal will operate as an import product terminal and store biofuels and petroleum products. Product would be received by tanker ships and despatched to customers by road tankers. The facility will be structured over three stages with an estimated 2,900 mega litres of finished fuel products being imported per annum at maximum throughput.

Cardno has been engaged by TQ Holdings to prepare a Traffic Impact Assessment (TIA) for the Project. This TIA has been prepared to assess the traffic impacts associated with construction and operations of the proposed Bulk Liquids Terminal.

1.2 Site Location

The PK BLT is located in Port Kembla New South Wales on Tom Thumb Road approximately 1.5 kilometres from the Springhill Road intersection. Figure 1-1 illustrates the site location and provides an overview of the surrounding area.



Source: Nearmap, June 2015

Figure 1-1 Site Location

1.3 Scope of Works

- > Review the existing road network
- > Review background data relating to the existing and proposed development, in particular previous relevant traffic studies for the Port Kembla Freight Accessibility Strategy Study (Maunsell 2007)
- > Determine the impacts on the road network during construction
- > Determine the impacts on the road network during operation
- > Assessment of the on-site parking facilities of the proposed development.
- > Recommend mitigation and management measures to minimize the impacts identified.

1.4 Report Structure

The remainder of this report is presented in the following sections:

Table 1-1 Report Structure Details

Report Section	Details
Section 2	Review the existing traffic conditions based on traffic survey data collected for this study
Section 3	Document the existing road network performance
Section 4	Assessment of the traffic impacts associated with the construction and operation stages of the development
Section 5	Assessment of the on-site parking facilities of the proposed development
Section 6	Describes the mitigation and management measures recommended to minimise the traffic impacts
Section 7	Outlines the conclusions of this report

1.5 Reference Documents

- > RMS Guide for Traffic Generating Developments (2002);
- > Australian Standards AS2890;
- > DECC Interim Construction Noise Guidelines (2009);
- > Environmental Scoping Assessment – TQ Holdings, Proposed Bulk Liquids Terminals URS (2014);
- > Port Kembla Bulk Liquids Terminal Technical Specification Environmental Impact Statement Scope of Work – TQ Holdings (2015);
- > Port Kembla Grinding Mill Traffic Impact Assessment – Bitzios (2011);
- > Port Kembla Freight Accessibility Strategy Study – Maunsell (2007); and
- > Australian Institute of Petroleum Ltd., Publications (2013).

2 Existing Traffic and Transport Conditions

2.1 Existing Road Network Functional Classification

NSW Roads and Maritime Services (RMS) has defined four road classes in its functional road hierarchy system, these are summarised in **Table 2-1**.

Table 2-1 RMS Functional road classification

Road Class	Description	Through Traffic	Speed Limit
Arterial roads	Regional road in urban areas, forming the principal corridors for transport movements. Typical traffic volumes greater than 15,000 vehicles per day (vpd)	Yes	70-100
Sub-arterial roads	Provide links from arterial roads to areas of development or carry traffic from one part of a subregion to all parts of the region. May relieve traffic on arterial roads in some circumstances. Typical traffic volumes between 5,000 and 20,000 vpd	Some	60-80
Collector roads	Provide links to sub-arterial or arterial roads, to the local road system in developed areas. Typical traffic volumes between 2,000 and 10,000 vpd.	Little	50-60
Local roads	Provide direct vehicular access to the development or development precinct and connect to the collector, sub-arterial or arterial road network. Low volumes, usually less than 2,000 vpd.	No	50

Source: RMS Network Planning Practice Notes and Austroads

2.2 Administrative Road Hierarchy

In addition to the functional classification, RMS has an administrative classification for the funding and management of the state's road network. This classification comprises:

- > State classified roads (main roads, highways and motorways), which are under the care, control and management of RMS;
- > Regional roads, which are partly funded by RMS but under the care and control of relevant local councils; and
- > Other roads, which are under the care and management of relevant local councils.

2.3 Local Road Network

2.3.1 M1 Princes Motorway

According to the Road and Maritime Schedule of classified road, the M1 Princes Motorway is a State Highway between Yallah and Waterfall. The corridor of the M1 Princes Motorway and Princes Highway connects Sydney to the Victorian Border to the south.

The section of the M1 Princes Motorway in the vicinity to the study area is a divided road two-way four lane. The average daily traffic flows on the M1 Princes Motorway at Gipps Road is 78,000 vehicles (RMS, 2012). The signposted speed limit of the segment of the Princes Motorway in the study area is 100km/h for the southbound carriageway and 90km/h for the northbound carriageway.

2.3.2 Masters Road

Masters Road is a State Road under the authority of the RMS, which connects M1 Princes Motorway to the west and Springhill Road to the east. Master Road provides a major link to the industrial zones in Port Kembla north and to commercial and residential zones in Wollongong south.

Masters Road is a divided road two-way six lanes with a signposted speed limit of 80km/h in both directions

2.3.3 Springhill Road

Springhill Road is a State Road under the authority of the RMS, which forms part of the Grand Pacific Drive from Croom in Shellharbour to the south through Wollongong and to Thirroul to the north where it connects with Princes Highway.

Springhill Road is a divided road two-way six lanes with a signposted speed limit of 80km/h in both directions.

2.3.4 Tom Thumb Road

Tom Thumb Road is an undivided two-way, two-lane road with a signposted speed limit of 40km/h in both directions. Tom Thumb Road is an internal private road which connects Springhill Road to the northwest and Port Kembla Road to the east. It provides a link to the industrial zones of Port Kembla including the Grain Handling Terminal and Coal Loading Plant. It is noted that Tom Thumb Road also provides access to a bulk liquid facility within the GrainCorp terminal and a second grain terminal under construction by Quattro Ports.

Furthermore, Tom Thumb Road connects to the General Cargo Handling Facility and the Pre-Delivery Inspection facilities in the Inner Harbour through which imported motor vehicles are handled for NSW.

Tom Thumb Road is the main access to the PK BLT.

2.3.5 Yampi Way

Yampi way is a Local Road, which connects Tom Thumb Road to the north and Products Berth Road to the south. As with Tom Thumb Road, Yampi Way connects to the General Cargo Handling Facility and the Pre-Delivery Inspection facilities in the Inner Harbour, through which imported motor vehicles are handled for NSW. Yampi Way is an undivided two-way, two-lane road with a signposted speed limit of 40km/h in both directions.

2.3.6 Farrer Road

Farrer Road is a Local Road connecting with Tom Thumb Road to the north. Farrer Road runs in a north to south direction and provides a link to the Grain Handling Terminal. It is noted that Farrer Road also provides alternate access to the AAT general cargo terminal, particularly for oversize vehicles. Farrer Road is an undivided two-way, two-lane road with a signposted speed limit of 40km/h in both directions.

2.3.7 Port Kembla Road

Port Kembla is a Local Road, which connects Tom Thumb Road to the south with Springhill Road to the north. It provides access to the industrial zones in Port Kembla including the Coal Terminal. Port Kembla Road also provides access to the Wollongong Heliport, Wollongong Sewage Treatment Plant, and the Northern Breakwater / Berth 201 via Seawall Road.

Port Kembla is an undivided two-way, two-lane road with a signposted speed limit of 50km/h in both directions with a section of the road signposted to 40km/h at the Port Kembla terminal approach.

2.4 Public Transport

2.4.1 Bus Services

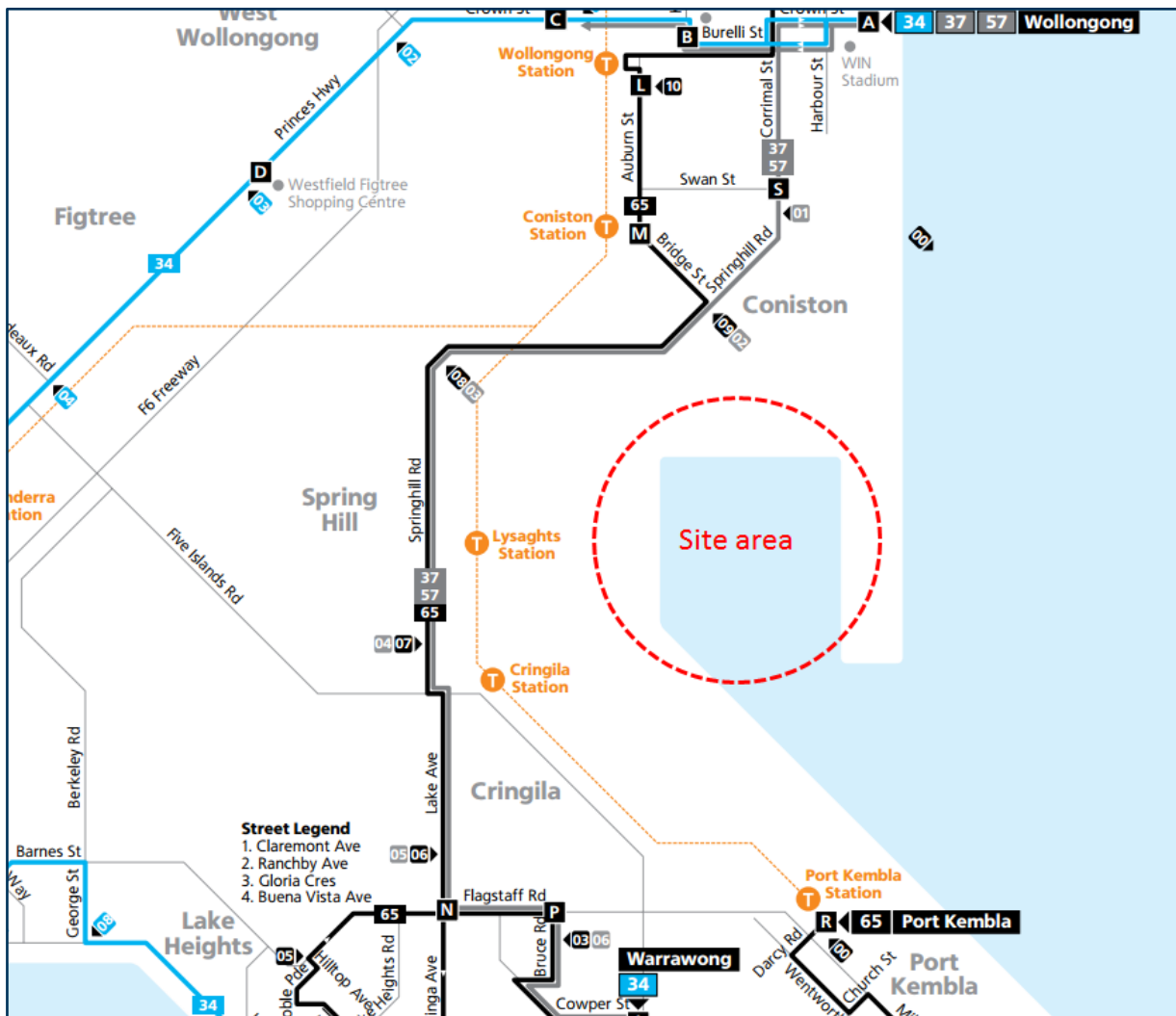
The area is served by the Premier Illawarra Services. Bus routes 65, 37 and 57 operate in the study area via Springhill Road connecting Wollongong with Port Kembla.

The bus route map is shown in **Figure 2-1**. **Table 2-2** provides details of the bus service frequency.

Table 2-2 Bus Service Frequency

Bus Route	Route Description	AM Peak	PM Peak	Off peak
37	North Wollongong to Port Kembla	n/a	n/a	n/a
57	North Wollongong to Port Kembla	60 minutes	60 minutes	60 minutes
65	North Wollongong to Port Kembla	45 minutes	20 minutes	60 minutes
37	Port Kembla to North Wollongong	20 minutes	30 minutes	60 minutes
57	Port Kembla to North Wollongong	n/a	n/a	n/a
65	Port Kembla to North Wollongong	60 minutes	30 minutes	90 minutes

Source: Premier Illawarra Bus Timetable June 2015



Source: Premier Illawarra Port Kembla district map, June 2015

Figure 2-1 Bus Route Map

2.4.2 Rail Services

The area is served by Sydney Trains – South Coast Line between Bomaderry and Port Kembla to Bondi Junction or Central. The nearest railway station is Coniston. The train service frequency is approximately six services during the AM and PM peak hours. Coniston Station provides service to workers from the BlueScope Steel’s Springhill Works to the west and the Flat Products Area of Port Kembla Steelworks to the east. **Figure 2-2** illustrates the Sydney Trains - South Coast Line.

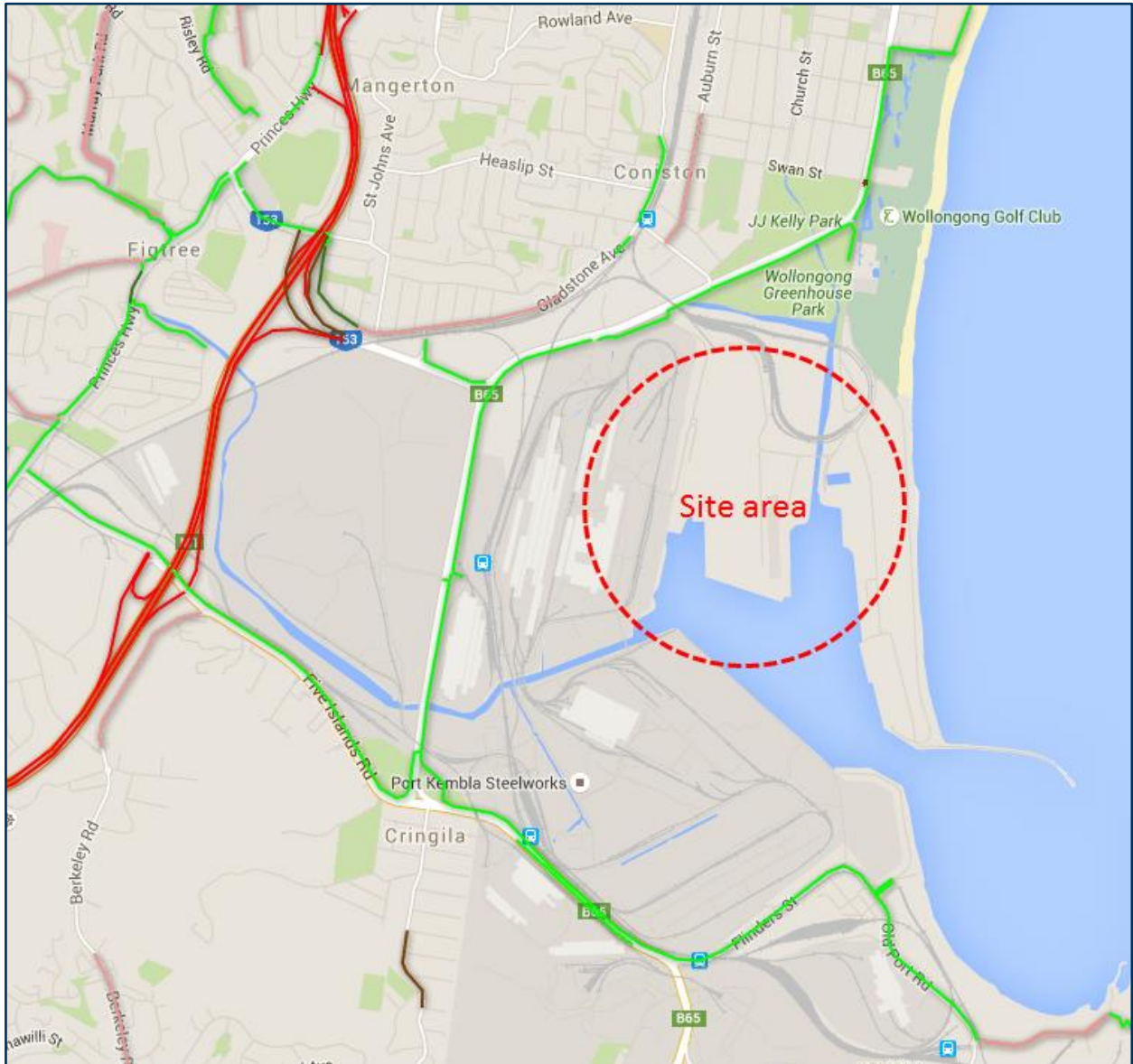


Source: Sydney Trains intercity map, June 2015

Figure 2-2 Sydney Trains – South Coast Line

2.4.3 Pedestrian & Cyclist Facilities

Springhill Road has a pedestrian and cyclist shared path on the eastern side of the road from Swan Street intersection on the northern side to the Five Islands Road intersection on the southern side. The Masters Road and Springhill Road intersection has a signalised pedestrian crossing on the northern side connecting Springhill Road to Gladstone Avenue. **Figure 2-3** illustrates the pedestrian and cyclist network near the study area

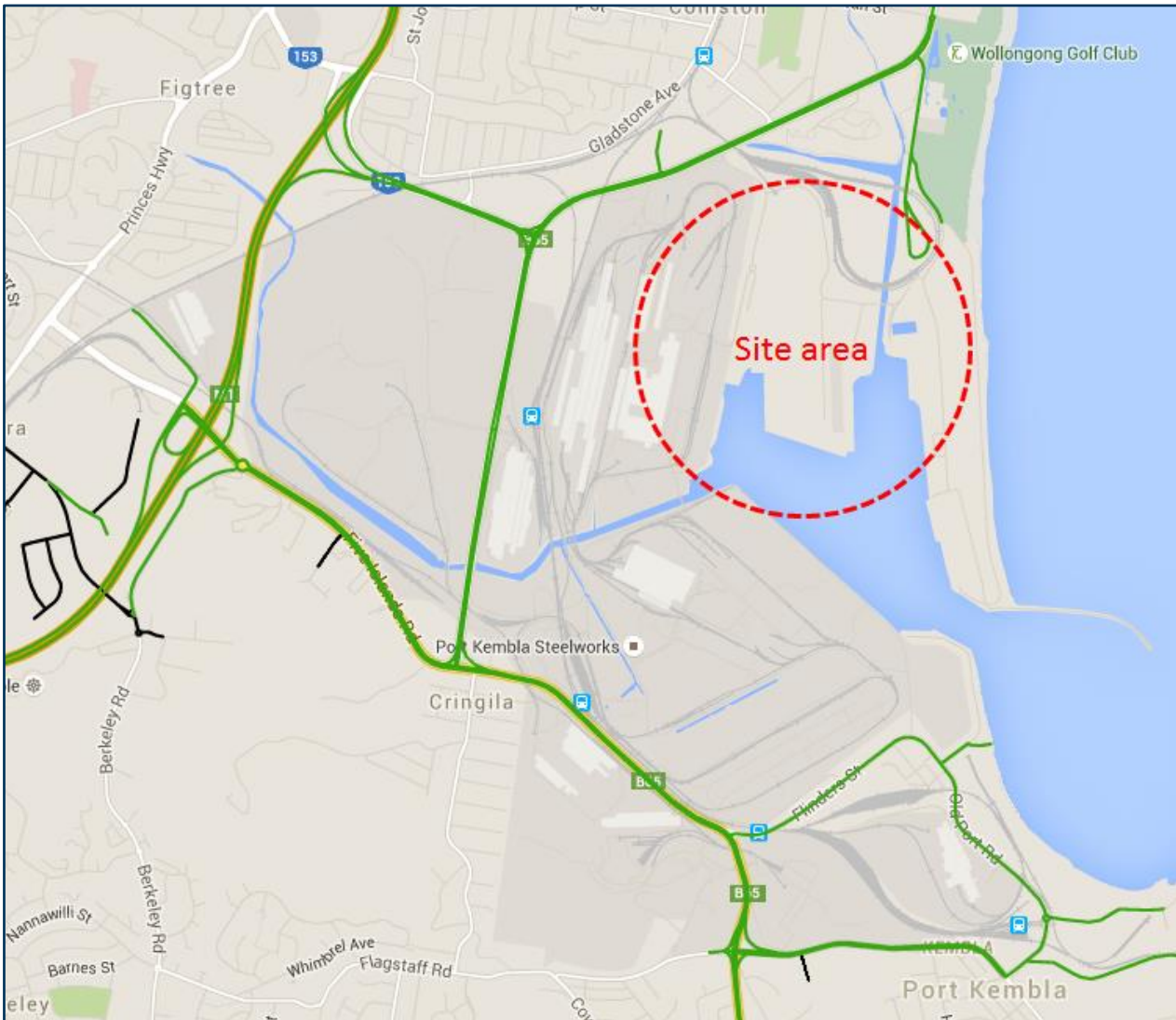


Source: TfNSW Cycleway Finder map V2, June 2015

Figure 2-3 Pedestrian and Cyclist facilities

2.4.4 Heavy Vehicles Haulage Routes

Figure 2-4 illustrates TfNSW restricted access vehicles road network in the study area. It is noted that NSW Ports permits the use of internal port roads (including Tom Thumb Road and Morton Way) for B-double vehicles. Heavy vehicles are currently accessing the site via Springhill Road and Tom Thumb Road. Northbound traffic on the M1 Princes Motorway accesses the site via the Five Island Road interchange. **Figure 2-5** illustrates the preferred heavy vehicles travel routes to and from the Bulk Liquids Terminal (PK BLT).



Source: TfNSW, Restricted Access Heavy Vehicles Map, June 2015

Figure 2-4 Restricted Access Heavy Vehicles Map



Background: Nearmap June 2015

Figure 2-5 Heavy Vehicles Routes

2.4.5 Related Projects

Port Kembla Outer Harbour Expansion – this project involves the expansion of the Outer Harbour for additional berthing and storing, handling and processing of bulk cargoes.

The Outer Harbour Expansion was approved in 2011 and the first stage has commenced. There are 3 stages in total with a combined cost of \$700 million. Although the Outer Harbour Expansion is quite substantial, it is believed to cause only a minor impact on the subject intersections of this study as the traffic from the Outer Harbour Expansion will travel through Five Islands Road instead of Springhill Road.

Quattro Grain Handling Facility is under construction and due to completion in Q4 2015. The facility will receive grain primarily by rail, but also has capacity to receive grain by truck.

2.4.6 Current Port Activities

Berth 104 services the grain facilities which are owned and operated by GrainCorp.

Berths 103, 105, 106 and 107 service Australian Amalgamated Terminals (AAT) for the purposes of transferring motor vehicles, general cargo and containers.

Berths 101 and 102 service Port Kembla Coal Terminal Limited, a consortium of coal producers primarily for the export of coal.

2.5 Existing Intersection Performance

2.5.1 Traffic Surveys

Cardno has commissioned traffic surveys at key locations surrounding the study area. The purpose of the traffic surveys was to determine existing traffic conditions and traffic patterns at key locations adjacent to the

site area. The general peak periods identified for the local area are from 8:15 AM to 9:15 AM during the morning peak period and from 4:30 PM to 5:30 PM during the afternoon peak period. Figure 2-6 illustrates the location of the traffic surveys.

Traffic surveys were conducted on Wednesday 27 May 2015 under good weather conditions at the following intersections:

1. Masters Road / Springhill Road
2. Springhill Road / Tom Thumb Road
3. Tom Thumb Road / Yampi Way
4. Tom Thumb Road / Farrer Road
5. Tom Thumb Road / Access Road.

Additionally, Midblock Traffic Counts were undertaken during the same day at the following locations:

- A. Springhill Road – between Masters Road and entrance of the BlueScope Port Kembla Steelworks
- B. Springhill Road – between entrance of the BlueScope Port Kembla Steelworks and Tom Thumb Road.



Figure 2-6 Traffic Survey Locations

2.5.2 Traffic Volumes

Based on the traffic data assessment, the AM and PM peaks were determined to be 8:15 AM to 9:15 AM and 4:30 PM to 5:30 PM respectively. **Figures 2-7 and 2-8** illustrates the existing traffic volumes in the study area during the AM and PM peak respectively.

**Existing Traffic Volumes (2015)
AM Peak Period – All vehicles**

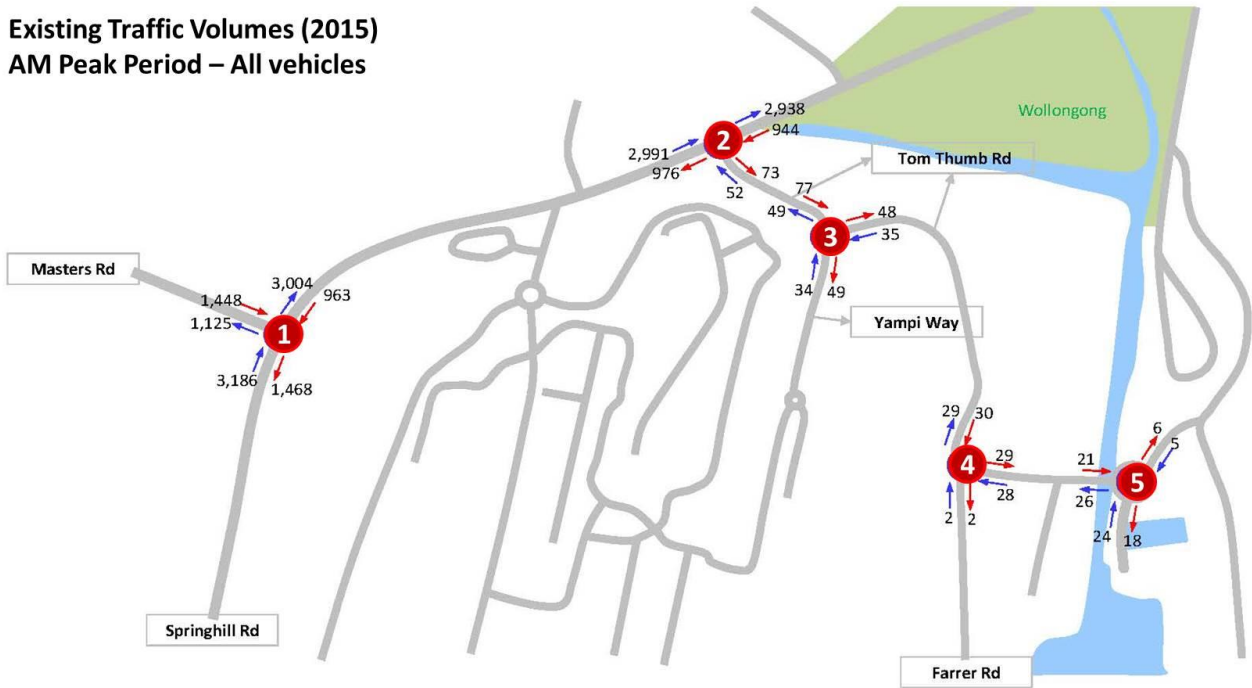


Figure 2-7 Traffic Volumes AM peak (All vehicles)

**Existing Traffic Volumes (2015)
PM Peak Period – All Vehicles**

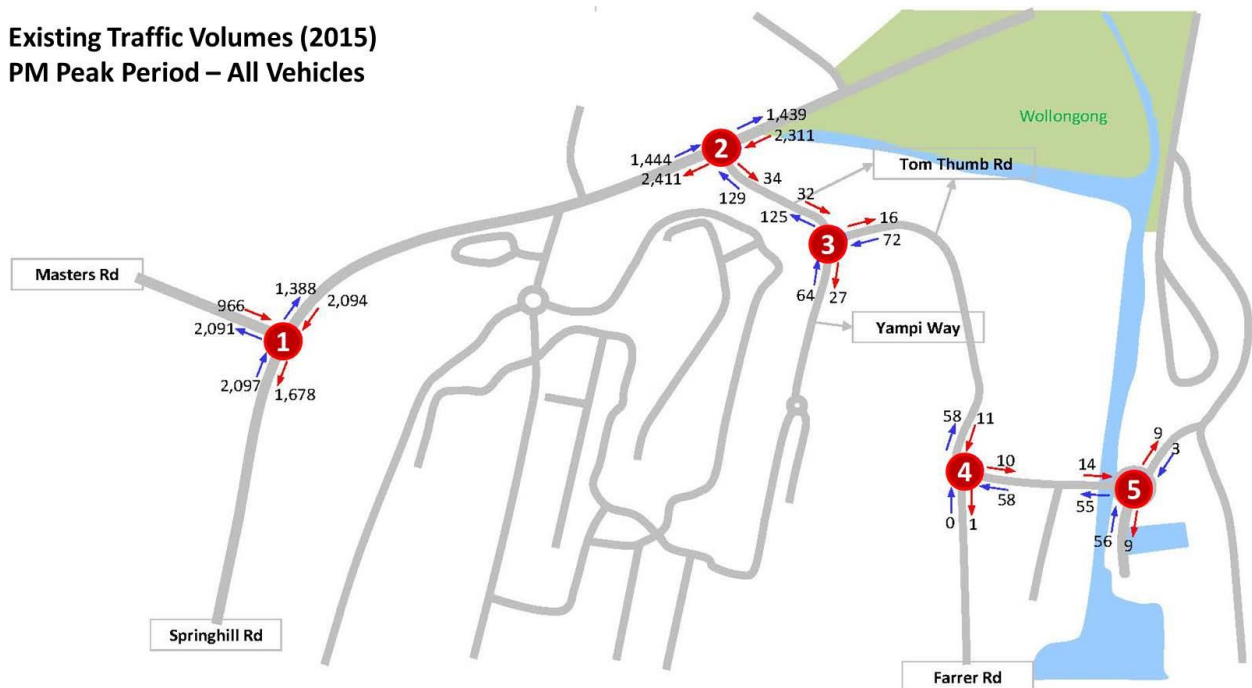


Figure 2-8 Traffic Volumes PM peak (All vehicles)

For the purposes of this report the heavy vehicle traffic volumes for the AM and PM peak periods are shown in **Figures 2-9 and 2-10** respectively.

**Existing Traffic Volumes (2015)
AM Peak Period – Heavy Vehicles**

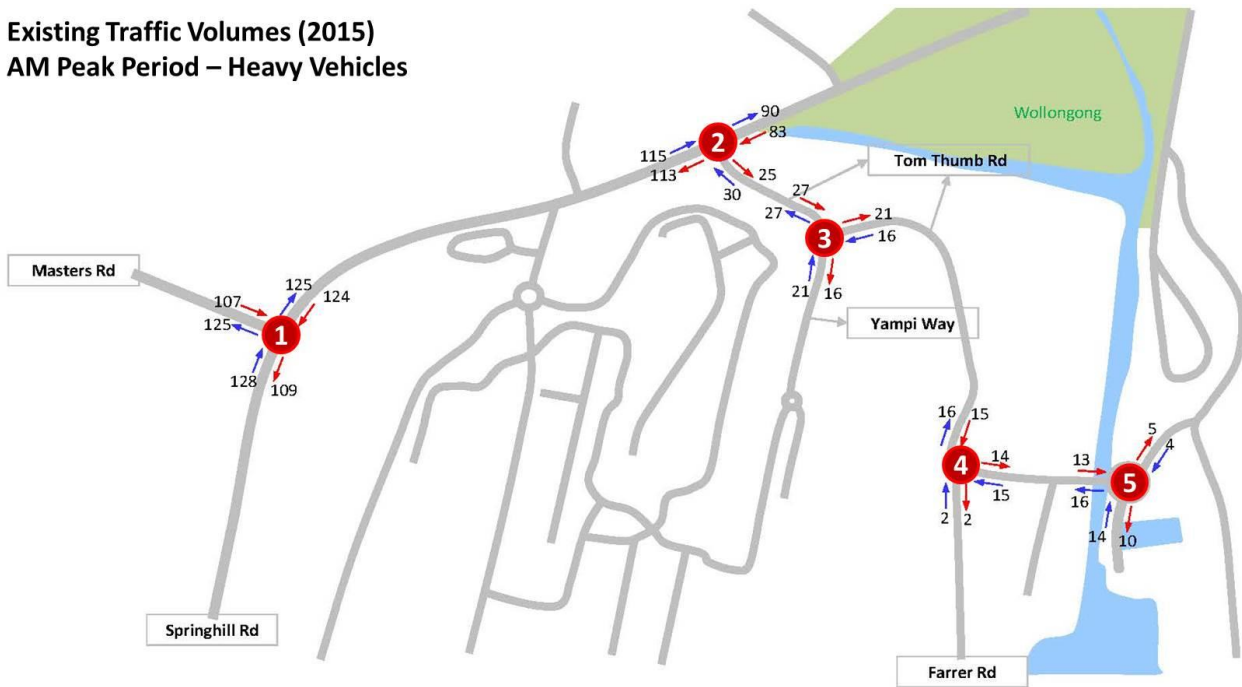


Figure 2-9 Traffic Volumes AM peak (Heavy vehicles)

**Existing Traffic Volumes (2015)
PM Peak Period – Heavy Vehicles**

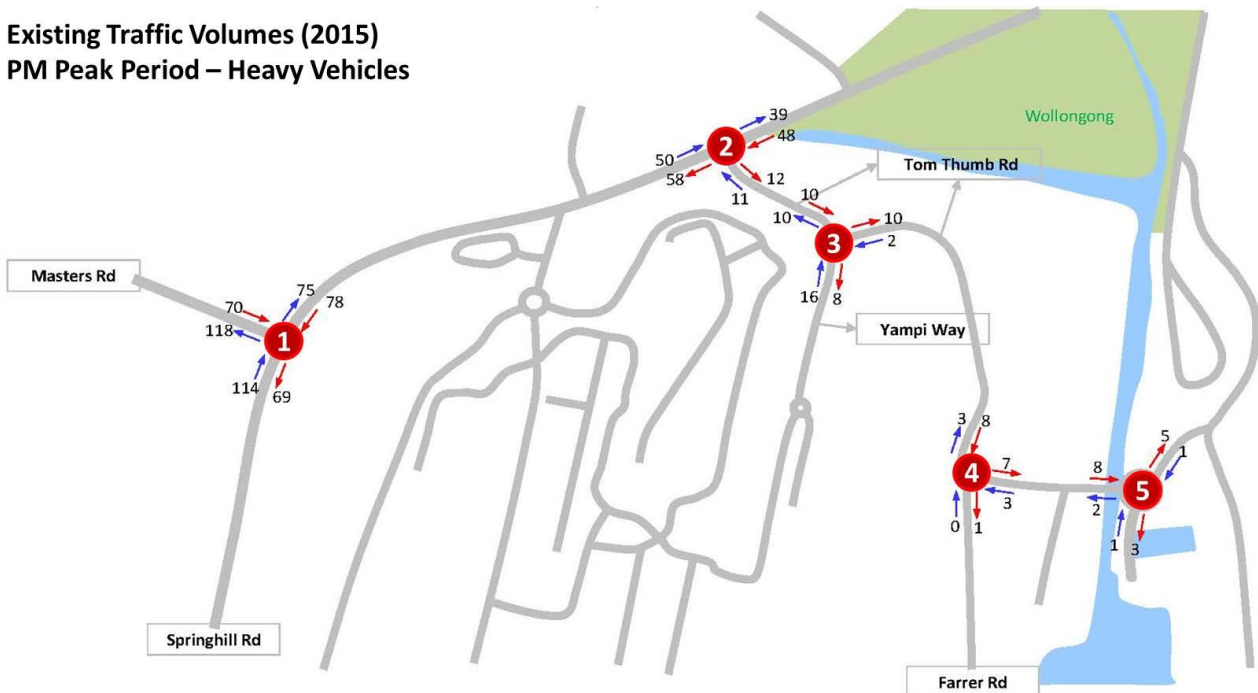


Figure 2-10 Traffic Volumes PM peak (Heavy vehicles)

2.5.3 Heavy Vehicles Proportion

Table 2-3 indicates the existing average daily traffic on the main routes and proportion of heavy vehicles

Table 2-3 Existing average daily traffic – Heavy vehicles proportion

Road Name	Average Daily Traffic	% Heavy Vehicles
Masters Road (between M1 Motorway and Springhill Road)	36,300	7.5%
Springhill Road (between Masters Road and John Cleary Place)	47,100	5.4%
Springhill Road (between Masters Road and Five Islands Road)	53,000	5.0%
Springhill Road (between John Cleary Place and Tom Thumb Road)	49,000	4.3%
Tom Thumb Road (between Springhill Road and Yampi Way)	2100	27%
Tom Thumb Road (between Yampi Way and Farrer Road)	1300	28%
Tom Thumb Road (between Farrer Road and port Kembla Road)	1000	31%

Source: Traffic Surveys May 2015

2.6 Intersection Analysis – Existing Conditions

In accordance with the *Guide to Traffic Engineering Practice, Part 2; Roadway Capacity (AUSTROADS, 1999)* and the *RMS Guide to Traffic Generating Developments V2.2 (2002)*, the Levels of Service relevant to local roads are summarised in **Table 2-4**. According to the RMS guidelines, roads operating at Level of Service (LoS) D or better are generally considered to have acceptable flow conditions because they are below capacity. Roads operating at Level of Service (LoS) E or worse are generally considered to have unacceptable flow conditions because they are at or above capacity.

Table 2-4 Intersection Level of Service

Level of Service (LoS)	Signalised Intersections	Sign Priority Control	Average Vehicle Delay (s)
A	Good operation	Good operation	< 14
B	Good operation, with acceptable delays and spare capacity	Acceptable delays and spare capacity	15 to 28
C	Satisfactory	Satisfactory, but crash study required	29 to 42
D	Operating near capacity	Near capacity and crash study required	43 to 56
E	At capacity; at signals, incidents will cause excessive delays	At capacity; requires other control mode	57 to 70
F	Unsatisfactory and requires additional capacity. Roundabouts require other control mode.	Unsatisfactory and requires additional capacity / control mode.	> 70

Source: RMS Guide to Traffic Generating Developments v2.2 (2002)

SIDRA Intersection version 6.1 was used to assess the performance of the key intersections listed in **Section 2.5** of this report.

Table 2-5 summarises the performance of the existing conditions at key intersections for the AM and PM peak periods.

Table 2-5 Existing Conditions Intersection Performance

Intersection	Control Type	AM Peak			PM Peak		
		Degree of Saturation (DoS)	Average Delay (s)	Level of Service (LoS)	Degree of Saturation (DoS)	Average Delay (s)	Level of Service (LoS)
Masters Road / Springhill Road	Signal Controlled	0.85	37	C	0.80	37	C
Springhill Road / Tom Thumb Road	Signal Controlled	0.81	18	B	0.80	19	B
Tom Thumb Road / Yampi Way	Priority Controlled	0.06	2	A	0.08	1	A
Tom Thumb Road / Farrer Road	Priority Controlled	0.02	6	A	0.03	6	A
Tom Thumb Road Roundabout	Roundabout	0.02	1	A	0.04	1	A

The SIDRA results indicate that the key intersections operate at acceptable Level of Service (LoS) C or better during the AM and PM peak periods. Detailed results from the SIDRA assessments are provided in **Appendix A**.

2.7 Lane Capacity – Existing Conditions

The Highway Capacity Manual (HCM) v. 2010 was used to assess the performance of the key travel routes listed in Section 2.5 of this report.

Table 2-6 summarises the performance of the existing conditions for the AM and PM peak periods

Table 2-6 Lane Capacity Level of Service (LoS) - Peak Hour

Location	Travel Direction	AM Peak Level of Service (LoS)	PM Peak Level of Service (LoS)
Springhill Road, east of Masters Road	Eastbound	C	A
	Westbound	A	B
Springhill Road, west of Tom Thumb Road	Eastbound	C	A
	Westbound	A	B
M1 Princes Motorway, south Memorial Drive	Northbound	C	C
	Southbound	C	C
Picton Road, east of Hume Highway	Eastbound	C	C
	Westbound	C	B

The High Capacity Manual (HCM) results indicate that the key travel routes operate at acceptable Level of Service (LoS) C or better during the AM and PM peak periods.

3 Development Proposal

3.1 Project Overview

The PK BLT has a long-term lease for three (3) separate land allotments from NSW Ports and includes non-exclusive access and use of Berth 104. The land allotments are shown in **Figure 3-1**. Typical land use for the sites are summarised below.

- > Site 1 – Combustible and flammable bulk liquids storage and pump bay;
- > Site 2 – Combustible and flammable bulk liquids and truck loading facilities;
- > Site 3 – Site control room and office block, maintenance work shop and utilities; and
- > Berth 104 – Bulk liquids unloading (and potential loading) facilities.

3.2 Ship Unloading Process

Assumes that bulk liquids will only be imported and will occur via the following sequence: Imported Cargo from ships will be storage at the PK BLT including some bulk liquids e.g. biofuels, may be imported by truck. Imported cargo will later be distributed on road trucks (B-double, Single Truck and Rigid).

3.2.1 Design Vehicle

The PK BLT preferred design vehicles that will utilise the truck loading bays within the proposed development include:

- > B-Double Trucks (50,000L) = 50%
- > Single Trucks (31,000L) = 40%
- > Rigid Trucks (18,000L) = 10%

3.3 Construction Staging

The PK BLT proposed construction staging consists of four strategic stages of execution for development Stage 1A, Stage 1B (Balance), Stage 2 and Stage 3.

3.3.1 Stage 1A (Approved)

Stage 1A (Approved) consists of:

- > Three pipelines from the berth to Site 1
- > Three combustible liquid storage tanks
- > Three Marine Unloading Arms (with capacity for a fourth)
- > Berth Operator Cabin required for unloading operations
- > Berth manifold to connect the pipelines to the Marine Unloading Arms

3.3.2 Stage 1B (Balance)

Stage 1B (Balance) consists of:

- > Four combustible liquid storage tanks on Site 1
- > Five flammable liquid storage tanks on Site 1
- > Six flammable liquid slops tanks on Site 1
- > Bund walls around Site 1
- > Two flammable liquid (ethanol) storage tanks and associated bund walls on Site 2
- > Truck loading bay structure and fit out of three truck loading bays on Site 2
- > Pump bay and product piping to the truck loading bay from both Site 1 and Site 2
- > Workshop and control room/office facilities on Site 3
- > Fire system, utilities, stormwater, fencing and pavements for Site 1, Site 2 and Berth 104 (near the truck loading bay and ethanol storage tanks)
- > All other associated infrastructure required for a safe operation of the terminal as per Stage 1 Balance scope of works

3.3.3 Stage 2 – Remainder of Immediate Terminal Capacity

Stage 2 consists of:

- > Three additional flammable liquid storage tanks on Site 2
- > Five flammable liquid slops tanks on Site 2
- > Two combustible liquid storage tanks on Site 2

- > Bunding around a reduced section on Site 2 to provide the necessary bund capacity and positioned in such a way as to allow future tanks construction to occur onsite during Stage 3
- > Extension of the three pipelines to the bunded area on Site 2
- > Fit out of one additional truck loading bay on site 2
- > Pump bay and product piping on site 2, to allow the transfer of product between sites
- > Fire system, utilities, and stormwater to additional storage tanks on Site 2
- > All other associated infrastructure required for a safe operation of the terminal as per Stages 1 and 2 scope of works

3.3.4 Stage 3 – Future capacity

- > Two additional flammable liquid storage tanks on Site 2
- > Two additional combustible liquid storage tank on Site 2
- > One additional combustible liquid storage tank on Site 2
- > One additional Marine Loading Arm on Berth 104
- > Bunding around additional tanks on Site 2, integrating with existing bunds constructed in Stage 2
- > Fit out of two additional truck loading bays on Site 2
- > Fire system, utilities, and stormwater for additional storage tanks on Site 2
- > All other associated infrastructure required for a safe operation of the terminal as per Stages 1, 2 and 3 scope of works

3.4 Construction & Operation Personnel

Construction activities associated with:

- > Stage 1 will occur on Sites 1, 2 and 3 and the Berth.
- > Stage 2 will predominantly occur on Site 2.
- > Stage 3 will predominantly occur on Site 2 and the Berth. (The date for commencing Stage 3 construction will be determined by market demand.)

Table 3-1 summarises the estimate personnel for each construction and operation stage.

Table 3-1 Summary of Personnel

STAGE	Construction (Personnel)	Operations (Personnel)	TOTAL (Personnel)	Duration (months)
Stage 1A Construction	17 – 35	0	17 – 35	4
Stage 1B (Balance) Construction	38 – 138	0	38 – 138	15
Stage 1 Operations & Stage 2 Construction	38 – 138	5 – 12	43 - 150	6
Stage 2 Operations	0	5 – 12	5 – 12	TBA
Stage 2 Operations & Stage 3 Construction	38 – 78	5 – 12	43 – 90	12
Stage 3 Operations	0	5 – 12	5 – 12	Ongoing

4 Impact of Proposed Development

4.1 Traffic Assumptions

- > The weekday AM and PM peak hour periods will be the focus of the assessment.
- > Annual growth rate will be based on RMS Average Annual Daily Traffic (AADT) data. This is daily traffic volume collected over a year and averaged.
- > Average shipping movements at Port Kembla will be based on the NSW Ports data.
- > Heavy vehicles routes will be based on RMS Restricted Access Vehicles Maps for 19m and 25/26m B-doubles.
- > The heavy vehicles are assumed to be:
 1. B-Double Trucks (50,000L) = 50%
 2. Single Trucks (31,000L) = 40%
 3. Rigid Trucks (18,000L) = 10%

4.2 RMS AADT Data

Historical AADT data was received from RMS and reviewed in order to estimate the annual growth on Springhill Road and Masters Road. **Table 4-1** presents the data, and the annual growth was estimated to be 1.4% based on the available data.

Table 4-1 Historical AADT data for Springhill Road north of Masters Road

Year	ADT
1988	31796
1990	36042
1992	36600
1994	35345
1997	35706
2000	35226
2003	31147
2005	36028
2015	40510
Average annual growth	1.4%

Source: RMS AADT historical data

4.3 Traffic Generation

The truck movements of the proposed development were assessed and used to estimate the trip generation for Stages 1 to 3 of the proposed development. The utilisation per day figures were provided by TQ as an estimation of their operational hours per day for each stage of development. The traffic generation rates for the proposed development during the construction and operations phases are summarised below in **Table 4-2**.

4.3.1 Stage 1 Traffic Generation

- > Truck loading bays = 4
- > Quickest truck loading time per loading bay = 20min/truck = 3 trucks/hour
- > Total = 12 trucks per hour

> Utilisation per day = 8.75hrs.

4.3.2 Stage 2 Traffic Generation

- > 4 truck loading bays
- > Quickest truck loading time per loading bay = 20min/truck = 3 trucks/hour
- > Total of 12 trucks per hour
- > Utilisation per day = 14.5hrs.

4.3.3 Stage 3 Traffic Generation

- > 6 truck loading bays
- > Quickest truck loading time per loading bay = 20min/truck = 3 trucks/hour
- > Total of 18 trucks per hour
- > Utilisation per day = 14.5hrs.

Table 4-2 Summary of Traffic Generation (daily)

STAGE	Construction (No. of Vehicles)		Operations (No. of Vehicles)		TOTAL	Duration (months)
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles		
Stage 1A Construction	7 – 15	10 – 20	0	0	17 – 35	4
Stage 1B (Balance) Construction	7 – 15	8 – 16	0	0	15 – 31	15
Stage 1 Operations & Stage 2 Construction	38 – 138	5 – 10	5 – 12	53 – 105	131 – 265	6
Stage 2 Operations	0	0	5 – 12	84 – 174	89 – 186	TBA
Stage 2 Operations & Stage 3 Construction	38 – 78	5 – 10	5 – 12	84 – 174	132 – 274	12
Stage 3 Operations	0	0	5 – 12	140 – 261	145 – 273	Ongoing

4.4 Trip Distribution

The traffic generated by the proposed project has been distributed and assigned to the external road network on the basis of the existing heavy vehicle inbound, outbound, AM and PM distribution at the Springhill Road / Tom Thumb Road intersection.

During the construction phase, vehicles have been distributed evenly between Site 1 and 2. In the operation phase, all heavy vehicles will access Site 2 and the majority of all light vehicles will access Site 3.

Table 4-3 Development Heavy Vehicles Trip Distribution

Description	Trip Distribution
AM Peak Period	50%
PM Peak Period	50%
Inbound (Springhill Road into Tom Thumb Road)	100%
Outbound (Tom Thumb Road out to Springhill Road)	100%

4.5 Peak Hour Traffic Generation

The daily peak traffic generation is based on a conservative scenario for each stage (critical scenario). Each vehicle would generate an inbound and outbound trip per day.

50% of light vehicles would generate a mid-trip during off peak periods. **Table 4-4** describes the conservative peak traffic generation for the AM and PM peak periods. (Light vehicles are assumed based on a vehicle occupancy rate of one person per vehicle). 20% of the light vehicle trips will occur prior to the general AM and PM peak periods.

The peak hourly traffic generation for heavy vehicles is based on a conservative scenario (critical scenario) of the traffic generation calculated in **Section 4.3** of this report, and includes a conservative multiplier of 2 to account for cover staff and other deliveries.

- > Stage 1 & 2 traffic generation total = 12 trucks per hour * 2 (conservative multiplier) = 24 trucks per hour
- > Stage 3 traffic generation total = 18 trucks per hour * 2 (conservative multiplier) = 36 trucks per hour.

Table 4-4 Peak Traffic Generation

STAGE	TOTAL per Day			AM Peak ⁽¹⁾ (Critical Scenario)		PM Peak ⁽²⁾ (Critical Scenario)	
	Duration of Peak (months)	Light Vehicles (per day)	Heavy Vehicles (per day)	Light Vehicles (hourly)	Heavy Vehicles (hourly)	Light Vehicles (hourly)	Heavy Vehicles (hourly)
Stage 1A Construction	4	15	20	9	20	9	20
Stage 1B (Balance) Construction	15	15	16	9	16	9	16
Stage 1 Operations & Stage 2 Construction	6	150	94	120	24	120	24
Stage 2 Operations	TBA	12	140	10	24	10	24
Stage 2 Operations & Stage 3 Construction	12	90	150	72	36	72	36
Stage 3 Operations	Ongoing	12	206	10	36	10	36

⁽¹⁾ Critical Scenario AM Peak assumes that a maximum of 36 heavy vehicles will occur during the general traffic peak period.

⁽²⁾ Critical Scenario PM Peak assumes that a maximum of 36 heavy vehicles will occur during the general traffic peak period.

4.6 Traffic Assignment

The peak traffic generation results have been used to estimate peak hour traffic flows on the internal road network.

Figures 4-1 and **Figure 4-2** illustrate the traffic assignment of the Stage 1 Operation and Stage 2 Construction during the AM and PM peak periods.

Figure 4-3 and **Figure 4-4** illustrate the traffic assignment of the Stage 3 Operation (critical scenario) during the AM and PM peak periods. It is noted, based on information received from TQ that the majority of heavy vehicle trips to and from the site will occur between 2am – 10am. However, it is considered as a conservative assessment, that a maximum of 36 heavy vehicles will occur during the peak AM and PM period as outlined previously in a critical scenario.

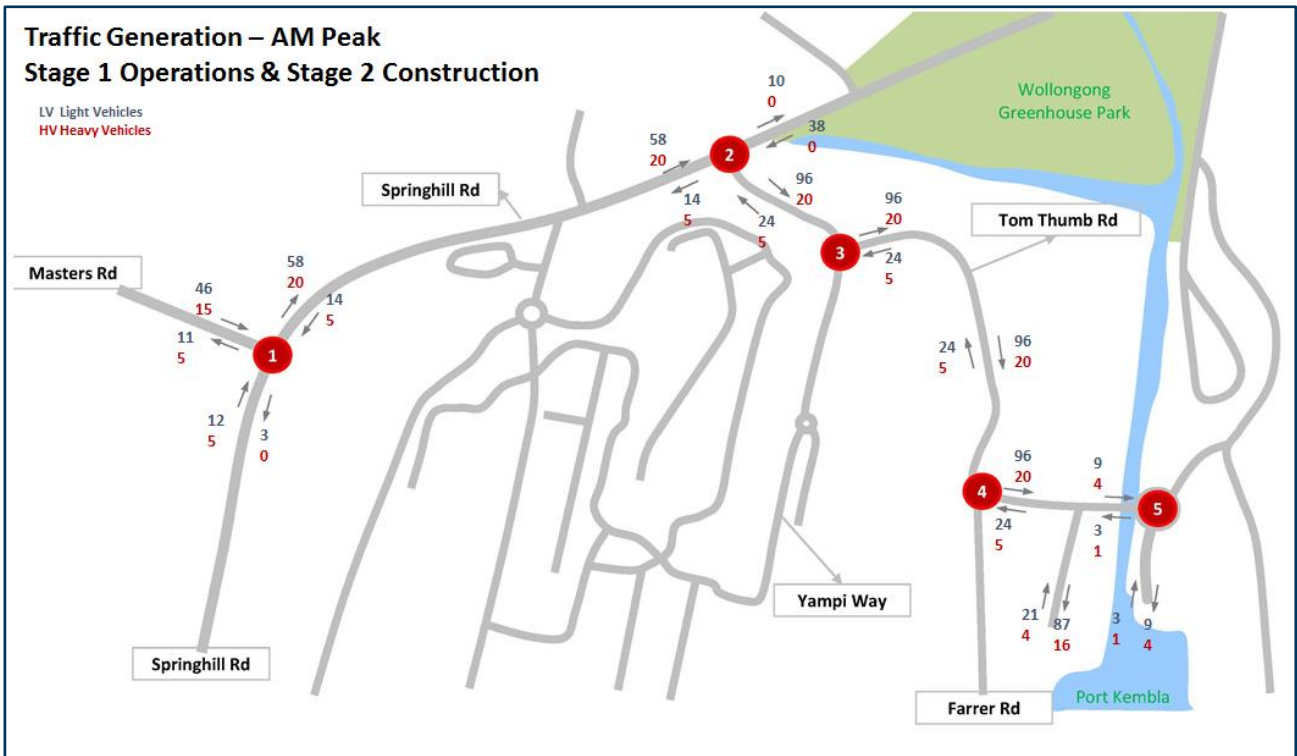


Figure 4-1 AM Peak Traffic Distribution – Stage 1 Operations & Stage 2 Construction

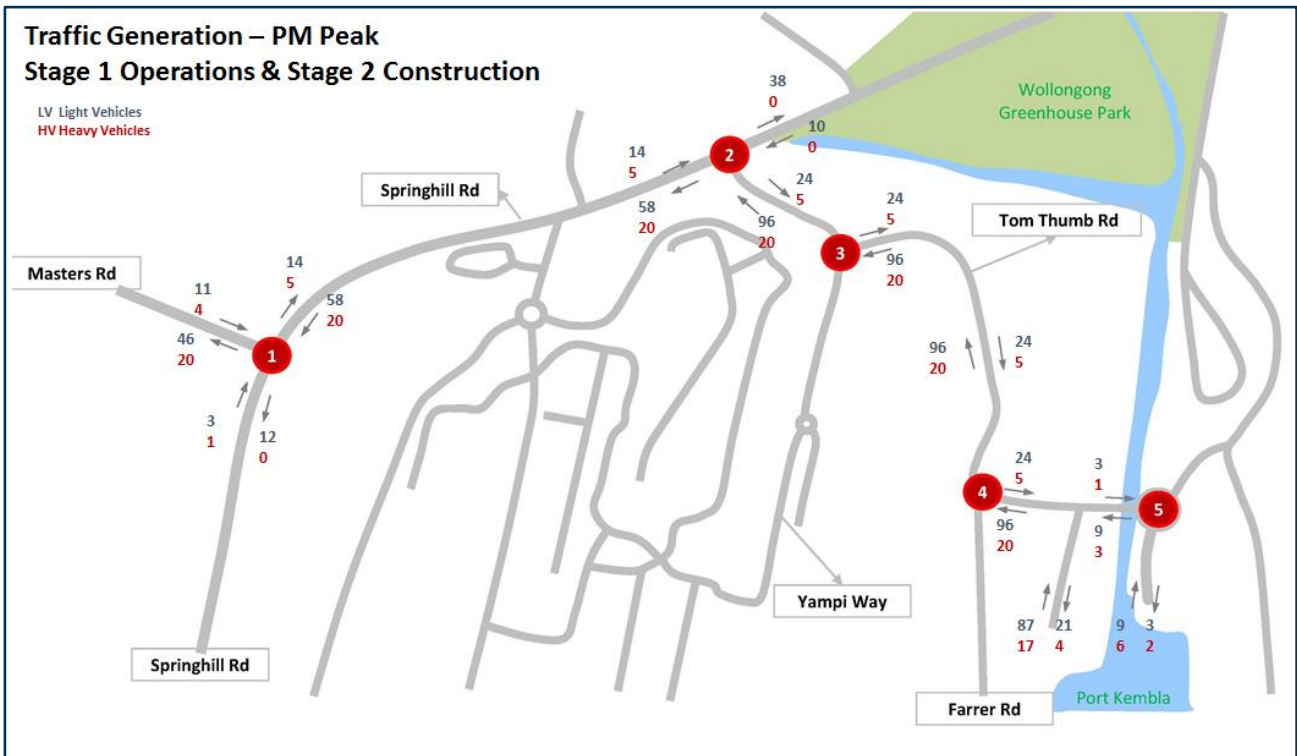


Figure 4-2 PM Peak Traffic Distribution – Stage 1 Operations & Stage 2 Construction

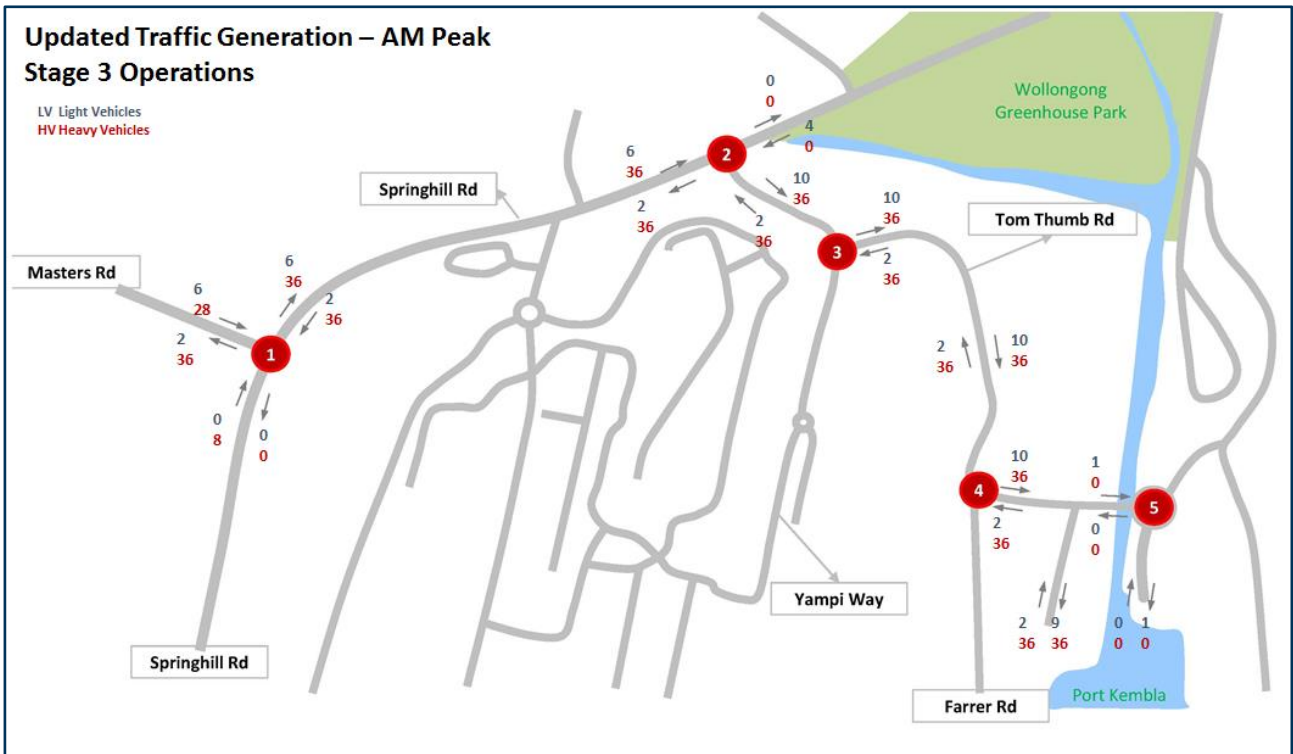


Figure 4-3 AM Peak Traffic Distribution – Stage 3 Operations

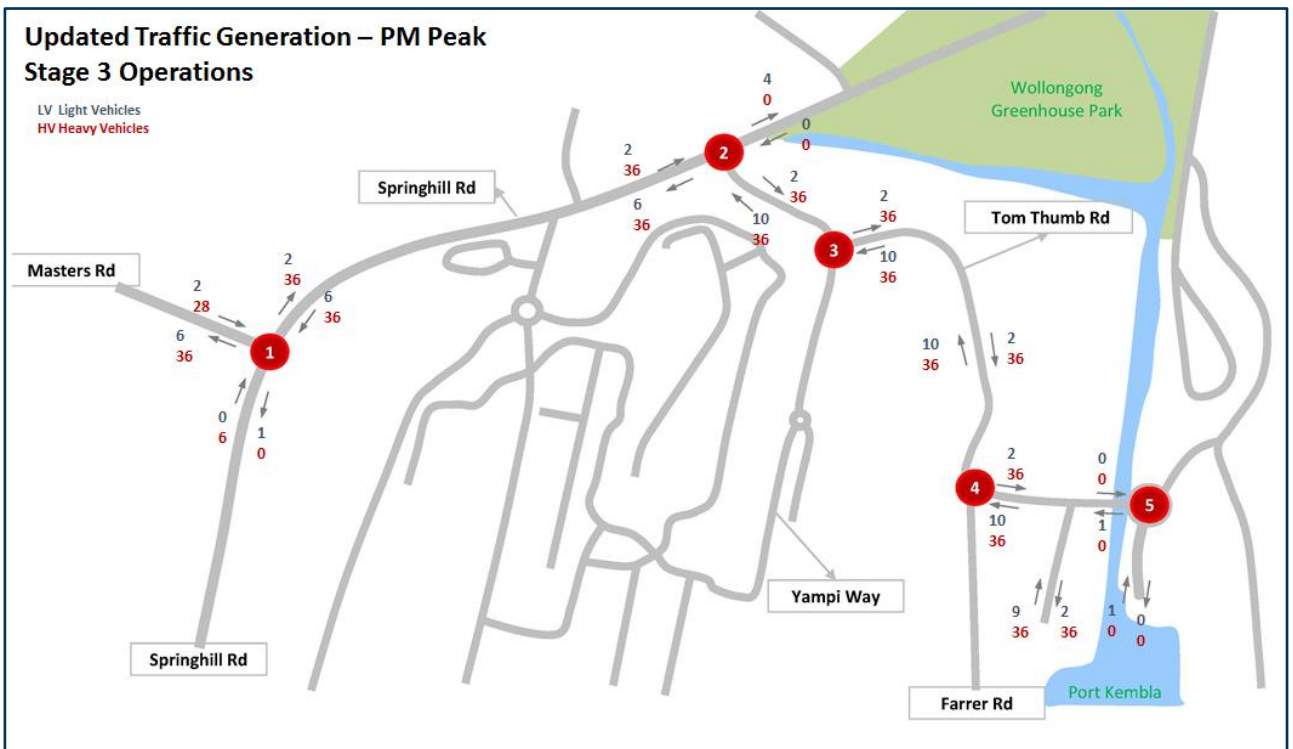


Figure 4-4 PM Peak Traffic Distribution – Stage 3 Operations

4.7 Passenger Car Unit

The following heavy vehicle types have been split and converted into PCU for the purpose of SIDRA 6.0 modelling.

- > B-Double Trucks (50,000L) = 50% = 3 PCU
- > Single Trucks (31,000L) = 40% = 2 PCU
- > Rigid Trucks (18,000L) = 10% = 2 PCU
- > Total average of 2.5 PCU

The heavy vehicles generated from the PK BLT development have been converted to PCU using a factor of 2.5 to consider the usage of a mix of heavy vehicles.

4.8 Intersection Performance Construction and Operational Staging

SIDRA Intersection version 6.1 was used to assess the performance of the key intersections listed in Section 2.6. The conservative scenarios identified for the development would occur during the Stage 1 Operations and Stage 2 Construction.

Additionally, a second scenario for the critical operational conditions (Stage 3 Operational) has been assessed for the development. **Table 4-5** and **Table 4-6** summarise the performance of the construction and operational staging for the conservative scenario traffic conditions at key intersections for the AM and PM peak periods.

Table 4-5 Stage 1 Operations & Stage 2 Construction – Intersection Performance

Intersection	Control Type	AM Peak			PM Peak		
		Degree of Saturation (DoS)	Average Delay (s)	Level of Service (LoS)	Degree of Saturation (DoS)	Average Delay (s)	Level of Service (LoS)
Masters Road / Springhill Road	Signal Controlled	0.88	39	C	0.86	34	C
Springhill Road / Tom Thumb Road	Signal Controlled	0.81	19	B	0.80	20	B
Tom Thumb Road / Yampi Way	Priority Controlled	0.12	1	A	0.25	1	A
Tom Thumb Road / Farrer Road	Priority Controlled	0.10	7	A	0.11	6	A
Tom Thumb Road Roundabout	Roundabout	0.04	1	A	0.05	1	A

The SIDRA results indicate that the key intersections operate at acceptable Level of Service (LoS) C or better during the AM and PM peak periods. Detailed results from the SIDRA assessments are provided in **Appendix A**.

Table 4-6 Stage 3 Operations – Intersection Performance

Intersection	Control Type	AM Peak (Critical Scenario)			PM Peak (Critical Scenario)		
		Degree of Saturation (DoS)	Average Delay (s)	Level of Service (LoS)	Degree of Saturation (DoS)	Average Delay (s)	Level of Service (LoS)
Masters Road / Springhill Road	Signal Controlled	0.89	44	D	0.86	36	D
Springhill Road / Tom Thumb Road	Signal Controlled	0.84	21	B	0.83	21	B

Tom Thumb Road / Yampi Way	Priority Controlled	0.18	2	A	0.21	2	A
Tom Thumb Road / Farrer Road	Priority Controlled	0.08	7	A	0.09	6	A
Tom Thumb Road Roundabout	Roundabout	0.02	1	A	0.04	1	A

The SIDRA results indicate that the key intersections operate at acceptable Level of Service (LoS) C or better during the AM and PM peak periods. The SIDRA analysis indicates that the Masters Road and Springhill Road intersection would perform at acceptable Level of Service (LoS) of D near capacity during the AM and PM Peak period. Detailed results from the SIDRA assessments are provided in **Appendix A**.

4.9 Lane Capacity – Construction and Operational Staging

The High Capacity Manual (HCM) v. 2010 was used to assess the performance of the key travel routes listed in Section 2.6. **Table 4-7** and **4-8** summarise the performance of the conservative scenario for the construction and operational staging during the AM and PM peak periods.

Table 4-7 Stage 1 Operations & Stage 2 Construction – Lane Capacity

Location	Travel Direction	AM Peak Level of Service (LoS)	PM Peak Level of Service (LoS)
Springhill Road, east of Masters Road	Eastbound	C	A
	Westbound	A	B
Springhill Road, west of Tom Thumb Road	Eastbound	C	A
	Westbound	A	B
M1 Princes Motorway, south Memorial Drive	Northbound	C	C
	Southbound	C	C
Picton Road, east of Hume Highway	Eastbound	C	C
	Westbound	C	B

The High Capacity Manual (HCM) results indicate that the key travel routes operate at acceptable Level of Service (LoS) C or better during the AM and PM peak periods.

Table 4-8 Stage 3 Operations – Lane Capacity

Location	Travel Direction	AM Peak Level of Service (LoS)	PM Peak Level of Service (LoS)
Springhill Road, east of Masters Road	Eastbound	C	A
	Westbound	A	B
Springhill Road, west of Tom Thumb Road	Eastbound	C	A
	Westbound	A	B
M1 Princes Motorway, south Memorial Drive	Northbound	C	C
	Southbound	C	C
Picton Road, east of Hume Highway	Eastbound	C	C
	Westbound	C	B

The High Capacity Manual (HCM) results indicate that the key travel routes operate at acceptable Level of Service (LoS) C or better during the AM and PM peak periods.

4.10 Noise and Vibration Assessment

For the purposes of informing the noise and vibration assessment undertaken by Pacific Environment, the existing heavy vehicle 24hr profile for Spring Hill Road was assessed and modified based on information received from TQ Holdings (see **Figure 4-5**).

Based on the modified profile below, the total number of heavy vehicle trips generating from PK BLT (Stage 3 Operation) for the purpose of noise and vibration assessment are as follows:

- > 7am to 10pm = 127 HVs
- > 10pm to 7am = 79 HVs

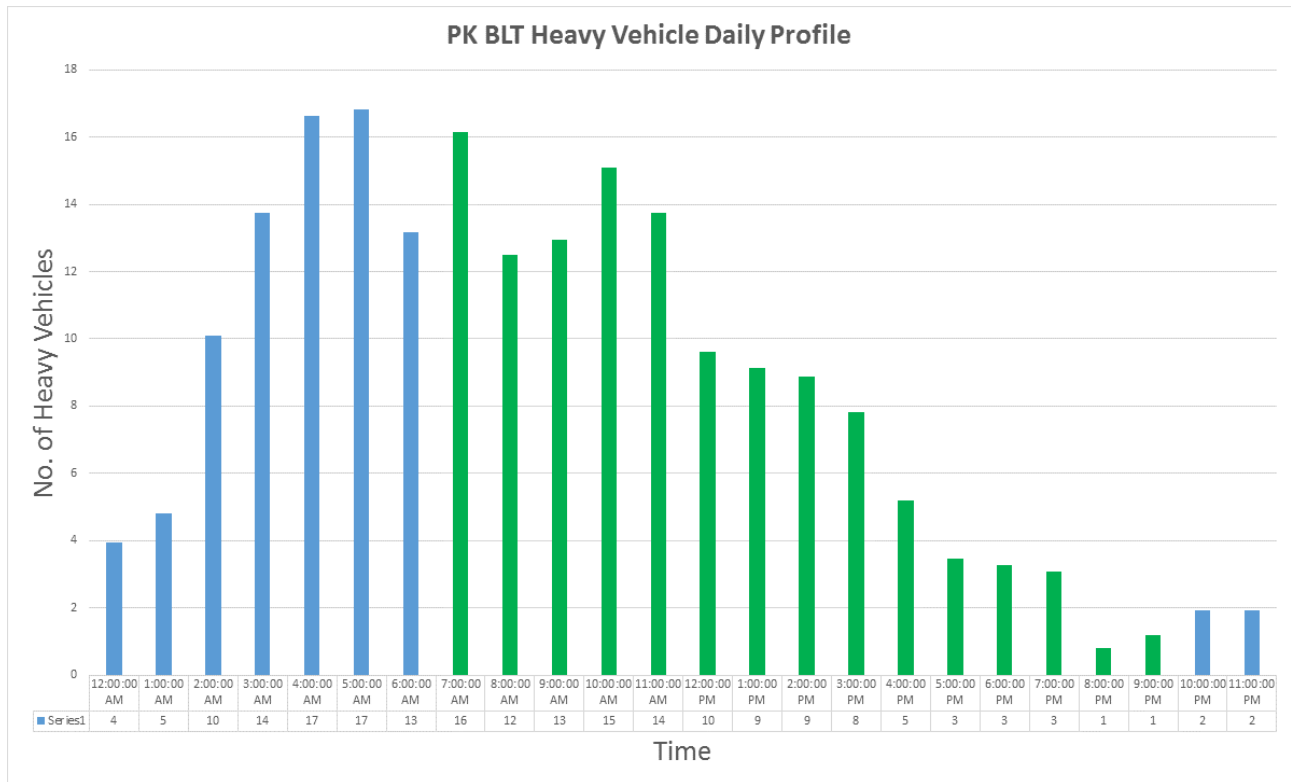


Figure 4-5 PK BLT Heavy Vehicle Daily Profile

It is acknowledged that this 24hr profile results in a lower peak hour heavy vehicle volume than that used for the purposes of the traffic impact assessment (see **Section 4.5**). The more conservative traffic generation assumptions were used to ensure a robust assessment of traffic impacts on local roads and intersections.

5 Future Year Impact Assessment

This report includes the assessment of two future year scenarios:

- > Future year 2026 without PK BLT development
- > Future year 2026 with PK BLT development.

5.1 Traffic Assumptions

Relevant background documents were reviewed and any future committed developments likely to impact the surrounding road network has been considered.

5.1.1 NSW Ports Five Year Port Development Plan

The NSW Ports Five Year Port Development Plan outlines the future strategy of the Port Kembla Port and the forecasted impact to the surrounding road network in the future. The NSW Ports Five Year Port Development Plan was created to:

- > Manage and develop the port land and port-related infrastructure in a safe, secure, efficient and environmentally responsible manner to cater for the import and export demands of the NSW economy.
- > Support the State and Commonwealth to deliver freight infrastructure by promoting and facilitating an integrated freight transport system capable of servicing the State's growing needs.

At Port Kembla, the trade is predominantly bulk and general cargo such as coal, grain, iron ore and motor vehicles. There is sufficient land capacity at Port Kembla to meet the incremental growth needs of current Port users over the next five years.

NSW Ports anticipates car imports will grow at an annual rate of approximately 3.1%. Continued steel export activity through BlueScope's berths is expected, but volumes are unlikely to increase over the next five years. Due to uncertain weather patterns and the cyclical nature of historic grain exports, it is difficult to project future grain volumes.

As a conservative future assessment, the anticipated annual growth rate of car imports of 3.1% has been applied as background growth to the internal road network in the Inner Harbour.

5.1.2 Committed Developments

This assessment has considered the following committed developments that are likely to impact the surrounding road network in the future:

- > Maldon to Dombarton Rail Line
- > Port Kembla Outer Harbour (PKOH) development
- > Quattro Second Grain Terminal development

Transport for NSW is currently proceeding with pre-construction activities for the Maldon to Dombarton Rail Link. Should the project proceed, the Rail Link would connect Port Kembla to the Southern Sydney Freight Line thereby improving productivity at the Port and providing an efficient rail connection between Port Kembla and future intermodal terminals in western and south-western Sydney.

However, as a conservative assessment, the traffic volume reducing benefits of this Rail Link have not been considered.

The Port Kembla Outer Harbour Concept has been approved and Stage 1A reclamation work is currently being undertaken. According to the Concept Approval in *Section 2.7*, it is noted that the total traffic movements associated with the operation of the projects associated with the concept plan approval shall be generally consistent with the limits specified as a:

- > Total of 121 vehicle movements per hour (102 trucks + 19 employee vehicles).

The Quattro second grain terminal development is anticipated to add a maximum of 4 B-double trucks per hour and this movement has been assumed to be split 50% in/out.

5.1.3 Port Kembla Grinding Mill TIA

The TIA related to the PKOH development produced by Bitzios was reviewed to understand how the trip distribution of the 121 vehicle movements per hour from the PKOH development may impact the surrounding road network. According to a traffic assignment diagram in the Bitzios report, we can expect approximately 50% of the PKOH development traffic to use Spring Hill Road.

Therefore, we can estimate that the PKOH development will be adding approximately a total of 50 (50% of 102) heavy vehicles and 10 (50% of 19) light vehicles to Springhill Road in the future.

Assuming a 50% in/out split then that is equal to approximately 25 HV 5 LV in and 25 HV 5 LV out to Springhill Road in the future.

5.1.4 Summary

Following review of relevant background documents and committed developments in the vicinity of the PK BLT site, the subsequent assumptions for future year assessment are summarised as follows:

- > Springhill Road / Masters Road
 1. Background growth of 1.4% per year (AADT) for 11 years from the 2015 traffic volume surveys
 2. 25 HV and 5 LV in/out from the PKOH development on Springhill Road
 3. 50% of PKOH traffic to turn into Masters Road with the remainder to continue on Spring Hill Road (based on existing 2015 HV split at this intersection)
- > Inner Harbour internal road network
 1. Anticipated growth of 3.1% per year for 11 years from the 2015 traffic volume surveys
 2. 4 HV in/out from the Quattro development

Figure 5-1 summaries the future year without PK BLT development assumptions.

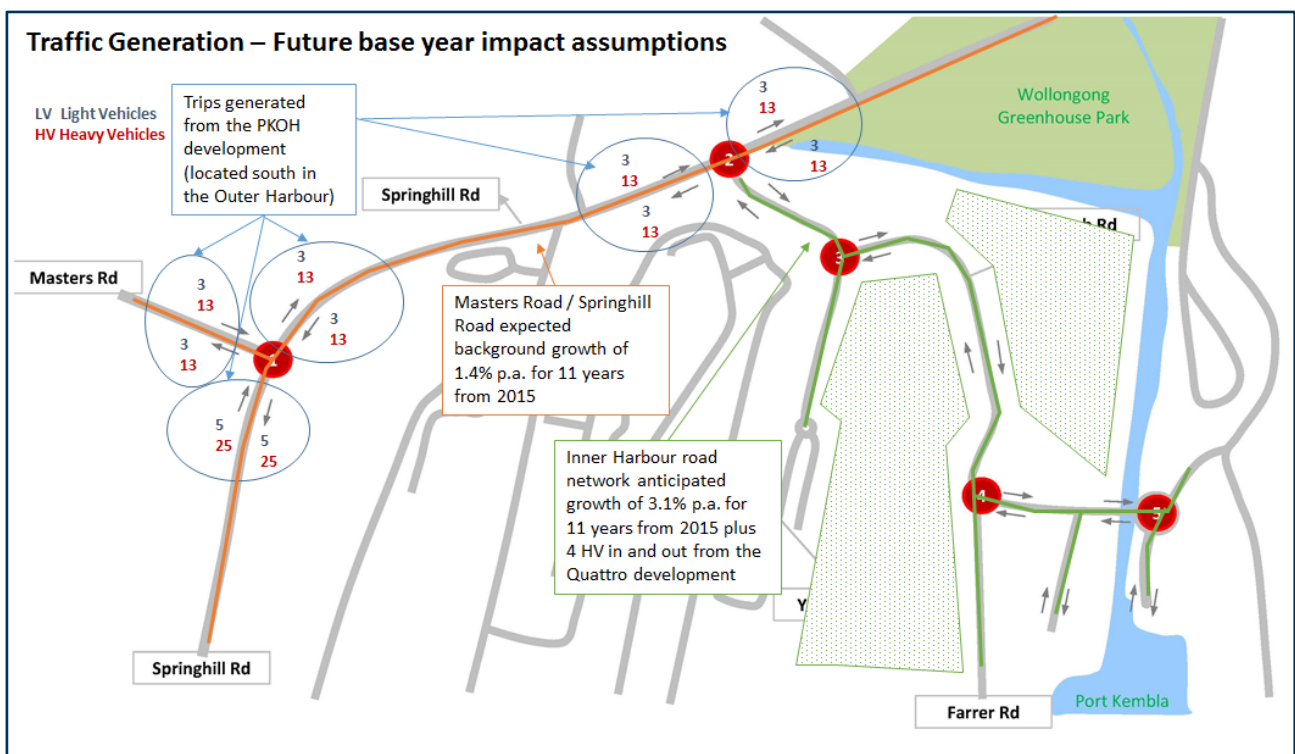


Figure 5-1 Summary of future base year traffic impact assumptions

5.2 Intersection Performance

The intersection performance of the key intersections was undertaken in SIDRA 6.1. The results of the following three scenarios are presented for each key intersection.

- > 2015 Base (assessed in **Section 2.6** of this report)
- > 2026 Future Base (without PK BLT development)
- > 2026 Future Base plus PK BLT development.

5.2.1 Masters Road / Springhill Road

The analysis undertaken indicates that the Masters Road / Springhill Road intersection is anticipated to operate at Level of Service E in the AM peak period for the 2026 future year scenario with PK BLT development. The Degree of Saturation is marginally worse with PK BLT but exceeds the desirable 0.9 even without the PKBLT development. The results of the intersection modelling for all scenarios are shown below in **Table 5-1**.

Table 5-1 Masters Road / Springhill Road SIDRA results

Scenario	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
2015 Base	Signals	0.85	37	C	0.80	37	C
2026 Future Base	Signals	0.92	54	D	0.89	42	C
2026 Future Base plus PK BLT	Signals	0.95	63	E	0.88	44	D

5.2.1.1 *Mitigation of Masters Road / Springhill Road intersection*

Figure 5-2 below shows the proposed mitigation layout of Masters Road / Springhill Road intersection for the ‘2026 Future Base plus PK BLT’ scenario. The mitigation includes conversion of the existing short left turn lane on Masters Road west into a continuous free-flow lane and a short exit lane on Springhill Road north.

Traffic modelling undertaken for the 2026 future year scenario has identified that the intersection of Springhill Road / Masters Road would reach practical capacity (DoS >0.9) by 2026 even without the traffic generated by the PK BLT at full operation. It is therefore evident that this intersection represents a key constraint on the future development of Port Kembla and a suitable mitigation measure (either the Cardno proposed upgrade or some other) will be required to be developed by RMS in the medium term.

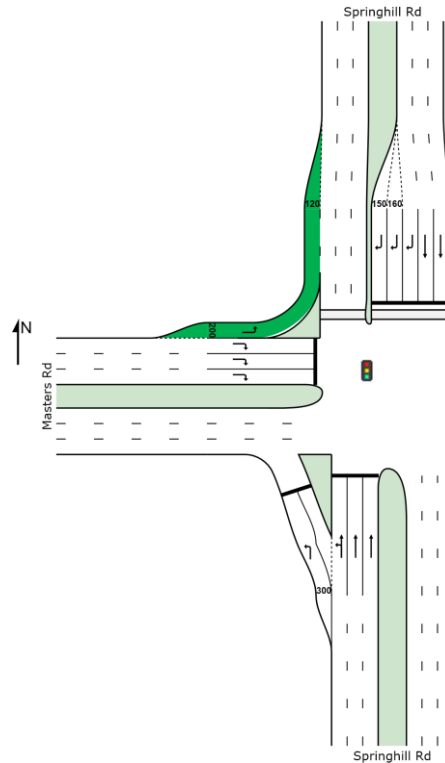


Figure 5-2 Layout of Masters Road / Springhill Road with proposed mitigation

The modelling undertaken indicates that the proposed mitigation of Masters Road / Springhill Road intersection is anticipated to operate at acceptable levels of service in both the AM and PM peak periods for the 2026 future year scenario with the addition of PK BLT. This layout is conceptual only and is subject to further investigation and liaison with NSW Roads and Maritime. The results of the mitigation intersection modelling are shown below in **Table 5-2**.

Table 5-2 Mitigation of Masters Road / Springhill Road SIDRA results

Scenario	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
2026 Future Base plus PK BLT with mitigation	Signals	0.91	46	D	0.88	44	D

5.2.2 Springhill Road / Tom Thumb Road

The analysis undertaken indicates that the Springhill Road / Tom Thumb Road intersection is anticipated to operate with an acceptable level of service in both the AM and PM peak period for all future year scenarios. The results of the intersection modelling for all scenarios is shown below in **Table 5-3**.

Table 5-3 Springhill Road / Tom Thumb Road SIDRA results

Scenario	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
2015 Base	Signals	0.81	18	B	0.80	19	B
2026 Future Base	Signals	0.88	24	B	0.81	19	B

2026 Future Base plus PK BLT	Signals	0.88	25	B	0.84	21	B
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5.2.3 Tom Thumb Road / Yampi Way

The analysis undertaken indicates that the Tom Thumb Road / Yampi Way intersection is anticipated to operate with an acceptable level of service in both the AM and PM peak period for all future year scenarios. The results of the intersection modelling for all scenarios is shown below in **Table 5-4**.

Table 5-4 Tom Thumb Road / Yampi Way SIDRA results

Scenario	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
2015 Base	Stop	0.06	2	A	0.08	1	A
2026 Future Base	Stop	0.08	3	A	0.13	2	A
2026 Future Base plus PK BLT	Stop	0.21	3	A	0.26	2	A

5.2.4 Tom Thumb Road / Farrer Road

The analysis undertaken indicates that the Tom Thumb Road / Farrer Road intersection is anticipated to operate with an acceptable level of service in both the AM and PM peak period for all future year scenarios. The results of the intersection modelling for all scenarios are shown below in **Table 5-5**.

Table 5-5 Tom Thumb Road / Farrer Road SIDRA results

Scenario	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
2015 Base	Give-way	0.02	6	A	0.03	6	A
2026 Future Base	Give-way	0.04	6	A	0.05	6	A
2026 Future Base plus PK BLT	Give-way	0.09	7	A	0.10	6	A

5.2.5 Tom Thumb Road roundabout

The analysis undertaken indicates that the Tom Thumb Road roundabout is anticipated to operate with an acceptable level of service in both the AM and PM peak period for all future year scenarios. The results of the intersection modelling for all scenarios are shown below in **Table 5-6**.

Table 5-6 Tom Thumb Road roundabout SIDRA results

Scenario	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
2015 Base	Roundabout	0.02	1	A	0.04	1	A
2026 Future Base	Roundabout	0.04	1	A	0.06	1	A
2026 Future Base plus PK BLT	Roundabout	0.04	1	A	0.06	1	A

6 Site Access & Parking

6.1 Site Accessibility

Access to the proposed development will be provided at two (2) locations identified in **Figure 6-1**.

1. Tom Thumb Road for Sites 1 and 3; and
2. Morton Way for Site 2

Site Access 1 will operate as main access to vehicles to the site control room and office block, maintenance work shop and utilities on Site 3. It will also provide access to the combustible and flammable bulk liquids storage and pump bay on Site 1. Site Access 2 will provide access to the combustible and flammable bulk liquids and truck loading facilities on Site 2 as well as Berth 104.



Figure 6-1 Site Accesses Bulk Liquids Terminal

Source: TQ Holdings Australia Pty Ltd

The access off Tom Thumb Road and Morton Way has been designed to accommodate the swept path of the largest vehicle anticipated to access the site which is a B-Double 25m Truck. The majority of the heavy vehicle movements would occur at Site Access 2 (Morton Way). It is expected that the majority of light vehicles would occur at Site Access 1 (Tom Thumb Road). The heavy vehicles swept path analyses for Site 2 are shown in **Figure 6-2** which indicates a potential conflict with vehicles turning from Tom Thumb Road into Morton Way and northbound traffic on Morton Way. This issue will be addressed in consultation with NSW Ports during the detailed design and future traffic management planning stages.

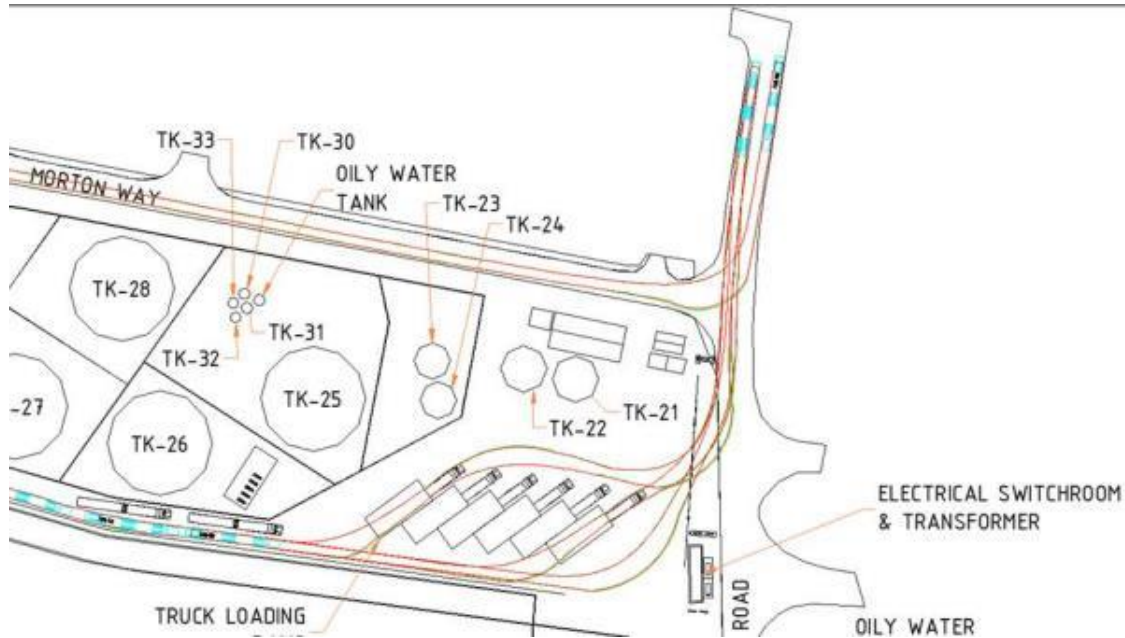


Figure 6-2 Heavy Vehicles Turning Paths – Tom Thumb Road

6.2 Operational Parking

The PK BLT Stage 3 Operations is proposed to generate up to 12 personnel daily during operations of the project. Details of the construction and operation personnel are described in **Section 3.4**. Site 3 is proposed to be developed as the site control room and office block and maintenance work shop and utilities. The Site 3 area provides 20 parking bays for personnel and visitors. Details of the parking access connecting to Tom Thumb Road (including parking on Site 1 and 2) would be provided in the Traffic Management Plan.

Figure 6-3 illustrates the parking area located in Site 3 adjacent to the Tom Thumb Road roundabout.

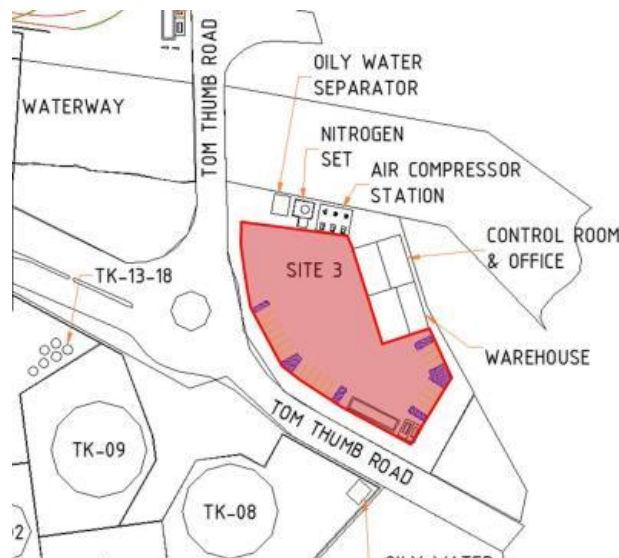


Figure 6-3 Parking Area Site 3

6.3 Operational Management

During peak periods, it is anticipated there is potential for heavy vehicle queuing during peak periods. Therefore, it is understood that time management measures will be planned and implemented by TQ. A truck slot booking system will be implemented and entry gates will be designed in the detailed design phase to be setback from the road to accommodate the longest vehicle accessing each site. These measures will be incorporated into the Operational Traffic Management Plan to allow free flow of internal and external traffic.

7 Mitigation and Management Measures

For the purposes of this assessment three scenarios have been assessed:

1. During Stage 1 Operation/Stage 2 Construction;
2. During Stage 3 Operations (full development of site); and
3. Future year 2026 Operations.

7.1 Construction Stage

This assessment has identified that there are no critical capacity issues arising during the Stage 1 Operation/Stage 2 Construction phase of development (see **Section 4**). Cardno has proposed a number of generic mitigation and management measures for the PK BLT to ensure construction and operational traffic is managed appropriately during this phase.

The following measures are proposed for minimising impacts associated with the construction development including transportation of materials, components and equipment:

- > Develop a detailed Traffic Management Plan for the construction stages of the project in accordance with the Traffic Control at Worksites, version 4.0 (NSW Roads and Maritime Services, June 2010). The Traffic Management Plan would include:
 - Details of a truck slot booking system to prevent queueing on internal and external road network.
 - Hours of haulage, which do not impose on peak periods and school drop-off and pick-up times.
 - Haulage routes, in accordance to the RMS restricted access to heavy vehicles.
 - Designated areas within the site for heavy and light vehicles turning movements, parking, loading and unloading.
 - Sequence for implementing traffic works and traffic management devices if required.
 - Safety principles for construction activities, such as speed limits around the site and procedures for specific activities.
 - Assessing the need for oversize/overmass vehicles and management of their movements.

7.2 Operational Stage

The traffic generated by the PK BLT during Stage 3 Operations (full development of site) would result in a negligible increase in traffic generation (see **Section 4**). The road network will be able to cater for the traffic generated by the proposed project.

- > The general morning peak traffic in the local area occurs between 8:15 AM and 9:15 AM and between 4:30 PM and 5:30 PM during the afternoon. This traffic impact assessment has demonstrated that the local road network has adequate capacity to cater for PK BLT operational traffic during the morning and evening peak hours.
- > The internal access and parking areas will be designed such that all vehicles, including the largest design vehicle (25m B-Double) are able to turn around within the sites. This will ensure safe turning manoeuvres without excessive reversing necessary.
- > The entry gates to each site shall also be setback from the road to accommodate the longest vehicle accessing each site to allow free flow of internal and external vehicles.
- > Parking facilities will be provided in accordance with Australian Standards (AS2890 Series).
- > TQ will utilise a truck slot booking system to prevent queueing on internal and external roads.

7.3 Future Year 2026

In the year 2026, it is anticipated that the Masters Road / Springhill Road intersection will have an unacceptable level of service with or without the PK BLT development. Therefore, it is anticipated that mitigation would be required prior to 2026. Mitigation has been proposed in **Section 5.2** of this report.

8 Conclusions

8.1 Overview

This report has been prepared to document the assessment of the traffic and transport impacts relating to the proposed development of the PK BLT. This proposed development will involve the development of a terminal with capacity of up to 288 ML of storage for combustible and flammable liquids.

This assessment has considered the following:

- > Intersection performance during construction and operation (AM and PM peak periods), under the following scenarios 1-5:
 1. 'Base 2015' conditions.
 2. 'Stage 1 and 2' with Stage 1 Operational Traffic and Stage 2 Construction Traffic
 3. 'Stage 3' (2018) with 1.4% background growth per annum on Springhill Road and Masters Road and PK BLT development traffic.
 4. 'Base 2026' including:
 - > 1.4% background growth per annum on Springhill Road and Masters Road
 - > Inner Harbour growth of 3.1% per annum
 - > Port Kembla Outer Harbour development trips
 - > Quattro Grain terminal development trips
 5. 'Design Year 2026' conditions with 'Base 2026' and PK BLT development traffic.
- > Road midblock capacity during construction and operation (AM and PM peak periods), under the following scenarios:
 - Base traffic flow conditions; and
 - Sensitivity assessment of the base flow conditions with traffic generated by the proposed development;
- > Site access locations and parking.

8.2 Summary of Results

This Traffic Impact Assessment has demonstrated the following key findings:

- > Key local intersections in the Port Kembla area and surrounds currently operate at a satisfactory Level of Service (LoS) in both the AM and PM peak periods.
- > The intersections will continue to operate at a satisfactory Level of Service (LoS) during Stage 1 Operations and Stage 2 Construction.
- > The intersections will continue to operate at a satisfactory Level of Service (LoS) during Stage 3 Operations in 2018.
- > The local road network will have adequate lane capacity to cater for PK BLT operational traffic during construction and operational opening year in 2018.
- > The future year assessment indicates that the key local intersections will operate at a satisfactory Level of Service (LoS) in 2026 with or without the PK BLT development, with the exception of Masters Road / Springhill Road intersection.
- > The analysis undertaken indicates that the Masters Road / Springhill Road intersection will operate at Level of Service E (incidents will cause excessive delays) in the AM peak period for the 2026 future year scenario with the PK BLT development. The Degree of Saturation is marginally worse with PK BLT but exceeds the desirable 0.9 even without the PK BLT development.
- > Cardno has devised an upgrade of Masters Road / Springhill Road to mitigate future year traffic impacts. This involves the addition of a free-flow slip lane and short exit lane for left turning traffic from Masters Road to Springhill Road (North).
- > The proposed internal circulation and manoeuvring arrangements are capable of providing for safe and efficient vehicular movements.
- > No additional public transport services or provisions are required to support the development.
- > A detailed Traffic Management Plan should be prepared for the construction stages of the project in accordance with the Traffic Control at Worksites Manual (TCAWS), version 4.0 (NSW Roads and Maritime Services, June 2010). The Traffic Management Plan shall consider safety principles for construction activities, such as speed limits around the site and procedures for specific activities. The Traffic Management Plan should describe:
 1. Hours of haulage, which do not impose on peak periods and school drop-off and pick-up times.
 2. Haulage routes, in accordance to the RMS restricted access to heavy vehicles.
 3. Designated areas within the site for heavy and light vehicles turning movements, parking, loading and unloading.
 4. Sequence for implementing traffic works and traffic management devices if required.
 5. Details of a truck slot booking system to prevent queueing on internal and external roads (during construction and operations).

Proposed Port Kembla Bulk Liquids
Terminal

APPENDIX

A

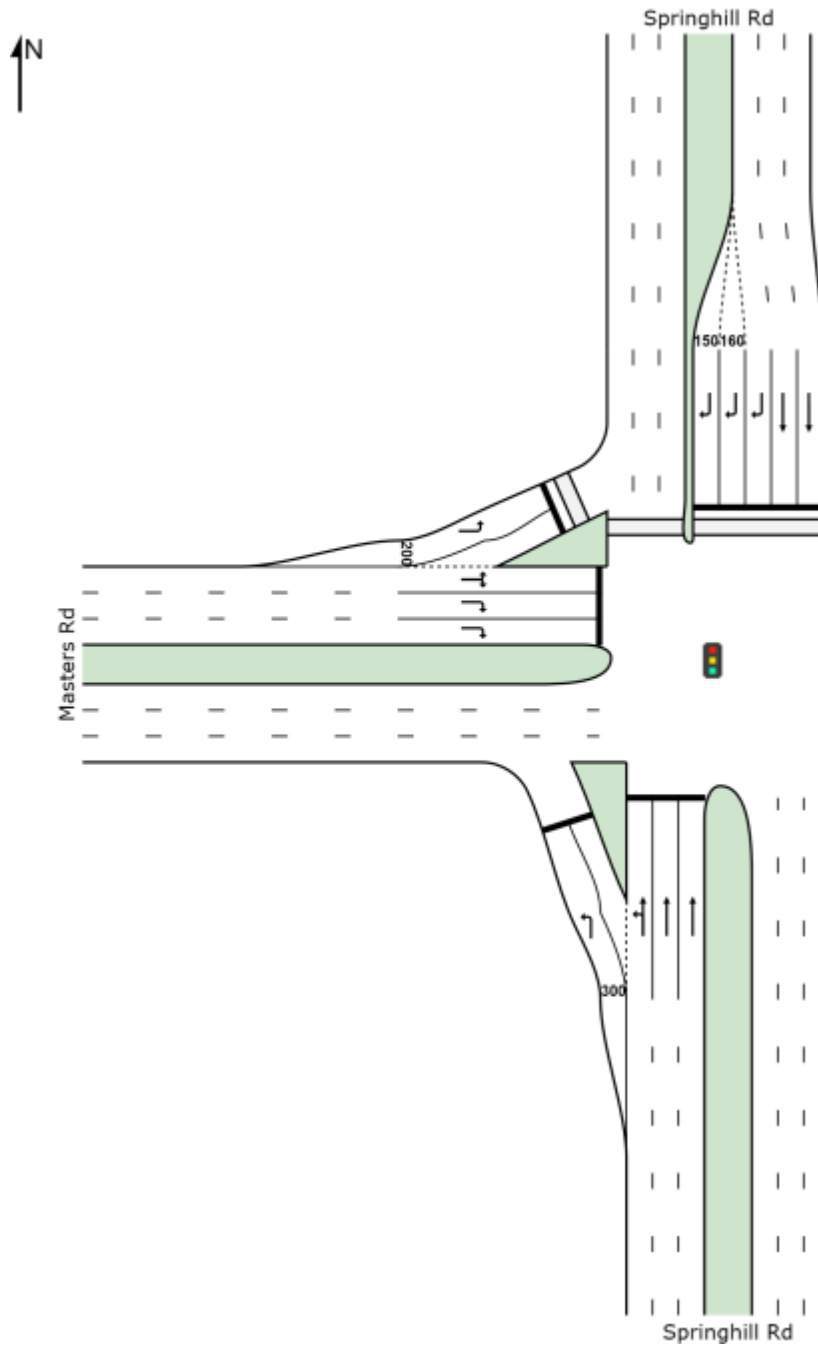
SIDRA INTERSECTION DETAILS

SIDRA Intersection Layouts

SITE LAYOUT

 Site: 1. Masters Road / Springhill Road

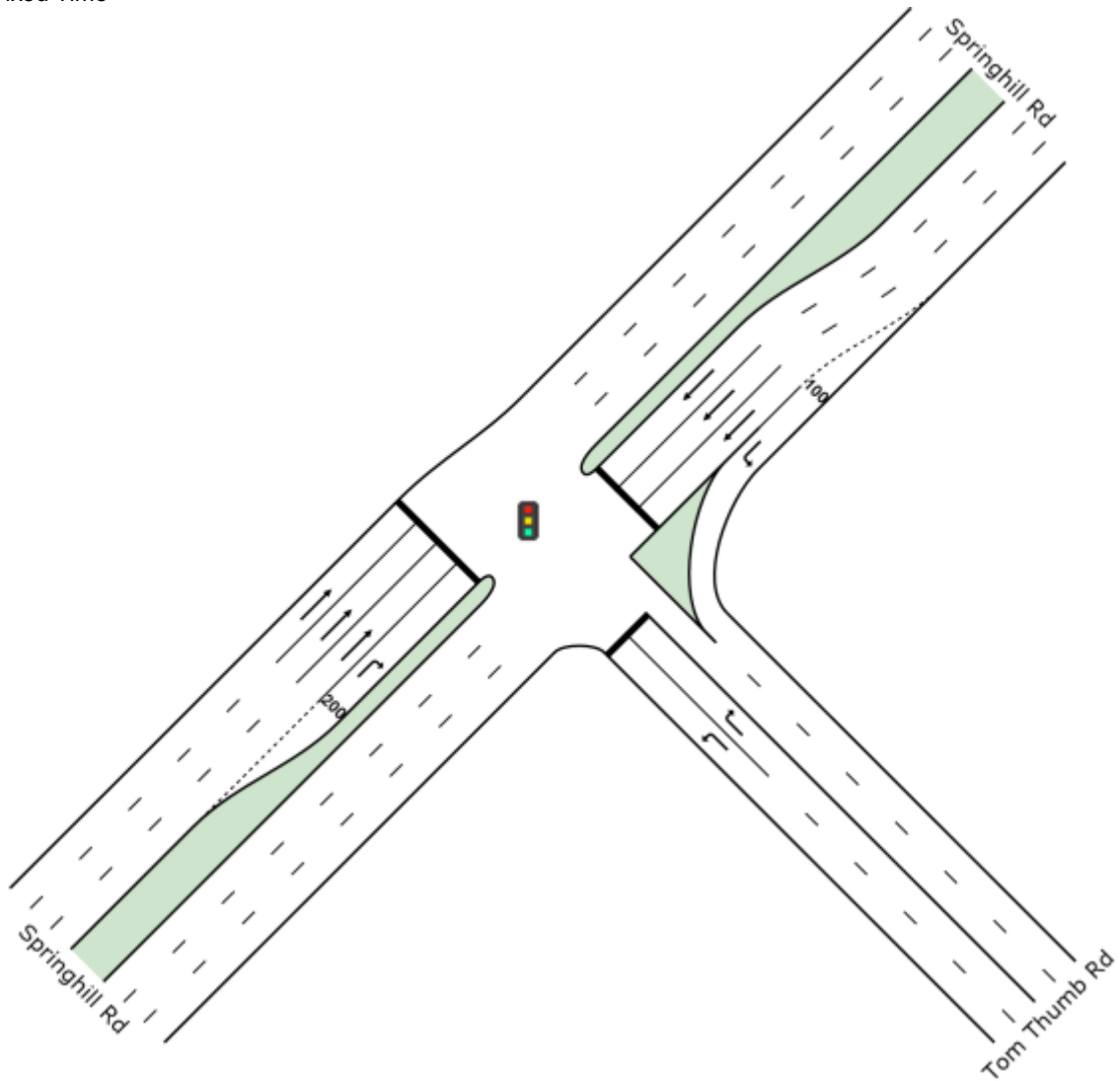
Signals - Fixed Time



SITE LAYOUT

 **Site: 2. Springhill Road / Tom Thumb Road**

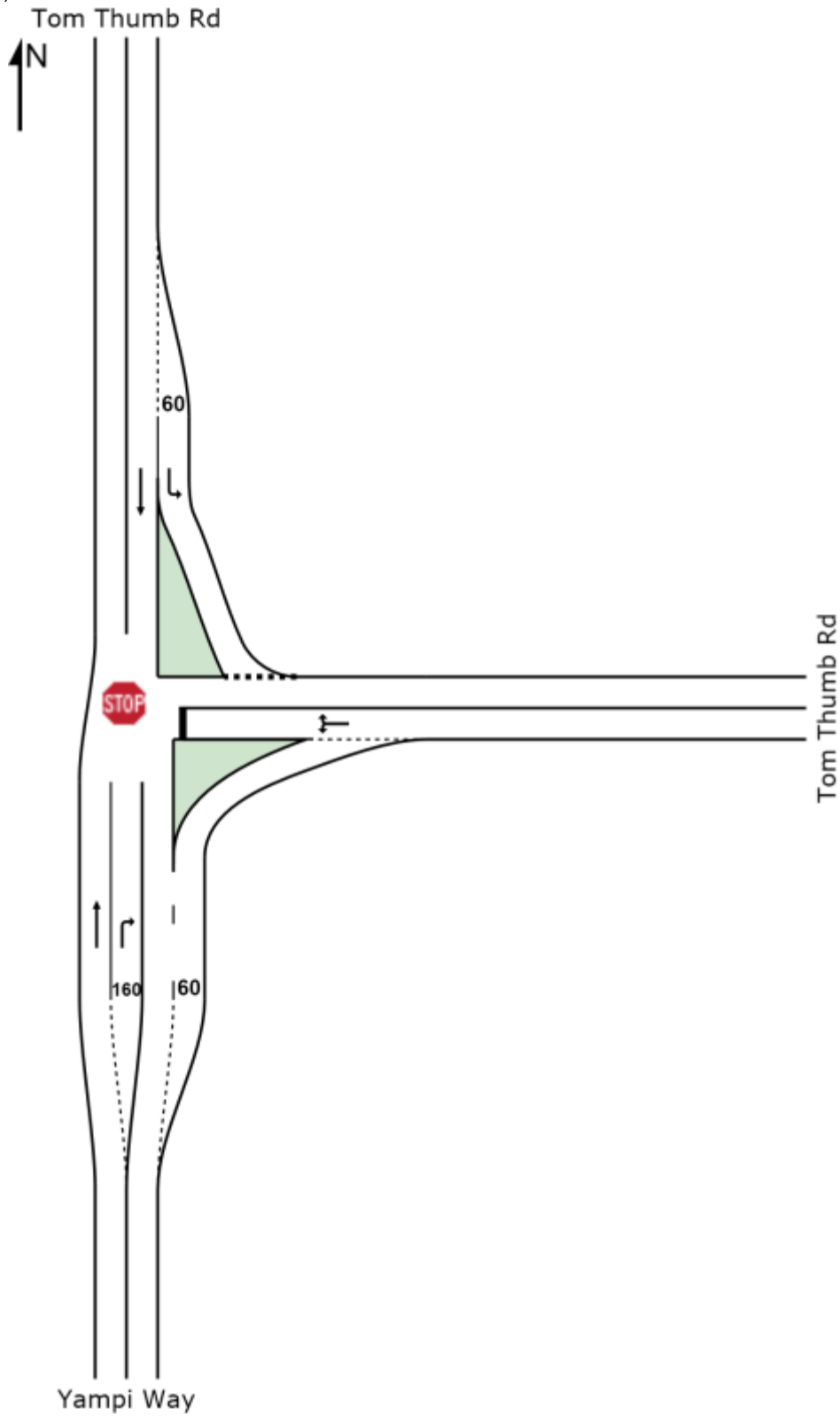
Signals - Fixed Time



SITE LAYOUT

Site: 3. Tom Thumb Road / Yampi Way

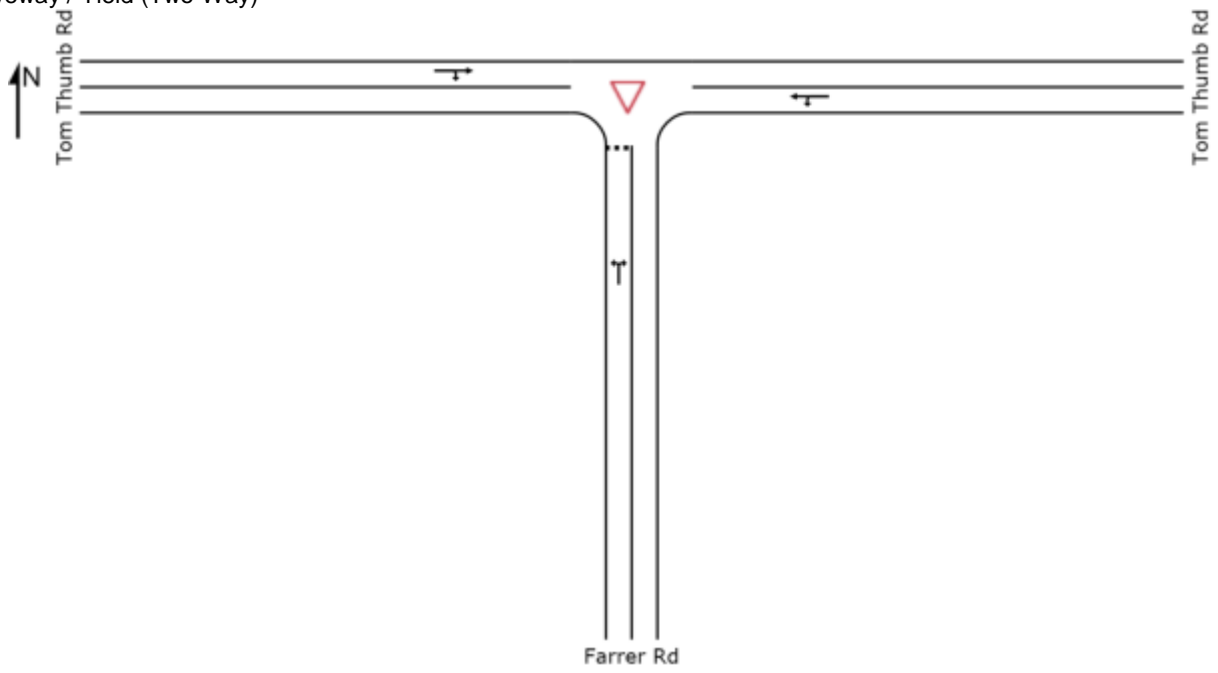
Stop (Two-Way)



SITE LAYOUT

▽ Site: 4. Tom Thumb Road / Farrer Road

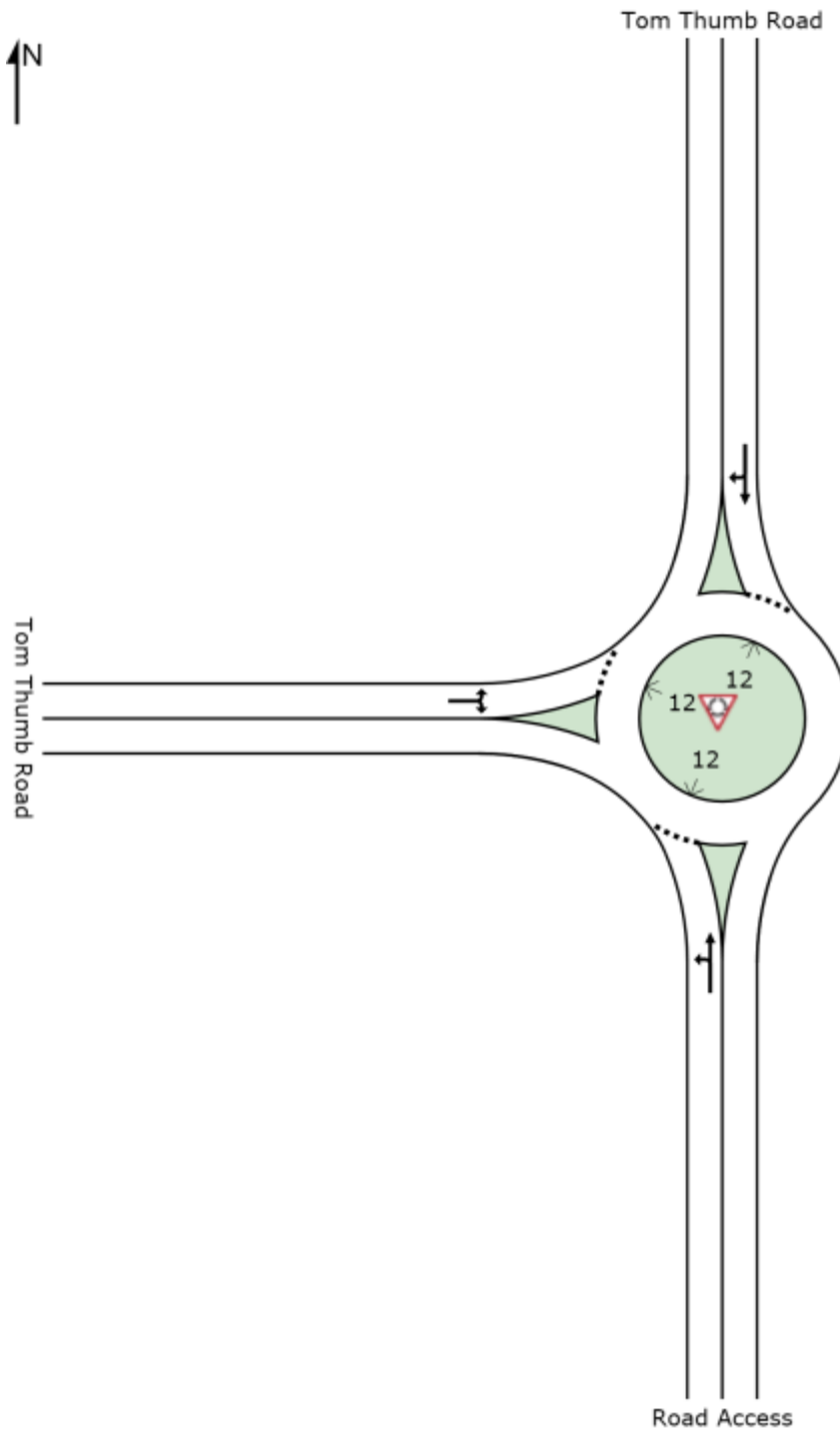
Giveway / Yield (Two-Way)



SITE LAYOUT

Site: 5. Tom Thumb Road Roundabout

Roundabout



SIDRA Intersection Results – Existing Conditions

SIDRA offers a variety of output features that can help in the analysis and reporting of model performance, which are detailed in this section. The core performance elements that should be assessed for any intersection modelling using SIDRA Intersection are:

- > Degree of Saturation (DoS).
- > Level of Service (LoS).
- > 95 per cent Back of queue distance.

Degree of Saturation (DoS)

Degree of saturation (x) is defined as the ratio of demand (arrival) flow to capacity, $x = qa / Q$ (also known as volume / capacity, v / c , ratio). DoS above 1.0 represent oversaturated conditions (demand flows exceed capacity), and degrees of saturation below 1.0 represent undersaturated conditions (demand flows are below capacity).

Level of Service (LoS)

The delay (RMS NSW) option uses the guidelines specified in following Table 2 of the "Guide to Traffic Generating Developments" published by the Roads and Traffic Authority of New South Wales, Australia (draft version 2.2 of October 2002). This is the default method when the NSW version of SIDRA INTERSECTION is used.

The average delay for level of service E should be no more than 70 Seconds. If the average vehicle delay is more than 70 seconds, the intersection should be assumed to be at Level of Service F. Note: For traffic signals, the average movement delay and level of service over all movements should be taken. For roundabouts and priority control signals intersection (with Stop and Give Way signs or operating under the T-junction rule) the critical movement for level of service assessment should be that with the worst movement delay.

95 per cent back of queue distance

A percentile queue length is a value below which the specified percentage of the average queue length values observed for individual cycles fall. For example, the 95th percentile queue length is the value below which 95 per cent of all observed cycle queue lengths fall, or five per cent of all observed queue lengths exceed. The standard SIDRA INTERSECTION default method uses the 95th percentile value of the back of queue. This value also represents the storage length of a lane and forms part of the overall lane length.

MOVEMENT SUMMARY

Site: 1. Masters Road / Springhill Road AM Peak

Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Springhill Rd											
1	L2	770	7.1	0.539	11.9	LOS A	13.7	101.9	0.37	0.76	29.4
2	T1	2450	2.4	0.851	38.7	LOS C	41.2	294.6	0.94	0.92	24.2
Approach		3220	3.6	0.851	32.3	LOS C	41.2	294.6	0.80	0.88	25.3
North: Springhill Rd											
8	T1	618	10.4	0.266	17.9	LOS B	7.1	54.3	0.47	0.76	28.1
9	R2	319	19.1	0.795	69.0	LOS E	6.3	51.0	1.00	0.88	20.2
Approach		937	13.3	0.795	35.3	LOS C	7.1	54.3	0.65	0.80	24.8
West: Masters Rd											
10	L2	630	11.1	0.759	42.3	LOS C	24.2	185.6	0.94	0.88	23.7
12	R2	925	5.4	0.759	51.2	LOS D	18.3	136.1	0.98	0.88	22.4
Approach		1555	7.7	0.759	47.6	LOS D	24.2	185.6	0.97	0.88	22.9
All Vehicles		5712	6.3	0.851	37.0	LOS C	41.2	294.6	0.82	0.87	24.5

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

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.

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: 1. Masters Road / Springhill Road PM Peak

Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Springhill Rd											
1	L2	931	7.2	0.803	26.6	LOS B	32.7	243.1	0.84	0.88	26.3
2	T1	1166	4.0	0.803	49.4	LOS D	20.3	147.0	0.99	0.90	22.7
Approach		2097	5.4	0.803	39.3	LOS C	32.7	243.1	0.93	0.89	24.1
North: Springhill Rd											
8	T1	934	2.9	0.407	19.7	LOS B	11.9	85.3	0.57	0.79	27.7
9	R2	1160	4.4	0.795	48.8	LOS D	19.0	138.0	0.99	0.90	22.7
Approach		2094	3.7	0.795	35.8	LOS C	19.0	138.0	0.80	0.85	24.7
West: Masters Rd											
10	L2	222	12.6	0.214	17.5	LOS B	4.8	37.1	0.48	0.75	28.2
12	R2	744	5.6	0.496	40.9	LOS C	10.2	75.1	0.89	0.82	23.9
Approach		966	7.2	0.496	35.5	LOS C	10.2	75.1	0.79	0.81	24.7
All Vehicles		5157	5.1	0.803	37.2	LOS C	32.7	243.1	0.85	0.86	24.5

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

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.

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: 2. Springhill Road / Tom Thumb Road AM Peak

Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	46	60.9	0.099	11.8	LOS A	0.8	8.2	0.69	0.53	18.8
6	R2	8	0.0	0.036	22.0	LOS B	0.2	1.3	0.91	0.60	17.9
Approach		54	51.9	0.099	13.3	LOS A	0.8	8.2	0.72	0.54	18.6
NorthEast: Springhill Rd											
7	L2	19	0.0	0.010	9.1	LOS A	0.0	0.0	0.00	0.69	63.9
8	T1	893	8.8	0.404	19.1	LOS B	5.3	40.1	0.76	0.79	27.7
Approach		912	8.7	0.404	18.9	LOS B	5.3	40.1	0.74	0.79	28.0
SouthWest: Springhill Rd											
2	T1	2956	3.1	0.805	18.0	LOS B	21.1	151.7	0.80	0.89	27.9
3	R2	68	44.1	0.401	32.4	LOS C	1.7	16.4	0.96	0.76	25.3
Approach		3024	4.0	0.805	18.3	LOS B	21.1	151.7	0.81	0.89	27.8
All Vehicles		3990	5.7	0.805	18.4	LOS B	21.1	151.7	0.79	0.86	27.7

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

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.

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: 2. Springhill Road / Tom Thumb Road PM Peak

Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	104	9.6	0.199	17.2	LOS B	2.3	17.6	0.78	0.62	18.3
6	R2	25	4.0	0.138	28.3	LOS B	0.7	5.2	0.94	0.67	17.3
Approach		129	8.5	0.199	19.4	LOS B	2.3	17.6	0.81	0.63	18.1
NorthEast: Springhill Rd											
7	L2	4	0.0	0.002	9.1	LOS A	0.0	0.0	0.00	0.69	63.9
8	T1	2307	2.1	0.799	24.1	LOS B	21.2	151.1	0.90	0.91	26.7
Approach		2311	2.1	0.799	24.1	LOS B	21.2	151.1	0.90	0.91	26.7
SouthWest: Springhill Rd											
2	T1	1414	2.7	0.351	11.0	LOS A	5.5	39.2	0.43	0.74	29.5
3	R2	30	40.0	0.208	37.2	LOS C	0.9	8.3	0.95	0.72	24.5
Approach		1444	3.5	0.351	11.5	LOS A	5.5	39.2	0.44	0.74	29.3
All Vehicles		3884	2.8	0.799	19.2	LOS B	21.2	151.1	0.72	0.84	27.2

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

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.

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: 3. Tom Thumb Road / Yampi Way AM Peak

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	22	59.1	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	13	61.5	0.013	0.6	LOS A	0.0	0.5	0.16	0.10	20.2
Approach		35	60.0	0.016	0.2	NA	0.0	0.5	0.06	0.04	20.1
East: Tom Thumb Rd											
4	L2	12	25.0	0.056	1.4	LOS A	0.3	2.5	0.31	0.14	19.8
6	R2	31	51.6	0.056	1.7	LOS A	0.3	2.5	0.31	0.14	20.1
Approach		43	44.2	0.056	1.6	NA	0.3	2.5	0.31	0.14	20.0
North: Tom Thumb Rd											
7	L2	36	30.6	0.032	0.1	LOS A	0.1	1.0	0.07	0.02	20.0
8	T1	46	34.8	0.029	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		82	32.9	0.032	0.0	LOS A	0.1	1.0	0.03	0.01	20.0
All Vehicles		160	41.9	0.056	0.5	NA	0.3	2.5	0.11	0.05	20.0

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

Vehicle movement LOS values are based on average delay per movement

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

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

SIDRA Standard Delay Model 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: 3. Tom Thumb Road / Yampi Way PM Peak

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	57	15.8	0.032	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	7	100.0	0.008	0.5	LOS A	0.0	0.4	0.11	0.08	20.2
Approach		64	25.0	0.032	0.1	NA	0.0	0.4	0.01	0.01	20.0
East: Tom Thumb Rd											
4	L2	4	25.0	0.081	0.8	LOS A	0.3	2.4	0.25	0.17	19.9
6	R2	68	1.5	0.081	1.1	LOS A	0.3	2.4	0.25	0.17	20.1
Approach		72	2.8	0.081	1.0	NA	0.3	2.4	0.25	0.17	20.1
North: Tom Thumb Rd											
7	L2	9	33.3	0.008	0.0	LOS A	0.0	0.3	0.05	0.01	20.0
8	T1	23	30.4	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		32	31.3	0.014	0.0	LOS A	0.0	0.3	0.01	0.00	20.0
All Vehicles		168	16.7	0.081	0.5	NA	0.3	2.4	0.12	0.08	20.1

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

▽ Site: 4. Tom Thumb Road / Farrer Road AM Peak

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	2	100.0	0.003	6.4	LOS A	0.0	0.1	0.14	0.53	51.2
3	R2	1	0.0	0.003	5.7	LOS A	0.0	0.1	0.14	0.53	29.2
Approach		3	66.7	0.003	6.2	LOS A	0.0	0.1	0.14	0.53	40.9
East: Tom Thumb Rd											
4	L2	2	100.0	0.025	6.2	LOS A	0.0	0.0	0.00	0.06	55.4
5	T1	34	50.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.06	59.4
Approach		36	52.8	0.025	0.7	NA	0.0	0.0	0.00	0.06	59.2
West: Tom Thumb Rd											
11	T1	37	43.2	0.025	0.3	LOS A	0.2	1.5	0.16	0.03	59.1
12	R2	1	100.0	0.025	6.3	LOS A	0.2	1.5	0.16	0.03	54.4
Approach		38	44.7	0.025	0.6	NA	0.2	1.5	0.16	0.03	58.9
All Vehicles		77	49.4	0.025	0.6	NA	0.2	1.5	0.08	0.06	58.0

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

Vehicle movement LOS values are based on average delay per movement

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

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

SIDRA Standard Delay Model 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: 4. Tom Thumb Road / Farrer Road PM Peak

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	1	0.0	0.001	5.7	LOS A	0.0	0.0	0.14	0.54	53.2
3	R2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.14	0.54	29.2
Approach		2	0.0	0.001	5.7	LOS A	0.0	0.0	0.14	0.54	37.7
East: Tom Thumb Rd											
4	L2	1	0.0	0.031	5.6	LOS A	0.0	0.0	0.00	0.01	58.2
5	T1	58	5.2	0.031	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		59	5.1	0.031	0.1	NA	0.0	0.0	0.00	0.01	59.9
West: Tom Thumb Rd											
11	T1	10	70.0	0.009	0.4	LOS A	0.0	0.5	0.19	0.10	57.9
12	R2	1	100.0	0.009	6.4	LOS A	0.0	0.5	0.19	0.10	53.4
Approach		11	72.7	0.009	1.4	NA	0.0	0.5	0.19	0.10	57.5
All Vehicles		72	15.3	0.031	0.4	NA	0.0	0.5	0.03	0.04	58.5

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

Site: 5. Tom Thumb Road Roundabout AM Peak

Roundabout

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	24	50.0	0.022	0.1	LOS A	0.1	1.0	0.06	0.01	20.0
2	T1	1	0.0	0.022	0.1	LOS A	0.1	1.0	0.06	0.01	20.0
Approach		25	48.0	0.022	0.1	LOS A	0.1	1.0	0.06	0.01	20.0
North: Tom Thumb Road											
8	T1	1	0.0	0.007	0.2	LOS A	0.0	0.4	0.13	0.06	19.9
9	R2	6	83.3	0.007	0.4	LOS A	0.0	0.4	0.13	0.06	20.7
Approach		7	71.4	0.007	0.4	LOS A	0.0	0.4	0.13	0.06	20.5
West: Tom Thumb Road											
10	L2	6	100.0	0.022	0.0	LOS A	0.1	1.1	0.02	0.03	20.0
12	R2	22	50.0	0.022	0.2	LOS A	0.1	1.1	0.02	0.03	20.7
Approach		28	60.7	0.022	0.1	LOS A	0.1	1.1	0.02	0.03	20.5
All Vehicles		60	56.7	0.022	0.1	LOS A	0.1	1.1	0.05	0.02	20.3

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

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: 5. Tom Thumb Road Roundabout PM Peak

New Site

Roundabout

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	51	2.0	0.036	0.0	LOS A	0.2	1.2	0.03	0.00	20.0
2	T1	4	0.0	0.036	0.0	LOS A	0.2	1.2	0.03	0.00	20.0
Approach		55	1.8	0.036	0.0	LOS A	0.2	1.2	0.03	0.00	20.0
North: Tom Thumb Road											
8	T1	1	0.0	0.003	0.1	LOS A	0.0	0.1	0.06	0.04	20.0
9	R2	3	33.3	0.003	0.3	LOS A	0.0	0.1	0.06	0.04	20.7
Approach		4	25.0	0.003	0.2	LOS A	0.0	0.1	0.06	0.04	20.5
West: Tom Thumb Road											
10	L2	5	100.0	0.012	0.0	LOS A	0.1	0.6	0.04	0.02	20.0
12	R2	8	37.5	0.012	0.2	LOS A	0.1	0.6	0.04	0.02	20.7
Approach		13	61.5	0.012	0.1	LOS A	0.1	0.6	0.04	0.02	20.4
All Vehicles		72	13.9	0.036	0.0	LOS A	0.2	1.2	0.03	0.01	20.1

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

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.

SIDRA Intersection Results – Construction Traffic

MOVEMENT SUMMARY

 **Site: AM 1. Masters Road / Springhill Road**

New Site

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Springhill Rd											
1	L2	770	7.1	0.560	12.3	LOS A	13.1	97.7	0.43	0.77	29.3
2	T1	2475	2.4	0.879	40.4	LOS C	38.9	278.3	0.97	0.96	24.0
Approach		3245	3.5	0.879	33.7	LOS C	38.9	278.3	0.84	0.91	25.1
North: Springhill Rd											
8	T1	621	10.3	0.264	15.9	LOS B	5.8	43.9	0.46	0.76	28.6
9	R2	343	17.8	0.780	57.8	LOS E	5.5	44.6	1.00	0.89	21.5
Approach		964	13.0	0.780	30.8	LOS C	5.8	44.6	0.65	0.80	25.6
West: Masters Rd											
10	L2	714	9.8	0.878	49.3	LOS D	28.8	218.2	1.00	0.97	22.7
12	R2	925	5.4	0.878	55.8	LOS D	18.8	139.4	1.00	0.97	21.8
Approach		1639	7.3	0.878	52.9	LOS D	28.8	218.2	1.00	0.97	22.1
All Vehicles		5848	6.2	0.879	38.6	LOS C	38.9	278.3	0.85	0.91	24.3

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

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.

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: PM 1. Masters Road / Springhill Road**

New Site

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Springhill Rd											
1	L2	931	7.2	0.861	32.1	LOS C	30.6	227.8	0.93	0.95	25.3
2	T1	1172	4.0	0.861	43.9	LOS D	16.6	120.0	1.00	0.97	23.5
Approach		2103	5.4	0.861	38.7	LOS C	30.6	227.8	0.97	0.96	24.2
North: Springhill Rd											
8	T1	946	2.9	0.402	15.9	LOS B	8.2	59.2	0.55	0.79	28.5
9	R2	1256	4.1	0.855	42.7	LOS D	16.4	118.7	1.00	0.96	23.6
Approach		2202	3.5	0.855	31.2	LOS C	16.4	118.7	0.81	0.89	25.5
West: Masters Rd											
10	L2	243	11.5	0.248	16.3	LOS B	4.1	31.8	0.53	0.76	28.4
12	R2	744	5.6	0.648	36.7	LOS C	8.2	59.8	0.97	0.84	24.5
Approach		987	7.1	0.648	31.7	LOS C	8.2	59.8	0.86	0.82	25.4
All Vehicles		5292	5.0	0.861	34.3	LOS C	30.6	227.8	0.88	0.90	25.0

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

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.

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: AM 2. Springhill Road / Tom Thumb Road

New Site

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	73	38.4	0.114	9.1	LOS A	1.1	10.0	0.62	0.49	19.1
6	R2	18	0.0	0.081	22.3	LOS B	0.4	2.9	0.92	0.64	17.8
Approach		91	30.8	0.114	11.7	LOS A	1.1	10.0	0.68	0.52	18.8
NorthEast: Springhill Rd											
7	L2	57	0.0	0.031	9.1	LOS A	0.0	0.0	0.00	0.69	63.9
8	T1	893	8.8	0.504	22.6	LOS B	6.1	46.0	0.86	0.81	27.0
Approach		950	8.3	0.504	21.8	LOS B	6.1	46.0	0.81	0.81	27.9
SouthWest: Springhill Rd											
2	T1	2956	3.1	0.805	18.0	LOS B	21.1	151.7	0.80	0.89	27.9
3	R2	176	17.0	0.531	28.2	LOS B	4.1	32.9	0.94	0.80	26.0
Approach		3132	3.9	0.805	18.6	LOS B	21.1	151.7	0.81	0.89	27.8
All Vehicles		4173	5.5	0.805	19.2	LOS B	21.1	151.7	0.81	0.86	27.5

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

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.

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: PM 2. Springhill Road / Tom Thumb Road

New Site

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	212	4.7	0.393	18.5	LOS B	5.1	36.9	0.84	0.69	18.2
6	R2	63	1.6	0.343	29.3	LOS C	1.9	13.2	0.97	0.73	17.3
Approach		275	4.0	0.393	20.9	LOS B	5.1	36.9	0.87	0.70	17.9
NorthEast: Springhill Rd											
7	L2	14	0.0	0.008	9.1	LOS A	0.0	0.0	0.00	0.69	63.9
8	T1	2307	2.1	0.799	24.1	LOS B	21.2	151.1	0.90	0.91	26.7
Approach		2321	2.1	0.799	24.0	LOS B	21.2	151.1	0.89	0.91	26.7
SouthWest: Springhill Rd											
2	T1	1414	2.7	0.351	11.0	LOS A	5.5	39.2	0.43	0.74	29.5
3	R2	57	21.1	0.353	37.3	LOS C	1.7	14.0	0.97	0.75	24.4
Approach		1471	3.4	0.353	12.0	LOS A	5.5	39.2	0.45	0.74	29.2
All Vehicles		4067	2.7	0.799	19.5	LOS B	21.2	151.1	0.73	0.83	26.7

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

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.

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: AM 3. Tom Thumb Road / Yampi Way**

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	22	59.1	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	13	61.5	0.010	0.5	LOS A	0.0	0.5	0.16	0.10	20.2
Approach		35	60.0	0.016	0.2	NA	0.0	0.5	0.06	0.04	20.1
East: Tom Thumb Rd											
4	L2	12	25.0	0.109	2.0	LOS A	0.5	4.0	0.38	0.26	19.8
6	R2	68	23.5	0.109	2.3	LOS A	0.5	4.0	0.38	0.26	20.0
Approach		80	23.8	0.109	2.2	NA	0.5	4.0	0.38	0.26	20.0
North: Tom Thumb Rd											
7	L2	182	6.0	0.116	0.1	LOS A	0.5	3.7	0.07	0.01	20.0
8	T1	46	34.8	0.029	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		228	11.8	0.116	0.0	LOS A	0.5	3.7	0.06	0.01	20.0
All Vehicles		343	19.5	0.116	0.6	NA	0.5	4.0	0.13	0.07	20.0

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

Vehicle movement LOS values are based on average delay per movement

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

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

SIDRA Standard Delay Model 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: PM 3. Tom Thumb Road / Yampi Way**

New Site

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	57	15.8	0.032	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	7	100.0	0.006	0.4	LOS A	0.0	0.4	0.11	0.08	20.2
Approach		64	25.0	0.032	0.0	NA	0.0	0.4	0.01	0.01	20.0
East: Tom Thumb Rd											
4	L2	4	25.0	0.253	1.2	LOS A	1.2	8.4	0.32	0.24	19.8
6	R2	214	0.5	0.253	1.4	LOS A	1.2	8.4	0.32	0.24	20.1
Approach		218	0.9	0.253	1.4	NA	1.2	8.4	0.32	0.24	20.1
North: Tom Thumb Rd											
7	L2	46	6.5	0.029	0.0	LOS A	0.1	0.9	0.05	0.01	20.0
8	T1	23	30.4	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		69	14.5	0.029	0.0	LOS A	0.1	0.9	0.03	0.00	20.0
All Vehicles		351	8.0	0.253	0.9	NA	1.2	8.4	0.21	0.15	20.1

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

▽ **Site: AM 4. Tom Thumb Road / Farrer Road**

New Site
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	2	100.0	0.003	6.6	LOS A	0.0	0.1	0.20	0.54	51.0
3	R2	1	0.0	0.003	6.4	LOS A	0.0	0.1	0.20	0.54	29.1
Approach		3	66.7	0.003	6.6	LOS A	0.0	0.1	0.20	0.54	40.8
East: Tom Thumb Rd											
4	L2	2	100.0	0.044	6.2	LOS A	0.0	0.0	0.00	0.03	55.7
5	T1	71	23.9	0.044	0.0	LOS A	0.0	0.0	0.00	0.03	59.8
Approach		73	26.0	0.044	0.3	NA	0.0	0.0	0.00	0.03	59.7
West: Tom Thumb Rd											
11	T1	183	8.7	0.100	0.0	LOS A	0.0	0.1	0.00	0.01	60.0
12	R2	1	100.0	0.100	6.6	LOS A	0.0	0.1	0.00	0.01	55.1
Approach		184	9.2	0.100	0.1	NA	0.0	0.1	0.00	0.01	59.9
All Vehicles		260	14.6	0.100	0.2	NA	0.0	0.1	0.00	0.02	59.5

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

▽ **Site: PM 4. Tom Thumb Road / Farrer Road**

New Site
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	1	0.0	0.002	6.1	LOS A	0.0	0.0	0.28	0.54	52.8
3	R2	1	0.0	0.002	6.3	LOS A	0.0	0.0	0.28	0.54	29.0
Approach		2	0.0	0.002	6.2	LOS A	0.0	0.0	0.28	0.54	37.5
East: Tom Thumb Rd											
4	L2	1	0.0	0.106	5.6	LOS A	0.0	0.0	0.00	0.00	58.3
5	T1	204	1.5	0.106	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		205	1.5	0.106	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Tom Thumb Rd											
11	T1	47	14.9	0.028	0.1	LOS A	0.0	0.1	0.02	0.02	59.8
12	R2	1	100.0	0.028	7.5	LOS A	0.0	0.1	0.02	0.02	55.0
Approach		48	16.7	0.028	0.3	NA	0.0	0.1	0.02	0.02	59.7
All Vehicles		255	4.3	0.106	0.1	NA	0.0	0.1	0.01	0.01	59.6

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

Site: AM 5. Tom Thumb Road Roundabout

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	48	25.0	0.038	0.0	LOS A	0.2	1.5	0.06	0.01	20.0
2	T1	1	0.0	0.038	0.0	LOS A	0.2	1.5	0.06	0.01	20.0
Approach		49	24.5	0.038	0.0	LOS A	0.2	1.5	0.06	0.01	20.0
North: Tom Thumb Road											
8	T1	1	0.0	0.007	0.1	LOS A	0.0	0.4	0.15	0.07	19.9
9	R2	6	83.3	0.007	0.5	LOS A	0.0	0.4	0.15	0.07	20.6
Approach		7	71.4	0.007	0.5	LOS A	0.0	0.4	0.15	0.07	20.5
West: Tom Thumb Road											
10	L2	6	100.0	0.026	0.0	LOS A	0.1	1.2	0.02	0.03	20.0
12	R2	28	39.3	0.026	0.2	LOS A	0.1	1.2	0.02	0.03	20.7
Approach		34	50.0	0.026	0.2	LOS A	0.1	1.2	0.02	0.03	20.6
All Vehicles		90	37.8	0.038	0.1	LOS A	0.2	1.5	0.05	0.02	20.2

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

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: PM 5. Tom Thumb Road Roundabout

New Site

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	75	1.3	0.050	0.0	LOS A	0.2	1.7	0.03	0.00	20.0
2	T1	4	0.0	0.050	0.0	LOS A	0.2	1.7	0.03	0.00	20.0
Approach		79	1.3	0.050	0.0	LOS A	0.2	1.7	0.03	0.00	20.0
North: Tom Thumb Road											
8	T1	1	0.0	0.003	0.1	LOS A	0.0	0.1	0.08	0.04	19.9
9	R2	3	33.3	0.003	0.3	LOS A	0.0	0.1	0.08	0.04	20.7
Approach		4	25.0	0.003	0.2	LOS A	0.0	0.1	0.08	0.04	20.5
West: Tom Thumb Road											
10	L2	5	100.0	0.016	0.0	LOS A	0.1	0.7	0.04	0.03	20.0
12	R2	14	21.4	0.016	0.2	LOS A	0.1	0.7	0.04	0.03	20.7
Approach		19	42.1	0.016	0.1	LOS A	0.1	0.7	0.04	0.03	20.5
All Vehicles		102	9.8	0.050	0.1	LOS A	0.2	1.7	0.03	0.01	20.1

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

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.

SIDRA Intersection Results – Operational Traffic

MOVEMENT SUMMARY

 **Site: AM 1. Masters Road / Springhill Road**

New Site

Signals - Fixed Time Isolated Cycle Time = 110 seconds (Practical Cycle Time)

Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Springhill Rd											
1	L2	802	7.1	0.574	12.8	LOS A	16.2	120.3	0.42	0.77	29.2
2	T1	2574	2.4	0.894	46.1	LOS D	49.1	350.8	0.98	0.96	23.1
Approach		3376	3.5	0.894	38.2	LOS C	49.1	350.8	0.85	0.91	24.3
North: Springhill Rd											
8	T1	644	10.4	0.269	17.0	LOS B	7.1	54.2	0.45	0.76	28.3
9	R2	428	14.8	0.850	70.3	LOS E	8.6	67.9	1.00	0.93	20.1
Approach		1072	12.1	0.850	38.3	LOS C	8.6	67.9	0.67	0.83	24.3
West: Masters Rd											
10	L2	736	9.9	0.866	52.7	LOS D	33.5	254.1	0.99	0.94	22.2
12	R2	964	5.4	0.866	61.4	LOS E	22.6	168.1	1.00	0.94	21.1
Approach		1700	7.4	0.866	57.7	LOS E	33.5	254.1	1.00	0.94	21.5
All Vehicles		6148	6.1	0.894	43.6	LOS D	49.1	350.8	0.86	0.91	23.5

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

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.

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: PM 1. Masters Road / Springhill Road**

New Site

Signals - Fixed Time Isolated Cycle Time = 80 seconds (Practical Cycle Time)

Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Springhill Rd											
1	L2	970	7.2	0.862	34.1	LOS C	34.3	255.1	0.93	0.95	25.0
2	T1	1231	4.0	0.862	47.1	LOS D	19.9	144.2	1.00	0.96	23.0
Approach		2201	5.4	0.862	41.4	LOS C	34.3	255.1	0.97	0.95	23.8
North: Springhill Rd											
8	T1	973	2.9	0.399	16.0	LOS B	9.2	65.7	0.52	0.78	28.5
9	R2	1309	4.1	0.841	44.3	LOS D	18.6	134.9	1.00	0.94	23.4
Approach		2282	3.6	0.841	32.2	LOS C	18.6	134.9	0.80	0.87	25.3
West: Masters Rd											
10	L2	306	9.5	0.306	17.6	LOS B	6.1	46.5	0.55	0.77	28.1
12	R2	775	5.6	0.681	41.2	LOS C	9.8	71.9	0.97	0.85	23.8
Approach		1082	6.7	0.681	34.5	LOS C	9.8	71.9	0.85	0.83	24.9
All Vehicles		5564	4.9	0.862	36.3	LOS C	34.3	255.1	0.88	0.90	24.6

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

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.

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: AM 2. Springhill Road / Tom Thumb Road

New Site

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	144	20.3	0.201	9.5	LOS A	2.2	18.1	0.65	0.53	19.0
6	R2	8	0.0	0.037	22.0	LOS B	0.2	1.3	0.91	0.60	17.9
Approach		152	19.2	0.201	10.1	LOS A	2.2	18.1	0.66	0.53	18.9
NorthEast: Springhill Rd											
7	L2	24	0.0	0.013	9.1	LOS A	0.0	0.0	0.00	0.69	63.9
8	T1	931	8.8	0.526	22.8	LOS B	6.4	48.3	0.87	0.82	26.9
Approach		954	8.6	0.526	22.4	LOS B	6.4	48.3	0.85	0.81	27.3
SouthWest: Springhill Rd											
2	T1	3080	3.1	0.839	20.7	LOS B	24.7	177.8	0.84	0.93	27.3
3	R2	171	18.3	0.520	28.2	LOS B	4.0	32.2	0.94	0.80	26.0
Approach		3251	3.9	0.839	21.1	LOS B	24.7	177.8	0.85	0.92	27.3
All Vehicles		4358	5.5	0.839	21.0	LOS B	24.7	177.8	0.84	0.88	26.9

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

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.

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: PM 2. Springhill Road / Tom Thumb Road

New Site

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	208	5.0	0.387	18.4	LOS B	5.0	36.3	0.84	0.69	18.2
6	R2	30	3.4	0.167	28.5	LOS B	0.9	6.2	0.95	0.68	17.3
Approach		239	4.8	0.387	19.7	LOS B	5.0	36.3	0.85	0.69	18.1
NorthEast: Springhill Rd											
7	L2	4	0.0	0.002	9.1	LOS A	0.0	0.0	0.00	0.69	63.9
8	T1	2404	2.1	0.833	26.6	LOS B	24.0	170.9	0.92	0.93	26.2
Approach		2408	2.1	0.833	26.6	LOS B	24.0	170.9	0.92	0.93	26.2
SouthWest: Springhill Rd											
2	T1	1473	2.7	0.366	11.0	LOS A	5.8	41.4	0.43	0.74	29.5
3	R2	127	9.8	0.733	40.1	LOS C	4.1	31.3	1.00	0.87	23.9
Approach		1601	3.3	0.733	13.3	LOS A	5.8	41.4	0.48	0.75	28.9
All Vehicles		4247	2.7	0.833	21.2	LOS B	24.0	170.9	0.75	0.85	26.5

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

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.

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: AM 3. Tom Thumb Road / Yampi Way

Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	23	59.1	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	14	61.5	0.010	0.5	LOS A	0.0	0.5	0.17	0.10	20.2
Approach		36	60.0	0.016	0.2	NA	0.0	0.5	0.06	0.04	20.1
East: Tom Thumb Rd											
4	L2	13	25.0	0.182	1.8	LOS A	0.8	6.4	0.38	0.28	19.8
6	R2	128	13.0	0.182	2.1	LOS A	0.8	6.4	0.38	0.28	20.0
Approach		141	14.1	0.182	2.0	NA	0.8	6.4	0.38	0.28	20.0
North: Tom Thumb Rd											
7	L2	142	8.1	0.091	0.1	LOS A	0.4	2.9	0.07	0.01	20.0
8	T1	48	34.8	0.030	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		190	14.8	0.091	0.0	LOS A	0.4	2.9	0.05	0.01	20.0
All Vehicles		367	19.0	0.182	0.8	NA	0.8	6.4	0.18	0.12	20.0

Level of Service (LOS) Method: Delay (RTA NSW).
 Vehicle movement LOS values are based on average delay per movement
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 SIDRA Standard Delay Model 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: PM 3. Tom Thumb Road / Yampi Way

New Site
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	49	19.1	0.028	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	7	100.0	0.006	0.4	LOS A	0.0	0.4	0.12	0.08	20.2
Approach		56	29.6	0.028	0.1	NA	0.0	0.4	0.02	0.01	20.0
East: Tom Thumb Rd											
4	L2	4	25.0	0.214	1.3	LOS A	1.0	6.8	0.34	0.25	19.8
6	R2	175	0.6	0.214	1.6	LOS A	1.0	6.8	0.34	0.25	20.1
Approach		179	1.2	0.214	1.6	NA	1.0	6.8	0.34	0.25	20.1
North: Tom Thumb Rd											
7	L2	105	3.0	0.066	0.0	LOS A	0.3	2.0	0.05	0.01	20.0
8	T1	24	30.4	0.015	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		129	8.1	0.066	0.0	LOS A	0.3	2.0	0.04	0.01	20.0
All Vehicles		365	8.0	0.214	0.8	NA	1.0	6.8	0.18	0.13	20.0

Level of Service (LOS) Method: Delay (RTA NSW).
 Vehicle movement LOS values are based on average delay per movement
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 SIDRA Standard Delay Model 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: AM 4. Tom Thumb Road / Farrer Road

New Site
Giveaway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	2	100.0	0.003	7.0	LOS A	0.0	0.1	0.28	0.54	50.8
3	R2	1	0.0	0.003	6.4	LOS A	0.0	0.1	0.28	0.54	29.1
Approach		3	66.7	0.003	6.9	LOS A	0.0	0.1	0.28	0.54	40.6
East: Tom Thumb Rd											
4	L2	2	100.0	0.075	6.2	LOS A	0.0	0.0	0.00	0.02	55.8
5	T1	131	13.5	0.075	0.0	LOS A	0.0	0.0	0.00	0.02	59.9
Approach		133	14.8	0.075	0.2	NA	0.0	0.0	0.00	0.02	59.8
West: Tom Thumb Rd											
11	T1	143	11.7	0.080	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
12	R2	1	100.0	0.080	7.1	LOS A	0.0	0.1	0.01	0.01	55.1
Approach		144	12.3	0.080	0.1	NA	0.0	0.1	0.01	0.01	59.9
All Vehicles		280	14.1	0.080	0.2	NA	0.0	0.1	0.01	0.02	59.5

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

MOVEMENT SUMMARY

▽ Site: PM 4. Tom Thumb Road / Farrer Road

New Site
Giveaway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	1	0.0	0.002	6.0	LOS A	0.0	0.0	0.26	0.54	52.9
3	R2	1	0.0	0.002	6.4	LOS A	0.0	0.0	0.26	0.54	29.1
Approach		2	0.0	0.002	6.2	LOS A	0.0	0.0	0.26	0.54	37.5
East: Tom Thumb Rd											
4	L2	1	0.0	0.086	5.6	LOS A	0.0	0.0	0.00	0.00	58.3
5	T1	165	1.9	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		166	1.9	0.086	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Tom Thumb Rd											
11	T1	106	6.9	0.058	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
12	R2	1	100.0	0.058	7.3	LOS A	0.0	0.1	0.01	0.01	55.1
Approach		107	7.8	0.058	0.2	NA	0.0	0.1	0.01	0.01	59.8
All Vehicles		275	4.2	0.086	0.1	NA	0.0	0.1	0.01	0.01	59.6

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

MOVEMENT SUMMARY

Site: AM 5. Tom Thumb Road Roundabout

Roundabout
Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	25	50.0	0.023	0.1	LOS A	0.1	1.0	0.06	0.01	20.0
2	T1	1	0.0	0.023	0.0	LOS A	0.1	1.0	0.06	0.01	20.0
Approach		26	48.0	0.023	0.1	LOS A	0.1	1.0	0.06	0.01	20.0
North: Tom Thumb Road											
8	T1	1	0.0	0.008	0.1	LOS A	0.0	0.4	0.13	0.06	19.9
9	R2	6	83.3	0.008	0.5	LOS A	0.0	0.4	0.13	0.06	20.7
Approach		7	71.4	0.008	0.4	LOS A	0.0	0.4	0.13	0.06	20.5
West: Tom Thumb Road											
10	L2	6	100.0	0.023	0.0	LOS A	0.1	1.1	0.02	0.03	20.0
12	R2	23	50.0	0.023	0.2	LOS A	0.1	1.1	0.02	0.03	20.7
Approach		29	60.7	0.023	0.1	LOS A	0.1	1.1	0.02	0.03	20.5
All Vehicles		63	56.7	0.023	0.1	LOS A	0.1	1.1	0.05	0.02	20.3

Level of Service (LOS) Method: Delay (RTA NSW).
 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: PM 5. Tom Thumb Road Roundabout

New Site
Roundabout
Design Life Analysis (Practical Capacity): Results for 3 years

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	53	2.0	0.037	0.0	LOS A	0.2	1.2	0.03	0.00	20.0
2	T1	4	0.0	0.037	0.0	LOS A	0.2	1.2	0.03	0.00	20.0
Approach		57	1.8	0.037	0.0	LOS A	0.2	1.2	0.03	0.00	20.0
North: Tom Thumb Road											
8	T1	1	0.0	0.004	0.0	LOS A	0.0	0.1	0.06	0.04	20.0
9	R2	3	33.3	0.004	0.3	LOS A	0.0	0.1	0.06	0.04	20.7
Approach		4	25.0	0.004	0.2	LOS A	0.0	0.1	0.06	0.04	20.5
West: Tom Thumb Road											
10	L2	5	100.0	0.012	0.0	LOS A	0.1	0.6	0.04	0.02	20.0
12	R2	8	37.5	0.012	0.2	LOS A	0.1	0.6	0.04	0.02	20.7
Approach		14	61.5	0.012	0.1	LOS A	0.1	0.6	0.04	0.02	20.4
All Vehicles		75	13.9	0.037	0.0	LOS A	0.2	1.2	0.04	0.01	20.1

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

SIDRA Intersection Results – 2026 Base

MOVEMENT SUMMARY

 **Site: AM 1. Masters Road / Springhill Road**

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	ODMo	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
	v	Total	HV		sec		Vehicles	Distance		per veh	km/h
		veh/h	%	v/c			veh	m			
South: Springhill Rd											
1	L2	904	8.4	0.620	12.7	LOS A	22.2	166.6	0.38	0.77	29.2
2	T1	2843	2.9	0.917	53.8	LOS D	71.6	513.4	0.99	0.96	22.1
Approach		3747	4.2	0.917	43.9	LOS D	71.6	513.4	0.84	0.91	23.4
North: Springhill Rd											
8	T1	729	11.9	0.302	19.6	LOS B	10.8	83.7	0.45	0.77	27.8
9	R2	372	19.9	0.881	94.9	LOS F	10.2	83.9	1.00	0.93	17.7
Approach		1101	14.6	0.881	45.0	LOS D	10.8	83.9	0.64	0.82	23.3
West: Masters Rd											
10	L2	731	11.6	0.905	73.1	LOS F	47.7	367.2	1.00	0.96	19.8
12	R2	1084	6.5	0.905	82.8	LOS F	34.5	258.5	1.00	0.95	18.8
Approach		1815	8.6	0.905	78.9	LOS F	47.7	367.2	1.00	0.96	19.2
All Vehicles		6663	7.1	0.917	53.6	LOS D	71.6	513.4	0.85	0.91	22.1

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

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.

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: PM 1. Masters Road / Springhill Road**

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	ODMo	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
	v	Total	HV		sec		Vehicles	Distance		per veh	km/h
		veh/h	%	v/c			veh	m			
South: Springhill Rd											
1	L2	1090	8.3	0.888	40.2	LOS C	42.8	320.6	0.95	0.96	24.0
2	T1	1361	4.9	0.888	52.6	LOS D	26.8	195.4	1.00	0.97	22.2
Approach		2451	6.4	0.888	47.1	LOS D	42.8	320.6	0.98	0.97	23.0
North: Springhill Rd											
8	T1	1094	4.0	0.432	16.0	LOS B	11.1	80.4	0.50	0.78	28.5
9	R2	1343	4.7	0.862	50.2	LOS D	22.0	160.1	1.00	0.95	22.5
Approach		2437	4.4	0.862	34.8	LOS C	22.0	160.1	0.78	0.88	24.9
West: Masters Rd											
10	L2	260	13.8	0.277	19.5	LOS B	6.0	46.6	0.56	0.77	27.7
12	R2	874	7.0	0.823	51.9	LOS D	13.9	102.8	1.00	0.92	22.3
Approach		1134	8.6	0.823	44.5	LOS D	13.9	102.8	0.90	0.88	23.3
All Vehicles		6022	6.0	0.888	41.6	LOS C	42.8	320.6	0.88	0.92	23.8

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

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.

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: AM 2. Springhill Road / Tom Thumb Road

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	66	63.6	0.187	13.8	LOS A	1.3	14.5	0.70	0.55	18.6
6	R2	16	31.3	0.129	29.1	LOS C	0.5	4.2	0.94	0.66	17.3
Approach		82	57.3	0.187	16.8	LOS B	1.3	14.5	0.74	0.58	18.3
NorthEast: Springhill Rd											
7	L2	30	16.7	0.020	9.4	LOS A	0.0	0.0	0.00	0.68	58.9
8	T1	1046	9.9	0.493	21.4	LOS B	7.7	58.2	0.78	0.81	27.2
Approach		1076	10.1	0.493	21.1	LOS B	7.7	58.2	0.76	0.81	27.6
SouthWest: Springhill Rd											
2	T1	3427	3.4	0.880	25.3	LOS B	35.8	258.3	0.85	0.95	26.4
3	R2	95	46.3	0.485	34.0	LOS C	2.7	26.6	0.94	0.79	25.0
Approach		3522	4.6	0.880	25.5	LOS B	35.8	258.3	0.85	0.95	26.4
All Vehicles		4680	6.8	0.880	24.3	LOS B	35.8	258.3	0.83	0.91	26.5

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

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.

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: PM 2. Springhill Road / Tom Thumb Road

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	143	11.9	0.325	23.3	LOS B	4.1	31.4	0.85	0.69	17.7
6	R2	37	13.5	0.255	34.8	LOS C	1.3	10.0	0.97	0.71	16.8
Approach		180	12.2	0.325	25.7	LOS B	4.1	31.4	0.88	0.69	17.5
NorthEast: Springhill Rd											
7	L2	10	50.0	0.007	10.0	LOS A	0.0	0.0	0.00	0.67	51.0
8	T1	2678	2.5	0.814	23.5	LOS B	27.2	194.5	0.87	0.90	26.8
Approach		2688	2.7	0.814	23.5	LOS B	27.2	194.5	0.86	0.90	26.8
SouthWest: Springhill Rd											
2	T1	1648	3.5	0.388	10.6	LOS A	6.7	48.4	0.39	0.74	29.6
3	R2	44	45.5	0.366	44.0	LOS D	1.6	15.2	0.98	0.74	23.4
Approach		1692	4.6	0.388	11.5	LOS A	6.7	48.4	0.40	0.74	29.4
All Vehicles		4560	3.8	0.814	19.1	LOS B	27.2	194.5	0.69	0.83	27.1

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

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.

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: AM 3. Tom Thumb Road / Yampi Way

Operational Conditions
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	33	63.6	0.024	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	18	61.1	0.014	0.6	LOS A	0.1	0.7	0.20	0.12	20.1
Approach		51	62.7	0.024	0.2	NA	0.1	0.7	0.07	0.04	20.1
East: Tom Thumb Rd											
4	L2	17	29.4	0.081	2.1	LOS A	0.4	3.6	0.37	0.18	19.7
6	R2	41	51.2	0.081	2.5	LOS A	0.4	3.6	0.37	0.18	20.0
Approach		58	44.8	0.081	2.4	NA	0.4	3.6	0.37	0.18	19.9
North: Tom Thumb Rd											
7	L2	49	30.6	0.035	0.1	LOS A	0.1	1.3	0.09	0.02	20.0
8	T1	65	38.5	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		114	35.1	0.042	0.0	LOS A	0.1	1.3	0.04	0.01	20.0
All Vehicles		223	43.9	0.081	0.7	NA	0.4	3.6	0.13	0.06	20.0

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

Vehicle movement LOS values are based on average delay per movement

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

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

SIDRA Standard Delay Model 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: PM 3. Tom Thumb Road / Yampi Way

Operational Conditions
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	80	20.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	14	64.3	0.011	0.5	LOS A	0.0	0.5	0.14	0.09	20.2
Approach		94	26.6	0.046	0.1	NA	0.0	0.5	0.02	0.01	20.0
East: Tom Thumb Rd											
4	L2	10	50.0	0.126	1.3	LOS A	0.5	4.1	0.33	0.23	19.8
6	R2	95	5.3	0.126	1.6	LOS A	0.5	4.1	0.33	0.23	20.1
Approach		105	9.5	0.126	1.6	NA	0.5	4.1	0.33	0.23	20.1
North: Tom Thumb Rd											
7	L2	13	38.5	0.010	0.1	LOS A	0.0	0.4	0.08	0.01	20.0
8	T1	34	38.2	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		47	38.3	0.022	0.0	LOS A	0.0	0.4	0.02	0.00	20.0
All Vehicles		246	21.5	0.126	0.7	NA	0.5	4.1	0.15	0.11	20.0

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

Vehicle movement LOS values are based on average delay per movement

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

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

SIDRA Standard Delay Model 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: AM 4. Tom Thumb Road / Farrer Road

Operational Conditions
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	10	50.0	0.019	6.4	LOS A	0.1	0.7	0.17	0.56	51.1
3	R2	10	50.0	0.019	6.7	LOS A	0.1	0.7	0.17	0.56	29.1
Approach		20	50.0	0.019	6.6	LOS A	0.1	0.7	0.17	0.56	37.1
East: Tom Thumb Rd											
4	L2	10	50.0	0.039	6.2	LOS A	0.0	0.0	0.00	0.10	55.0
5	T1	46	50.0	0.039	0.0	LOS A	0.0	0.0	0.00	0.10	59.0
Approach		56	50.0	0.039	1.1	NA	0.0	0.0	0.00	0.10	58.3
West: Tom Thumb Rd											
11	T1	49	42.9	0.040	0.1	LOS A	0.1	0.7	0.07	0.10	58.9
12	R2	10	50.0	0.040	6.4	LOS A	0.1	0.7	0.07	0.10	54.2
Approach		59	44.1	0.040	1.1	NA	0.1	0.7	0.07	0.10	58.1
All Vehicles		135	47.4	0.040	1.9	NA	0.1	0.7	0.06	0.17	53.6

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

▽ Site: PM 4. Tom Thumb Road / Farrer Road

Operational Conditions
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	10	50.0	0.019	6.5	LOS A	0.1	0.7	0.19	0.55	51.0
3	R2	10	50.0	0.019	6.7	LOS A	0.1	0.7	0.19	0.55	29.1
Approach		20	50.0	0.019	6.6	LOS A	0.1	0.7	0.19	0.55	37.1
East: Tom Thumb Rd											
4	L2	10	50.0	0.049	6.2	LOS A	0.0	0.0	0.00	0.07	55.6
5	T1	79	6.3	0.049	0.0	LOS A	0.0	0.0	0.00	0.07	59.6
Approach		89	11.2	0.049	0.7	NA	0.0	0.0	0.00	0.07	59.2
West: Tom Thumb Rd											
11	T1	14	64.3	0.018	0.2	LOS A	0.1	0.7	0.17	0.24	56.8
12	R2	10	50.0	0.018	6.5	LOS A	0.1	0.7	0.17	0.24	52.5
Approach		24	58.3	0.018	2.8	NA	0.1	0.7	0.17	0.24	54.9
All Vehicles		133	25.6	0.049	2.0	NA	0.1	0.7	0.06	0.17	53.6

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

Site: AM 5. Tom Thumb Road Roundabout

Operational Conditions
Roundabout

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	32	50.0	0.038	0.1	LOS A	0.2	1.8	0.09	0.02	20.0
2	T1	10	50.0	0.038	0.1	LOS A	0.2	1.8	0.09	0.02	20.0
Approach		42	50.0	0.038	0.1	LOS A	0.2	1.8	0.09	0.02	20.0
North: Tom Thumb Road											
8	T1	10	50.0	0.022	0.3	LOS A	0.1	1.0	0.16	0.07	19.9
9	R2	12	58.3	0.022	0.5	LOS A	0.1	1.0	0.16	0.07	20.6
Approach		22	54.5	0.022	0.4	LOS A	0.1	1.0	0.16	0.07	20.3
West: Tom Thumb Road											
10	L2	13	61.5	0.038	0.1	LOS A	0.2	1.8	0.08	0.04	19.9
12	R2	30	50.0	0.038	0.3	LOS A	0.2	1.8	0.08	0.04	20.7
Approach		43	53.5	0.038	0.2	LOS A	0.2	1.8	0.08	0.04	20.4
All Vehicles		107	52.3	0.038	0.2	LOS A	0.2	1.8	0.10	0.04	20.2

Level of Service (LOS) Method: Delay (RTA NSW).
 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: PM 5. Tom Thumb Road Roundabout

Operational Conditions
Roundabout

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	72	6.9	0.059	0.1	LOS A	0.3	2.2	0.07	0.01	20.0
2	T1	10	50.0	0.059	0.1	LOS A	0.3	2.2	0.07	0.01	20.0
Approach		82	12.2	0.059	0.1	LOS A	0.3	2.2	0.07	0.01	20.0
North: Tom Thumb Road											
8	T1	10	50.0	0.019	0.1	LOS A	0.1	0.8	0.09	0.04	20.0
9	R2	10	50.0	0.019	0.3	LOS A	0.1	0.8	0.09	0.04	20.7
Approach		20	50.0	0.019	0.2	LOS A	0.1	0.8	0.09	0.04	20.3
West: Tom Thumb Road											
10	L2	12	58.3	0.022	0.1	LOS A	0.1	1.0	0.08	0.03	20.0
12	R2	12	41.7	0.022	0.3	LOS A	0.1	1.0	0.08	0.03	20.7
Approach		24	50.0	0.022	0.2	LOS A	0.1	1.0	0.08	0.03	20.3
All Vehicles		126	25.4	0.059	0.1	LOS A	0.3	2.2	0.08	0.02	20.1

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

SIDRA Intersection Results – 2026 Base + PK

BLT

MOVEMENT SUMMARY

 **Site: AM 1. Masters Road / Springhill Road**

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Springhill Rd											
1	L2	904	8.4	0.630	13.5	LOS A	24.0	180.0	0.41	0.77	29.0
2	T1	2863	2.9	0.947	68.6	LOS E	82.5	591.5	1.00	0.99	20.3
Approach		3767	4.2	0.947	55.4	LOS D	82.5	591.5	0.86	0.94	21.9
North: Springhill Rd											
8	T1	729	11.9	0.302	19.6	LOS B	10.8	83.7	0.45	0.77	27.8
9	R2	464	15.9	0.929	102.9	LOS F	13.6	108.1	1.00	0.99	17.0
Approach		1193	13.5	0.929	52.0	LOS D	13.6	108.1	0.66	0.85	22.3
West: Masters Rd											
10	L2	807	10.5	0.928	80.0	LOS F	54.4	414.8	1.00	0.98	19.1
12	R2	1084	6.5	0.928	90.0	LOS F	37.7	282.7	1.00	0.98	18.1
Approach		1891	8.2	0.928	85.7	LOS F	54.4	414.8	1.00	0.98	18.5
All Vehicles		6851	6.9	0.947	63.1	LOS E	82.5	591.5	0.86	0.93	20.9

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

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.

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: PM 1. Masters Road / Springhill Road**

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Springhill Rd											
1	L2	1090	8.3	0.882	41.2	LOS C	44.4	332.8	0.95	0.95	23.8
2	T1	1376	4.9	0.882	54.4	LOS D	29.4	214.3	1.00	0.96	22.0
Approach		2466	6.4	0.882	48.6	LOS D	44.4	332.8	0.98	0.96	22.8
North: Springhill Rd											
8	T1	1095	4.0	0.418	15.6	LOS B	11.4	82.8	0.47	0.78	28.6
9	R2	1439	4.4	0.859	51.9	LOS D	25.5	184.9	1.00	0.94	22.3
Approach		2534	4.2	0.859	36.2	LOS C	25.5	184.9	0.77	0.87	24.6
West: Masters Rd											
10	L2	332	10.8	0.344	21.0	LOS B	8.7	66.9	0.58	0.78	27.4
12	R2	874	7.0	0.867	60.8	LOS E	16.1	119.5	1.00	0.95	21.2
Approach		1206	8.0	0.867	49.8	LOS D	16.1	119.5	0.89	0.90	22.6
All Vehicles		6206	5.8	0.882	43.8	LOS D	44.4	332.8	0.87	0.91	23.5

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

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.

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: AM 2. Springhill Road / Tom Thumb Road**

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	158	26.6	0.269	11.4	LOS A	3.0	25.5	0.66	0.55	18.8
6	R2	16	31.3	0.129	29.1	LOS C	0.5	4.2	0.94	0.66	17.3
Approach		174	27.0	0.269	13.0	LOS A	3.0	25.5	0.69	0.56	18.7
NorthEast: Springhill Rd											
7	L2	34	14.7	0.023	9.4	LOS A	0.0	0.0	0.00	0.68	59.5
8	T1	1046	9.9	0.587	24.9	LOS B	8.6	65.3	0.87	0.83	26.5
Approach		1080	10.1	0.587	24.5	LOS B	8.6	65.3	0.84	0.82	27.0
SouthWest: Springhill Rd											
2	T1	3427	3.4	0.880	25.3	LOS B	35.8	258.3	0.85	0.95	26.4
3	R2	191	23.0	0.563	30.1	LOS C	5.2	43.3	0.92	0.81	25.6
Approach		3618	4.5	0.880	25.5	LOS B	35.8	258.3	0.85	0.94	26.4
All Vehicles		4872	6.5	0.880	24.8	LOS B	35.8	258.3	0.84	0.90	26.1

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

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.

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: PM 2. Springhill Road / Tom Thumb Road

Operational Conditions

Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
SouthEast: Tom Thumb Rd											
4	L2	239	7.1	0.498	23.8	LOS B	7.1	52.5	0.89	0.74	17.7
6	R2	41	12.2	0.280	34.9	LOS C	1.4	11.0	0.97	0.71	16.8
Approach		280	7.9	0.498	25.4	LOS B	7.1	52.5	0.90	0.74	17.6
NorthEast: Springhill Rd											
7	L2	10	50.0	0.007	10.0	LOS A	0.0	0.0	0.00	0.67	51.0
8	T1	2678	2.5	0.835	26.1	LOS B	29.2	209.0	0.90	0.92	26.3
Approach		2688	2.7	0.835	26.0	LOS B	29.2	209.0	0.89	0.92	26.3
SouthWest: Springhill Rd											
2	T1	1648	3.5	0.388	10.6	LOS A	6.7	48.4	0.39	0.74	29.6
3	R2	136	14.7	0.809	47.4	LOS D	5.3	41.6	1.00	0.92	22.9
Approach		1784	4.3	0.809	13.4	LOS A	6.7	48.4	0.44	0.75	28.9
All Vehicles		4752	3.6	0.835	21.3	LOS B	29.2	209.0	0.72	0.84	26.4

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

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.

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: AM 3. Tom Thumb Road / Yampi Way

Operational Conditions

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	33	63.6	0.024	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	18	61.1	0.014	0.6	LOS A	0.1	0.7	0.20	0.12	20.1
Approach		51	62.7	0.024	0.2	NA	0.1	0.7	0.07	0.04	20.1
East: Tom Thumb Rd											
4	L2	17	29.4	0.207	2.4	LOS A	1.0	7.6	0.43	0.33	19.7
6	R2	133	15.8	0.207	2.7	LOS A	1.0	7.6	0.43	0.33	20.0
Approach		150	17.3	0.207	2.7	NA	1.0	7.6	0.43	0.33	19.9
North: Tom Thumb Rd											
7	L2	149	10.1	0.098	0.1	LOS A	0.4	3.2	0.09	0.02	20.0
8	T1	65	38.5	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		214	18.7	0.098	0.1	LOS A	0.4	3.2	0.06	0.01	20.0
All Vehicles		415	23.6	0.207	1.0	NA	1.0	7.6	0.20	0.13	20.0

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

Vehicle movement LOS values are based on average delay per movement

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

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

SIDRA Standard Delay Model 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: PM 3. Tom Thumb Road / Yampi Way

Operational Conditions

Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Yampi Way											
2	T1	80	20.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
3	R2	14	64.3	0.011	0.5	LOS A	0.0	0.5	0.14	0.09	20.2
Approach		94	26.6	0.046	0.1	NA	0.0	0.5	0.02	0.01	20.0
East: Tom Thumb Rd											
4	L2	10	50.0	0.264	2.0	LOS A	1.2	9.0	0.42	0.34	19.8
6	R2	195	2.6	0.264	2.3	LOS A	1.2	9.0	0.42	0.34	20.0
Approach		205	4.9	0.264	2.3	NA	1.2	9.0	0.42	0.34	20.0
North: Tom Thumb Rd											
7	L2	105	4.8	0.067	0.1	LOS A	0.3	2.0	0.07	0.01	20.0
8	T1	34	38.2	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	20.0
Approach		139	12.9	0.067	0.0	LOS A	0.3	2.0	0.05	0.01	20.0
All Vehicles		438	12.1	0.264	1.1	NA	1.2	9.0	0.22	0.16	20.0

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

Vehicle movement LOS values are based on average delay per movement

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

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

SIDRA Standard Delay Model 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: AM 4. Tom Thumb Road / Farrer Road

Operational Conditions

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	10	50.0	0.023	6.8	LOS A	0.1	0.8	0.30	0.59	50.6
3	R2	10	50.0	0.023	8.0	LOS A	0.1	0.8	0.30	0.59	29.0
Approach		20	50.0	0.023	7.4	LOS A	0.1	0.8	0.30	0.59	36.9
East: Tom Thumb Rd											
4	L2	10	50.0	0.086	6.2	LOS A	0.0	0.0	0.00	0.04	55.7
5	T1	138	16.7	0.086	0.0	LOS A	0.0	0.0	0.00	0.04	59.8
Approach		148	18.9	0.086	0.4	NA	0.0	0.0	0.00	0.04	59.5
West: Tom Thumb Rd											
11	T1	149	14.1	0.093	0.1	LOS A	0.1	0.8	0.05	0.04	59.6
12	R2	10	50.0	0.093	6.9	LOS A	0.1	0.8	0.05	0.04	54.8
Approach		159	16.4	0.093	0.5	NA	0.1	0.8	0.05	0.04	59.3
All Vehicles		327	19.6	0.093	0.9	NA	0.1	0.8	0.04	0.07	57.2

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

Site: PM 4. Tom Thumb Road / Farrer Road

Operational Conditions

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Farrer Rd											
1	L2	10	50.0	0.023	7.0	LOS A	0.1	0.8	0.32	0.59	50.6
3	R2	10	50.0	0.023	7.9	LOS A	0.1	0.8	0.32	0.59	29.0
Approach		20	50.0	0.023	7.4	LOS A	0.1	0.8	0.32	0.59	36.9
East: Tom Thumb Rd											
4	L2	10	50.0	0.101	6.2	LOS A	0.0	0.0	0.00	0.03	55.7
5	T1	179	2.8	0.101	0.0	LOS A	0.0	0.0	0.00	0.03	59.8
Approach		189	5.3	0.101	0.3	NA	0.0	0.0	0.00	0.03	59.6
West: Tom Thumb Rd											
11	T1	105	8.6	0.067	0.1	LOS A	0.1	0.8	0.08	0.05	59.4
12	R2	10	50.0	0.067	7.0	LOS A	0.1	0.8	0.08	0.05	54.6
Approach		115	12.2	0.067	0.7	NA	0.1	0.8	0.08	0.05	59.0
All Vehicles		324	10.5	0.101	0.9	NA	0.1	0.8	0.05	0.07	57.2

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

Vehicle movement LOS values are based on average delay per movement

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

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

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

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

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

MOVEMENT SUMMARY

Site: AM 5. Tom Thumb Road Roundabout

Operational Conditions

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	32	50.0	0.038	0.1	LOS A	0.2	1.8	0.09	0.02	20.0
2	T1	10	50.0	0.038	0.1	LOS A	0.2	1.8	0.09	0.02	20.0
Approach		42	50.0	0.038	0.1	LOS A	0.2	1.8	0.09	0.02	20.0
North: Tom Thumb Road											
8	T1	10	50.0	0.022	0.3	LOS A	0.1	1.0	0.16	0.07	19.9
9	R2	12	58.3	0.022	0.5	LOS A	0.1	1.0	0.16	0.07	20.6
Approach		22	54.5	0.022	0.4	LOS A	0.1	1.0	0.16	0.07	20.3
West: Tom Thumb Road											
10	L2	13	61.5	0.039	0.1	LOS A	0.2	1.8	0.08	0.04	19.9
12	R2	31	48.4	0.039	0.3	LOS A	0.2	1.8	0.08	0.04	20.7
Approach		44	52.3	0.039	0.2	LOS A	0.2	1.8	0.08	0.04	20.5
All Vehicles		108	51.9	0.039	0.2	LOS A	0.2	1.8	0.10	0.04	20.2

Level of Service (LOS) Method: Delay (RTA NSW).
 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: PM 5. Tom Thumb Road Roundabout

Operational Conditions
Roundabout

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Road Access											
1	L2	73	6.8	0.060	0.1	LOS A	0.3	2.2	0.07	0.01	20.0
2	T1	10	50.0	0.060	0.1	LOS A	0.3	2.2	0.07	0.01	20.0
Approach		83	12.0	0.060	0.1	LOS A	0.3	2.2	0.07	0.01	20.0
North: Tom Thumb Road											
8	T1	10	50.0	0.019	0.1	LOS A	0.1	0.8	0.09	0.04	20.0
9	R2	10	50.0	0.019	0.3	LOS A	0.1	0.8	0.09	0.04	20.7
Approach		20	50.0	0.019	0.2	LOS A	0.1	0.8	0.09	0.04	20.3
West: Tom Thumb Road											
10	L2	12	58.3	0.022	0.1	LOS A	0.1	1.0	0.08	0.03	20.0
12	R2	12	41.7	0.022	0.3	LOS A	0.1	1.0	0.08	0.03	20.7
Approach		24	50.0	0.022	0.2	LOS A	0.1	1.0	0.08	0.03	20.3
All Vehicles		127	25.2	0.060	0.1	LOS A	0.3	2.2	0.08	0.02	20.1

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

Proposed Port Kembla Bulk Liquids
Terminal

APPENDIX

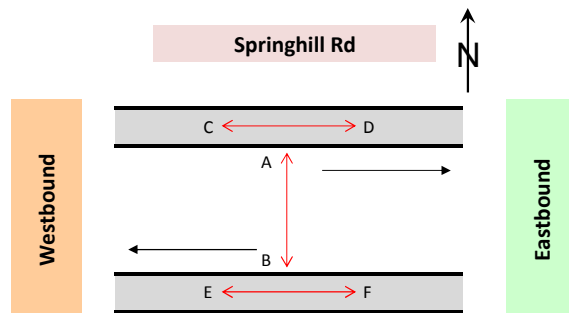
B

TRAFFIC SURVEYS 2015

Job No. : N1801
Client : Cardno
Suburb : Port Kembla
Location : MB1. Springhill Rd

Day/Date : Wed, 27th May 2015
Weather : Fine
Description : Mid Block Count

: Hourly Summary

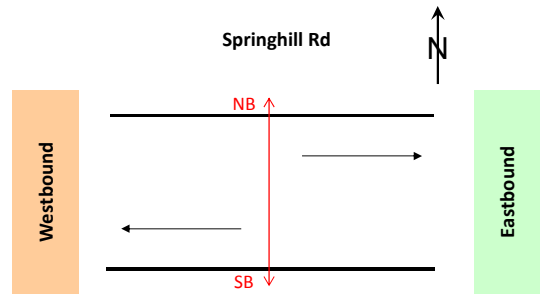


Approach	Springhill Rd						Pedestrians							
Direction	Westbound			Eastbound										
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	A	B	C	D	E	F	Total	
0:00 to 1:00	73	5	78	48	7	55	0	0	0	0	0	0	0	
0:15 to 1:15	53	8	61	44	10	54	0	0	0	0	0	0	0	
0:30 to 1:30	43	6	49	46	8	54	0	0	0	0	0	0	0	
0:45 to 1:45	39	10	49	38	7	45	0	0	0	0	0	0	0	
1:00 to 2:00	38	10	48	37	8	45	0	0	0	0	0	0	0	
1:15 to 2:15	38	10	48	28	10	38	0	0	0	0	0	0	0	
1:30 to 2:30	47	12	59	30	15	45	0	0	0	0	0	0	0	
1:45 to 2:45	40	12	52	30	15	45	0	0	0	0	0	0	0	
2:00 to 3:00	41	12	53	36	17	53	0	0	0	0	0	0	0	
2:15 to 3:15	35	12	47	47	17	64	0	0	0	0	0	0	0	
2:30 to 3:30	33	10	43	40	12	52	0	0	0	0	0	0	0	
2:45 to 3:45	39	11	50	41	15	56	0	0	0	0	0	0	0	
3:00 to 4:00	36	12	48	44	17	61	0	0	0	0	0	0	0	
3:15 to 4:15	39	21	60	44	19	63	0	0	0	0	0	0	0	
3:30 to 4:30	35	26	61	60	24	84	0	0	0	0	0	0	0	
3:45 to 4:45	42	26	68	91	26	117	0	0	0	0	0	0	0	
4:00 to 5:00	50	30	80	125	29	154	0	0	0	0	0	0	0	
4:15 to 5:15	62	30	92	146	24	170	0	0	0	0	0	0	0	
4:30 to 5:30	84	29	113	174	30	204	0	0	0	0	0	0	0	
4:45 to 5:45	107	34	141	246	26	272	0	0	0	0	0	0	0	
5:00 to 6:00	141	40	181	389	32	421	0	0	0	0	0	0	0	
5:15 to 6:15	186	42	228	517	47	564	0	0	0	0	0	0	0	
5:30 to 6:30	212	43	255	695	59	754	0	0	0	0	0	0	0	
5:45 to 6:45	276	52	328	885	74	959	0	0	0	0	0	0	0	
6:00 to 7:00	352	61	413	1,134	90	1,224	0	0	0	0	0	0	0	
6:15 to 7:15	411	64	475	1,256	105	1,361	0	0	0	0	0	0	0	
6:30 to 7:30	501	94	595	1,425	103	1,528	0	0	0	0	0	0	0	
6:45 to 7:45	585	110	695	1,575	104	1,679	0	0	0	0	0	0	0	
7:00 to 8:00	668	115	783	1,680	91	1,771	0	0	0	0	0	0	0	
7:15 to 8:15	745	124	869	2,010	91	2,101	0	0	0	0	0	0	0	
7:30 to 8:30	807	119	926	2,335	95	2,430	0	0	0	0	0	0	0	

7:45 to 8:45	858	125	983	2,605	103	2,708	0	0	0	0	0	0	0	0
8:00 to 9:00	854	134	988	2,850	115	2,965	0	0	0	0	0	0	0	0
8:15 to 9:15	877	136	1,013	2,838	119	2,957	0	0	0	0	0	0	0	0
8:30 to 9:30	885	138	1,023	2,538	120	2,658	0	0	0	0	0	0	0	0
8:45 to 9:45	855	141	996	2,158	113	2,271	0	0	0	0	0	0	0	0
9:00 to 10:00	874	140	1,014	1,718	112	1,830	0	0	0	0	0	0	0	0
9:15 to 10:15	884	138	1,022	1,368	100	1,468	0	0	0	0	0	0	0	0
9:30 to 10:30	905	131	1,036	1,233	94	1,327	0	0	0	0	0	0	0	0
9:45 to 10:45	929	108	1,037	1,148	96	1,244	0	0	0	0	0	0	0	0
10:00 to 11:00	931	104	1,035	1,048	93	1,141	0	0	0	0	0	0	0	0
10:15 to 11:15	955	109	1,064	1,035	100	1,135	0	0	0	0	0	0	0	0
10:30 to 11:30	984	128	1,112	972	93	1,065	0	0	0	0	0	0	0	0
10:45 to 11:45	1,021	134	1,155	957	100	1,057	0	0	0	0	0	0	0	0
11:00 to 12:00	1,102	142	1,244	969	100	1,069	0	0	0	0	0	0	0	0
11:15 to 12:15	1,140	133	1,273	959	85	1,044	0	0	0	0	0	0	0	0
11:30 to 12:30	1,133	113	1,246	1,007	90	1,097	0	0	0	0	0	0	0	0
11:45 to 12:45	1,126	110	1,236	1,022	89	1,111	0	0	0	0	0	0	0	0
12:00 to 13:00	1,094	96	1,190	1,020	91	1,111	0	0	0	0	0	0	0	0
12:15 to 13:15	1,090	104	1,194	1,035	93	1,128	0	0	0	0	0	0	0	0
12:30 to 13:30	1,106	105	1,211	965	97	1,062	0	0	0	0	0	0	0	0
12:45 to 13:45	1,126	110	1,236	957	84	1,041	0	0	0	0	0	0	0	0
13:00 to 14:00	1,161	113	1,274	898	81	979	0	0	0	0	0	0	0	0
13:15 to 14:15	1,193	108	1,301	887	83	970	0	0	0	0	0	0	0	0
13:30 to 14:30	1,278	113	1,391	916	85	1,001	0	0	0	0	0	0	0	0
13:45 to 14:45	1,383	116	1,499	899	100	999	0	0	0	0	0	0	0	0
14:00 to 15:00	1,438	122	1,560	938	104	1,042	0	0	0	0	0	0	0	0
14:15 to 15:15	1,596	126	1,722	938	103	1,041	0	0	0	0	0	0	0	0
14:30 to 15:30	1,733	122	1,855	974	106	1,080	0	0	0	0	0	0	0	0
14:45 to 15:45	1,928	114	2,042	1,044	100	1,144	0	0	0	0	0	0	0	0
15:00 to 16:00	2,041	112	2,153	1,084	94	1,178	0	0	0	0	0	0	0	0
15:15 to 16:15	2,088	104	2,192	1,140	94	1,234	0	0	0	0	0	0	0	0
15:30 to 16:30	2,108	102	2,210	1,180	83	1,263	0	0	0	0	0	0	0	0
15:45 to 16:45	2,101	91	2,192	1,180	81	1,261	0	0	0	0	0	0	0	0
16:00 to 17:00	2,133	75	2,208	1,234	69	1,303	0	0	0	0	0	0	0	0
16:15 to 17:15	2,320	77	2,397	1,234	62	1,296	0	0	0	0	0	0	0	0
16:30 to 17:30	2,495	65	2,560	1,204	64	1,268	0	0	0	0	0	0	0	0
16:45 to 17:45	2,468	69	2,537	1,154	57	1,211	0	0	0	0	0	0	0	0
17:00 to 18:00	2,320	73	2,393	1,054	64	1,118	0	0	0	0	0	0	0	0
17:15 to 18:15	1,953	73	2,026	979	64	1,043	0	0	0	0	0	0	0	0
17:30 to 18:30	1,510	79	1,589	919	56	975	0	0	0	0	0	0	0	0
17:45 to 18:45	1,219	85	1,304	830	56	886	0	0	0	0	0	0	0	0
18:00 to 19:00	1,046	85	1,131	792	48	840	0	0	0	0	0	0	0	0
18:15 to 19:15	967	75	1,042	711	46	757	0	0	0	0	0	0	0	0
18:30 to 19:30	898	64	962	617	58	675	0	0	0	0	0	0	0	0
18:45 to 19:45	814	61	875	574	60	634	0	0	0	0	0	0	0	0
19:00 to 20:00	802	56	858	469	61	530	0	0	0	0	0	0	0	0
19:15 to 20:15	738	50	788	425	63	488	0	0	0	0	0	0	0	0
19:30 to 20:30	730	51	781	379	52	431	0	0	0	0	0	0	0	0
19:45 to 20:45	699	40	739	345	46	391	0	0	0	0	0	0	0	0

Job No. : N1801
Client : Cardno
Suburb : Port Kembla
Location : MB2. Springhill Rd

Day/Date : Wed, 27th May 2015
Weather : Fine
Description : Mid Block Count
 : Hourly Summary



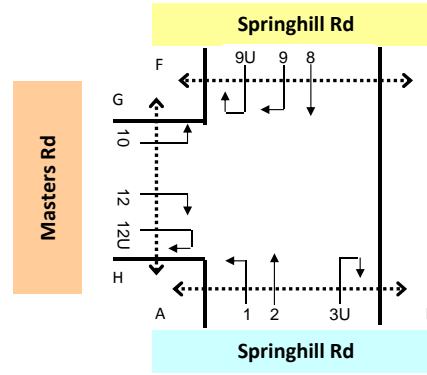
Approach	Springhill Rd						Pedestrians		
	Westbound			Eastbound					
Direction	Lights	Heavies	Total	Lights	Heavies	Total	NB	SB	Total
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	NB	SB	Total
0:00 to 1:00	71	5	76	47	7	54	0	0	0
0:15 to 1:15	44	5	49	43	6	49	0	0	0
0:30 to 1:30	43	7	50	41	7	48	0	0	0
0:45 to 1:45	39	12	51	36	7	43	0	0	0
1:00 to 2:00	36	11	47	33	9	42	0	0	0
1:15 to 2:15	46	16	62	23	13	36	0	0	0
1:30 to 2:30	40	14	54	30	13	43	0	0	0
1:45 to 2:45	43	12	55	33	13	46	0	0	0
2:00 to 3:00	35	12	47	42	15	57	0	0	0
2:15 to 3:15	25	8	33	46	12	58	0	0	0
2:30 to 3:30	31	9	40	37	13	50	0	0	0
2:45 to 3:45	28	10	38	40	13	53	0	0	0
3:00 to 4:00	34	11	45	33	14	47	0	0	0
3:15 to 4:15	37	11	48	41	19	60	0	0	0
3:30 to 4:30	37	16	53	58	21	79	0	0	0
3:45 to 4:45	44	14	58	91	25	116	0	0	0
4:00 to 5:00	50	21	71	116	25	141	0	0	0
4:15 to 5:15	63	26	89	136	22	158	0	0	0
4:30 to 5:30	91	24	115	164	26	190	0	0	0
4:45 to 5:45	115	30	145	242	24	266	0	0	0
5:00 to 6:00	150	31	181	374	27	401	0	0	0
5:15 to 6:15	172	31	203	533	42	575	0	0	0
5:30 to 6:30	191	35	226	685	58	743	0	0	0
5:45 to 6:45	271	51	322	827	70	897	0	0	0
6:00 to 7:00	334	57	391	983	93	1,076	0	0	0
6:15 to 7:15	424	81	505	1,115	111	1,226	0	0	0
6:30 to 7:30	512	95	607	1,315	104	1,419	0	0	0
6:45 to 7:45	574	106	680	1,567	106	1,673	0	0	0
7:00 to 8:00	653	115	768	1,804	96	1,900	0	0	0
7:15 to 8:15	720	115	835	2,127	92	2,219	0	0	0
7:30 to 8:30	784	117	901	2,496	99	2,595	0	0	0
7:45 to 8:45	815	121	936	2,706	110	2,816	0	0	0
8:00 to 9:00	808	124	932	2,948	121	3,069	0	0	0
8:15 to 9:15	808	117	925	2,829	114	2,943	0	0	0
8:30 to 9:30	796	124	920	2,459	114	2,573	0	0	0
8:45 to 9:45	753	128	881	2,079	106	2,185	0	0	0

9:00	to	10:00	781	128	909	1,612	99	1,711	0	0	0
9:15	to	10:15	795	125	920	1,351	98	1,449	0	0	0
9:30	to	10:30	815	115	930	1,232	87	1,319	0	0	0
9:45	to	10:45	883	93	976	1,109	92	1,201	0	0	0
10:00	to	11:00	882	98	980	1,055	93	1,148	0	0	0
10:15	to	11:15	893	110	1,003	1,005	95	1,100	0	0	0
10:30	to	11:30	922	115	1,037	980	97	1,077	0	0	0
10:45	to	11:45	923	127	1,050	1,028	100	1,128	0	0	0
11:00	to	12:00	979	120	1,099	1,014	92	1,106	0	0	0
11:15	to	12:15	1,009	110	1,119	1,059	80	1,139	0	0	0
11:30	to	12:30	999	108	1,107	1,082	90	1,172	0	0	0
11:45	to	12:45	1,015	96	1,111	1,059	87	1,146	0	0	0
12:00	to	13:00	982	101	1,083	1,070	89	1,159	0	0	0
12:15	to	13:15	990	99	1,089	1,030	96	1,126	0	0	0
12:30	to	13:30	1,008	97	1,105	978	95	1,073	0	0	0
12:45	to	13:45	1,013	110	1,123	989	84	1,073	0	0	0
13:00	to	14:00	1,076	97	1,173	924	88	1,012	0	0	0
13:15	to	14:15	1,101	107	1,208	954	88	1,042	0	0	0
13:30	to	14:30	1,177	111	1,288	981	89	1,070	0	0	0
13:45	to	14:45	1,269	106	1,375	947	95	1,042	0	0	0
14:00	to	15:00	1,297	117	1,414	1,006	90	1,096	0	0	0
14:15	to	15:15	1,439	106	1,545	1,042	85	1,127	0	0	0
14:30	to	15:30	1,498	96	1,594	1,080	89	1,169	0	0	0
14:45	to	15:45	1,603	103	1,706	1,206	87	1,293	0	0	0
15:00	to	16:00	1,675	101	1,776	1,268	81	1,349	0	0	0
15:15	to	16:15	1,716	95	1,811	1,316	89	1,405	0	0	0
15:30	to	16:30	1,749	98	1,847	1,317	75	1,392	0	0	0
15:45	to	16:45	1,810	75	1,885	1,320	67	1,387	0	0	0
16:00	to	17:00	1,871	65	1,936	1,362	65	1,427	0	0	0
16:15	to	17:15	2,068	64	2,132	1,318	47	1,365	0	0	0
16:30	to	17:30	2,171	64	2,235	1,419	46	1,465	0	0	0
16:45	to	17:45	2,079	59	2,138	1,412	49	1,461	0	0	0
17:00	to	18:00	1,954	60	2,014	1,296	46	1,342	0	0	0
17:15	to	18:15	1,549	60	1,609	1,224	55	1,279	0	0	0
17:30	to	18:30	1,201	59	1,260	1,007	52	1,059	0	0	0
17:45	to	18:45	942	72	1,014	797	49	846	0	0	0
18:00	to	19:00	765	73	838	656	56	712	0	0	0
18:15	to	19:15	662	71	733	540	61	601	0	0	0
18:30	to	19:30	625	68	693	451	58	509	0	0	0
18:45	to	19:45	570	61	631	395	60	455	0	0	0
19:00	to	20:00	557	63	620	370	56	426	0	0	0
19:15	to	20:15	684	59	743	335	42	377	0	0	0
19:30	to	20:30	690	59	749	308	46	354	0	0	0
19:45	to	20:45	687	57	744	269	46	315	0	0	0
20:00	to	21:00	637	47	684	223	42	265	0	0	0
20:15	to	21:15	451	48	499	192	42	234	0	0	0
20:30	to	21:30	373	40	413	177	35	212	0	0	0
20:45	to	21:45	346	34	380	169	26	195	0	0	0
21:00	to	22:00	300	31	331	167	25	192	0	0	0
21:15	to	22:15	276	31	307	158	20	178	0	0	0
21:30	to	22:30	313	28	341	173	20	193	0	0	0
21:45	to	22:45	308	33	341	186	24	210	0	0	0
22:00	to	23:00	322	30	352	169	27	196	0	0	0

22:15 to 23:15	299	30	329	159	27	186	0	0	0
22:30 to 23:30	254	37	291	112	27	139	0	0	0
22:45 to 23:45	209	33	242	91	21	112	0	0	0
23:00 to 0:00	183	31	214	81	15	96	0	0	0
24hr Totals	16,432	1,549	17,981	18,653	1,371	20,024	0	0	0

Job No. : N1801
Client : Cardno
Suburb : Port Kembla
Location : 1. Springhill Rd / Masters Rd

Day/Date : Wed, 27th May 2015
Weather : Fine
Description : Classified Intersection Count
 : Peak Hour Summary



Approach	Springhill Rd			Springhill Rd			Masters Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM 8:00 to 9:00	3,105	115	3,220	812	125	937	1,435	120	1,555	5,712
PM 16:15 to 17:15	2,001	102	2,103	2,060	84	2,144	964	69	1,033	5,280

Approach	Springhill Rd			Springhill Rd			Masters Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 7:00	1,502	103	1,605	359	57	416	650	111	761	2,782
6:15 to 7:15	1,630	131	1,761	494	65	559	743	104	847	3,167
6:30 to 7:30	1,840	141	1,981	574	92	666	804	95	899	3,546
6:45 to 7:45	1,990	163	2,153	661	114	775	833	102	935	3,863
7:00 to 8:00	2,046	163	2,209	732	121	853	914	88	1,002	4,064
7:15 to 8:15	2,408	139	2,547	725	127	852	1,056	100	1,156	4,555
7:30 to 8:30	2,647	138	2,785	783	121	904	1,221	113	1,334	5,023
7:45 to 8:45	2,863	114	2,977	816	119	935	1,417	113	1,530	5,442
8:00 to 9:00	3,105	115	3,220	812	125	937	1,435	120	1,555	5,712
8:15 to 9:15	3,058	128	3,186	839	124	963	1,341	107	1,448	5,597
8:30 to 9:30	2,810	133	2,943	835	123	958	1,176	102	1,278	5,179
8:45 to 9:45	2,463	138	2,601	822	126	948	904	97	1,001	4,550
9:00 to 10:00	2,005	145	2,150	830	121	951	732	99	831	3,932
AM Totals	8,658	526	9,184	2,733	424	3,157	3,731	418	4,149	16,490
15:00 to 16:00	1,811	132	1,943	1,973	107	2,080	864	99	963	4,986
15:15 to 16:15	1,838	119	1,957	2,008	104	2,112	926	88	1,014	5,083
15:30 to 16:30	1,878	101	1,979	1,979	104	2,083	965	72	1,037	5,099
15:45 to 16:45	1,907	94	2,001	2,007	91	2,098	966	69	1,035	5,134
16:00 to 17:00	1,943	107	2,050	1,999	87	2,086	974	76	1,050	5,186
16:15 to 17:15	2,001	102	2,103	2,060	84	2,144	964	69	1,033	5,280
16:30 to 17:30	1,983	114	2,097	2,016	78	2,094	896	70	966	5,157
16:45 to 17:45	1,921	103	2,024	1,859	71	1,930	817	65	882	4,836
17:00 to 18:00	1,865	83	1,948	1,720	63	1,783	745	55	800	4,531
17:15 to 18:15	1,741	69	1,810	1,416	60	1,476	581	60	641	3,927
17:30 to 18:30	1,597	53	1,650	1,170	60	1,230	549	65	614	3,494
17:45 to 18:45	1,370	42	1,412	931	66	997	505	69	574	2,983
18:00 to 19:00	1,166	39	1,205	757	69	826	489	68	557	2,588
PM Totals	6,785	361	7,146	6,449	326	6,775	3,072	298	3,370	17,291

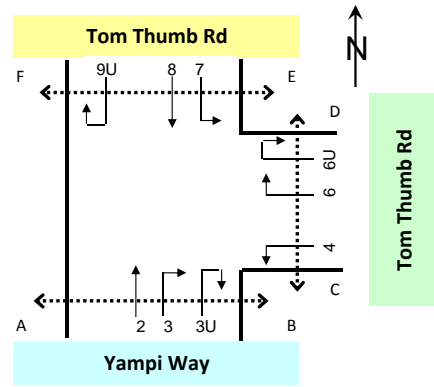
Job No. : N1801
Client : Cardno
Suburb : Port Kembla
Location : 3. Tom Thumb Rd / Yampi Way

Day/Date : Wed, 27th May 2015

Weather : Fine

Description : Classified Intersection Count

: Peak Hour Summary

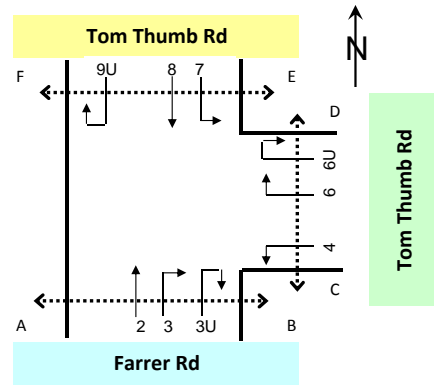


Approach	Yampi Way			Tom Thumb Rd			Tom Thumb Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM 6:00 to 7:00	3	26	29	9	3	12	165	32	197	238
PM 16:00 to 17:00	45	16	61	74	5	79	22	16	38	178

Approach	Yampi Way			Tom Thumb Rd			Tom Thumb Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 7:00	3	26	29	9	3	12	165	32	197	238
6:15 to 7:15	6	28	34	12	5	17	146	35	181	232
6:30 to 7:30	5	30	35	14	9	23	121	30	151	209
6:45 to 7:45	7	35	42	16	12	28	107	28	135	205
7:00 to 8:00	13	35	48	20	14	34	78	25	103	185
7:15 to 8:15	16	33	49	26	18	44	71	21	92	185
7:30 to 8:30	18	31	49	29	20	49	73	23	96	194
7:45 to 8:45	17	24	41	27	22	49	74	26	100	190
8:00 to 9:00	14	21	35	25	19	44	55	27	82	161
8:15 to 9:15	13	21	34	19	16	35	50	27	77	146
8:30 to 9:30	18	19	37	14	13	27	54	27	81	145
8:45 to 9:45	17	21	38	17	13	30	62	28	90	158
9:00 to 10:00	18	21	39	15	15	30	71	32	103	172
AM Totals	48	103	151	69	51	120	369	116	485	756
15:00 to 16:00	45	13	58	59	5	64	20	16	36	158
15:15 to 16:15	38	16	54	72	6	78	17	18	35	167
15:30 to 16:30	37	15	52	65	7	72	17	20	37	161
15:45 to 16:45	51	14	65	56	6	62	19	20	39	166
16:00 to 17:00	45	16	61	74	5	79	22	16	38	178
16:15 to 17:15	45	15	60	58	3	61	23	15	38	159
16:30 to 17:30	48	16	64	70	2	72	22	10	32	168
16:45 to 17:45	25	15	40	74	2	76	23	9	32	148
17:00 to 18:00	24	17	41	46	2	48	14	8	22	111
17:15 to 18:15	25	18	43	35	4	39	11	8	19	101
17:30 to 18:30	20	14	34	18	2	20	10	9	19	73
17:45 to 18:45	16	14	30	16	5	21	4	6	10	61
18:00 to 19:00	12	10	22	10	5	15	3	5	8	45
PM Totals	126	56	182	189	17	206	59	45	104	492

Job No. : N1801
Client : Cardno
Suburb : Port Kembla
Location : 4. Tom Thumb Rd / Farrer Rd

Day/Date : Wed, 29th May 2015
Weather : Fine
Description : Classified Intersection Count
 : Peak Hour Summary



Approach	Farrer Rd			Tom Thumb Rd			Tom Thumb Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM 6:00 to 7:00	2	0	2	9	4	13	101	6	107	122
PM 16:00 to 17:00	1	0	1	58	4	62	4	11	15	78

Approach	Farrer Rd			Tom Thumb Rd			Tom Thumb Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 7:00	2	0	2	9	4	13	101	6	107	122
6:15 to 7:15	2	0	2	10	2	12	79	12	91	105
6:30 to 7:30	2	0	2	11	7	18	52	15	67	87
6:45 to 7:45	2	0	2	11	9	20	42	18	60	82
7:00 to 8:00	1	0	1	6	12	18	27	18	45	64
7:15 to 8:15	1	0	1	11	22	33	26	14	40	74
7:30 to 8:30	1	2	3	12	21	33	27	13	40	76
7:45 to 8:45	1	2	3	16	23	39	27	13	40	82
8:00 to 9:00	0	2	2	17	19	36	21	17	38	76
8:15 to 9:15	0	2	2	13	15	28	15	15	30	60
8:30 to 9:30	0	0	0	13	13	26	15	15	30	56
8:45 to 9:45	1	0	1	12	12	24	17	18	35	60
9:00 to 10:00	2	0	2	13	16	29	21	14	35	66
AM Totals	5	2	7	45	51	96	170	55	225	328
15:00 to 16:00	0	1	1	31	7	38	10	6	16	55
15:15 to 16:15	1	1	2	46	4	50	11	7	18	70
15:30 to 16:30	1	0	1	43	6	49	9	9	18	68
15:45 to 16:45	1	0	1	38	6	44	7	10	17	62
16:00 to 17:00	1	0	1	58	4	62	4	11	15	78
16:15 to 17:15	0	0	0	48	4	52	3	10	13	65
16:30 to 17:30	0	0	0	55	3	58	3	8	11	69
16:45 to 17:45	0	0	0	64	3	67	1	7	8	75
17:00 to 18:00	0	0	0	40	3	43	1	5	6	49
17:15 to 18:15	0	1	1	28	4	32	1	3	4	37
17:30 to 18:30	0	1	1	18	1	19	1	2	3	23
17:45 to 18:45	0	1	1	10	2	12	2	0	2	15
18:00 to 19:00	0	1	1	8	2	10	2	0	2	13
PM Totals	1	2	3	137	16	153	17	22	39	195

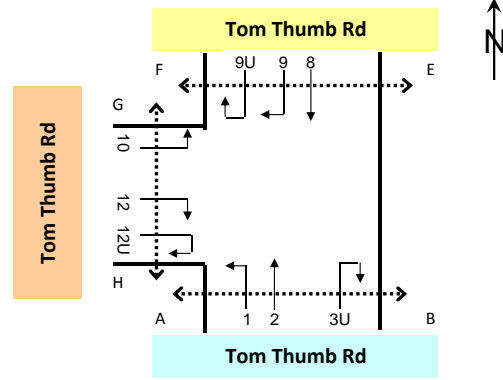
Job No. : N1801
Client : Cardno
Suburb : Port Kembla
Location : 5. Tom Thumb Rd Roundabout

Day/Date : Wed, 27th May 2015

Weather : Fine

Description : Classified Intersection Count

: Peak Hour Summary



AM

PM

Approach	Tom Thumb Rd			Tom Thumb Rd			Tom Thumb Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 7:00	7	2	9	9	2	11	80	4	84	104
16:45 to 17:45	66	1	67	2	1	3	3	6	9	79

Approach	Tom Thumb Rd			Tom Thumb Rd			Tom Thumb Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 7:00	7	2	9	9	2	11	80	4	84	104
6:15 to 7:15	9	6	15	5	2	7	51	9	60	82
6:30 to 7:30	9	9	18	2	4	6	21	17	38	62
6:45 to 7:45	7	13	20	2	3	5	13	21	34	59
7:00 to 8:00	4	12	16	3	3	6	10	22	32	54
7:15 to 8:15	6	13	19	3	5	8	10	22	32	59
7:30 to 8:30	9	13	22	3	6	9	9	17	26	57
7:45 to 8:45	11	13	24	2	6	8	12	16	28	60
8:00 to 9:00	12	14	26	1	5	6	11	17	28	60
8:15 to 9:15	10	14	24	1	4	5	8	13	21	50
8:30 to 9:30	7	13	20	2	1	3	13	12	25	48
8:45 to 9:45	7	10	17	9	1	10	17	13	30	57
9:00 to 10:00	8	9	17	15	1	16	22	10	32	65
AM Totals	31	37	68	28	11	39	123	53	176	283
15:00 to 16:00	19	5	24	1	0	1	14	8	22	47
15:15 to 16:15	28	4	32	1	0	1	17	7	24	57
15:30 to 16:30	28	5	33	1	1	2	14	9	23	58
15:45 to 16:45	26	5	31	0	1	1	13	9	22	54
16:00 to 17:00	54	4	58	0	1	1	8	9	17	76
16:15 to 17:15	48	3	51	1	1	2	4	10	14	67
16:30 to 17:30	55	1	56	2	1	3	6	8	14	73
16:45 to 17:45	66	1	67	2	1	3	3	6	9	79
17:00 to 18:00	34	1	35	2	1	3	3	4	7	45
17:15 to 18:15	28	1	29	1	1	2	3	2	5	36
17:30 to 18:30	20	1	21	0	0	0	1	1	2	23
17:45 to 18:45	11	1	12	0	0	0	1	0	1	13
18:00 to 19:00	9	0	9	0	0	0	2	0	2	11
PM Totals	116	10	126	3	2	5	27	21	48	179