Australian Government

BUILDING OUR FUTURE

NSW GOVERNMENT

# Coffs Harbour Bypass

Environmental Impact Statement

September 2019

VOLUME 3

## Traffic and transport assessments

Appendix F

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APPENDIX

F



# Appendix F

Roads and Maritime Services

# Coffs Harbour Bypass Environmental Impact Statement

## Appendix F Traffic and Transport Assessment

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## Appendices

# 1 Introduction

## 1.1 Overview

Roads and Maritime Services (Roads and Maritime) is seeking approval for the Coffs Harbour Bypass (the project). The approval is being sought under Division 5.2 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) as Critical State Significant Infrastructure (CSSI).

The project complements the Pacific Highway upgrade program which, when complete, will provide free flowing dual carriageway conditions for the Pacific Highway between Hexham and the Queensland border. The benefits of the project include:

- Improve road safety by removing through traffic (light and heavy vehicles) and some local traffic from the existing road network will reduce conflicts and improve safety for all road users
- Improve travel time for through and local traffic, reducing through traffic travel times
- Improve transport efficiency of the existing Pacific Highway through Coffs Harbour, relieving congestion on the wider Coffs Harbour road network and providing an alternative route for some local trips. This improved transport efficiency and the resulting improvements to accessibility and amenity to the Coffs Harbour CBD would likely result in wider economic benefits for the Coffs Harbour region
- Improving freight efficiency for heavy vehicles by providing a high standard dual carriageway road to complement the National Land Transport Network, Future Transport Strategy 2056 and the recently upgraded Pacific Highway.

The Pacific Highway upgrade program also seeks to create public value and ensure safety of its workers and travelling public.

A concept design has been developed for the project, which forms the basis of this assessment. This traffic and transport assessment supports the environmental impact statement (EIS) prepared for the project.

## 1.2 The project

The project includes a 12 km bypass of Coffs Harbour from south of Englands Road to Korora Hill in the north and a 2 km upgrade of the existing highway between Korora Hill and Sapphire. The project would provide a four-lane divided highway that bypasses Coffs Harbour, passing through the North Boambee Valley, Roberts Hill and then traversing the foothills of the Coffs Harbour basin to the west and north to Korora Hill.

The key features of the project include:

- Four-lane divided highway from south of Englands Road roundabout to the dual carriageway highway at Sapphire
- Bypass of the Coffs Harbour urban area from south of Englands Road intersection to Korora Hill
- Upgrade of the existing Pacific Highway between Korora Hill and the dual carriageway highway at Sapphire
- Grade-separated interchanges at Englands Road, Coramba Road and Korora Hill
- A one-way local access road along the western side of the project between the southern tie-in and Englands Road, connecting properties to the road network via Englands Road
- A new service road, located east of the project, connecting Solitary Islands Way with James Small Drive and the existing Pacific Highway near Bruxner Park Road
- Three tunnels through ridges at Roberts Hill (around 190 m long), Shephards Lane (around 360 m long), and Gatelys Road (around 450 m long)
- Structures to pass over local roads and creeks as well as a bridge over the North Coast Railway
- A series of cuttings and embankments along the alignment
- Tie-ins and modifications to the local road network to enable local road connections across and around the alignment
- Pedestrian and cycling facilities, including a shared path along the service road tying into the existing shared path on Solitary Islands Way, and a new pedestrian bridge to replace the existing Luke Bowen footbridge with the name being retained
- Relocation of the Kororo Public School bus interchange
- Noise attenuation, including low noise pavement, noise barriers and at-property treatments as required
- Fauna crossing structures including glider poles, underpasses and fencing
- Ancillary work to facilitate construction and operation of the project, including:
  - Adjustment, relocation and/or protection of utilities and services
  - New or adjusted property accesses as required
  - Operational water quality measures and retention basins
  - Temporary construction facilities and work including compound and stockpile sites, concrete/asphalt batching plant, sedimentation basins and access roads (if required).


**Legend**

Construction footprint

Alignment

North Coast Railway

Watercourse

Coffs Harbour Bypass
Key features of the project
Figure 1

0 0.5 1 1.5 km

Scale @A4: 1:50,000
GDA 1994 MGA Zone 56

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## 1.3 Project objectives

The Pacific Highway upgrade program aims to support regional development. The objectives of the program are to:

- Significantly reduce road crashes and injuries
- Reduce travel times
- Reduce freight transport costs
- Develop a route involving the community and considering its interests
- Provide a route supporting economic development
- Manage the upgrading of the route in accordance with the principles of ecologically sustainable development
- Provide the best value for money.

Specific objectives relating to the project are to:

- Provide travel time savings for through and local traffic, and business vehicles/freight
- Provide a road which supports and integrates with the broader transport network
- Provide sufficient road capacity to meet traffic demand on the Pacific Highway
- Provide safer road conditions for all road users on the new and existing road.

## 1.4 Purpose of this report

This traffic and transport assessment report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) for the project for the purpose of seeking project approval under Division 5.2 of the EP&A Act. Table 1 identifies the SEARs which are relevant to this technical assessment.

Table 1 SEARs relevant to traffic and transport

| SEARs relevant to this technical assessment | | Where addressed in this technical assessment |
|---|---|---|
| **Key Issues**<br>**1. Transport and traffic**<br>1. The Proponent must assess construction transport and traffic (vehicle, pedestrian and cyclists) impacts, including, but not necessarily limited to: | | |
| (a) | A considered approach to the identification of transport routes and movements, particularly outside standard construction hours | Section 6.4 and 6.7.4 |
| (b) | The indicative number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements) | Section 6.7.4 |
| (c) | Indicative construction worker parking requirements | Section 6.6 |
| (d) | the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times, land uses, in particular sensitive receivers, and parking arrangements) | Section 6.7.4 |
| (e) | Access constraints and impacts on public transport, pedestrians and cyclists | Section 6.6, 6.7.7 |
| (f) | Impacts on the operation of the North Coast railway line | Section 6.7.7 |
| (g) | The need to close, divert or otherwise reconfigure elements of the road and cycle network associated with construction of the project | Section 5.2, 6.7.5 and 6.7.7 |
| (h) | The cumulative traffic impacts of other major development projects preparing for or commencing construction in the vicinity of the proposal | Section 6.7.6 |
| 2. The Proponent must assess (and model) the operational transport impacts of the project including, but not necessarily limited to: | | |
| (a) | Forecast travel demand and traffic volumes for the project and the surrounding road, cycle and public transport network | Sections 2.1, 2.6, 2.7, 4.5, 4.6, 5.3 and 5.4 |
| (b) | Travel time analysis | Sections 3.4 and 5.5 |
| (c) | Performance of key interchanges and intersections by undertaking a level of service analysis at key locations | Sections 3.5 and 5.6 |
| (d) | Wider transport interactions and modifications (local and regional roads, cyclist, public and freight transport, and the North Coast railway line) | Sections 5.8 |
| (e) | Access to identified and future urban release areas, such as North Boambee Valley | Section 5.9.2 |
| (f) | Impacts on cyclists and pedestrian access and safety | Section 5.7 and 5.8.4 |
| (g) | Opportunities to integrate cycling and pedestrian elements with surrounding networks (existing and proposed) and within the project | Section 2.7 and 5.8.4 |

The area addressed for this assessment incorporates the project's construction and operational footprint and the surrounding road network that connects with the project. This is discussed further in Section 2.

The operational assessment presented in this report is primarily based on the findings of the *Coffs Harbour Bypass – Traffic Model Development Report* prepared by Arup (2018), as discussed further in Section 4.1. Updates to the traffic model to reflect design changes since the *Coffs Harbour Bypass – Traffic Model Development Report* was prepared have been included in the traffic model outputs and results presented in this report.

# 2 Existing traffic and transport environment

This chapter outlines the existing traffic and transport features and conditions relevant to the areas modelled (refer Figure 2). This chapter provides the regional and local context within which the assessment has been undertaken.

## 2.1 Road network

The Pacific Highway is the major interstate route between Sydney and Brisbane and is part of the National Highway. It is a key freight, bus and tourist route for the region, as well as a local route for Coffs Harbour. The Pacific Highway is a designated B-double heavy vehicle route and forms part of the Higher Mass Limit road freight network.

The traffic volumes on the Pacific Highway within the Coffs Harbour LGA are steadily increasing with a relatively high proportion of heavy vehicles, being approximately 12 to 15 per cent of daily traffic volumes. Within Coffs Harbour there are 12 sets of traffic signals and numerous intersections and property accesses along the existing highway that contribute to stop-start traffic conditions experienced by traffic using the highway. A substantial portion of the peak hour traffic travelling on the existing highway is through traffic conflicting with local trips.

Traffic congestion on the highway is predicted to intensify as a result of continuing population growth in the Coffs Harbour LGA, with developments being planned in North Boambee Valley and Korora Hill, providing housing for over 2,000 persons when fully developed. Long-term projections by the NSW Department of Planning predict that population in the Coffs Harbour will increase by around 20,000 people over the next 20 years.

In 2016, the Pacific Highway carried in the order of 37,000 vehicles through central Coffs Harbour per day in a typical weekday condition. Traffic volumes have increased steadily along the Pacific Highway since 2007. At Sapphire Beach, the traffic volumes on the Pacific Highway have been observed to increase at a rate of approximately three per cent (compound) per annum.

In addition to the Pacific Highway, regional roads carrying relatively high traffic demands (ie greater than 8,000 vehicles per day) within the Coffs Harbour LGA that have been addressed in this report. These include Stadium Drive, east of the Pacific Highway and Coramba Road, west of the Pacific Highway.

### 2.1.1 Pacific Highway

The existing Pacific Highway between the project extents is a four-lane highway with a divided carriageway. The Pacific Highway is a State Road, intersecting with regional and local roads at interchanges and at-grade intersections. There is a grade separated interchange where the Pacific Highway passes over Mastracolas Road and Arthur Street.

The existing Pacific Highway between Englands Road and West Kororo Road functions as an urban arterial road with direct access provided for residential, commercial and industrial properties, at-grade signalised and priority (stop or give-way controlled) intersections and a speed limit of 60km/h. Through central Coffs Harbour, footpaths are provided on either side of the highway and on-street parking is available. South of Combine Street a shared path is provided on the western side of the highway.

Between West Kororo Road and Solitary Islands Way, the posted speed limit of the Pacific Highway is 80km/h. Property access is restricted along this section of the highway although there a several at-grade intersections and there is an at-grade school bus interchange adjacent to Kororo Public School accessed from the Pacific Highway just south of the Old Coast Road intersection.

North of Solitary Islands Way, the posted speed limit increases to 110km/h and access to the highway is restricted.

### 2.1.2 Stadium Drive

Stadium Drive is a regional road to the south of Coffs Harbour providing an east-west link between the Pacific Highway and Hogbin Drive. Stadium Drive is located adjacent to the Coffs Coast Sports and Leisure Park and is mostly a two-lane, two-way undivided roadway with on-street cycle lanes and limited pedestrian facilities. Stadium Drive is an approved B-double route subject to certain travel conditions (ie B-doubles are not permitted to travel on this roadway between 8:00 to 9:00am and 2:30 to 4:00pm on school days).

### 2.1.3 Coramba Road

Coramba Road is a regional road which connects Coffs Harbour with Karangi (to the west of the project). Coramba Road (locally named West High Street) intersects with the Pacific Highway at a signalised intersection within the Coffs Harbour CBD. West of the CBD, Coramba Road is a two-lane, two-way undivided roadway with limited pedestrian and cyclist facilities. As part of Main Road 151, Coramba Road / Orara Way provides an alternative route between Coffs Harbour and Grafton via the Orara Valley.

### 2.1.4 Englands Road

Englands Road is the continuation of Stadium Drive west of the Pacific Highway. It provides an access to the industrial estate located north-west of the Englands Road interchange and to Coffs Coast Resource Recovery Park

Englands Road is a two-way, two lane road with a 50km/h posted speed limit. Between the Pacific Highway and Isles Drive (ie entry to the industrial estate) Englands Road is an approved B-double route.

Approximately 400m west of the Pacific Highway, Englands Road becomes a rural roadway with no shoulders, no kerbs and no active (ie pedestrian or cyclist) transport facilities. It predominately provides access to farmland and rural residential properties.

### 2.1.5 Bennetts Road

Bennetts Road intersects with Coramba Road west of Coffs Harbour, providing access to a number of rural private properties and development. Bennetts Road is a rural road with no kerb and channel, limited pavement marking, no active transport provisions and a posted speed limit of 60km/h.

### 2.1.6 Bruxner Park Road

Bruxner Park Road provides access to Ulidarra National Park and Sealy Lookout at the northern end of the project. Bruxner Park Road is a winding rural road with no kerb and channel and limited pavement marking. It is a designated local school bus route and cycle route and incorporates signage warning motorists of the occurrence of these vulnerable users (ie pedestrians and cyclists).

### 2.1.7 North Boambee Road

North Boambee Road is a two-way, two lane local road connecting to the Pacific Highway. It currently provides access to Bishop Druitt College; and commercial and urban residential development. The posted speed limit is 50km/h between the Pacific Highway and Bishop Druitt College; and 60km/h to the west of Bishop Druitt College where the land-use along this section of the road is predominately rural residential. At the western end of North Boambee Road is a quarry operated by Holcim, generating heavy vehicle movements to/from the Pacific Highway. There are limited pedestrian and cyclist facilities along the length of North Boambee Road.

North Boambee Road will intersect with the project approximately 1.5km north of the Englands Road interchange. The road provides access to the North Boambee Valley (east) urban release area and will provide access to the North Boambee Valley (west) future urban release area (refer to 4.5) to be developed west of the project.

### 2.1.8 Lakes Drive

Lakes Drive is located within the currently mostly developed North Boambee Valley (east) urban release area. Lakes Drive terminates just prior to the project. Lakes Drive is a local residential street which provides direct access to private properties within North Boambee Valley. The posted speed limit of Lakes Drive is 50km/h. Footpaths are provided predominantly on the eastern side of the road.

### 2.1.9 Spagnolos Road

Spagnolos Road intersects with Coramba Road east of Bennetts Road. Spagnolos Road is a short local residential street linking Coramba Road and Roselands Drive, and has no existing pedestrian or cyclist facilities. Where Spagnolos Road intersects with Coramba Road, a bus stop is provided for school bus services. The speed environment of Spagnolos Road is 50km/h.

### 2.1.10 Shephards Lane

Shephards Lane is a two-way, two lane residential street which connects Coramba Road to residents located in the western suburbs of Coffs Harbour. The posted speed limit of Shephards Lane is 50 km/h. Footpaths are provided intermittently along Shephards Lane, with no cycle provisions. West of Roselands Drive, Shephards Lane becomes a rural residential street with no kerb and channel and no shoulders. An overpass over the North Coast Railway is provided on Shephards Lane to continue to provide access to rural properties west of the rail line.

### 2.1.11 Mackays Road

Mackays Road is a predominately residential local road west of the existing Pacific Highway in the northwest suburbs of Coffs Harbour, with a 50km/h posted speed limit and limited pedestrian and cyclist facilities. The Baringa Private Hospital is accessed via Mackays Road north of Bray Street.

Mackays Road south of Bray Street forms part of a local bus route network. It intersects with the North Coast Railway at a level crossing. North of the level crossing, Mackays Road becomes a rural unsealed roadway providing access to a limited number of rural properties before terminating prior to the Ulidarra National Park.

### 2.1.12 West Korora Road

West Korora Road is a rural road with no kerb and channel, limited pavement marking and no pedestrian or cyclist provisions. The posted speed limit of West Korora Road is 50km/h. This road intersects with the existing Pacific Highway at an at-grade priority (give-way) all-movements intersection approximately 250m north of the Big Banana Fun Park. West Korora Road terminates just prior to the Ulidarra National Park.

### 2.1.13 Old Coast Road

Old Coast Road is a rural road with no kerb and channel and no pedestrian or cyclist provisions. Old Coast Road provides access to predominantly rural residential allotments, and north of Innes Road becomes unsuitable for longer vehicles. The speed environment of Old Coast Road is 50km/h.

Old Coast Road currently intersects with the Pacific Highway 40m south of Korora School Road, at an at-grade unsignalised T-intersection, which allows all turning movements. Approximately 80m west of its intersection with the Pacific Highway, there is a narrow one-lane bridge crossing on Old Coast Road over Pine Brush Creek.

### 2.1.14 Korora School Road

Korora School Road is a 500m one-way southbound road which diverges from the Pacific Highway approximately 40m north of Old Coast Road and terminates at a priority-controlled T intersection with James Small Drive. Korora School Road provides access to the adjacent Kororo Public School and residential properties. The road has a restricted posted speed limit of 40km/h during school peak periods.

There is a 14-bay formalised on-street car park (including two disabled parking spaces) and an approximately 40m long parent drop-off area located on Korora School Road adjacent to the school. Alongside the drop-off area, there is a pedestrian pathway connecting to the pedestrian entry to the school. There is an existing children's crossing located just north of the on-street car park, providing access to the nearby school bus interchange on the Pacific Highway, and the Luke Bowen footbridge / cyclist overpass connecting to the service road on the western side of the Highway.

### 2.1.15 James Small Drive

James Small Drive is a former section of the Pacific Highway route and is a two-lane, two-way roadway that commences and terminates at the existing Pacific Highway within the project extents. James Small Drive currently intersects with the Pacific Highway at a priority-controlled left-in / left-out / right out intersection approximately 250m north of the Korora School Road diverge. James Small Drive continues south before terminating at the Pacific Highway opposite its intersection with Bruxner Park Road.

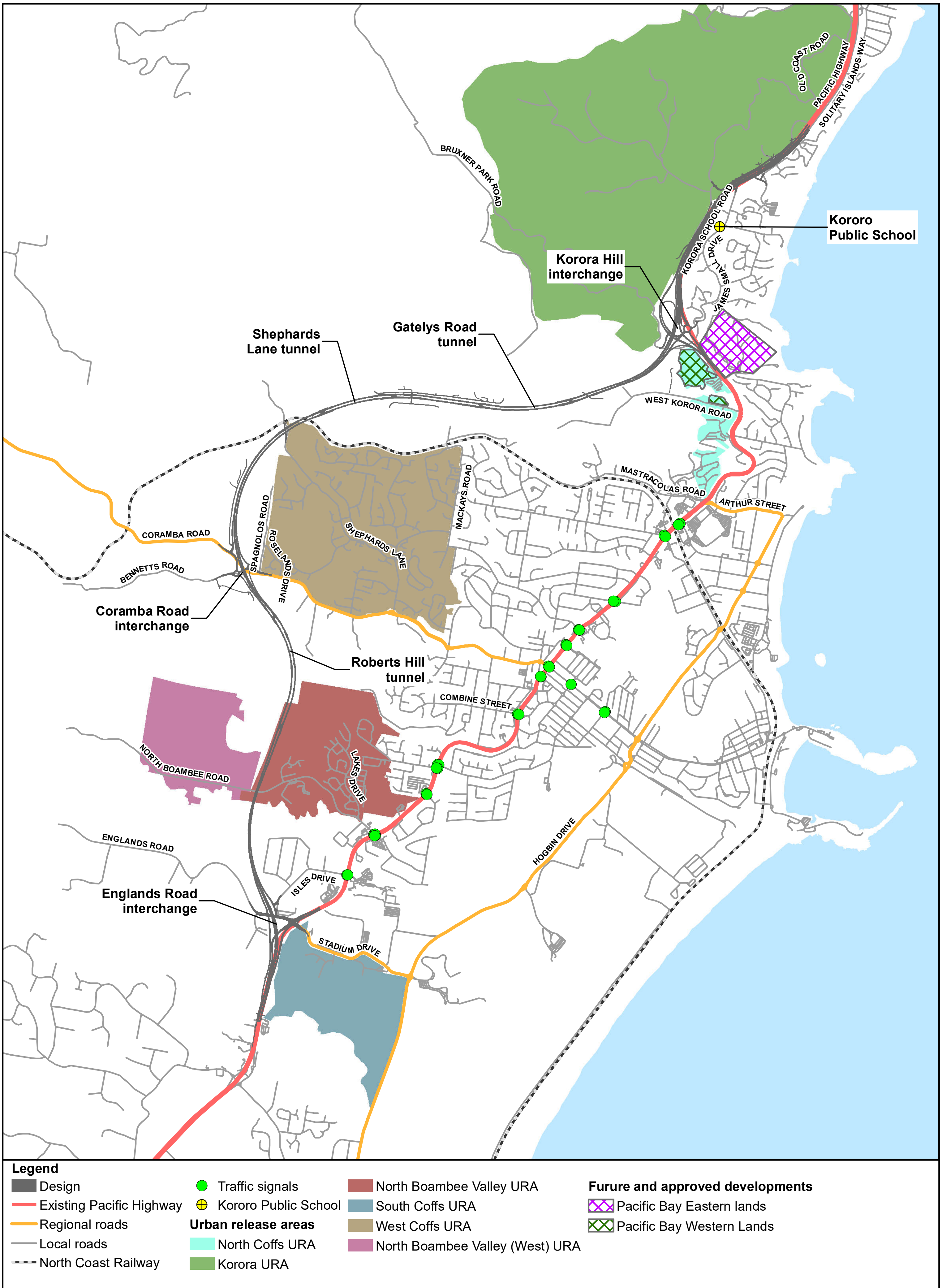
The posted speed limit of James Small Drive is 50km/h. There is a footpath on the western side of the road, north of its intersection with Korora Bay Drive. Adjacent to Kororo Public School, there is a children's crossing point providing a designated location for pedestrians to cross to reach parking on either side of the road.

### 2.1.16 Isles Drive

Isles Drive is a two-way, two-lane road through the Isles Industrial Park located just north of Englands Road. Given the surrounding industrial land uses, the carriageway is approximately 12.5m wide allowing for both parking on-street, and to cater for the turning movements of large commercial vehicles into industrial tenancies. Isles Drive is an approved B-double route, which is subject to certain travel conditions (ie B-doubles are not permitted to turn left into Isles Drive from the Pacific Highway). Additionally, it is noted that case-by-case permits for over dimensional vehicles to access the industrial estate are currently in place. For example, a permit exists for over dimensional vehicles to access the casting yard on Industrial Drive / Engineering Drive via the southern end of Isles Drive and Englands Road from the Pacific Highway.

Isles Drive intersects with Englands Road at a priority-controlled T intersection 180m west of the Pacific Highway. It also intersects with the Pacific Highway approximately 760m north of Englands Road, at a signalised four-way intersection.

The posted speed limit of Isles Drive is 50 km/h. There are limited pedestrian facilities along the length of Isles Drive with no dedicated cycling provisions.




Coffs Harbour Bypass
Existing signalised intersections and road infrastructure
Figure 2

## 2.2 Heavy and restricted access vehicles

The national key freight network has been developed collaboratively by Commonwealth, state and territory governments and industry; to assist governments and industry to better understand, and plan for, critical freight flows. It provides a detailed illustration of the road and rail routes connecting Australia's nationally significant places for freight. Within the Coffs Harbour LGA, the Pacific Highway forms part of the national key freight route network (Department of Infrastructure and Regional Development, 2018*).*

Heavy vehicles are defined under the Heavy Vehicle National Law (which is administered by the National Heavy Vehicle Regulator) as a vehicle with a single, or combined (ie with trailer) mass of more than 4.5 tonnes. This includes many types of trucks and large vehicles such as buses.

Restricted access vehicles are any single or combined vehicle which when either empty or loaded exceeds the overall dimensions specified for heavy vehicles under the Heavy Vehicle National Law. These include vehicles such as B-doubles, road trains and vehicles over 4.6 metres in height.

Heavy vehicles with an overall length not greater than 19m are generally permitted to travel on all NSW roads with B-double trucks up to 25/26 metres being restricted. The approved NSW B-double routes within the Coffs Harbour LGA are illustrated in Figure 3.


Coffs Harbour Bypass
B-double and restricted access vehicles
Figure 3

The following have been identified as existing routes for restricted access heavy vehicles:

- The existing Pacific Highway and Englands Road (from the existing Pacific Highway to Isles Drive) form part of the approved B-double network.
- Local access routes from the Pacific Highway along Orlando Drive, Hurley Drive and Cook Drive also form part of the approved B-double network.
- Isles Drive is an approved 25m B-double route with the restriction that the left-turn from the Pacific Highway is not permitted.
- Stadium Drive and parts of Hogbin Drive are approved 25m B-double routes but with travel conditions to prevent interference with peak school drop off and pick up times.
- The full length of the Pacific Highway is also an approved route for 4.6m high vehicles.

There are no approved routes for road trains within the Coffs Harbour LGA.

## 2.3 Historical traffic growth

Traffic volumes on the Pacific Highway through Coffs Harbour are mostly attributed to a combination of through traffic to regional centres, and local trips accessing commercial and retail centres throughout Coffs Harbour including Park Beach, Coffs Harbour CBD and North Boambee. Additional key generators of traffic along the existing Pacific Highway corridor include the industrial land uses at the Isles Drive and Cook Drive estates and the Coffs Harbour Health Campus.

Historical daily traffic data between 2007 and 2011 for historical count sites on the Pacific Highway were obtained from Roads and Maritime and are presented in Table 2 along with the current volumes from traffic surveys undertaken in June 2016. The table shows average weekday volumes and the per cent heavy vehicles.

Table 2 Historical and current traffic volumes (Source: Roads and Maritime Traffic Volume Viewer, Arup 2016 traffic counts)

| Count Location | Two-way average weekday volume [vpd (per cent HV)] | | |
|---|---|---|---|
| | 2007 | 2011 | 2016 |
| Pacific Highway - south of Coffs Harbour (1km south of Englands Road) | 31,300 (-) | 33,700 (-) | 31,500 (14%) |
| Pacific Highway – Coffs Harbour CBD (north of Harbour Drive) | 28,600 (-) | 29,300 (-) | 35,200 (15%) |
| Pacific Highway – north of Coffs Harbour (at 1km south of Moonee Beach Road) | 18,600 (12%) | 22,000 (13%) | 24,200 (15%) |

Key points to note from the above:

- Counts on the Pacific Highway north of Coffs Harbour show the percentage of heavy vehicles has increased between 2007 and 2016

- Since 2007, traffic volumes on the Pacific Highway in the Coffs Harbour CBD have risen by 6,600 vpd
- Similar increases were observed on the northern section of the Pacific Highway near Moonie Beach where traffic volumes have increased from 18,600 vpd (2007) to 24,200 vpd (2016)

Traffic volumes on the Pacific Highway in central Coffs Harbour and to the north of Coffs Harbour have been observed to increase at a rate of approximately 2.3 per cent to 3 per cent per annum between 2007 and 2016. The counts for the southern section of the Pacific Highway suggest that there hasn't been any growth in traffic volumes between 2007 and 2016. However, it is possible that the counts from the RMS Volume Viewer (2007 and 2011 counts) and the 2016 counts may have been affected differently by seasonal variations.

## 2.4 Crash data

There were 259 crashes recorded for the period from January 2014 to December 2018 on the Pacific Highway at Coffs Harbour between the southern tie-in at the Sawtell Road interchange the dual carriageway at Sapphire (crash data provided by Roads and Maritime 2019). Of these, two crashes were fatal, 39 crashes resulted in serious injury, 122 crashes resulted in moderate, minor or uncategorised injuries, and the remaining 96 were non-casualty (tow-away) incidents.

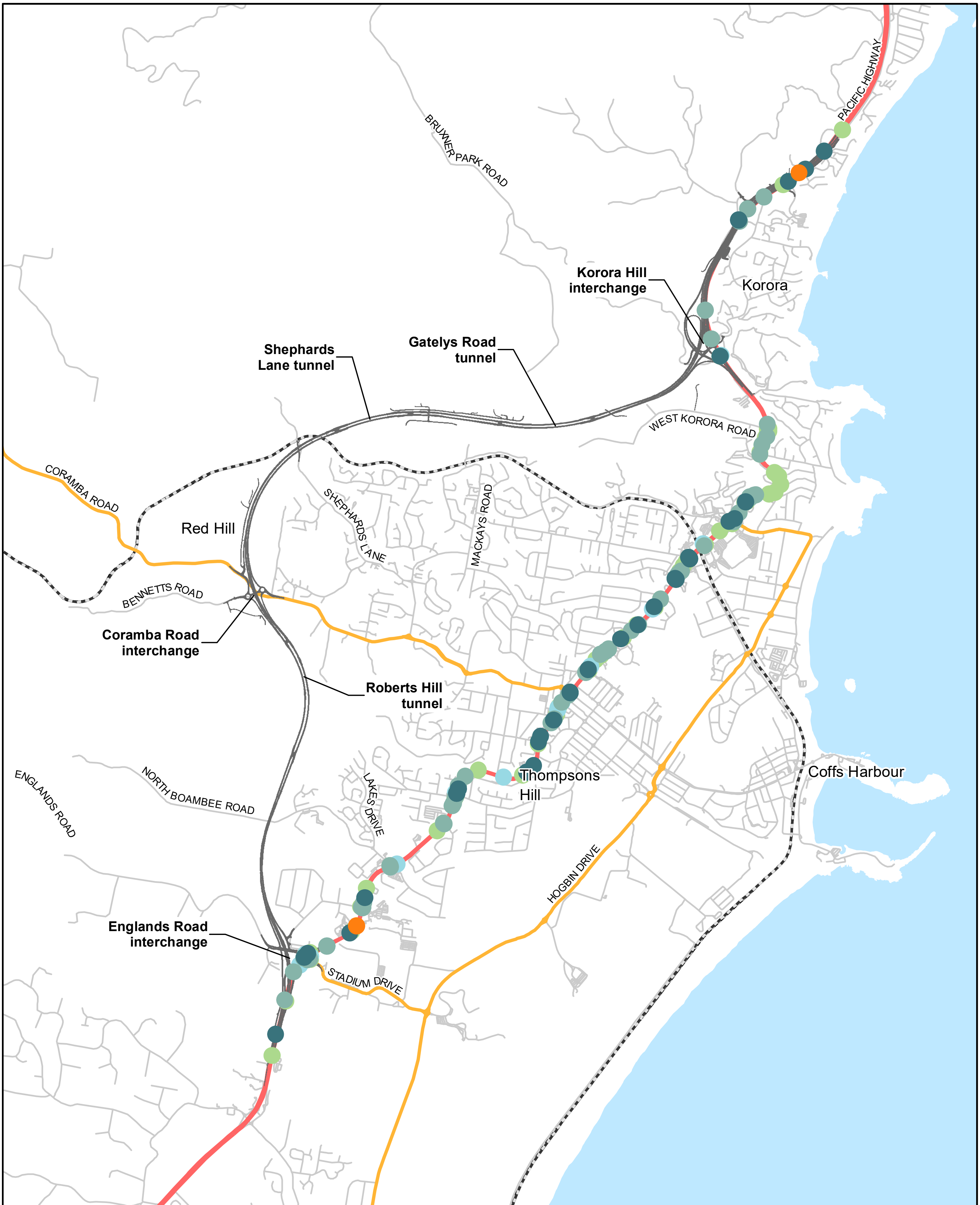
The most common crash types, by RUM (Road User Movement) code, in the dataset are presented in Table 3.

Table 3 Most common crash types by RUM code

| RUM Code | Description | Count | Proportion of total |
|---|---|---|---|
| 30 | Rear-end | 103 | 40% |
| 21 | Right Through | 25 | 10% |
| 10 | Cross Traffic | 18 | 7% |
| 13 | Right near | 11 | 4% |
| 35 | Lane Change Left | 10 | 4% |
| 81 | Off carriageway on right bend into object or parked vehicle | 9 | 3% |
| 33 | Lane sideswipe | 7 | 3% |
| 73 | Right off carriageway into object or parked vehicle | 6 | 2% |
| 85 | Off carriageway on right bend into object or parked vehicle | 6 | 2% |
| 87 | Off carriageway on left bend into object or parked vehicle | 6 | 2% |
| - | All other crashes | 58 | 23% |

The key findings from the crash data include:

- The majority of crashes occurred in dry weather (78 per cent), rear-end (40 per cent), multi-vehicle (69 per cent) which indicate heavy traffic congestion along this route. Rear end crashes are more likely to occur with unstable flow on high speed roads, including disturbance to traffic flow such as from driveways and bus stops (Austroads *Guide to Road Safety Part 8 Treatment of Crash Locations*, August 2015)
- Another common type of crash during this period was right-through (ten per cent) incidents
- 67 per cent of crashes occurred at intersections, reflecting the large number of intersections and conflict points for traffic flow along this route
- 76 per cent of crashes occurred between 8am and 6pm, with the afternoon peak recording the highest number of crashes (i.e. 19% of crashes occurred between 3 to 5pm)
- There were nine cyclist crashes and nine pedestrian crashes which account for seven per cent of all crashes
- Around 14 per cent of crashes involved a heavy vehicle, for the section of the Pacific Highway. This is proportionate with the number of heavy vehicles currently using the network, as shown in Table 2
- The number of crashes increase as the existing Pacific Highway approaches the Coffs Harbour CBD with most crashes recorded within the Coffs Harbour CBD (Figure 4). This increase in crash numbers within the CBD is due to the increased number of conflict points between pedestrian, passenger and freight traffic. This would continue to be a safety issue as traffic volumes increase.




**Legend**

- Design
- Existing Pacific Highway
- Regional roads
- Local roads
- North Coast Railway

**Crash points 2014-2018**

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Non-casualty (towaway)

0 0.5 1 1.5 km

Scale @A4: 1:50,000
GDA 1994 MGA Zone 56

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Coffs Harbour Bypass
Road crash data on the existing Pacific Highway (2014-2018)
Figure 4

## 2.5 North Coast Railway

The North Coast Railway is a major trunk line from NSW to Brisbane, Queensland and provides both passenger and freight services. The Coffs Harbour railway station is located on Angus McLeod Place east of the Pacific Highway and is on the North Coast NSW Line operated (for passenger services) by Transport for NSW. The line is the primary rail route in the Mid North Coast and Northern Rivers regions and forms part of the rail corridor between Sydney and Brisbane, servicing towns such as Casino, Grafton, Nambucca Heads, Taree and Maitland.

There are currently six daily (two-way) passenger rail services operating on the North Coast NSW Line, stopping at Coffs Harbour railway station. Additionally, there are approximately nine freight services daily (two-way) that run along the North Coast Railway through Coffs Harbour.

## 2.6 Public transport

Busways is the main public bus operator in Coffs Harbour, providing regular services within Coffs Harbour and the surrounding towns; including Bonville, Urunga, Valla Beach, Nambucca Heads and Macksville etc. Routes servicing Coffs Harbour are illustrated in Figure 5. Routes 360, 360M, 365, 366, 367 and 368 all travel along the existing Pacific Highway for portions of their service.

- Busways Route 360 – this bus service travels between Park Beach Plaza and Park Avenue via the Pacific Highway, with selected trips servicing the Coffs Harbour Base Hospital
- Busways Route 360M – this service travels between Park Beach Plaza and Park Avenue via the Pacific Highway. This service also operates through to Urunga, Nambucca Heads and Macksville
- Busways Route 365 – travels from Park Beach Plaza to Park Avenue via The Jetty
- Busways Route 366 – services Park Beach Plaza through to Park Avenue via Frances Street
- Busways Route 367 – this bus service travels between Park Beach Plaza and Park Avenue via Donn Patterson Drive, servicing the Baringa Private Hospital
- Busways Route 368 – this service travels between Park Beach Plaza and Park Avenue via Pearce Drive servicing the Baringa Private Hospital.

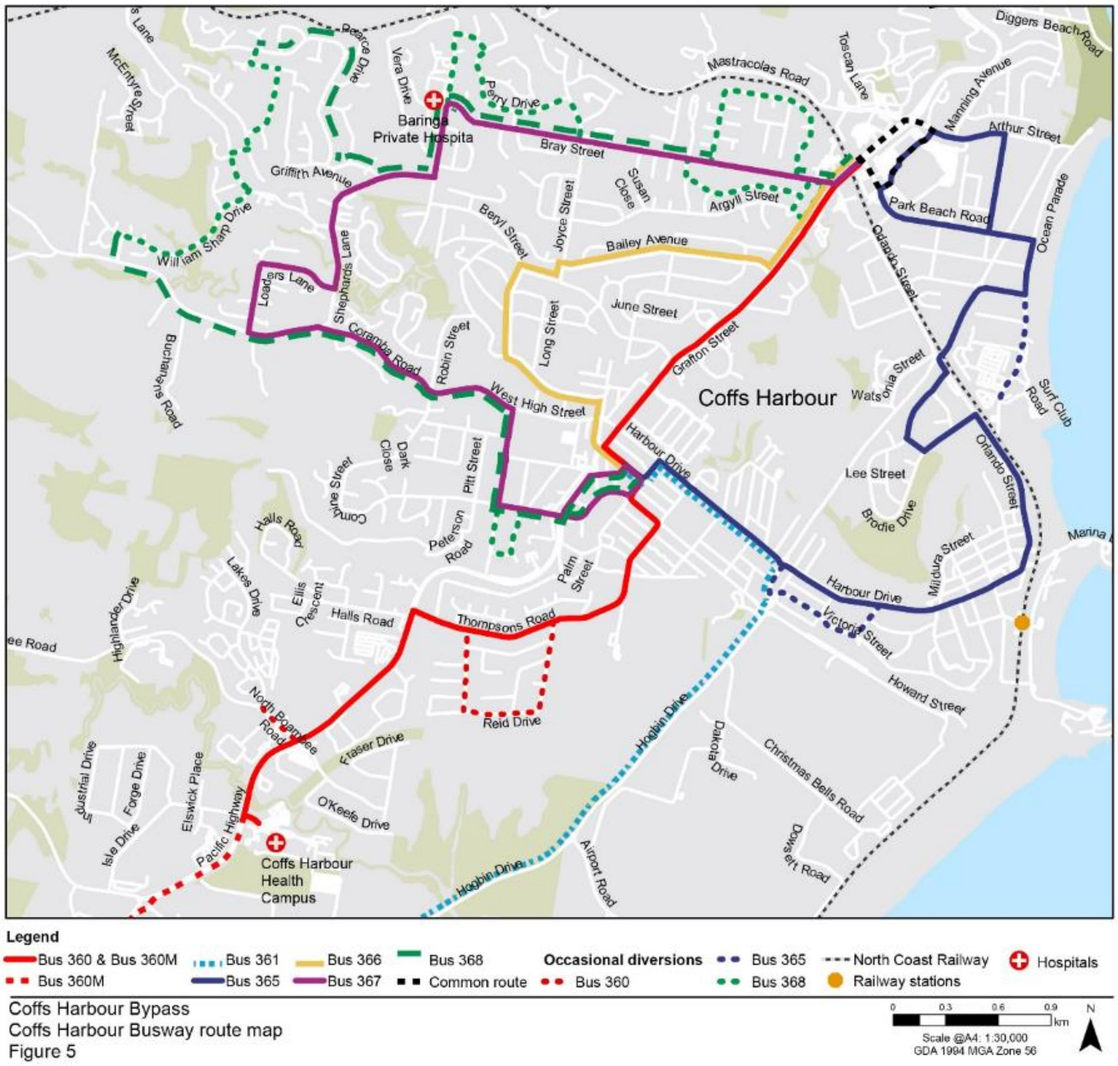



Figure 5 Coffs Harbour Busways route map (Source: Busways 2018)

A number of bus companies provide regular services to and from Coffs Harbour and towns and regional centres such as Woolgoolga, Grafton, Sawtell, Tamworth, Armidale, Urunga, Warwick, Toowoomba and Brisbane. Several local bus companies also provide school and charter services to Coffs Harbour.

The Korora Public School bus interchange is an existing school bus interchange located on the Pacific Highway at Korora. A number of schools within and surrounding Coffs Harbour are serviced by the bus interchange, including Korora Public School. Based on on-site observations, up to seven buses utilise the southbound interchange and one bus uses the northbound interchange simultaneously during the morning peak period. During the afternoon school peak period, buses arrive and depart independently of the other services. There is currently one bus shelter provided on the northbound platform with no shelter provided on the southbound platform.

In addition to the existing school bus interchange at Korora, there is also an existing informal school bus stop located on the corner of Spagnolos Road / Coramba Road. Site visit observations from Roads and Maritime indicated that a maximum of four buses were observed using the location at a given time.

## 2.7 Pedestrian and cyclist network

### 2.7.1 Pedestrian

At the southern end of the project, there is an existing north-south shared path on the eastern side of the Pacific Highway extending beyond Sawtell Road to the south. Linking to this is a local shared path connection on the northern side of Englands Road.

At the northern end of the project, there is an existing north-south shared path (Sapphire to Woolgoolga shared path) on the eastern side of Solitary Islands Way adjacent to the Pacific Highway. The shared path is located within the shoulder with a line-marked offset from the adjacent lane. The shared path becomes a cycle-only path just prior to the Pacific Highway / Solitary Islands Way interchange, where cyclists are provided the opportunity to either enter the highway or the local road network via a connection to Coachmans Close.

The Kororo Public School and the associated school bus interchange are located at the northern end of the project, adjacent to the Pacific Highway. The Luke Bowen footbridge is located north of Bruxner Park Road, providing access to the northbound and southbound school bus interchanges on the Pacific Highway at this location. The bridge also provides a pedestrian / cyclist connection from the property access road to the Kororo Public School over the Pacific Highway.

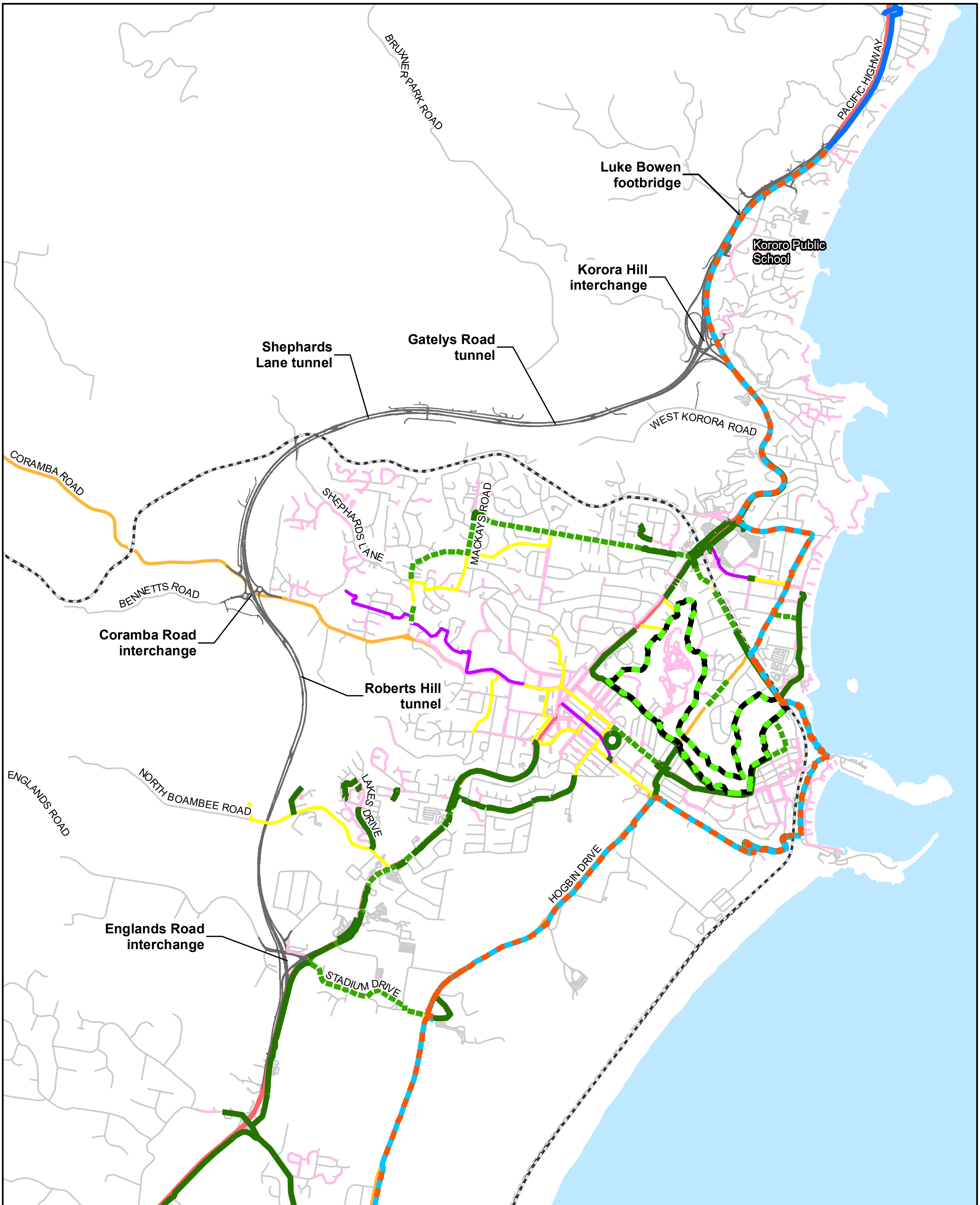
Along Korora School Road there is a pedestrian path adjacent to the school pick-up / drop-off zone. At the northern end of this set-down area, a children's crossing exists providing a safe crossing point on Korora School Road to exit the school grounds and access the Luke Bowen footbridge.

### 2.7.2 Cyclists

An illustration of cycleway infrastructure in and around Coffs Harbour is presented in Figure 6 and has been sourced from the CHCC *Bike Plan 2014-2019* (CHCC 2014). The plan, developed with Roads and Maritime, details the Coffs Harbour LGA cycling infrastructure and cycling programs for a five-year period. The objectives of the plan are:

- Plan and deliver a connected cycling network
- Improve cycling support facilities
- Make cycling safer
- Encourage greater participation.

Within the Coffs Harbour LGA, cyclists travel within the shoulder of the Pacific Highway with designated crossing points of entry and exit ramps at interchanges (ie Solitary Islands Way, Mastracolas Road and Pine Creek Way). On-street cycle lanes are provided on Stadium Drive linking to the shared path alongside the Pacific Highway. There is no other existing cycle-only infrastructure within the project (refer Section 2.7.1 for detail regarding shared paths).




**Legend**

- Design
- Existing Pacific Highway
- Regional roads
- Local roads
- North Coast Railway
- Existing footpath
- Coastline Cycleway
- Coffs Creek Trail
- Existing off-road shared user path
- Existing on-road cycle route
- Council proposed off-road shared user path
- Future plans (unfunded)
- Sapphire to Woolgoolga shared path

0 0.5 1 1.5 km

N

Scale @A4: 1:49,590
GDA 1994 MGA Zone 56

Coffs Harbour Bypass
Coffs Harbour Bike Plan 2014-2019
Figure 6

Separate to the above illustrated existing and proposed cycling infrastructure, there are a number of popular recreational cycle routes surrounding the project which are primarily provided on sealed roads or shared paths. As shown in Figure 7, Bruxner Park Road forms part of both the Bucca 'T' and Big Block scenic recreational cycle routes through banana farms, bushlands and farmlands. The Big Block route also loops south to Coramba Road.

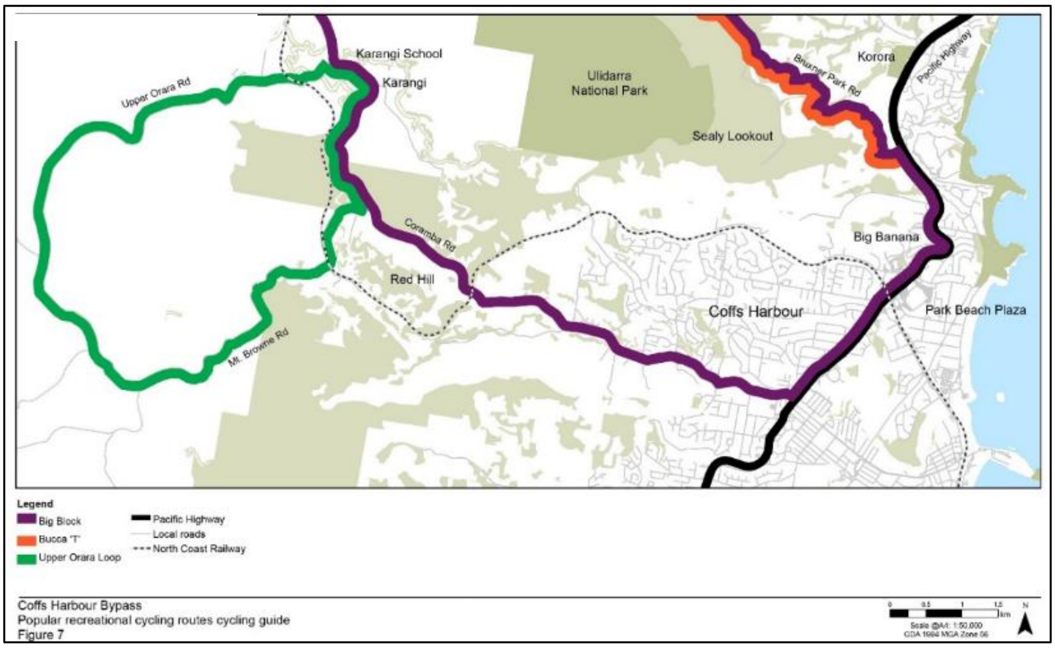



Figure 7 Popular recreational cycling routes cycling guide (Source: CHCC, Nambucca Valley Council & Bellingen Shire Council 2018).

## 2.8 Parking

On and off-street parking is available near the project where it connects to the existing road network. These areas are associated with Kororo Public School, adjacent the informal school bus stop at the intersection of Coramba Road and Spagnolos Road, Englands Road and the existing parking available at the OzGroup Packhouse at Isles Drive.

### 2.8.1 Kororo Public School

At the Kororo Public School, the following parking provisions are provided:

- A 14 bay formalised on-street car park (including two disabled parking spaces) on Korora School Road. Korora School Road (and subsequently the car park) at this location has one-way southbound operation
- Approximately 40m long drop-off area located immediately adjacent (west) of the school.

A parking demand and utilisation survey was carried out at and around the Kororo Public School to understand the existing on-street parking demand of the school.

Surrounding the school on Korora School Road, James Small Drive, Old Coast Road and the property access road, there is a total of 287 parking spaces (on-street) available for staff and students. This was split across four roads, as follows:

- Korora School Road – 82 parking space supply (includes formalised, short-term drop-off and on-street parking)
- James Small Drive – 80 parking space supply (includes short-term drop-off and on-street parking)
- Old Coast Road – 15 on-street parking space supply
- Property access road – 110 informal short-term parking space supply.

The parking occupancy results of the parking demand and utilisation survey (described in Section 3.1 and Appendix B) demonstrated:

- A steady increase in occupancy in all areas surveyed during the morning peak until 8:50am
- Full occupancy of the formalised car park on Korora School Road by 8:20am through to 8:50am
- Short intense parking peak during the afternoon between 2:50pm and 3:10pm
- Highest parking demand was observed during the afternoon peak of 158 vehicles.

# 3 Existing road performance

This chapter establishes the existing transport network performance of the road network. Results from traffic surveys and assessment of existing traffic performance are summarised in this chapter.

## 3.1 Traffic surveys

Extensive data collection was completed, which involved origin-destination (OD) surveys, travel time surveys, midblock counts, intersection turning movement counts, bus counts and parking demand and occupancy surveys. Three traffic survey data sets were collected in June 2016 (by Trans Traffic Survey), November 2016 (by Austraffic) and May 2017 (by Austraffic). This traffic data was the most up to date and comprehensive data-set available at the time of writing and is considered current for the purposes of the traffic and transport assessment.

The OD, mid-block and intersection turning movement count locations are shown on Figure 8. The results of these surveys are included in the network performance analysis in subsequent sections.

### 3.1.1 June 2016

Traffic surveys were carried out between 20 and 27 June 2016 at the locations shown in Figure 8. Travel time surveys were undertaken along four routes, mid-block counts at 60 locations and intersection turning movement counts at 69 locations. Table 4 lists survey type and locations. The survey data provided key inputs, particularly for the calibration and validation task, into the Coffs Harbour Strategic Transport Model (CHSTM) and Coffs Harbour Traffic Model (CHTM) developed for the project.

Table 4 June 2016 survey types and locations

| Survey Type | Date / period | Locations |
|---|---|---|
| Travel time surveys | 23 June 2016<br>4 routes | • Pacific Highway (north-south: between Old Coast Road and Lyons Road interchange)<br>• Hogbin Drive (north-south: between Orlando Street / Pacific Highway intersections and Lyons Road interchange<br>• Coramba Road (east-west: between Bennetts Road and Orlando Street / Harbour Drive intersection<br>• Stadium Drive (west-east: between Pacific Highway / Stadium Drive roundabout and Hogbin Drive / Stadium Drive roundabout). |
| Mid-block surveys | 20 – 27 June 2016<br>60 locations | Various locations as shown in Figure 8 |
| Intersection turning movement counts | 23 June 2016<br>6am to 6pm<br>69 locations | Various locations as shown in Figure 8 |

### 3.1.2 November 2016

To inform the design of the Pacific Highway upgrade near Kororo Public School, a number of surveys were carried out to understand the existing transport operations of the school. The surveys listed in Table 5 were carried out by Austraffic during the morning and afternoon school peak periods on Wednesday 30 November 2016 through to Friday 2 December 2016.

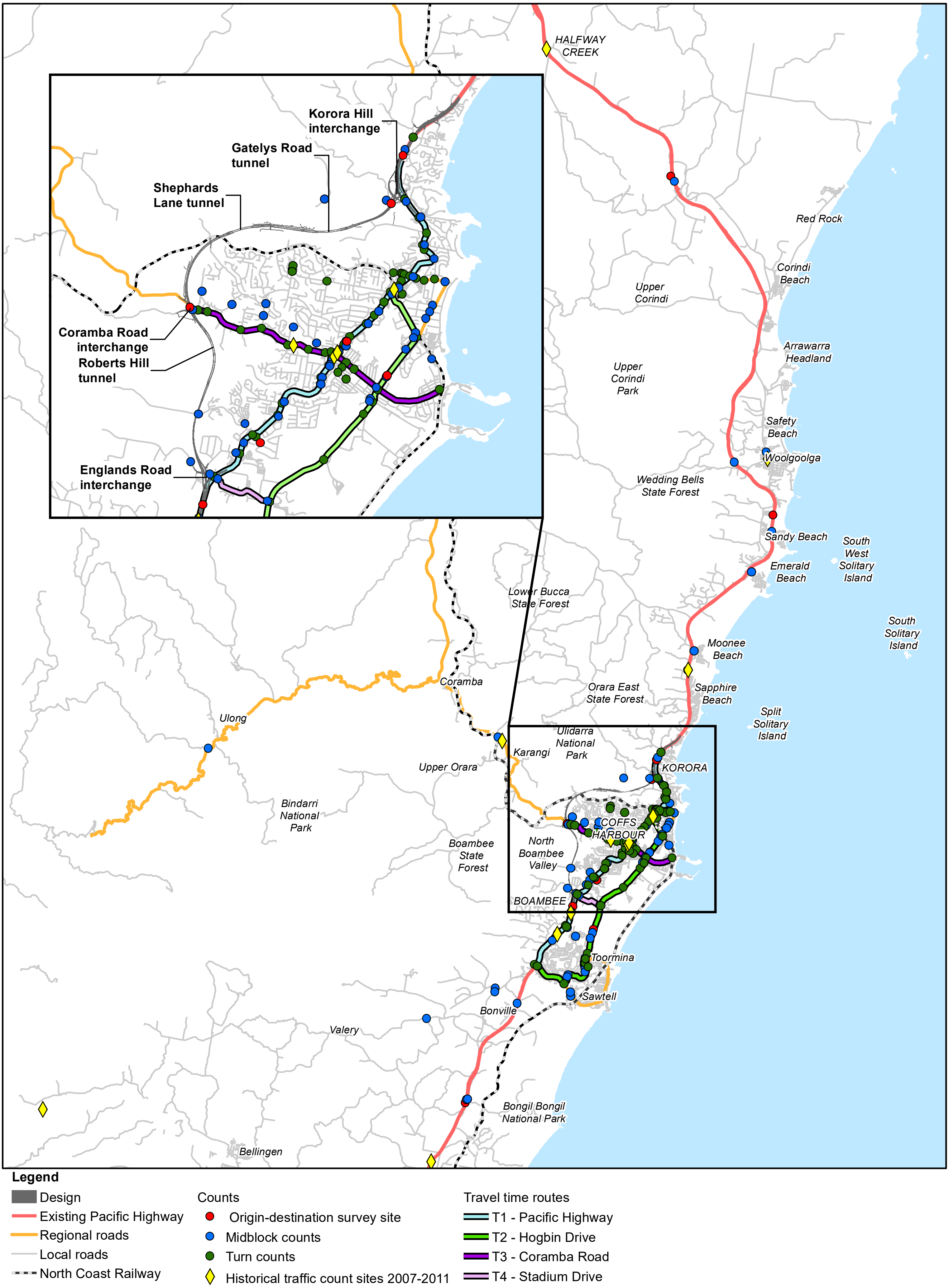
Table 5 November 2016 survey types and locations

| Survey Type | Date / period | Locations |
|---|---|---|
| Intersection turning movement counts | 30 November to 2 December 2016<br>7:30am to 9am<br>2:30pm to 4pm | • Pacific Highway / James Small Drive<br>• Pacific Highway / Old Coast Road<br>• Pacific Highway / Korora School Road<br>• Korora School Road / James Small Drive<br>• James Small Drive / Norman Hill Drive. |
| Bus counts | 30 November to 2 December 2016<br>7:30am to 9am<br>2:30pm to 4pm | Pacific Highway adjacent to Kororo Public School<br>• Northbound bus interchange<br>• Southbound bus interchange |
| Parking demand and occupancy survey | 30 November to 2 December 2016<br>7:30am to 9am<br>2:30pm to 4pm | • Korora School Road<br>• James Small Drive (between Korora School Road and Russ Hammond Close)<br>• Old Coast Road (between Pacific Highway and Pine Brush Creek)<br>• Property access road (south of Old Coast Road) |

### 3.1.3 May 2017

OD surveys were collected at 10 locations on Tuesday 16 May 2017 (24-hours) for further model refinement of the CHSTM. The surveys locations were:

- Pacific Highway (north of Old Pacific Highway / Pine Creek Way ramps)
- Hogbin Drive (500m north of Hi-Tech Drive)
- Pacific Highway (1,000m north of Lindsays Road)
- Coramba Road (70m west of Bennetts Road)
- Hogbin Drive (400m north of Harbour Drive)
- Pacific Highway (100m north of Coff Street)
- Bruxner Park Road (300m west of Pacific Highway)
- Pacific Highway (450m south of Old Coast Road)
- Pacific Highway (south of Hearnes Lake Road interchange)
- Pacific Highway (1,000m north of Range Road).




Coffs Harbour Bypass
Origin-destination survey and count locations
Figure 8

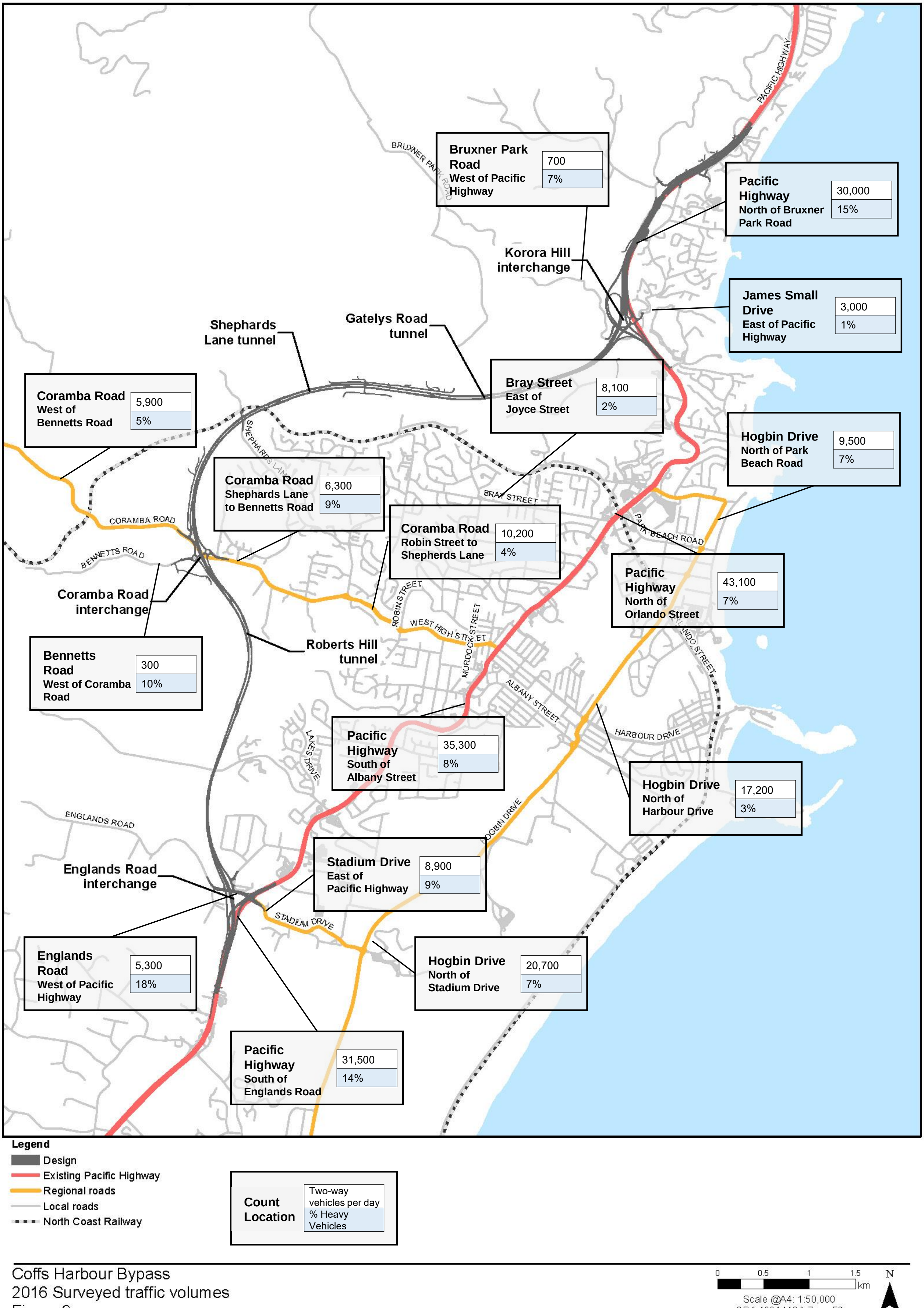
## 3.2 Traffic volumes

The existing (2016) average weekday traffic volumes (vpd) and classification of vehicles (ie proportion of heavy vehicles (HV)) sourced from the survey data are presented in Table 6 and Figure 9.

Table 6 Traffic volumes in Coffs Harbour (Source: 2016 traffic survey data)

| Count location | 2016 two-way daily average volume [vpd] (% HV) |
|---|---|
| **Pacific Highway** | |
| Pacific Highway (south of Englands Road) | 31,500 (14%) |
| Pacific Highway (south of Albany Street) | 35,300 (8%)* |
| Pacific Highway (north of Orlando Street) | 43,100 (7%)* |
| Pacific Highway (north of Bruxner Park Road) | 30,000 (15%)* |
| **Local and regional road network** | |
| Hogbin Drive (north of Park Beach Road) | 9,500 (7%)* |
| Hogbin Drive (north of Harbour Drive) | 17,200 (3%) |
| Hogbin Drive (north of Stadium Drive) | 20,700 (7%)* |
| Stadium Drive (east of Pacific Highway) | 8,900 (9%) |
| Englands Road (west of Pacific Highway) | 5,300 (18%) |
| Bray Street (east of Joyce Street) | 8,100 (2%)* |
| Coramba Road (from Robin Street to Shephards Lane) | 10,200 (4%)* |
| Coramba Road (from Shephards Lane to Bennetts Road) | 6,300 (9%) |
| Coramba Road (west of Bennetts Road) | 5,900 (5%)* |
| Bennetts Road (west of Coramba Road) | 300 (10%) |
| James Small Drive (east of Pacific Highway) | 3,000 (1%)* |
| Bruxner Park Road (west of Pacific Highway) | 700 (6%) |

* These daily volumes are derived from 12-hour turning movement counts using conversion factors.




Coffs Harbour Bypass
2016 Surveyed traffic volumes
Figure 9

## 3.3 Origin-destination survey

An OD survey was conducted over a 24-hour period on Tuesday 16 May 2017 at 10 count stations within the Coffs Harbour LGA. Vehicle number plates were captured using video and an automated reading and matching process was used to produce the OD survey results.

The results of the survey were used to understand travel patterns, particularly 'through movements'. Through movements are vehicles which have travelled through Coffs Harbour along the Pacific Highway without stopping, and have been taken to be any vehicle which has taken the average travel time (plus up to 15 minutes) to travel between the south and north OD count locations that correspond to the project interchanges at Englands Road and Korora Hill.

Analysis of the OD survey data carried out by Austraffic (2017) found that:

- Two-way daily through traffic volumes between the Pacific Highway, (just south of Stadium Drive) and Pacific Highway (south of Bruxner Park Road), are approximately 4,410 vehicles
- Of traffic observed travelling to Coffs Harbour North and areas north of Coffs Harbour, around 6,700 trips originated from south of Englands Road
- Of traffic observed travelling to Coffs Harbour South and areas south of Coffs Harbour, around 6,300 originated from north of Korora
- Of traffic travelling on Hogbin Drive at Stadium Drive, 15 per cent travelled to/from the Pacific Highway north of Korora.

## 3.4 Network operations

### 3.4.1 Travel speeds

The Pacific Highway, between Kororo Hill and Englands Road is approximately 10 kilometres long. The speed limit of the Pacific Highway through this section is 60km/h. Through Coffs Harbour, the Pacific Highway provides direct access for residential, commercial and industrial properties, and passes through 12 sets of at-grade signalised intersections and multiple priority (stop or give-way controlled) intersections.

A summary of the travel time survey results and the resultant average speed of traffic along the Pacific Highway through Coffs Harbour during the morning, midday and afternoon peak hour periods is presented in Table 7.

Table 7 2016 Average speeds on Pacific Highway between Korora Hill and Englands Road (Source: 2016 traffic surveys)

| Time From | To | Northbound Average Speed | Southbound Average Speed |
|---|---|---|---|
| 8am | 9am | 33.0 km/h | 37.7 km/h |
| 11am | 12pm | 26.9 km/h | 33.1 km/h |
| 4pm | 5pm | 33.5 km/h | 33.7 km/h |

As shown, during the morning peak period the average speed along the highway through Coffs Harbour is under 40km/h in both the northbound and southbound directions. During the midday peak period, the average speeds reduce even further, with northbound traffic slowing to under 27km/h. By the afternoon peak period, traffic in both directions has increased speed to approximately 34 km/h but remains slower than the morning peak period.

### 3.4.2 Travel times

A summary of the 2016 travel time on the Pacific Highway between Korora Hill and Englands Road for the morning peak (8am to 9am), midday peak (11am to 12pm) and afternoon peak (4pm to 5pm), is presented in Table 8.

Table 8 2016 Travel times on Pacific Highway between Kororo Hill and Englands Road (Source: 2016 traffic surveys)

| Time | | Northbound | | Southbound | |
|---|---|---|---|---|---|
| From | To | Max Time (min:sec) | Average Time (min:sec) | Max Time (min:sec) | Average Time (min:sec) |
| 8am | 9am | 26:27 | 19:04 | 20:05 | 16:40 |
| 11am | 12pm | 32:55 | 23:23 | 22:42 | 19:00 |
| 4pm | 5pm | 24:32 | 18:48 | 26:54 | 18:38 |

As shown above, the average times to travel northbound through Coffs Harbour on the Pacific Highway currently (2016) varies between 18 to 24 minutes during the peak periods of the day. Southbound, the average time is slightly reduced to 16 to 19 minutes during the peak hours.

The maximum times recorded for travelling between Kororo Hill and Englands Road is 33 minutes northbound during the midday peak hour, and 27 minutes southbound during the afternoon peak hour period. This reflects the existing congested stop-start conditions for traffic on the Pacific Highway through the Coffs Harbour CBD.

## 3.5 Level of service

In order to quantify the current road network performance and locations of deficiency along the Pacific Highway, the existing traffic performance at key intersections was assessed for 2016 traffic conditions. The assessment involved the development and analysis of individual intersections using SIDRA intersection modelling software.

The performance of each intersection has been assessed by assigning a level of service (LOS) based on the average delay of vehicles at an intersection (refer Table 10). LOS has been reported in accordance with Roads and Maritime *Traffic Modelling Guidelines (2013)* where for signalised intersections, the average intersection delay is used for the LOS assessment. For roundabouts and priority-controlled intersections, the worst movement is used for the LOS assessment.

LOS can be correlated to a qualitative description of traffic conditions that includes speed, travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort, convenience and operating costs. LOS ranges from A (very good) to F (unsatisfactory) as described in Table 9.

Table 9 Summary of Roads and Maritime LOS criteria

| LOS | Average vehicle delay (sec) | Traffic signals and roundabouts |
|---|---|---|
| A | < 14 | Free flowing traffic virtually unaffected by other road users |
| B | 15 to 28 | Steady flow of traffic allowing manoeuvrability |
| C | 29 to 42 | Stable flow of traffic restricting manoeuvrability |
| D | 43 to 56 | Limited stable flow and all drivers restricted in movement |
| E | 57 to 70 | Operating at capacity with unstable traffic flow |
| F | > 70 | Traffic approaching the intersection exceeds ability for traffic to pass resulting in queueing |

In general, the traffic capacity on the Pacific Highway is constrained, with analysis demonstrating the current LOS experienced by traffic within Coffs Harbour reaching LOS D, E and even F on some intersection approaches during peak periods. This indicates that the road has an unstable flow of traffic (ie where minor incidents can result in significant congestion and stop-and-go conditions) at a number of intersections.

Table 10 2016 Intersection performance of key Pacific Highway intersections

| Intersection | Approach | AM | PM |
|---|---|---|---|
| Pacific Highway / Park Beach Road | South | A | A |
| | East | D | D |
| | North | B | B |
| | **Overall** | **B** | **B** |
| Pacific Highway / Orlando Street | South | C | D |
| | East | C | E |
| | North | C | D |
| | West | C | C |
| | **Overall** | **C** | **D** |
| Pacific Highway / Melittas Avenue | South | A | B |
| | East | C | D |
| | North | B | B |
| | West | C | D |
| | **Overall** | **B** | **B** |
| Pacific Highway / Beryl Street | South | B | A |
| | North | B | A |
| | West | C | E |
| | **Overall** | **B** | **A** |
| Pacific Highway / Coff Street | South | B | C |
| | East | E | E |
| | North | B | B |
| | West | E | D |
| | **Overall** | **C** | **C** |
| Pacific Highway / Harbour Drive | South | B | B |
| | East | D | D |
| | North | B | B |
| | West | D | D |
| | **Overall** | **B** | **B** |
| Pacific Highway / Moonee Street | South | C | C |
| | East | E | E |
| | North | B | B |

| Intersection | Approach | AM | PM |
|---|---|---|---|
| | West | D | D |
| | **Overall** | **C** | **C** |
| Pacific Highway / Albany Street | South | E | C |
| | East | E | D |
| | North | C | C |
| | West | E | D |
| | **Overall** | **D** | **C** |
| Pacific Highway / Halls Road | South | B | F |
| | North | A | A |
| | West | E | E |
| | **Overall** | **B** | **D** |
| Pacific Highway / Hurley Drive | South | A | A |
| | East | E | E |
| | North | A | B |
| | **Overall** | **A** | **A** |
| Pacific Highway / Cook Drive | South | C | C |
| | East | D | E |
| | North | C | C |
| | West | C | C |
| | **Overall** | **C** | **C** |
| Pacific Highway / Isles Drive | South | C | C |
| | East | E | E |
| | North | C | C |
| | West | E | E |
| | **Overall** | **C** | **D** |
| Pacific Highway / Stadium Drive | South | B | A |
| | East | B | D |
| | North | B | B |
| | West | B | B |
| | **Overall** | **B** | **D** |

Deteriorating road performance is leading to road network congestion and resulting in long travel times (refer Table 8) and reducing reliability for freight and local, regional and national road users. Signalised intersections in Coffs Harbour lead to a high level of stop-starting for freight vehicles on the Pacific Highway resulting in increased noise levels, higher vehicle operating costs and higher fuel consumption. Vehicle operating costs are impacted due to the running costs for significant speed fluctuations from cruise speed and the additional fuel costs due to stopping such as queuing at traffic signals. Higher fuel consumption in congested conditions leads to higher greenhouse gas emissions; air pollution, increases in stop-start conditions and noise-related impacts.

# 4 Traffic modelling and forecasting

This chapter provides details of the traffic modelling and forecasting approach which has been adopted for the project operational performance assessment.

## 4.1 Traffic modelling approach

Traffic modelling for the project was carried out using a three-tiered approach with a regional strategic model being used to provide forecast traffic demands for the modelled area (detailed in the following sections). A more detailed project specific network model was completed to predict traffic distribution on the road network and performance of the road network with and without the project; and a detailed intersection capacity analysis was undertaken using microsimulation and intersection models. The development of the models is detailed in the *Coffs Harbour Bypass – Traffic Model Development Report* (2018) prepared by Arup. Model development was carried out with consideration to the Roads and Maritime Service *Traffic Modelling Guidelines (2013d)* and in direct consultation and with rigorous peer review with Roads and Maritime. The approach is illustrated in Figure 10 and the traffic modelling extents are shown in Figure 11.

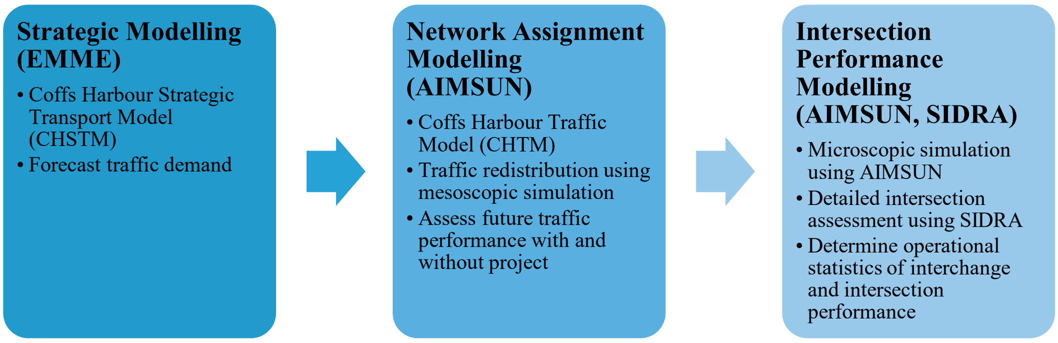
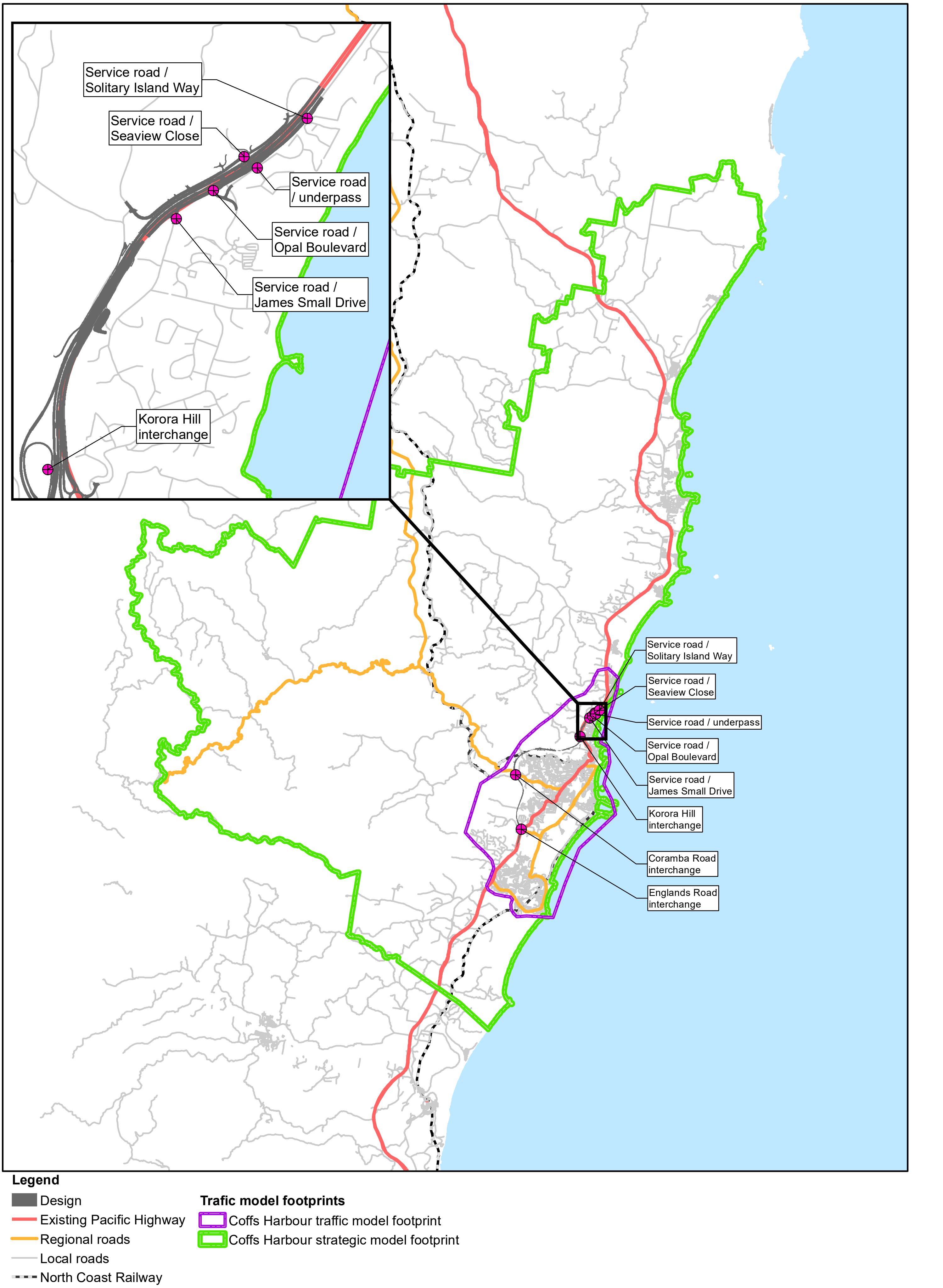



Figure 10 Modelling approach




Coffs Harbour Bypass
Traffic modelling extents
Figure 11

## 4.2 Coffs Harbour Strategic Transport Model

The Coffs Harbour Strategic Transport Model (CHSTM) was developed by Arup using EMME software. As shown in Figure 11, the CHSTM covers a similar area to the Coffs Harbour LGA, and includes 619 travel zones and all State-controlled highways, arterial distributor roads, local collector roads and key local roads. The process and methodology to develop the CHSTM is detailed in the *Coffs Harbour Bypass – Traffic Model Development Report* (Arup, 2018).

The modelling approach for the CHSTM follows a typical four-step strategic modelling process by which the number of trips is estimated and distributed among origin and destination zones based on land-use and demographics; then divided according to mode of travel and assigned to the road network. The CHSTM produces forecast traffic volumes for the morning peak, day time off-peak, afternoon peak and night time off-peak periods.

The CHSTM was used to produce forecast traffic demands based on land-use assumptions and predicted population and employment growth sourced from DP&E, the *North Coast Employment Land Review* (March, 2015) and *Coffs Harbour Land Use and Employment Strategies* (CHCC 2009c).

The CHSTM has been used to strategically assess the project options and forecast traffic demand for future years with and without the project (taking into account forecast traffic growth in the Coffs Harbour LGA), which supplied outputs to the detailed network assignment model.

The CHSTM has been calibrated and validated using the guideline criteria outlined in the Roads and Maritime's *Traffic Modelling Guidelines* for highway assignment models and the New Zealand Transport Authority's *Transport Model Development Guidelines*. The model has been validated against the survey data (including OD, travel time and counts) discussed in Section 3.1 of this report.

The calibration and validation process confirmed that:

- The CHSTM was well calibrated based on counts along screenlines
- The model reflects existing traffic patterns well in the key areas of interest
- The model validation achieved 95 per cent (15 out of 16) of the modelled travel time routes being within a travel time difference of +/- 15 per cent of the observed average, suggesting that the CHSTM provides a good reflection of observed travel times
- The model has a good representation of the 'through' traffic volumes observed in the 2017 OD survey between the north and south of Coffs Harbour (ie Pacific Highway just south of Englands Road and Pacific Highway north of Bruxner Park Road).

## 4.3 Coffs Harbour Traffic Model

The Coffs Harbour Traffic Model (CHTM) is a mesoscopic traffic model that has been developed to assess the operational performance of the project. As shown in Figure 11, the model is focussed on the area between Sapphire Beach and Sawtell and includes 544 internal travel zones. It provides detailed modelling of traffic conditions for the project and immediate road network and the modelled network includes all State-controlled highways, arterial roads, distributor roads, local collector roads and key local roads.

The CHTM has been developed using AIMSUN software which has informed the detailed assessment of the traffic network impacts of the project.

The purpose of the CHTM is to assign traffic demands to the road network to provide predictions of traffic volumes and delays on various links and turns. The model outputs have been used as inputs to the economic analysis comparing the future year project case (ie assuming that the bypass is operating) against a base case (ie assuming that the bypass has not been built).

An integral element of the traffic assessment relates to the development of a base model representing existing (2016) conditions in the peak morning (8 to 9am) and afternoon (4 to 5pm) periods. The model was calibrated and validated to the 2016 traffic data discussed in Section 3.1. The development of this base model is detailed in the *Coffs Harbour Bypass – Traffic Model Development Report* (2018) prepared by Arup.

The base traffic model was then used to develop future year scenarios for the assessment of the project options. The scenarios assessed using the CHTM were:

- 2024 (year of project opening) with and without project
- 2034 (10-year design horizon) with and without project
- 2044 (20-year design horizon) with and without project

The predicted traffic volumes, delays and network performance results from the CHTM presented in the EIS reflect the project design as described in the EIS. The results differ somewhat from those presented in the *Coffs Harbour Bypass – Traffic Model Development Report* (2018), which reflected the project concept design.

## 4.4 Detailed intersection analysis

Detailed intersection and interchange performance was assessed using both microscopic (AIMSUN) and detailed intersection (SIDRA Intersection) modelling tools. These models were developed to review the local traffic operational assessment to inform the design of interchanges and assess closely spaced intersections along the existing highway within the construction footprint.

SIDRA Intersection allows modelling of individual intersections to determine the intersection LOS and capacity, using the traffic demands sourced from the CHTM.

The intersection models were produced to determine the future intersection LOS at key interchanges and intersections with and without the project. Similar to the CHTM, the future years assessed were 2024 (project year of opening), 2034 (project 10-year design horizon) and 2044 (project 20-year design horizon) for the peak morning and afternoon hours (ie 8:00am to 9:00am, and 4:00pm to 5:00pm).

## 4.5 Forecast development

Future traffic volumes for this assessment were forecast taking into account population and employment forecasts sourced from CHCC, DP&E, the *North Coast Employment Land Review* (March 2015) and *Coffs Harbour Land Use and Employment Strategies*.

Forecasting of the future traffic volumes on the road network also considered a number of development related planning documents, proposals and transport assessment reports. The developments included in the forecast demands included:

- Korora Rural Residential Release Area (*Developer Contributions Plan*, dated 2017) – rural residential expansion on the western side of the existing Pacific Highway (between West Korora Road to The Mountain Way) to ultimately cater for a population of 1,500 people. Key access into the area will be provided by Old Coast Road and Bruxner Park Road
- Big Banana Development (*Big Banana Development Coffs Harbour – Access Options Assessment Paramics Modelling,* dated June 2011) – mixed development including residential apartments, retail and tourist attractions. It was assumed that the development would generate a total of 925 vehicles during the morning peak hour in 2025
- North Boambee Valley East / Lakes Estate (*North Boambee Valley East Development Control Plan*, dated July 2009) – residential subdivision development of approximately 282 lots located off North Boambee Road. Construction of this development has since commenced
- North Boambee Valley West (*Coffs Harbour City Council Planning Proposal – North Boambee Valley West Residential Investigation Area,* dated October 2013) - will provide residential housing for approximately 2,132 people and will be accessed via North Boambee Road west of the project. No proposed development time frame was indicated in the document sourced at the time of preparing the model
- Pacific Bay Western Lands and North Coffs Urban Release Area[1] (*Pacific Bay Western Lands Project Application – Environmental Assessment Report,* dated March 2010) – a total of 34 hectares of land located south along West Korora Road (including 7.7 hectare Big Banana site). Information provided by CHCC at the time indicated approximately 340 single detached dwellings. The development time-frame was unknown but was assumed to occur between 2020 to 2030.

[1] The Development Application for the Pacific Bay Western Lands has lapsed since the model forecasts were developed. However, it is understood that the proponent remains in consultation with CHCC.

The resultant forecasts of households, population and employment for the area modelled in the CHSTM are shown in Table 11.

Table 11 Forecast number of households, population and employment

| | Forecasts | | | | Average Growth Rate | | |
|---|---|---|---|---|---|---|---|
| | 2016 | 2024 | 2034 | 2044 | 2016 - 2024 | 2024 - 2034 | 2034 - 2044 |
| Households | 27,043 | 29,999 | 33,377 | 36,688 | 1.3% | 1.1% | 1.0% |
| Population | 73,001 | 79,914 | 87,708 | 95,320 | 1.1% | 0.9% | 0.8% |
| Jobs | 27,803 | 28,972 | 31,150 | 31,406 | 0.5% | 0.7% | 0.1% |

The forecasts show that population in Coffs Harbour is predicted to increase by around 22,000 people, or 30 per cent between 2016 and 2044. Employment is predicted to increase by a lower rate with the number of jobs increasing by 3,600 or 13 per cent between 2016 and 2044.

## 4.6 Traffic forecasts

The forecast daily traffic volumes on the existing Pacific Highway and several locations on key local roads are shown in Table 12 for the base case (ie without project) at 2024, 2034 and 2044.

The forecast daily traffic volumes are derived by factoring the peak hour traffic forecasts from the CHTM to a daily volume. The factors are calculated for each individual link using results from the CHSTM, which produces traffic volume forecasts at both a peak and daily level. The CHTM peak hour volumes are used as the basis for the daily volume forecasts due to its higher degree of network assignment accuracy.

Table 12 Forecast daily volumes (two-way) without the project

| Location | Two-way daily average volume [vpd] | | | | Annual growth rate (%) 2016 - 2044 |
|---|---|---|---|---|---|
| | 2016 | 2024 | 2034 | 2044 | |
| **Existing Pacific Highway** | | | | | |
| South of Englands Road | 31,200 | 34,700 | 37,400 | 40,400 | 0.9% |
| South of Albany St (south of CBD) | 28,400 | 31,700 | 33,300 | 33,500 | 0.6% |
| North of Orlando St (north of CBD) | 40,300 | 43,900 | 47,300 | 49,900 | 0.8% |
| South of Bruxner Park Rd | 34,800 | 38,000 | 42,600 | 45,900 | 1.0% |
| **Local and Regional Road Network** | | | | | |
| Hogbin Drive (north of Park Beach Road) | 9,500 | 9,300 | 11,300 | 10,000 | 0.2% |
| Hogbin Drive (north of Harbour Drive) | 17,500 | 18,300 | 19,500 | 19,200 | 0.3% |
| Hogbin Dive (north of Stadium Drive) | 27,500 | 29,900 | 32,700 | 33,100 | 0.7% |
| Stadium Drive (east of Pacific Highway) | 10,000 | 11,700 | 12,800 | 15,000 | 1.5% |
| Englands Road (west of Pacific Highway) | 3,800 | 8,700 | 11,600 | 12,500 | 4.3% |

| Location | Two-way daily average volume [vpd] | | | | Annual growth rate (%) 2016 - 2044 |
|---|---|---|---|---|---|
| | 2016 | 2024 | 2034 | 2044 | |
| Bray Street (east of Joyce Street) | 9,600 | 9,800 | 10,500 | 11,300 | 0.6% |
| Coramba Road (Robin Street to Shephards Lane) | 10,800 | 11,300 | 12,000 | 12,700 | 0.6% |
| Coramba Road (Shephards Lane to Bypass) | 7,700 | 8,300 | 8,600 | 9,000 | 0.6% |
| Coramba Road (west of Bypass) | 6,200 | 6,700 | 7,000 | 7,100 | 0.5% |
| Bennetts Road (west of Coramba Road) | 500 | 400 | 500 | 500 | 0.0% |
| James Small Drive (east of the Pacific Highway) | 3,500 | 4,000 | 4,200 | 5,100 | 1.4% |
| Bruxner Park Road (west of Pacific Highway) | 500 | 1,200 | 1,600 | 1,800 | 4.7% |
| **Average Growth Rate** | | | | | **0.8%** |

The forecast traffic volumes demonstrate that:

- Combined daily traffic for the existing Pacific Highway and Local and Regional Road Network without the project is forecast to increase by approximately 27 per cent to 2044 from 2016 volumes. This is slightly less than the forecast population increase of 30 per cent discussed earlier
- Respective daily traffic on the existing Pacific Highway and the Local and Regional Road Network are forecast to increase at similar rates
- The largest growth period for the combined existing Pacific Highway and the Local and Regional Road Network is forecast to be between 2016 and 2024 (26,200 vpd increase), followed by 2024 to 2034 (24,900 vpd increase). The forecast increase between 2034 and 2044 is 14,100 vpd
- Daily traffic on the Pacific Highway south of Englands Road is expected to increase by approximately 29 per cent over the same time, which is slightly higher than average growth rate
- Traffic on the Pacific Highway just north of the CBD is expected to grow at a similar rate to the overall average growth rate to 2044.
- Traffic on the Pacific Highway south of Bruxner Park Road is expected to grow at a slightly higher rate than the average growth rate, of approximately 1.0 per cent per annum, or approximately 32 per cent between 2016 and 2044
- The roads with the higher forecast traffic growth are Englands Road and Bruxner Park Road; which are forecast to grow at 4.3 per cent and 4.7 per cent per annum respectively. This reflects expected future development that would be accessed using these roads.

# 5 Assessment of operational impacts

This section provides an assessment of the resulting traffic, transport and road safety impacts which are anticipated to occur from the operation of the project.

## 5.1 Operational impacts

The beneficial operational impacts to the Pacific Highway and the surrounding road network as a result of the project are extensive. Without the project, traffic increases of the magnitude forecast over the 28-year period (2016 to 2044), as shown in Table 12, would place significant demands on the existing Pacific Highway through Coffs Harbour. Additionally, without the project LOS would drop to F at a number of intersections and road conditions would continue to deteriorate with high congestion and stop-start conditions through Coffs Harbour CBD.

The deteriorating traffic conditions predicted for the Pacific Highway without the project is anticipated to result in increased noise levels, higher vehicle operating costs and higher fuel consumption for freight vehicles. Heavy vehicle operating costs are impacted due to the running costs for significant speed fluctuations from cruise speed and the additional fuel costs due to stopping such as queuing at traffic signals. Higher fuel consumption in congested conditions leads to higher greenhouse gas emissions; air pollution, increases in stop-start conditions and noise-related impacts.

The construction of the project will alleviate the current and future pressures on the road network through Coffs Harbour and as a result, assist in improving the issues relating to noise, pollution and heavy vehicle operating costs.

## 5.2 Network changes

The following permanent road / access closures will be provided as part of the project:

- Korora School Road would no longer exist as part of the project. Car parking and pick-up / drop-off for the Kororo School would be accessed via James Small Drive and the service road
- Access to the Pacific Highway from Old Coast Road will be permanently closed as part of the project
- Access to Coramba Road from Spagnolos Road will be permanently closed as part of the project
- There would be no access to Isles Drive from Englands Road. Traffic bound for Isles Drive would instead gain access via the existing intersection of Isles Drive and the Pacific Highway or directly from the southbound exit ramp (this would only be for southbound traffic on the bypass). The design allows over-dimensional vehicles to exit the re-aligned Isles Drive and to access the Pacific Highway through the interchange as per the current permit for the existing casting yard on Industrial Drive. Minor modifications to the left turn

from the Pacific Highway to Isles Drive may be needed to permit B-doubles to access Isles Drive. This will be investigated during detailed design in consultation with CHCC.

New network changes constructed as part of the project include:

- Construction of a one-way northbound property access road from a new exit from the existing Pacific Highway, just north of the Sawtell Road interchange northbound entry ramp, to the Englands Road interchange. The proposed road will provide access from existing properties to Englands Road. Traffic from the access road would be able to travel in any direction via the Englands Road interchange
- Construction of the service road from Solitary Islands Way to Korora Hill interchange. James Small Drive (north), Opal Boulevard, Seaview Close and Solitary Islands Way will no longer intersect directly with the Pacific Highway, and instead will be accessed via new intersections along the service road.

The Kororo Public School staff car park and the adjacent Kororo Public School bus interchange will all be provided via a new facility accessed via James Small Drive. Additional on-street parallel car parking for set-down and pick-up will also be provided along the service road adjacent to the school (refer Figure 12).

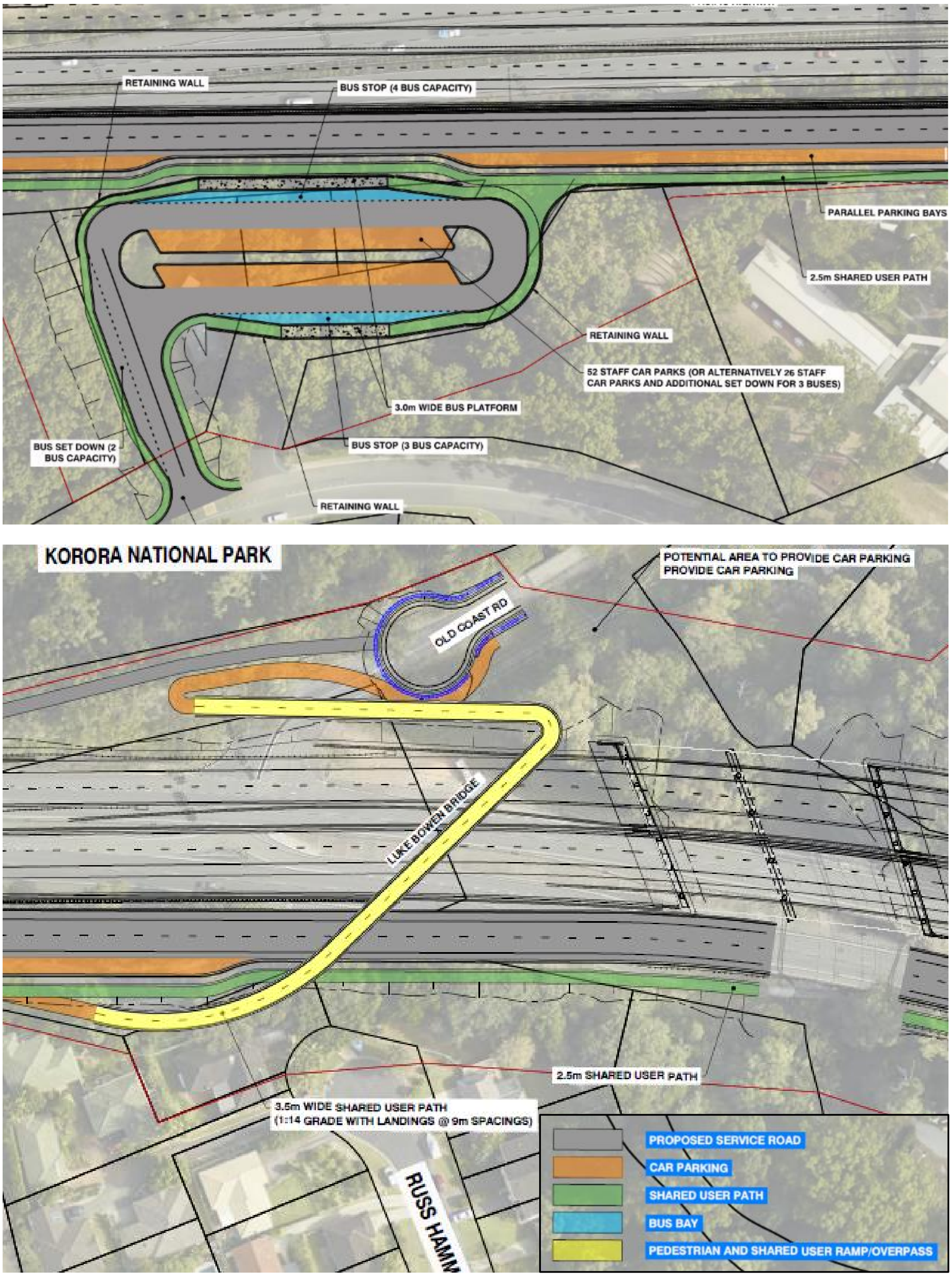



Figure 12 Proposed network changes near the Kororo Public School

## 5.3 Traffic volumes on the project

Forecast traffic volumes for the project for the 2024, 2034 and 2044 design years are summarised in Table 13. These volumes reflect the redistribution of traffic demand to the project during its operational phase.

Table 13 Forecast daily weekday volumes (two-way) for the project (source: CHTM)

| Location | Two-way daily average volume [vpd (% HV)] | | |
|---|---|---|---|
| | 2024 | 2034 | 2044 |
| Project, south of Coramba Road | 23,400 (14%) | 26,400 (14%) | 27,900 (14%) |
| Project, north of Coramba Road | 19,300 (15%) | 22,300 (15%) | 24,000 (16%) |

The forecast data shows:

- The section of the project south of Coramba Road is expected to carry more vehicles than the northern section
- The proportion of heavy vehicles is expected to remain relatively static between 2024 and 2044 for both sections, with a slight increase on the northern section
- Overall traffic volumes on the project are anticipated to increase at a rate of approximately 1.0 per cent per annum from 2024 to 2044.

## 5.4 Traffic impacts on the existing road network

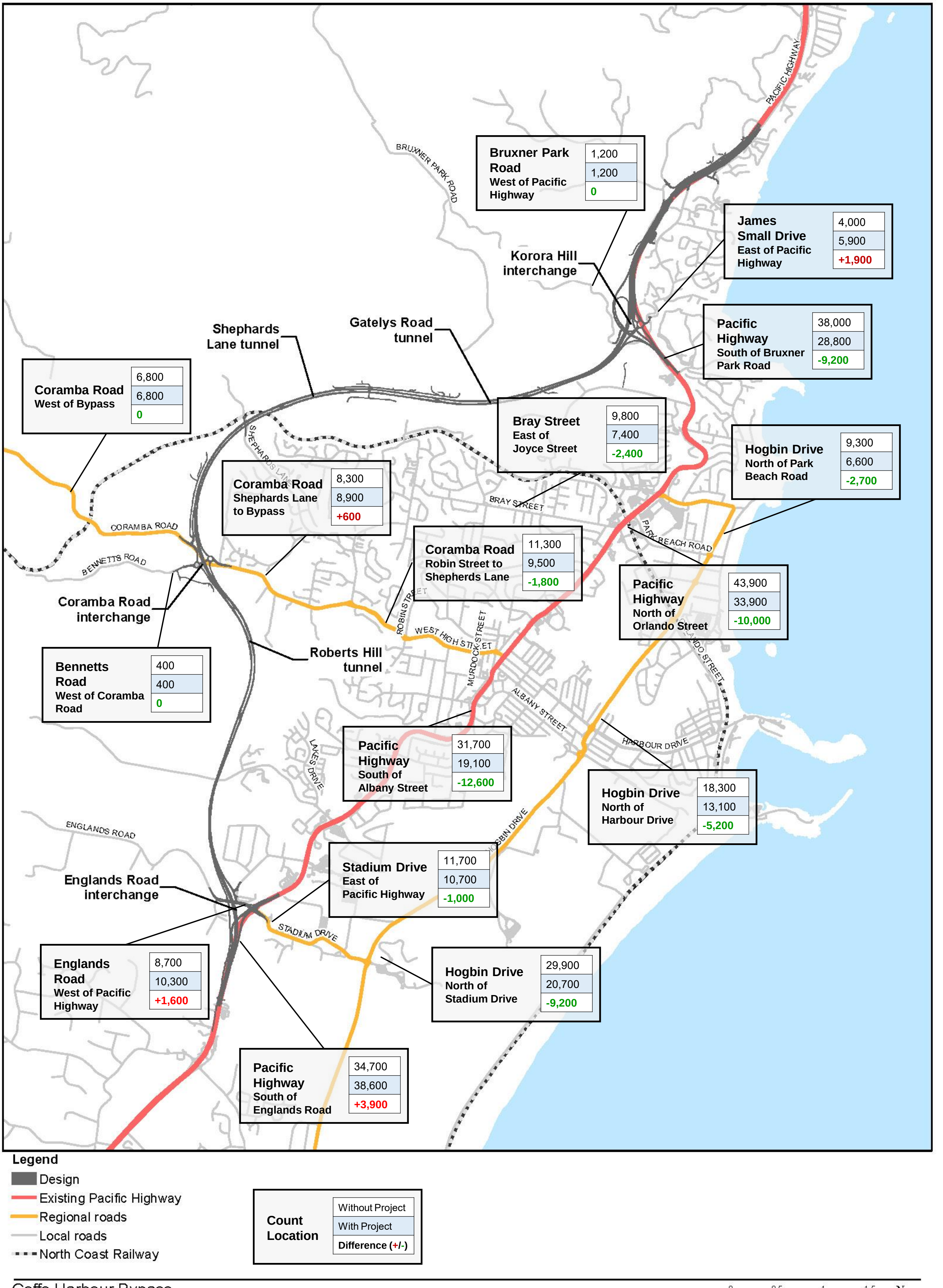
A comparison of traffic volumes with and without the project and changes to traffic patterns on existing roads has been carried out for future traffic conditions and is presented in Table 14Table 14.

Once constructed, the project would redistribute traffic to the Coffs Harbour Bypass from the north-south movements on the Pacific Highway and Hogbin Drive. Additionally, east-west movements on key local roads, including Coramba Road and Bray Street may be redistributed to the Coffs Harbour Bypass as a result of better traffic conditions along the new route.

The key findings shown in Table 14 and Figure 13 for opening year (2024) conditions include:

- The project is expected to increase traffic volumes on the Pacific Highway south of Englands Road by 3,900 vpd, which is an 11 per cent increase, as a result of some trips diverting from Hogbin Drive to the Pacific Highway corridor
- The project is expected to substantially decrease traffic volumes on the Pacific Highway south of Albany Street (just south of the CBD) by 12,600 vpd, which is a 40 per cent decrease
- The project is expected to substantially decrease traffic volumes on the Pacific Highway north of Orlando Street (just north of the CBD) by 10,000 vpd, which is a 23 per cent decrease
- The project is expected to substantially reduce traffic volumes on the Pacific Highway south of Bruxner Park Road by 9,200 vpd, which is a 24 per cent decrease

- The project is expected to decrease traffic volumes by up to approximately 9,200 vpd on Hogbin Drive north of Stadium Drive, which is a 31 per cent decrease
- The project is expected to decrease traffic on Stadium Drive by 1,000 vpd, which is a 9 per cent decrease
- The project is expected to increase traffic volumes on Englands Road between the bypass and the existing Pacific Highway by 1,600 vpd, which is an 18 per cent increase and is due to traffic using this short section of Englands Road to access the bypass
- The project is expected to reduce traffic on Coramba Road, between Robin Street and Shephards Lane, by 1,800 vpd, which is a 16 per cent decrease
- West of the bypass, traffic volumes on Coramba Road are not substantially affected by the project
- The project is expected to increase traffic at the southern end of James Small Drive by around 1900 vpd, which is a 48 per cent increase and is because of traffic from the north using the Korora Hill interchange to access James Small Drive from the southern end instead of using the northern end of James Small Drive. There is expected to be a corresponding decrease in traffic volumes at the northern end of James Small Drive.




Coffs Harbour Bypass
Forecast daily volumes (average two-way)
Figure 13

Table 14 Forecast daily volumes (two-way)

| Location | 2024 daily volumes | | | 2034 daily volumes | | | 2044 daily volumes | | |
|---|---|---|---|---|---|---|---|---|---|
| | Without Project | With Project | Change | Without Project | With Project | Change | Without Project | With Project | Change |
| **Project** | | | | | | | | | |
| South of Coramba Road | - | 23,400 | 23,400 | - | 26,400 | 26,400 | - | 27,900 | 27,900 |
| North of Coramba Road | - | 19,300 | 19,300 | - | 22,300 | 22,300 | - | 24,000 | 24,000 |
| **Existing Pacific Highway** | | | | | | | | | |
| South of Englands Road | 34,700 | 38,600 | 3,900 | 37,400 | 43,100 | 5,700 | 40,400 | 45,800 | 5,400 |
| South of Albany St (south of CBD) | 31,700 | 19,100 | -12,600 | 33,300 | 20,400 | -12,900 | 33,500 | 20,600 | -12,900 |
| North of Orlando St (north of CBD) | 43,900 | 33,900 | -10,000 | 47,300 | 35,900 | -11,400 | 49,900 | 38,000 | -11,900 |
| South of Bruxner Park Road | 38,000 | 28,800 | -9,200 | 42,600 | 31,500 | -11,100 | 45,900 | 34,500 | -11,400 |
| **Local and regional road network** | | | | | | | | | |
| Hogbin Drive (north of Park Beach Road) | 9,300 | 6,600 | -2,700 | 11,300 | 7,800 | -3,500 | 10,000 | 8,100 | -1,900 |
| Hogbin Drive (north of Harbour Drive) | 18,300 | 13,100 | -5,200 | 19,500 | 13,900 | -5,600 | 19,200 | 14,300 | -4,900 |
| Hogbin Dive (north of Stadium Drive) | 29,900 | 20,700 | -9,200 | 32,700 | 20,900 | -11,800 | 33,100 | 22,500 | -10,600 |
| Stadium Drive (east of Pacific Highway) | 11,700 | 10,700 | -1,000 | 12,800 | 11,900 | -900 | 15,000 | 12,700 | -2,300 |
| Englands Road (west of Pacific Highway) | 8,700 | 10,300 | 1,600 | 11,600 | 13,000 | 1,400 | 12,500 | 14,300 | 1,800 |
| Bray Street (east of Joyce Street) | 9,800 | 7,400 | -2,400 | 10,500 | 7,300 | -3,200 | 11,300 | 7,500 | -3,800 |
| Coramba Road (Robin Street to Shephards Lane) | 11,300 | 9,500 | -1,800 | 12,000 | 10,000 | -2,000 | 12,700 | 10,700 | -2,000 |
| Coramba Road (Shephards Lane to Bypass) | 8,300 | 8,900 | 600 | 8,600 | 9,600 | 1,000 | 9,000 | 10,500 | 1,500 |
| Coramba Road (west of Bypass) | 6,800 | 6,800 | 0 | 7,000 | 7,000 | 0 | 7,100 | 7,100 | 0 |
| Bennetts Road (west of Coramba Road) | 400 | 400 | 0 | 500 | 500 | 0 | 500 | 500 | 0 |

| Location | 2024 daily volumes | | | 2034 daily volumes | | | 2044 daily volumes | | |
|---|---|---|---|---|---|---|---|---|---|
| | Without Project | With Project | Change | Without Project | With Project | Change | Without Project | With Project | Change |
| James Small Drive (east of Pacific Highway) | 4,000 | 5,900 | 1,900 | 4,200 | 6,200 | 2,000 | 5,100 | 7,500 | 2,400 |
| Bruxner Park Road (west of Pacific Highway) | 1,200 | 1,200 | 0 | 1,600 | 1,600 | 0 | 1,800 | 1,800 | 0 |

## 5.5 Network performance

### 5.5.1 Network statistics

The CHTM was used to assess the impact of the project on the overall performance of the road network. Road network performance was measured with reference to:

- Total travel time: measure of the total travel time of all vehicles on the network during the modelled peak periods
- Total distance travelled: measure of the total distance travelled by all vehicles in the network during the modelled peak periods
- Average speed: recorded for all traffic in the network over the modelled peak periods.

The base and project scenarios were assessed for three design years; the project opening year (2024) and 10 and 20-year design horizons (2034 and 2044 respectively).

The total travel time predicted for each design year during the morning and afternoon peak hours is presented in Table 15 and Figure 14**.** The total travel time savings per day are calculated by taking the difference between the base and project case and converting the AM and PM peak hour total to a daily equivalent using expansion factors determined using strategic model (CHTM) outputs.

Table 15 Predicted network wide change in total travel time

| Scenario | Total travel time (hours) | | | | | |
|---|---|---|---|---|---|---|
| | 2024 | | 2034 | | 2044 | |
| | AM | PM | AM | PM | AM | PM |
| Base case (without project) | 3,427 | 3,116 | 4,008 | 3,659 | 4,607 | 4,152 |
| Project case (with project) | 2,995 | 2,794 | 3,240 | 3,141 | 3,554 | 3,336 |
| Difference | -432 | -322 | -768 | -518 | -1053 | -816 |
| **Travel time savings (hours per day)** | **-4,142** | | **-7,059** | | **-10,262** | |


Figure 14 Total network travel time comparison

The total distance travelled predicted for each design year during the morning and afternoon peak hours is presented in Table 16 and Figure 15. As above, the total change in distance travelled has been calculated by converting AM and PM peak hour totals to a daily equivalent by using expansion factors.

Table 16 Predicted network wide change in total distance travelled

| Scenario | Total distance travelled (km) | | | | | |
|---|---|---|---|---|---|---|
| | 2024 | | 2034 | | 2044 | |
| | AM | PM | AM | PM | AM | PM |
| Base case (without project) | 141,665 | 136,461 | 152,709 | 151,250 | 160,679 | 159,041 |
| Project case (with project) | 150,333 | 142,804 | 163,758 | 159,831 | 176,030 | 169,310 |
| Difference | 8,667 | 6,343 | 11,049 | 8,581 | 15,351 | 10,269 |
| **Change in distance travelled (km per day)** | **76,253** | | **99,722** | | **130,150** | |

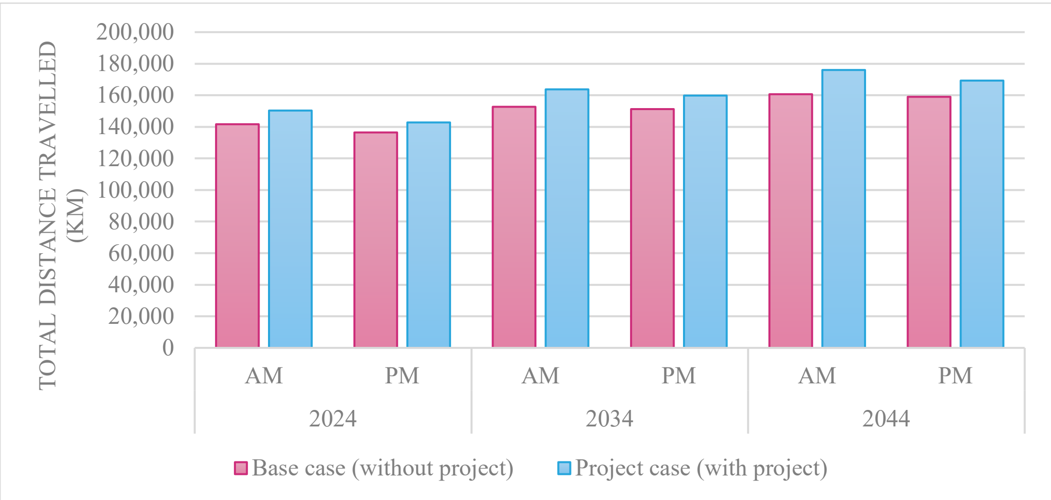


Figure 15 Total network distance travelled comparison

Table 17 presents the network statistics for average speed per vehicle type for the 2024, 2034 and 2044 design years during the morning and afternoon peak periods.

Table 17 Predicted network wide change in average speed

| Scenario | Average speed (km/h) | | | | | |
|---|---|---|---|---|---|---|
| | 2024 | | 2034 | | 2044 | |
| | AM | PM | AM | PM | AM | PM |
| Base case (without project) - all vehicles | 41 | 42 | 40 | 41 | 38 | 39 |
| Base case (without project) - heavy vehicles | 46 | 48 | 43 | 46 | 43 | 45 |
| Project case (with project) - all vehicles | 46 | 47 | 46 | 46 | 45 | 46 |
| Project case (with project) - heavy vehicles | 59 | 69 | 57 | 71 | 61 | 71 |
| **Difference - all vehicles** | **5** | **5** | **6** | **6** | **7** | **7** |
| **Difference – heavy vehicles** | **13** | **21** | **14** | **25** | **18** | **26** |

The network-wide performance statistics indicate that the project would have the following impacts:

- Reduced overall travel times in the project scenario, with estimated network wide travel time savings of approximately 12 per cent in 2024 and 21 per cent in 2044
- An increase in the total distance travelled due to the shift of traffic demand to the project. This is due to the bypass route being longer than the existing route. However, although the project route is longer, it is a more attractive as it is a faster alternative to the existing route, with free-flow conditions
- An increase in network-wide average travel speeds by 18 per cent at 2044 for all vehicles. This is expected due to the 110 km/h posted speed on the bypass, and the reduction of traffic congestion along routes through Coffs Harbour
- Heavy vehicles gain a larger overall increase in average speed as these vehicles mainly use the highway network and therefore gain a larger overall benefit per vehicle once shifted to the free-flow bypass. This is reflected in the results by the considerable increase in network-wide average travel speeds of 42 per cent to 58 per cent at 2044 for heavy vehicles.

### 5.5.2 Through traffic on Pacific Highway

The Pacific Highway serves as an important transport route, connecting regional towns and centres across NSW and Queensland. The project will provide an alternative route for traffic passing through Coffs Harbour. As detailed in Section 5.5.1, the project route is faster than the existing Pacific Highway as it avoids existing signalised intersections and the grade-separated interchanges creating uninterrupted flow for motorists on the highway. Table 18 presents the travel time savings for traffic going through Coffs Harbour calculated from the CHTM.

Table 18 Predicted travel time for vehicles passing through Coffs Harbour

| Scenario | Direction | Travel times (minutes) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2024 | | 2034 | | 2044 | |
| | | AM | PM | AM | PM | AM | PM |
| Base case (without project) | Southbound | 21.0 | 19.3 | 20.7 | 20.7 | 29.2 | 21.8 |
| | Northbound | 19.6 | 19.6 | 20.5 | 21.4 | 20.4 | 23.7 |
| Project case (with project) | Southbound | 8.5 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 |
| | Northbound | 8.3 | 8.4 | 8.4 | 8.5 | 8.5 | 8.5 |
| **Travel time savings** | **Southbound** | **12.4** | **10.7** | **12.2** | **12.1** | **20.6** | **13.2** |
| | **Northbound** | **11.3** | **11.2** | **12.1** | **12.8** | **12.0** | **15.2** |

The base case predictions show that average travel times along the existing Pacific Highway can be expected to increase from around 21 minutes in 2024 to 29 minutes by 2044 during the morning peak. However, as shown, the travel time savings for road users travelling through Coffs Harbour would be significant with the introduction of the project. By 2044, travel time savings of up to 20 minutes when travelling southbound along the Pacific Highway during the morning peak period are expected compared to the base case. This travel time saving reflects the higher posted speed and free-flow conditions of the project.

The results also demonstrate little change in travel times between the opening year (2024) and the 20-year design horizon (2044). This indicates the project will operate with free-flow conditions (ie without congestion) over the entire design duration.

## 5.6 Intersection performance

An assessment of the project's intersection operational performance was completed taking in account predicted traffic redistribution due to the project. The arrangement of each of the project interchanges were modelled as described in Table 19.

Table 19 Proposed interchange arrangements

| Interchange | Proposed layout |
|---|---|
| Englands Road Interchange | Englands Road interchange will be grade-separated, incorporating two new signalised intersections at Englands Road / Bypass ramp / property access road; and Englands Road / Bypass ramp and a give-way controlled intersection at Isles Drive / Bypass ramp.<br>The existing Pacific Highway / Stadium Drive/ Englands Road roundabout will be upgraded to a signalised intersection. The existing connection of Isles Drive to Englands Road will be replaced with a connection to the new southbound Bypass ramp, which will close access to Isles Drive from Englands Road. This will result in traffic redistributing to the Pacific Highway / Isles Drive intersection to access the Isles Industrial Park. |
| Coramba Road Interchange | Coramba Road interchange will be grade-separated with two roundabouts (Coramba West and Coramba East) and a give-way controlled intersection (Coramba NW) controlling bypass entry and exit traffic. |
| Korora Hill Interchange | Korora Hill interchange will replace the intersection at Bruxner Park Road / Pacific Highway / James Small Drive. The proposed layout contains two signalised intersections (Korora Hills West and Korora Hills East) along the new Pacific Highway alignment, and a roundabout (James Small Drive) connecting the service road to the Pacific Highway. |

The project will remove all existing at-grade intersections along the Pacific Highway between the Korora Hill and Sapphire interchanges. The roads that currently connect directly to the Pacific Highway will instead be connected onto a service road that runs parallel to the highway. This will create five new intersections at: Solitary Island Way, Fernleigh Avenue, Seaview Close, Opal Boulevard and James Small Drive. The arrangements at these intersections are described in Table 20.

Table 20 Proposed intersection arrangements

| Intersection | Proposed layout |
|---|---|
| Service road / Solitary Island Way | Solitary Island Way is to be connected to the service road instead of the Pacific Highway. Existing layout and give-way control is retained with modifications to the southern leg which now connects to the service road. |
| Service road / Underpass | Underpass connecting the service road to the Seaview Close is to be provided. Proposed layout is a T-intersection give-way control intersection with the service road as the major road. |
| Service road / Seaview Close | Seaview Close is to be connected to the service road instead of the Pacific Highway. Proposed layout is a T-intersection with give-way control. |
| Service road / Opal Boulevard | Opal Boulevard is to be connected to the service road instead of the Pacific Highway. Proposed layout is a T-intersection with give-way control. |
| Service road / James Small Drive | James Small Drive is to be connected to the service road instead of the Pacific Highway. Proposed layout is roundabout control. |
| James Small Drive Roundabout | New roundabout connecting James Small Drive and service road to the Korora Hill interchange |

Traffic performance was assessed for the AM and PM peak hour periods using 100th highest hour design volumes (sourced by factoring the average weekday

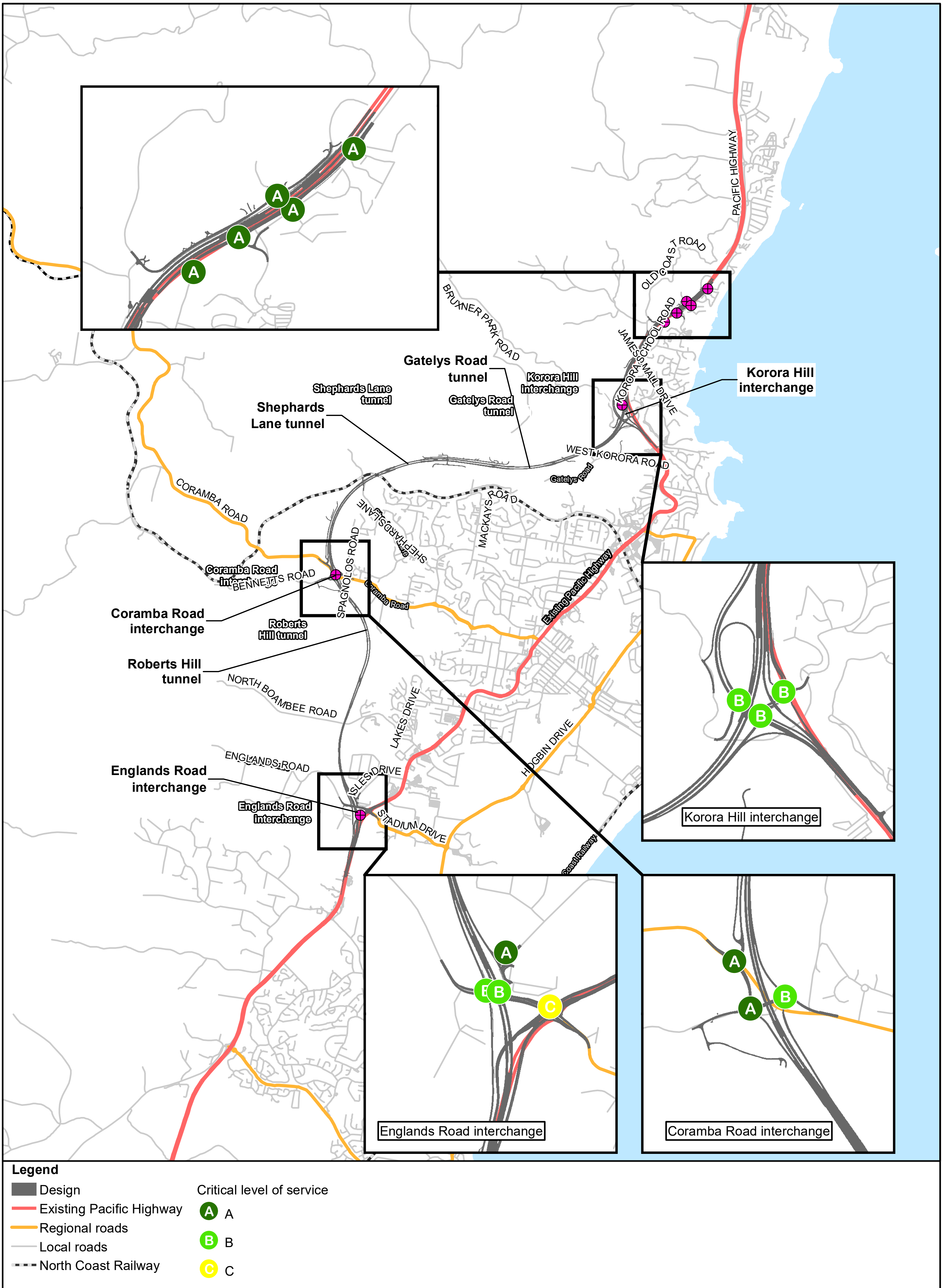
AM and PM peak hour volumes from the CHTM), and measured using LOS based on delay (refer Table 9).

Interchanges and intersections were designed to provide a minimum LOS C in accordance with the Pacific Highway Upgrade Guidelines. For signalised intersections, the LOS averaged over all movements is defined as the critical LOS for the assessment. For roundabouts and priority-controlled intersections, the worst turning movement at the intersection is defined as the critical LOS for the assessment. The interchange performance is considered satisfactory if all intersections within the interchange meet the LOS criteria in 2044 (20 years after opening) using 100th highest hourly volume.

A summary of the 2044 traffic analysis results is shown in Table 21 and Figure 16.

Table 21 Summary of 2044 intersection LOS

| Intersection | Control | Overall LOS | | Worst Movement LOS | | Critical LOS |
|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | |
| **Englands Road Interchange** | | | | | | |
| Englands Road / Bypass Southbound Off-Ramp | Signals | A | B | B | B | B |
| Isles Drive / Bypass Southbound Off-Ramp | Priority | A | A | A | A | A |
| Englands Road / Bypass Northbound On-Ramp / Western Property Access Road | Signals | A | B | D | D | B |
| Pacific Highway / Englands Rd / Stadium Dr | Signals | C | C | D | D | C |
| Pacific Highway / Isles Drive | Signals | D | C | F | E | D |
| **Coramba Road Interchange** | | | | | | |
| Coramba Road (east) roundabout | Roundabout | A | A | B | A | B |
| Coramba Road (west) roundabout | Roundabout | A | A | A | A | A |
| Coramba Road NW priority | Priority | - | - | A | A | A |
| **Korora Hill Interchange** | | | | | | |
| Korora Hill (east) signals | Signals | A | B | D | E | B |
| Korora Hill (west) signals | Signals | B | B | D | E | B |
| James Small Drive roundabout | Roundabout | A | A | B | B | B |
| **Service Road** | | | | | | |
| Service Road / James Small Drive | Roundabout | - | - | A | A | A |
| Service Road / Opal Boulevard | Priority | - | - | A | A | A |
| Service Road / Seaview Close | Priority | - | - | A | A | A |
| Service Road / Underpass | Priority | - | - | A | A | A |
| Service Road / Solitary Island Way | Priority | - | - | A | A | A |




Coffs Harbour Bypass
Critical level of service at modelled intersections in 2044
Figure 16

The results demonstrate that the project interchanges and intersections under forecast traffic volumes perform as follows:

- Englands Road interchange is anticipated to operate at level of service C or better through to 2044
- The Pacific Highway / Isles Drive intersection is expected to operate with an overall LOS D at 2044
- The intersections associated with the Coramba Road interchange are anticipated to operate at level of service B or better through to 2044
- The Korora Hill interchange is anticipated to operate at level of service B or better through to 2044
- All Service Road intersections are anticipated to operate at level of service A over the 20-year design horizon

The analysis demonstrates that the proposed project intersections arrangements would meet the traffic and transport objectives for the project and the intersections would operate at an acceptable level of service over the 20-year design horizon.

### 5.6.1 Summary of operational performance of the project

In summary, the following conclusions can be derived from the predicted operational performance of the project:

- The project is predicted to provide major benefits for motorists using the bypass with substantial improvements in traffic flow and travel time for both northbound and southbound journeys, relative to the base case (without project)
- The project is predicted to improve travel times for north-south trips on the existing route
- The intersections and interchanges associated with the project are anticipated to operate within acceptable LOS limits over the 20-year design horizon.

## 5.7 Road safety

There are various elements of the project which will have a positive impact on road safety in the area, including:

- On the existing Pacific Highway, as rear-end, multi-vehicle crashes are the most common type of crash occurring and the frequency of these crashes increases during periods of traffic congestion, the reduction in congestion with the project that occurs along the existing Pacific Highway is anticipated to result in a substantial reduction in rear-end type crashes
- James Small Drive, Korora School Road, Opal Boulevard and Seaview Close will no longer connect directly with the Pacific Highway at four separate un-signalised intersections. Instead, access to these roads will be provided by the newly provided Service Road. This arrangement and removal of at-grade priority (stop or give-way) controlled intersections along the Pacific Highway,

would improve safety by reducing the number of conflict points (safety issues) along the highway

- Access to and from the project is to be provided via grade-separated interchanges, which reduces potential points of conflict between vehicles. Providing the interchanges as grade-separated will also result in free-flow conditions along the project, minimising the risk of congestion-related incidents
- Removal of the existing school bus interchange from the Pacific Highway would improve safety by removing the conflict points associated with the northbound and southbound interchange diverges and merges on the Highway. This also removes significant vehicle speed differentials between the buses (as they slow or accelerate to speed on the highway) and all other vehicles on the Pacific Highway
- Introduction of a one-way local access road adjacent to the existing Pacific Highway alignment at the southern end of the project (south of Englands Road interchange). This road eliminates direct access onto the highway from private properties and other access points (e.g. Lindsay Transport). This reduces the likelihood of collisions with vehicles travelling at high speed (100km/hr) on the highway, particularly with heavy vehicles accelerating to exit Lindsay Transport
- Crash data received from Roads and Maritime (2014-2018) indicated there have been a total of seven rollover crashes at the Pacific Highway / Stadium Drive / Englands Road roundabout during the years assessed. The roundabout will be upgraded to a signalised intersection as part of the project. It is anticipated this will minimise the occurrence of rollover incidents at this location.

The project introduces or changes the road user environment which may have an adverse impact on road safety for some users, including:

- Although the project provides an improved road safety situation than the existing situation, the proposed changes to the parking (staff and set-down) and the bus interchange at the Kororo Public School could lead to increased conflicts between users. This could be managed through bus driver awareness and training, as well as restricting staff vehicle movements to be outside of the peak periods of bus services
- The addition of traffic on Coramba Road between the project and Shephards Lane would increase the exposure rate of the opportunity for crashes to occur on this road segment. This is due to the marginal increase (600 vpd) on Coramba Road east of the project between the project and Shephards Lane. However, other segments of Coramba Road are anticipated to experience decreases in traffic.

In addition to the above, as a result of road safety concerns provided in community submissions during the 2018 concept design display, the use of James Small Drive as part of operation of the project has been investigated. The investigation considered the existing condition and configuration of James Small Drive and proposed use of the Kororo Public School bus interchange. A number of traffic management improvement opportunities were identified, including restrictions to on-street parking installation of traffic barriers. These opportunities will be further evaluated and finalised during detailed design and in consultation with CHCC, Kororo Public School, Coffs Harbour Montessori Preschool and the adjacent community.

### 5.7.1 Crash reduction assessment

As discussed in Section 2.4, the existing Pacific Highway through Coffs Harbour is subject to a large number of crashes with 259 recorded over the period from 2014 to 2018. This is reflective of the large number of intersections, variable road conditions and traffic congestion that occurs currently along the Pacific Highway.

An assessment has been carried out to forecast the potential reduction in crashes on the Pacific Highway resulting from the operation of the project. The assessment includes analysis of the existing Pacific Highway and the main project alignment.

The assessment analysed the existing Pacific Highway in three segments:

- Segment 1: Pacific Highway between the bypass interchange at Korora Hill and the northern tie-in at Sapphire
- Segment 2: Pacific Highway from Englands Road interchange to Korora Hill interchange
- Segment 3: Pacific Highway between Englands Road and the southern tie-in at Boambee.

Table 22 shows the current crash rates (without project) based on crash data from the last five years for Segments 1 to 3. It also shows the expected crash rate for Segment 1 and 3 once upgraded as part of the project, and for the bypass. The crash rate for Segment 2 is assumed to remain at the same current rate as there would not be any changes to this segment as part of the project.

The predicted reduction in the number of crashes for the project in comparison to the without project scenario is summarised in Table 23. The number crashes are a product of the crash rate and the number of vehicles travelling along Segments 1 to 3 or the bypass.

Table 22 Crash rates with and without project

| Road element | Crash rate (per 100 mvkt) | | |
|---|---|---|---|
| | Without project | With project | Change |
| Segment 1 | 18.3 | 12.5 | -5.8 |
| Segment 2 | 39.2 | 39.2 | - |
| Segment 3 | 8.1 | 8.1 | - |
| Bypass | - | 12.5 | - |

Table 23 Comparison of predicted crashes for the with and without project scenarios

| Road element | Number of crashes in 2024 | | | Number of crashes in 2044 | | |
|---|---|---|---|---|---|---|
| | Without project | With project | Change | Without project | With project | Change |
| Segment 1 | 6 | 4 | -2 | 7 | 5 | -2 |
| Segment 2 | 49 | 38 | -11 | 53 | 41 | -12 |
| Segment 3 | 2 | 2 | 0 | 2 | 2 | 0 |
| Bypass | - | 10 | 10 | 0 | 12 | 12 |
| **Total** | **57** | **54** | **-3** | **62** | **60** | **-2** |

The crash rate analysis demonstrates:

- The section of the Pacific Highway north of Englands Road (Segment 2) has a crash rate (without the project) of 39 per 100 million vehicle kilometres travelled (mvkt). With the project, the crash rate remains the same, however the number of crashes reduces due to the decrease in traffic volumes on the link
- The section of the Pacific Highway north of Korora Hill (Segment 1) has an existing crash rate (without the project) of 18.3 per 100 mvkt. With the project, the crash rate is predicted to reduce to 12.5 per 100 mvkt
- It is predicted the proposed bypass would demonstrate a crash rate of 12.5 per 100 mvkt, which is consistent with expectations for new highways constructed to a motorway standard
- The introduction of the bypass results in a reduction of 14 crashes on the Pacific Highway
- The analysis demonstrates that although a reduction of two crashes is forecast at 2044, the project attracts an additional 11,281 vpd to the road network assessed (ie Segments 1, 2 and 3 of the Pacific Highway and the project) due to a redistribution of traffic from key local roads to the project ie north-south movements on Hogbin Drive and east-west movements on Stadium Drive and Bray Street.

## 5.8 Impacts on other travel modes

### 5.8.1 Heavy vehicles

The existing conditions creates inefficient driving conditions for freight and heavy vehicles. This inefficiency occurs as a result of stop-start movements through 12 sets of traffic lights, and mixing with pedestrians, cyclists and local traffic.

The project would benefit freight and heavy vehicle movements by:

- Providing a more efficient free-flow freight route past Coffs Harbour
- Improving amenity for local regional traffic. Traffic analysis shows that there would be a reduction in heavy vehicles along the existing Pacific Highway, and a resultant increase along the bypass
- Reducing travel times and thus improving freight efficiency as heavy vehicles are redistributed to the bypass
- Improving the environment of the existing Pacific Highway through a reduction in truck-related noise, vibration and vehicle emissions.

### 5.8.2 North Coast Railway

The project will travel over (ie will be grade separated) the North Coast Railway near Shephards Lane to the north-west of the Coffs Harbour CBD. Once operational the bypass and the North Coast Railway will operate independently, with no impact to the rail passenger and freight operations anticipated.

### 5.8.3 Public transport

The project is not expected to generate the need for any additional bus stops for the existing services. The existing Busways and long-distance charter services would benefit from the improved traffic conditions due to the project, including reduced congestion on the existing Pacific Highway through Coffs Harbour.

The design of the Coramba Road interchange will impact the location of the existing, informal school bus stop at the intersection of Coramba Road and Spagnolos Road. The existing school bus stop would be replaced in consultation with CHCC and the bus operator.

As part of the project, Kororo Public School bus interchange will be relocated adjacent to the Kororo Public School and accessed via James Small Drive. The relocated bus interchange comprises two bus platforms, with capacity for either seven buses in nose-to-tail operation (ie seven buses arriving and departing in order) or up to four buses with independent operation (ie can arrive and depart separately). The design also includes an adjacent layby / waiting area for up to two buses. The total capacity is therefore nine buses, which is anticipated to cater for the observed existing demand of the interchange (i.e. maximum of eight buses at any one time). The relocated interchange will improve existing arrangements by providing bus shelters for waiting students for the full length of each of the two platforms.

Buses using the relocated Kororo Public School bus interchange would be required to use the service road to access James Small Drive when arriving from the north. When approaching the relocated bus interchange from the south, buses would need to access the service road via the Korora Hill interchange. The additional travel distance to access the service road and James Small Drive may result in added travel time.

The design of the Kororo Public School bus interchange has been developed in consultation with the Kororo Public School. Further consultation will be undertaken during the detailed design phase.

### 5.8.4 Pedestrians and cyclists

During operation, the project would not result in the severing of any existing pedestrian or cyclist routes.

The project includes provision for pedestrian and cyclist connectivity in the local area including:

- Providing more segregation between heavy vehicles, and pedestrians and cyclists thus reducing the likelihood of conflicts between these vulnerable road users and freight traffic through the Coffs Harbour CBD
- Cyclist provisions in the form of cycle lanes within the shoulder of the bypass in both the northbound and southbound directions
- Extension of the existing shared path on Solitary Islands Way. The shared path will extend for the length of the new service road
- Reinstatement of the existing shared path along the existing Pacific Highway south and through the Pacific Highway / Stadium Drive / Englands Road intersection.
- The project includes northbound and southbound links to the existing shared path along the Pacific Highway at the southern interchange of the bypass
- Provision of signalised pedestrian/cycle crossings of the existing Pacific Highway and Stadium Drive at the Pacific Highway/Stadium Drive/Englands Road intersection
- A new shared user path would be provided through the Korora Hill interchange connecting between the service road and Bruxner Park Road with a pedestrian/cycle crossing provided at the signalised intersections
- All local road underpasses would be wide enough to include provision for pedestrians and cyclists, separated from the local road
- The Coramba Road and Shephards Lane overpasses would include a footpath on one side of the bridges for pedestrian access across the project.

At the Kororo Public School, the following changes to the local pedestrian and cycle network are to be incorporated into the project:

- The Luke Bowen footbridge pedestrian / cyclist overpass is to be rebuilt and provide a link from the Kororo Public School to Old Coast Road west of the existing Pacific Highway
- A 2.5m wide pedestrian path to be constructed on the eastern side of the service road from James Small Drive (north) to the existing path on Solitary Islands Way. The pedestrian path will provide linkages to the overpass and runs adjacent to the on-street parallel car parks proposed on the service road adjacent to the school

- A 2.5m wide pedestrian ramp with 1:14 grade and landings at 9m intervals to be provided from James Small Drive to the relocated Kororo Public School bus interchange
- A 2.5m wide pedestrian path surrounding the Kororo Public School bus interchange and linking to the north-south path alongside the service road.

The proposed changes provide connections to the existing pedestrian and cycle network within the construction footprint and enhanced options for walking and cycling. This would improve safety for pedestrians and cyclists, particularly surrounding the Kororo Public School, providing for better connections between the existing off-road network. Additionally, by redistributing a significant proportion of heavy vehicles away from the Coffs Harbour CBD, conflict with these vulnerable users is reduced.

The project has three short tunnels through ridges at Roberts Hill (around 190 m long), Shephards Lane (around 360 m long), and Gatelys Road (around 450 m long). Each of these tunnels includes the following facilities for pedestrians and cyclists:

- A 1.5 metre wide pedestrian and cycle path (on both sides of each tunnel) with a concrete barrier to separate the path from the traffic lanes
- Emergency walkways for pedestrians, one metre wide and 2.1 m high, with a concrete barrier to separate the path from traffic lanes. Emergency walkways would provide a connection to the cross passages
- Cross passages provided as follows:
  - Roberts Hill tunnel: one cross passage located near the centre of the tunnel
  - Shephards Lane tunnel: two cross passages with a maximum spacing of 120m
  - Gatelys Road tunnel: three cross passages with a maximum spacing of 120m.
- Shoulder widths vary between a minimum width of one metre and maximum width is five metres (for the Shephards Lane and Gatelys Road tunnels). For Roberts Hill tunnel the outside shoulder widths are 2.5 metres southbound and 4.5 metres northbound.

## 5.9 Property access

### 5.9.1 Access to existing properties

During operation, the existing access to all properties (that have not been full acquisitioned) would be reinstated, with adjustments as required to suit the new road infrastructure. The design of access arrangements to affected properties will be refined during detailed design subject to consultation with affected property owners.

There is an existing large property at the northern end of Roselands Drive that will be divided in two with the introduction of the project. While the project will provide access to both sides of the property, it is likely that the property owner would need to use the public Coramba Road interchange roads to travel between each side of their property.

In addition to property accesses, the existing access from the Solitary Rural Fire Service's shed to the Pacific Highway via Old Coast Road would be affected by the project. Consultation with the Solitary Rural Fire Service will be undertaken during detailed design to ensure the revised access arrangements during and after construction would be appropriate.

### 5.9.2 Access to urban release areas

**South Coffs urban release area**

The South Coffs urban release area is located to the south of Stadium Drive and to the east of the Pacific Highway. It is currently being developed as the Elements Estate and is accessed from Stadium Drive. Its access would not be impacted by the project.

**North Boambee Valley East urban release area**

The North Boambee Valley East urban release area is located to the east of the project and is accessed via North Boambee Road. Access will not be affected by the project.

**North Boambee Valley (West) urban release area**

North Boambee Valley (West) urban release area is located off North Boambee Road to the west of the project. During operation, access to the area would continue to be provided via North Boambee Road. The project would pass over North Boambee Road via an overpass. The overpass has been designed with consideration of a future upgrade of North Boambee Road by CHCC as part of the development of North Boambee Valley (West) urban release area. As such, access to this urban release area would not be impacted and traffic volumes on North Boambee Road would not be affected by the project.

**West Coffs urban release area**

The West Coffs urban release area is located to the west of Mackays Road, Donn-Patterson Drive and Shephards Lane. It is approximately bounded to the north by the rail line, to the south by Coramba Road and to the west by Spagnolos Road. The project passes to the north and west of the urban release area and access to the area would not be directly affected by the project.

Some roads used to access the area such as William Sharp Drive and Coramba Road are predicted to experience increased traffic volumes once the project is operational. This is due to local traffic movements accessing the project via the Coramba Road interchange. However, the increased traffic volumes are not expected impact access to the West Coffs area.

**North Coffs urban release area**

The North Coffs urban release area is located to north of Mastracolas Road, south of West Korora Road and to the west of the existing Pacific Highway. The urban release area is located south of the Korora Hill interchange. Access would not be affected by the project.

**Korora rural residential release area**

It is anticipated that access to the proposed Korora rural residential release area would be provided via Bruxner Park Road and/or Old Coast Road. Both of these roads currently connect with the Pacific Highway with at-grade priority-controlled intersections. The project design would connect Bruxner Park Road to the Englands Road interchange and Old Coast Road to a service road.

**Pacific Bay Western Lands**

Pacific Bay Western Lands is a proposed residential development located immediately south of the Korora Hill interchange. Consultation with CHCC and the proponent of the residential development will be undertaken during detailed design to ensure future access arrangements are considered as part of the project.

**Pacific Bay Eastern Lands**

Pacific Bay Eastern Lands includes approved residential developments as part of the Pacific Bay Resort on the eastern side of the Pacific Highway south of the Korora Hill interchange. Access to Pacific Bay Eastern Lands is provided via Charlesworth Bay Road/Bay Drive/Resort Drive. The existing intersection of Charlesworth Bay Road/Pacific Highway would not be affected by the project. However, consultation with the proponent has indicated that the further proposals are being investigated and further consultation with the proponent will be undertaken during detailed design to ensure any future access arrangements are considered as part of the project.

## 5.10 Parking

At the Kororo Public School, the following changes to the on-street parking supply as part of the project will be provided:

- A total of 66 parallel parking bays (including two persons with disability parking spaces) to be provided on the eastern side of the service road adjacent to the school
- Addition of 52 staff car parks within the proposed Kororo Public School bus interchange, accessed via James Small Drive
- A total of approximately 90 informal on-street parking spaces (similar to the existing arrangement) on the property access road (opposite the school) and on Old Coast Road.

As detailed in Section 2.8.1, the existing parking supply surrounding the school is 287 parking spaces. Based on a parking study however, the maximum parking demand during the school peak period observed was in the order of 158 spaces.

As part of the project, the total parking supply surrounding the school will be 236 spaces (including on-street parking on James Small Drive, service road and the property access road) and 52 staff parking spaces. This exceeds the existing parking demand of the school by 130 spaces and is anticipated to cater for the parking demand currently observed during the school peak.

# 6 Assessment of construction impacts

This section provides an assessment of the resulting transport-related impacts which are anticipated to occur during construction of the project.

## 6.1 Assessment methodology

The assessment of potential construction traffic impacts discussed in this section considers the:

- Construction processes, staging and timeframes
- Estimates of construction material quantities
- Locations of construction access routes
- Location of ancillary areas.

The assessment is based on potential and typical construction methodologies anticipated at this stage of concept design. Further development of the above-listed aspects would occur as the project progresses through detailed design and pre-construction stages.

## 6.2 Construction activities

Subject to approval, Roads and Maritime would consider and select the most suitable procurement method for project construction delivery. The preferred procurement method would be selected and implemented in compliance with the EIS and the conditions of approval for the project.

Detailed construction methodologies would be developed by the selected contractor(s) for the project. Roads and Maritime would be responsible for overseeing the construction, including inspections, monitoring and auditing work performed by the construction contractor(s).

Construction of the project is described in detail in the EIS and would generally involve the activities listed in Table 24.

Table 24 Construction activities

| Type | Typical activities |
|---|---|
| Pre-construction and site establishment | • Property acquisition and adjustments, including property access changes<br>• Detailed investigations and survey work including investigative drilling, contamination investigations and excavations<br>• Condition surveys<br>• General site clearance, site establishment work, fencing and signage<br>• Establishment of temporary ancillary facilities and compound sites including the site office<br>• Temporary traffic management arrangements including construction of minor access roads<br>• Progressive installation of environmental controls including temporary or permanent fencing, and erosion and sediment control measures |

| Type | Typical activities |
|---|---|
| | • Construction of temporary drainage controls including temporary creek crossings<br>• Clearing and removal of vegetation (non-threatened species)<br>• Relocation and/or protection of utilities |
| Site preparation and bulk earthworks | • Clearing and grubbing of vegetation<br>• Mulching of vegetation for re-use in landscaping activities, where possible<br>• Stripping topsoil and stockpiling it for reuse in landscaping<br>• Excavation of cuttings, including processing, stockpiling or haulage of material, and stabilisation of batters<br>• Drilling of blast holes<br>• Establishment of crushing plant<br>• Crushing and screening excavated material<br>• Hauling materials from excavated cuttings, borrow sites and external sources to fill embankment locations<br>• Construction of fill embankments, including foundation drainage<br>• Benching and stabilising cut and fill batter slopes |
| Drainage and structures | • Construction of drainage, including kerb and gutter (where required)<br>• Installation of cross-drainage, including culverts and inlet and outlet work, such as channel diversions and scour protection<br>• Installation of longitudinal and vertical drainage in cuttings and embankments<br>• Construction of diversion and catch drains along the formation and sedimentation control basins or swales (where required)<br>• Construction of subsurface drainage<br>• Construction of any retaining walls<br>• Installation of fauna connectivity structures |
| Bridge work | • Establishment of batching plant<br>• Preparation of bridge work areas including temporary piling pads, access platforms<br>• Installation of rock caissons or cofferdams or temporary access roads across waterways<br>• Installation of bridge foundations (driven or bored piles, pile caps and footings)<br>• Construction of new bridge abutments and piers<br>• Construction of bridge superstructure including deck and pavement work (cast in-situ or pre-cast bridge elements)<br>• Construction of scour protection (where required)<br>• Construction of noise walls (where required) |
| Tunnel work | • Establishment of portal sites in preparation for tunnel excavation, including provision of temporary tunnel services<br>• Excavation of tunnel portals<br>• Excavation of mined tunnels using drilling and blasting equipment for hard rock<br>• Excavation of cross passages<br>• Finishing works in tunnel and provision of permanent tunnel services<br>• Commissioning tunnel plant and equipment. |
| Demolition | • Demolition of bridges (Luke Bowen footbridge and northbound carriageway bridge over Pine Brush Creek) |

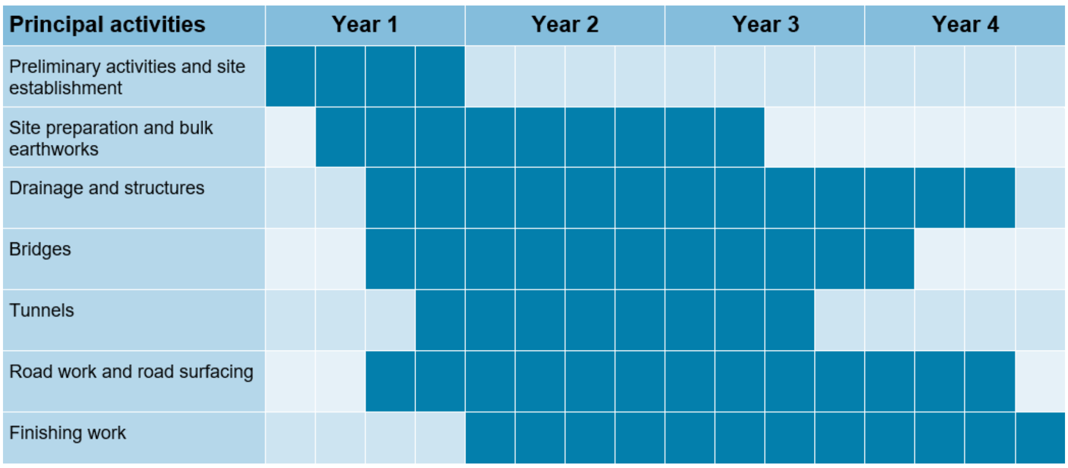
| Type | Typical activities |
|---|---|
| | • Demolition of buildings (properties and sheds) |
| Road work and road surfacing | • Construction of temporary local traffic management diversions<br>• Construction of base and select layers of materials<br>• Construction of pavement layers<br>• Construction of pavement drainage, including kerb and gutter (where required)<br>• Construction of concrete barriers, wire rope fencing and guardrails<br>• Installation of traffic signals, road markings, signposting, roadside furniture and lighting<br>• Progressive landscaping and tree planting |
| Finishing work | • Remove temporary work<br>• Restoration and landscaping of temporary sites<br>• General site clean-up<br>• Restoration of topsoil and revegetation of batters<br>• Removal of temporary environmental controls<br>• Site clean-up and demobilisation, including restoration of ancillary sites and construction access roads (where required) |

## 6.3 Construction timing

Subject to planning approval, construction of the project is anticipated to start in 2020 and take around four years. The actual timing of construction, opening to traffic and completion would depend on the availability of construction funding, the preferred procurement method and wet weather.

The construction program shown in Table 25 is indicative only and may change based on further work during detailed design and changes to construction methods and/or materials as well as wet weather periods. The community would be kept informed of timing as the construction program is refined after project approval.

Table 25 Indicative construction timeline




Final construction staging and programming would be determined by the construction contractor in coordination with Roads and Maritime.

## 6.4 Construction zones

Three construction zones have been defined for the project during concept design development. These zones are based on separating the project into sections where construction issues or differences in construction methods are likely. This approach has mainly been developed as a planning tool and may be altered during construction. The locations and significant features of the three proposed construction zones are provided in Figure 17 and described in the following sections.

### 6.4.1 Zone 1 – Englands Road to Roberts Hill ridge

This construction zone covers the area of the project from the southern tie-in to the existing Pacific Highway, south of Englands Road, to the north of Roberts Hill ridge. Most of this construction zone would be constructed away from the existing Pacific Highway and across the Newports Creek flood plain. It includes the Englands Road interchange and the Roberts Hill tunnel.

Vehicular access to Zone 1 would be via the existing Pacific Highway, Englands Road and North Boambee Road.

### 6.4.2 Zone 2 – Roberts Hill ridge to Korora Hill

This construction zone covers the area of the project north of Roberts Hill ridge to south of the Korora Hill interchange. It traverses a number of minor ridges, with a series of cuts and fills along the project and includes the Shephards Lane and Gatelys Road tunnels. This construction zone also includes the Coramba Road interchange and a crossing of the North Coast Railway.

Vehicular access to Zone 2 would be via Coramba Road, Shephards Lane, Bray Street, Mackays Road and West Korora Road.

### 6.4.3 Zone 3 – Korora Hill to Sapphire

This construction zone covers the area of the project from south of Korora Hill interchange to the northern tie-in to the existing Pacific Highway at Sapphire. This construction zone is largely located along the existing Pacific Highway between Bruxner Park Road and the northern tie-in. It is located in a tightly constrained corridor, with key pinch points at the Kororo Nature Reserve and Kororo Public School. It comprises a continuation of the existing service road to the east (built as part of the Sapphire to Woolgoolga upgrade) from south of Sapphire to James Small Drive, and a local access road proposed to the west of the project to provide access to Old Coast Road and Seaview Close.

Vehicular access to Zone 3 would be via the existing Pacific Highway, Bruxner Park Road, Old Coast Road and James Small Drive.


Coffs Harbour Bypass
Construction access routes
Figure 17

## 6.5 Workforce and construction work hours

The size and composition of the construction workforce would vary throughout the construction period depending on the activities being carried out.

An estimated peak workforce of about 400 to 520 people is anticipated. The average size of the construction workforce on site would be about 270 people including management staff and subcontractors.

The proposed normal construction working hours for the project are:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sunday and public holidays: no work

The majority of construction would be carried out during the proposed working hours. However, certain activities would need to take place during the evening and night-time periods (that is, 'out of hours') due to technical considerations, to ensure the health and safety of the public and construction crews, and to minimise disruption to the travelling public.

The NSW *Interim Construction Noise Guideline* (DECC 2009) also recognises there are some situations where specific construction work may need to be carried out outside of the recommended standard construction hours. The following are the categories of work that may be carried out outside the recommended standard hours:

- Delivery of oversized plant or structures that the police or other authorities determine require special arrangement to transport along public roads
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- Maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- Public infrastructure works that shorten the duration of construction and are supported by the affected community
- Work where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours.

## 6.6 Location and use of ancillary sites

A range of construction related facilities would be required to build the project and would be located on ancillary sites within the construction footprint. These ancillary facilities would include some or all of the following:

- Site compounds
- Concrete batching plant
- Asphalt batching plant

- Crushing plant
- Stockpile areas.

Potential locations of the ancillary facilities and the likely public local road by which they would be accessed, even outside typical construction hours, are shown in Table 26. Initial site work in these areas would involve site clearing, installing appropriate environmental controls and providing hardstand areas for storage, parking and access roads.

Table 26 Indicative ancillary sites

| Site | Local Access Road | Main site compound | Secondary site compound | Concrete batch plant | Asphalt batch plant | Crushing plant | Stockpile site |
|---|---|---|---|---|---|---|---|
| 1C | Englands Rd | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1D | Englands Rd | ✓ | ✓ | | ✓ | | ✓ |
| 1G | North Boambee Rd | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1H | North Boambee Rd | | ✓ | | | ✓ | ✓ |
| 2A | Coramba Rd* | ✓ | ✓ | | | | ✓ |
| 2B | Coramba Rd* | | | | | ✓ | ✓ |
| 2C | Shephards Ln | | ✓ | | | ✓ | ✓ |
| 2D | Mackays Rd | | ✓ | | | ✓ | ✓ |
| 2E | Mackays Rd | | ✓ | | | ✓ | ✓ |
| 2G | West Korora Rd | | ✓ | | | | ✓ |
| 3B | Bruxner Park Rd | ✓ | ✓ | | | ✓ | ✓ |
| 3C | Bruxner Park Rd | | ✓ | | | | ✓ |
| 3D | Bruxner Park Rd | | | | | | ✓ |
| 3E | Pacific Hwy (direct) | | ✓ | | | | |
| 3G | Pacific Hwy (direct) | | | | | | ✓ |

**Access would initially be via Spagnolos Road during site establishment and following this, the main line would be prioritised to access the site. It is envisaged that any potential impacts associated with the temporary short-term use of Spagnolos Road would be mitigated through a construction Traffic Management Plan (TMP) that the contractor will be required to provide.*

The final locations and layout of ancillary facilities would be determined by the construction contractor. Ancillary sites may, where necessary, include hardstand areas for parking of staff, site vehicles and visitors, particularly the main and secondary site compounds. To minimise on-street parking impacts on surrounding public local roads, temporary on-site parking areas will be designed to ensure that sufficient car parking provision is available for the peak construction period.

Parking spaces for a peak estimated construction workforce of around 520 workers would be required. The indicative number of parking spaces is estimated to be around 140 to 240 spaces at each of the main site compounds, which equates to a space requirement of about 3,600m$^2$ to 6,000m$^2$. For the other ancillary sites, it is estimated that parking for 15 to 25 spaces would be required, which equates to a space requirement of about 400m$^2$ to 700m$^2$. Potential impacts associated with construction worker parking would be managed through the implementation of a construction TMP and ensuring the above space is available.

## 6.7 Construction traffic impacts

### 6.7.1 General traffic impacts

Construction of the project is planned to occur over a four-year period and would result in some traffic and transportation impacts to the surrounding public road network during this time. These impacts would mostly relate to:

- Speed limit restrictions and traffic controls on existing roads adjacent to work sites
- Increased localised traffic due to construction activities, particularly from heavy vehicle movements
- Temporary changes to property access during the construction period
- Impacts to travel times, including public transport timetables, due to traffic controls being implemented
- Detours to pedestrian and cyclist movements due to construction works.

### 6.7.2 Construction traffic

Construction related traffic would use the surrounding road network to:

- Haul materials from quarries / borrow source to work site areas
- Provide access for the delivery of construction materials and removal of waste
- Provide access for the workforce to the various locations within the construction footprint, particularly to the compounds.

The most significant contributions to additional vehicle movements on the existing road network would occur at access points to the proposed construction ancillary sites and construction footprint access roads. The majority of construction traffic movements are expected to be contained within the project's construction footprint with the exception of deliveries to site, disposal of waste and staff travel.

### 6.7.3 Material haulage

Construction of the project would require a range of materials to be transported to and within the construction footprint and compound / stockpile areas. Typical materials that would be used for the construction of the project include:

- Earthwork materials, such as topsoil, general fill, and select fill
- Aggregates for drainage, and producing concrete and asphalt and spray seals
- Sand for drainage and concrete, and producing asphalt
- Cement and fly ash for producing concrete

- Concrete for drainage, road surfaces, tunnel work, bridge work and miscellaneous work such as barrier kerbs, kerbs and gutters, paving and signpost footings
- Road base for constructing flexible road surfaces
- Bitumen for spray seals and producing asphalt
- Precast concrete elements for drainage (culverts, pits and headwalls), bridge work (piles, girders and parapets) and miscellaneous work
- Steel for bridge girders, barrier railings, tunnel support, rock bolts and concrete reinforcement.

Once the project alignment has been cleared, the main haulage movements and construction vehicle movements are expected to be contained within the construction footprint. Fill material would be sourced from within the project where practicable, however some would need to be imported from local quarries. These materials would be hauled along identified local public roads and transported from quarries and along the existing Pacific Highway. Estimated peak heavy vehicle traffic movements required for materials that need to be sourced outside of the construction footprint are provided in Table 27.

Table 27 Haulage vehicle trip estimates

| Construction activity | Quantity | Unit | Haulage vehicle trips (two-way per day) |
|---|---|---|---|
| **Earthworks** | | | |
| Earthwork (cut to fill) (bulked volume) | 4,224,000[2] | $m^3$ | - |
| Earthwork (dispose of excess material) | 174,000 | $m^3$ | 70 |
| Earthwork (import select fill material) | 378,000 | $m^3$ | 69 |
| **Road work and road surfacing** | | | |
| Concrete | 100,000 | $m^3$ | 159 |
| Asphalt (external sources only) | 53,000 | $m^3$ | 59 |
| Road base | 55,000 | $m^3$ | 25 |
| Steel reinforcement | 1,000 | tonnes | 2 |
| **Bridges** | | | |
| Concrete | 60,000 | $m^3$ | 26 |
| Steel | 14,000 | tonnes | 5 |
| Bridge deck wearing surface ($m^3$) | 3000 | | 1 |
| **Tunnels** | | | |
| Concrete | 60,000 | $m^3$ | 87 |
| Steel | 20,600 | tonnes | 21 |
| **Drainage** | | | |
| Concrete | 9,000 | $m^3$ | 8 |
| Steel | 200 | tonnes | 1 |
| **Retaining Walls** | | | |
| Concrete (m3) | 7,000 | $m^3$ | 14 |
| Steel reinforcement (tonnes) | 400 | tonnes | 2 |
| **Finishing work** | | | |
| Barriers / signs / lines | 10,000 | $m^3$ | 12 |

[2] Value includes bulking factor of 21.5% (factor determined based on geotechnical data for the project). Bulking factors are applied to the volume of excavated material to allow for a greater volume of material that would result from the excavation process.

The potential sources for the haulage materials are:

- Earthworks – existing, approved or potential queries near the project (refer Table 28)
- Concrete – cement and fly ash road or rail from Newcastle, Sydney or Brisbane
- Asphalt – existing large commercial plants in Coffs Harbour ie Boral Asphalt (Lot 1 O'Keefe Street, located 1.9km from project). Bitumen for asphalt production and spray sealing work sourced from refineries in Sydney or Brisbane
- Steel - Structural steel elements, such as bridge girders and bridge barrier railings and handrails, would be supplied from Roads and Maritime accredited steel fabricators in either Wollongong, Sydney or Brisbane, and brought to site by truck.

Table 28 Potential external fill sources

| Quarry | Location | Materials | Distance to project |
|---|---|---|---|
| Coffs Harbour Quarry | Bennetts Road, Karangi, NSW | | 5.5km west of project |
| Karangi Mine | Karangi, NSW, | | 6km |
| T.G. Jung Quarries | 530 Coramba Road, Coffs Harbour | Road base, landscape rock, fill | 8km west of project |
| Flintstone Quarry | 130 Taylors Creek Road, Central Bucca, NSW, 2450 | Road base, rocks. | 12km west of project |
| Woolgoolga Quarry | 66A Morgans Road, Woolgoolga, NSW, 2456 | Road base, crusher dust, blue metal, landscape rock, fill, gravel, aggregates and crushed rocks | 20km north of project |
| Illabo Mine | Cat Trail, Lowanna, NSW, 2450 | Open cut and underground gold mine | 35km north-west of the project |
| Corindi Quarry | Corindi Beach, NSW, 2456 | | Approximately 35km north of the project |

### 6.7.4 Construction traffic impacts

To provide an indication of the worst-case impacts of construction traffic on the current network, the estimated daily volume (including both light and heavy vehicles) that would use the existing road network has been detailed in Table 29. The construction traffic volumes represent peak construction traffic movements for the haulage of materials and access by construction workers and have been developed in consultation with Roads and Maritime. These volumes are dependent on the timing and duration of construction works and would need to be refined as the construction plan is further developed during detailed design. The final construction operations, staging and programming would be determined by the contractor in consultation with Roads and Maritime.

In order to determine the construction traffic volumes and the resultant impact, the following assumptions have been incorporated into the assessment:

- Application of a 30% increase to workforce numbers to account for uncertainty in estimates
- Each construction worker arrives and departs the site via private vehicle with a conservative occupancy rate of one worker per vehicle
- Light vehicles (ie construction workers) would be arriving and departing the worksite outside of peak traffic hours and heavy vehicle arrivals /departures would be evenly distributed throughout the day
- Only one main and/or secondary compound within each zone will be operational at any given time during construction
- Each local access road addressed in Table 29 has included the traffic demand associated with parking at a main compound site (ie the highest staff parking demand).

The delivery and removal of construction materials would occur during normal work hours (ie 7am to 6pm) and would be scheduled to avoid peak traffic conditions on the road network (such weekday peak school and commuter times and holiday periods). Additionally the use of public local roads for construction traffic, particularly in Zone 2, will be minimised where possible and managed through the implementation of the TMP.

The distribution of construction vehicle traffic on the public road network has been estimated based on the location of proposed ancillary sites in proximity to the nearest dedicated access road to the project corridor. The volume of traffic on the access roads would depend on the timing of construction activities, hence average construction traffic volumes will be lower than the peak volumes identified in Table 29 and some minor access roads (those with lower volumes) may not be used for the full construction duration.

Table 29 Construction traffic impacts

| Road | Peak daily construction vehicles | | | 2016 daily volumes [vpd] | Total with const. traffic [vpd] | % increase due to const. traffic |
|---|---|---|---|---|---|---|
| | No. HV [vpd] | No. LV [vpd] | Total [vpd] | | | |
| Englands Road | 200 | 290 | 490 | 5,320 | 5,810 | 9% |
| North Boambee Road | 240 | 290 | 530 | 6,980 | 7,510 | 8% |
| Coramba Road (West High Street) | 470 | 520 | 990 | 10,160 | 11,150 | 10% |
| Shephards Lane | 20 | 470 | 490 | 6,700 | 7,190 | 7% |
| Mackays Road | 30 | 470 | 500 | 3,590 | 4,090 | 14% |
| Bray Street | 30 | 470 | 500 | 8,100 | 8,600 | 6% |
| West Korora Road | 260 | 470 | 730 | 270 | 1,000 | 270% |
| Bruxner Park Road | 250 | 310 | 560 | 730 | 1,290 | 77% |
| James Small Drive | 100 | 200 | 300 | 3,550 | 3,850 | 8% |
| Old Coast Road | 100 | 200 | 300 | 2,160 | 2,460 | 14% |
| Pacific Highway (South of Englands Road) | 200 | 290 | 490 | 36,000 | 36,490 | 1% |
| Pacific Highway (North of Bruxner Park Road) | 250 | 310 | 560 | 30,000 | 30,560 | 2% |

### Englands Road

Englands Road construction access (for a length of 400m west from the Pacific Highway) has been classified as local sub-arterial road based on its movement function and the definition in *Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). This specification states that local sub-arterials have a nominal upper limit capacity of 10,000 vpd. The total predicted daily traffic volumes on Englands Road with the addition of construction traffic are 5,810 vpd, which is less than the nominal accepted capacity for a local sub-arterial road.

As the predicted volumes for Englands Road are less than the nominated acceptable capacity for a local sub-arterial, construction traffic is not anticipated to trigger adverse traffic impacts.

### North Boambee Road and Shephards Lane

North Boambee Road and Shephards Lane would be classified as collector streets based on their existing cross-section and function, and the definitions in *Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). This specification states that collector streets have a nominal upper limit capacity of 6,000 vpd.

The total predicted daily traffic volumes on North Boambee Road and Shephards Lane with the addition of construction traffic would be approximately 7,510 vpd and 7,190 vpd respectively, which corresponds to a seven to eight per cent increase for these roads. This suggests that both roads would be operating at capacity during peak construction periods, although it should be noted that both roads were already operating above capacity based on 2016 volumes alone (6,980 vpd and 6,700 vpd respectively).

To mitigate potential traffic impacts to North Boambee Road and Shephards Lane, it is recommended that a TMP is developed to manage construction traffic. The TMP will be used to further address potential construction traffic impacts, manage community expectations, and may implement control measures to address construction traffic impacts by placing restrictions on certain movements during peak traffic periods, or modifying intersection traffic signals during peak construction periods (eg by adjusting phasing or timing).

The predicted volumes for North Boambee Road and Shephards Lane are greater than the nominated acceptable capacity for collector streets. However, with appropriate mitigation measures including those discussed above, construction traffic is not anticipated to impact significantly on the operation of North Boambee Road and Shephards Lane.

Given the location of Bishop Druitt College on North Boambee Road and proximity to the project, any traffic management measures would be developed in consultation with the college to ensure school operations and potential conflicts with school children are adequately considered.

### Coramba Road (West High Street)

Coramba Road (West High Street) would be classified as local sub-arterial roads based on their existing cross-section and function, and the definitions in

*Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). This specification states that local sub-arterial roads have a nominal upper limit capacity of 10,000 vpd.

The total predicted daily traffic volumes on Coramba Road (West High Street) with the addition of construction traffic would be approximately 11,150 vpd, which corresponds to a ten per cent increase. This suggests that Coramba Road (West High Street) would be operating at capacity during peak construction periods, although it should be noted that the roads were already operating above capacity based on 2016 volumes alone (10,160 vpd).

To mitigate potential traffic impacts on Coramba Road (West High Street), similar measures to those proposed for North Boambee Road and Shephards Lane are recommended. These would include implementation of a TMP, potential modification to traffic signals and community consultation.

The predicted volumes for Coramba Road (West High Street)are greater than the nominated acceptable capacity for local sub-arterials. However, with appropriate mitigation measures including those discussed above, construction traffic is not anticipated to trigger adverse traffic impacts.

Additionally, as noted in Section 6.6, Spagnolos Road will initially be used during construction for site establishment (rather than Coramba Road). However, the proposed construction volumes are expected to be low and any short-term impacts are expected to be mitigated through the construction TMP.

**Mackays Road**

Mackays Road has been classified as a collector street based on the function of the road and the definitions in *Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). This specification states that collector streets have a nominal upper limit capacity of 6,000 vpd. The total predicted daily traffic volume on this road with the addition of construction traffic would be approximately 4,090 vpd which would be less than the nominal capacity for a collector street.

As the predicted volumes for Mackays Road are less than the nominated acceptable capacity for a collector street, construction traffic is not anticipated to significantly impact the operation of Mackays Road.

**Bray Street**

Bray Street construction access has been classified as a local sub-arterial road based on its movement function and the definition in *Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). This specification states that local sub-arterials have a nominal upper limit capacity of 10,000 vpd. The total predicted daily traffic volumes on Bray Street with the addition of construction traffic are 8,600 vpd. This would be less than the nominal capacity for a local sub-arterial road.

As the predicted volumes for Bray Street are less than the nominated acceptable capacity for a local sub-arterial, construction traffic is not anticipated to trigger adverse traffic impacts.

**West Korora Road and Bruxner Park Road**

West Korora Road and Bruxner Park Road would experience high percent increases in daily traffic volumes (270% and 77% respectively) as they currently carry low levels of traffic. The total predicted daily traffic volumes on these roads with the addition of construction traffic are expected to remain less than 2,000 vpd, which is the nominated design capacity of local streets within Coffs Harbour as per *Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). As such, these roads would be expected to operate with acceptable travel times and level of service.

As the predicted volumes for West Korora Road and Bruxner Park Road are less than the nominated acceptable capacity for a local street, construction traffic is not anticipated to significantly impact the operation of these roads.

**James Small Drive**

James Small Drive has been classified as a collector street based on the function of the road and the definitions in *Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). This specification states that collector streets have a nominal upper limit capacity of 6,000 vpd. The total predicted daily traffic volume on this road with the addition of construction traffic would be approximately 3,850 vpd which would be less than the nominal capacity for a collector street.

As the predicted volumes for James Small Drive are less than the nominated acceptable capacity for a collector street, construction traffic is not anticipated to significantly impact travel time or LOS on James Small Drive. However, consultation will be undertaken with Kororo Public School regarding access and parking requirements to develop appropriate traffic management measures to minimise impact on school operations and potential conflict with school children on James Small Drive.

**Old Coast Road**

Old Coast Road would be classified as a local street based on its existing cross-section and function, and the definitions in *Development Specification Design 0041 Geometric Road Layout* (CHCC 2009b). This specification states that collector streets have a nominal upper limit capacity of 2,000 vpd.

Vehicle class restrictions on Old Coast Road may be required as a result of the structural engineering inspections of both heritage bridges. This will be confirmed during detailed design. The construction impact assessment conservatively assumed that no restrictions would be placed on heavy vehicles, thus assessing the worst case scenario.

The total predicted daily traffic volumes on Old Coast Road with the addition of construction traffic would be approximately 2,460 vpd, which corresponds to a 14 per cent increase. This suggests that Old Coast Road would be operating at capacity during peak construction periods, although it should be noted that it was already operating above capacity based on 2016 volumes alone (2,160 vpd).

To mitigate potential traffic impacts on Old Coast Road, similar measures to those proposed for North Boambee Road and Shephards Lane are recommended. These would include implementation of a TMP, potential modification to traffic signals and community consultation.

The predicted volumes Old Coast Road are greater than the nominated acceptable capacity for local roads. However, with appropriate mitigation measures including those discussed above, construction traffic is not anticipated to impact significantly on the operation of Old Coast Road.

**Pacific Highway**

The increase in traffic volumes on the Pacific Highway due to the addition of construction traffic represent increases of less than five per cent of existing daily traffic volumes. This is considered to be a low level of impact and there would not be expected to be any noticeable impacts to travel time or level of service on the Pacific Highway.

### 6.7.5 Construction traffic management measures

Much of the project would be able to be constructed with minimal direct disruption to existing Pacific Highway traffic (ie the project alignment between Englands Road and Korora Hill). However, there are locations where construction activities would interact with the existing Pacific Highway traffic, including:

- At the tie-ins at the southern limit of the project to the north of the Englands Road interchange
- At the Korora Hill interchange where the project joins the alignment of the existing Pacific Highway
- Along the existing Pacific Highway between Korora Hill interchange and the tie-in at Sapphire.

Speed restrictions and traffic controls would be required to manage traffic during construction of the above sections of the project. This would likely include a minimum speed of 60 km/h and two lanes of traffic in each direction would be maintained in accordance with any ROL requirements. Given the existing traffic volumes on the Pacific Highway (about 30,000 vehicles per day between Korora Hill interchange and the tie-in at Sapphire), the ROL restrictions necessary to minimise road user delays and traffic queuing would likely require work to be undertaken outside the recommended standard hours. Detailed arrangements for works in these areas would be developed during detailed design.

All construction activities are expected to be completed in stages with multiple traffic switches likely to maintain through traffic on existing roads. There are no appropriate alternative temporary routes or diversions to the existing Pacific Highway that could be used during construction. Provision for traffic would be included in the construction sequencing and construction methodology for all sections of the project, consistent with the Roads and Maritime guideline, *Traffic Control at Work Sites* (RTA, 2010). In addition to undertaking multiple traffic switches to maintaining through traffic, construction traffic management measures could include:

- Modification to lane widths to facilitate the safe entry, exit and movement of plant and materials in close proximity to existing roads
- Placement of separation barriers to protect live traffic from the worksites
- Reducing speed zones where existing road conditions are adversely modified by construction works
- Reducing shoulder widths to allow for tie-in works to be completed
- The use of temporary directional and advisory signage as well as Variable Message Signs would be used through the surrounding road network where necessary.

There are several locations where construction activities would be required close to existing local roads and property access roads, including:

- North Boambee Road
- Coramba Road
- Bennetts Road
- Shephards Lane
- Mackays Road
- West Korora Road
- Bruxner Park Road
- James Small Drive
- Korora School Road
- Old Coast Road
- Opal Boulevard
- Coachmans Close
- Seaview Close.

Speed restrictions and traffic controls would be required to manage traffic during construction of the project when construction activities are being carried out near the above listed roads. Construction of the project would have impacts on road users of the above roads.

Haulage may also have an impact on local roads as it would include the transfer of fill material within and beyond the construction corridor. Haulage would also consider peak travel hours and times, particularly during school and public holiday periods, to minimise the potential for delays on the existing Pacific Highway to the travelling public and to minimise impacts to local roads.

Haulage of excavated material would be carried out along the project corridor. The construction program will prioritise the excavation of one tunnel tube at each ridge (starting at both portals) to establish the haul road for the project.

### 6.7.6 Cumulative traffic impacts

An assessment has been carried out to determine the potential cumulative impacts of construction activities associated with current and identified developments within Coffs Harbour. A summary of any potential impacts has been detailed in Table 30. Where impacts have been noted it is anticipated that they would be mitigated with short term traffic management measures.

Table 30 Cumulative construction traffic impacts

| Programmed Works | Impacted local roads | Potential traffic impacts |
|---|---|---|
| Moonee Beach Residential Subdivision | Pacific Highway (north of project) | May interact with haulage of materials north of the project. Combined increase in construction vehicles not anticipated to impact significantly on the capacity of the Pacific Highway. |
| Korora Rural Residential Release Area | Bruxner Park Road<br>Old Coast Road | Traffic management measures will be put in place to ensure access to Bruxner Park Road and Old Coast Road will be available during construction works.<br>Old Coast Road access to Pacific Highway will be permanently closed as part of the project. Access to Old Coast Road will instead be provided via the service road. |
| Sunset Ridge Estate | Shephards Lane | Combined increase in construction vehicles not anticipated to impact significantly on the capacity of the Pacific Highway. |
| Seniors Housing, Arthur Street | Arthur Street | Located on the eastern side of the Pacific Highway where this is minimal construction traffic associated with the project. Therefore, limited cumulative impacts anticipated. |
| Coffs Central Shopping Centre Extension | Harbour Drive | Construction periods do not overlap therefore no cumulative impacts anticipated. |
| Coffs Harbour Hospital Campus Extension | Pacific Highway at southern end of project | Pacific Highway / Stadium Drive intersection is currently at LOS C. Traffic management measures to be put in place to monitor any excessive queuing or delays due to the potential combined increase in traffic demand due to construction activities. |
| North Boambee Valley Urban Release Area (Highlander Drive) | North Boambee Road | No significant impact to the capacity of North Boambee Road anticipated with the combined increase in traffic volumes.<br>Should construction of the urban release area commence during bridge works over North Boambee Road, contractor to be consulted to minimise disruption to construction works. |
| North Boambee Valley (West) Residential Investigation Area | North Boambee Road | Construction timing currently unknown. |
| Elements Estate | Stadium Drive | Traffic management measures will be put in place to ensure access Stadium Drive will be available during construction works.<br>Pacific Highway / Stadium Drive intersection is currently at LOS C. Traffic management measures to be put in place to monitor any excessive queuing |

| Programmed Works | Impacted local roads | Potential traffic impacts |
|---|---|---|
| | | or delays due to the potential combined increase in traffic demand due to construction activities. |
| Stadium upgrade | Stadium Drive | Construction periods do not overlap therefore no cumulative impacts anticipated. |
| Lyons Road, Bonville Subdivision | Pacific Highway (south of project) | May interact with haulage of materials south of the project. Combined increase in construction vehicles not anticipated to impact significantly on the capacity of the Pacific Highway. |
| Warrell Creek to Urunga Pacific Highway Upgrade | Pacific Highway (south of project) | Works complete. No overlap of construction traffic therefore no cumulative impacts anticipated. |
| Woolgoolga to Ballina Pacific Highway upgrade | Pacific Highway (north of project) | No overlap of construction traffic therefore no cumulative impacts anticipated. |

### 6.7.7 Impacts on other travel modes

**Heavy vehicles**

Temporary delays may occur for heavy and restricted vehicles travelling within the Coffs Harbour Local Government Area due to increased traffic levels and the implementation of temporary traffic management measures associated with construction of the project. Due to the low levels of additional traffic that would be generated by the construction of the project, impacts from this temporary increase in traffic volume is expected to have minor impacts for heavy vehicles along the Pacific Highway.

**North Coast Railway**

The bridge crossing over the North Coast Railway will be constructed as part of the bridge works phase in Construction Zone 2. Therefore, construction of the project could have short-term impacts on the North Coast Line rail services, which would not be able to run during possession (closure of the rail line). The duration of track possessions would be confirmed during detailed design and through consultation with the Australian Rail Track Corporation (ARTC).

To minimise impacts to rail passenger and freight operations, Roads and Maritime will consult with ARTC to schedule track possessions during planned ARTC rail network outages during off-peak periods, such as public holidays and long weekends.

**Public transport**

Temporary delays may occur for buses travelling within the Coffs Harbour Local Government Area due to the impact of temporary traffic management measures associated with construction of the project.

Some proposed construction access routes would be located along existing bus routes. The potentially affected bus routes would be:

- Routes 367 and 368 along Bray Street, Mackays Road and Coramba Road
- Route 360 along the Pacific Highway.

There may be impacts to bus travel times on the construction access routes due to the addition of construction traffic. It is recommended that liaison with Busways and school bus operators is undertaken to ensure potential impacts during construction are communicated.

The informal bus stop at the Coramba Road / Spagnolos Road intersection and the Kororo Public School bus interchange would be permanently relocated because of the project. Consultation would be carried out with the bus operators during detailed design to ensure changes to bus stops are communicated to bus users prior to commencement of construction.

No additional alterations or relocations of bus stops are expected for construction of the project.

**Pedestrians and cyclists**

Temporary delays and/or detours may be required where construction activities occur across existing cycling routes and shared paths. Locations that may be impacted include:

- The shared path along the eastern side of the Pacific Highway at the southern extents of the project
- The shoulder of the existing Pacific Highway used by cyclists along the northern extents of the project between Charlesworth Bay Road and Solitary Islands Way
- Bruxner Park Road recreational cycling route
- Pedestrian and shared path facilities surrounding Kororo Public School. The new Luke Bowen footbridge would be constructed prior to the removal of the existing bridge where possible with any disruptions to access occurring outside of school terms and in consultation with Kororo Public School and NSW Department of Education.

Alternative cycling and pedestrian routes will be developed during the detailed design phase and detours established as required during the construction period.

**Parking**

During construction, some existing parking areas at Kororo Public School will be permanently removed as part of the project. The affected areas include the formal parking area along Korora School Road as well as informal parking along Korora School Road and along the service road on the western side of the Pacific Highway. The replacement parking area to be provided as part of the project would need to be constructed prior to the removal of existing parking where possible or alternative arrangements agreed in consultation with Kororo Public School and NSW Department of Education.

Existing parking arrangements associated the informal school bus stop at the intersection of Coramba Road and Spagnolos Road, Englands Road and at the

OzGroup Packhouse at Isles Drive would also be affected during construction of the project. Consultation and further parking demand and use surveys will be undertaken at these locations to confirm the extent of temporary and/or permanent impacts and alternative arrangements where reasonable and feasible.

### Property access

The permanent property access changes that would result from construction of the project are described in Section 5.9. It is not currently anticipated that any additional property access would be required during the construction period. However, should there be any temporary property access changes required as part of short term traffic management measures, the property owners will be consulted to ensure changes are communicated prior to construction.

# 7 Management of traffic and transport impacts

The following management and mitigation measures would be implemented to mitigate construction and operational traffic impacts from the project:

- Consultation with relevant stakeholders and community:
  - Kororo Public School regarding the changes to parking, vehicular and pedestrian / cyclist access, and bus interchange
  - school bus operators regarding the changes at the Kororo Public School bus interchange
  - school bus operators regarding the potential relocation of the school bus stop at the Coramba Road / Spagnolos Road intersection
  - affected landowners about changes to property access
- During detailed design, Roads and Maritime will conduct a project road safety audit in accordance with *Austroads Guide to Road Safety* to identify and address potential safety issues associated with the operation of the project
- If more detailed information regarding future traffic demand becomes available during detailed design of the project (e.g. from development applications, traffic counts, signalised intersection detector data etc.), Roads and Maritime will assess the suitability of incorporating the revised projections into the modelling
- A construction traffic management plan will be prepared (in accordance with *Traffic Control at Work Sites Manual* (Roads and Maritime, July 2018)) prior to commencement of construction, including:
  - Traffic control plans illustrating the access arrangements to ancillary sites and the location of traffic management signs and devices
  - Scheduling of construction works, particularly deliveries, to be completed outside of peak periods where possible
  - Requirements for notification of road users where traffic management measures are to be implemented
  - Access management plan to ensure access to properties can be maintained where it is safe and feasible during construction
  - Pedestrian and cyclist management plan where necessary to ensure access is maintained where it is safe and feasible during construction
  - Road safety audit requirements
  - Traffic performance review / observations during construction
- Pre-construction road dilapidation reports
- Vehicle movement plans for construction haulage routes.

# 8 References

Arup 2018, *Coffs Harbour Bypass – Traffic Model Development Report*

Austroads 2015, *Austroads Guide to Road Safety Part 8 Treatment of Crash Locations*

Roads and Maritime 2002, *Guide to Traffic Generating Developments*

Roads and Maritime 2013, *Traffic Modelling Guidelines (2013)*

DP&E 2015, *North Coast Employment Land Review*

*Coffs Harbour Land Use and Employment Strategies*

New Zealand Transport Authority 2014, *Transport Model Development Guidelines*

2016, *Planning Proposal – Korora Basin – Residue Land adjacent to the Pacific Highway*

2011, *Big Banana Development Coffs Harbour – Access Options Assessment Paramics Modelling*

2009, *North Boambee Valley East Development Control Plan*

2013, *Coffs Harbour City Council Planning Proposal – North Boambee Valley West Residential Investigation Area*

2010, *Pacific Bay Western Lands Project Application – Environmental Assessment Report*

Coffs Harbour City Council *Development Specification Design 0041 Geometric Road Layout*, 2009

# 9 Glossary

Table 31 Glossary of terms

| Term | Definition |
|---|---|
| % | Per cent |
| AADT | Annual Average Daily Traffic |
| ARTC | Australian Rail Track Corporation |
| CBD | Central Business District |
| CHCC | Coffs Harbour City Council |
| CHSTM | Coffs Harbour Strategic Transport Model |
| CHTM | Coffs Harbour Traffic Model |
| CSSI | Critical State Significant Infrastructure |
| DP&E | Department of Planning and Environment |
| EIS | Environmental Impact Statement |
| EP&A Act | Environmental Planning and Assessment Act 1979 |
| km | Kilometres |
| LGA | Local Government Area |
| LOS | Level of Service |
| m | Metres |
| mvkt | million vehicle kilometres travelled |
| OD | Origin-destination |
| Roads and Maritime | Roads and Maritime services |
| SEARs | Secretary's Environmental Assessment Requirements |
| The project | Coffs Harbour Bypass |
| TMP | Traffic Management Plan |
| veh/h | Vehicles per hour |
| vpd | Vehicles per day |

# Appendix A

## Coffs Harbour Bypass Traffic Model Development Report

Roads and Maritime Services

# Coffs Harbour Bypass

Traffic Model Development Report

Issue | 22 May 2018



Job number 248379-00

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CHTM - Model Plots

# 1 Introduction

Arup was engaged by Road and Maritime Services (Roads and Maritime) to prepare a business case, develop a concept design and undertake an Environmental Impact Statement (EIS) for the Coffs Harbour Bypass project (the Project). As a part of the scope, Arup was required to undertake traffic modelling which entailed developing a strategic demand forecasting model and a mesoscopic traffic assignment model.

The purpose of this report is to document the model development and the level of calibration and validation achieved for the Coffs Harbour Strategic Transport Model (CHSTM), and the Coffs Harbour Traffic Model (CHTM).

## 1.1 Purpose and Objectives

The purpose of this report is to detail the modelling hierarchy structure and development methodology of the Coffs Harbour Strategic Transport Model (CHSTM), and Coffs Harbour Traffic Model (CHTM).

The strategic transport model will be used to carry out high-level travel demand forecasts and to provide traffic inputs for the mesoscopic model for more detailed traffic analysis. The CHSTM and CHTM model outputs will be used to:

- Provide input into an economic analysis for the business case considering the difference between a base case and project case in future years.
- Assess the future traffic performance of the concept design.
- Provide inputs to the assessment of traffic related impacts for an Environmental Impact Statement.

## 1.2 Model development history

The traffic models for the Project have been progressively developed since September 2016. The models have been utilised at various phases of the Project and have undergone various levels of reviews. A summary of key model development milestones are summarised below:

- June 2016 - traffic surveys undertaken in June 2016
- September 2016 – model development initiated
- February 2017 - an initial version of the CHSTM utilised for high level assessment of options for the bypass access strategy
- March 2017 – Models completed to (approximately) 90% calibration level and used for assessment of the Strategic Business Case
- March 2017 - Model development progress presented to RMS Road Network Analysis

- May 2017 – Peer review undertaken on models used for the Strategic Business Case.
- June 2017 – Gateway review undertaken by iNSW
- July to August 2017 – Models updated with new origin-destination survey data
- August 2017 – Land-use and demographic assumptions presented to Council for comment.
- November 2017 – Model development progress presented to RMS Road Network Analysis
- September 2017 to January 2018 – Models finalised with updated with 2016 Census data, land use comments from Council addressed, comments from the peer review addressed.
- February 2018 - Model development progress presented to RMS Road Network Analysis
- February 2018 – Models finalised and used for assessment of Stage 1 Final Business Case
- March 2018 – Model documentation (this report) submitted for comment.

# 2 Model specification

## 2.1 Model functionality

### 2.1.1 Business case

Transport modelling was required to inform the evaluation of the project and the problem definition. The model will need to provide future year traffic forecasts to identify the future traffic network operations and the impact the bypass will have on the Coffs Harbour road network and externalities. Outputs from the model will be used for the economic evaluation for the business case. For the purposes of the business case, the model needs to be capable of assessing or supporting the assessment of:

- Changes to travel demand due to land use growth in the Coffs Harbour region
- Temporal impacts on travel demand and traffic operation.
- The impact of different vehicle types including commercial vehicle demands
- Economic evaluation of the preferred bypass alignment.

### 2.1.2 Design

Detailed traffic operational analysis will be required to support concept design development including:

- Interchange options considering location, form and connectivity
- Construction staging
- Design of connection roads

### 2.1.3 Environmental impact statement

Transport modelling is required to input to a range of activities and assessments to support the EIS including:

- Traffic demand levels on the bypass
- Impact on the existing highway through Coffs Harbour and other surrounding roads
- Impact on amenity
- Air quality assessment
- Noise impact.

## 2.2 Model hierarchy

To undertake the work required in the specification, a suite of modelling tools were developed. A strategic model was developed in Emme to provide base and future year travel demand forecasts. This three-step model (excludes mode share modelling) generates the traffic demand inputs for the detailed assignment mesoscopic model, built in AIMSUN. For detailed traffic performance analysis of intersections, AIMSUN microsimulation and/or SIDRA software was used, to which the mesoscopic model provided the relevant traffic volume inputs.

The modelling hierarchy adopted for the purposes of modelling the Coffs Harbour Bypass is shown in Figure 1.

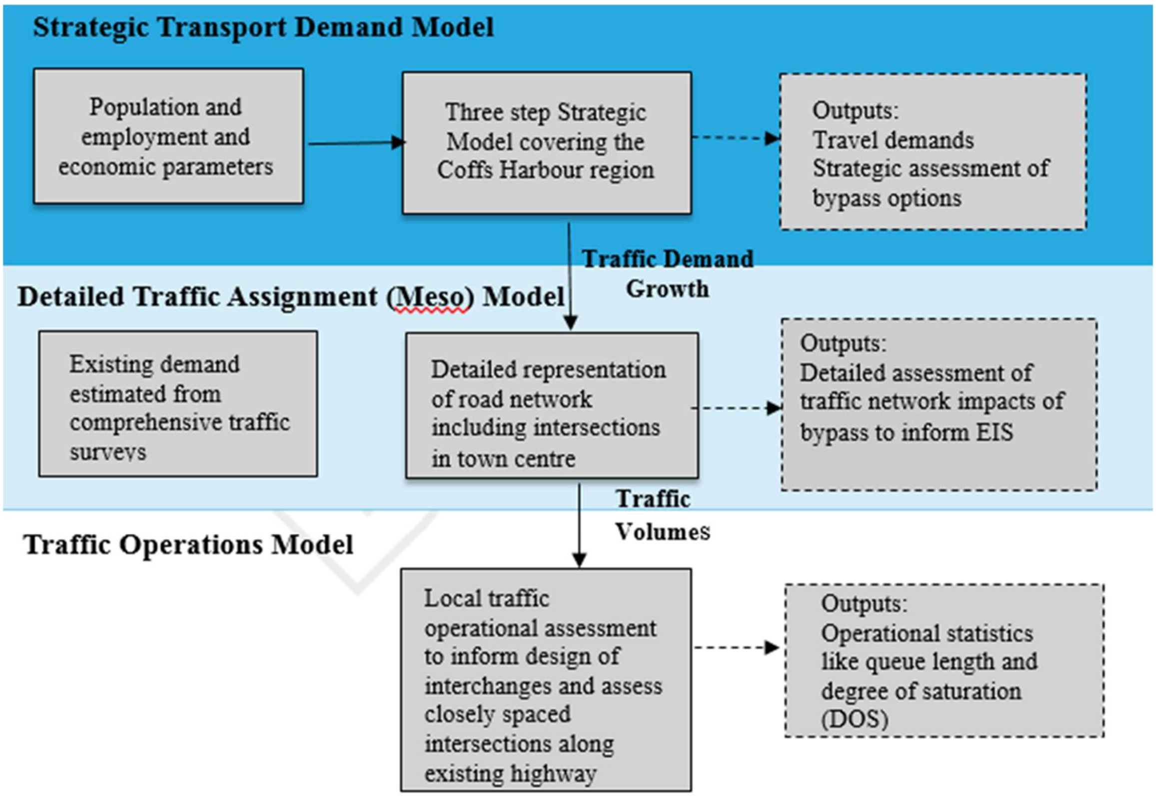



Figure 1 - Model hierarchy diagram

## 2.3 Coffs Harbour Strategic Transport Model

### 2.3.1 Summary of CHSTM key features

The key dimensions and features of the CHSTM are summarised in Table 1.

Table 1. Key features of the CHSTM

| Key Feature | Description |
|---|---|
| Model Zones | CHSTM covers a similar area to the Coffs Harbour Local Government Area. 619 internal travel zones defined based on the combination of SA1 and mesh block boundaries from ABS. 7 external travel zones defined as external traffic demand feeds. |
| Model Network | All state controlled highways, arterial, distributor and local collector roads plus some important local roads. |
| Model Year | Calibrated to represent travel conditions in a 2016 base year. |

| Key Feature | Description |
|---|---|
| | Demographic forecasts and networks developed for forecast years 2024, 2034 and 2044. |
| Time Periods | 24-hour demand split into 4 time periods:<br>- AM (8-9am),<br>- OP (9am-4pm),<br>- PM (4-5pm), and<br>- RD (5pm-8am). |
| Vehicle Classes | 3 vehicle classes:<br>- light vehicles (Austroads classification 1 and 2),<br>- medium commercial vehicles (Austroads classification 3 – 5), and<br>- heavy commercial vehicles (Austroads classification 6 – 12) |
| Trip Purposes | Travel demand segmented into 9 trip purposes:<br>- HBW (home based work),<br>- HBEPS (home based education primary and secondary),<br>- HBET (home based education tertiary),<br>- HBEs (home based escort),<br>- HBS (home based shopping),<br>- HBO (home based other purposes),<br>- NHB (non-home based trips),<br>- VHB (visitor home based),<br>- VNHB (visitor non-home based)<br>Plus<br>- MCV (medium commercial vehicles),<br>- HCV (heavy commercial vehicles) |
| Mode Choice | Fixed PT and active travel mode share |
| Public Transport | Bus services have not been included in the CHSTM due to the relatively low levels of bus service provision in Coffs Harbour. |

### 2.3.2 Model coverage

The CHSTM covers the vast majority of the Coffs Harbour Local Government Area (LGA), with the exception of one unpopulated rural area due to the SA1 zone crossing the LGA boundary. The zone system was based primarily on 2011 ABS Census mesh blocks and SA1 zones, with a few large mesh block zones further subdivided into several land parcels to represent the proposed future land uses. The modelled road network includes all highway, arterial, distributor and local collector roads and some important local access roads.

The zonal detail and network coverage is presented Figure 2.

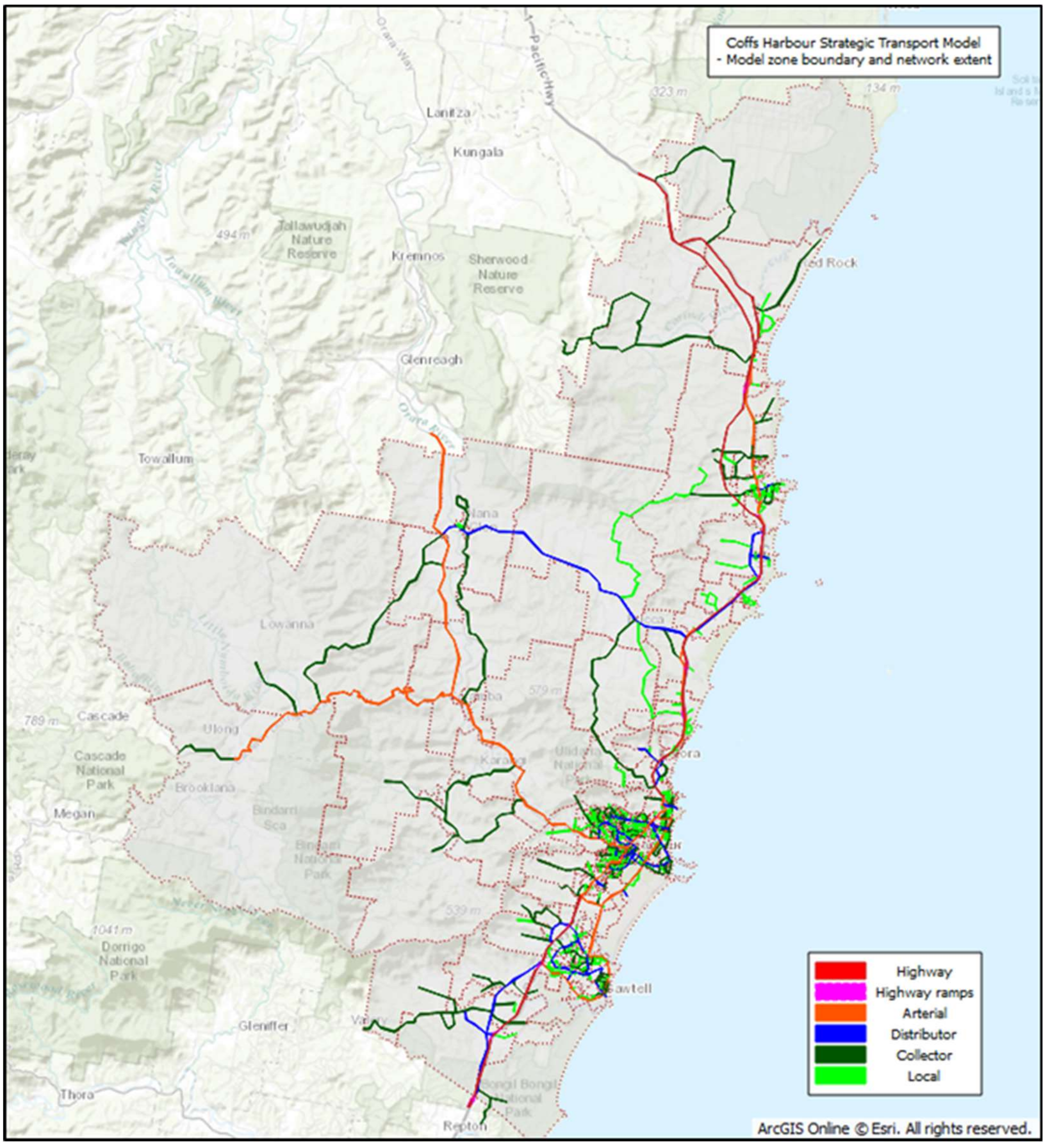



Figure 2 - Extent of CHSTM

### 2.3.3 Model structure

The model structure consists of a typical four-step strategic modelling approach, with a simplified mode choice module for the estimation of the car driver mode. A logit mode choice model was considered unnecessary for Coffs Harbour due to the very low public transport mode share. The CHSTM follows the procedure presented in the flowchart in Figure 3.

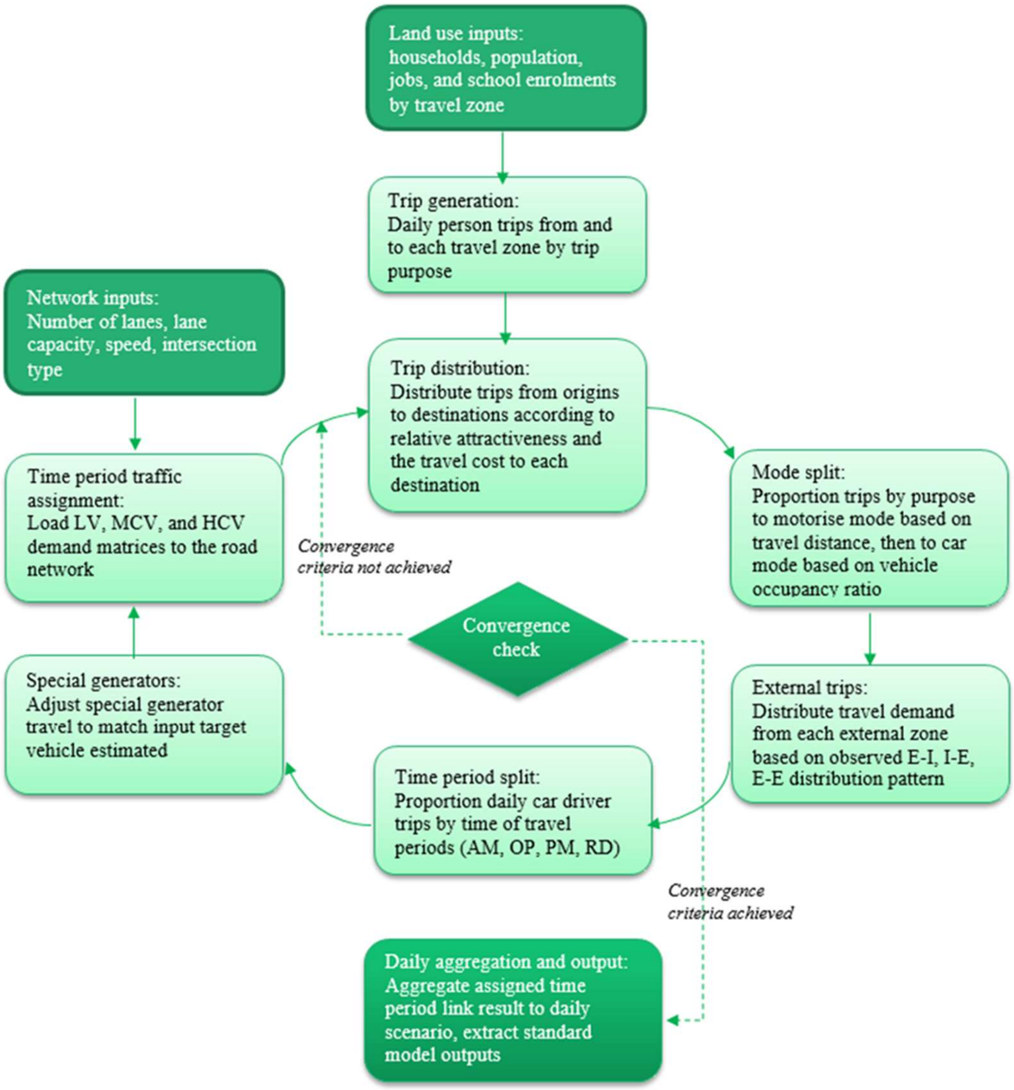



Figure 3 - CHSTM model procedure - four step model with fixed mode share

## 2.4 Network traffic model

### 2.4.1 Model overview

A network traffic assignment model in AIMSUN has been developed for the Coffs Harbour Bypass Project. The purpose of the Coffs Harbour Traffic Model (CHTM) was to assign traffic demands (outputs from the strategic transport model) to the road network to provide predictions of traffic volumes and delays on modelled road links and turns. The model outputs have been used as inputs to the economic analysis for the business case comparing a future year project case scenario against a base case scenario.

The key features of CHTM are summarised in Table 2.

Table 2. Key features of the network assignment model

| Key Feature | Description |
|---|---|
| Model Zones | CHTM covers the central Coffs Harbour area from Sapphire Beach to Boambee East. A total of 544 internal travel zones were developed based on the combination use of SA1 and mesh block boundaries from ABS. A total of 7 external travel zones were defined as external traffic demand feeds. |
| Model Network | All state controlled highways, arterial, distributor and local collector roads and most local roads. |
| Model Year | Calibrated to represent travel conditions in a 2016 base year.<br>Traffic demand forecasts and networks developed for forecast years 2024, 2034 and 2044. |
| Time Periods | Peak morning and afternoon one hour periods: AM (8-9am) and PM (4-5pm). |
| Vehicle Classes | 3 vehicle classes<br>- light vehicles (Austroads classification 1 and 2),<br>- medium commercial vehicles (Austroads classification 3 – 5), and<br>heavy commercial vehicles (Austroads classification 6 – 12) |
| Trip Purposes | Travel demand not defined by trip purpose |
| Public Transport | Bus services have not been included in the CHTM due to the relatively low levels of bus service provision in Coffs Harbour. |

### 2.4.2 Model network

The CHTM road network is shown in Figure 4 bounded by the dashed red line. The model network was coded to represent the physical characteristics of the existing road network including functional hierarchy, number of lanes (including turning lanes) and free-flow speed. Intersections were also coded according to existing form and control type such as give-way, roundabout, merges and signalised intersections. The signalised intersections were coded using existing signal phase plans and timings.

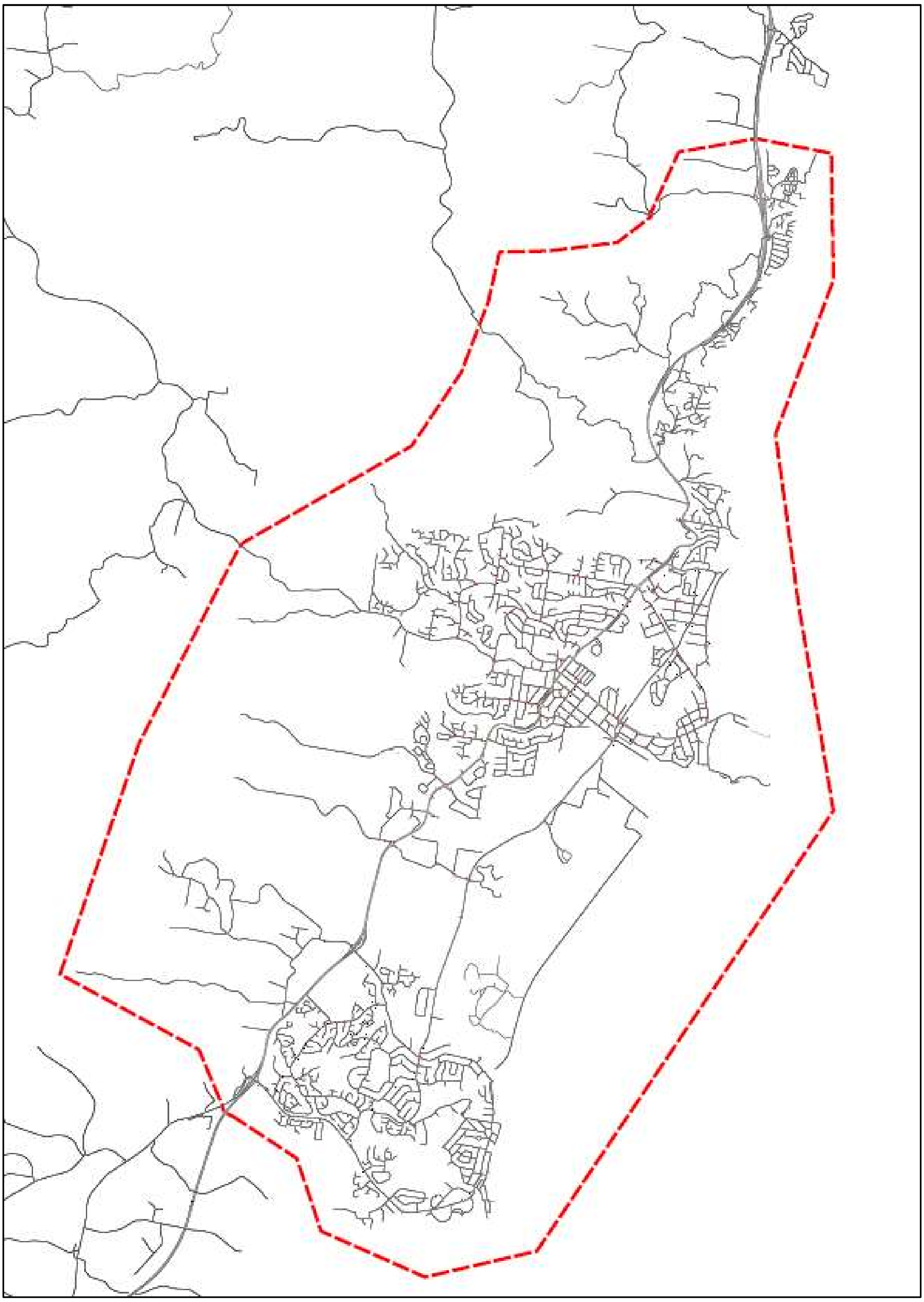


Figure 4 - Traffic model area

# 3 Data sources

## 3.1 Overview

Strategic transport models are reliant on travel survey data to calibrate travel forecasting functions used to estimate trip generation, distribution and mode choice characteristics against observed transport network demands and patterns as a basis to forecast future travel demand growth.

A comprehensive household travel survey (HTS) dataset was not available for Coffs Harbour. Undertaking a HTS for Coffs Harbour was explored but was considered not feasible within the study timeframe or budget of this project. The development of the model functionality was therefore based on other data, augmented by experience from other similar regional models – called in this report *the reference models*. The key data sources are summarised in the following subsections.

## 3.2 Household travel survey data sources

### 3.2.1 2012 Regional HTS – TfNSW

In 2012, Transport for NSW Bureau of Transport Statistics (BTS) carried out a regional Household Travel Survey (regional HTS) across 15 regional areas in Northern NSW including Coffs Harbour. As this survey covered multiple regions, the sample size of trips within Coffs Harbour was relatively small at 360. The data was lacking geographical details with recorded origins and destinations at the suburb level, which was ideally required at detailed SA1 level. As such, the data set was considered inadequate to develop representative functions and parameters for the region.

Additionally, the CHSTM required certain details that were not included in the regional HTS survey such as some key trip compositions (i.e. home based education trips, non-home based trips) and information relating to the time of day when travel was undertaken; . However, the regional HTS survey data has been used to assist in building the demand model for CHSTM, by applying a total regional analysis where appropriate and cross-referencing parameters developed from other data sources.

### 3.2.2 Local household travel survey

A local household travel survey dataset for Coffs Harbour was not available during the model development work. The option of undertaking a survey for the purposes of CHSTM development was explored, however it was deemed unfeasible within the study timeframe and budget.

### 3.2.3 Transferability of other model variables and approaches

Although it is important and recommended to have specified localised HTS data available for strategic transport model development, collecting such data is normally costly and time consuming. With the absence of HTS data, the use of model variables from other models provided an alternative source of information. Care needed to be taken to ensure the transferred model variables were usable in the new context.

The Cairns Strategic Transport Model (based on the 2014 Cairns Household Travel Survey), a model with certain similarities in the urban context to Coffs Harbour, was selected as the source of model variables to support the development of the CHSTM. Some context similarities include but are not limited to the following:

- Similar urban layout with north-south expansions, as both are constrained by geometry with coastal frontage on the east and mountain area to the west.
- Both cities function as major urban centres with national highways servicing the area.
- Strong tourism industries (the overnight visitor to total population ratios were 8% in Coffs Harbour versus 11% in Cairns based on 2011 Census).
- Similar industry profiles (both cities have a majority of jobs in the service industry with 40% in Coffs Harbour and 37% in Cairns, followed by industrial jobs with 20% and 22%, then professional jobs with 18% and 21%).
- Low public transport mode shares with limited public transport system.

The population profile between the two cities differ to a certain degree with Coffs Harbour having a higher proportion of elderly population than Cairns (for persons aged 65 and above, 18% in Coffs Harbour and 10% in Cairns). In terms of working age population, Coffs Harbour has a 58% share while Cairns has 64%.

Despite both cities having other notable differences between each other, for example the total population of Cairns is double that of Coffs Harbour, the similarities in socio-economic characteristics shows that the Cairns Strategic Transport Model is a suitable model to be considered. Two additional reference models have also been used to cross check the outputs, and to update variables where appropriate. The additional models were Townsville Strategic Transport Model and the Rockhampton and Livingstone Strategic Transport Model.

#### 3.2.3.1 Trip generation / attraction parameters

The first stage of a four-step model involves the estimation of the number of trips generated from and attracted to individual zones. The risk of adopting transferred trip generation parameters was considered small as the demographics and socio-economic characteristic in Australian small cities on the eastern sea-board are generally homogeneous. In addition to the above mentioned three reference models being used to cross check the outputs, a localisation process (using count data) has been followed to calibrate the parameters to fit the local context in Coffs Harbour.

Traffic counts at closed development cordons have been used to understand how well the generated vehicle trips match the traffic counts. Those closed cordons have been defined specifically to eliminate through-traffic in the traffic counts. The closed developments cordon captured 12 residential zones, 4 industrial zones, 1 mixed retail and residential zone, and the Southern Cross University zone. It can be seen in Figure 5 that the daily generated light vehicle trips matched well with the count data at the closed cordon locations.

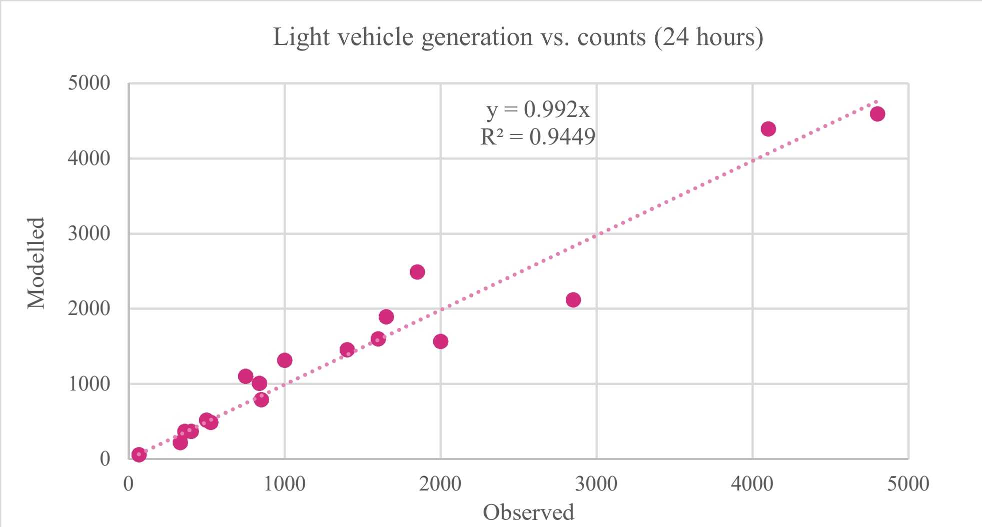



Figure 5 - Trip generation checks

The home based work trip generation parameters were estimated based on localised dataset as an exemption, that the 2011 NSW Bureau of Transport Statistics journey to work (JTW) data provides a good source to undertake such analysis.

#### 3.2.3.2 Trip distribution coefficients

The second stage of the model development involves distributing the trips generated from each origin zone to each destination zone. A gravity model has been adopted whereby the distribution of trips is proportional to the attractive power of destinations and inversely to the friction (time and distance) between them. Because of this, the process does not directly follow / rely on observed trip patterns. As such the trip length distribution curves generally follow similar patterns based on the trip making purposes. Precise distribution may not be easily followed due to the unique land use pattern existing in each city. For example, the physical locations of tertiary institutes will largely influence the distribution curve of home based education tertiary trips.

The home based work trip distribution coefficients were calibrated to the 2011 NSW JTW data. The regional HTS survey did not provide enough local information to support trip distribution calibration for the other trip purposes. Therefore, the trip distribution of other trip purposes was calibrated to the trip length distribution curves in the Cairns Strategic Transport Model. The distribution was ultimately validated using traffic volumes at 14 screenline locations across Coffs Harbour LGA which indicated the transferred coefficients fit well with the Coffs Harbour condition.

#### 3.2.3.3 Mode split factors

Mode choice was considered as a deterministic step during the CHSTM development as choice behaviour differs by the cultural context and the provisions of facilities and services. Mode choice information was made available by the regional HTS for Coffs Harbour, form which the mode choice module was developed.

#### 3.2.3.4 Time period factors / Route choice

The final stage of a typical four-step model is primarily related to route choice (traffic assignment). This step is unaffected by HTS data availability as information about route is generally not collected as part of a HTS.

Data regarding the choice of time of day travel are normally collected in a HTS to provide more detailed travel characteristics to build a transport model, but this information was unavailable in the regional HTS data for Coffs Harbour. Despite this, the time periods of travel characteristics do have some similarities in home base trips, as the trip makers are normally aiming to reach their destination at a certain committed time frame, for example, commuting trips normally happen during the peak hours. Although time period choice does vary by urban extent and the level of congestion in the network, these factors in the Cairns Strategic Transport Model were considered transferable for Coffs Harbour since both cities have similar spatial urban characteristics.

## 3.3 2011 and 2016 census demographic data

### 3.3.1 Population

The data used for this exercise was the available 2016 Census data, released on 27 June 2017. Note this data does not include the complete set of population and housing profiles collected with the 2016 Census. The information included:

- Characteristics of people, families and dwellings including age structure, education, income and housing at statistical area level 1 (SA1)
- Counts of dwelling and population totals at mesh block level (MB).

The next round of census data released is scheduled in October / November 2017, and is likely to include:

- Residential worker information in statistical area level 1
- Method of travel to work data at a higher aggregated level (statistical area level 2 (SA2))
- Estimated resident population at higher aggregated level (SA2)

Total population by mesh block was used in conjunction with detailed population categorisation by age group at SA1 level to produce an estimation of population at mesh block level. This was aggregated into the following age groups:

- Population total
- Population 0 – 17
- Population 18 – 64
- Population 65 +

### 3.3.2 Households

The number of households per traffic zone were estimated using 2016 census data, which provided the total number of dwellings per mesh block.

### 3.3.3 Workers

The number of resident workers was still unavailable in the 2016 census at the time of this study. Therefore, the 2011 census was used to provide the split of workers by industry category based on 2016 working age population at SA1 level. This data was prepared by five industry sectors, subdivided by blue collar and white collar categories, as follows:

- Service (blue collar/white collar)
- Professional (blue collar/white collar),
- Industry (blue collar/white collar),
- Retail (blue collar/white collar),
- Other (blue collar/white collar)

The correlation between jobs in detailed categorisation and the five main industry types is documented in Section 3.4.

### 3.3.4 Visitor data

Visitor data was available in the 2016 census at SA1 level. This data was used as the basis for modelling visitor trips within the model zones, split into mesh blocks based on using the total population split.

## 3.4 2011 census journey to work data

The 2011 NSW Bureau of Transport Statistics journey to work (JTW) data provides a good source for understanding home based work (HBW) travel distribution patterns in the Coffs Harbour Region.

This information was provided at the JTW sector level as a basis to calibrate HBW travel patterns. The average distance between different JTW sectors can be calculated together with the total number of home based work trips to establish the trip length distribution profile. The time period of travel information was not available in this data source, hence was developed based on reference models.

The dataset also represented the best available source of information relating to the number of jobs by journey to work zone. This was provided by detailed industry and sector breakdowns. The information was aggregated into five industries and split by blue collar and white collar categories. This was achieved by using the correlations shown in Table 3 and

Table 4.

Table 3. Detailed industry to industry sector lookup

| Detailed Industry type | Industry Sector |
|---|---|
| Accommodation and Food Services | Service |
| Administrative and Support Services | Professional |
| Agriculture, Forestry and Fishing | Other |
| Arts and Recreation Services | Service |
| Construction | Industry |
| Education and Training | Service |
| Electricity, Gas, Water and Waste Services | Other |
| Financial and Insurance Services | Professional |
| Health Care and Social Assistance | Service |
| Inadequately described or Not stated | Other |
| Information Media and Telecommunications | Industry |
| Manufacturing | Industry |
| Mining | Other |
| Other Services | Service |
| Professional, Scientific and Technical Services | Professional |
| Public Administration and Safety | Professional |
| Rental, Hiring and Real Estate Services | Professional |
| Retail Trade | Retail |
| Transport, Postal and Warehousing | Industry |
| Wholesale Trade | Retail |

Table 4. Detailed job type to job category lookup

| Detailed Job Type | Job Category |
|---|---|
| Clerical and Administrative Workers | White collar |
| Community and Personal Service Workers | Blue collar |
| Inadequately described or Not stated | Blue collar |
| Labourers | Blue collar |
| Machinery Operators and Drivers | Blue collar |
| Managers | White collar |
| Professionals | White collar |
| Sales Workers | White collar |
| Technicians and Trades Workers | Blue collar |

The number of jobs per model zone was then estimated using the estimated gross floor area (GFA) in each zone to split the totals from journey to work zone by industry type. The process for undertaking this was as follows.

**Step 1 - estimate GFA**:

- Coffs Harbour City Council provided property information by land use type
- Filter out lots that are job related (land use type in relevant to business purposes, e.g. B1-B6 as business centres, IN1-3 as industrial areas, etc.)
- Sample measuring of roof areas and building floors to estimate GFAs.
- Calculate the average floor space ratio (FSR) by land use type (e.g. business centre, industry area, commercial core, special purposes, etc.)
- Apply the FSR back to derive GFAs based on land size by land use type, and constrained by Council's FSR limit.
- Aggregate calculated GFAs into JTW zone level (by land use type).

**Step 2 - calculate GFA to job ratio:**

- A regression model was developed to establish the relationship between GFAs and jobs, using total jobs by industry type at JTW level and GFAs by land use type at JTW level.
- Business surveys were also undertaken to confirm & supplement the relationships derived above.

The assumptions for the number of jobs by industry type generated by 1,000 sqm of each land use type are shown in Table 5. These were initially generated within the regression model, and then were reviewed against other sources including business surveys and guidance parameters; values were then adjusted where required.

Table 5. Job rates per 1000 m$^2$ GFA

| Industry | Business Centre | Commercial Core | Industry Land | Isolated Business | Special Land Use |
|---|---|---|---|---|---|
| Service | 7.0 | 11.1 | 12.0 | 12.8 | 11.7 |
| Professional | 3.6 | 13.8 | 0.0 | 3.7 | 0.3 |
| Industry | 2.0 | 1.5 | 6.3 | 1.0 | 1.6 |
| Retail | 9.4 | 13.3 | 7.7 | 3.6 | 0.0 |
| Other | 0.1 | 0.9 | 0.3 | 2.6 | 0.3 |
| **Total** | **22.1** | **40.6** | **26.3** | **23.6** | **13.8** |

**Step 3 - calculate jobs for CHSTM zones:**

- Forecast of 2016 jobs by industry type produced based on 2011 JTW data
- GFA to job ratios used to calculate jobs for each model zone in Coffs Harbour
- The 2016 forecasted JTW zone figures by industry type acted as control totals to further calibrate the total job numbers

The overall figure for growth between 2011 and 2016 was 0.3%, due to the modest forecast in workers; employment forecasts are controlled by the growth in the labour force within the LGA.

## 3.5 Enrolment data

### 3.5.1 School enrolment data

Data covering school enrolments in 2016 was sourced from the MySchool website for all of the primary and secondary schools within the Coffs Harbour LGA. This was used for estimating education trips.

The catchments for each school were defined using the NSW Schools Finder website. This then defined the growth areas for each school in the forecast years.

### 3.5.2 TAFE and university enrolment data

Enrolment data was obtained from TAFE and university campuses by contacting the institutions directly. Catchments for these establishments were assumed to be local government area wide.

## 3.6 Data for validation

A number data sources were available for the purposes of model development and validation, including origin-destination surveys, traffic counts and journey times.

### 3.6.1 Origin-destination surveys

An origin-destination (O-D) survey was carried out in May 2017 using number plate matching at 10 defined video camera sites. The purpose of this O-D survey was to understand the existing traffic distribution pattern for traffic entering and exiting the Coffs Harbour study area.

Videos were captured in both directions of travel at each camera site for 24 hours, covering each of the modelled time periods. Travel time cut-offs were specified for each O-D pair to exclude vehicles that stopped within Coffs Harbour The survey differentiated the vehicle classes into light vehicles and heavy vehicles.

The derived O-D distribution pattern was utilised to inform the external traffic distribution into the CHSTM, which included external to external, external to internal, and internal to external trips by light vehicles and heavy vehicles.

Further information regarding the O-D survey is contained in Appendix A.

### 3.6.2 Traffic counts

Traffic count data was collected at various locations throughout the Coffs Harbour study area in September 2016. Fourteen screenlines were defined for the purpose of model validation with over 120 count locations. The traffic count data consisted of two types of counts including:

- Automatic traffic counters (tubes), mainly on the screenlines; and
- Intersection turning counts mainly at the key intersection locations on the Pacific Highway and Hogbin Drive.

The tube counts were collected for 24 hours over a full week period whilst the intersection turning counts were collected for 12 hours between 6 am and 6 pm over one day. The intersection turning counts were mainly for the purpose of mesoscopic model calibration, though some counts were processed at the link level and expanded to 24 hours for the purpose of link validation in the CHSTM.

### 3.6.3 Journey times

A set of GPS journey time surveys were collected for 4 routes, bi directional during the AM and PM peak periods.

In addition, RMS supplied Google derived travel time data. However, after analysing this against other sources, it was concluded that this dataset considerably underestimated journey times, and as such this information was not used for model development or validation.

# 4 Strategic model development

This chapter explains the strategic model development process, including the zone system design, network development, and the 4-step demand modelling phases.

It should be noted that the strategic model serves the primary function of providing forecast demand for the mesoscopic model to use for detailed assignment modelling.

## 4.1 Zone system

The CHSTM zone system was developed using standard ABS zonal boundaries, primarily mesh blocks and some SA1 zones. In a small number of cases, due to there being substantial future development planned, greenfield mesh zones were further subdivided into several land parcels to represents the know future land uses. This allowed the new network loading points, as well as the forecast trips associated with these developments, to be more accurately modelled.

The zone system consisted of 619 internal and 7 external zones. The coverage and density of these are shown in Figure 6 below. Zones were numbered according to the parent SA2 under which they lay spatially. In addition, the node numbering system also followed this convention; the Pacific Highway was the exception, allocated to the range 9000-9999 to allow for easy analysis. Zonal configuration by SA2 sector is summarised in Table 6.

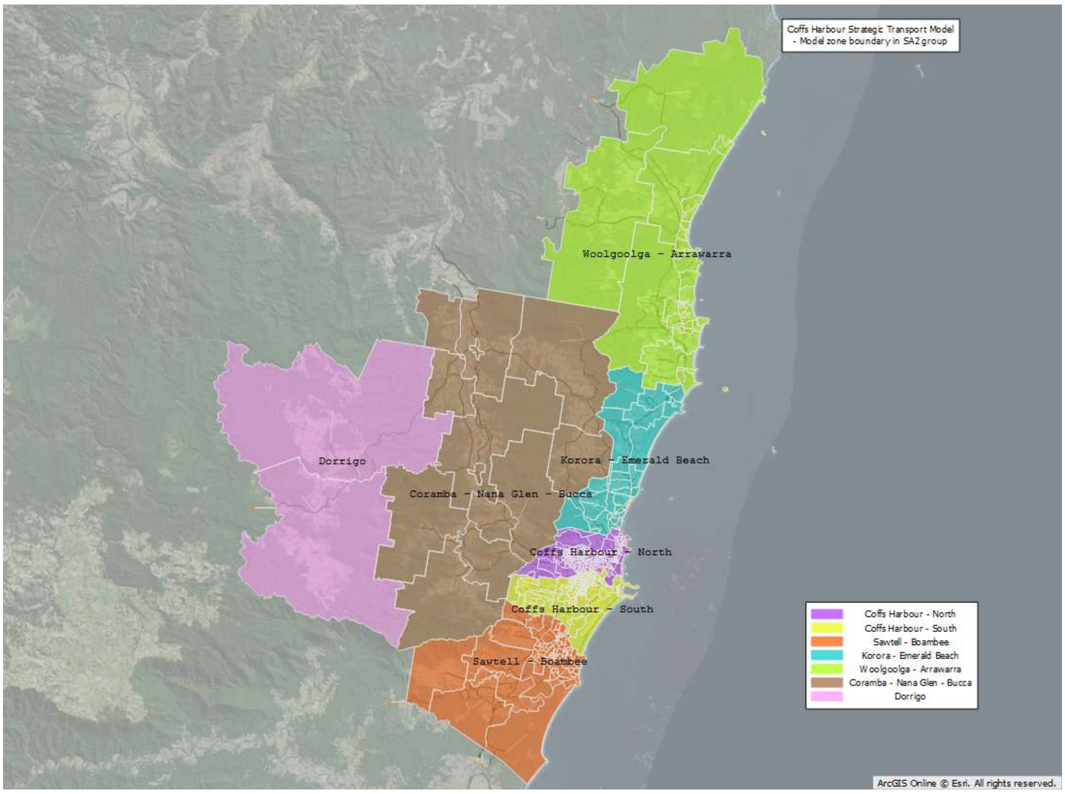


Figure 6 - CHSTM zone system

Table 6. Summary of CHSTM zones by SA2

| SA2 Name | SA2 Number | Number of Zones | Zone Numbers | Node Numbers |
|---|---|---|---|---|
| Coffs Harbour - North | 104021084 | 264 | 1-299 | 1000-2999 |
| Coffs Harbour - South | 104021085 | 172 | 300-499 | 3000-4999 |
| Sawtell - Boambee | 104021089 | 78 | 500-599 | 5000-5999 |
| Korora - Emerald Beach | 104021088 | 50 | 600-699 | 6000-6999 |
| Woolgoolga - Arrawarra | 104021091 | 40 | 700-799 | 7000-7999 |
| Coramba - Nana Glen - Bucca | 104021086 | 13 | 800-849 | 8000-8499 |
| Dorrigo | 104021087 | 2 | 850-899 | 8500-8899 |
| Externals | | 7 | 900-999 | 8900-8999 |
| **Total zones** | | **626** | | |
| *Pacific Highway nodes* | | | | *9000-9999* |

## 4.2 Network

### 4.2.1 Source dataset

The network was based on the latest available OpenStreetMap (OSM) vector GIS dataset covering the Coffs Harbour LGA. To prepare the GIS network for input to the Emme model, a number of processing steps were undertaken.

#### Select network based on road hierarchy

The network was developed based on selecting links within each road hierarchy class. All highway (and ramps), arterial, distributor and collector roads were included. In addition, a number of local roads were incorporated where additional detail was required.

All other links within the original GIS network were removed, including private streets, isolated links, small tracks and pedestrian and cycle only routes.

#### Merge separated directional links

Road sections which had separate links for individual directions, for example segregated single carriageways and dual carriageways, were merged together so that one GIS link represented both carriageway directions. The key reason for this was to simplify the representation of junctions, allowing the turning count data to be allocated accurately to arms.

## Merge intersections into one node

Intersections represented by more than one node, primarily roundabouts, were imploded so that the junction was represented by only one node. This simplified representation allowing junctions to be more accurately modelled within Emme, and to align with the turning count data used for validation.

## Consolidate links

Sections of network, particularly rural areas, where there were intermediate dummy nodes with only two arms (not representing intersections), were dissolved into one link. This simplified the network for modelling purposes.

The impacts of these consolidation processes are demonstrated below. Figure 7 shows an intersection before (left) and after (right) junction and network simplification, whilst Figure 8 shows the difference in an urban area.

Figure 7 - Intersection before (left) and after (right) simplification

Figure 8 - Urban network before (left) and after (right) consolidation

### 4.2.2 Zone connectors

Zone connectors were created for all internal and external zones, with more than one connection point being allocated on the network where appropriate. The length of connectors was calculated using the GIS geometry of the lines which were accurately digitised in GIS.

### 4.2.3 Network attributes

The network attributes allocated to the GIS links and forming the input to the modelling, were based on information from a variety of sources. These are summarised in Table 7.

Table 7. Network attributes and sources

| Network Attribute | Source(s) |
|---|---|
| Road hierarchy classification | Coffs Harbour Council road hierarchy |
| Posted speed limit | OSM<br>*Reviewed against Google Street View* |
| Number of lanes | OSM<br>*Reviewed against Google aerial imagery* |
| Modes | No data sources available regarding banned HGV links<br>*Assumed all vehicles are able to use all links* |
| Road impedance | Engineering judgement based on considerations including intersection controls, road side parking, property access density, road condition |
| Junction approach type | Determined using Google aerial imagery |
| Turn restrictions | Determined using Google aerial imagery |

### Network speeds

The posted speeds assigned to links were based on the attributes provided in the original OSM layer, reviewed against Google Street View imagery. These speeds formed the starting point for calculating the volume/delay functions discussed below; posted speed ranges by link type are summarised in Table 8.

Table 8. Count of link types by posted speed ranges

| Speed (km/h) | Type 1 | Type 2 | Type 3 | Type 4 | Type 5 | Type 6 | Type 9 | Total |
|---|---|---|---|---|---|---|---|---|
| 20 | | | | | | 1 | | 1 |
| 40 | | | 6 | 15 | 16 | | 1,326 | 1,363 |
| 50 | | | 34 | 370 | 611 | 971 | | 1,986 |
| 60 | | 26 | 170 | 44 | 76 | 66 | | 382 |
| 70 | | | 16 | 30 | 92 | 20 | | 158 |

| Speed (km/h) | Type 1 | Type 2 | Type 3 | Type 4 | Type 5 | Type 6 | Type 9 | Total |
|---|---|---|---|---|---|---|---|---|
| 80 | 22 | 18 | 102 | 28 | 6 | | | 176 |
| 100 | 46 | | | | | | | 46 |
| 110 | 86 | | | | | | | 86 |
| **Total** | **154** | **44** | **328** | **487** | **801** | **1,058** | **1,326** | **4,198** |

Key: 1 - Highway, 2 – Highway ramps, 3 - Arterial, 4 - Distributor, 5 - Collector, 6 - Local, 9 - Centroid connector

## Link capacities

Free-flow capacities by lane were based on Austroads guidance, reviewed in the context of other similar models in Australia. Some revisions were made to reflect local conditions. Capacities per lane were slightly different for single and multi-lane roads, as shown in Table 9.

Table 9. Base link capacities per lane

| Road type | Multi-Lane Capacity (PCUs per hour) | Single-Lane Capacity (PCUs per hour) |
|---|---|---|
| Highway | 1,900 | 1,800 |
| Highway ramp | 1,800 | 1,700 |
| Arterial road | 1,600 | 1,500 |
| Distributor | 1,350 | 1,300 |
| Collector | 1,150 | 1,100 |
| Local | 850 | 800 |

Base capacities per lane were then revised in line with road impedance levels, where these were defined as:

- Low – 100% capacity
- Medium – 90% capacity
- High – 80% capacity
- Rural – 95% capacity.

Links were assigned to these categories using engineering judgement, considering factors such as road side parking, topography, geometry, road surface condition, property access density and intersection approaches. Impedance values were then used in conjunction with lane capacities to generate the final matrix of link capacities presented in Table 10.

Table 10. Final capacities by road type based on impedance level

| Link Type | Rural | Low | Medium | High |
|---|---|---|---|---|
| Highway single-lane | 1,700 | 1,800 | 1,600 | 1,450 |
| Highway multi-lane | 1,800 | 1,900 | 1,700 | 1,500 |
| Arterial single-lane | 1,450 | 1,500 | 1,350 | 1,200 |
| Arterial multi-lane | 1,500 | 1,600 | 1,400 | 1,250 |
| Distributor single-lane | 1,250 | 1,300 | 1,150 | 1,050 |
| Distributor multi-lane | 1,300 | 1,350 | 1,250 | 1,100 |
| Collector single-lane | 1,050 | 1,100 | 1,000 | 900 |
| Collector multi-lane | 1,100 | 1,150 | 1,050 | 900 |
| Local single-lane | 750 | 800 | 700 | 650 |
| Local multi-lane | 800 | 850 | 750 | 650 |

## Volume delay functions – link delay

Two sets of volume delay functions were used in model development; link based delay and junction approach delay, also assigned to links.

Link delay in the CHSTM was based on a function known as the Akcelik speed-flow curve, one of the most widely used curves in establishing speed flow relations.

The expression of the Akcelik curve is as follows:

$$t = t_f + 0.25\ T_p\ [z + (z^2 + 8\ J_D\ (x - x_0) / (Q\ T_p))^{0.5}] \qquad \text{for } x > x_0$$
$$= t_f \qquad \text{for } x <= x_0$$

Where:

$t$ = travel time at a given degree of saturation x (h/km)

$t_f$ = free-flow time or speed at x = 0 (h/km)

$t_n$ = travel time at capacity (x=1) (h/km)

$q_a$ = arrival flow (veh/h)

Q = capacity (veh/h)

x = degree if saturation, = $q_a$/Q (also known as volume/capacity or v/c ratio)

$x_0$ = degree of saturation below which the overflow delay is zero and travel time equals free-flow speed

$T_p$ = duration of peak flow period (1 h)

$J_D$ = shape or delay factor

z = (x -1)

$J_D$ is known as the Akcelik parameter, which defines the shape of the function. There is always some uncertainty in estimating the capacity Q and the travel time at capacity $t_n$, both of which will affect the shape factor $J_D$.

The solution for $J_D$ for uninterrupted traffic flow is set out below:
$J_D = 2\ Q\ (t_n - t_f)^2 / [T_p\ (1 - x_0)]$

During this project, literature reviews and analysis of reference models have been carried out to determine the $J_D$ factor to be used for the CHSTM. Different link types have different characteristics in the speed flow relations, hence the $J_D$ will be defined differently by link type.

The following $J_D$ factors were used for uninterrupted traffic flow based on the link types, presented in Table 11.

Table 11. $J_D$ values used for speed-flow curves by link type

| Link Type | $J_D$ Value |
|---|---|
| Highway | 0.3 |
| Highway ramps | 0.3 |
| Arterial road | 0.6 |
| Distributor | 0.9 |
| Collector | 1.2 |
| Local road | 1.6 |

The shapes of the speed-flow curves by link type are presented in Figure 9.

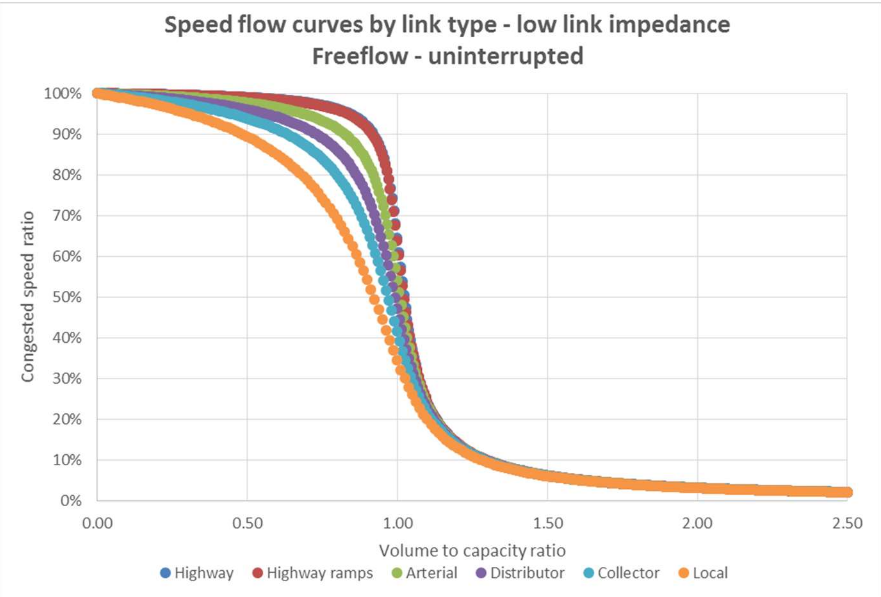


Figure 9 - Speed flow curves by link type

Comparisons have been made to check how the defined speed-flow curves fit with survey data points based on the relevant link type (where data exists). It can be seen in Figure 10 below that the curves generally fit well with survey data points.

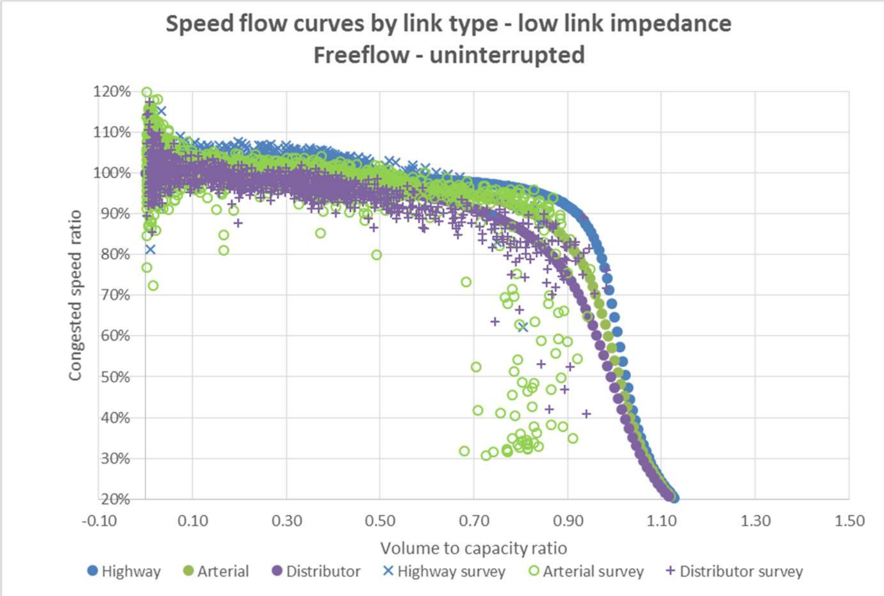



Figure 10 - Comparison of speed flow curves against observed data

## Volume delay functions – junction approach delay

The standard volume delay functions used in strategic transport models do not include delays at intersections. With this limitation, it often underestimates delays on links with signals / roundabouts, in which case the route choice in the statistical assignment may not be correctly informed.

In the CHSTM, intersection delays are not explicitly modelled at nodes. Instead, a set of junction approach delays are assigned to links as a proxy for the delays at intersections. In addition to the uninterrupted speed flow relation, different functions were adopted for the two types of intersections; signals and roundabouts.

This approach caps the first 500 metre link segment towards a signalised / roundabout junction with a higher $J_D$ value to reflect a more sensitive speed-flow relation. For links longer than 500 meters, the remaining section will follow the normal speed-flow relation as uninterrupted flow. This will avoid over estimating delays for long links in the network. The $J_D$ value used for the intersection approach section is 20 for signals and 5 for roundabouts.

Figure 11 and Figure 12 show the speed flow curves with combined junction delays and uninterrupted section of links based on the link type.

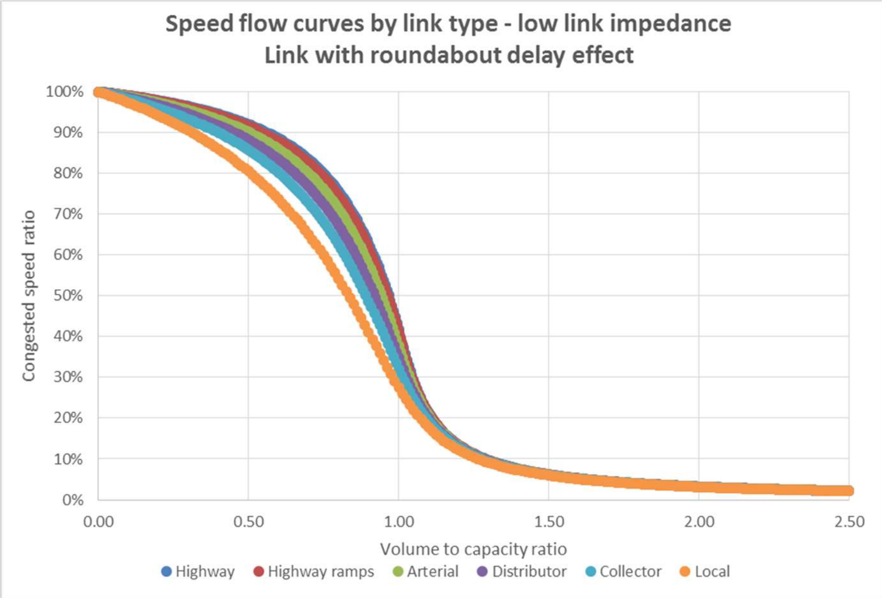



Figure 11 - Speed flow curves – roundabout delay effect

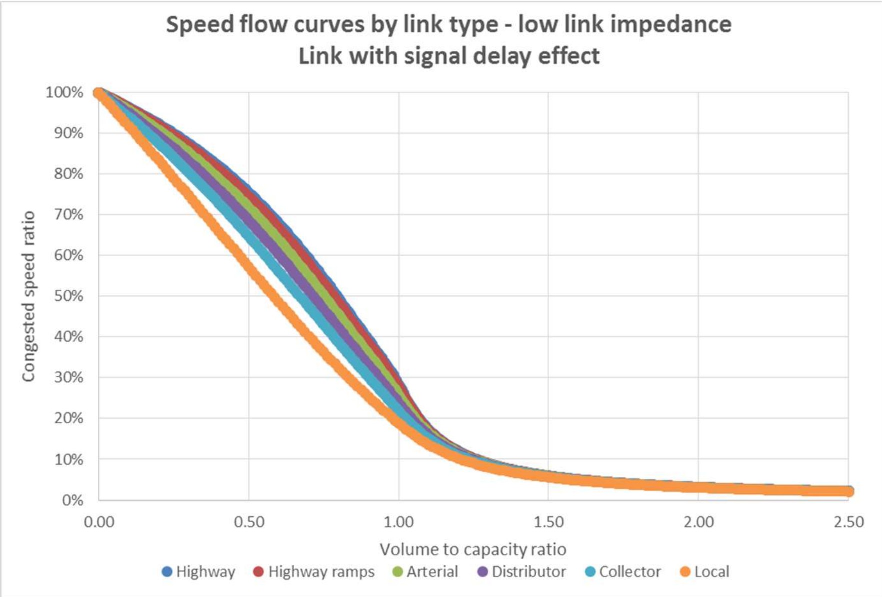



Figure 12 - Speed flow curves - signal delay effect

A comparison was made between the assumed speed-flow curves in the model and observed speed and volume data at roundabout approaches to observed data from the reference study. It can be seen that the curve generally fits in line with the survey data, as shown in Figure 13.

This data was not available for signalised approaches. The delays at signalised approaches are more sensitive to volume increases, whereby the congested speed drops quicker than roundabout approaches. However, there is a greater element of randomness when considering signal delays as such delays depend on the nature of signal operation when vehicles approach. The signal coordination would also affect the speed-flow relation considerably. For example, an optimised corridor would have good chance of obtaining a green signal when vehicle approaches –

similar to uninterrupted flow, whilst the opposite travel direction could be totally different. These details are not considered at this level of modelling.

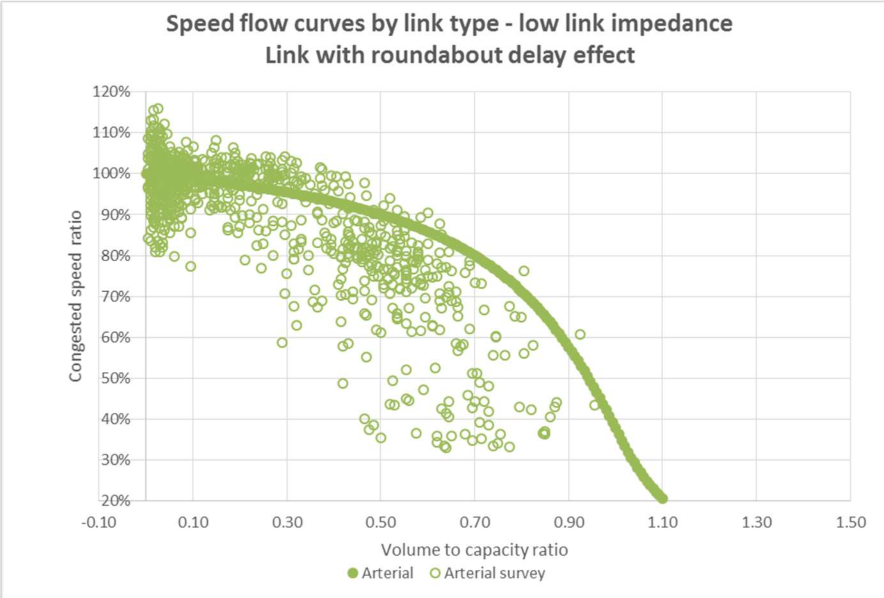



Figure 13 - Comparison of modelled against observed roundabout approach delays.

### 4.2.4 Base network overview

Based on the steps outlined in Chapter 4.2, the final input base network was created. Figure 14 and Figure 15 show the network coverage at a regional and Coffs Harbour city level respectively.

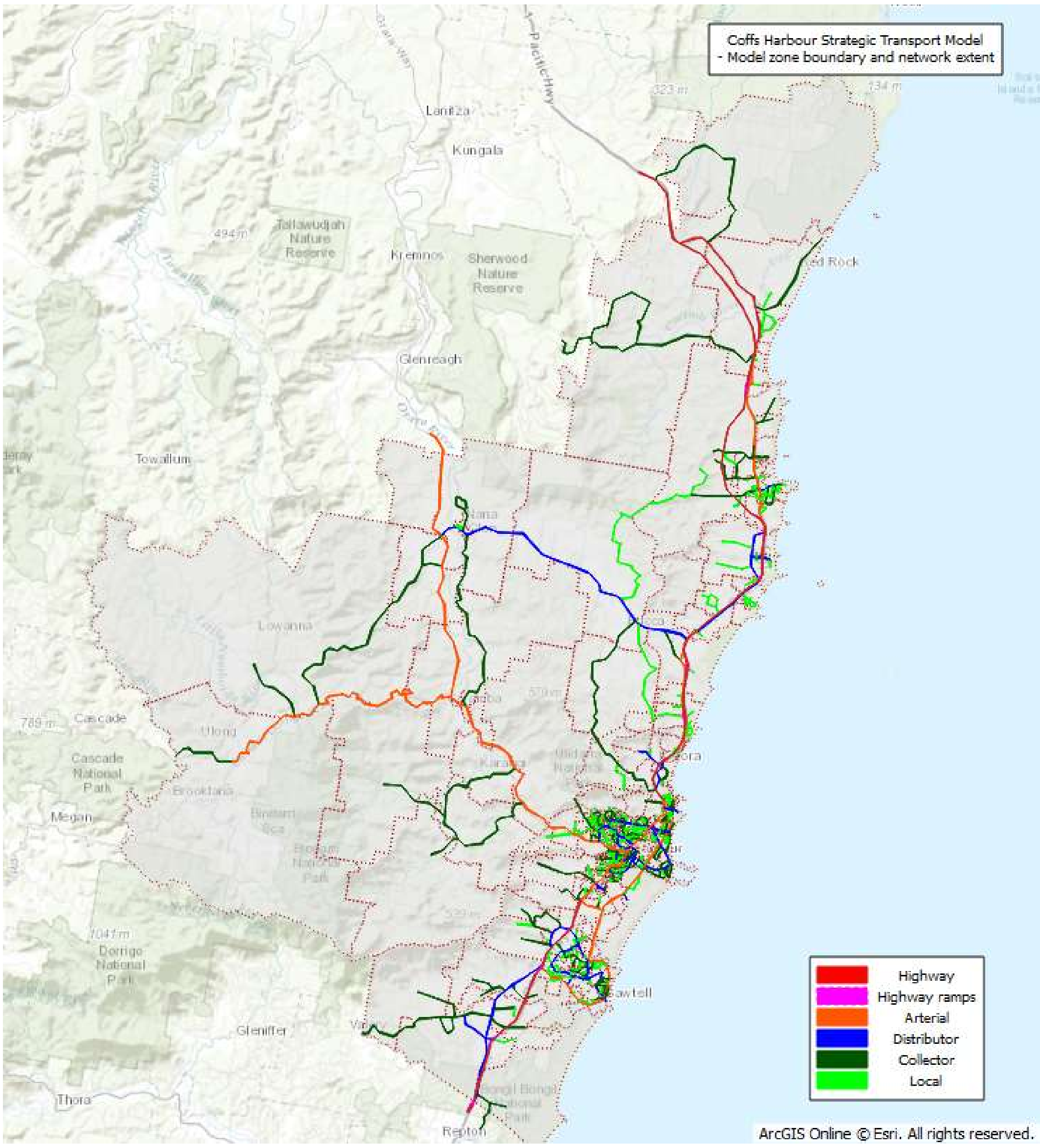



Figure 14 - CHSTM network coverage – LGA level

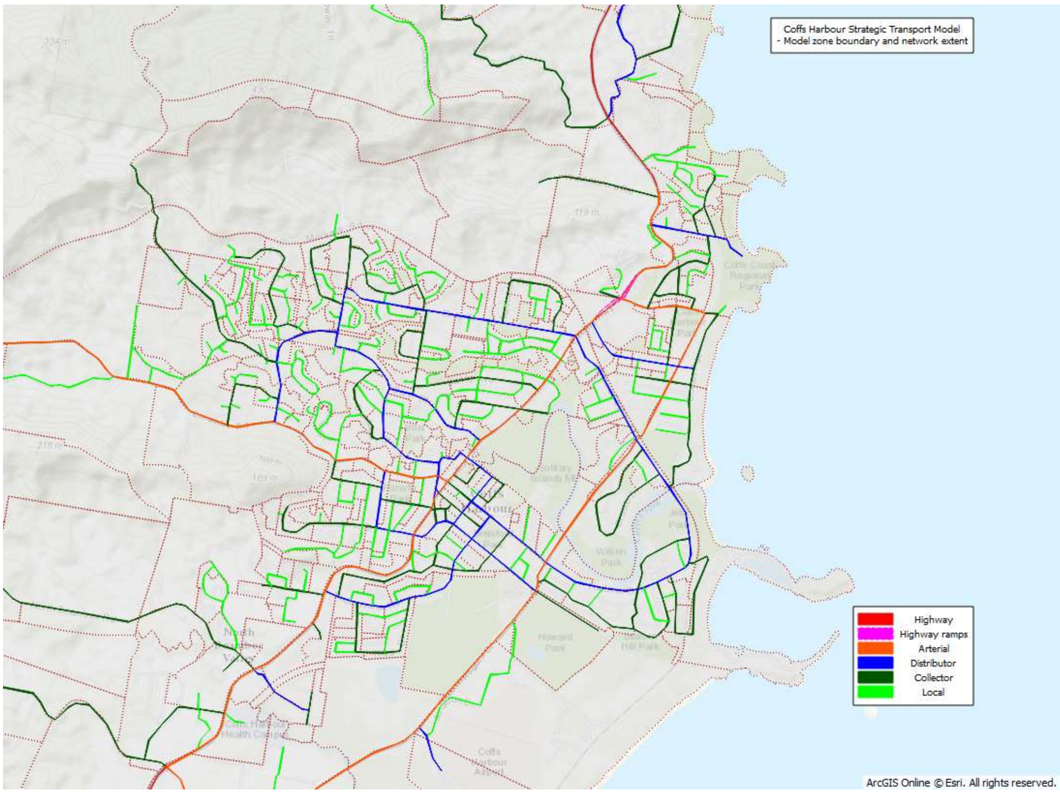



Figure 15 - CHSTM network coverage – Coffs Harbour city level

The data sources listed in Chapter 3 formed the basis of the land use inputs for the strategic model. For each of the model zones, the following land use data was produced and used as the basis for trip generation and attraction, and matrix development.

### 4.2.5 Population

The 619 model zones were allocated data for 2016 as follows:

- Occupied dwellings
- Population total
- Population 0 – 17
- Population 18 – 64
- Population 65 +
- Residential workers (blue and white collar workers, by industry)
- Domestic and international visitors.

Table 12 shows these numbers at a total level, for 2016 and how these compared to the 2011 data sources.

Table 12. Summary of demographic data totals

| Demographic | 2011 | 2016 Base Year |
|---|---|---|
| Occupied dwellings | 26,099 | 27,435 |
| Total population | 68,434 | 70,371 |
| Population 0 – 17 | 16,139 | 15,956 |
| Population 18 – 64 | 39,917 | 40,345 |
| Population 65+ | 12,378 | 14,068 |
| Total residential workers | 28,011 | 28,311 |
| Visitors | 5,148 | 5,377 |

### 4.2.6 Employment

After undertaking the employment regression modelling, described in Section 3.4, jobs by industry type and blue/white collar worker profession categories were estimated for each model zone. The total number of jobs by industry type calculated for 2016, in comparison to 2011, is presented in Table 13.

Table 13. Total jobs by industry type in 2016

| Year | Service | Professional | Industry | Retail | Other | Total Jobs |
|---|---|---|---|---|---|---|
| 2011 JTW data | 11,662 | 4,872 | 4,667 | 4,651 | 1,690 | 27,541 |
| 2016 forecast total | 11,138 | 4,757 | 5,669 | 4,477 | 1,926 | 27,966 |

## 4.3 Trip generation

The trip generation model is the first step of the traditional 4 step modelling process and is reliant on socio-economic and demographic inputs to model the number of trips produced and attracted to each designated travel zone in CHSTM.

This step requires the establishment of relationships between the demographics, and socio-economic variables, and the generated number of trip by the purposes of travel; these functions are usually informed by a HTS. However, due to the absence of local HTS data, and the NSW Regional HTS Pilot dataset lacking some of the required information for trip rate analysis, the trip generation rates from other reference models were reviewed and subsequently used for CHSTM development.

The demographics and socio-economic parameters in other comparable Australian regional towns of the eastern seaboard are generally homogeneous, so the trip making rates of Coffs Harbour can be predicted with reasonable accuracy using other models as a proxy. The reference models used for CHSTM development include:

- Cairns Strategic Transport Model
- Rockhampton and Livingstone Strategic Transport Model
- Townsville Strategic Transport Model

In addition to the above, other models were also used for sense checks in terms of trip composition and average trip rate. Those included the Mackay Area Transport Model, the Sunshine Coast Integrated Multi-Mode Model and the Brisbane Strategic Transport Model.

The home based work (HBW) trip generation was developed based on the 2011 JTW data in Coffs Harbour. The JTW information was released in January 2014 by TfNSW BTS, which provides a comprehensive set of information to establish the HBW trip relationship for Coffs Harbour.

The following set of trip purposes were defined in CHSTM:

- HBW (home based work trip)
- HBEPS (home based education primary and secondary trip)
- HBET (home based education tertiary trip)
- HBEs (home based escort trip)
- HBS (home based shopping trip)
- HBO (home based other trip)
- NHB (non-home based trip)
- VHB (visitor home based trip)
- VNHB (visitor non-home based trip)
- MCV (medium commercial vehicle trip)
- HCV (heavy commercial vehicle trip).

The daily trip generation and attraction rates by user class are shown in Table 14.

Table 14. Trip generation and attraction rates by trip purpose

| | Trip Purpose | Equation |
|---|---|---|
| Production | HBW | 1.294 household workers |
| | HBEPS | 0.949 residents age 0-17 |
| | HBET | 0.026 residents age 18-64 |
| | HBEs | 0.359 residents age 0-17 + 0.341 residents age 18-64 + 0.072 resident age 65+ |
| | HBS | 0.27 residents age 0-17 + 0.67 residents age 18-64 + 1.6 resident age 65+ |
| | HBO | 0.665 total residents |

| | Trip Purpose | Equation |
|---|---|---|
| | NHB | 0.104 total residents +1.641 primary enrolment + 0.77 secondary enrolment + 0.29 tertiary enrolment + 1.715 service jobs + 2.058 professional jobs + 0.686 industry jobs + 4.424 retail jobs +0.686 other jobs |
| | VHB | 2.5 visitors |
| | VNHB | 0.253 retail jobs (with expansion to 60% of VHB trips) |
| Attraction | HBW | 1.226 service jobs + 1.389 professional jobs + 0.964 industry jobs + 1.274 retail jobs + 1.389 other jobs |
| | HBEPS | 1.636 primary enrolment + 1.296 secondary enrolment |
| | HBET | 1.7 tertiary enrolment |
| | HBEs | 1.747 primary enrolment + 0.651 secondary enrolment |
| | HBS | 1.37 white collar service jobs + 6.529 white collar retail jobs |
| | HBO | 0.225 total residents + 0.882 primary enrolment + 0.882 secondary enrolment + 0.452 white collar service jobs + 0.452 white collar professional jobs + 0.452 white collar industry jobs +1.803 white collar retail + 0.452 white collar other |
| | NHB | 0.104 total residents +1.641 primary enrolment + 0.77 secondary enrolment + 0.29 tertiary enrolment + 1.715 service jobs + 2.058 professional jobs + 0.686 industry jobs +4.424 retail jobs + 0.686 other jobs |
| | VHB | 0.043 total population + 0.133 retail jobs + 0.085 other jobs |
| | VNHB | 0.253 retail jobs (with expansion to 60% of VHB trips) |

The HBW trip rate was calibrated to the JTW trip totals at the JTW zone level, as shown in Figure 16.

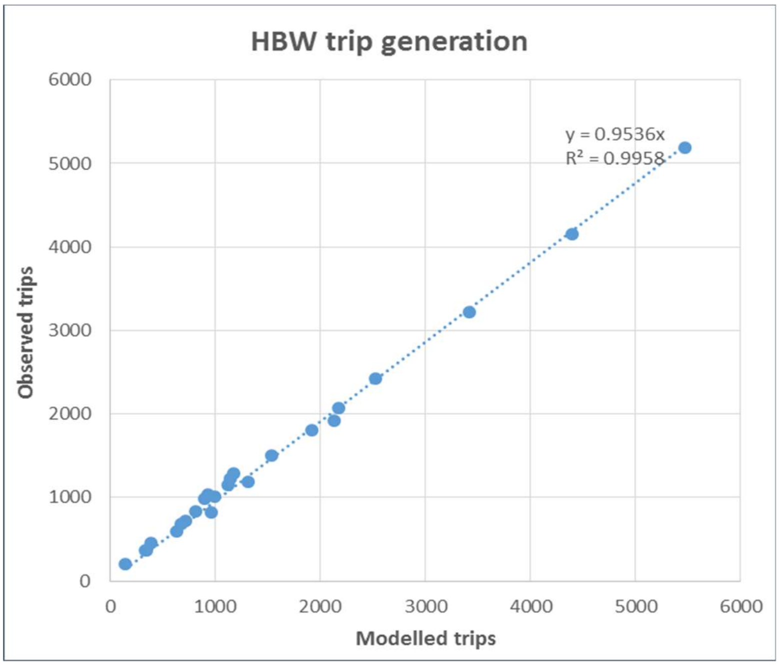



Figure 16 - HBW trip rate calibration against JTW data

Due to the lack of HTS data, observed total trips for other trip purposes were not available, so there were no comparable target values. However, the average daily trip rates by trip purpose were calculated based on the reference models listed above. These average rates are shown in Table 15. Forecast year trip rates per person and per household also included for comparison in Table 16 and Table 17.

Table 15. Average trip rates by purpose calibrated within model

| Trip Purpose | Average Daily Trip Rate | Unit |
|---|---|---|
| HBW | 0.443 | per resident |
| HBEPS | 0.271 | per resident |
| HBET | 0.080 | per resident |
| HBEs | 0.229 | per resident |
| HBS | 0.658 | per resident |
| HBO | 0.570 | per resident |
| NHB | 1.026 | per resident |
| VHB | 2.180 | per visitor |
| VNHB | 1.310 | per visitor |
| Total Average | 3.363 | Excluding visitors |

Table 16. Trip rates per person for all modelled years

| Trip rate (per person) | 2016 | 2024 | 2034 | 2044 |
|---|---|---|---|---|
| Home based work | 0.443 | 0.421 | 0.412 | 0.413 |
| Home based education (primary & secondary) | 0.271 | 0.281 | 0.286 | 0.288 |
| Home based education (tertiary) | 0.080 | 0.076 | 0.074 | 0.074 |
| Home based escort | 0.229 | 0.236 | 0.238 | 0.240 |
| Home based shopping | 0.658 | 0.672 | 0.675 | 0.667 |
| Home based other | 0.570 | 0.565 | 0.559 | 0.554 |
| Non home based | 1.113 | 1.094 | 1.094 | 1.108 |
| Total trip rate | 3.363 | 3.345 | 3.338 | 3.343 |

Table 17. Trip rates per household for all modelled years

| Trip rate (per household) | 2016 | 2024 | 2034 | 2044 |
|---|---|---|---|---|
| Home based work | 1.135 | 1.009 | 0.988 | 0.989 |
| Home based education (primary & secondary) | 0.695 | 0.672 | 0.685 | 0.689 |
| Home based education (tertiary) | 0.205 | 0.182 | 0.178 | 0.178 |
| Home based escort | 0.588 | 0.564 | 0.571 | 0.574 |
| Home based shopping | 1.688 | 1.609 | 1.616 | 1.598 |
| Home based other | 1.460 | 1.354 | 1.338 | 1.326 |
| Non home based | 2.853 | 2.621 | 2.622 | 2.653 |
| Total trip rate | 8.623 | 8.012 | 7.997 | 8.007 |

While there was no observed trip rate data available for Coffs Harbour, sense checks were carried out to compare modelled trip rates in the CHSTM to the trip rates estimated from the other reference models. The estimated car trip rate per person for the AM, PM and daily periods have been compared with the reference models in Table 18. The numbers were found to be generally close to the other models. Most of the reference models have modelled 2 hours peak periods, so the actual 1-hour peak rate would be higher if not just taking the average of the 2 hours.

Table 18. Car trip rate comparison

| Models | AM | PM | Daily |
|---|---|---|---|
| Coffs Harbour Strategic Transport Model | 0.26 | 0.26 | 2.66 |
| Rockhampton & Livingston Strategic Transport Model | 0.26 | 0.22 | 2.35 |
| Mackay Area Transport Model (average rate of 2hr peak) | 0.19 | 0.21 | 2.57 |
| Cairns Strategic Transport Model (average rate of 2hr peak) | 0.20 | 0.17 | 2.06 |
| Townsville Strategic Transport Model (average rate of 2hr peak) | 0.20 | 0.23 | 2.67 |
| Sunshine Coast Integrated Multi-Mode Model (average rate of 2hr peak) | 0.20 | 0.19 | 2.52 |

## 4.4 Trip distribution

Trip distribution is often the second stage of the four-step modelling process which distributes the trips between origins and destinations by trip purposes according to the relative attractiveness and the friction (travel cost including time and distance) to each destination. The parameters which determine the distribution pattern are generally considered unique due to the distinctive land use pattern in each city. However, there are often similarities in the travel distance profile which is determined by the mechanism of a gravity model. The gravity model process essentially assumes that people are more likely to choose their employment and/or residential locations based on the relative accessibility between them.

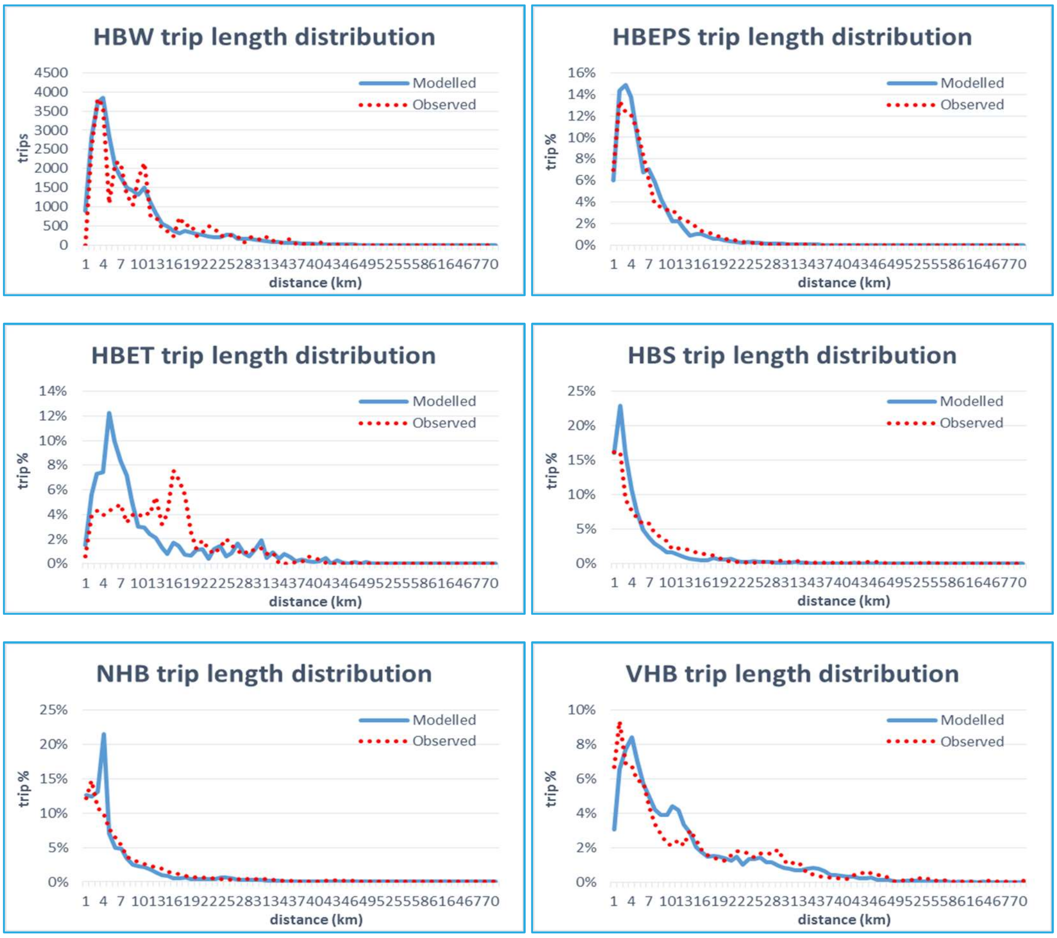
With inadequate information available in the pilot HTS dataset to inform such a relationship for Coffs Harbour, parameters from other models have been reviewed and adopted for use in CHSTM. The HBW trip distribution was informed by the 2011 JTW data, therefore the trip distribution was developed and calibrated against the JTW data in Coffs Harbour. Trips for other purposes have been calibrated to the trip length distribution indicated in the reference models. Trip distribution friction factors by purpose are shown in Table 19.

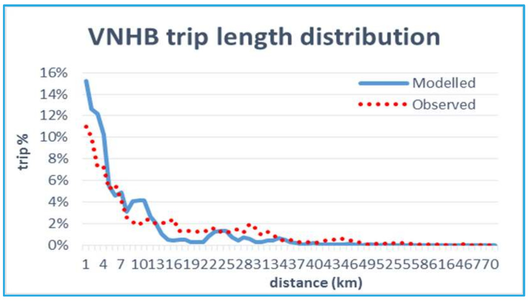
Table 19. Trip distribution friction factors by purpose

| Trip Purpose | Alpha | Beta |
|---|---|---|
| HBW | -0.2 | -0.003 |
| HBEPS | -0.6 | -0.005 |
| HBET | -0.8 | 0 |
| HBEs | -0.7 | -0.005 |

| Trip Purpose | Alpha | Beta |
|---|---|---|
| HBS | -2 | -0.011 |
| HBO | -0.7 | -0.003 |
| NHB | -0.35 | -0.003 |
| VHB | -0.3 | -0.001 |
| VNHB | -0.4 | 0 |

The comparison of modelled trip length distributions to the observed / target trends are shown in Figure 17. As discussed, the HBW trip distribution is calibrated to 2011 JTW data so the calibration was achieved for both trip volumes and distance. For other trip purposes, the calibration was undertaken for trip percentage travel by distance as the total trip volumes from the reference model were not directly comparable due to the difference in population size. The HBET (home based education tertiary) trip length is different to the reference model, because this particular trip purpose is very area specific depending on the location of the tertiary facilities and the city size.





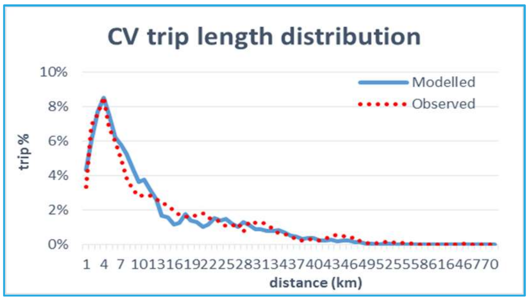




Figure 17 - Modelled v observed trip length distributions by trip purpose

## 4.5 Time of day and mode split

The third stage of the four-step modelling process involves separating the travel demand by purpose into various travel modes such as car drivers, car passengers, public transport and active transport. The mode share percentage information was derived from the pilot HTS dataset for most of the trip purposes. A very low share of public transport mode was observed in the dataset across all the surveyed regional towns including Coffs Harbour, consistent with known travel patterns in Coffs Harbour and other regional centres.

Importantly the reference models that have been used to benchmark parameters for this model also exhibited low public transport mode share. The range of data sources described above and the expectation that public transport mode share will not change significantly in the future suggested that the approach of applying fixed mode share is reasonable.

The mode share parameters were primarily calibrated to the pilot HTS data which included HBW, HBS, HBO, and HBEs trip purposes, while the remainder of the trip purposes were reviewed and compared to the reference models. The time of the day travel information was not included in the pilot HTS data provided, and as such this information has been reviewed and extracted from the reference models. The time of day travel is ultimately validated by screenline counts, as the model validation includes each of the modelled time periods.

Care was taken when considering trip purposes other than HBW and HBE trips. However, there is a risk of inaccuracy without an observed travel survey dataset to rely on. The similarities in travel profile characteristics between the cities of the reference models and the Coffs Harbour traffic surveys do provide confidence in the assumptions applied within the model. At the same time, the comprehensive traffic count dataset provides a strong point of comparison to validate the model against. Table 20 shows active travel mode share values used in the CHSTM, in addition to the calculated car occupancy rates.

Table 20. Calibrated mode share for active travel and car occupancy rates

| Trip Purpose | Calibrated Active Travel Mode share | Pilot HTS Survey Active Travel Mode Share | Calibrated Car Occupancy Rate | Pilot HTS Survey Car Occupancy Rate |
|---|---|---|---|---|
| HBW | 7.5% | 7.6% | 1.1 | 1.08 |
| HBEPS | 16.0% | *N/A* | 65^ | *N/A* |
| HBET | 16.3% | *N/A* | 1.3 | *N/A* |
| HBEs | 3.6% | 3.5% | 1.1 | 1.05 |
| HBS | 8.9% | 9.7% | 1.2 | 1.13 |
| HBO | 12.9% | 10.7% | 1.2 | 1.15 |
| NHB | 8.1% | *N/A* | 1.1 | *N/A* |
| VHB | 15.3% | *N/A* | 1.2 | *N/A* |
| VNHB | 8.5% | *N/A* | 1.2 | *N/A* |

^ Car occupancy rate calculated as total trips over car trips

## 4.6 External demand

Following the development of the internal demand matrices, the external base year and future year demand matrices were estimated. Five bi-directional count sites were used to calculate origin and destination matrix control totals for the five model time periods. These count sites are located as per Table 21.

Table 21: External trip count site locations

| Site ID | Location | Direction |
|---|---|---|
| 1.1 | Pacific Hwy *North Of Range Rd* | Northbound |
| | | Southbound |
| 1.3 | Eastern Dorrigo Way *50m East of Lower Bobo Rd* | Westbound |
| | | Eastbound |
| 1.4 | Glennifer Rd *40m West of Gordons Rd* | Westbound |
| | | Eastbound |
| 1.5 | Pacific Hwy *North of Mailmans Track Rd* | Northbound |
| | | Southbound |
| 1.6 | Pine Creek Way *North of Overhead Bridge Rd* | Northbound |
| | | Southbound |

For the internal-external (I2E) and external- internal (E2I) base and future year matrices, observed distribution factors (obtained from the Coffs Harbour O-D survey) were applied to both the origin and destination matrix control totals. I2E and E2I matrices for all vehicle classes were subsequently adjusted to take into account a finer distribution at the zonal level.

For light vehicles, internal-internal (I2I) HBW, VHB and VNHB trip purpose matrices were used to scale the base and future year I2E and E2I matrices. Medium and heavy commercial vehicle I2E and E2I matrices were not adjusted by trip purpose.

A yearly growth factor of 1.4% was applied to the 2016 base year E2E demand matrix to obtain future year E2E demand matrices. The E2E, E2I and I2E matrices were then summed to form an external assignable matrix.

## 4.7 Special generators

Special generator traffic demand was developed based on eight special generator zones (see Table 22). Traffic count data from 14 bidirectional sites within these zones were used to create initial origin and destination base year traffic matrices.

Table 22: CHSTM special generators

| Zone ID | Location |
|---|---|
| 109 | Baringa Private Hospital |
| 123 | Park Beach Plaza |
| 222 | Park Beach Home Base Homemaker Centre |
| 314 | Coffs Harbour Marina |
| 315 | Bunnings Coffs Harbour South |
| 448 | Coffs Harbour Airport |
| 455 | Coffs Harbour Health Campus |
| 553 | Toormina Shopping Centre |

These initial base year origin and destination matrices were subsequently growthed by compound annual growth rates (CAGRs, see Table 23) to create future year special generator matrices. Initial CAGRs were used to develop future year matrices, however, following modifications to the demographic process these CAGRs were updated to align with population growth across the model year horizons. CHSTM iterations to come will include the updated special generator CAGRs with sensitivity tests having shown only minor differences in link flows between the initial and updated CAGRs.

Table 23: CHSTM special generator CAGRs

| Years | Initial CAGR | Updated CAGR |
|---|---|---|
| 2016 | 0.00% | 0.00% |
| 2016 - 2024 | 1.53% | 1.10% |
| 2024 - 2034 | 1.49% | 0.90% |
| 2034 - 2044 | 1.44% | 0.80% |

The assignable demand matrix was then filtered to the special generator zones to obtain a distribution and finally adjusted to meet the special generator origin and destination matrix control totals.

## 4.8 Assignment

The final stage of the four-step modelling is primarily related to the choice of travel routes on the road network. As detailed in Chapter 4.2, the CHSTM network hierarchy includes state controlled highways, arterial roads, distributor roads, collector roads. Some important local roads have also been included to form the connections between zone connectors and major roads and / or considered providing through traffic routes to the other local traffic feeders. Intersection delays of signals and roundabouts have also been taken into account in the delay functions during the network establishment.

The traffic assignment is performed on an hourly basis for each time period with a representation of similar level of congestion and route choice indicated by the traffic surveys (described in Chapter 3.6).

Assignment works on the basis that the cheapest, or least cost path is the route that travellers will choose. The Emme assignment module performs an equilibrium traffic assignment using the path-based traffic assignment method, until the state of Wardrop Equilibrium is reached. Once this state is achieved, based on a set of specified convergence criteria, the assignment is deemed to have achieved convergence.

- Max iterations: 50
- Relative gap: 0.0001
- Best relative gap: 0.01
- Normalised gap: 0.001

For assignment purposes, the vehicle to PCU values of 4 and 2 for HCV and MCV were used, as per RMS modelling guidelines[1].

[1] RMS Traffic Modelling Guidelines, Chapter 10.1.1

# 5 Strategic model validation

The model validation has been reported using the criteria outlined in the Roads and Maritime's Modelling Guidelines for highway assignment models and the New Zealand Transport Authority's (NZTA) Transport Model Development Guidelines. The NZTA's guidance has been used as the criteria recognises different types of models, from strategic or regional transport models through to project models.

The CHSTM serves primarily as a demand forecasting model, supplying outputs to the detailed traffic assignment model. Given this primary function, matrix-estimation has not been undertaken within the assignment Emme model. Validation statistics using the Emme assignment model have been provided to demonstrate the level of modelling accuracy achieved at a strategic level.

## 5.1 Approach to validation

Validation has been undertaken in both CHSTM, and also in the mesoscopic model; the latter is ultimately used as the assignment module within the 4-step process to inform the project. As such, the validation performance presented in this chapter is intended to demonstrate the extent to which the CHSTM performs against the RMS guidelines and the NZTA's criteria for regional models.

The CHSTM model has been validated against 14 screenlines with approximately 100 individual count locations (by direction) for each modelled time period (AM, OP, PM, RD) and the aggregated daily, and for each vehicle classes (LV, MCV, HCV). It also has been validated against four travel time routes by directions for and AM and PM peak periods.

## 5.2 Counts and screenline locations

The count and screenline data described in Chapter 3.6 was used to undertake model validation. This consisted of 100 individual sites and 14 screenlines, with the locations of screenlines shown in Figure 18 and Figure 19.

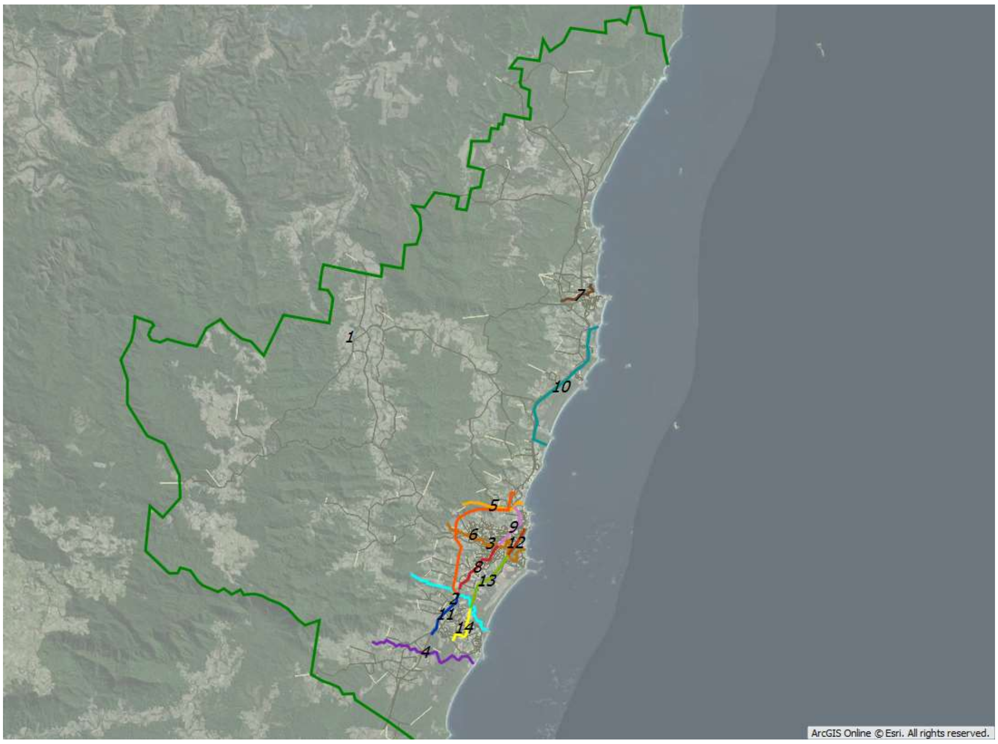



Figure 18 - Screenlines used in model validation – LGA wide

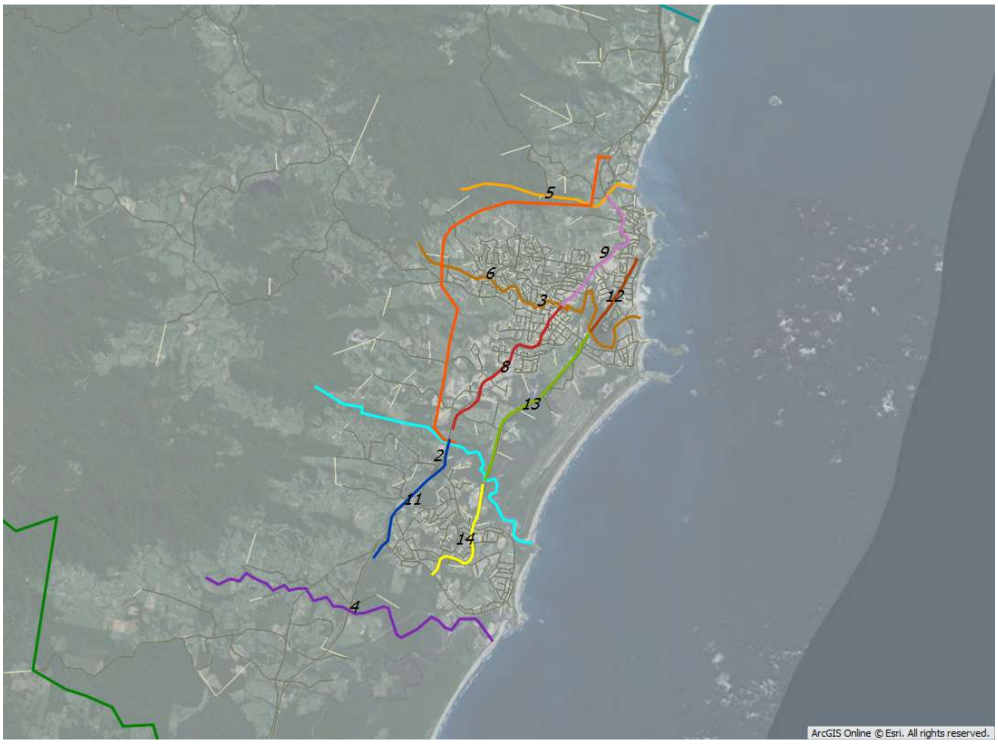



Figure 19 - Screenlines used in model validation - Coffs Harbour city area

## 5.3 Count validation statistics

The Roads and Maritime's model calibration and validation guidelines[2] were used with the NZTA EEM guidelines as the basis for assessing model validation performance. The Roads and Maritime's guidelines have been developed from a variety of sources, including the UK DMRB and NZTA's EEM. In summary, the guidance recommends that:

- 95% of individual link values to have a GEH <= 5.0
- 85% of individual turn values to have a GEH <= 5.0
- All individual link and turn volumes should have a GEH <= 10.0
- Plots of modelled versus observed hourly flows required, included $R^2$ values and slope equation
- All $R^2$ values >= 0.9 and counts RMSE <= 30.0
- Each directional screenline or cordon total to have GEH < 4.0.

Validation criteria are guidelines and should not be viewed as a pass/fail test of the model, but should be used to highlight the strength and weaknesses of the model in reflecting observed travel characteristics. They therefore inform the application of the model and future model development by providing information to assess model performance and suitability.

Note that:

- whilst overall, the model may achieve a level of acceptable fit, model users will still need to establish that the model performs satisfactorily in the local area of interest;
- the validity and currency of observed traffic count data should be take into account, day to day variation, impacts of road network construction as well as seasonal variation may be important in some applications.

## 5.4 Screenlines

In terms of screenline validation, the performance of CHSTM against RMS guidelines is shown in Table 24 and Table 25. The analysis suggests that the AM period has achieved a higher level of screenline validation than the PM period.

Table 24. AM screenline GEH – RMS target

| Criteria | AM Count | AM % | Target % | RMS Criteria |
|---|---|---|---|---|
| GEH <= 4 | 26 | 93% | 100% | **N** |
| Total | 28 | | | |

[2] RMS Traffic Modelling Guidelines, Table 10.3

Table 25. PM screenline GEH – RMS target

| Criteria | PM Count | PM % | Target % | RMS Criteria |
|---|---|---|---|---|
| GEH <= 4 | 22 | 79% | 100% | N |
| Total | 28 | | | |

It should be noted that these guidelines are intended for use with highway assignment models, and represent a stringent set of targets for a strategic model to achieve. Comparing the CHSTM to the strategic modelling requirements presented in the New Zealand Transport Agency Transport Model Development Guidelines[3] highlights that the CHSTM is performing well within the requirements of a model of this nature, as shown in Table 26 and Table 27.

Table 26. AM screenline GEH – NZ guidelines

| Criteria | AM Count | AM % | Target % | NZ Criteria |
|---|---|---|---|---|
| GEH <= 5 | 26 | 93% | > 60% | Y |
| GEH <= 10 | 27 | 96% | > 90% | Y |
| Total | 28 | | | |

Table 27. PM screenline GEH – NZ guidelines

| Criteria | PM Count | PM% | Target% | NZ Criteria |
|---|---|---|---|---|
| GEH <= 5 | 25 | 89% | > 60% | Y |
| GEH <= 10 | 28 | 100% | > 90% | Y |
| Total | 28 | | | |

Presenting the screenline data in scatter plots by vehicle type highlights the level to which each class validates against the observed data. The RMS guidelines does not state requirements for screenlines, therefore the New Zealand guidelines have been used for this purpose.

Figure 20 - Scatter plot - AM LV modelled v observed screenlines

Figure 20 to Figure 22 present scatter plots for LV, MCV and HCV in the AM peak, while Figure 23 to Figure 25 present corresponding information for the PM peak. The $R^2$ values and line of best fit for each vehicle class and time period are summarised in Table 28 below. The comparison highlights that the modelling of LV traffic and MCVs is very good across all time periods, with HCVs performing less well. It is worth noting that in the CHSTM, the former two vehicle classes represent 98% of the total network flow, suggesting that the overall representation of traffic volumes on the network is very good.

[3] https://www.nzta.govt.nz/assets/resources/transport-model-development-guidelines/docs/tmd.pdf

Table 28. Screenline $R^2$ values and line of best fit for each vehicle class and time period

| Period | Measure (target) | LV | MCV | HCV | RMS Criteria |
|---|---|---|---|---|---|
| AM | $R^2$ (> 0.85) | 0.95 | 0.86 | 0.55 | Y Y N |
| | Line of best fit (y = 0.9x - 1.1x) | y = 0.95x | y = 0.99x | y = 0.99x | Y Y Y |
| OP | $R^2$ (> 0.85) | 0.88 | 0.93 | 0.78 | Y Y N |
| | Line of best fit (y = 0.9x - 1.1x) | y = 0.91x | y = 0.98x | y = 0.93x | Y Y Y |
| PM | $R^2$ (> 0.85) | 0.93 | 0.90 | 0.64 | Y Y N |
| | Line of best fit (y = 0.9x - 1.1x) | y = 1.02x | y = 1.01x | y = 0.94x | Y Y Y |
| RD | $R^2$ (> 0.85) | 0.91 | 0.95 | 0.90 | Y Y Y |
| | Line of best fit (y = 0.9x - 1.1x) | y = 0.95x | y = 0.97x | y = 1.02x | Y Y Y |

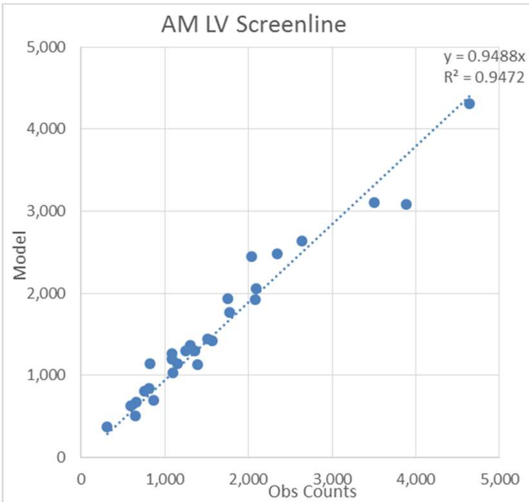



Figure 20 - Scatter plot - AM LV modelled v observed screenlines

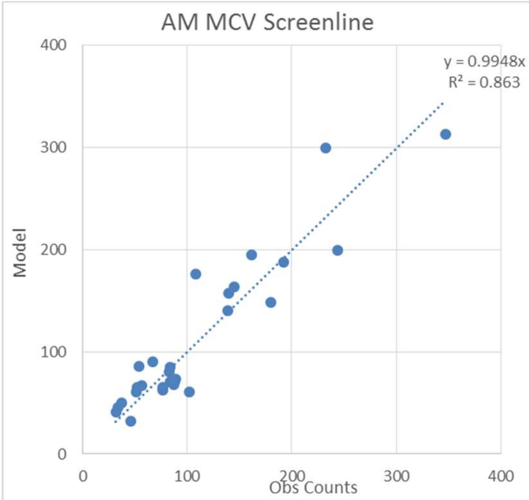



Figure 21 - Scatter plot – AM MCV modelled v observed screenlines

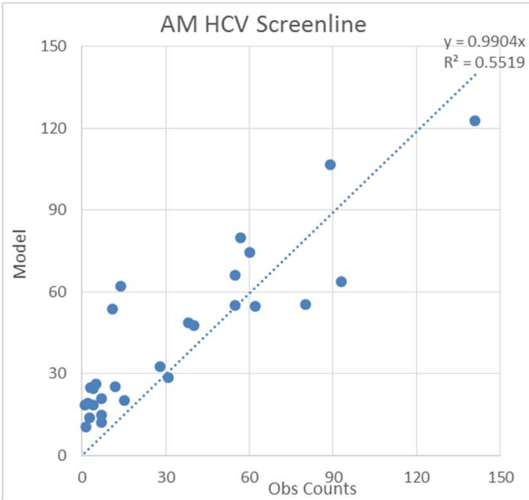



Figure 22 - Scatter plot - AM HCV modelled v observed screenlines

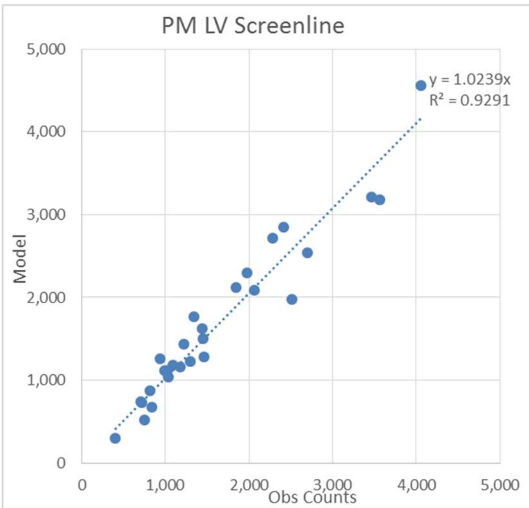


Figure 23 - Scatter plot – PM LV modelled v observed screenlines

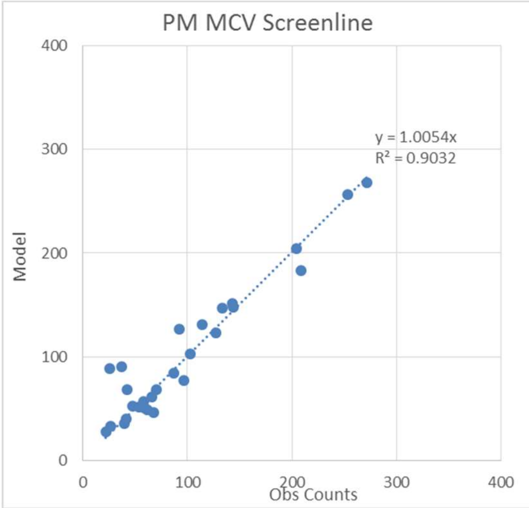



Figure 24 - Scatter plot – PM MCV modelled v observed screenlines

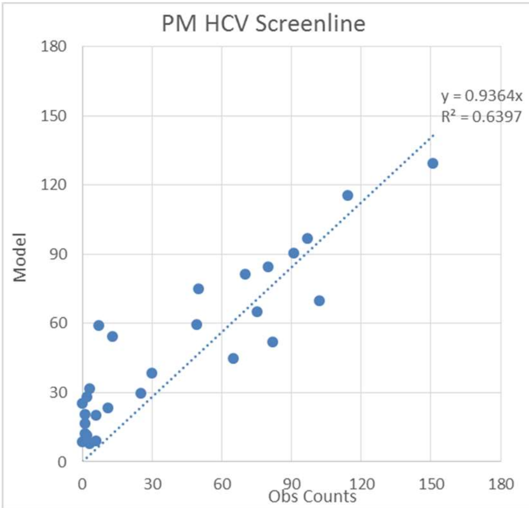



Figure 25 - Scatter plot – PM HCV modelled v observed screenlines

Full validation statistics, including graphs and performance against individual counts, are shown in 0 and 0.

## 5.5 Individual count validation

The CHSTM individual count validation following the RMS guidelines GEH criteria is shown in Table 29 and Table 30. The existing Pacific Highway corridor is well calibrated based on the counts available, with the model validation being weaker in some areas within the CBD.

Table 29. RMS GEH validation guidelines – AM individual counts

| Criteria | AM Count | AM % | Target % | RMS Criteria |
|---|---|---|---|---|
| GEH <= 5 | 157 | 68% | 95% | N |

| | | | | |
|---|---|---|---|---|
| GEH <= 10 | 216 | 93% | 100% | **N** |
| Total | 232 | | | |

Table 30. RMS GEH validation guidelines – PM individual counts

| Criteria | PM Count | PM % | Target % | RMS Criteria |
|---|---|---|---|---|
| GEH <= 5 | 170 | 73% | 95% | **N** |
| GEH <= 10 | 211 | 91% | 100% | **N** |
| Total | 232 | | | |

The AM and PM peaks demonstrate very similar performance, both falling short of the assignment modelling criteria set by RMS. However, comparing the CHSTM validation against the New Zealand strategic model GEH requirements again demonstrates that it comfortably meets these measures, as shown in Table 31 and Table 32.

Table 31. AM individual counts GEH – NZ guidelines

| Criteria | AM Count | AM % | Target % | NZTA Criteria |
|---|---|---|---|---|
| GEH <= 5 | 157 | 68% | 65% | **Y** |
| GEH <= 10 | 216 | 93% | 75% | **Y** |
| GEH <= 12 | 224 | 97% | 85% | **Y** |
| Total | 232 | | | |

Table 32. PM individual counts GEH – NZ guidelines

| Criteria | PM Count | PM % | Target % | NZTA Criteria |
|---|---|---|---|---|
| GEH <= 5 | 170 | 73% | 65% | **Y** |
| GEH <= 10 | 211 | 91% | 75% | **Y** |
| GEH <= 12 | 216 | 93% | 85% | **Y** |
| Total | 232 | | | |

The New Zealand guidelines for strategic models also indicate that comparisons of observed versus modelled link counts should be summarised in bandings, to support the GEH statistics. This analysis is presented in Table 33, which shows both the AM and PM period count data comfortably surpassing the 70% requirement.

Table 33. Individual counts modelled versus observed – percentage difference

| Criteria | Difference Criteria | AM | AM Achieved | PM | PM Achieved |
|---|---|---|---|---|---|
| Flow < 700 veh/hr | < 100 veh/hr | 209 | 167 | 210 | 173 |
| Flow 700 – 2700 veh/hr | < 15% | 23 | 14 | 22 | 14 |
| Flow > 2700 veh/hr | < 400 veh/hr | 0 | 0 | 0 | 0 |
| | Total | 232 | 181 | 232 | 187 |
| | Target >70% achieved | | 78% | | 81% |

Plotting modelled flows against observed counts by time period shows the degree to which each individual count validates. Table 34 demonstrates that the RMS criteria are very close to being met in the four time periods, including the off-peak and rest of day periods. The New Zealand guidelines for strategic models are comfortably met in all time periods. Scatter plots for each time period are shown in Figure 26 to Figure 29, while scatter plots for each vehicle type are included in Appendix C.

Table 34. Individual count $R^2$ values and line of best fit for each time period

| Period | RMS measure (NZ measure) | Total traffic | RMS Criteria | NZTA Criteria |
|---|---|---|---|---|
| AM | $R^2$ >0.9 ($R^2$>0.85) | 0.89 | **N** | **Y** |
| | Line of best fit (y = 0.9x - 1.1x) | y = 0.96x | *N/A* | **Y** |
| OP | $R^2$ >0.9 ($R^2$ >0.85) | 0.91 | **Y** | **Y** |
| | Line of best fit (y = 0.9x - 1.1x) | y = 0.97x | *N/A* | **Y** |
| PM | $R^2$ >0.9 ($R^2$ >0.85) | 0.90 | **Y** | **Y** |
| | Line of best fit (y = 0.9x - 1.1x) | y = 1.04x | *N/A* | **Y** |
| RD | $R^2$ >0.9 ($R^2$ >0.85) | 0.89 | **N** | **Y** |
| | Line of best fit (y = 0.9x - 1.1x) | y = 0.98x | *N/A* | **Y** |

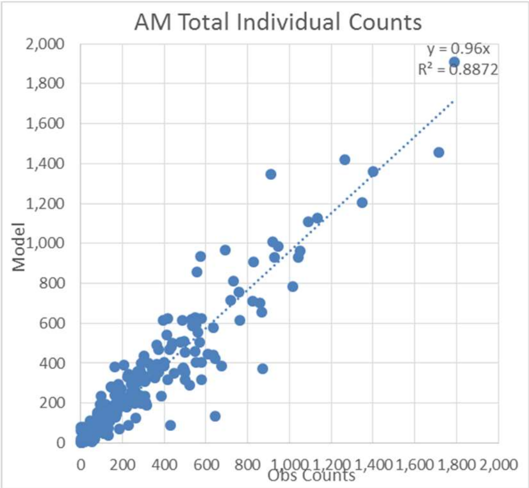



Figure 26 - Scatter plot – AM modelled v observed individual counts

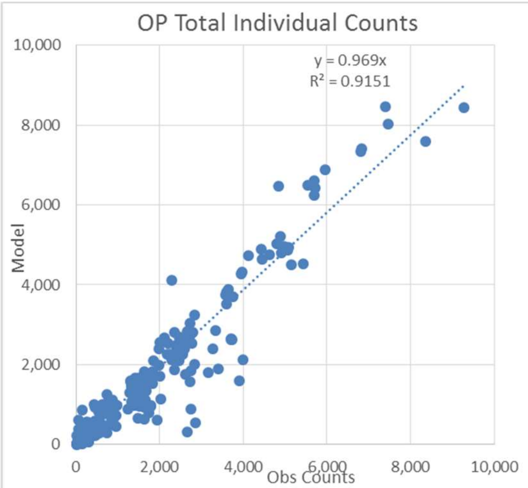



Figure 27 - Scatter plot – OP modelled v observed individual counts

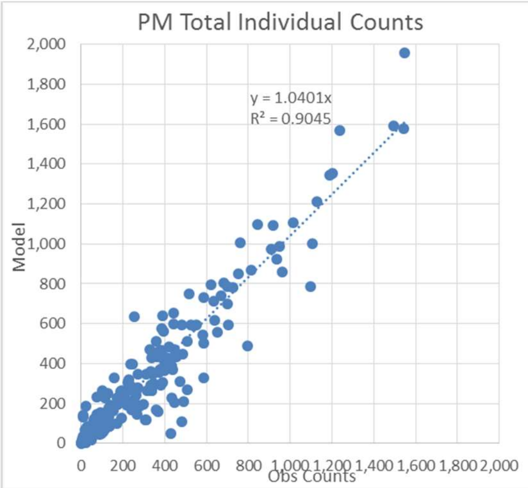



Figure 28 - Scatter plot – PM modelled v observed individual counts

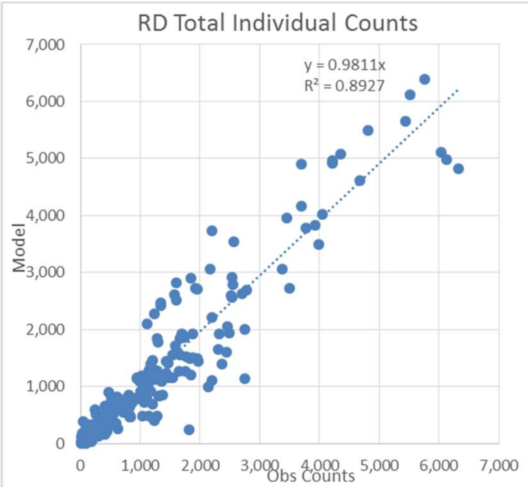



Figure 29 - Scatter plot – RD modelled v observed individual counts

As the primary purpose of the CHSTM development was to provide high level travel demand forecasts for the Coffs Harbour Bypass project, it is therefore important to understand how well the model performs in the locations of interest, especially the existing traffic corridors of Pacific Highway and Hogbin Drive.

Table 35 compares the modelled vehicle volumes to the observed volumes at the Pacific Highway and Hogbin Drive screenline count locations. It can be seen that the traffic volumes are reasonably well modelled along the Pacific Highway and Hogbin Drive. In the AM peak, 78% counts (out of 18) were achieved with a GEH of less than 5, and 94% with a GEH less than 10 and 12. In the PM peak, 83% counts were achieved with a GEH of less than 5, and 100% with a GEH of less than 10 and 12. This indicates that the model is reflecting existing traffic patterns well in the key areas of interest.

Table 35. Link volume validation at Pacific Hwy and Hogbin Dr locations

| Screenline | Road Name | Dir. | AM Period | | | PM Period | | |
|---|---|---|---|---|---|---|---|---|
| | | | Obs. | Mod. | GEH | Obs. | Mod. | GEH |
| SL1 | Pacific Hwy *North of Range Rd* | NB | 367 | 398 | 1.6 | 380 | 369 | 0.5 |
| | | SB | 308 | 310 | 0.1 | 508 | 510 | 0.1 |
| SL1 | Pacific Hwy *North of Old Pacific Hwy Interchange* | NB | 930 | 933 | 0.1 | 699 | 700 | 0.1 |
| | | SB | 563 | 553 | 0.4 | 935 | 921 | 0.5 |
| SL2 | Pacific Hwy *At Boambee Ck* | NB | 1,791 | 1,908 | 2.7 | 1,016 | 1,105 | 2.7 |
| | | SB | 944 | 985 | 1.3 | 1,546 | 1,957 | 9.8 |
| SL2 | Hogbin Dr *At Boambee Ck* | NB | 1,049 | 962 | 2.7 | 588 | 729 | 5.5 |
| | | SB | 534 | 588 | 2.3 | 951 | 989 | 1.2 |
| SL3 | Pacific Hwy *At Coffs Harbour Ck* | NB | 911 | 1,346 | 12.9 | 1,544 | 1,578 | 0.9 |
| | | SB | 1,400 | 1,359 | 1.1 | 1,191 | 1,343 | 4.3 |
| SL3 | Hogbin Dr *At Coffs Harbour Ck* | NB | 756 | 758 | 0.1 | 964 | 858 | 3.5 |
| | | SB | 830 | 908 | 2.7 | 681 | 803 | 4.5 |
| SL4 | Pacific Hwy *At Bonville Ck* | NB | 919 | 1,008 | 2.9 | 670 | 739 | 2.6 |
| | | SB | 532 | 618 | 3.6 | 909 | 975 | 2.2 |
| SL6 | Pacific Hwy *Adjacent to Fern Tree Pl* | NB | 692 | 968 | 9.6 | 1,494 | 1,590 | 2.4 |
| | | SB | 1,715 | 1,456 | 6.5 | 918 | 1,091 | 5.5 |
| SL7 | Pacific Hwy *At Woolgoolga Ck* | NB | 289 | 402 | 6.1 | 363 | 435 | 3.6 |
| | | SB | 363 | 372 | 0.5 | 384 | 464 | 3.9 |

## 5.6 Journey time validation

A set of four journey time routes were used for validation, covering two directions and two time periods, giving 16 comparisons with modelled travel times. The locations of these are shown in Figure 30.

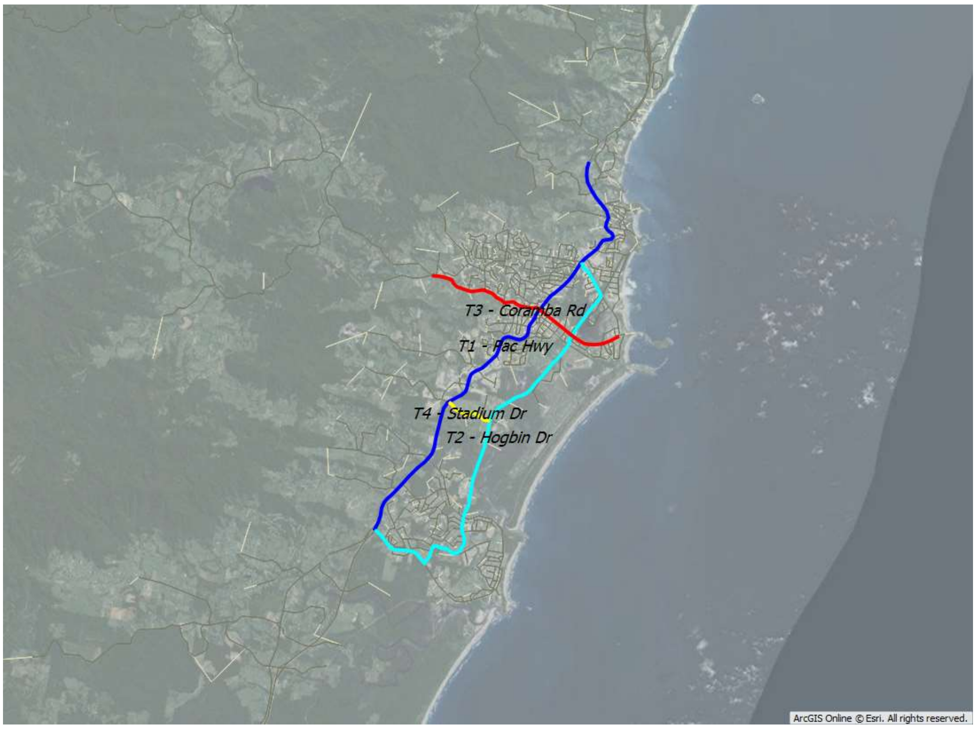



Figure 30 - Journey time routes used during validation

RMS modelling guidance recommends that 95% of modelled journey time routes should be within 15% or 1 minute (whichever is greater) of the observed values.

The model journey time validation is summarised in Figure 31, Figure 32 and Figure 33, with the performance of each route in the AM and PM shown in Table 36 and Table 37. A full breakdown of modelled against observed journey time comparison by segment is presented in Appendix D.

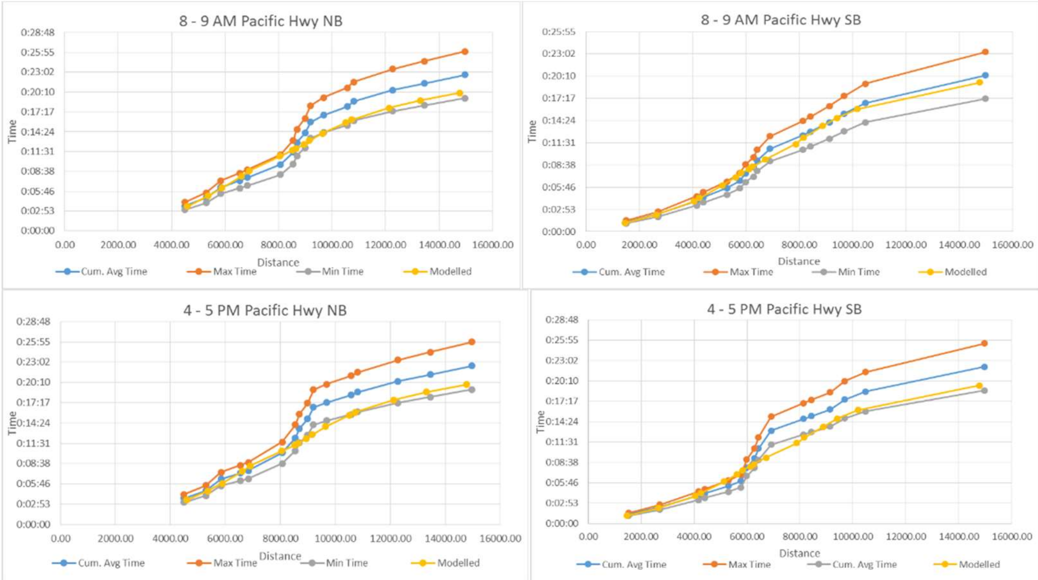



Figure 31. Journey time route 1 - Pacific Highway

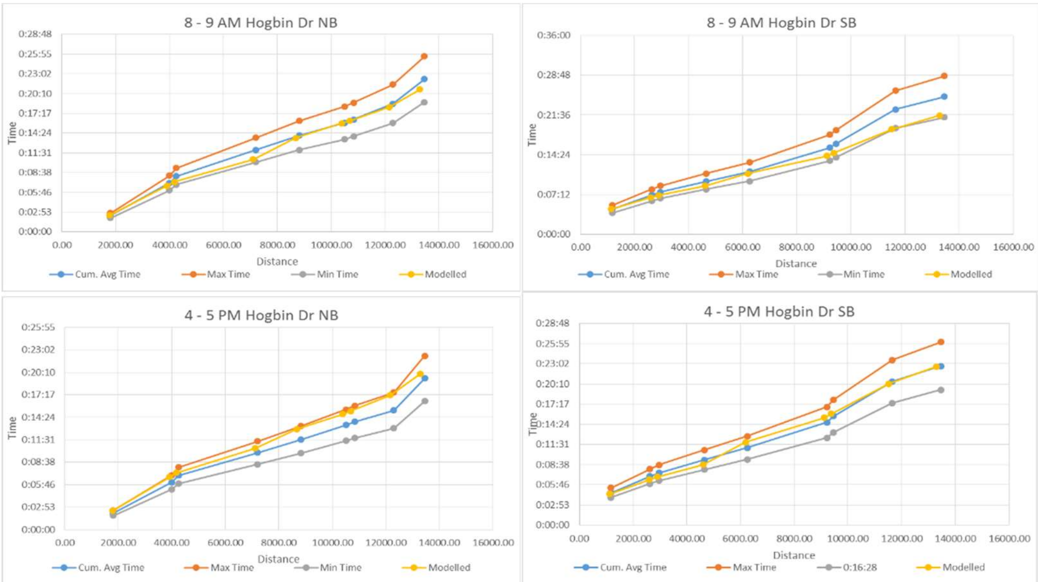



Figure 32. Journey time route 2 – Hogbin Drive

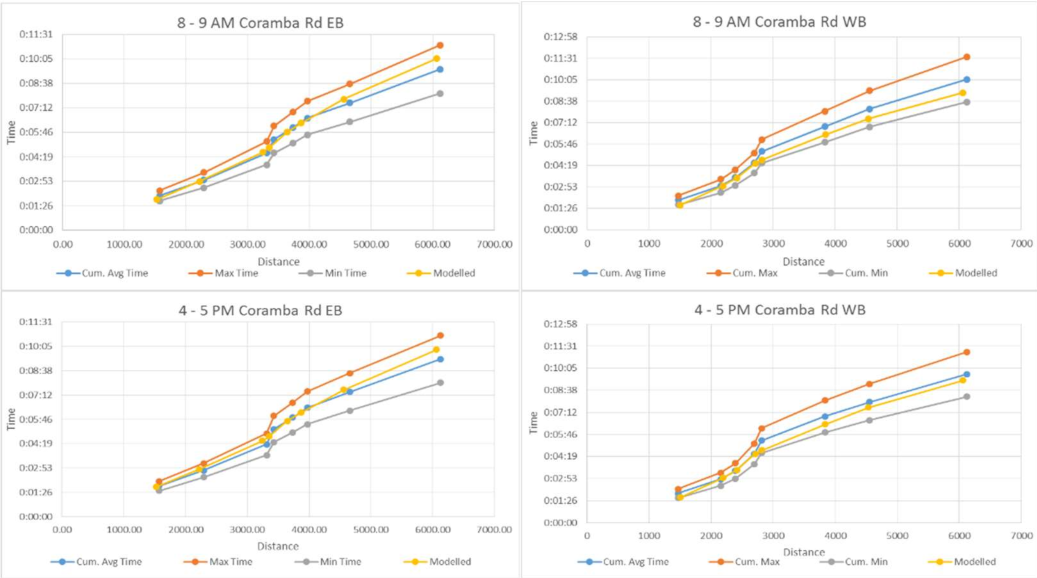



Figure 33. Journey time route 3 – Coramba Road

Route 4, Stadium Drive, only has one data point and therefore does not lend itself to being graphed.

Table 36. AM journey time route validation

| Route | Direction | Obs. (mins) | Mod. (mins) | Diff. (Abs.) | Diff (%) | RMS Criteria |
|---|---|---|---|---|---|---|
| 1 | NB | 22.68 | 19.92 | -2.77 | -12.2% | Y |
| 1 | SB | 20.27 | 19.23 | -1.04 | -5.1% | Y |
| 2 | NB | 22.28 | 20.61 | -1.68 | -7.5% | Y |
| 2 | SB | 24.93 | 19.22 | -5.71 | -22.9% | N |
| 3 | NB | 9.47 | 10.08 | 0.61 | 6.5% | Y |
| 3 | SB | 10.63 | 9.92 | -0.71 | -6.7% | Y |
| 4 | NB | 1.67 | 1.70 | 0.03 | 1.7% | Y |
| 4 | SB | 2.10 | 2.13 | 0.03 | 1.3% | Y |

Table 37. PM journey time route validation

| Route | Direction | Obs. (mins) | Mod. (mins) | Diff. (Abs.) | Diff (%) | RMS Criteria |
|---|---|---|---|---|---|---|
| 1 | NB | 22.53 | 19.87 | -2.67 | -11.8% | Y |
| 1 | SB | 22.13 | 19.52 | -2.61 | -11.8% | Y |
| 2 | NB | 19.38 | 20.65 | 1.27 | 6.5% | Y |
| 2 | SB | 22.73 | 20.47 | -2.27 | -10.0% | Y |
| 3 | NB | 9.32 | 9.95 | 0.63 | 6.8% | Y |
| 3 | SB | 9.68 | 10.10 | 0.42 | 4.3% | Y |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | NB | 1.68 | 1.68 | 0.00 | 0.1% | Y |
| 4 | SB | 2.30 | 2.16 | -0.14 | -6.1% | Y |

Overall, the model validation has achieved 94% (15 out of 16) of modelled routes being within a travel time difference of +/- 15% of the observed average. This conforms to the RMS guidelines against a target of 95%, suggesting that the CHSTM exhibits a very high level of validation against observed travel times.

## 5.7 Model vs O-D Survey

A select link analysis was undertaken for the Pacific Highway at O-D survey stations 3 and 8 using the CHSTM. This was compared to the 2017 O-D survey results to understand how closely the model reflected ‘through’ traffic volumes. The results of the comparison indicated the updated CHSTM has a good representation of through traffic between stations 3 and 8 as shown in Table 38.

Table 38 Through traffic analysis between station 8 and 3

| | Model select link | | | Observed 2017 O-D | | |
|---|---|---|---|---|---|---|
| **NB through** | **Total volume at station 8** | **Select link volume at station 3** | **% through** | **Total count at station 8** | **Matched count at station 3** | **% through** |
| Daily | 15679 | 2498 | 16% | 15661 | 2133 | 14% |
| AM | 1732 | 132 | 8% | 1887 | 134 | 7% |
| PM | 1069 | 163 | 15% | 1051 | 142 | 14% |
| **SB through** | **Total volume at station 3** | **Select link volume at station 8** | **% through** | **Total count at station 3** | **Matched count at station 8** | **% through** |
| Daily | 14289 | 2396 | 17% | 14596 | 2280 | 16% |
| AM | 1396 | 135 | 10% | 1911 | 137 | 7% |
| PM | 1148 | 193 | 17% | 922 | 183 | 20% |

# 6 Strategic model future years

## 6.1 Data sources

### 6.1.1 Demographic data sources

The data sources used to carry out the demographic forecast are listed below:

**For population and household forecast:**

- ABS 2011 and 2016 Census Data (reported in URP)
- DPE population and household forecast 2011 – 2036 (reported in ERP)
- .ID population and household forecast 2011 – 2036 (reported in ERP)
- Planning documents, development proposals and other traffic study reports received from Coffs Harbour City Council.

**For employment forecast:**

- Working age population forecast derived from population and household forecast (reported in URP)
- Bureau of Transport Statistics 2011 Journey to Work
- Department of Employment – Labour Market Information Portal projection 2015 – 2020
- North Coast Employment Land Review 2011 – 2031
- Planning documents, development proposals and other traffic study reports received from Coffs Harbour City Council.

**For enrolment forecast:**

- My School website 2016 enrolment information, TAFE and university sources
- School age bracket forecast derived from population and household forecast (reported in URP).

This information was used to establish the base year 2016 demographics and estimate the future year demographics for 2024, 2034 and 2044 at detailed traffic analysis zone (TAZ) level in the CHSTM. Based on this information, the CHSTM can be used to forecast future year travel conditions on the road network in Coffs Harbour.

## 6.2 Forecast procedure

The process followed to develop the demographic forecasts is broadly outlined below and the procedure is briefly illustrated in the flowchart in Figure 34:

- Base year data (2016) developed at a traffic analysis zone level for population and households, worker and employment, and school enrolment.  Base year data based on information from both the 2011 and 2016 census data packs and 2016 My School enrolment data.

- Forecast growth rates, by 16 .ID sectors, determined based on .ID forecasts
- Additional developments and .ID forecast growth rates used to determine unconstrained population and household forecasts
- Forecasts by job industry from *Department of Employment: Labour Market Information Portal* and *North Coast Employment Land Review*, and forecast growth rates used to determine unconstrained worker and employment forecasts by job industry
- Forecast growth rates of school age population used to determine unconstrained school enrolment forecasts
- Total forecast growth rates provided by DPE used to constrain population and households, worker and employment, and school enrolment forecast.

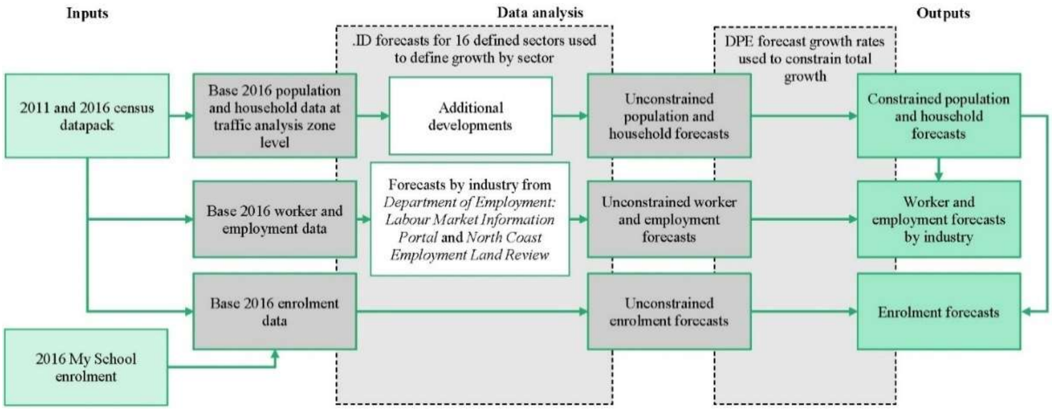



Figure 34: Demographic forecast procedure flowchart

## 6.3 Additional developments in Coffs Harbour

### 6.3.1 Planning documents

Coffs Harbour City Council provided a number of development related planning documents, proposals and transport assessment reports to inform the demographic forecast work. The development names, the supporting document titles and a brief description of each development are provided below:

- Korora Basin (referred in document *Planning Proposal – Korora Basin – Residue Land adjacent to the Pacific Highway, dated November 2016*): Residue land development – rezoning land to provide for 16 hectare of large lot (R5) from rural land use (RU) 40 hectare per lot to 1 hectare per lot, resulting in maximum 16 dwelling houses / 45 person in the area. The proposed opening date was June to August 2017.
- Big Banana Development (referred in document *Big Banana Development Coffs Harbour – Access Options Assessment Paramics Modelling, dated June*

*2011*): Mixed developments include residential apartments, retail and tourist attractions. There was no information about development size, but it assumed a total of 925 vehicles during the AM peak in 2025.

- North Boambee Valley East (referred in document *North Boambee Valley East Development Control Plan, dated July 2009*): Provided a target number of total 282 lots in the area. There was no proposed development time frame in this development control plan.
- North Boambee Valley West (referred in document *Coffs Harbour City Council Planning Proposal – North Boambee Valley West Residential Investigation Area, dated October 2013*): It noted the future resident population of the NBV (West) area will be approximately 2,130 people. No proposed development time frame was indicated in the document.
- Pacific Bay Western Lands (referred in document *Pacific Bay Western Lands Project Application – Environmental Assessment Report, dated March 2010*): Residential development contains 112 dwellings (19 townhouses and 93 single dwellings). No time frame was provided for the development but the consultant has assumed the site will be developed in a single phase and construction will take around two years by 2012.
- North Coffs Release Area (referred in document *Pacific Bay Western Lands Project Application – Environmental Assessment Report, dated March 2010*): A total of 34 hectares of land located south along West Korora Road (including 7.7 hectare of Big Banana Site). Information provided by the Council indicated approximately 340 lots, assumed all to be single detached dwellings. The development time frame is unknown.

### 6.3.2 Assumptions and process

The planning documents listed in Section 6.3.16.3.1 were reviewed and the proposed developments were compared with the initial development forecast contained with the .ID and DPE projections. It was found the North Boambee Valley (East) development was already captured in the initial forecast, with the forecasts showing an increase of households greater than the total dwellings proposed by the developments. The other developments were considered not to have been captured by the .ID and DPE forecasts.

Given that the majority of the development time frames were unclear or the initial proposed opening year had already passed with no development having taken place, assumptions were made for the development time frames for the relevant developments. Assumptions were also made for total development size which was not clearly stated. The additional residential development numbers and the assumed build out periods are shown in Table 39.

Table 39. Additional residential development assumptions

| Additional Development | Total dwellings | Assumed time frame | Captured by initial forecast? |
|---|---|---|---|
| Korora Basin | 16 | 2017 | N |
| Big Banana Development | 200 | 2020-2025 | N |
| North Boambee Valley (East) | 282 | 2020-2030 | Y |
| North Boambee Valley (West) | 900 | 2020-2030 | N |
| Pacific Bay Western Lands | 112 | 2020-2025 | N |
| North Coffs Release Area | 340 | 2020-2030 | N |

## 6.4 Population

### 6.4.1 Calculating household forecasts

To create population forecasts, the Forecast.ID household data was used as a starting point. Data covering all the assumed new residential sites within each of the 16 sectors in Coffs Harbour LGA was available in terms of site location description, quantum of development and temporal profile.

These sites were plotted in a GIS using a combination of automatic geocoding processes, and manual geo-referencing. Once geocoding was complete, the sites were assigned to CHSTM zones using a spatial join in the GIS. For sites without a specific spatial reference, such as infill development, these were allocated evenly across the CHSTM zones within the sector.

The next step was to calibrate this disaggregate model of development against the sector totals produced by .ID. To do this, the descriptions of the development size, and temporal profile relating to construction rate per year were used to estimate a build-out per annum profile for each site. This was an iterative process, with amendments made to profiles until the sector totals for 2024 and 2034 were within 1-2% of the forecasts.

The allocated total dwellings from the .ID forecast were converted into occupied dwellings, with each occupied dwelling representing a household. This conversion was carried out using the 2016 Census occupancy rate, and involved the following:

- Estimates were made at the TAZ level in CHSTM
- Occupancy rates from the 2016 Census were used for future years
- Model zones with no dwellings in the 2016 data were allocated an average occupancy rate based on the occupancy rate in the parent SA1 zone.

An additional feature was added to allow different dwelling build out scenarios to be modelled, because of uncertainties in projected future growth outcomes. This was implemented as a percentage factor to the total allocated dwellings within the .ID Forecasts as follows:

- High: 100% build out
- Medium: 75% build out
- Low: 50% build out.

These three dwelling forecast scenarios then formed the basis for generating unconstrained population projections. The medium build out scenario formed the core forecast, with high and low build out scenarios forming sensitivity tests.

### 6.4.2 Calculating total population forecasts

The 2016 Census total usual residence population to occupied private dwelling rate in each model zone was used to generate future population. This rate was approximately 2.7 total population per occupied private dwelling across the Coffs Harbour local government area in 2016. This is equivalent to 2.47 people living in each occupied private dwelling, with the remainder not residing in private dwellings. The relationship between usual residence population and occupied private dwelling in each zone was assumed to remain constant in future years.

The average household size is expected to change over time. The Forecast.ID future year population to dwelling ratios were used to inform these changes, whereby the percentage change in each .ID sector is applied to each of the TAZ zones within the relevant sector.

One enhancement made to the previous methodology related to instances where the Census data had calculated very high population to household ratios. These tended to be in the non-residential zones with very small base year populations, however the consequence of these very high rates was that significant future residential developments generated excessively high populations, e.g. 13 people per household in a large SA1 zone which includes the Coffs Harbour Health Campus and Southern Cross University Campus.

As such, a cap of 4 total population per occupied dwelling was applied to zones in future years which exceeded this value, to maintain a sensible population per household rate. This was applied to a total of three SA1 zones, and was based on analysis of identified outliers in the 2016 Census data.

### 6.4.3 Calculating age group profiles

The Forecast.ID age profile projections at the .ID sector level were used to calculate the forecast population by age category. The percentage point change in age group share at the .ID sector level was applied at TAZ zone level. For TAZ zones which had no population in the base year, the average age group profile for the .ID sector was used in future years to generate population splits from new developments.

There was one SA1 zone with exceptional age splits with dominant aged 65+ population, which was due to the current inclusion of an age care centre. The growth by age category was therefore assigned with sector average for forecast years to avoid age categories calculating extremely high / low shares in future.

The age group profiles for 2044 were calculated based on an extrapolated average 2024 – 2034 growth profile for each age group, which was consistent with the approach used for the household and population forecast.

### 6.4.4 Extrapolating to 2044

The .ID forecasts only extended to 2036. To produce estimates for the 2044, these forecasts were extrapolated. This involved the following:

- The compounded annual growth rates of households, and changes in average household size between 2024 and 2034 were calculated for each .ID sector, which had data points aligned with these forecast years
- Each TAZ zone then inherited the growth rates from the .ID sector in which it was located, to produce the projection of households and total population per household for 2044
- The 2044 values were calculated by extrapolating the 2034 values using the 2024 – 2034 calculated average growth rate.

### 6.4.5 DPE controlling totals

The methodology described above produced a set of unconstrained household and population forecasts. However, it was agreed with Roads and Maritime that the overall population growth should be consistent with DPE projections.

Applying control totals to the forecast years based on the absolute DPE forecasts was not considered to be appropriate because of the difference between the 2016 Census data and the DPE 2016 forecasts for households and population. The method used to constrain forecasts so they are consistent with DPE forecasts is broadly outlined below:

- Compound annual growth rates between forecast years, based on the DPE forecasts for the Coffs Harbour local government area, were used to generate controlling totals for the unconstrained forecasts
- Household and population values were adjusted up or down accordingly to replicate the DPE projected rates; these factors were applied globally across all CHSTM zones.

The DPE projections only extended to 2036, and the projection years did not correspond to the CHSTM horizon years. Interpolation and extrapolation was undertaken to estimate the controlling factors as follows:

- 2024 – compound annual growth rate for 2021 to 2026 used to calculate interpolated value
- 2034 – compound annual growth rate for 2031 to 2036 used to calculate interpolated value
- 2044 – compound annual growth rate for 2031 to 2036 used to calculate extrapolated value.

This process was undertaken for both household and population projections.

### 6.4.6 Final household and population forecasts

Based on the steps outlined above, a set of controlled land use forecasts were produced and used for input to the 4-step model. These totals are presented in Table 40. The distribution of population growth to 2044 is shown in Figure 35 and Figure 36.

Table 40. DPE controlled household and population forecasts

| | Forecasts | | | | Average Growth Rate | | |
|---|---|---|---|---|---|---|---|
| | 2016 | 2024 | 2034 | 2044 | 2016 - 2024 | 2024 - 2034 | 2034 - 2044 |
| Households | 27,043 | 29,999 | 33,377 | 36,688 | 1.3% | 1.1% | 1.0% |
| Population | 73,001 | 79,914 | 87,708 | 95,320 | 1.1% | 0.9% | 0.8% |

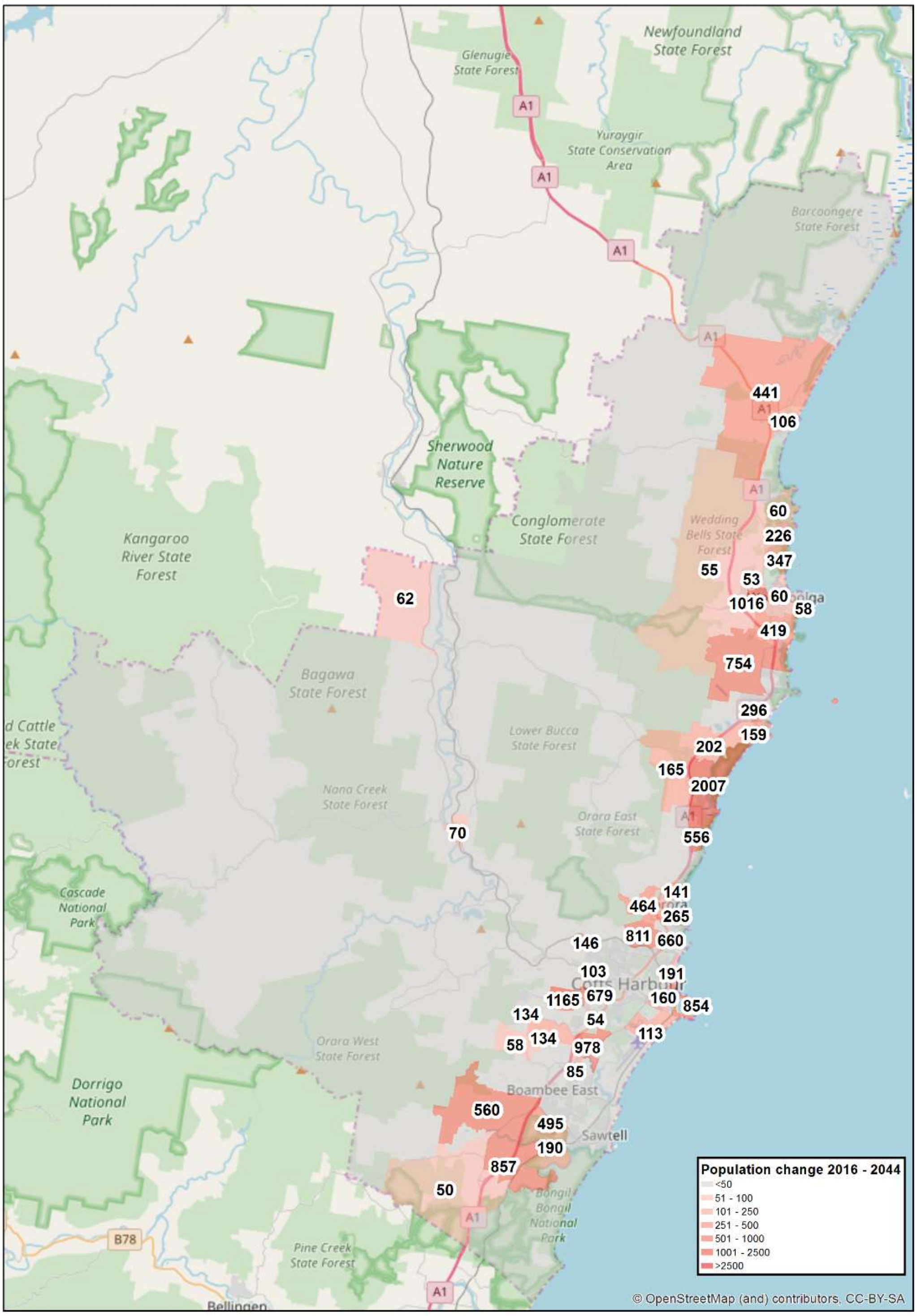



Figure 35 - Forecast population change between 2016 and 2044 – LGA wide

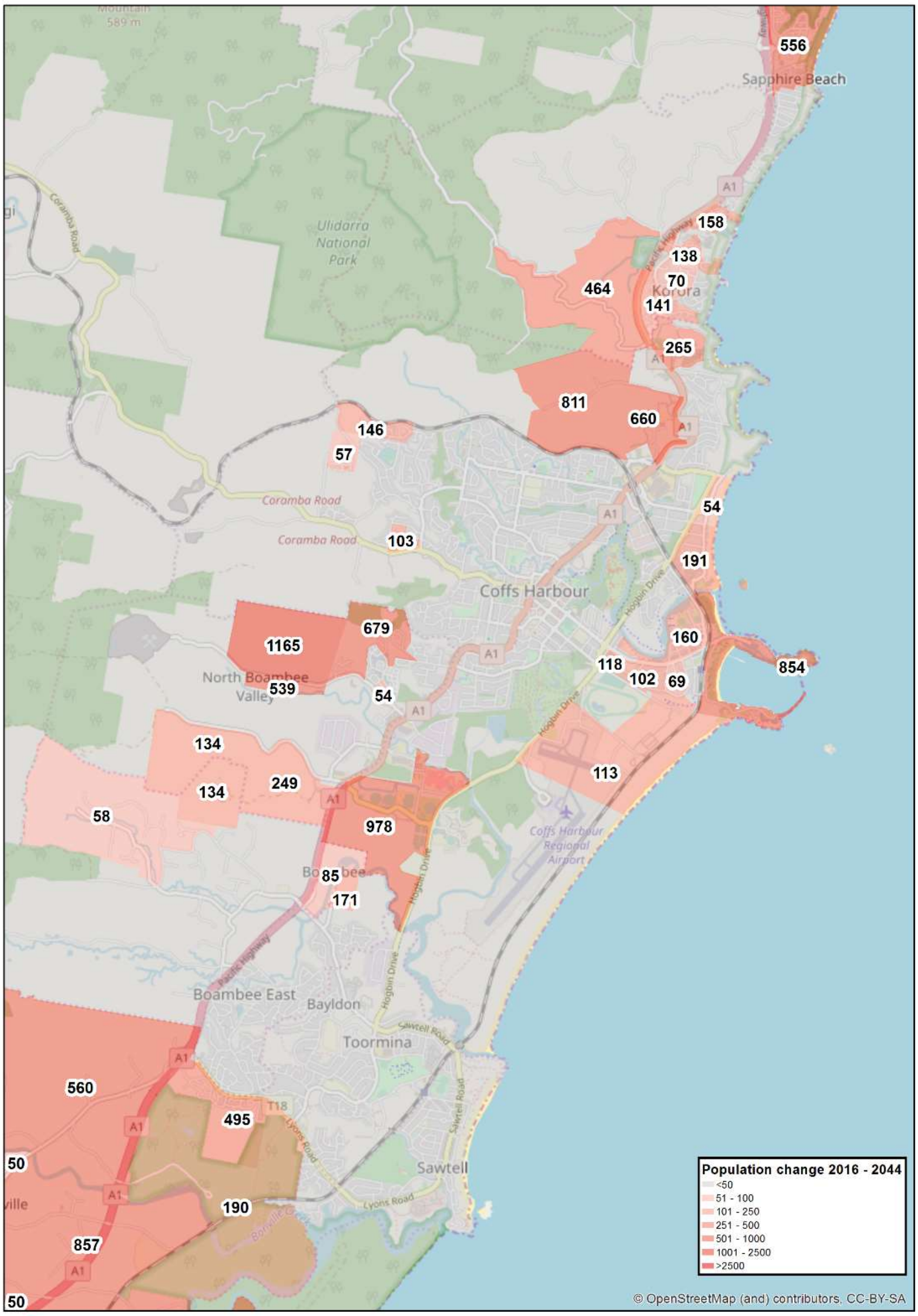



Figure 36 - Forecast population change between 2016 and 2044 – Coffs Harbour city

### 6.4.7 Enrolment and visitor forecasts

To calculate enrolment forecastsfor primary, secondary and tertiary educational establishments, the first task was to define the assumed catchments for each. Tertiary institutions were assumed to have an LGA wide catchment area.

Data covering school enrolments in 2016 was sourced from the MySchool website for all of the primary and secondary schools within the Coffs Harbour LGA. This was used to estimate equivalent catchments for each public school using the CHSTM zone system.

The method used to determine enrolment and visitors forecasts is outlined below:

- Growth rates were calculated based on the total change in the school age bracket (0-17) within these defined catchments of each school
- These growth rates were then applied to the appropriate school enrolments based on each school catchment area
- For tertiary educational establishments, the growth in total working age population (18-64) for the local government area was applied to the enrolment figures for each horizon year

The estimated 2016 visitor numbers were uplifted in line with the DPE controlled total population forecasts. Due to the regional nature of visitor demand, rates for each year were applied globally to all CHSTM zones; the relative distribution of visitor trips across zones was assumed to remain the same.

## 6.5 Employment and workers

### 6.5.1 Calculating growth rates by employment sector

The *North Coast Employment Land Review* (March 2015) provided information for future employment growth by industry type. Employment projections were based on a methodology which considered population projections by age, labour force status by age, industry composition and job self-sufficiency in the region, to estimate the number of jobs per industry. The projected growth rate in jobs by industry within this study has been used as the basis for the updated employment forecasts.

Forecast employment by industry type was available for 2021 and 2031, and the existing employment data by industry type was available for 2011 (2011 Census). Future year employment growth rates were estimated by:

- Interpolating for 2016 and 2024 employment numbers, based on the compound annual growth rates for 2011 to 2021, and 2021 to 2031 respectively
- Extrapolating the 2021 – 2031 compound annual growth rate to estimate 2034 and 2044 employment numbers.

Note the 2016 employment data from the 2016 Census was not available at the time of this update.

The growth rates calculated by industry for each model year are presented inTable 41.

Table 41. Growth rates by aggregate sector

| Industry sector | % Change from 2016 | | | CAGR | | |
|---|---|---|---|---|---|---|
| | **2024** | **2034** | **2044** | **2016 - 2024** | **2016 - 2024** | **2034 - 2044** |
| Service | 8% | 20% | 32% | 1.0% | 1.0% | 1.0% |
| Professional | 4% | 9% | 14% | 0.5% | 0.4% | 0.4% |
| Industry | 0% | 3% | 5% | 0.0% | 0.2% | 0.2% |
| Retail | 6% | 15% | 24% | 0.7% | 0.8% | 0.8% |
| Other | -8% | -11% | -14% | -1.0% | -0.3% | -0.3% |
| **Total all sectors** | **5%** | **13%** | **21%** | **0.6%** | **0.7%** | **0.7%** |

### 6.5.2 Key employment developments

The *North Coast Employment Land Review* and *North Boambee Traffic Study* (by GTA) were used to develop a list of the key employment development locations, including the hectares of land for each development. These were assigned to CHSTM model zones. Assumptions on construction dates were used to estimate build-out profiles for each site, equating to a percentage of the total site size for each model year.

As a part of the updated forecast, an additional assumption was made to include build out profiles / development staging of the new employment developments to allow for the progressive increase of employment over time, rather than allocating 100% of the proposed employments in one year. The development profiles for each identified development site are shown in Table 42.

Table 42. Assumed build out profiles for identified development sites

| Name | CHSTM Zone | 2024 | 2034 | 2044 |
|---|---|---|---|---|
| Woolgoolga | 700 | 25% | 75% | 100% |
| South Bonville West | 562 | 25% | 75% | 100% |
| North Boambee - Isles Drive | 453 | 25% | 75% | 100% |
| North Boambee - Cook Drive | 316 | 25% | 75% | 100% |
| North Boambee Valley West Ind 1 | 464 | 50% | 75% | 100% |
| North Boambee Valley West Ind 2 | 465 | 50% | 75% | 100% |

The number of jobs in future industrial land development areas were estimated based on the area of the site and the average area per job in industrial zones. The process followed is broadly outlined below:

- The average land area per job in industrial zoned land was estimated at 344 $m^2$ per job. This value was determined based on an estimation of the average industrial land area per job from Coffs Harbour base year employment data

- The total land area of the development and the average area per job were used to determine the total number of jobs (all sectors) for each development
- The total number of jobs were then divided across the six industry sectors based on the average proportion of jobs by industry type within existing industrial land (based on the average profile of industrial land in the base year model). The proportions used were as follows:
  - Service – 40%
  - Professional – 3%
  - Industry – 32%
  - Retail – 21%
  - Other – 4%

This split produced an estimate of jobs by sector for each industrial development zone identified, based on 100% build-out. The profiles in Table 42were used to produce forecast jobs for each forecast year.

### 6.5.3 Calculating employment forecasts

The growth rates in Table 41 were used to create employment forecasts for each CHSTM zone by industry sector. The 2016 employment values were uplifted in line with these factors, with the exception of the zones allocated to specific commercial development sites in Chapter 6.5.2. This produced a set of unconstrained employment forecasts for each year.

### 6.5.4 Calculating worker forecasts

Worker forecasts were also produced using the growth rates in Table 41. These values were applied by sector by year for all CHSTM zones. As an enhancement to the previous methodology, the number of workers in each zone were then controlled by the working age population forecast in that zone, by maintaining the 2016 workers to working age population rate in each zone. Where a rate did not exist in the base year, the average Coffs Harbour local government area rate was applied instead.

### 6.5.5 Controlling totals

The unconstrained forecasts in jobs and workers were initially produced independently of the population forecasts. However, population, workers and jobs within an area are intrinsically linked. As such, because the sources of population forecasts were more extensive, growth in employment and workers was controlled by the changes in working age population.

To do this, the relationship between jobs and working age population (18-64), and between workers and working age population was calculated using the 2011 Census data. However, analysis of worker participation rates through time highlighted the 2011 Census data was slightly higher than an average year within the period. As such, the rates applied for future forecasting were adjusted slightly lower to the following values:

- Jobs per working age person – 0.67
- Workers per working age person – 0.68.

The above factors were applied to the total working age population to calculate the total jobs and workers within Coffs Harbour local government area. The derived values were used to constrain the estimated total jobs and workers from the earlier forecast steps.

### 6.5.6 Final employment and worker forecasts

The methodology outlined above produced the following set of constrained employment and worker forecasts (Table 43). The distribution of job growth across CHSTM zones is shown in Figure 37 and Figure 38.

Table 43. Final controlled workers and jobs forecasts

| | Forecasts | | | | Average Growth Rate | | |
|---|---|---|---|---|---|---|---|
| | 2016 | 2024 | 2034 | 2044 | 2016 - 2024 | 2024 - 2034 | 2034 - 2044 |
| Workers | 28,218 | 29,405 | 31,615 | 31,875 | 0.5% | 0.7% | 0.1% |
| Jobs | 27,803 | 28,972 | 31,150 | 31,406 | 0.5% | 0.7% | 0.1% |

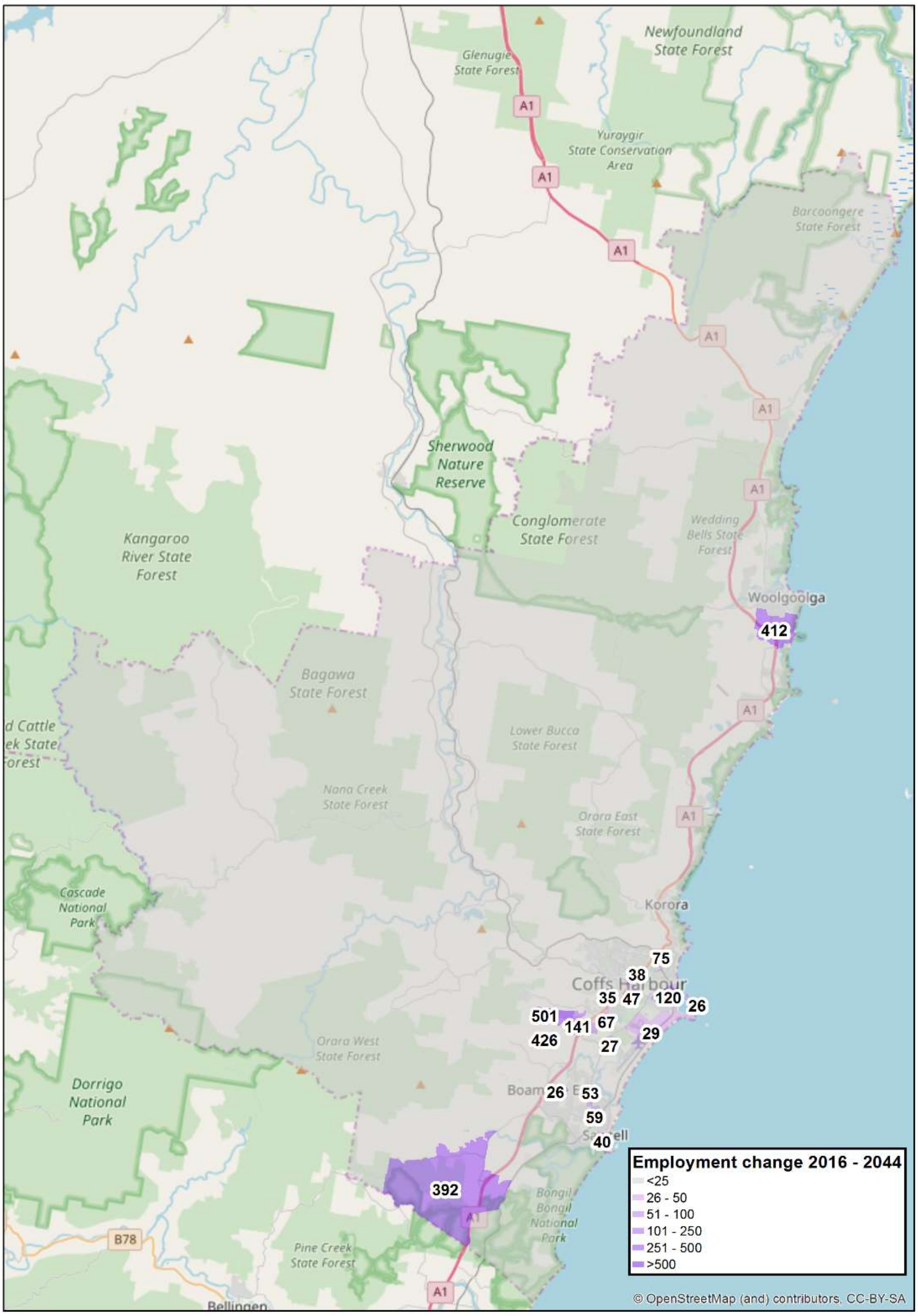



Figure 37 - Forecast employment change between 2016 and 2044 – LGA wide

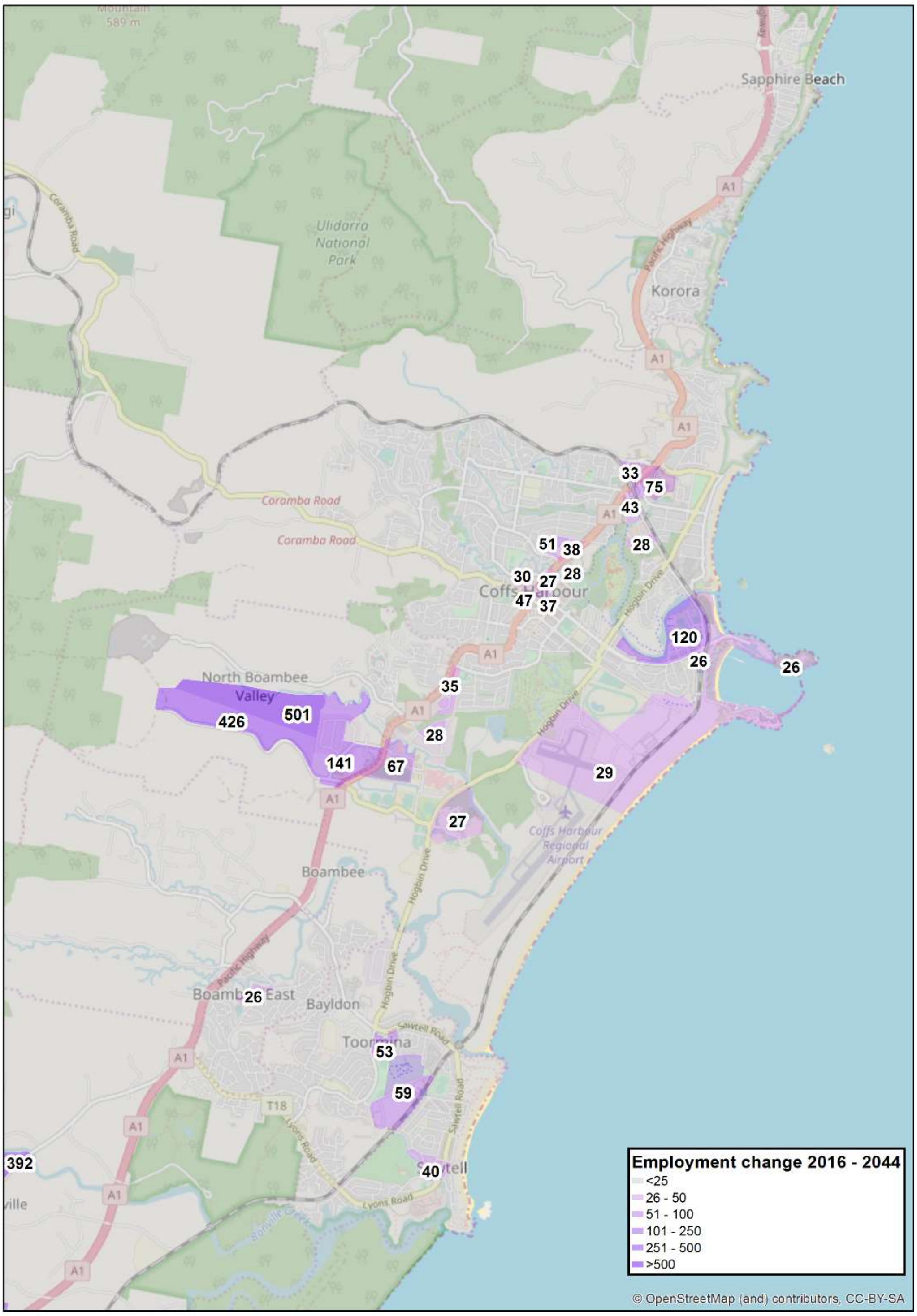



Figure 38 - Forecast employment change between 2016 and 2044 – Coffs Harbour city

## 6.6 Model forecast outputs

### 6.6.1 Demand outputs

The population and employment forecasts were used in the CHSTM to produce forecasts of traffic demand. The outputs of this are summarised by vehicle, time period and year in Table 44. It can be seen that total daily demand increases by around 13% between 2016 and 2024, before slowing to a rate of approximately 7% in the period thereafter. This reflects the population forecast growth rate profiles.

Table 44. Demand outputs (PCUs) by vehicle type, time period and year

| Vehicle type and time period | 2016 | 2024 | 2034 | 2044 | 2016-2024 | 2024-2034 | 2034-2044 |
|---|---|---|---|---|---|---|---|
| AM LV | 21,160 | 22,950 | 25,154 | 26,985 | 1.1% | 1.0% | 0.7% |
| AM MCV | 2,528 | 2,838 | 3,069 | 3,183 | 1.5% | 0.8% | 0.4% |
| AM HCV | 1,341 | 1,514 | 1,640 | 1,694 | 1.6% | 0.8% | 0.3% |
| **Total AM** | **25,029** | **27,302** | **29,863** | **31,862** | **1.1%** | **0.9%** | **0.7%** |
| OP LV | 114,256 | 124,087 | 136,470 | 147,502 | 1.1% | 1.0% | 0.8% |
| OP MCV | 16,209 | 18,193 | 19,724 | 20,456 | 1.5% | 0.8% | 0.4% |
| OP HCV | 7,325 | 8,212 | 8,998 | 9,525 | 1.5% | 1.0% | 0.6% |
| **Total OP** | **137,790** | **150,492** | **165,192** | **177,483** | **1.2%** | **1.0%** | **0.7%** |
| PM LV | 20,487 | 22,149 | 24,298 | 26,044 | 1.0% | 1.0% | 0.7% |
| PM MCV | 2,395 | 2,688 | 2,911 | 3,025 | 1.5% | 0.8% | 0.4% |
| PM HCV | 1,182 | 1,328 | 1,462 | 1,560 | 1.5% | 1.0% | 0.7% |
| **Total PM** | **24,064** | **26,165** | **28,671** | **30,629** | **1.1%** | **1.0%** | **0.7%** |
| RD LV | 74,211 | 79,906 | 87,490 | 93,196 | 1.0% | 0.9% | 0.7% |
| RD MCV | 9,501 | 10,655 | 11,565 | 12,009 | 1.5% | 0.9% | 0.4% |
| RD HCV | 7,095 | 7,889 | 8,744 | 9,529 | 1.4% | 1.1% | 0.9% |
| **Total RD** | **90,807** | **98,450** | **107,799** | **114,734** | **1.1%** | **0.9%** | **0.6%** |
| Daily LV | 230,114 | 249,092 | 273,412 | 293,727 | 1.0% | 1.0% | 0.7% |
| Daily MCV | 30,633 | 34,374 | 37,269 | 38,673 | 1.5% | 0.8% | 0.4% |
| Daily HCV | 16,943 | 18,943 | 20,844 | 22,308 | 1.5% | 1.0% | 0.7% |
| **Total Daily** | **277,690** | **302,409** | **331,525** | **354,708** | **1.1%** | **1.0%** | **0.7%** |

### 6.6.2 Network statistics

A set of global network statistics provides a useful indication of network-wide performance in each modelled year. The network statistics by time period by year are shown in Table 45 below.

Table 45. Network statistics by time period by year

| Network Statistics | 2016 | 2024 | 2034 | 2044 |
|---|---|---|---|---|
| AM vehicle kilometres travelled (km) | 197,064 | 213,068 | 233,711 | 250,547 |
| AM vehicle hours travelled (hours) | 3,680 | 4,062 | 4,591 | 5,083 |
| AM average speed (kph) | 53.6 | 52.5 | 50.9 | 49.3 |
| AM time lost to congestion (hours) | 200 | 296 | 472 | 680 |
| OP vehicle kilometres travelled (km) | 1,143,959 | 1,237,696 | 1,359,551 | 1,469,723 |
| OP vehicle hours travelled (hours) | 20,474 | 22,408 | 25,010 | 27,421 |
| OP average speed (kph) | 55.9 | 55.2 | 54.4 | 53.6 |
| OP time lost to congestion (hours) | 992 | 1344 | 1934 | 2546 |
| PM vehicle kilometres travelled (km) | 203,153 | 218,538 | 239,513 | 257,169 |
| PM vehicle hours travelled (hours) | 3,709 | 4,060 | 4,603 | 5,062 |
| PM average speed (kph) | 54.8 | 53.8 | 52.0 | 50.8 |
| PM time lost to congestion (hours) | 215 | 300 | 490 | 658 |
| RD vehicle kilometres travelled (km) | 828,723 | 893,069 | 981,438 | 1,051,865 |
| RD vehicle hours travelled (hours) | 14,202 | 15,366 | 16,955 | 18,211 |
| RD average speed (kph) | 58.4 | 58.1 | 57.9 | 57.8 |
| RD time lost to congestion (hours) | 421 | 537 | 731 | 914 |
| Daily vehicle kilometres travelled (km) | 2,372,899 | 2,562,371 | 2,814,213 | 3,029,304 |
| Daily vehicle hours travelled (hours) | 42,065 | 45,896 | 51,159 | 55,777 |
| Daily average speed (kph) | 56.4 | 55.8 | 55.0 | 54.3 |
| Daily time lost to congestion (hours) | 1,828 | 2,477 | 3,626 | 4,798 |

# 7 Traffic model development

## 7.1 Introduction

A mesoscopic network assignment model has been developed in AIMSUN (version 8.2.2) for the Coffs Harbour Bypass Project.

The purpose of the Coffs Harbour Traffic Model (CHTM) is to assign traffic demands (from the strategic model) to the road network to provide predictions of traffic volumes and delays on various road links and turns. The model outputs have been used as inputs to the economic analysis for the business case comparing the future year project case against a base case.

The key features of CHTM are summarised in Table 46.

Table 46: Key features of the network assignment model

| Key Feature | Description |
|---|---|
| Model Zones | CHTM covers the central Coffs Harbour area from Sapphire Beach to Boambee East. 544 internal travel zones were defined based on the combination of SA1 and mesh block boundaries from ABS. 7 external travel zones were defined as external traffic demand feeds. The zones represent a relatively high level of spatial detail suitable for a mesoscopic model. |
| Model Network | All state controlled highways, arterial, distributor local collector roads, and most local roads are modelled in CHTM. |
| Model Year | Calibrated to represent travel conditions in a 2016 base year.<br>Traffic demand forecasts and networks developed for forecast years 2024, 2034 and 2044. |
| Time Periods | Peak morning and afternoon one hour periods: AM (8-9am) and PM (4-5pm). |
| Vehicle Classes | 3 vehicle classes<br>- light vehicles (Austroads classification 1 and 2),<br>- medium commercial vehicles (Austroads classification 3 – 5), and<br>- heavy commercial vehicles (Austroads classification 6 – 12) |
| Trip Purposes | Travel demand not defined by trip purpose |
| Public Transport | Bus services have not been included in the CHTM due to the relatively low levels of bus service provision in Coffs Harbour. |

## 7.2 Model network

The CHTM road network is shown in Figure 39 bounded by a dashed red line. The model network was coded to represent the physical characteristics of the existing road network including functional hierarchy, number of lanes (including turning lanes) and free-flow speed. Intersections were also coded according to existing form and control type such as priority control, roundabout, merges and signalised intersections.

The signalised intersections were coded using existing signal phase plans and timings with adjustments made to suit the model demand flows.

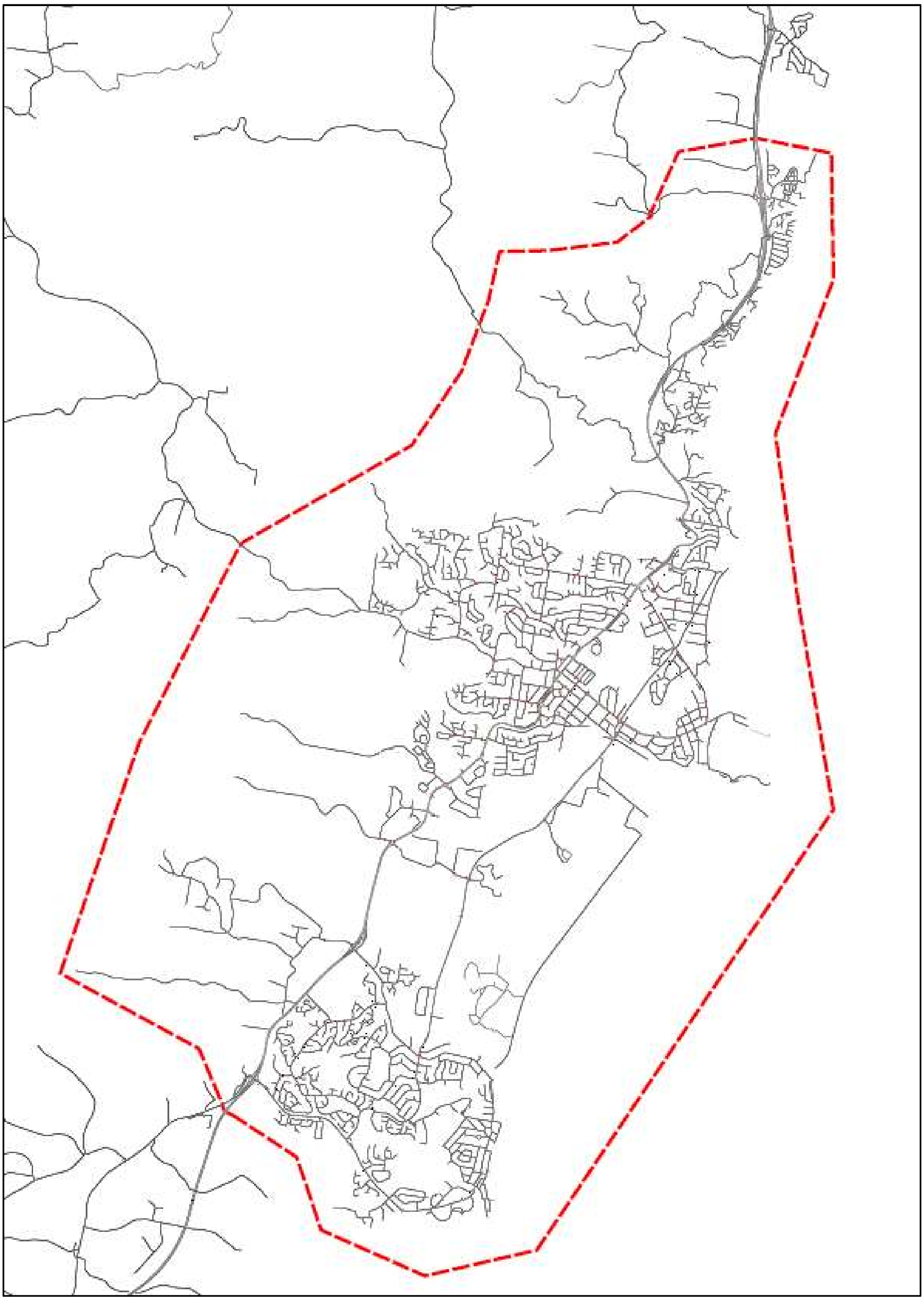


Figure 39 - AIMSUN model area

### 7.2.1 Road types

The road types are based off the existing road hierarchy of Coffs Harbour. They were developed from the default road types defined by Aimsun. Table 47 shows the 13 different road types and their main properties.

There are several locations where individual section properties have been changed. For example, there were changes to speed where free flow speed is expected to lower than the default due to high friction (e.g. shopping centres, car parking).

Table 47: Road types and main properties

| Road Type | Jam Density (per Lane) (veh/km) | Lane Capacity (PCUs/h) | Lane Width (m) | Speed (km/h) | No. Sections in CHTM |
|---|---|---|---|---|---|
| Freeway | 142 | 1800 | 3.5 | 100 | 209 |
| Arterial | 142 | 1200 | 3 | 60 | 2539 |
| Road | 142 | 1200 | 3 | 50 | 2 |
| Regional 80 | 142 | 1200 | 3 | 80 | 35 |
| Regional 70 | 142 | 1200 | 3 | 70 | 22 |
| Regional | 142 | 1200 | 3 | 60 | 193 |
| Regional 50 | 142 | 1200 | 3 | 50 | 31 |
| Regional 40 | 142 | 1200 | 3 | 40 | 6 |
| Roundabout | 250 | 1000 | 3.2 | 30 | 212 |
| Distributor | 142 | 1000 | 3 | 50 | 666 |
| On/Off Ramp | 142 | 900 | 3 | 60 | 87 |
| Local Collector | 142 | 800 | 3 | 50 | 1318 |
| Street | 142 | 300 | 3 | 40 | 2518 |

### 7.2.2 Intersections and signal timings

By default, turn speeds at intersections are automatically calculated by the AIMSUN program. These are generally considered to be higher than reality and therefor the speeds for left and right turns were globally revised to 20 and 30 km/h respectively.

#### Signalised intersections

There are 15 signalised intersections within the model area. All signals were coded as fixed time signals. Average cycle times and phase timings for the AM and PM peak hour period were calculated from SCATS IDM data. Minor adjustments were made to the signal timings to match modelled traffic demands and observed traffic performance. Signal offset information was not available but were calibrated based on travel time information.

A comparison of observed signal timings versus modelled signal timings is shown in Appendix E. In summary the comparison shows that:

- All modelled cycle times are within 10% of the average observed cycle time.
- Modelled phase times are within 10 seconds of the average observed phase time.
- Phases with an average observed phase time of less than seven seconds were not included in the model unless it contained a turning movement not included in the other phases.
- The modelled signals assume a minimum phase time of 11 seconds. This includes five seconds of green-time and 6 seconds of interphase. Phase C at Pacific Hwy / Isle Dr is an exception as this phase was modelled to only occur once every two cycles.
- The low frequency of some right-turn phases (Phase B) at Pacific Hwy/ Albany St and Pacific Hwy/ Beryl St means that the difference between modelled and observed phase times exceed 10 seconds.

#### Unsignalised intersections

Priority rules were added where necessary to reflect realistic constraints and delays to the road network. Due to the large scale of the model, priority rules were not added to local roads with the sole purpose of loading trips onto the network.

Give-way parameters remained unchanged for give-way and stop rules at priority intersections. For roundabouts, the initial and final safety margins were increased to 7 and 4 seconds respectively, and the visibility along mainstream was decreased to 20 metres. This is to simulate the lower vehicle speeds and increased breaking approaching roundabouts.

Stop-yields were used instead of give-ways at some approaches to reflect higher vehicle stopping were necessary. For example, this was applied to the north approach of Hogbin Drive/ Orlando Street roundabout to reflect restricted visibility approaching the roundabout.

### 7.2.3 Public transport

Public transport services were not modelled in the CHTM. The most frequent public transport route operates every half hour, and therefore would have a negligible impact on network operation.

## 7.3 Model assignment

The CHTM used a mesoscopic dynamic user equilibrium assignment to predict route choice in the model. A static equilibrium assignment was also used to determine initial paths for input to the dynamic user equilibrium assignment to assist in achieving faster convergence. The key parameters for the dynamic assignment were as follows:

- Stopping criteria: relative gap of 1%
- Gradient-based equilibrium algorithm
- One-hour assignment period with a 30-minute warm-up (using scenario demand).
- Route choice paths calculated at 15 minute intervals.
- Attractiveness weight of three was used to increase the utility of higher order roads.

# 8 Traffic model calibration and validation

## 8.1 Model calibration

### 8.1.1 Vehicle types

There are three defined vehicle types used within the model:

1. Car (representing light vehicles)
2. Truck (rigid)
3. Heavy Truck (articulated and b-double)

### 8.1.2 Driver and vehicle calibration

Several adjustments were made to driver and vehicle parameters to better match overall traffic performance to site observations of travel time and queues. These included:

- Jam Density per lane reduced from the default value of 200 to 142 vehicles per kilometre. A change to this parameter reflects the overall larger vehicle fleet size and vehicle spacing in Australia (compared to Europe) and results in a lower traffic flow capacity. A jam density of 250 per lane was applied to sections shorter than seven metres long to prevent unrealistic blocking of the link.
- Driver reaction times were adjusted for each vehicle type with higher values compared to the default value. These higher reaction times better represent driver behaviour in regional areas as opposed to city areas. This change results in a lower traffic flow capacity.
- Higher values for reaction time were applied to truck and heavy truck to account for the slower acceleration of the heavier vehicle types.

Table 48: Mesoscopic model reaction time parameter

| Vehicle Class | Reaction Time (sec) | Reaction Time at Traffic Light (sec) |
|---|---|---|
| Default (all vehicles) | 1.2 | 1.6 |
| Adjusted - Car | 1.4 | 1.8 |
| Adjusted - Truck | 1.5 | 1.9 |
| Adjusted - Heavy Truck | 1.6 | 2.0 |

## 8.2 Route choice calibration

Route choice in the model was calibrated to match apparent route choice demonstrated by the traffic count data and a logic check undertaken. Key issues addressed in the calibration of route choice included the balance of traffic using the Pacific Highway versus Hogbin Drive and the reduction of traffic using lower order streets instead of higher order streets. Route choice calibration was achieved through the adjustment of the following:

- Free-flow speeds adjusted lower. Some key examples include:
- Harbour Drive within the CBD reduced from 40km/h to 20km/h to reflect the shared zone and friction due to parking
- A range of streets in the CBD reduced from 50km/h or 40km/h to 30km/h to reflect friction effects caused by parking and pedestrian movement.
- Turn delays were applied at priority controlled intersections where modelled turning traffic was too high compared to traffic count data due to unrealistic rat running. These turns were:
- Elm Street to Bray Street
- Woolgoolga Road to Argyll Street
- Woolgoolga Road to Bailey Avenue
- Albany Street to Grafton Street
- Rose Avenue to Marcia Street
- Park Avenue to Earl Street
- Ocean Parade to Orlando Street

## 8.3 Traffic demand calibration

Base year (2016) traffic demand matrices from the strategic model where provided as initial demand inputs to the CHTM. A matrix adjustment process was then undertaken within AIMSUN to achieve a closer match between the modelled traffic volumes and the traffic counts. Controls were applied in the matrix adjustment process to limit the extent of the changes that could be made to the initial matrices. These controls included:

- Matrix elasticity value of 0.5 for AM and 0.7 for PM (a value of zero means no variation is permitted and a value of one permits a greater level of freedom).
- Maximum deviation of 20% permitted per matrix cell value for light vehicles.
- For AM peak, a matrix elasticity value of one and no maximum deviation was applied to the truck matrix.
- For PM peak, a matrix elasticity value of one and no maximum deviation was applied to the truck and heavy truck matrix.

The above controls allowed for some degree of elasticity without overly distorting the original matrix patterns.

The full process followed for calibrating the demand matrix was is outlined below:

1. Demand matrices were extracted from the strategic model and imported into the CHTM. These are the ‘seed’ matrices.

2. The seed matrices were assigned to the network and modelled volume was compared to traffic count data at cordon locations. External zone origin or destination totals were factored to better match the count data where GEH comparison values were greater than five. This produced a set of 'manually adjusted' matrices.
3. The manually adjusted demand matrices were passed through the AIMSUN matrix adjustment process.
4. The AIMSUN adjusted matrices were assigned to the network and modelled volumes checked against traffic count data leading to final manual adjustments to fine tune the matrices. These final adjustments were generally made to parts of the matrices where changes greater than the maximum 20% cell change where required to achieve an acceptable match result.

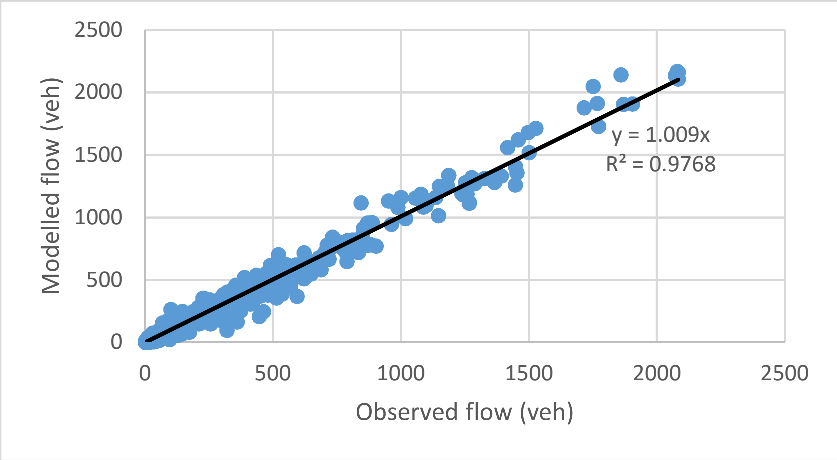
The results of the traffic demand calibration process have been assessed using the following:

- Scatter plot analysis;
- Link and turn volume analysis;
- Screenline volume analysis; and
- RMSE of counts versus model volumes.

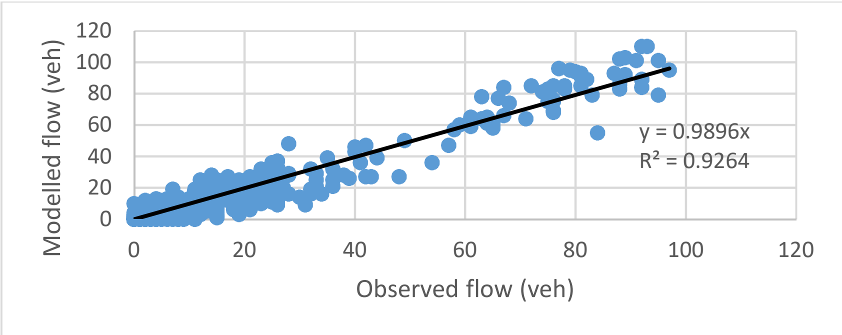
## Scatter plot analysis

The results of the matrix adjustment process are shown in the volume scatter plots displayed in Figure 40 and Figure 41 for the AM and PM peaks, split by vehicle type. The scatter plots compare the modelled volumes on links to traffic count volumes.

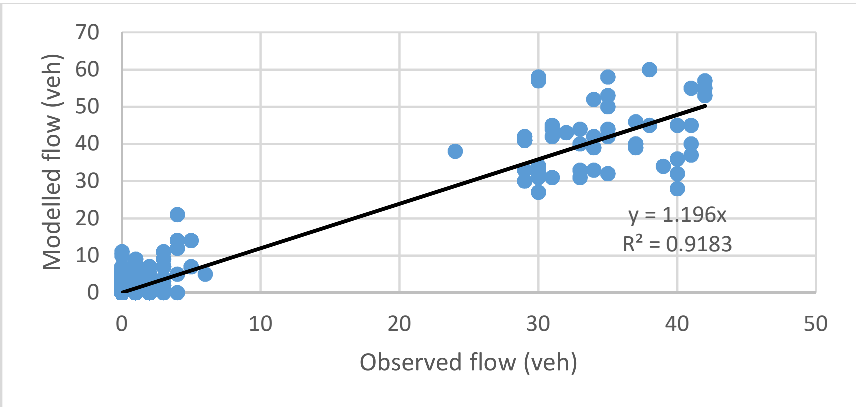
Both Figure 40 and 41 show the $R^2$ values being above 0.9. This satisfies the $R^2$ value criteria as specified within the RMS Traffic Modelling Guidelines.




(a) AM Light Vehicles observed versus modelled flow

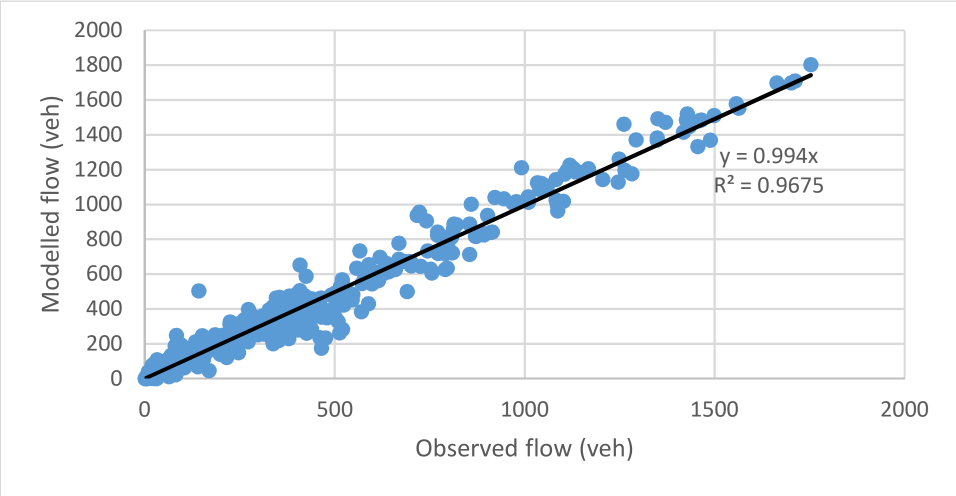



(b) AM Medium Commerical Vehicles observed versus modelled flow

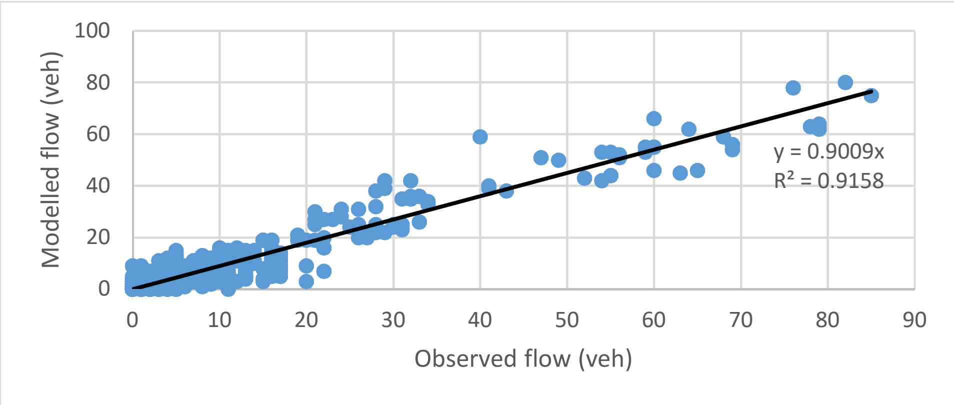



(c) AM Heavy Commercial Vehicles observed versus modelled flow

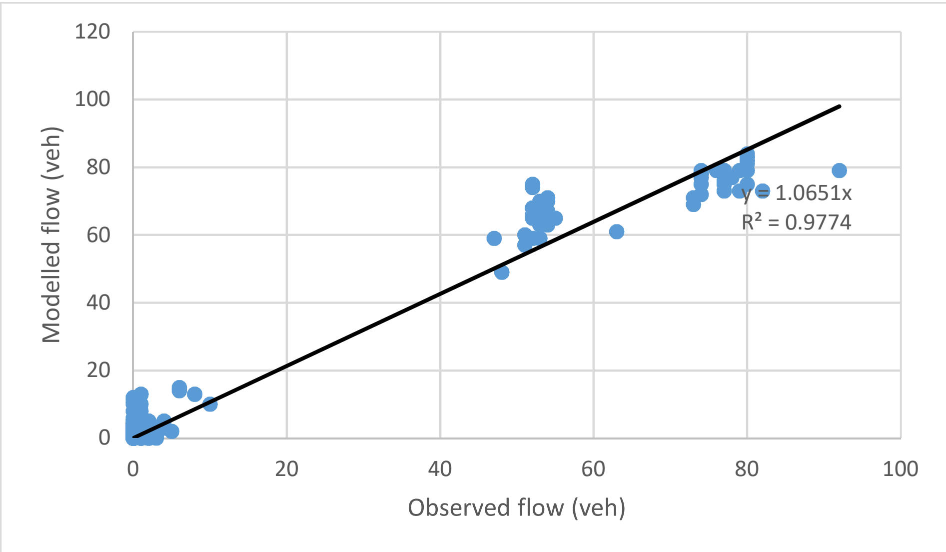
Figure 40 - Regression analysis of AM base year model (a) LV, (b) MCV, (c) HCV




(a) PM Light Vehicles observed versus modelled flow




(b) PM Medium Commercial Vehicles observed versus modelled flow




(c) PM Heavy Commercial Vehicles observed versus modelled flow

Figure 41 - Regression analysis of PM base year model (a) LV, (b) MCV, (c) HCV

## Link and turn volume analysis

An assessment of the level of match between modelled link and turning volumes against traffic count data was undertaken using the GEH statistic. Summarised results of these comparisons are shown in Table 49 and Table 50.

The target percentage of counts passing each criteria are from the RMS *Traffic Modelling Guidelines*. The results show that the level of calibration does not achieve the RMS criteria. However, it is generally recognised that the GEH criteria from the RMS guidelines are too stringent for large scale mesoscopic model applications.

The Transport and Infrastructure and Regional Development has developed the *Australian Transport Assessment and Planning Guidelines* (ATAP) that provide calibration criteria for different categories of modelling, including mesoscopic modelling. As a comparison, we have provided a check of the level of calibration achieved using the criteria for a mesoscopic model in Table 51 and Table 53. These results show that the model calibration would meet or are very close to meeting the targets set-out in the ATAP guidelines for link and screenline GEH comparison.

Table 49: GEH calibration check using RMS criteria – link counts

| Individual Link Counts GEH Statistic | Target % | AM Count | AM % | AM Pass Check | PM Count | PM % | PM Pass Check |
|---|---|---|---|---|---|---|---|
| < 5 | 95% | 387 | 88% | N | 373 | 85% | N |
| < 10 | 100% | 434 | 98% | N | 432 | 98% | N |
| **Total** | | **441** | | | **441** | | |

Table 50: GEH calibration check using RMS criteria – turn counts

| Individual Turn Counts GEH Statistic | Target % | AM Count | AM % | AM Pass Check | PM Count | PM % | PM Pass Check |
|---|---|---|---|---|---|---|---|
| < 5 | 85% | 305 | 81% | N | 302 | 81% | N |
| < 10 | 100% | 365 | 97% | N | 357 | 95% | N |
| **Total** | | **375** | | | **375** | | |

Table 51: GEH calibration check using ATAP criteria – link counts

| Individual Link Counts GEH Statistic | Target % | AM Count | AM % | AM Pass Check | PM Count | PM % | PM Pass Check |
|---|---|---|---|---|---|---|---|
| < 5 | 85% | 387 | 88% | Y | 373 | 85% | N |
| Total | | 441 | | | 441 | | |

Table 52 shows the link counts with a GEH value greater than 10. The calibration results for these links have been accepted as outlined below. The ability of the model to predict traffic flows on the highway, regional road network or future bypass was not considered to be contingent on further improvement to the calibration of these links. :

- Links 1 to 3

  These links are used to connect the Park Beach Plaza zone onto the local network. This is a large zone which encompasses the plaza and surrounding businesses. Because of the size of the zone, it has been connected to the road network in four different areas. The calibration of individual accesses to Park Beach Plaza and the surrounding businesses did not meet the required criteria however the total number of trips into and out of the zone were correct.

- Link 4

  This link is a local access onto the Pacific Highway from the Park Beach Plaza. Flows on this link are related to the relative imbalance of flows on the various accesses to/from Park Beach Plaza as described above.

  Link 5

- This link is a minor road used by traffic accessing local zones from the Highway. This link sees a lower traffic volume due to the adjacent offloading links being more attractive. This is because the adjacent links are closer to the zone connectors for trips coming off the Pacific Highway.

  Links 6 to 12

- These links are used by vehicles accessing the CBD. Low calibration results were achieved in the CBD due to the limited detail in the structure of zones and zone connectors, and the number of parallel routes.

Table 52: Links with GEH value greater than 10.

| Link No. | Intersection | Road | Approach | Direction | AM GEH | PM GEH |
|---|---|---|---|---|---|---|
| 1 | Shopping Centre and Arthur St | Shopping Centre | S | App | 3.7 | 10.7 |
| 2 | Park Beach Rd and Shopping Centre | Shopping Centre | E | App | 7.0 | 12.2 |
| 3 | Park Beach Rd and Shopping Centre | Shopping Centre | E | Dep | 15.6 | 16.2 |
| 4 | Pacific Hwy and Arthur St | Pacific Hwy Ramp | S | Dep | 12.6 | 20.3 |
| 5 | Pacific Hwy and Melittas Ave | Marcia St | W | Dep | 2.2 | 12.6 |
| 6 | Gordon St and Harbour Dr | Gordon St | S | Dep | 12.3 | 12.8 |
| 7 | Gordon St and Park Ave | Gordon St | N | App | 10.9 | 8.8 |
| 8 | Earl St and Harbour Dr | Harbour Dr | E | App | 10.5 | 7.1 |
| 9 | Earl St and Harbour Dr | Earl St | S | App | 1.6 | 12.8 |
| 10 | Earl St and Albany St | Albany St | W | App | 12.0 | 7.2 |
| 11 | Gordon St and Albany St | Albany St | E | App | 13.5 | 12.2 |
| 12 | Gordon St and Albany St | Gordon St | S | Dep | 6.8 | 13.0 |

## Screenline count analysis

Four screenlines were assessed for calibration purposes with the results compared to the ATAP guideline criteria. The ATAP criteria requires modelled volumes across a screenline to be within 10% of traffic count volumes and with a GEH statistic of less than four.

The screenlines are shown in Figure 42 and listed below:

1. North/south – north of Bruxner Park Road
2. North/south – across Coffs Creek
3. North/south – south of Englands Road
4. East/west – along western side of Hogbin Drive

Three of the screenlines report on north/south traffic movements with locations to the north and south of Coffs Harbour, and one through central Coffs Harbour. The fourth screenline reported on east/west travel between the Pacific Highway and Hogbin Drive.

The results of the screenline check showed that all screenlines except for Screenline 4 westbound in the PM peak achieved the guidance passing criteria. The results for Screenline 4 showed that modelled volumes were 11% lower than traffic counts with a GEH statistic of 6.1, which is slightly outside the guideline criteria. Overall, the comparison of traffic volumes across the screenlines demonstrated the model was well calibrated.

Table 53: GEH calibration check using ATAP criteria – screenline counts

| Period | Screenline | Dir. | Obs. | Mod. | Diff (Abs.) | Diff (%) | GEH | Meets Criteria? |
|---|---|---|---|---|---|---|---|---|
| AM | 1 | NB | 824 | 905 | 81 | 10% | 2.8 | Y |
| AM | 1 | SB | 2178 | 2230 | 52 | 2% | 1.1 | Y |
| AM | 2 | NB | 2645 | 2724 | 79 | 3% | 1.5 | Y |
| AM | 2 | SB | 4313 | 4153 | -160 | -4% | 2.5 | Y |
| AM | 3 | NB | 2831 | 2781 | -50 | -2% | 0.9 | Y |
| AM | 3 | SB | 1854 | 1890 | 36 | 2% | 0.8 | Y |
| AM | 4 | EB | 2795 | 2886 | 91 | 3% | 1.7 | Y |
| AM | 4 | WB | 2924 | 2721 | -203 | -7% | 3.8 | Y |
| PM | 1 | NB | 1718 | 1780 | 62 | 4% | 1.5 | Y |
| PM | 1 | SB | 1011 | 957 | -54 | -5% | 1.7 | Y |
| PM | 2 | NB | 3623 | 3833 | 210 | 6% | 3.4 | Y |
| PM | 2 | SB | 3084 | 3087 | 3 | 0% | 0.1 | Y |
| PM | 3 | NB | 2672 | 2638 | -34 | -1% | 0.7 | Y |
| PM | 3 | SB | 1741 | 1759 | 18 | 1% | 0.4 | Y |
| PM | 4 | EB | 2725 | 2660 | -65 | -2% | 1.3 | Y |

| Period | Screenline | Dir. | Obs. | Mod. | Diff (Abs.) | Diff (%) | GEH | Meets Criteria? |
|---|---|---|---|---|---|---|---|---|
| PM | 4 | WB | 2839 | 2522 | -317 | -11% | 6.1 | N |

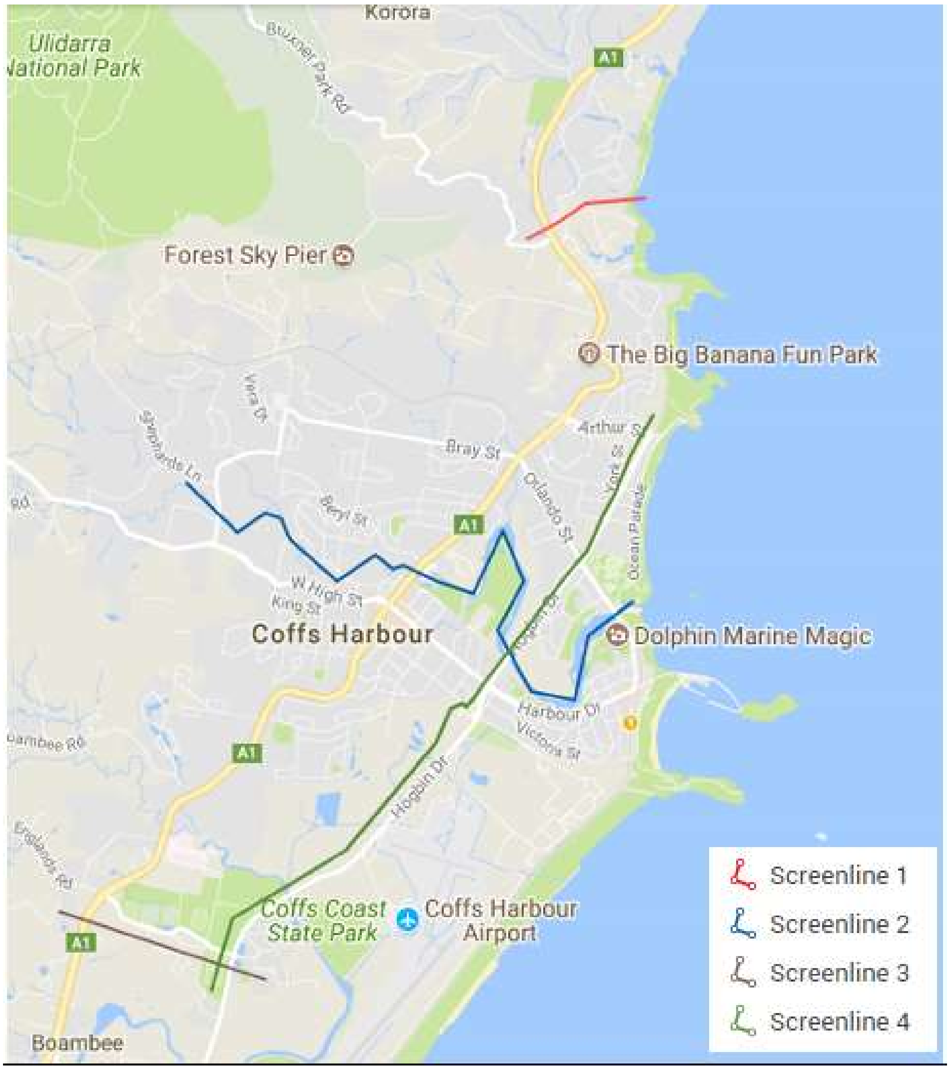



Figure 42 – CHTM screenlines

## Count RMSE analysis

The Root Mean Square Error (RMSE) is used to measure the level of match using the entire count data set. RMS Traffic Modelling Guidelines specify that the all counts RMSE should be 30 or lower. The RMSE value for AM and PM were calculated to be 16 and 17 respectively, which satisfies the criteria.

## Summary of calibration

Given the results of the traffic demand calibration of the CHTM, there are some limitations in the level of comparison of modelled volumes to count data across the network.

To better understand these limitations, plots showing the level of GEH calibration for the AM and PM peaks is shown in Figure 43 and Figure 44. A GEH of less than five are shown in green, GEH between five and ten are yellow and GEH greater than ten are red.

It can be seen that the Pacific Highway and the key routes of Hogbin Drive, Coramba Road and Bray Street are reasonably well matched to count data. Limitations on the demand calibration results include the CBD area, Park Beach retail area and some isolated locations on the local road network.

The level of calibration in the CBD area was particularly difficult to achieve due to the complexity of route choice and traffic movement due to:

- The distributed nature of on-street parking
- Circulation on streets to find parking spaces
- Location of off-street car parks.

Based on the results reported above we have concluded that the traffic flow calibration of the CHTM reached a level that was acceptable to proceed with testing of the Project Case in future years.

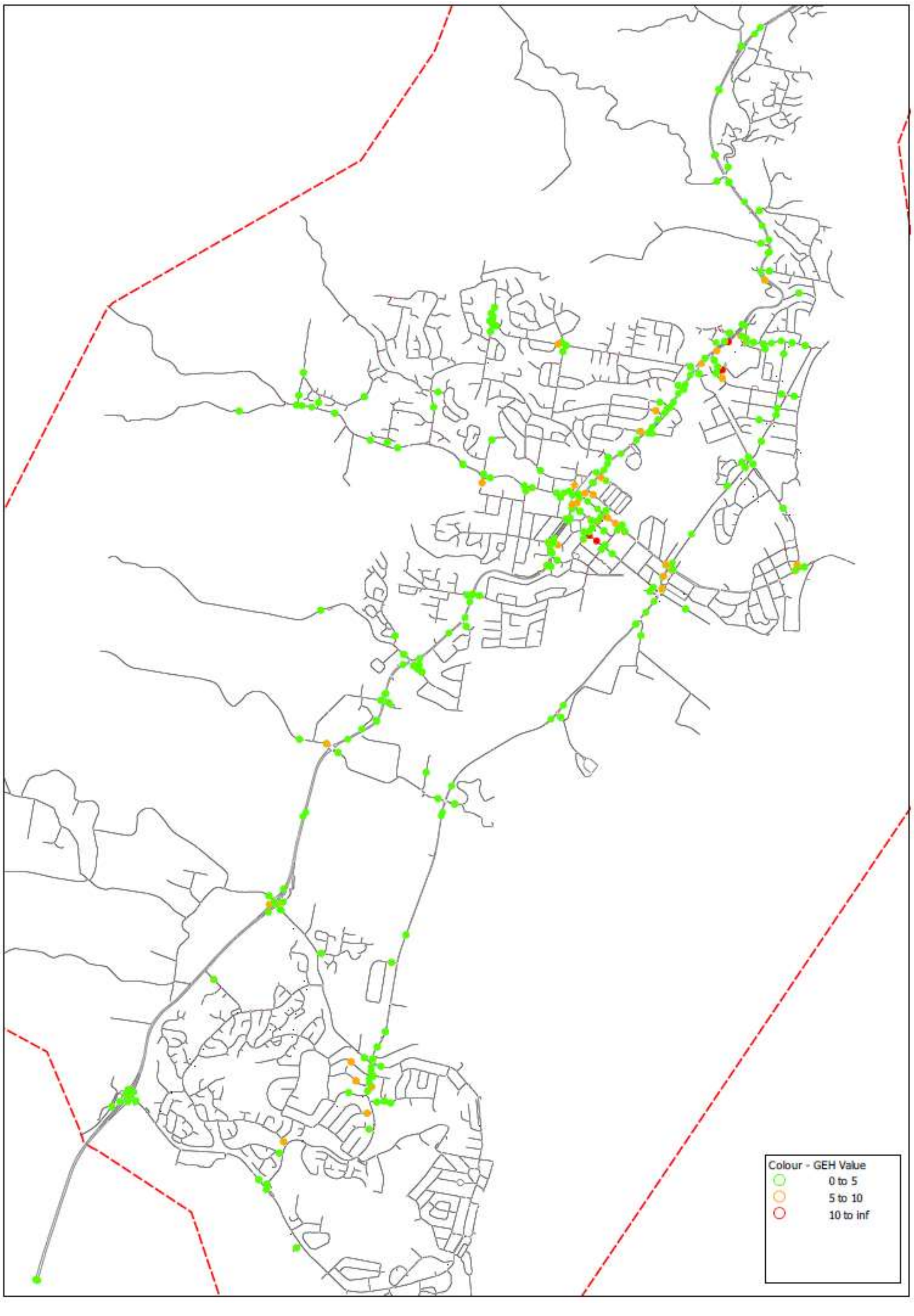



Figure 43: Mesoscopic model GEH calibration check – AM peak

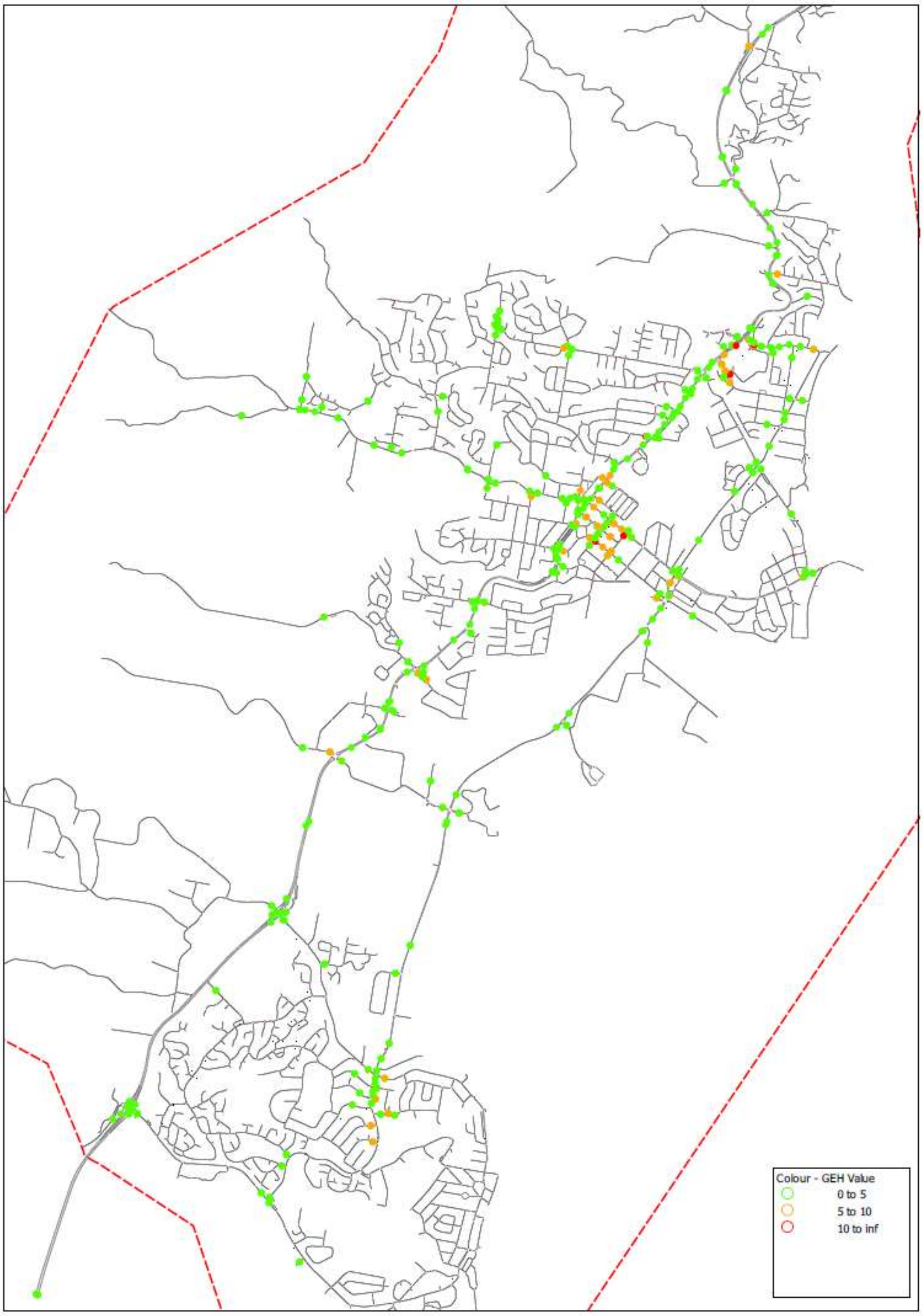



Figure 44: Mesoscopic model GEH calibration check – PM peak

### 8.3.1 Travel time validation

Modelled travel times along four key routes were compared to travel time survey data to validate the model results. The RMS Traffic Modelling Guidelines recommend that 95% of modelled journey time routes should be within 15% or one minute (whichever is greater) of the observed values. The overall validation results for the CHTM are shown in Table 54 and Table 55. Graphs displaying the modelled travel times against distance are shown in Figure 45 to Figure 48. The graphs also show surveyed average travel time and the boundaries for 15% variance either side of the average.

Table 54: Travel time validation check for AM peak

| Route | Direction | Obs. | Mod. | Diff (Abs.) | Diff (%) | Pass Check |
|---|---|---|---|---|---|---|
| 1 Pacific Highway | NB | 22.68 | 20.82 | -1.86 | -8% | Y |
| 1 Pacific Highway | SB | 19.70 | 19.71 | 0.01 | 0% | Y |
| 2 Hogbin Drive | NB | 10.58 | 9.38 | -1.20 | -11% | Y |
| 2 Hogbin Drive | SB | 11.15 | 10.02 | -1.13 | -10% | Y |
| 3 Coramba Road | EB | 9.47 | 10.60 | 1.13 | 12% | Y |
| 3 Coramba Road | WB | 9.88 | 9.16 | -0.72 | -7% | Y |
| 4 Stadium Drive | EB | 2.10 | 2.60 | 0.50 | 24% | Y |
| 4 Stadium Drive | WB | 1.67 | 1.90 | 0.23 | 14% | Y |

Table 55: Travel time validation check for PM peak

| Route | Direction | Obs. | Mod. | Diff (Abs.) | Diff (%) | Pass Check |
|---|---|---|---|---|---|---|
| 1 Pacific Highway | NB | 22.53 | 19.94 | -2.60 | -12% | Y |
| 1 Pacific Highway | SB | 21.03 | 19.56 | -1.47 | -7% | Y |
| 2 Hogbin Drive | NB | 8.33 | 8.64 | 0.31 | 4% | Y |
| 2 Hogbin Drive | SB | 10.03 | 8.88 | -1.16 | -12% | Y |
| 3 Coramba Road | EB | 9.32 | 10.26 | 0.95 | 10% | Y |
| 3 Coramba Road | WB | 9.68 | 9.74 | 0.05 | 1% | Y |
| 4 Stadium Drive | EB | 1.68 | 1.84 | 0.16 | 9% | Y |
| 4 Stadium Drive | WB | 2.30 | 2.35 | 0.05 | 2% | Y |

Overall, the model validation was achieved for all routes with travel time difference +/- 15% or +/- 1 minute of the observed average.

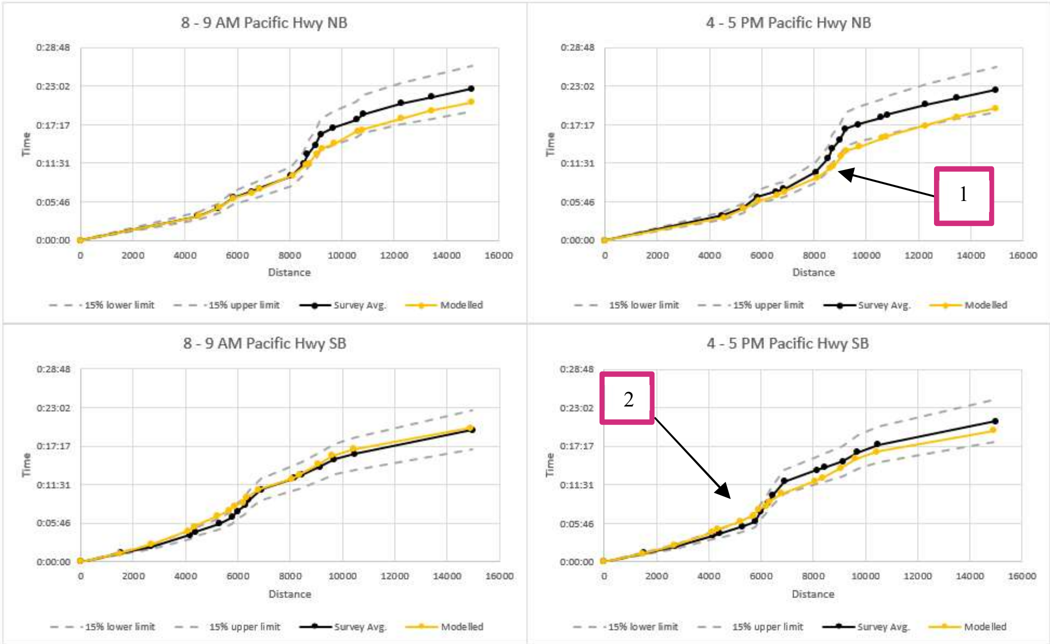



Figure 45: Journey time route 1 - Pacific Highway

Results for the travel time analysis showed that the modelled travel times exceeded the +/-15% boundary line at the numbered locations in the figures:

1. The observed travel times are influenced by outliers skewing the average upwards. These outliers are more common in the CBD area where an unfavourable signal could lead to a high amount of delays. Because of the small sample size, a few slow trips had a large impact on the average travel times. Removing these outliers would show a faster travel time which more closely matches the modelled travel time.
2. The modelled travel time was slightly higher due to delays caused by the signalised intersections. The observed travel times show minimal intersection delays as the average speed was just under posted speed. The differences were considered to be acceptable given the variability apparent in the sample data.

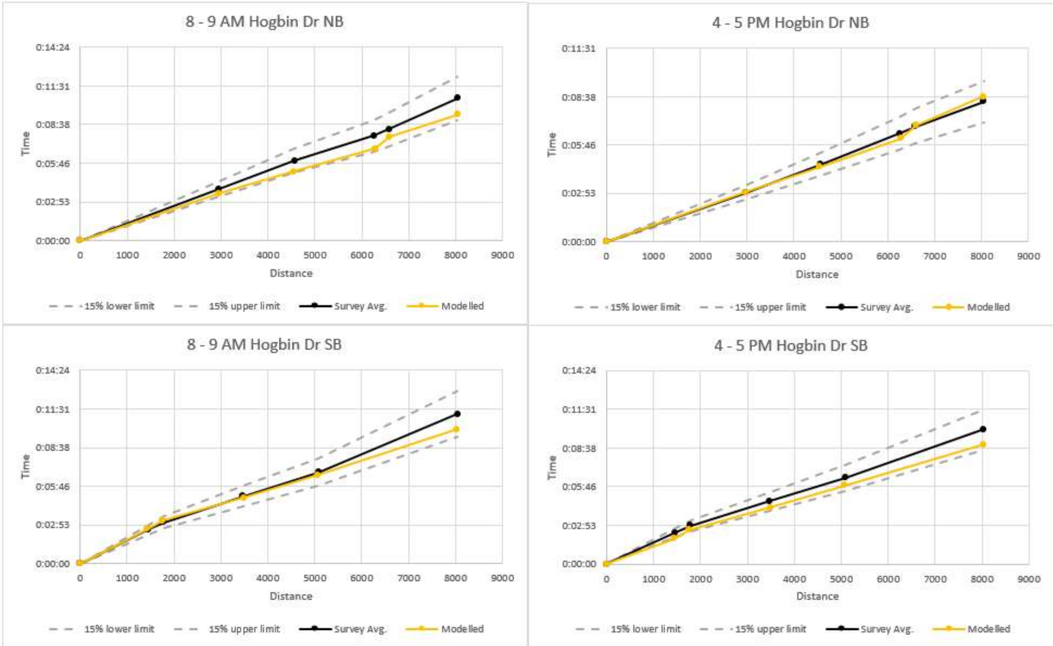



Figure 46: Journey time route 2 – Hogbin Drive

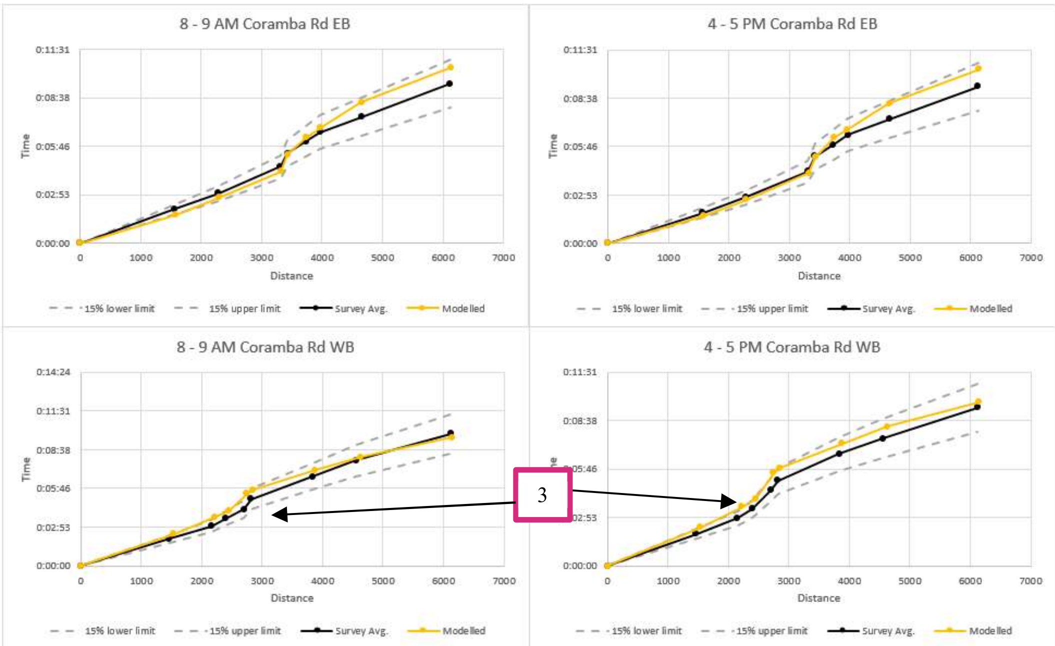



Figure 47: Journey time route 3 – Coramba Road

3. Higher modelled travel times are due to the model having to obey the reduced speeds zones (40km/h high pedestrian activity and school zones). This was not observed in the sample vehicles as the speed was shown to be higher than 40 km/h within the first two travel time sections. This causes the modelled travel times in the next few sections to exceed the tolerance limit.

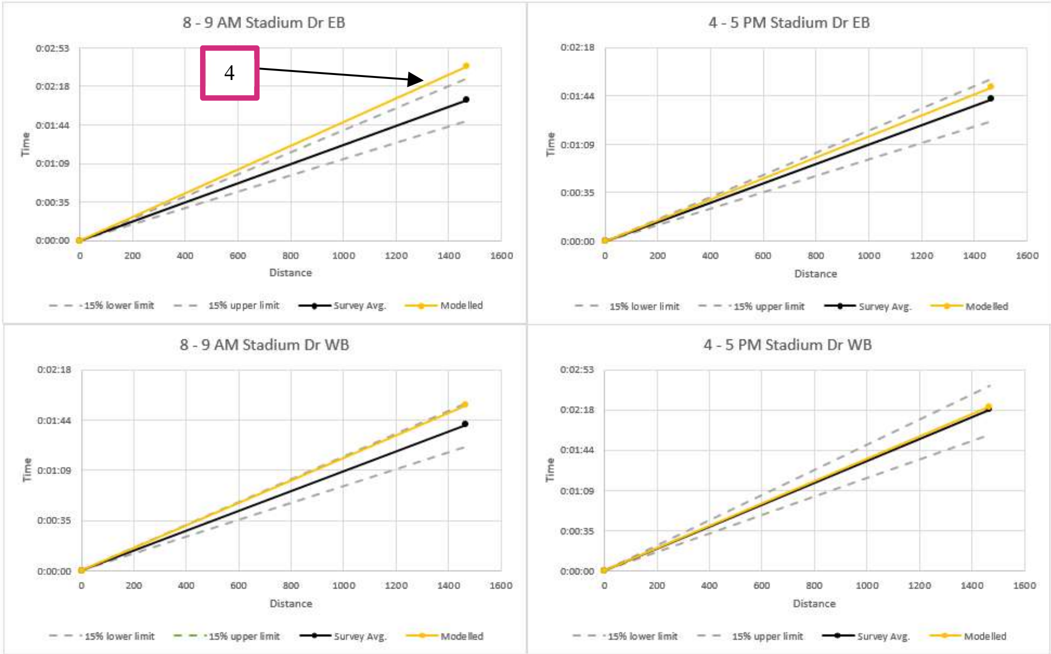



Figure 48: Journey time route 4 – Stadium Drive

4. The overall route travel time difference was considered acceptable as it was less than 60 seconds.

# 9 Forecast traffic performance

## 9.1 Traffic growth rates

Growth of traffic using the Pacific Highway will be influenced by growth in local traffic and inter-regional traffic movements. Growth in local traffic movements, which are traffic movements that have either an origin or destination within Coffs Harbour, will be largely governed by growth in population and employment. Population and employment are both forecast to grow by an average of 0.9% per annum between 2016 and 2044.

Inter-regional traffic movements, including freight traffic, was assumed to grow at 1.4% per annum, though it is noted historical traffic count data on the Pacific Highway near Sapphire indicates growth over the last 9 years has averaged 2.3% per annum (see Table 56).

Table 56: Pacific Highway traffic counts at Sapphire

| Year | ADT | ADT Growth | HV | HV Growth |
|---|---|---|---|---|
| 2007 | 18,420 | | 2,122 | |
| 2011 | 20,464 | 2.8% | 2,426 | 3.6% |
| 2016 | 22,582 | 2.1% | 3,188 | 6.3% |

Source: Roads and Maritime counts

The assumed growth rate of 1.4% per annum for inter-regional traffic using the Pacific Highway was based on the following:

- Historic traffic growth on the Pacific Highway just north of Coffs Harbour was 2.3% over the last nine years (refer to Table 5 in Section 2.2)
- The *NSW Freight and Ports Strategy* (TfNSW, 2013), which notes the freight traffic on the Pacific Highway is set to almost double by 2031, from 2011
- The Sydney to Brisbane Corridor Strategy (DoTARS, 2007), which indicates heavy vehicle traffic is projected to grow by 1.4% per annum
- BTRE *Working Paper 66 (Demand Projections for AusLink Non-Urban Corridors: Methodology and Projections*), which provides a 1999 to 2025 forecast growth rate of 2.3% per annum. This paper does not provide forecasts beyond 2025.

## 9.2 Do minimum improvements

Modelling of a ‘do nothing’ infrastructure base case showed that traffic delays in some parts of the Coffs Harbour network would increase in future years to a point where extensive delays would be experienced. An approach was adopted where ‘do minimum’ improvements were assumed at individual locations where delays generally exceeded 4 minutes. Such improvements were limited to upgrades that could be implemented ‘in corridor’ (i.e. substantial land acquisition wouldn’t be required). These assumptions resulted in a base case which operates reasonably well in 2034 and 2044 with isolated locations of high delay.

Modelling of the project case also showed that some locations of the network would operate with high levels of delay. In such cases, do minimum upgrades were also assumed.

The infrastructure improvements assumed in the base case and project case are shown in Table 57.

Table 57: Intersection improvements and upgrade year adopted for the business case

| Location | Description | Base Case | | | Project Case | | |
|---|---|---|---|---|---|---|---|
| | | 2024 | 2034 | 2044 | 2024 | 2034 | 2044 |
| Pacific Hwy / Solitary Island Way | 2-way signalised intersection | | ✓ | ✓ | | | |
| Pacific Hwy / Opal Boulevard | 3-way signalised intersection | | ✓ | ✓ | | | |
| Pacific Hwy / Bruxner Park Rd | 4-way signalised intersection | | ✓ | ✓ | | | |
| Pacific Hwy / Stadium Dr | Replace roundabout with four-way at-grade signalised intersection | ✓ | ✓ | ✓ | | | ✓ |
| Pacific Hwy / Cook Dr | Double right turn from minor street | | | ✓ | | | ✓ |
| Pacific Hwy / Boambee Rd | Double right turn from minor street | | | ✓ | | | ✓ |
| Pacific Hwy / Moonee St | Reconfigure intersection geometry and removal of right-turns from Pacific Highway | | | ✓ | | | |

## 9.3 Forecast volumes

The forecast daily traffic volumes for the bypass, existing highway and several locations on key local roads are shown in Table 58. The daily volumes are derived from the CHTM by factoring the AM and PM peak flows by VKT factors determined from the CHSTM.

Plots showing the modelled AM and PM peak hour traffic flows for 2024 and 2044 are included in Appendix H, along with difference flow plots to show the change in traffic flow between the base case and project case and select link plots showing the origin and destinations of trips using the highway.

Table 58: Forecast daily volumes (two-way)

| | Base Daily Volumes | | | Project Daily Volumes | | |
|---|---|---|---|---|---|---|
| **Location** | **2024** | **2034** | **2044** | **2024** | **2034** | **2044** |
| Bypass | | | | | | |
| North of Coramba Road | - | - | - | 19,100 | 21,200 | 23,400 |
| South of Coramba Road | - | - | - | 24,600 | 27,100 | 29,300 |
| Existing Pacific Hwy | | | | | | |
| South of Bruxner Park Rd | 38,600 | 43,300 | 46,500 | 33,400 | 36,600 | 40,000 |
| North of Orlando St | 45,800 | 49,700 | 52,000 | 35,000 | 37,700 | 39,600 |
| South of Albany St | 34,300 | 36,000 | 36,000 | 19,500 | 21,200 | 21,200 |
| Local Network | | | | | | |
| Hogbin Dr north of Park Beach Rd | 8,900 | 11,000 | 10,000 | 6,500 | 8,000 | 8,400 |
| Hogbin Dr north of Harbour Dr | 18,000 | 19,100 | 18,800 | 13,800 | 14,800 | 15,100 |
| Hogbin Dr north of Stadium Dr | 28,900 | 31,300 | 31,700 | 20,700 | 21,800 | 22,600 |
| Stadium Dr east of Pac Hwy | 10,400 | 11,600 | 13,500 | 11,300 | 11,800 | 13,200 |
| Bray St east of Joyce St | 10,600 | 11,400 | 12,200 | 8,000 | 8,200 | 8,400 |
| West High St west of Murdock St | 9,000 | 10,500 | 11,800 | 9,500 | 10,200 | 10,600 |
| Coramba Rd between Shephards Lane and Robin St | 12,800 | 13,600 | 14,500 | 10,800 | 11,700 | 13,000 |
| Coramba Rd between Bypass and Shephards Lane | 9,200 | 9,500 | 9,900 | 9,900 | 10,900 | 12,600 |

## 9.4 Predicted travel times

Travel time surveys conducted in June 2016 showed that the current travel time between Korora Hill and Englands Road ranges from 13 minutes to 26 minutes in the morning peak hour, giving an average speed of around 35 km/h over a travel distance of around 10 km. The current travel times measured in the survey for the morning, midday and afternoon peak periods are shown in Table 59.

Table 59: 2016 Travel time survey results (minutes) between Korora Hill and England's Road

| Time | | Southbound | | | Northbound | | |
|---|---|---|---|---|---|---|---|
| From | To | Max. Time | Avg. Time | Avg. Speed | Max. Time | Avg. Time | Avg. Speed |
| 8:00 AM | 9:00 AM | 20:05 | 16:40 | 38 km/h | 26:27 | 19:04 | 33 km/h |
| 11:00 AM | 12:00 PM | 22:42 | 19:00 | 33 km/h | 32:55 | 23:23 | 27 km/h |
| 4:00 PM | 5:00 PM | 26:54 | 18:38 | 34 km/h | 24:32 | 18:48 | 34 km/h |

Travel times for the future 2024 and 2044 base case have been estimated using the AIMSUN model. The predicted base case travel times for the project extents (i.e. between Sapphire and 1 km south of Englands Road) in 2024 and 2044 are shown in Table 60. It was notable that the southbound travel time is predicted to increase substantially during and AM peak. Much of the additional delay was caused by signalised intersections in south Coffs Harbour exceeding capacity even with the implementation of do minimum upgrades.

Table 60: Predicted future base case travel time (minutes) for project extents

| | Travel times (minutes) | | | |
|---|---|---|---|---|
| | Southbound | | Northbound | |
| | AM | PM | AM | PM |
| Predicted 2024 | 21.0 | 19.3 | 19.6 | 19.6 |
| Predicted 2044 | 29.2 | 21.8 | 20.4 | 23.7 |

The travel time for traffic using the bypass was predicted using the Coffs Harbour AIMSUN model. The assumed posted speed for the bypass was 110 km/h, and the speed of heavy vehicles was limited to 100 km/h.

The predicted travel times for traffic using the proposed bypass compared to the base case travel times are shown in Table 61.

Table 61: Comparison of predicted base case and project case travel times (minutes) for project extents

| | Direction | Travel times (minutes) | | | |
|---|---|---|---|---|---|
| | | 2024 | | 2044 | |
| | | AM | PM | AM | PM |
| Existing Pacific Highway (Base Case) | Southbound | 21.0 | 19.3 | 29.2 | 21.8 |
| | Northbound | 19.6 | 19.6 | 20.4 | 23.7 |
| Bypass (Project Case) | Southbound | 8.6 | 8.5 | 8.6 | 8.6 |
| | Northbound | 8.3 | 8.4 | 8.4 | 8.5 |
| Bypass travel time savings | Southbound | 12.4 | 10.7 | 20.6 | 13.2 |
| | Northbound | 11.3 | 11.2 | 12.0 | 15.2 |

## 9.5 Predicted travel time savings

The total travel times for each scenario was output from the CHTM as a network statistic and summarised in Table 62.

The total travel time savings predicted using the CHTM are a combination of:

- Travel time saved by vehicles using the bypass; plus
- The reduction in delays experienced by traffic using the existing highway and local road network that benefit from reduced traffic volumes.

Table 62: Predicted network wide travel time savings

| | **Total Travel Time (hours)** | | | |
|---|---|---|---|---|
| | 2024 | | 2044 | |
| | AM Hour | PM Hour | AM Hour | PM Hour |
| Base case | 3,427 | 3,116 | 4,607 | 4,152 |
| Project case | 2,940 | 2,745 | 3,538 | 3,298 |
| Difference | -487 | -371 | -1,069 | -854 |
| Travel time savings (hours/day) | -4,713 | | -10,558 | |

## 9.6 Total distance travelled

The total distance travelled predicted by the CHTM for the base and project cases are shown in Table 63 for 2024 and Table 64 for 2044. The total distance travelled was also split between 'highway' and 'non-highway' travel. These were used in the calculation of vehicle operating costs whereby highway travel was assumed to represent uninterrupted flow conditions and non-highway travel represents interrupted flow conditions.

The results show an increase in distance travelled in the project case as the bypass route is longer (but faster) than the existing route.

Table 63: Predicted network wide change in total distance travelled in 2024

| | **2024 Distance Travelled (km)** | | | | | |
|---|---|---|---|---|---|---|
| | AM Hour | | | PM Hour | | |
| | All | Highway | Non-Highway | All | Highway | Non-Highway |
| Base case | 141,665 | 41,439 | 100,226 | 136,461 | 38,768 | 97,692 |
| Project case | 150,141 | 58,464 | 91,677 | 142,950 | 55,036 | 87,914 |
| Difference | 8,476 | 17,025 | -8,549 | 6,489 | 16,268 | -9,779 |
| Change in distance travelled (km/day) | 76,024 | | | | | |

Table 64: Predicted network wide change in total distance travelled in 2044

| | 2044 Distance Travelled (km) | | | | | |
|---|---|---|---|---|---|---|
| | AM Hour | | | PM Hour | | |
| | All | Highway | Non-Highway | All | Highway | Non-Highway |
| Base case | 160,679 | 44,714 | 115,965 | 159,041 | 44,133 | 114,908 |
| Project case | 175,068 | 69,566 | 105,502 | 168,812 | 68,508 | 100,304 |
| Difference | 14,389 | 24,853 | -10,463 | 9,771 | 24,375 | -14,604 |
| Change in distance travelled (km/day) | 122,737 | | | | | |

## 9.7 Average travel speeds

The average travel speeds of vehicles that travelled through the network for the base and project cases are shown in Table 65. The average speeds were also split between ‘highway’ and ‘non-highway’ travel. These were used in the calculation of vehicle operating costs whereby highway travel was assumed to represent uninterrupted flow conditions and non-highway travel represents interrupted flow conditions.

The results show an increase in speeds in the project case, which is expected due to the high speed bypass and the reduction of traffic congestion along routes through Coffs Harbour. Heavy vehicles gain a larger overall increase in average speed as these vehicles mainly use the highway network and therefore gain a larger overall benefit per vehicle.

Table 65: Predicted network wide change in average speed in 2024

| | 2024 Average Speed (km/h) | | | | | |
|---|---|---|---|---|---|---|
| | AM Hour | | | PM Hour | | |
| | All | Highway | Non-Highway | All | Highway | Non-Highway |
| Base case - all vehicles | 41 | 76 | 35 | 42 | 78 | 38 |
| Base case – heavy trucks | 46 | 77 | 30 | 48 | 90 | 32 |
| Project case - all vehicles | 47 | 87 | 40 | 47 | 88 | 41 |
| Project case – heavy trucks | 60 | 90 | 38 | 70 | 93 | 39 |
| Difference - all vehicles | 5 | 11 | 5 | 5 | 10 | 3 |
| Difference – heavy trucks | 14 | 12 | 7 | 22 | 3 | 7 |

Table 66: Predicted network wide change in average speed in 2044

| | 2044 Average Speed (km/h) | | | | | |
|---|---|---|---|---|---|---|
| | AM Hour | | | PM Hour | | |
| | All | Highway | Non-Highway | All | Highway | Non-Highway |
| Base case - all vehicles | 38 | 67 | 30 | 39 | 77 | 33 |
| Base case – heavy trucks | 43 | 71 | 24 | 45 | 78 | 27 |
| Project case - all vehicles | 45 | 87 | 38 | 46 | 87 | 40 |
| Project case – heavy trucks | 62 | 89 | 38 | 71 | 92 | 39 |
| Difference - all vehicles | 7 | 20 | 8 | 7 | 10 | 7 |
| Difference – heavy trucks | 19 | 19 | 14 | 27 | 14 | 12 |

# 10 Expansion factors

## 10.1 Peak to daily factors

Expansion factors to convert AM and PM peak hour model results from the mesoscopic model to total daily estimates were calculated using base year strategic model outputs. The factors were calculated separately for each vehicle type as the traffic volume profiles for each vehicle type were different throughout the day.

The difference in total network travel time (vehicle hours travelled) between the base and project scenarios for each modelled time period was used to calculate an expansion factor for travel time benefits. The factors to convert AM plus PM travel time benefits to a daily total are shown in Table 67.

Table 67: Peak to daily factors for travel time benefits

| Vehicle Class | Travel Time Benefits |
|---|---|
| All vehicles | 5.49 |
| Light vehicles | 5.20 |
| Medium commercial vehicles | 5.46 |
| Heavy commercial vehicles | 7.77 |

Factors to convert total distance travelled (vehicle kilometres travelled) were calculated separately for the base and project scenarios. Factors for highway and non-highway travel were also calculated separately to suit the calculation of vehicle operating costs. The factors to convert AM plus PM travel distance to a daily total are shown in Table 68.

Table 68: Peak to daily factors for total distance travelled

| Vehicle Class | Link type | Base Case VKTs | Project Case VKTs |
|---|---|---|---|
| All vehicles | All travel | 5.93 | 5.91 |
| Light vehicles | Highway travel | 6.26 | 6.22 |
| Medium commercial vehicles | | 6.04 | 6.04 |
| Heavy commercial vehicles | | 8.65 | 8.62 |
| Light vehicles | Non-highway travel | 5.53 | 5.48 |
| Medium commercial vehicles | | 6.18 | 6.18 |
| Heavy commercial vehicles | | 6.78 | 6.04 |

## 10.2 Daily to annual factor

An annualisation factor was calculated to convert daily travel benefits to yearly estimates. To calculate the annualisation factor, traffic counts from traffic signal detectors for 12 intersections along the Pacific Highway in Coffs Harbour were analysed.

Traffic count data for the day of traffic surveys (23 June 2016) was compared against detector count data for a full year.

All detector data were processed to take into account numerous errors and discrepancies within the traffic detectors at each site. For any date that involved 'BAD' and 'NA' data readings, the entire readings for that date were removed from the analysis for that particular site. For the survey date, only four sites (i.e. Site 647, 2808, 4205 and 4565) had complete data with no 'BAD' or 'NA' readings. Site 2808 was removed due to inconsistent readings during the survey date.

Following the preparation of the detector data, average daily traffic volumes were computed for an average day (i.e. weekdays and weekends) and the survey day. An annualisation factor was then calculated for all three sites by dividing the sum of average day traffic by the survey day traffic and multiplying by 365. The average annualisation factor across the three sites equated to 353. An annualisation factor of 350 was implemented for the cost benefit analysis.

# Appendix A

Origin-Destination Traffic Survey

# A1 Introduction

The Coffs Harbour Strategic Transport Model (CHSTM) was developed by Arup on behalf of Roads and Maritime for the Coffs Harbour bypass project. A first version of the model used to inform a strategic business case (SBC) for the bypass in early 2017. This version of the CHSTM was developed using traffic survey data (amongst other inputs) collected in July 2016, including an origin-destination (O-D) survey.

The O-D survey was conducted over a 24-hour period and consisted of 10 two-way survey stations covering a wide area across the Coffs Harbour local government area. Vehicle number plates were captured using video and an automated reading and matching process was used to produce the O-D survey results. The results of the survey where used to understand travel patterns, particularly ‘through movements’. Some results of the survey, such as through movements (i.e. external movements) were used as direct inputs to the CHSTM, while other travel patterns within the modelled network (i.e. internal movements) where used to check and calibrate the model.

Over the course of the model development program, some of the results from the 2016 O-D survey were found to contain possible discrepancies that could not be adequately verified. As a result, a second, similar O-D survey was commissioned and the data was collected in May 2017.

The purpose of this Appendix is to discuss data analysis of the 2017 O-D survey.

# A2 O-D Survey

## A2.1 Survey locations

The O-D survey was carried out by a specialised traffic survey company from 1:00am on Tuesday 16th May 2017 to 2:00am on Wednesday 17th May 2017. The survey covered a total of 10 O-D stations capturing traffic movements in both travel directions at each station. Vehicles captured during the survey were classified into three vehicle classes including light vehicles (Austroads vehicle class 1-2), medium heavy vehicles (class 3-5), and articulated heavy vehicles (class 6-12).

The O-D stations are listed in Table 1 with indicative locations shown in Figure 1. An O-D sector system has been developed based on indicative cordons bounded by camera locations for the purpose of data analysis and model inputs. These sectors are also shown in Figure 49.

Table 69 O-D camera station location list

| Station Number | Location Description |
|---|---|
| 1 (N&S) | Pacific Hwy - 1000m north of Range Rd |
| 2 (N&S) | Pacific Hwy - south of Hearnes Lake Road interchange |

| | |
|---|---|
| 3 (N&S) | Pacific Hwy - 450m south of Old Coast Rd |
| 4 (E&W) | Bruxner Park Rd - 300m west of Pacific Hwy |
| 5 (N&S) | Pacific Hwy - 100m north of Coff St |
| 6 (N&S) | Hogbin Dr - 400m north of Harbour Dr |
| 7 (E&W) | Coramba Rd - 70m west of Bennetts Rd |
| 8 (N&S) | Pacific Hwy - 1000m north of Lindsays Rd |
| 9 (N&S) | Hogbin Dr - 500m north of Hi-Tech Dr |
| 10 (N&S) | Pacific Hwy - north of Old Pacific Hwy/ Pine Creek Way ramps |


Figure 49 Indicative O-D camera locations and sector system

## A2.2 Data process

The survey firm carried out the data processing and analysis based on the video footage recorded during the survey. The major steps involved in the data processing are summarised as follows:

1. Number plates recorded in the video were converted into a digital format with time stamp, station ID, travel direction, and vehicle class information. The number plate information were encoded by the survey firm for privacy reasons.
2. Number plates were matched based on logical time sequence between each station – station pair distinct by vehicle classes. The survey firm utilised a fuzzy matching approach to capture incomplete number plates with missing characters.
3. Number plate matching was initially carried out with no travel time cut-offs. The frequency count of the matches was inspected for cluster of matches to understand the data quality and to work out a practical travel time cut-offs for traffic O-D demand.
4. The travel time cut-offs were then applied to determine valid matches by O-D pairs by vehicle class. Matches with too small / too large travel time were excluded from the matched records. The matches with too large travel time will be considered as stopping trips (i.e. separated trips between the O-D).
5. The matched camera O-D demands were then converted by Arup into sector to sector O-D demands as the required input format for modelling processes and result analysis.

## A2.3 Data analysis and discussion

The frequency count of number plate matches has been inspected for each O-D pair. This exercise was to understand the survey data quality as well as determine the travel time cut-off windows to derive the O-D demand. The following elements have been inspected and with findings summarised in Table 70.

Table 70 O-D match results check and findings

| Check | Finding | Result |
|---|---|---|
| Presence of matches between each O-D pair | Each station pair has matched records with expected frequency between key stations on Pacific Highway | Pass |
| Duplication of matches | No duplication match record found | Pass |
| Presence of illogical travel time between each O-D pair (i.e. too small / negative) | No negative travel time calculated, error matches in small travel time window (i.e. smaller than its realistic travel time between certain O-D pair) is less than 1% | Pass |
| Relative travel time with similar distance between O-D pair | Travel time generally increased in a plausible manner with distance increase between the O-D stations | Pass |
| Reverse travel time of the same O-D pair | Comparisons were plausible | Pass |
| The highest frequent travel time compare to Google travel time | The highest frequent travel time was generally in line with Google measured travel time, except for O-D pairs with fewer records (i.e. camera 1 & 7), or parallel camera stations which did not form an ordinary through traffic route (i.e. camera 5 & 6) | Pass |

Table 71 and Table 72 compare the highest frequent travel time[4] based on number plate matching with the Google measured travel time[5]. Both travel times were rounded to whole minutes and it can be seen the differences between the two sets of travel time data were generally small, with travel time differences typically less than 2 minutes.

The O-D pairs with large differences are highlighted yellow in Table 71 and Table 72. It was found some travel time records between certain O-D pairs were unrealistically low (i.e. the time difference from number plate matching was too low based on the distance and realistic travel speed between the sites). This suggested there could be some errors in the matching process. Key points to note are as follows:

- Differences in highest frequent travel time and Google measured travel time between O-D pairs were generally found where there were too few matching records between sites. These differences were generally associated with site 4 (Bruxner Park Road) and site 7 (Coramba Road). Note that the error matches for these O-D pairs (typically 1 or 2 records), were marginally more than the matched records in the time period that coincides with the Google measured travel time, and as such, the error matches show up as the highest frequent travel time
- The O-D pairs with a relatively large number of matching records all had travel times close to the Google measured travel time
- Matching errors exist in all O-D pairs but the matching error records were very few (an overall 0.42% out of 156,551 matched records)

It was also noted the highest frequent travel time between site 6 and site 5 was much larger than the ordinary travel time measured by Google. The route between site 6 and site 5 is not an ordinary travel route. Vehicles travelling along this route would need to travel through the CBD and it is very likely these vehicles would normally stop somewhere, and return via Hogbin Drive and via site 6. These trips should be treated as two separate trips because the highest frequent travel time between these two sites is so different to the Google measured travel time.

Table 71 Highest frequent travel time based on number plate matching

| Highest Frequent time (minute) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | - | 17 | 27 | 28 | 32 | 33 | 2 | 40 | 38 | 47 |
| **2** | 17 | - | 10 | 11 | 16 | 16 | 22 | 24 | 22 | 29 |
| **3** | 26 | 10 | - | 1 | 6 | 7 | 12 | 14 | 12 | 21 |
| **4** | 27 | 11 | 2 | - | 7 | 7 | 11 | 14 | 13 | 21 |
| **5** | 32 | 15 | 6 | 6 | - | 4 | 6 | 8 | 9 | 15 |
| **6** | 33 | 17 | 7 | 7 | 52 | - | 21 | 7 | 6 | 14 |

[4] The travel time with the highest number of trips recorded. Travel time broken into each 1 minute intervals.

[5] Travel time measured in Google map between A and B in uncongested time period.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **7** | 12 | 22 | 11 | 13 | 6 | 17 | - | 12 | 12 | 19 |
| **8** | 40 | 25 | 15 | 11 | 9 | 7 | 11 | - | 5 | 8 |
| **9** | 38 | 22 | 13 | 13 | 10 | 6 | 13 | 4 | - | 11 |
| **10** | 47 | 30 | 23 | 3 | 16 | 14 | 18 | 8 | 12 | - |

Table 72 Google measured travel time between O-D pairs (outside peak hours)

| Google time (minute) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | - | 15 | 25 | 26 | 31 | 32 | 38 | 39 | 37 | 46 |
| **2** | 15 | - | 10 | 11 | 16 | 16 | 22 | 24 | 22 | 31 |
| **3** | 25 | 10 | - | 2 | 6 | 7 | 13 | 14 | 13 | 22 |
| **4** | 26 | 11 | 2 | - | 6 | 7 | 13 | 15 | 13 | 22 |
| **5** | 31 | 16 | 6 | 6 | - | 5 | 7 | 9 | 9 | 15 |
| **6** | 32 | 16 | 7 | 7 | 5 | - | 11 | 7 | 6 | 14 |
| **7** | 38 | 22 | 13 | 13 | 7 | 11 | - | 12 | 13 | 18 |
| **8** | 39 | 24 | 14 | 15 | 9 | 7 | 12 | - | 5 | 7 |
| **9** | 37 | 22 | 13 | 13 | 9 | 6 | 13 | 5 | - | 11 |
| **10** | 46 | 31 | 22 | 22 | 15 | 14 | 18 | 7 | 11 | - |

## A2.4 Travel time cut-offs

The travel time cut-offs between each O-D pair were determined based on the highest frequent travel time and the Google measured travel time, with time buffers to capture faster / speeding vehicles and slower / short stopping vehicles in addition to the average travel condition. The cut-offs were applied consistently for all time periods during the day and the reverse travel directions. The adopted travel time cut-offs are shown in Table 73.

Table 73 Travel time cut-offs by O-D pairs

| Cut-off time (minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | - | 11 - 23 | 18 - 38 | 18 - 39 | 23 - 45 | 23 - 46 | 27 - 57 | 27 - 59 | 27 - 56 | 32 - 65 |
| **2** | 11 - 23 | - | 7 - 15 | 8 - 17 | 11 - 24 | 11 - 24 | 15 - 33 | 17 - 36 | 15 - 33 | 22 - 47 |
| **3** | 18 - 38 | 7 - 15 | - | 1 - 3 | 4 - 14 | 5 - 15 | 9 - 24 | 8 - 26 | 9 - 24 | 15 - 33 |
| **4** | 18 - 39 | 8 - 17 | 1 - 3 | - | 4 - 14 | 5 - 15 | 9 - 24 | 9 - 27 | 9 - 24 | 15 - 33 |
| **5** | 23 - 45 | 11 - 24 | 4 - 14 | 4 - 14 | - | 4 - 8 | 5 - 15 | 4 - 18 | 6 - 18 | 11 - 23 |
| **6** | 23 - 46 | 11 - 24 | 5 - 15 | 5 - 15 | 4 - 8 | - | 8 - 21 | 4 - 15 | 4 - 9 | 10 - 21 |
| **7** | 27 - 57 | 15 - 33 | 9 - 24 | 9 - 24 | 5 - 15 | 8 - 21 | - | 8 - 23 | 9 - 24 | 13 - 27 |
| **8** | 27 - 59 | 17 - 36 | 8 - 26 | 9 - 27 | 4 - 18 | 4 - 15 | 8 - 23 | - | 4 - 8 | 5 - 11 |
| **9** | 27 - 56 | 15 - 33 | 9 - 24 | 9 - 24 | 6 - 18 | 4 - 9 | 9 - 24 | 4 - 8 | - | 8 - 17 |
| **10** | 32 - 65 | 22 - 47 | 15 - 33 | 15 - 33 | 11 - 23 | 10 - 21 | 13 - 27 | 5 - 11 | 8 - 17 | - |

The derived statistics of number plate records between each O-D pair, based on the travel time cut-offs in Table 73, are presented in Table 74. It resulted in a total of 103,429 records between all O-D pairs. Matched records by time period and by vehicle class are tubulised in the following section.

Table 74 Daily matches for all vehicles based on defined travel time cut-offs

| Daily matches all vehicles | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 2,837 | 2,726 | 7 | 1,965 | 168 | 4 | 1,548 | 134 | 1,510 |
| 2 | 3,394 | 0 | 5,393 | 11 | 3,078 | 501 | 34 | 1,843 | 343 | 1,729 |
| 3 | 3,165 | 5,853 | 0 | 15 | 5,050 | 1,185 | 95 | 2,280 | 702 | 1,934 |
| 4 | 11 | 23 | 49 | 0 | 53 | 13 | 2 | 16 | 6 | 10 |
| 5 | 2,231 | 3,156 | 4,452 | 48 | 0 | 37 | 82 | 3,624 | 413 | 2,718 |
| 6 | 173 | 501 | 1,061 | 18 | 30 | 0 | 15 | 493 | 2,176 | 320 |
| 7 | 9 | 25 | 73 | 2 | 101 | 22 | 0 | 160 | 104 | 80 |
| 8 | 1,660 | 1,843 | 2,133 | 16 | 3,211 | 533 | 195 | 0 | 57 | 5,538 |
| 9 | 107 | 263 | 557 | 11 | 376 | 2,260 | 87 | 36 | 0 | 143 |
| 10 | 1,610 | 1,769 | 1,921 | 6 | 2,480 | 377 | 96 | 6,268 | 65 | 0 |

A series of sensitivity tests were carried out to investigate the impact of varying travel time cut-offs to number plate matches. Table 75 summaries the changes of daily records by adopting the adjusted travel time cut-offs. The adjustments were made globally across all the O-D pairs.

Table 75 Sensitivity tests results by changing travel time cut-offs

| Adjust lower limit of travel time cut-off | Result changes | Adjust upper limit of travel time cut-off | Result changes |
|---|---|---|---|
| Reduce 1 minute | Increase of 288 records (0.3%) | Increase 1 minute | Increase of 961 records (0.9%) |
| Reduce 2 minute | Increase of 357 records (0.3%) | Increase 2 minute | Increase of 2,662 records (2.6%) |
| Reduce 5 minute | Increase of 518 records (0.5%) | Increase 5 minute | Increase of 4,814 records (4.7%) |
| Reduce 10 minute | Increase of 656 records (0.6%) | Increase 10 minute | Increase of 7,712 records (7.5%) |
| Reduce 15 minute | Increase of 733 records (0.7%) | Increase 15 minute | Increase of 10,225 records (9.9%) |
| Take out lower limit completely | Increase of 805 records (0.8%) | Take out upper limit completely | Increase of 52,317 records (50.6%) |

The sensitivity tests indicated the impact of reducing the lower limit of travel time cut-offs was minor with only 0.5% increase of records when the lower limit was reduced by 5 minutes. There was only 0.8% increase of records when removing the lower limit completely.

On the other hand, the impact of increasing the upper limit of travel time cut-offs was relatively large with around 5% increase in matches the upper limit was increased by another 5 minutes. The records increased by another 50% when the upper limit was completely removed. This approach was only used as a sensitivity check but not considered viable for O-D demand recording as trips with large travel times between stations should be treated as two separate trips.

## A2.5 Matched records by time period and vehicle class

| AM - Light vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 142 | 144 | 0 | 68 | 8 | 2 | 49 | 8 | 52 |
| 2 | 179 | 0 | 491 | 2 | 168 | 52 | 5 | 59 | 21 | 58 |
| 3 | 164 | 289 | 0 | 2 | 490 | 165 | 7 | 114 | 70 | 79 |
| 4 | 0 | 1 | 5 | 0 | 4 | 2 | 0 | 0 | 0 | 0 |
| 5 | 60 | 96 | 129 | 0 | 0 | 5 | 3 | 178 | 24 | 121 |
| 6 | 20 | 39 | 81 | 2 | 0 | 0 | 0 | 43 | 144 | 27 |
| 7 | 2 | 4 | 10 | 0 | 14 | 4 | 0 | 14 | 13 | 6 |
| 8 | 73 | 87 | 108 | 1 | 155 | 95 | 6 | 0 | 6 | 317 |
| 9 | 9 | 15 | 38 | 2 | 28 | 248 | 2 | 11 | 0 | 12 |
| 10 | 66 | 77 | 81 | 0 | 91 | 48 | 2 | 561 | 7 | 0 |

| AM - Medium heavy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 18 | 17 | 0 | 14 | 0 | 0 | 5 | 0 | 4 |
| 2 | 15 | 0 | 23 | 0 | 17 | 1 | 0 | 3 | 1 | 2 |
| 3 | 19 | 30 | 0 | 0 | 27 | 3 | 1 | 5 | 2 | 2 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 9 | 14 | 18 | 0 | 0 | 0 | 2 | 17 | 3 | 5 |
| 6 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 6 | 1 |
| 7 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 1 |
| 8 | 6 | 6 | 7 | 0 | 14 | 1 | 4 | 0 | 1 | 20 |
| 9 | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 0 | 0 | 1 |
| 10 | 2 | 3 | 3 | 0 | 5 | 0 | 2 | 25 | 0 | 0 |

| AM - Articular vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 12 | 16 | 0 | 12 | 0 | 0 | 13 | 0 | 15 |
| 2 | 36 | 0 | 20 | 0 | 18 | 0 | 0 | 14 | 0 | 12 |
| 3 | 27 | 30 | 0 | 0 | 23 | 0 | 0 | 18 | 0 | 15 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 13 | 19 | 18 | 0 | 0 | 0 | 0 | 20 | 0 | 16 |
| 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 17 | 17 | 19 | 0 | 15 | 0 | 0 | 0 | 1 | 26 |
| 9 | 3 | 2 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 10 | 17 | 18 | 18 | 0 | 15 | 0 | 0 | 25 | 0 | 0 |

| Inter peak - Light vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1,025 | 1,087 | 7 | 656 | 85 | 0 | 458 | 66 | 498 |
| 2 | 1,328 | 0 | 2,043 | 5 | 967 | 201 | 6 | 493 | 154 | 479 |
| 3 | 1,249 | 2,422 | 0 | 6 | 1,767 | 425 | 30 | 683 | 289 | 599 |
| 4 | 8 | 18 | 31 | 0 | 20 | 5 | 0 | 10 | 1 | 5 |
| 5 | 772 | 1,145 | 1,682 | 23 | 0 | 18 | 36 | 1,275 | 204 | 1,002 |
| 6 | 70 | 200 | 413 | 7 | 18 | 0 | 12 | 196 | 990 | 143 |
| 7 | 2 | 5 | 21 | 1 | 45 | 11 | 0 | 48 | 29 | 21 |
| 8 | 578 | 632 | 727 | 10 | 1,353 | 255 | 93 | 0 | 22 | 2,101 |
| 9 | 33 | 93 | 187 | 5 | 171 | 1,033 | 38 | 8 | 0 | 77 |
| 10 | 554 | 603 | 644 | 3 | 1,026 | 195 | 46 | 2,855 | 32 | 0 |

| Inter peak - Medium heavy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 90 | 85 | 0 | 65 | 4 | 1 | 42 | 6 | 41 |
| 2 | 67 | 0 | 166 | 0 | 108 | 10 | 4 | 42 | 11 | 42 |
| 3 | 61 | 123 | 0 | 1 | 136 | 21 | 5 | 42 | 21 | 40 |
| 4 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 5 | 49 | 78 | 99 | 2 | 0 | 0 | 7 | 66 | 10 | 48 |
| 6 | 4 | 11 | 24 | 0 | 2 | 0 | 0 | 6 | 37 | 3 |
| 7 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 9 | 2 | 7 |
| 8 | 24 | 34 | 37 | 0 | 61 | 4 | 4 | 0 | 5 | 132 |
| 9 | 2 | 7 | 13 | 0 | 7 | 29 | 2 | 2 | 0 | 3 |
| 10 | 24 | 30 | 31 | 0 | 43 | 0 | 3 | 129 | 4 | 0 |

| Inter peak - Articular vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 226 | 251 | 0 | 223 | 4 | 0 | 196 | 3 | 189 |
| 2 | 176 | 0 | 260 | 0 | 233 | 1 | 1 | 183 | 5 | 183 |
| 3 | 174 | 210 | 0 | 0 | 260 | 4 | 6 | 201 | 5 | 193 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 165 | 198 | 203 | 0 | 0 | 0 | 2 | 205 | 1 | 194 |
| 6 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 7 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 2 | 1 | 1 |
| 8 | 119 | 125 | 127 | 0 | 134 | 0 | 9 | 0 | 0 | 259 |
| 9 | 2 | 3 | 3 | 0 | 1 | 1 | 2 | 0 | 0 | 0 |
| 10 | 116 | 127 | 123 | 0 | 120 | 0 | 7 | 189 | 0 | 0 |

| PM - Light vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 195 | 147 | 0 | 95 | 14 | 0 | 53 | 13 | 47 |
| 2 | 138 | 0 | 302 | 2 | 146 | 38 | 2 | 73 | 31 | 68 |
| 3 | 118 | 446 | 0 | 3 | 263 | 82 | 13 | 109 | 53 | 77 |
| 4 | 0 | 0 | 6 | 0 | 7 | 0 | 1 | 3 | 1 | 3 |
| 5 | 73 | 166 | 330 | 7 | 0 | 4 | 9 | 239 | 45 | 150 |
| 6 | 12 | 62 | 133 | 2 | 5 | 0 | 1 | 72 | 252 | 45 |
| 7 | 1 | 2 | 6 | 0 | 9 | 5 | 0 | 16 | 9 | 9 |
| 8 | 43 | 54 | 94 | 1 | 189 | 35 | 18 | 0 | 4 | 504 |
| 9 | 7 | 22 | 55 | 2 | 39 | 181 | 10 | 5 | 0 | 24 |
| 10 | 41 | 55 | 83 | 1 | 134 | 29 | 5 | 389 | 4 | 0 |

| PM - Medium heavy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 20 | 18 | 0 | 13 | 2 | 0 | 6 | 2 | 7 |
| 2 | 11 | 0 | 29 | 0 | 21 | 4 | 0 | 7 | 3 | 9 |
| 3 | 11 | 18 | 0 | 0 | 41 | 8 | 0 | 12 | 11 | 14 |
| 4 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 |
| 5 | 5 | 7 | 12 | 0 | 0 | 0 | 0 | 12 | 2 | 13 |
| 6 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 11 | 0 |
| 7 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 1 |
| 8 | 6 | 9 | 11 | 0 | 10 | 5 | 0 | 0 | 0 | 19 |
| 9 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 2 |
| 10 | 6 | 8 | 9 | 0 | 6 | 3 | 0 | 23 | 1 | 0 |

| PM - Articular vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 77 | 71 | 0 | 72 | 1 | 0 | 72 | 0 | 69 |
| 2 | 37 | 0 | 74 | 0 | 76 | 1 | 0 | 73 | 1 | 70 |
| 3 | 40 | 40 | 0 | 0 | 66 | 0 | 0 | 62 | 1 | 59 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 44 | 47 | 48 | 0 | 0 | 0 | 1 | 69 | 1 | 60 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 8 | 36 | 36 | 37 | 0 | 41 | 0 | 0 | 0 | 0 | 75 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 40 | 40 | 40 | 0 | 43 | 0 | 0 | 45 | 0 | 0 |

| Rest of day - Light vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 551 | 450 | 0 | 286 | 49 | 1 | 227 | 30 | 198 |
| 2 | 667 | 0 | 1,352 | 2 | 676 | 191 | 14 | 329 | 109 | 274 |
| 3 | 567 | 1,415 | 0 | 3 | 1,326 | 466 | 27 | 480 | 234 | 332 |
| 4 | 3 | 4 | 6 | 0 | 21 | 4 | 1 | 3 | 2 | 2 |
| 5 | 336 | 609 | 1,075 | 16 | 0 | 10 | 17 | 893 | 106 | 523 |
| 6 | 60 | 177 | 382 | 7 | 5 | 0 | 2 | 170 | 720 | 97 |
| 7 | 3 | 12 | 24 | 1 | 25 | 2 | 0 | 62 | 47 | 30 |
| 8 | 263 | 334 | 431 | 4 | 698 | 135 | 53 | 0 | 11 | 1,385 |
| 9 | 37 | 104 | 228 | 2 | 114 | 732 | 31 | 7 | 0 | 22 |
| 10 | 219 | 263 | 323 | 2 | 439 | 101 | 26 | 1,396 | 15 | 0 |

| Rest of day - Medium heavy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 66 | 77 | 0 | 54 | 1 | 0 | 41 | 2 | 44 |
| 2 | 143 | 0 | 104 | 0 | 84 | 1 | 2 | 56 | 2 | 55 |
| 3 | 85 | 123 | 0 | 0 | 98 | 9 | 4 | 63 | 10 | 84 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 78 | 89 | 138 | 0 | 0 | 0 | 5 | 89 | 10 | 62 |
| 6 | 5 | 8 | 19 | 0 | 0 | 0 | 0 | 5 | 11 | 4 |
| 7 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 3 | 2 | 3 |
| 8 | 72 | 53 | 57 | 0 | 59 | 3 | 6 | 0 | 1 | 113 |
| 9 | 8 | 11 | 23 | 0 | 5 | 25 | 1 | 1 | 0 | 1 |
| 10 | 69 | 52 | 41 | 0 | 38 | 1 | 3 | 100 | 1 | 0 |

| Rest of day - Articular vehicle | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 415 | 363 | 0 | 407 | 0 | 0 | 386 | 4 | 346 |
| 2 | 597 | 0 | 529 | 0 | 564 | 1 | 0 | 511 | 5 | 477 |
| 3 | 650 | 707 | 0 | 0 | 553 | 2 | 2 | 491 | 6 | 440 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 627 | 688 | 700 | 0 | 0 | 0 | 0 | 561 | 7 | 524 |
| 6 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 7 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 8 | 423 | 456 | 478 | 0 | 482 | 0 | 2 | 0 | 6 | 587 |
| 9 | 6 | 6 | 7 | 0 | 8 | 1 | 1 | 2 | 0 | 1 |
| 10 | 456 | 493 | 525 | 0 | 520 | 0 | 2 | 531 | 1 | 0 |

# A3 O-D Demand by Sectors

For the purpose of using the O-D survey data for model calibration and validation, the station to station survey results format was converted to sector to sector movements. The sector locations are shown on Figure 49 and the daily total sector to sector surveyed matches are presented in Table 76.

Table 76 Daily all vehicles sector to sector O-D matches

| **Daily all vehicles** | Pac Hwy North | Woolgoolga Area | Moonee Beach | Coffs North | Coramba Area | Coffs South | Bonville Area | Pac Hwy South |
|---|---|---|---|---|---|---|---|---|
| Pac Hwy North | 0 | 2,258 | 111 | 593 | 4 | 447 | 172 | 1,510 |
| Woolgoolga Area | 1,915 | 0 | 3,438 | 1,221 | 30 | 912 | 285 | 219 |
| Moonee Beach | 229 | 2,972 | 0 | 6,547 | 61 | 1,799 | 591 | 205 |
| Coffs North | 761 | 1,435 | 6,989 | 0 | 2 | 15,311 | 2,620 | 1,104 |
| Coramba Area | 9 | 16 | 48 | 48 | 0 | 2,443 | 184 | 80 |
| Coffs South | 628 | 898 | 1,224 | 17,417 | 2,335 | 0 | 14,810 | 2,563 |
| Bonville Area | 157 | 180 | 432 | 2,754 | 186 | 14,740 | 0 | 4,360 |
| Pac Hwy South | 1,610 | 159 | 152 | 936 | 96 | 3,380 | 3,819 | 0 |

The sector to sector results indicate significant demand exists between Coffs Harbour North and South sectors, and Coffs Harbour South and Bonville Area. The two-way daily through traffic volume between Pacific Highway north and Pacific Highway south is around 3,100 vehicles.

# A4 Model vs O-D Survey Check

A select link analysis was undertaken for the Pacific Highway at O-D survey stations 3 and 8 using the CHSTM. This was compared to the 2017 O-D survey results to understand how closely the model reflected 'through' traffic volumes. The results of the comparison indicated the updated CHSTM has a good representation of through traffic between stations 3 and 8 as shown in Table 15.

Table 77 Through traffic analysis between station 8 and 3

| | Model select link | | | Observed 2017 O-D | | |
|---|---|---|---|---|---|---|
| **NB through** | **Total volume at station 8** | **Select link volume at station 3** | **% through** | **Total count at station 8** | **Matched count at station 3** | **% through** |
| Daily | 15679 | 2498 | 16% | 15661 | 2133 | 14% |
| AM | 1732 | 132 | 8% | 1887 | 134 | 7% |
| PM | 1069 | 163 | 15% | 1051 | 142 | 14% |
| **SB through** | **Total volume at station 3** | **Select link volume at station 8** | **% through** | **Total count at station 3** | **Matched count at station 8** | **% through** |
| Daily | 14289 | 2396 | 17% | 14596 | 2280 | 16% |
| AM | 1396 | 135 | 10% | 1911 | 137 | 7% |
| PM | 1148 | 193 | 17% | 922 | 183 | 20% |

# A5 Limitations

O-D survey data provides good data source to understand the travel demand distribution in the study area, especially with regards to the 'through' traffic component. However, there are limitations when using the O-D survey data.

- The O-D camera survey is usually conducted at major corridors only, in which case traffic using minor routes could be missed from the recorded O-D data. Hence the actual numbers observed from an O-D survey will under represent the total traffic numbers travelling between two points.
- To a certain degree, the split between through trips and terminating trips will be determined by travel time cut-offs. While it is difficult to determine an accurate cut-off time for continuous trips due to the variations in travel conditions, the processed trips from O-D survey may include a certain amount of "two part trips", and hence the amount of trips in the O-D matches may not be 100% accurate. The travel time cut-offs have been selected carefully to capture such potential situations.
- There are usually a certain proportion of matching errors in the process due to misread characters in number plate capturing, through system or human errors.

Understanding the above limitations, the O-D survey results should be used in conjunction with other available traffic survey data sources. The actual numbers obtained from O-D survey should be treated with care, as the O-D results should be used to inform the traffic distribution patterns, rather than on the magnitude of matched demands.

# Appendix B

Strategic Model - Screenline Counts

# B1 CHSTM – Screenline counts validation

## B1.1 Screenline Validation Daily Totals

| Daily | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Count Section | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| **SL1** | **External Screenline** | | | | | | | | | | | |
| 1.1 | Pacific Hwy | Pacific Hwy (1.1) - North Of Range Rd | SB | 5,012 | 5,060 | 640 | 647 | 494 | 496 | 6,146 | 6,203 | 1% |
| 1.3 | Eastern Dorrigo Way | Eastern Dorrigo Way (1.3) - 50m East Of Lower Bobo Rd | EB | 64 | 64 | 2 | 2 | 0 | 0 | 66 | 66 | 0% |
| 1.4 | Glennifer Rd | Glennifer Rd (1.4) - 40m West Of Gordons Rd | EB | 140 | 140 | 12 | 12 | 0 | 0 | 152 | 152 | 0% |
| 1.5 | Pacific Hwy | Pacific Hwy (1.5) - North of Mailmans Track Rd | NB | 8,808 | 8,816 | 518 | 517 | 1,054 | 1,052 | 10,380 | 10,385 | 0% |
| 1.6 | Pine Creek Way | Pine Creek Way (1.6) - North Of Overhead Bridge Rd | NB | 179 | 108 | 13 | 7 | 3 | 0 | 195 | 115 | -41% |
| **SL1** | Sub-Total | | IB | 14,203 | 14,189 | 1,185 | 1,184 | 1,551 | 1,548 | 16,939 | 16,921 | 0% |
| 1.1 | Pacific Hwy | Pacific Hwy (1.1) - North Of Range Rd | NB | 5,111 | 5,073 | 491 | 450 | 681 | 704 | 6,283 | 6,227 | -1% |
| 1.3 | Eastern Dorrigo Way | Eastern Dorrigo Way (1.3) - 50m East Of Lower Bobo Rd | WB | 61 | 56 | 2 | 1 | 1 | 1 | 64 | 58 | -10% |
| 1.4 | Glennifer Rd | Glennifer Rd (1.4) - 40m West Of Gordons Rd | WB | 133 | 132 | 11 | 11 | 0 | 0 | 144 | 143 | -1% |
| 1.5 | Pacific Hwy | Pacific Hwy (1.5) - North of Mailmans Track Rd | SB | 8,898 | 8,788 | 640 | 656 | 913 | 834 | 10,451 | 10,278 | -2% |
| 1.6 | Pine Creek Way | Pine Creek Way (1.6) - North Of Overhead Bridge Rd | SB | 158 | 114 | 11 | 7 | 0 | 1 | 169 | 122 | -28% |
| **SL1** | Sub-Total | | OB | 14,361 | 14,163 | 1,155 | 1,126 | 1,595 | 1,539 | 17,111 | 16,827 | -2% |
| **SL1** | **TOTAL** | | | 28,564 | 28,351 | 2,340 | 2,310 | 3,146 | 3,087 | 34,050 | 33,749 | -1% |
| **SL2** | | | | | | | | | | | | |
| 29.1 | Pacific Hwy | Pacific Hwy (29.1) - 700m South Of Stadium Dr | NB | 13,643 | 14,979 | 1,224 | 1,070 | 931 | 1,104 | 15,798 | 17,153 | 9% |
| 2.2 | Hogbin Dr | Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | NB | 8,138 | 8,467 | 428 | 655 | 61 | 123 | 8,627 | 9,245 | 7% |
| **SL2** | Sub-Total | | NB | 21,781 | 23,446 | 1,652 | 1,726 | 992 | 1,227 | 24,425 | 26,398 | 8% |
| 29.1 | Pacific Hwy | Pacific Hwy (29.1) - 700m South Of Stadium Dr | SB | 13,300 | 15,670 | 1,461 | 1,224 | 893 | 891 | 15,654 | 17,785 | 14% |
| 2.2 | Hogbin Dr | Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | SB | 8,221 | 8,126 | 387 | 667 | 25 | 132 | 8,633 | 8,925 | 3% |
| **SL2** | Sub-Total | | SB | 21,521 | 23,797 | 1,848 | 1,891 | 918 | 1,022 | 24,287 | 26,710 | 10% |
| **SL2** | **TOTAL** | | | 43,302 | 47,242 | 3,500 | 3,617 | 1,910 | 2,249 | 48,712 | 53,108 | 9% |
| **SL3** | | | | | | | | | | | | |
| 3.1 | Spagnolos Rd | Spagnolos Rd (3.1) - 450m North Of Coramba Rd | NB | 63 | 59 | 5 | 3 | 0 | 1 | 68 | 63 | -8% |
| 3.2 | William Sharp Dr | William Sharp Dr (3.2) - 300m SW Of Sherpards Ln | NB | 276 | 192 | 29 | 9 | 0 | 0 | 305 | 202 | -34% |
| 3.3 | Shephards Ln | Shephards Ln (3.3) - 300m North Of Coramba Rd | NB | 3,003 | 2,234 | 288 | 136 | 14 | 14 | 3,305 | 2,384 | -28% |
| 3.4 | Robin St | Robin St (3.4) - 400m North Of Coramba Rd | NB | 845 | 428 | 44 | 4 | 0 | 0 | 889 | 432 | -51% |
| 3.5 | Gundagai St | Gundagai St (3.5) - 100m West Of Murdock St | WB | 2,974 | 2,116 | 159 | 73 | 12 | 5 | 3,145 | 2,193 | -30% |
| 3.6 | Pacific Hwy | Pacific Hwy (3.6) - 80m North Of Coffs St | NB | 15,410 | 14,046 | 1,423 | 1,271 | 1,227 | 867 | 18,060 | 16,183 | -10% |
| 3.7 | Hogbin Dr | Hogbin Dr (3.7) - 320m North Of Harbour Dr | NB | 9,155 | 9,128 | 182 | 604 | 4 | 287 | 9,341 | 10,019 | 7% |
| 3.8 | Orlando St | Orlando St (3.8) - 50m South Of Vost St | NB | 4,325 | 3,412 | 349 | 154 | 21 | 30 | 4,695 | 3,595 | -23% |
| **SL3** | Sub-Total | | NB | 36,051 | 31,614 | 2,479 | 2,254 | 1,278 | 1,204 | 39,808 | 35,072 | -12% |
| 3.1 | Spagnolos Rd | Spagnolos Rd (3.1) - 450m North Of Coramba Rd | SB | 67 | 57 | 1 | 4 | 0 | 1 | 68 | 62 | -9% |
| 3.2 | William Sharp Dr | William Sharp Dr (3.2) - 300m SW Of Sherpards Ln | SB | 284 | 207 | 20 | 8 | 0 | 0 | 304 | 216 | -29% |
| 3.3 | Shephards Ln | Shephards Ln (3.3) - 300m North Of Coramba Rd | SB | 3,064 | 2,361 | 310 | 144 | 18 | 13 | 3,392 | 2,518 | -26% |
| 3.4 | Robin St | Robin St (3.4) - 400m North Of Coramba Rd | SB | 842 | 471 | 53 | 4 | 0 | 0 | 895 | 475 | -47% |
| 3.5 | Gundagai St | Gundagai St (3.5) - 100m West Of Murdock St | EB | 3,444 | 1,875 | 182 | 64 | 0 | 4 | 3,626 | 1,944 | -46% |
| 3.6 | Pacific Hwy | Pacific Hwy (3.6) - 80m North Of Coffs St | SB | 14,381 | 13,052 | 1,661 | 1,435 | 1,026 | 775 | 17,068 | 15,261 | -11% |
| 3.7 | Hogbin Dr | Hogbin Dr (3.7) - 320m North Of Harbour Dr | SB | 7,559 | 9,298 | 232 | 644 | 35 | 249 | 7,826 | 10,191 | 30% |
| 3.8 | Orlando St | Orlando St (3.8) - 50m South Of Vost St | SB | 5,135 | 3,414 | 355 | 168 | 38 | 32 | 5,528 | 3,614 | -35% |
| **SL3** | Sub-Total | | SB | 34,776 | 30,735 | 2,814 | 2,472 | 1,117 | 1,074 | 38,707 | 34,281 | -11% |
| **SL3** | **TOTAL** | | | 70,827 | 62,349 | 5,293 | 4,726 | 2,395 | 2,278 | 78,515 | 69,353 | -12% |
| **SL4** | | | | | | | | | | | | |
| 4.1 | N Bonville RD | N Bonville RD (4.1) - 150m North Of Pine Creek Way | NB | 845 | 715 | 51 | 33 | 2 | 3 | 898 | 751 | -16% |
| 4.2 | Pine Creek Way | Pine Creek Way (4.2) - 150m South Of N Bonville Rd | NB | 1,467 | 1,780 | 148 | 115 | 6 | 24 | 1,621 | 1,920 | 18% |
| 4.3 | Pacific Hwy | Pacific Hwy (4.3) - 400m N Of Bonville Station Rd Overpass | NB | 8,481 | 9,304 | 403 | 559 | 1,044 | 1,055 | 9,928 | 10,918 | 10% |
| **SL4** | Sub-Total | | NB | 10,793 | 11,799 | 602 | 707 | 1,052 | 1,082 | 12,447 | 13,589 | 9% |
| 4.1 | N Bonville RD | N Bonville RD (4.1) - 150m North Of Pine Creek Way | SB | 853 | 728 | 49 | 35 | 2 | 3 | 904 | 766 | -15% |
| 4.2 | Pine Creek Way | Pine Creek Way (4.2) - 150m South Of N Bonville Rd | SB | 1,446 | 1,791 | 95 | 115 | 13 | 23 | 1,554 | 1,929 | 24% |

| Daily | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Count Section | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| 4.3 | Pacific Hwy | Pacific Hwy (4.3) - 400m N Of Bonville Station Rd Overpass | SB | 8,455 | 9,256 | 457 | 694 | 1,024 | 835 | 9,936 | 10,784 | 9% |
| SL4 | Sub-Total | | SB | 10,754 | 11,774 | 601 | 843 | 1,039 | 861 | 12,394 | 13,478 | 9% |
| SL4 | TOTAL | | | 21,547 | 23,573 | 1,203 | 1,551 | 2,091 | 1,943 | 24,841 | 27,067 | 9% |
| SL5 | | | | | | | | | | | | |
| 29.5 | Bennetts Rd | Bennetts Rd | NB | 130 | 146 | 12 | 13 | 0 | 3 | 142 | 163 | 15% |
| 29.9 | Pacific Hwy | Pacific Hwy | NB | 12,919 | 13,064 | 1,111 | 1,241 | 1,024 | 767 | 15,054 | 15,072 | 0% |
| 25-2 | James Small Dr | James Small Dr | NB | 1,623 | 1,963 | 23 | 46 | 0 | 2 | 1,646 | 2,011 | 22% |
| 2.2 | Hogbin Dr | Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | NB | 8,138 | 8,467 | 428 | 655 | 61 | 123 | 8,627 | 9,245 | 7% |
| SL5 | Sub-Total | | NB | 22,810 | 23,640 | 1,574 | 1,956 | 1,085 | 895 | 25,469 | 26,491 | 4% |
| 29.5 | Bennetts Rd | | SB | 124 | 137 | 15 | 13 | 0 | 3 | 139 | 153 | 10% |
| 29.9 | Pacific Hwy | | SB | 12,430 | 13,434 | 1,575 | 1,401 | 893 | 708 | 14,898 | 15,542 | 4% |
| 25-2 | James Small Dr | Pacific Hwy | SB | 1,521 | 2,121 | 30 | 47 | 1 | 2 | 1,553 | 2,170 | 40% |
| 2.2 | Hogbin Dr | Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | SB | 8,221 | 8,126 | 387 | 667 | 25 | 132 | 8,633 | 8,925 | 3% |
| SL5 | Sub-Total | | SB | 22,296 | 23,819 | 2,007 | 2,128 | 919 | 844 | 25,223 | 26,791 | 6% |
| SL5 | TOTAL | | | 45,106 | 47,459 | 3,581 | 4,084 | 2,004 | 1,739 | 50,692 | 53,282 | 5% |
| SL6 | | | | | | | | | | | | |
| 29.10 | Pacific Hwy | Pacific Hwy (29.10) - Adjacent To End Of Coachmans Close | SB | 12,430 | 13,434 | 1,575 | 1,401 | 893 | 708 | 14,898 | 15,542 | 4% |
| 6.2 | Bruxner Park Rd | Bruxner Park Rd (6.2) - 400m West Of Pacific Hwy | EB | 329 | 235 | 21 | 27 | 0 | 14 | 350 | 277 | -21% |
| 29.4 | Coramba Rd | Coramba Rd (29.4) - 250m East Of Bennetts Rd | EB | 2,884 | 2,855 | 258 | 269 | 37 | 54 | 3,179 | 3,178 | 0% |
| 29.2 | N Boambee Rd | N Boambee Rd (29.2) - 100m West Of Highlander Dr | EB | 197 | 85 | 9 | 8 | 6 | 1 | 212 | 94 | -56% |
| 6.5 | Englands Rd | Englands Rd (6.5) - 400m West Of Isles Dr | EB | 245 | 96 | 41 | 10 | 6 | 2 | 292 | 108 | -63% |
| 29.1 | Pacific Hwy | Pacific Hwy (29.1) - 700m South Of Stadium Dr | NB | 13,643 | 14,979 | 1,224 | 1,070 | 931 | 1,104 | 15,798 | 17,153 | 9% |
| 2.2 | Hogbin Dr | Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | NB | 8,138 | 8,467 | 428 | 655 | 61 | 123 | 8,627 | 9,245 | 7% |
| SL6 | Sub-Total | | IB | 37,866 | 40,151 | 3,556 | 3,440 | 1,934 | 2,006 | 43,356 | 45,597 | 5% |
| 29.10 | Pacific Hwy | Pacific Hwy (29.10) - Adjacent To End Of Coachmans Close | NB | 12,919 | 13,064 | 1,111 | 1,241 | 1,024 | 767 | 15,054 | 15,072 | 0% |
| 6.2 | Bruxner Park Rd | Bruxner Park Rd (6.2) - 400m West Of Pacific Hwy | WB | 351 | 212 | 26 | 28 | 0 | 11 | 377 | 251 | -33% |
| 29.4 | Coramba Rd | Coramba Rd (29.4) - 250m East Of Bennetts Rd | WB | 2,833 | 3,019 | 226 | 272 | 33 | 66 | 3,092 | 3,357 | 9% |
| 29.2 | N Boambee Rd | N Boambee Rd (29.2) - 100m West Of Highlander Dr | WB | 181 | 94 | 8 | 8 | 15 | 2 | 204 | 104 | -49% |
| 6.5 | Englands Rd | Englands Rd (6.5) - 400m West Of Isles Dr | WB | 239 | 97 | 49 | 11 | 2 | 2 | 290 | 111 | -62% |
| 29.1 | Pacific Hwy | Pacific Hwy (29.1) - 700m South Of Stadium Dr | SB | 13,300 | 15,670 | 1,461 | 1,224 | 893 | 891 | 15,654 | 17,785 | 14% |
| 2.2 | Hogbin Dr | Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | SB | 8,221 | 8,126 | 387 | 667 | 25 | 132 | 8,633 | 8,925 | 3% |
| SL6 | Sub-Total | | OB | 38,044 | 40,284 | 3,268 | 3,451 | 1,992 | 1,869 | 43,304 | 45,604 | 5% |
| SL6 | TOTAL | | | 75,910 | 80,434 | 6,824 | 6,892 | 3,926 | 3,876 | 86,660 | 91,201 | 5% |
| SL7 | | | | | | | | | | | | |
| 7.1 | Pacific Hwy | 300m NW Of Woolgoolga Creek Rd Overpass | NB | 4,280 | 4,546 | 383 | 432 | 583 | 528 | 5,246 | 5,506 | 5% |
| 7.2 | Solitary Islands Way | Solitary Islands Way (7.2) - 100m North Of Dalgety St | NB | 5,003 | 3,914 | 462 | 283 | 22 | 161 | 5,487 | 4,358 | -21% |
| SL7 | Sub-Total | | NB | 9,283 | 8,460 | 845 | 715 | 605 | 689 | 10,733 | 9,864 | -8% |
| 7.1 | Pacific Hwy | 300m NW Of Woolgoolga Creek Rd Overpass | SB | 4,980 | 5,169 | 692 | 671 | 436 | 453 | 6,108 | 6,293 | 3% |
| 7.2 | Solitary Islands Way | Solitary Islands Way (7.2) - 100m North Of Dalgety St | SB | 5,096 | 3,204 | 451 | 234 | 20 | 69 | 5,567 | 3,507 | -37% |
| SL7 | Sub-Total | | SB | 10,076 | 8,373 | 1,143 | 905 | 456 | 522 | 11,675 | 9,800 | -16% |
| SL7 | TOTAL | | | 19,359 | 16,832 | 1,988 | 1,621 | 1,061 | 1,211 | 22,408 | 19,664 | -12% |
| SL8 | | | | | | | | | | | | |
| 25-10 | Coff St | Pacific Hwy and Coff St, Coffs Harbour | WB | 7,320 | 4,049 | 140 | 230 | 4 | 59 | 7,464 | 4,338 | -42% |
| 25-24 | Vernon St | Pacific Hwy and Vernon St, Coffs Harbour | WB | 1,327 | 582 | 27 | 16 | 0 | 10 | 1,354 | 609 | -55% |
| 25-11 | Harbour Dr | Pacific Hwy and Harbour Dr, Coffs Harbour | WB | 3,390 | 3,578 | 24 | 150 | 0 | 28 | 3,414 | 3,755 | 10% |
| 25-12 | Moonee St | Pacific Hwy and Moonee St, Coffs Harbour | WB | 3,614 | 1,243 | 149 | 48 | 3 | 13 | 3,766 | 1,303 | -65% |
| 25-23 | Market St | Pacific Hwy and Market St, Coffs Harbour | WB | 563 | 439 | 60 | 20 | 1 | 10 | 624 | 469 | -25% |
| 25-13 | Albany St | Pacific Hwy and Albany St, Coffs Harbour | WB | 3,977 | 2,355 | 94 | 23 | 3 | 2 | 4,074 | 2,380 | -42% |
| 25-22 | Valley St | Pacific Hwy and Grafton St and Valley St, Coffs Harbour | WB | 104 | 652 | 4 | 66 | 0 | 36 | 109 | 754 | 594% |
| 8.10 | Thompsons Rd | Thompsons Rd (8.10) - 20m East Of Pacific Hwy | WB | 2,556 | 1,936 | 250 | 112 | 5 | 28 | 2,811 | 2,076 | -26% |
| 25-15 | Hurley Dr | Pacific Hwy and Hurley Dr, Coffs Harbour | WB | 2,146 | 1,548 | 186 | 167 | 33 | 64 | 2,364 | 1,780 | -25% |
| 24-3 | Cook Dr | Shopping Carpark and Cook Dr, Coffs Harbour | WB | 4,806 | 5,171 | 350 | 385 | 94 | 147 | 5,250 | 5,703 | 9% |
| 24-2 | Isle Dr | Pacific Hwy and Isle Dr, Coffs Harbour | WB | 2,906 | 2,678 | 96 | 88 | 0 | 6 | 3,001 | 2,771 | -8% |
| 8.13 | Stadium Dr | Stadium Dr (8.13) - 20m East Of Pacific Hwy | WB | 3,948 | 4,974 | 342 | 269 | 59 | 200 | 4,349 | 5,444 | 25% |
| SL8 | Sub-Total | | WB | 36,657 | 29,205 | 1,722 | 1,573 | 203 | 603 | 38,581 | 31,381 | -19% |
| 25-10 | Coff St | Pacific Hwy and Coff St, Coffs Harbour | EB | 7,950 | 3,137 | 87 | 179 | 4 | 55 | 8,041 | 3,371 | -58% |

| Daily | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Count Section | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| 25-24 | Vernon St | Pacific Hwy and Vernon St, Coffs Harbour | EB | 383 | 404 | 0 | 19 | 0 | 7 | 383 | 430 | 12% |
| 25-11 | Harbour Dr | Pacific Hwy and Harbour Dr, Coffs Harbour | EB | 3,346 | 3,403 | 23 | 99 | 0 | 25 | 3,369 | 3,527 | 5% |
| 25-12 | Moonee St | Pacific Hwy and Moonee St, Coffs Harbour | EB | 5,143 | 655 | 190 | 25 | 3 | 8 | 5,336 | 688 | -87% |
| 25-23 | Market St | Pacific Hwy and Market St, Coffs Harbour | EB | 1,273 | 2,047 | 39 | 121 | 0 | 21 | 1,311 | 2,189 | 67% |
| 25-13 | Albany St | Pacific Hwy and Albany St, Coffs Harbour | EB | 3,806 | 2,210 | 106 | 82 | 4 | 42 | 3,916 | 2,333 | -40% |
| 25-22 | Valley St | Pacific Hwy and Grafton St and Valley St, Coffs Harbour | EB | 90 | 218 | 3 | 19 | 0 | 1 | 93 | 238 | 157% |
| 8.10 | Thompsons Rd | Thompsons Rd (8.10) - 20m East Of Pacific Hwy | EB | 2,748 | 2,212 | 314 | 114 | 8 | 38 | 3,070 | 2,364 | -23% |
| 25-15 | Hurley Dr | Pacific Hwy and Hurley Dr, Coffs Harbour | EB | 1,619 | 1,368 | 180 | 175 | 40 | 72 | 1,839 | 1,615 | -12% |
| 24-3 | Cook Dr | Shopping Carpark and Cook Dr, Coffs Harbour | EB | 4,807 | 4,888 | 333 | 387 | 79 | 159 | 5,219 | 5,434 | 4% |
| 24-2 | Isle Dr | Pacific Hwy and Isle Dr, Coffs Harbour | EB | 3,230 | 2,786 | 107 | 108 | 0 | 8 | 3,337 | 2,901 | -13% |
| 8.13 | Stadium Dr | Stadium Dr (8.13) - 20m East Of Pacific Hwy | EB | 4,109 | 4,643 | 356 | 247 | 42 | 251 | 4,507 | 5,140 | 14% |
| **SL8** | Sub-Total | | EB | 38,503 | 27,969 | 1,737 | 1,575 | 180 | 687 | 40,420 | 30,231 | -25% |
| **SL8** | **TOTAL** | | | 75,160 | 57,174 | 3,459 | 3,148 | 383 | 1,289 | 79,001 | 61,612 | -22% |
| **SL9** | | | | | | | | | | | | |
| 25-25 | Bay Dr | Pacific Hwy and Bay Dr, Coffs Harbour | WB | 1,096 | 562 | 51 | 14 | 0 | 2 | 1,147 | 578 | -50% |
| 22-1 | Diggers Beach Rd | Pacific Hwy and Diggers Beach Rd, Coffs Harbour | WB | 403 | 295 | 6 | 13 | 0 | 0 | 409 | 308 | -25% |
| 9.3 | Macauleys Headland Dr | Macauleys Headland Dr (9.3) - 20m East Of Pacific Hwy | WB | 38 | 404 | 0 | 10 | 0 | 0 | 38 | 415 | 991% |
| 25-3 | Arthur St | Pacific Hwy and Arthur St, Coffs Harbour | WB | 7,556 | 7,779 | 111 | 494 | 4 | 75 | 7,671 | 8,348 | 9% |
| 25-4 | Park Beach Rd | Pacific Hwy and Park Beach Rd, Coffs Harbour | WB | 6,410 | 5,283 | 166 | 144 | 4 | 15 | 6,580 | 5,442 | -17% |
| 25-5 | Orlando St | Pacific Hwy and Orlando St, Coffs Harbour | WB | 6,903 | 4,760 | 341 | 304 | 39 | 110 | 7,283 | 5,173 | -29% |
| 9.7 | Rose Ave | Rose Ave (9.7) - Just East Of Pacific Hwy | NB | 95 | 38 | 5 | 1 | 0 | 0 | 100 | 39 | -61% |
| 25-8 | Melittas Ave | Pacific Hwy and Melittas Ave, Coffs Harbour | WB | 129 | 1,078 | 0 | 81 | 0 | 41 | 129 | 1,200 | 833% |
| **SL9** | Sub-Total | | WB | 22,629 | 20,197 | 681 | 1,062 | 47 | 242 | 23,357 | 21,502 | -8% |
| 25-25 | Bay Dr | Pacific Hwy and Bay Dr, Coffs Harbour | EB | 926 | 603 | 49 | 16 | 0 | 2 | 974 | 620 | -36% |
| 22-1 | Diggers Beach Rd | Pacific Hwy and Diggers Beach Rd, Coffs Harbour | EB | 609 | 589 | 13 | 16 | 0 | 0 | 621 | 606 | -3% |
| 9.3 | Macauleys Headland Dr | Macauleys Headland Dr (9.3) - 20m East Of Pacific Hwy | EB | 319 | 57 | 18 | 5 | 0 | 0 | 337 | 62 | -82% |
| 25-3 | Arthur St | Pacific Hwy and Arthur St, Coffs Harbour | EB | 4,414 | 7,725 | 114 | 144 | 6 | 10 | 4,534 | 7,880 | 74% |
| 25-4 | Park Beach Rd | Pacific Hwy and Park Beach Rd, Coffs Harbour | EB | 6,657 | 5,897 | 99 | 148 | 3 | 11 | 6,759 | 6,055 | -10% |
| 25-5 | Orlando St | Pacific Hwy and Orlando St, Coffs Harbour | EB | 6,916 | 5,008 | 321 | 701 | 19 | 183 | 7,256 | 5,891 | -19% |
| 9.7 | Rose Ave | Rose Ave (9.7) - Just East Of Pacific Hwy | SB | 318 | 154 | 16 | 12 | 0 | 3 | 334 | 169 | -49% |
| 25-8 | Melittas Ave | Pacific Hwy and Melittas Ave, Coffs Harbour | EB | 419 | 873 | 16 | 71 | 1 | 43 | 436 | 986 | 126% |
| **SL9** | Sub-Total | | EB | 20,577 | 20,905 | 645 | 1,112 | 29 | 252 | 21,251 | 22,269 | 5% |
| **SL9** | **TOTAL** | | | 43,206 | 41,102 | 1,326 | 2,174 | 76 | 494 | 44,608 | 43,771 | -2% |
| **SL10** | | | | | | | | | | | | |
| 10.1 | Diamond Head Dr | Diamond Head Dr (10.1) - Just East Of Pacific Hwy | WB | 2,053 | 1,371 | 73 | 69 | 1 | 1 | 2,126 | 1,442 | -32% |
| 10.2 | Fiddaman Rd | Fiddaman Rd (10.2) - 100m West Of Lights St | WB | 1,683 | 1,754 | 142 | 249 | 4 | 145 | 1,829 | 2,148 | 17% |
| 10.3 | Moonee Beach Rd | Moonee Beach Rd (10.3) - 200m West Of Estuary Dr | WB | 1,768 | 929 | 114 | 37 | 18 | 15 | 1,900 | 981 | -48% |
| **SL10** | Sub-Total | | WB | 5,504 | 4,054 | 329 | 355 | 23 | 161 | 5,855 | 4,571 | -22% |
| 10.1 | Diamond Head Dr | Diamond Head Dr (10.1) - Just East Of Pacific Hwy | EB | 1,989 | 1,404 | 117 | 72 | 3 | 1 | 2,108 | 1,477 | -30% |
| 10.2 | Fiddaman Rd | Fiddaman Rd (10.2) - 100m West Of Lights St | EB | 1,631 | 1,666 | 123 | 253 | 2 | 122 | 1,756 | 2,041 | 16% |
| 10.3 | Moonee Beach Rd | Moonee Beach Rd (10.3) - 200m West Of Estuary Dr | EB | 2,855 | 1,852 | 168 | 125 | 16 | 44 | 3,039 | 2,021 | -34% |
| **SL10** | Sub-Total | | EB | 6,475 | 4,922 | 408 | 450 | 21 | 166 | 6,903 | 5,539 | -20% |
| **SL10** | **TOTAL** | | | 11,978 | 8,977 | 736 | 806 | 44 | 328 | 12,758 | 10,110 | -21% |
| **SL11** | | | | | | | | | | | | |
| 11.1 | Sawtell Rd | Sawtell Rd (11.1) - 70m South-East Of Pacific Hwy | WB | 4,555 | 5,096 | 257 | 320 | 43 | 99 | 4,855 | 5,515 | 14% |
| 11.2 | Bruce King Dr | Bruce King Dr (11.2) - 50m East Of Pacific Hwy | WB | 424 | 398 | 29 | 5 | 4 | 0 | 457 | 404 | -12% |
| 11.3 | Lyons Rd | Lyons Rd (11.3) - Just East Of Pacific Hwy (East Roundabout) | WB | 4,062 | 3,780 | 129 | 120 | 7 | 29 | 4,198 | 3,929 | -6% |
| **SL11** | Sub-Total | | WB | 9,041 | 9,273 | 415 | 445 | 54 | 129 | 9,510 | 9,847 | 4% |
| 11.1 | Sawtell Rd | Sawtell Rd (11.1) - 70m South-East Of Pacific Hwy | EB | 3,771 | 4,579 | 210 | 250 | 50 | 80 | 4,031 | 4,908 | 22% |
| 11.2 | Bruce King Dr | Bruce King Dr (11.2) - 50m East Of Pacific Hwy | EB | 1,717 | 1,952 | 105 | 117 | 4 | 26 | 1,826 | 2,094 | 15% |
| 11.3 | Lyons Rd | Lyons Rd (11.3) - Just East Of Pacific Hwy (East Roundabout) | EB | 3,581 | 3,431 | 119 | 100 | 35 | 31 | 3,735 | 3,562 | -5% |
| **SL11** | Sub-Total | | EB | 9,069 | 9,961 | 434 | 467 | 89 | 136 | 9,592 | 10,564 | 10% |
| **SL11** | **TOTAL** | | | 18,110 | 19,234 | 849 | 912 | 143 | 265 | 19,102 | 20,411 | 7% |
| **SL12** | | | | | | | | | | | | |
| 12.1 | Arthur St | Arthur St (12.1) - 40m West Of Hogbin Dr N | WB | 4,341 | 5,241 | 311 | 421 | 5 | 69 | 4,657 | 5,731 | 23% |
| 12.2 | Park Beach Rd | Park Beach Rd (12.2) - 40m West Of Hogbin Dr N | WB | 3,003 | 2,382 | 140 | 12 | 2 | 2 | 3,145 | 2,396 | -24% |

| Daily | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site ID** | **Road Name** | **Count Section** | **Dir.** | **LV obs** | **LV mod** | **MCV obs** | **MCV mod** | **HCV obs** | **HCV mod** | **TT obs** | **TT mod** | **TT %** |
| 12.3 | Boultwood St | Boultwood St (12.3) - 30m West Of Hogbin Dr N | WB | 287 | 1,344 | 9 | 84 | 0 | 53 | 296 | 1,481 | 400% |
| 12.4 | Prince St | Prince St (12.4) - 30m West Of Hogbin Dr N | WB | 435 | 292 | 10 | 14 | 0 | 0 | 445 | 306 | -31% |
| 12.5 | Orlando St | Orlando St (12.5) - 80m North-West Of Hogbin Dr N Roundaobut | WB | 5,731 | 3,411 | 310 | 229 | 41 | 183 | 6,082 | 3,822 | -37% |
| 12.6 | Watsonia Ave | Watsonia Ave (12.6) - 60m NE Of Gentlemen St | SB | 17 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | -100% |
| 12.7 | Watsonia Ave | Watsonia Ave (12.7) - Just West of Hogbin Dr | WB | 436 | 579 | 21 | 11 | 0 | 1 | 457 | 591 | 29% |
| **SL12** | Sub-Total | | WB | 14,250 | 13,248 | 801 | 770 | 48 | 308 | 15,099 | 14,326 | -5% |
| 12.1 | Arthur St | Arthur St (12.1) - 40m West Of Hogbin Dr N | EB | 4,140 | 4,946 | 260 | 59 | 6 | 5 | 4,406 | 5,010 | 14% |
| 12.2 | Park Beach Rd | Park Beach Rd (12.2) - 40m West Of Hogbin Dr N | EB | 3,117 | 3,320 | 114 | 96 | 7 | 17 | 3,238 | 3,433 | 6% |
| 12.3 | Boultwood St | Boultwood St (12.3) - 30m West Of Hogbin Dr N | EB | 255 | 34 | 16 | 1 | 0 | 22 | 271 | 57 | -79% |
| 12.4 | Prince St | Prince St (12.4) - 30m West Of Hogbin Dr N | EB | 513 | 279 | 12 | 16 | 0 | 0 | 525 | 295 | -44% |
| 12.5 | Orlando St | Orlando St (12.5) - 80m North-West Of Hogbin Dr N Roundaobut | EB | 5,617 | 4,282 | 472 | 643 | 26 | 231 | 6,115 | 5,156 | -16% |
| 12.6 | Watsonia Ave | Watsonia Ave (12.6) - 60m NE Of Gentlemen St | NB | 166 | 186 | 5 | 4 | 0 | 0 | 171 | 190 | 11% |
| 12.7 | Watsonia Ave | Watsonia Ave (12.7) - Just West of Hogbin Dr | EB | 325 | 360 | 15 | 7 | 0 | 0 | 340 | 368 | 8% |
| **SL12** | Sub-Total | | EB | 14,133 | 13,407 | 894 | 826 | 39 | 275 | 15,066 | 14,509 | -4% |
| **SL12** | **TOTAL** | | | 28,383 | 26,655 | 1,695 | 1,597 | 87 | 583 | 30,165 | 28,835 | -4% |
| **SL13** | | | | | | | | | | | | |
| 13.1 | Harbour Dr | Harbour Dr (13.1) - Just West Of Hogbin Dr | WB | 5,921 | 7,820 | 320 | 348 | 29 | 79 | 6,270 | 8,247 | 32% |
| 13.2 | Albany St | Albany St (13.2) - 60m West Of Hogbin Dr | WB | 4,870 | 1,146 | 324 | 40 | 10 | 7 | 5,204 | 1,193 | -77% |
| 24-1 | Stadium Dr | Hogbin Dr and Stadium Dr, Coffs Harbour | WB | 4,746 | 6,177 | 281 | 305 | 33 | 200 | 5,060 | 6,682 | 32% |
| **SL13** | Sub-Total | | WB | 15,537 | 15,143 | 925 | 693 | 72 | 287 | 16,534 | 16,122 | -2% |
| 13.1 | Harbour Dr | Harbour Dr (13.1) - Just West Of Hogbin Dr | EB | 6,363 | 7,412 | 357 | 270 | 86 | 70 | 6,806 | 7,751 | 14% |
| 13.2 | Albany St | Albany St (13.2) - 60m West Of Hogbin Dr | EB | 4,709 | 1,742 | 339 | 108 | 5 | 18 | 5,053 | 1,868 | -63% |
| 24-1 | Stadium Dr | Hogbin Dr and Stadium Dr, Coffs Harbour | EB | 4,263 | 5,670 | 236 | 277 | 36 | 251 | 4,534 | 6,198 | 37% |
| **SL13** | Sub-Total | | EB | 15,335 | 14,824 | 932 | 655 | 127 | 339 | 16,393 | 15,818 | -4% |
| **SL13** | **TOTAL** | | | 30,872 | 29,967 | 1,857 | 1,348 | 199 | 625 | 32,927 | 31,940 | -3% |
| **SL14** | | | | | | | | | | | | |
| 14.1 | Hi-Tech Dr | Hi-Tech Dr (14.1) - 30m West Of Hogbin Dr | WB | 1,409 | 1,535 | 236 | 251 | 5 | 90 | 1,650 | 1,876 | 14% |
| 14.2 | Sawtell Rd | Sawtell Rd (14.2) - 30m West Of Hogbin Dr | WB | 4,469 | 4,020 | 273 | 222 | 13 | 63 | 4,755 | 4,305 | -9% |
| 20-10 | Coorabin Cres | Toormina Rd and Minorca Pl, Coffs Harbour | WB | 930 | 1,179 | 21 | 30 | 0 | 1 | 951 | 1,210 | 27% |
| 20-11 | Bangalee Cres | Toormina Rd and Shopping Centre, Coffs Harbour | WB | 934 | 437 | 30 | 11 | 0 | 1 | 964 | 449 | -53% |
| 14.5 | Amaroo Cresent | Amaroo Cresent (14.5) - 30m West Of Toormina Rd | WB | 871 | 1,817 | 26 | 60 | 0 | 0 | 897 | 1,877 | 109% |
| 14.6 | Kintorie Cresent | Kintorie Cresent (14.6) - 30m West Of Toormina Rd | WB | 287 | 775 | 13 | 12 | 0 | 0 | 300 | 787 | 162% |
| 14.7 | Mirroola Cresent | Mirroola Cresent (14.7) - 30m west of Toormina Rd | WB | 330 | 454 | 16 | 9 | 2 | 0 | 348 | 462 | 33% |
| 14.8 | Linden Ave | Linden Ave (14.8) - 30m West Of Toormina Rd | WB | 1,580 | 2,272 | 116 | 61 | 5 | 18 | 1,701 | 2,351 | 38% |
| 14.9 | Playford Ave | Playford Ave (14.9) - 30m West of Toormina Rd | WB | 491 | 305 | 28 | 7 | 0 | 0 | 519 | 312 | -40% |
| 26-6 | Lyons Rd | Lyons Rd and Hogbin Dr, Coffs Harbour | WB | 3,196 | 1,395 | 99 | 47 | 4 | 6 | 3,299 | 1,448 | -56% |
| **SL14** | Sub-Total | | WB | 14,497 | 14,188 | 858 | 708 | 29 | 180 | 15,384 | 15,076 | -2% |
| 14.1 | Hi-Tech Dr | Hi-Tech Dr (14.1) - 30m West Of Hogbin Dr | EB | 1,401 | 1,664 | 238 | 252 | 5 | 86 | 1,644 | 2,002 | 22% |
| 14.2 | Sawtell Rd | Sawtell Rd (14.2) - 30m West Of Hogbin Dr | EB | 4,687 | 4,612 | 305 | 243 | 11 | 69 | 5,003 | 4,924 | -2% |
| 20-10 | Coorabin Cres | Toormina Rd and Minorca Pl, Coffs Harbour | EB | 1,061 | 887 | 16 | 23 | 0 | 0 | 1,077 | 911 | -15% |
| 20-11 | Bangalee Cres | Toormina Rd and Shopping Centre, Coffs Harbour | EB | 986 | 621 | 29 | 14 | 0 | 1 | 1,014 | 636 | -37% |
| 14.5 | Amaroo Cresent | Amaroo Cresent (14.5) - 30m West Of Toormina Rd | EB | 939 | 1,845 | 16 | 63 | 0 | 1 | 955 | 1,908 | 100% |
| 14.6 | Kintorie Cresent | Kintorie Cresent (14.6) - 30m West Of Toormina Rd | EB | 288 | 782 | 9 | 12 | 0 | 0 | 297 | 794 | 167% |
| 14.7 | Mirroola Cresent | Mirroola Cresent (14.7) - 30m west of Toormina Rd | EB | 363 | 427 | 11 | 10 | 0 | 0 | 374 | 437 | 17% |
| 14.8 | Linden Ave | Linden Ave (14.8) - 30m West Of Toormina Rd | EB | 1,642 | 2,207 | 82 | 60 | 0 | 18 | 1,724 | 2,285 | 33% |
| 14.9 | Playford Ave | Playford Ave (14.9) - 30m West of Toormina Rd | EB | 602 | 301 | 25 | 9 | 1 | 0 | 628 | 309 | -51% |
| 26-6 | Lyons Rd | Lyons Rd and Hogbin Dr, Coffs Harbour | EB | 2,909 | 1,402 | 111 | 43 | 6 | 7 | 3,026 | 1,451 | -52% |
| **SL14** | Sub-Total | | EB | 14,878 | 14,747 | 842 | 728 | 23 | 182 | 15,742 | 15,657 | -1% |
| **SL14** | **TOTAL** | | | 29,375 | 28,935 | 1,700 | 1,436 | 52 | 362 | 31,126 | 30,733 | -1% |
| **SL21** | **Airport** | | | | | | | | | | | |
| 21-1 | Airport Dr | Airport Dr | WB | 1,203 | 1,428 | 19 | 36 | 1 | 9 | 1,223 | 1,473 | 20% |
| 21-2 | Christmas Bells Rd | Christmas Bells Rd | WB | 347 | 458 | 81 | 38 | 17 | 10 | 446 | 506 | 14% |
| **SL21** | Sub-Total | | WB | 1,550 | 1,886 | 100 | 74 | 19 | 18 | 1,669 | 1,979 | 19% |
| 21-1 | Airport Dr | Airport Dr | EB | 1,316 | 1,497 | 19 | 35 | 1 | 10 | 1,336 | 1,542 | 15% |
| 21-2 | Christmas Bells Rd | Christmas Bells Rd | EB | 397 | 429 | 80 | 35 | 16 | 10 | 493 | 473 | -4% |
| **SL21** | Sub-Total | | EB | 1,713 | 1,926 | 99 | 70 | 17 | 20 | 1,829 | 2,015 | 10% |

| Daily | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Count Section | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| SL21 | TOTAL | | | 3,263 | 3,812 | 199 | 144 | 36 | 38 | 3,497 | 3,994 | 14% |
| SL22 | Big Banana | | | | | | | | | | | |
| 22-1a | Diggers Beach Rd | Diggers Beach Rd | EB | 540 | 120 | 6 | 5 | 1 | 1 | 547 | 125 | -77% |
| 22-2 | Island View Close | Island View Close | EB | 330 | 464 | 6 | 18 | 0 | 4 | 336 | 486 | 45% |
| SL22 | Sub-Total | | EB | 870 | 584 | 11 | 23 | 1 | 5 | 883 | 611 | -31% |
| 22-1a | Diggers Beach Rd | Diggers Beach Rd | WB | 453 | 416 | 4 | 13 | 0 | 5 | 457 | 433 | -5% |
| 22-2 | Island View Close | Island View Close | WB | 457 | 170 | 13 | 8 | 0 | 1 | 470 | 179 | -62% |
| SL22 | Sub-Total | | WB | 910 | 586 | 17 | 21 | 0 | 5 | 927 | 612 | -34% |
| SL22 | TOTAL | | | 1,780 | 1,170 | 29 | 44 | 1 | 10 | 1,810 | 1,223 | -32% |
| SL23 | Baringa Private Hospital | | | | | | | | | | | |
| | Hospital | Departing | EB | 617 | 664 | 7 | 9 | 0 | 3 | 624 | 676 | 8% |
| 23-1 | Mackays Rd | Approaching | EB | 1,329 | 952 | 69 | 24 | 0 | 5 | 1,397 | 982 | -30% |
| SL23 | Sub-Total | | EB | 1,946 | 1,616 | 76 | 33 | 0 | 8 | 2,021 | 1,657 | -18% |
| | Hospital | | WB | 604 | 629 | 9 | 11 | 0 | 2 | 613 | 642 | 5% |
| 23-1 | Mackays Rd | | WB | 1,400 | 907 | 74 | 26 | 0 | 4 | 1,474 | 937 | -36% |
| SL23 | Sub-Total | | WB | 2,004 | 1,536 | 83 | 37 | 0 | 6 | 2,087 | 1,579 | -24% |
| SL23 | TOTAL | | | 3,950 | 3,152 | 159 | 70 | 0 | 14 | 4,109 | 3,236 | -21% |

# B1.2 Screenline Validation AM & PM Peak

| | | | AM (8-9) | | | | | | | | | | PM (16-17) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | GEH | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | GEH |
| **SL1** | **External Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 1.1 | Pacific Hwy | SB | 259 | 260 | 37 | 38 | 12 | 12 | 308 | 310 | 1% | **0.1** | 404 | 406 | 64 | 64 | 40 | 40 | 508 | 510 | 0% | **0.1** |
| 1.3 | Eastern Dorrigo Way | EB | 6 | 6 | 0 | 0 | 0 | 0 | 6 | 6 | 0% | **0.0** | 3 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 0% | **0.0** |
| 1.4 | Glennifer Rd | EB | 18 | 18 | 1 | 1 | 0 | 0 | 19 | 19 | 0% | **0.0** | 13 | 13 | 1 | 1 | 0 | 0 | 14 | 14 | 0% | **0.0** |
| 1.5 | Pacific Hwy | NB | 844 | 845 | 44 | 45 | 42 | 43 | 930 | 933 | 0% | **0.1** | 605 | 606 | 37 | 37 | 57 | 57 | 699 | 700 | 0% | **0.1** |
| 1.6 | Pine Creek Way | NB | 23 | 17 | 2 | 1 | 1 | 0 | 26 | 18 | -32% | **1.8** | 12 | 7 | 1 | 1 | 0 | 0 | 13 | 7 | -43% | **1.8** |
| **SL1** | Sub-Total | IB | 1,150 | 1,146 | 84 | 85 | 55 | 55 | 1,289 | 1,285 | 0% | **0.1** | 1,037 | 1,035 | 103 | 103 | 97 | 97 | 1,237 | 1,235 | 0% | **0.1** |
| 1.1 | Pacific Hwy | NB | 302 | 333 | 37 | 36 | 28 | 29 | 367 | 398 | 8% | **1.6** | 323 | 311 | 32 | 31 | 25 | 28 | 380 | 369 | -3% | **0.5** |
| 1.3 | Eastern Dorrigo Way | WB | 4 | 5 | 1 | 1 | 1 | 1 | 6 | 6 | 6% | **0.1** | 10 | 9 | 0 | 0 | 0 | 0 | 10 | 9 | -6% | **0.2** |
| 1.4 | Glennifer Rd | WB | 10 | 9 | 1 | 1 | 0 | 0 | 11 | 10 | -7% | **0.2** | 15 | 14 | 1 | 1 | 0 | 0 | 16 | 15 | -5% | **0.2** |
| 1.5 | Pacific Hwy | SB | 488 | 486 | 42 | 42 | 33 | 25 | 563 | 553 | -2% | **0.4** | 817 | 807 | 52 | 52 | 66 | 62 | 935 | 921 | -1% | **0.5** |
| 1.6 | Pine Creek Way | SB | 7 | 7 | 2 | 1 | 0 | 0 | 9 | 7 | -22% | **0.7** | 18 | 16 | 2 | 1 | 0 | 0 | 20 | 16 | -19% | **0.9** |
| **SL1** | Sub-Total | OB | 811 | 840 | 83 | 80 | 62 | 55 | 956 | 975 | 2% | **0.6** | 1,183 | 1,157 | 87 | 84 | 91 | 90 | 1,361 | 1,332 | -2% | **0.8** |
| **SL1** | **TOTAL** | | 1,961 | 1,985 | 167 | 165 | 117 | 110 | 2,245 | 2,260 | 1% | **0.3** | 2,220 | 2,192 | 190 | 187 | 188 | 188 | 2,598 | 2,566 | -1% | **0.6** |
| **SL2** | **Boambee Creek Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 29.1 | Pacific Hwy | NB | 1,635 | 1,748 | 103 | 104 | 53 | 57 | 1,791 | 1,908 | 7% | **2.7** | 882 | 957 | 87 | 83 | 47 | 65 | 1,016 | 1,105 | 9% | **2.7** |
| **SL2** | Sub-Total | NB | 2,635 | 2,633 | 145 | 163 | 60 | 74 | 2,840 | 2,871 | 1% | **0.6** | 1,440 | 1,628 | 114 | 132 | 50 | 75 | 1,604 | 1,834 | 14% | **5.6** |
| 29.1 | Pacific Hwy | SB | 796 | 856 | 112 | 95 | 36 | 34 | 944 | 985 | 4% | **1.3** | 1,361 | 1,784 | 117 | 101 | 68 | 72 | 1,546 | 1,957 | 27% | **9.8** |
| 2.2 | Hogbin Dr | SB | 504 | 512 | 28 | 63 | 2 | 14 | 534 | 588 | 10% | **2.3** | 922 | 933 | 27 | 46 | 2 | 9 | 951 | 989 | 4% | **1.2** |
| **SL2** | Sub-Total | SB | 1,300 | 1,367 | 140 | 157 | 38 | 49 | 1,478 | 1,573 | 6% | **2.4** | 2,283 | 2,717 | 144 | 148 | 70 | 81 | 2,497 | 2,946 | 18% | **8.6** |
| **SL2** | **TOTAL** | | 3,935 | 4,000 | 285 | 321 | 98 | 123 | 4,318 | 4,444 | 3% | **1.9** | 3,723 | 4,345 | 258 | 279 | 120 | 156 | 4,101 | 4,780 | 17% | **10.2** |
| **SL3** | **Creek Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 3.1 | Spagnolos Rd | NB | 3 | 4 | 0 | 0 | 0 | 0 | 3 | 5 | 56% | **0.9** | 8 | 7 | 0 | 1 | 0 | 0 | 8 | 7 | -12% | **0.4** |
| 3.2 | William Sharp Dr | NB | 38 | 24 | 3 | 1 | 0 | 0 | 41 | 26 | -38% | **2.7** | 22 | 18 | 3 | 1 | 0 | 0 | 25 | 19 | -24% | **1.3** |
| 3.3 | Shephards Ln | NB | 238 | 189 | 22 | 11 | 1 | 1 | 261 | 201 | -23% | **4.0** | 313 | 253 | 23 | 12 | 1 | 1 | 337 | 266 | -21% | **4.1** |
| 3.4 | Robin St | NB | 125 | 39 | 7 | 1 | 0 | 0 | 132 | 40 | -70% | **10.0** | 67 | 58 | 6 | 1 | 0 | 0 | 73 | 59 | -20% | **1.8** |
| 3.5 | Gundagai St | WB | 162 | 136 | 9 | 8 | 1 | 0 | 172 | 144 | -17% | **2.3** | 365 | 301 | 22 | 6 | 3 | 0 | 390 | 307 | -21% | **4.4** |
| 3.6 | Pacific Hwy | NB | 779 | 1,186 | 80 | 107 | 52 | 52 | 911 | 1,346 | 48% | **12.9** | 1,332 | 1,427 | 116 | 104 | 96 | 47 | 1,544 | 1,578 | 2% | **0.9** |
| 3.7 | Hogbin Dr | NB | 742 | 680 | 14 | 55 | 0 | 23 | 756 | 758 | 0% | **0.1** | 954 | 793 | 10 | 47 | 0 | 19 | 964 | 858 | -11% | **3.5** |
| 3.8 | Orlando St | NB | 252 | 224 | 27 | 13 | 3 | 3 | 282 | 239 | -15% | **2.6** | 409 | 354 | 29 | 13 | 2 | 2 | 440 | 369 | -16% | **3.5** |
| **SL3** | Sub-Total | NB | 2,339 | 2,482 | 162 | 195 | 57 | 80 | 2,558 | 2,757 | 8% | **3.9** | 3,470 | 3,210 | 209 | 183 | 102 | 70 | 3,781 | 3,463 | -8% | **5.3** |
| 3.1 | Spagnolos Rd | SB | 10 | 9 | 1 | 0 | 0 | 0 | 11 | 9 | -19% | **0.7** | 4 | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 5% | **0.1** |
| 3.2 | William Sharp Dr | SB | 24 | 22 | 1 | 1 | 0 | 0 | 25 | 23 | -7% | **0.4** | 30 | 22 | 3 | 1 | 0 | 0 | 33 | 23 | -31% | **1.9** |
| 3.3 | Shephards Ln | SB | 332 | 316 | 23 | 11 | 1 | 2 | 356 | 328 | -8% | **1.5** | 269 | 181 | 28 | 14 | 0 | 1 | 297 | 195 | -34% | **6.5** |
| 3.4 | Robin St | SB | 128 | 112 | 15 | 1 | 0 | 0 | 143 | 113 | -21% | **2.7** | 83 | 47 | 5 | 0 | 0 | 0 | 88 | 47 | -47% | **5.0** |
| 3.5 | Gundagai St | EB | 480 | 312 | 20 | 7 | 0 | 0 | 500 | 319 | -36% | **9.0** | 291 | 112 | 16 | 6 | 0 | 1 | 307 | 118 | -61% | **12.9** |
| 3.7 | Hogbin Dr | SB | 807 | 840 | 20 | 52 | 3 | 16 | 830 | 908 | 9% | **2.7** | 661 | 721 | 16 | 55 | 4 | 27 | 681 | 803 | 18% | **4.5** |
| 3.8 | Orlando St | SB | 531 | 299 | 42 | 14 | 5 | 3 | 578 | 316 | -45% | **12.4** | 359 | 276 | 20 | 13 | 3 | 2 | 382 | 291 | -24% | **5.0** |
| **SL3** | Sub-Total | SB | 3,506 | 3,112 | 244 | 199 | 93 | 64 | 3,843 | 3,375 | -12% | **7.8** | 2,699 | 2,536 | 204 | 204 | 80 | 85 | 2,983 | 2,824 | -5% | **2.9** |
| **SL3** | **TOTAL** | | 5,845 | 5,594 | 406 | 394 | 150 | 144 | 6,401 | 6,132 | -4% | **3.4** | 6,169 | 5,745 | 413 | 387 | 182 | 154 | 6,764 | 6,287 | -7% | **5.9** |
| **SL4** | **Bonville Creek Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 4.1 | N Bonville RD | NB | 44 | 110 | 4 | 3 | 0 | 0 | 48 | 114 | 137% | **7.3** | 93 | 45 | 5 | 3 | 1 | 0 | 99 | 48 | -52% | **6.0** |
| 4.2 | Pine Creek Way | NB | 190 | 172 | 23 | 11 | 0 | 3 | 213 | 186 | -13% | **1.9** | 131 | 182 | 11 | 9 | 0 | 2 | 142 | 193 | 36% | **4.0** |
| 4.3 | Pacific Hwy | NB | 854 | 914 | 25 | 50 | 40 | 44 | 919 | 1,008 | 10% | **2.9** | 590 | 642 | 32 | 41 | 48 | 57 | 670 | 739 | 10% | **2.6** |
| **SL4** | Sub-Total | NB | 1,088 | 1,196 | 52 | 65 | 40 | 48 | 1,180 | 1,308 | 11% | **3.6** | 814 | 869 | 48 | 52 | 49 | 60 | 911 | 980 | 8% | **2.3** |
| 4.1 | N Bonville RD | SB | 107 | 42 | 5 | 3 | 0 | 1 | 112 | 46 | -59% | **7.4** | 57 | 96 | 6 | 3 | 0 | 0 | 63 | 99 | 57% | **4.0** |
| 4.2 | Pine Creek Way | SB | 183 | 222 | 11 | 11 | 1 | 3 | 195 | 236 | 21% | **2.8** | 122 | 164 | 10 | 9 | 2 | 2 | 134 | 176 | 31% | **3.3** |
| 4.3 | Pacific Hwy | SB | 467 | 546 | 35 | 47 | 30 | 25 | 532 | 618 | 16% | **3.6** | 810 | 856 | 26 | 57 | 73 | 63 | 909 | 975 | 7% | **2.2** |
| **SL4** | Sub-Total | SB | 757 | 810 | 51 | 61 | 31 | 29 | 839 | 900 | 7% | **2.1** | 989 | 1,116 | 42 | 68 | 75 | 65 | 1,106 | 1,250 | 13% | **4.2** |
| **SL4** | **TOTAL** | | 1,845 | 2,006 | 103 | 126 | 71 | 76 | 2,019 | 2,208 | 9% | **4.1** | 1,803 | 1,985 | 90 | 120 | 124 | 125 | 2,017 | 2,230 | 11% | **4.6** |
| **SL5** | **Korora boundary** | | | | | | | | | | | | | | | | | | | | | |
| 29.5 | Bennetts Rd | NB | 6 | 11 | 1 | 1 | 0 | 0 | 7 | 12 | 76% | **1.7** | 13 | 17 | 1 | 1 | 0 | 0 | 14 | 18 | 27% | **1.0** |
| 29.9 | Pacific Hwy | NB | 579 | 808 | 65 | 111 | 48 | 48 | 692 | 968 | 40% | **9.6** | 1,313 | 1,455 | 102 | 94 | 79 | 41 | 1,494 | 1,590 | 6% | **2.4** |
| 25-2 | James Small Dr | NB | 163 | 236 | 0 | 4 | 0 | 0 | 163 | 239 | 47% | 5.4 | 89 | 151 | 3 | 4 | 0 | 0 | 92 | 155 | 68% | 5.6 |

| | | | AM (8-9) | | | | | | | | | | PM (16-17) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | **TT obs** | **TT mod** | TT % | GEH | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | **TT obs** | **TT mod** | TT % | GEH |
| 2.2 | Hogbin Dr | NB | 1,000 | 885 | 42 | 60 | 7 | 17 | 1,049 | 962 | -8% | 2.7 | 558 | 670 | 27 | 49 | 3 | 10 | 588 | 729 | 24% | 5.5 |
| **SL5** | Sub-Total | NB | 1,748 | 1,940 | 108 | 176 | 55 | 66 | 1,911 | 2,181 | 14% | 6.0 | 1,973 | 2,293 | 133 | 147 | 82 | 52 | 2,188 | 2,491 | 14% | 6.3 |
| 29.5 | Bennetts Rd | SB | 13 | 20 | 2 | 1 | 0 | 0 | 15 | 21 | 41% | 1.5 | 12 | 10 | 3 | 1 | 0 | 0 | 15 | 11 | -26% | 1.1 |
| 29.9 | Pacific Hwy | SB | 1,478 | 1,296 | 159 | 120 | 78 | 41 | 1,715 | 1,456 | -15% | 6.5 | 743 | 957 | 112 | 99 | 63 | 35 | 918 | 1,091 | 19% | 5.5 |
| 25-2 | James Small Dr | SB | 97 | 230 | 3 | 4 | 0 | 0 | 100 | 234 | 134% | 10.4 | 170 | 222 | 1 | 5 | 0 | 0 | 171 | 227 | 33% | 3.9 |
| 2.2 | Hogbin Dr | SB | 504 | 512 | 28 | 63 | 2 | 14 | 534 | 588 | 10% | **2.3** | 922 | 933 | 27 | 46 | 2 | 9 | 951 | 989 | 4% | **1.2** |
| **SL5** | Sub-Total | SB | 2,092 | 2,057 | 192 | 187 | 80 | 55 | 2,364 | 2,299 | -3% | **1.3** | 1,847 | 2,121 | 143 | 151 | 65 | 45 | 2,055 | 2,318 | 13% | **5.6** |
| **SL5** | **TOTAL** | | 3,840 | 3,996 | 300 | 363 | 135 | 122 | 4,275 | 4,481 | 5% | **3.1** | 3,820 | 4,414 | 276 | 298 | 147 | 97 | 4,243 | 4,809 | 13% | **8.4** |
| **SL6** | **North Ring Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 29.10 | Pacific Hwy | SB | 1,478 | 1,296 | 159 | 120 | 78 | 41 | 1,715 | 1,456 | -15% | **6.5** | 743 | 957 | 112 | 99 | 63 | 35 | 918 | 1,091 | 19% | **5.5** |
| 6.2 | Bruxner Park Rd | EB | 33 | 25 | 1 | 2 | 0 | 1 | 34 | 29 | -16% | **0.9** | 26 | 19 | 3 | 2 | 0 | 1 | 29 | 22 | -24% | **1.4** |
| 29.4 | Coramba Rd | EB | 446 | 338 | 37 | 25 | 3 | 7 | 486 | 370 | -24% | **5.6** | 170 | 234 | 19 | 22 | 1 | 5 | 190 | 261 | 37% | **4.7** |
| 29.2 | N Boambee Rd | EB | 21 | 12 | 1 | 1 | 0 | 0 | 22 | 12 | -44% | **2.3** | 16 | 6 | 2 | 1 | 0 | 0 | 18 | 7 | -61% | **3.1** |
| 6.5 | Englands Rd | EB | 28 | 13 | 4 | 1 | 0 | 0 | 32 | 14 | -57% | **3.8** | 22 | 8 | 3 | 1 | 0 | 0 | 25 | 9 | -65% | **4.0** |
| 29.1 | Pacific Hwy | NB | 1,635 | 1,748 | 103 | 104 | 53 | 57 | 1,791 | 1,908 | 7% | **2.7** | 882 | 957 | 87 | 83 | 47 | 65 | 1,016 | 1,105 | 9% | **2.7** |
| 2.2 | Hogbin Dr | NB | 1,000 | 885 | 42 | 60 | 7 | 17 | 1,049 | 962 | -8% | **2.7** | 558 | 670 | 27 | 49 | 3 | 10 | 588 | 729 | 24% | **5.5** |
| **SL6** | Sub-Total | IB | 4,641 | 4,316 | 347 | 313 | 141 | 123 | 5,129 | 4,751 | -7% | **5.4** | 2,417 | 2,852 | 253 | 256 | 114 | 116 | 2,784 | 3,223 | 16% | **8.0** |
| 6.2 | Bruxner Park Rd | WB | 13 | 17 | 2 | 3 | 0 | 1 | 15 | 21 | 37% | **1.3** | 41 | 22 | 1 | 3 | 0 | 1 | 42 | 26 | -38% | **2.7** |
| 29.4 | Coramba Rd | WB | 125 | 245 | 22 | 27 | 2 | 8 | 149 | 280 | 88% | **9.0** | 377 | 339 | 20 | 22 | 1 | 5 | 398 | 367 | -8% | **1.6** |
| 29.2 | N Boambee Rd | WB | 10 | 5 | 0 | 1 | 1 | 0 | 11 | 6 | -43% | **1.6** | 15 | 10 | 1 | 0 | 1 | 0 | 17 | 10 | -39% | **1.8** |
| 6.5 | Englands Rd | WB | 13 | 7 | 4 | 1 | 0 | 0 | 17 | 8 | -51% | **2.4** | 25 | 12 | 4 | 1 | 0 | 0 | 29 | 14 | -53% | **3.4** |
| 29.1 | Pacific Hwy | SB | 796 | 856 | 112 | 95 | 36 | 34 | 944 | 985 | 4% | **1.3** | 1,361 | 1,784 | 117 | 101 | 68 | 72 | 1,546 | 1,957 | 27% | **9.8** |
| 2.2 | Hogbin Dr | SB | 504 | 512 | 28 | 63 | 2 | 14 | 534 | 588 | 10% | **2.3** | 922 | 933 | 27 | 46 | 2 | 9 | 951 | 989 | 4% | **1.2** |
| **SL6** | Sub-Total | OB | 2,040 | 2,449 | 233 | 300 | 89 | 107 | 2,362 | 2,856 | 21% | **9.7** | 4,054 | 4,555 | 272 | 268 | 151 | 129 | 4,477 | 4,952 | 11% | **6.9** |
| **SL6** | **TOTAL** | | 6,681 | 6,765 | 580 | 613 | 230 | 229 | 7,491 | 7,607 | 2% | **1.3** | 6,471 | 7,407 | 525 | 524 | 265 | 245 | 7,261 | 8,175 | 13% | **10.4** |
| **SL7** | **Woolgoolga Creek Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 7.1 | Pacific Hwy | NB | 239 | 343 | 25 | 37 | 25 | 22 | 289 | 402 | 39% | **6.1** | 319 | 388 | 20 | 27 | 24 | 19 | 363 | 435 | 20% | **3.6** |
| 7.2 | Solitary Islands Way | NB | 622 | 352 | 52 | 26 | 3 | 10 | 677 | 388 | -43% | **12.5** | 394 | 356 | 39 | 24 | 1 | 10 | 434 | 390 | -10% | **2.2** |
| **SL7** | Sub-Total | NB | 861 | 695 | 77 | 63 | 28 | 33 | 966 | 790 | -18% | **5.9** | 713 | 745 | 59 | 51 | 25 | 30 | 797 | 826 | 4% | **1.0** |
| 7.1 | Pacific Hwy | SB | 301 | 305 | 49 | 51 | 13 | 17 | 363 | 372 | 3% | **0.5** | 302 | 374 | 54 | 57 | 28 | 33 | 384 | 464 | 21% | **3.9** |
| 7.2 | Solitary Islands Way | SB | 358 | 364 | 39 | 19 | 2 | 4 | 399 | 387 | -3% | **0.6** | 543 | 302 | 43 | 20 | 2 | 6 | 588 | 328 | -44% | **12.2** |
| **SL7** | Sub-Total | SB | 659 | 668 | 88 | 70 | 15 | 20 | 762 | 759 | 0% | **0.1** | 845 | 676 | 97 | 78 | 30 | 38 | 972 | 792 | -19% | **6.1** |
| **SL7** | **TOTAL** | | 1,520 | 1,363 | 165 | 133 | 43 | 53 | 1,728 | 1,549 | -10% | **4.4** | 1,558 | 1,420 | 156 | 129 | 55 | 68 | 1,769 | 1,617 | -9% | **3.7** |
| **SL8** | **South Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 25-10 | Coff St | WB | 302 | 292 | 10 | 20 | 1 | 7 | 313 | 319 | 2% | **0.4** | 791 | 466 | 4 | 19 | 0 | 5 | 795 | 490 | -38% | **12.0** |
| 25-24 | Vernon St | WB. | 56 | 28 | 0 | 2 | 0 | 1 | 56 | 31 | -44% | **3.8** | 124 | 78 | 0 | 1 | 0 | 1 | 124 | 80 | -36% | **4.4** |
| 25-11 | Harbour Dr | WB | 192 | 253 | 1 | 14 | 0 | 4 | 193 | 270 | 40% | **5.1** | 336 | 416 | 2 | 10 | 0 | 2 | 338 | 429 | 27% | **4.6** |
| 25-12 | Moonee St | WB | 220 | 82 | 9 | 5 | 0 | 2 | 229 | 88 | -62% | **11.2** | 360 | 153 | 7 | 4 | 0 | 1 | 367 | 158 | -57% | **12.9** |
| 25-23 | Market St | WB | 21 | 20 | 4 | 2 | 0 | 1 | 25 | 23 | -9% | **0.5** | 53 | 60 | 9 | 2 | 0 | 1 | 62 | 62 | 0% | **0.0** |
| 25-13 | Albany St | WB | 302 | 188 | 14 | 2 | 0 | 0 | 316 | 190 | -40% | **7.9** | 426 | 224 | 9 | 2 | 0 | 0 | 435 | 226 | -48% | **11.5** |
| 25-22 | Valley St | WB | 8 | 51 | 0 | 7 | 0 | 3 | 8 | 61 | 657% | **9.0** | 9 | 135 | 0 | 5 | 0 | 3 | 9 | 143 | 1485% | **15.3** |
| 8.10 | Thompsons Rd | WB | 236 | 256 | 23 | 10 | 0 | 3 | 259 | 269 | 4% | **0.6** | 225 | 156 | 16 | 8 | 0 | 3 | 241 | 167 | -31% | **5.2** |
| 25-15 | Hurley Dr | WB. | 102 | 83 | 15 | 16 | 0 | 7 | 117 | 106 | -10% | **1.1** | 203 | 194 | 5 | 13 | 1 | 6 | 209 | 212 | 2% | **0.2** |
| 24-3 | Cook Dr | WB | 211 | 242 | 28 | 38 | 5 | 16 | 244 | 296 | 21% | **3.2** | 380 | 597 | 8 | 30 | 4 | 13 | 392 | 640 | 63% | **10.9** |
| 24-2 | Isle Dr | WB | 113 | 97 | 4 | 4 | 0 | 0 | 117 | 101 | -14% | **1.5** | 269 | 342 | 5 | 6 | 0 | 0 | 274 | 349 | 27% | **4.2** |
| 8.13 | Stadium Dr | WB | 311 | 330 | 31 | 20 | 5 | 10 | 347 | 360 | 4% | **0.7** | 386 | 362 | 27 | 26 | 2 | 24 | 415 | 411 | -1% | **0.2** |
| **SL8** | Sub-Total | WB | 2,074 | 1,921 | 139 | 140 | 11 | 54 | 2,224 | 2,114 | -5% | **2.4** | 3,562 | 3,181 | 92 | 127 | 7 | 59 | 3,661 | 3,367 | -8% | **5.0** |
| 25-10 | Coff St | EB | 866 | 350 | 7 | 17 | 0 | 6 | 873 | 373 | -57% | **20.0** | 501 | 250 | 5 | 14 | 0 | 5 | 506 | 268 | -47% | **12.1** |
| 25-24 | Vernon St | EB | 15 | 42 | 0 | 2 | 0 | 1 | 15 | 45 | 199% | **5.5** | 27 | 31 | 0 | 2 | 0 | 0 | 27 | 33 | 23% | **1.1** |
| 25-11 | Harbour Dr | EB | 287 | 353 | 1 | 8 | 0 | 2 | 288 | 363 | 26% | **4.2** | 244 | 206 | 2 | 7 | 0 | 2 | 246 | 215 | -13% | **2.0** |
| 25-12 | Moonee St | EB | 403 | 84 | 25 | 4 | 1 | 1 | 429 | 89 | -79% | **21.1** | 419 | 47 | 11 | 2 | 0 | 1 | 430 | 50 | -88% | **24.6** |
| 25-23 | Market St | EB | 161 | 369 | 2 | 12 | 0 | 2 | 163 | 383 | 135% | **13.3** | 74 | 220 | 3 | 10 | 0 | 2 | 77 | 232 | 201% | **12.4** |
| 25-13 | Albany St | EB | 488 | 344 | 10 | 8 | 1 | 4 | 499 | 356 | -29% | **6.9** | 262 | 137 | 5 | 6 | 0 | 4 | 267 | 147 | -45% | **8.3** |
| 25-22 | Valley St | EB. | 1 | 19 | 0 | 3 | 0 | 0 | 1 | 22 | 2105% | **6.2** | 8 | 36 | 0 | 2 | 0 | 0 | 8 | 38 | 369% | **6.2** |
| 8.10 | Thompsons Rd | EB | 274 | 185 | 36 | 12 | 2 | 4 | 312 | 202 | -35% | **6.9** | 242 | 229 | 20 | 9 | 1 | 3 | 263 | 241 | -8% | **1.4** |
| 25-15 | Hurley Dr | EB | 131 | 143 | 22 | 16 | 2 | 8 | 155 | 166 | 7% | **0.9** | 92 | 104 | 14 | 14 | 2 | 6 | 108 | 124 | 15% | **1.5** |

| | | | AM (8-9) | | | | | | | | | | PM (16-17) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | GEH | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | GEH |
| 24-3 | Cook Dr | EB | 324 | 436 | 39 | 37 | 4 | 17 | 367 | 490 | 34% | **5.9** | 209 | 354 | 29 | 31 | 8 | 14 | 246 | 399 | 62% | **8.5** |
| 24-2 | Isle Dr | EB | 339 | 360 | 5 | 7 | 0 | 0 | 344 | 368 | 7% | **1.3** | 124 | 101 | 10 | 9 | 0 | 1 | 134 | 111 | -17% | **2.1** |
| 8.13 | Stadium Dr | EB | 599 | 401 | 33 | 24 | 4 | 15 | 636 | 440 | -31% | **8.5** | 317 | 267 | 28 | 19 | 2 | 16 | 347 | 302 | -13% | **2.5** |
| **SL8** | Sub-Total | EB | 3,888 | 3,087 | 180 | 149 | 14 | 62 | 4,082 | 3,298 | -19% | **12.9** | 2,519 | 1,981 | 127 | 124 | 13 | 54 | 2,659 | 2,159 | -19% | **10.2** |
| **SL8** | **TOTAL** | | 5,962 | 5,007 | 319 | 289 | 25 | 116 | 6,306 | 5,412 | -14% | **11.7** | 6,081 | 5,162 | 219 | 251 | 20 | 114 | 6,320 | 5,527 | -13% | **10.3** |
| **SL9** | **North Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 25-25 | Bay Dr | WB | 89 | 63 | 7 | 1 | 0 | 0 | 96 | 64 | -34% | **3.6** | 87 | 52 | 2 | 1 | 0 | 0 | 89 | 53 | -40% | **4.2** |
| 22-1 | Diggers Beach Rd | WB | 36 | 51 | 0 | 1 | 0 | 0 | 36 | 52 | 43% | **2.4** | 26 | 17 | 0 | 1 | 0 | 0 | 26 | 18 | -29% | **1.6** |
| 9.3 | Macauleys Headland Dr | WB | 3 | 58 | 0 | 1 | 0 | 0 | 3 | 59 | 1876% | **10.1** | 4 | 22 | 0 | 1 | 0 | 0 | 4 | 23 | 470% | **5.1** |
| 25-3 | Arthur St | WB | 434 | 457 | 5 | 36 | 0 | 9 | 439 | 502 | 14% | **2.9** | 717 | 735 | 11 | 43 | 0 | 5 | 728 | 784 | 8% | **2.0** |
| 25-4 | Park Beach Rd | WB | 288 | 324 | 17 | 11 | 1 | 1 | 306 | 336 | 10% | **1.7** | 520 | 573 | 17 | 12 | 0 | 7 | 537 | 592 | 10% | **2.3** |
| 25-5 | Orlando St | WB | 389 | 279 | 25 | 28 | 4 | 13 | 418 | 320 | -24% | **5.1** | 696 | 562 | 7 | 25 | 0 | 9 | 703 | 595 | -15% | **4.2** |
| 9.7 | Rose Ave | NB | 7 | 1 | 0 | 0 | 0 | 0 | 7 | 1 | -80% | **2.7** | 9 | 4 | 0 | 0 | 0 | 0 | 9 | 4 | -56% | **2.0** |
| 25-8 | Melittas Ave | WB | 4 | 69 | 0 | 7 | 0 | 3 | 4 | 79 | 1883% | **11.7** | 10 | 121 | 0 | 7 | 0 | 5 | 10 | 133 | 1233% | **14.6** |
| **SL9** | Sub-Total | WB | 1,250 | 1,302 | 54 | 86 | 5 | 26 | 1,309 | 1,414 | 8% | **2.8** | 2,069 | 2,086 | 37 | 91 | 0 | 25 | 2,106 | 2,202 | 5% | **2.1** |
| 25-25 | Bay Dr | EB. | 86 | 49 | 6 | 2 | 0 | 0 | 92 | 50 | -45% | **4.9** | 95 | 60 | 1 | 1 | 0 | 0 | 96 | 61 | -37% | **4.0** |
| 22-1 | Diggers Beach Rd | EB. | 27 | 24 | 4 | 1 | 0 | 0 | 31 | 25 | -19% | **1.1** | 59 | 75 | 1 | 1 | 0 | 0 | 60 | 76 | 27% | **2.0** |
| 9.3 | Macauleys Headland Dr | EB | 51 | 5 | 3 | 0 | 0 | 0 | 54 | 5 | -91% | **9.0** | 21 | 7 | 1 | 0 | 0 | 0 | 22 | 8 | -66% | **3.8** |
| 25-3 | Arthur St | EB. | 383 | 607 | 11 | 8 | 1 | 0 | 395 | 615 | 56% | **9.8** | 251 | 616 | 3 | 18 | 0 | 1 | 254 | 635 | 150% | **18.1** |
| 25-4 | Park Beach Rd | EB | 419 | 458 | 9 | 11 | 0 | 1 | 428 | 470 | 10% | **2.0** | 480 | 587 | 3 | 9 | 0 | 1 | 483 | 596 | 23% | **4.9** |
| 25-5 | Orlando St | EB. | 732 | 535 | 28 | 60 | 3 | 19 | 763 | 614 | -20% | **5.7** | 383 | 342 | 16 | 53 | 1 | 15 | 400 | 410 | 3% | **0.5** |
| 9.7 | Rose Ave | SB | 39 | 11 | 4 | 1 | 0 | 0 | 43 | 12 | -72% | **5.9** | 20 | 15 | 1 | 1 | 0 | 0 | 21 | 16 | -26% | **1.3** |
| 25-8 | Melittas Ave | EB | 41 | 79 | 2 | 7 | 0 | 4 | 43 | 89 | 107% | **5.7** | 29 | 72 | 0 | 6 | 0 | 3 | 29 | 81 | 178% | **7.0** |
| **SL9** | Sub-Total | EB | 1,778 | 1,767 | 67 | 90 | 4 | 25 | 1,849 | 1,881 | 2% | **0.7** | 1,338 | 1,772 | 26 | 89 | 1 | 20 | 1,365 | 1,881 | 38% | **12.8** |
| **SL9** | **TOTAL** | | 3,028 | 3,068 | 121 | 176 | 9 | 51 | 3,158 | 3,295 | 4% | **2.4** | 3,407 | 3,858 | 63 | 179 | 1 | 46 | 3,471 | 4,084 | 18% | **10.0** |
| **SL10** | **Moonee Beach Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 10.1 | Diamond Head Dr | WB | 255 | 216 | 12 | 7 | 0 | 0 | 267 | 223 | -17% | **2.8** | 132 | 80 | 3 | 6 | 0 | 0 | 135 | 86 | -36% | **4.7** |
| 10.2 | Fiddaman Rd | WB | 221 | 222 | 23 | 22 | 0 | 9 | 244 | 253 | 4% | **0.5** | 111 | 127 | 9 | 19 | 0 | 8 | 120 | 153 | 28% | **2.8** |
| 10.3 | Moonee Beach Rd | WB | 175 | 65 | 11 | 4 | 1 | 1 | 187 | 70 | -63% | **10.4** | 163 | 96 | 10 | 3 | 0 | 1 | 173 | 101 | -42% | **6.2** |
| **SL10** | Sub-Total | WB | 651 | 503 | 46 | 32 | 1 | 10 | 698 | 545 | -22% | **6.1** | 406 | 303 | 22 | 27 | 0 | 9 | 428 | 340 | -21% | **4.5** |
| 10.1 | Diamond Head Dr | EB | 79 | 84 | 9 | 7 | 1 | 0 | 88 | 90 | 2% | **0.2** | 208 | 184 | 10 | 6 | 0 | 0 | 218 | 190 | -13% | **2.0** |
| 10.2 | Fiddaman Rd | EB | 68 | 118 | 11 | 24 | 0 | 10 | 79 | 151 | 91% | **6.7** | 205 | 184 | 12 | 24 | 0 | 13 | 217 | 220 | 1% | **0.2** |
| 10.3 | Moonee Beach Rd | EB | 161 | 174 | 12 | 11 | 2 | 4 | 175 | 190 | 9% | **1.1** | 340 | 156 | 20 | 10 | 1 | 4 | 361 | 170 | -53% | **11.7** |
| **SL10** | Sub-Total | EB | 308 | 376 | 32 | 41 | 3 | 14 | 342 | 431 | 26% | **4.5** | 753 | 523 | 42 | 40 | 1 | 16 | 796 | 580 | -27% | **8.3** |
| **SL10** | **TOTAL** | | 959 | 878 | 78 | 74 | 4 | 24 | 1,041 | 976 | -6% | **2.0** | 1,159 | 827 | 64 | 67 | 1 | 25 | 1,224 | 919 | -25% | **9.3** |
| **SL11** | **Boambee East Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 11.1 | Sawtell Rd | WB | 389 | 576 | 21 | 35 | 6 | 12 | 416 | 624 | 50% | **9.1** | 362 | 436 | 16 | 24 | 2 | 7 | 380 | 467 | 23% | **4.2** |
| 11.2 | Bruce King Dr | WB | 29 | 44 | 2 | 1 | 1 | 0 | 32 | 45 | 41% | **2.1** | 50 | 37 | 4 | 0 | 0 | 0 | 54 | 37 | -32% | **2.5** |
| 11.3 | Lyons Rd | WB | 400 | 524 | 14 | 14 | 0 | 3 | 414 | 540 | 31% | **5.8** | 308 | 257 | 7 | 9 | 1 | 1 | 316 | 267 | -16% | **2.9** |
| **SL11** | Sub-Total | WB | 818 | 1,144 | 37 | 50 | 7 | 15 | 862 | 1,209 | 40% | **10.8** | 720 | 730 | 27 | 33 | 3 | 8 | 750 | 771 | 3% | **0.8** |
| 11.1 | Sawtell Rd | EB | 215 | 311 | 14 | 25 | 2 | 7 | 231 | 343 | 48% | **6.6** | 374 | 537 | 19 | 19 | 3 | 6 | 396 | 561 | 42% | **7.6** |
| 11.2 | Bruce King Dr | EB | 94 | 97 | 11 | 10 | 2 | 3 | 107 | 111 | 3% | **0.4** | 215 | 294 | 10 | 10 | 0 | 2 | 225 | 306 | 36% | **5.0** |
| 11.3 | Lyons Rd | EB | 284 | 220 | 9 | 10 | 3 | 2 | 296 | 232 | -22% | **4.0** | 347 | 434 | 11 | 7 | 3 | 1 | 361 | 442 | 23% | **4.1** |
| **SL11** | Sub-Total | EB | 593 | 628 | 34 | 45 | 7 | 12 | 634 | 685 | 8% | **2.0** | 936 | 1,265 | 40 | 36 | 6 | 9 | 982 | 1,310 | 33% | **9.7** |
| **SL11** | **TOTAL** | | 1,411 | 1,772 | 71 | 95 | 14 | 27 | 1,496 | 1,894 | 27% | **9.7** | 1,656 | 1,994 | 67 | 69 | 9 | 17 | 1,732 | 2,081 | 20% | **8.0** |
| **SL12** | **Hogbin Dr North Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 12.1 | Arthur St | WB | 349 | 320 | 20 | 33 | 1 | 9 | 370 | 362 | -2% | **0.4** | 330 | 468 | 28 | 37 | 1 | 5 | 359 | 510 | 42% | **7.3** |
| 12.2 | Park Beach Rd | WB | 220 | 228 | 12 | 1 | 0 | 0 | 232 | 230 | -1% | **0.1** | 245 | 167 | 10 | 1 | 0 | 0 | 255 | 168 | -34% | **6.0** |
| 12.3 | Boultwood St | WB | 15 | 72 | 1 | 7 | 0 | 2 | 16 | 82 | 411% | **9.4** | 23 | 178 | 0 | 5 | 0 | 3 | 23 | 186 | 708% | **15.9** |
| 12.4 | Prince St | WB | 24 | 18 | 2 | 2 | 0 | 0 | 26 | 20 | -23% | **1.3** | 27 | 35 | 1 | 1 | 0 | 0 | 28 | 36 | 28% | **1.4** |
| 12.5 | Orlando St | WB | 427 | 313 | 18 | 23 | 2 | 13 | 447 | 349 | -22% | **4.9** | 442 | 281 | 26 | 17 | 5 | 12 | 473 | 310 | -34% | **8.2** |
| 12.6 | Watsonia Ave | SB | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | -100% | **2.0** | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | -100% | **1.4** |
| 12.7 | Watsonia Ave | WB | 54 | 81 | 4 | 1 | 0 | 0 | 58 | 82 | 41% | **2.8** | 22 | 53 | 1 | 1 | 0 | 0 | 23 | 54 | 133% | **4.9** |
| **SL12** | Sub-Total | WB | 1,091 | 1,033 | 57 | 67 | 3 | 25 | 1,151 | 1,125 | -2% | **0.8** | 1,090 | 1,182 | 66 | 62 | 6 | 20 | 1,162 | 1,264 | 9% | **2.9** |
| 12.1 | Arthur St | EB | 479 | 452 | 21 | 4 | 1 | 0 | 501 | 456 | -9% | **2.0** | 310 | 349 | 23 | 12 | 0 | 0 | 333 | 361 | 9% | **1.5** |
| 12.2 | Park Beach Rd | EB | 207 | 201 | 8 | 8 | 0 | 1 | 215 | 210 | -2% | **0.4** | 221 | 312 | 7 | 5 | 0 | 0 | 228 | 317 | 39% | **5.4** |

| | | | AM (8-9) | | | | | | | | | | PM (16-17) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | GEH | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | GEH |
| 12.3 | Boultwood St | EB | 17 | 6 | 2 | 0 | 0 | 0 | 19 | 6 | -70% | **3.8** | 22 | 2 | 1 | 0 | 0 | 1 | 23 | 3 | -89% | **5.7** |
| 12.4 | Prince St | EB | 48 | 51 | 1 | 1 | 0 | 0 | 49 | 52 | 7% | **0.5** | 35 | 15 | 1 | 2 | 0 | 0 | 36 | 17 | -53% | **3.7** |
| 12.5 | Orlando St | EB | 589 | 350 | 52 | 54 | 3 | 17 | 644 | 421 | -35% | **9.7** | 409 | 396 | 37 | 49 | 2 | 27 | 448 | 472 | 5% | **1.1** |
| 12.6 | Watsonia Ave | NB | 13 | 22 | 3 | 0 | 0 | 0 | 16 | 22 | 37% | **1.4** | 11 | 16 | 0 | 0 | 0 | 0 | 11 | 16 | 44% | **1.3** |
| 12.7 | Watsonia Ave | EB | 39 | 46 | 0 | 1 | 0 | 0 | 39 | 47 | 21% | **1.2** | 16 | 32 | 1 | 1 | 0 | 0 | 17 | 32 | 90% | **3.1** |
| **SL12** | Sub-Total | EB | 1,392 | 1,128 | 87 | 68 | 4 | 18 | 1,483 | 1,214 | -18% | **7.3** | 1,024 | 1,122 | 70 | 68 | 2 | 28 | 1,096 | 1,218 | 11% | **3.6** |
| **SL12** | **TOTAL** | | 2,483 | 2,160 | 144 | 135 | 7 | 43 | 2,634 | 2,338 | -11% | **5.9** | 2,114 | 2,304 | 136 | 130 | 8 | 48 | 2,258 | 2,482 | 10% | **4.6** |
| **SL13** | **Hogbin Dr South Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 13.1 | Harbour Dr | WB | 519 | 812 | 34 | 34 | 3 | 10 | 556 | 856 | 54% | **11.3** | 495 | 718 | 20 | 26 | 3 | 7 | 518 | 752 | 45% | **9.3** |
| 13.2 | Albany St | WB | 606 | 131 | 35 | 4 | 2 | 1 | 643 | 136 | -79% | **25.7** | 452 | 107 | 28 | 3 | 0 | 1 | 480 | 111 | -77% | **21.5** |
| 24-1 | Stadium Dr | WB | 443 | 474 | 33 | 23 | 2 | 10 | 478 | 507 | 6% | **1.3** | 355 | 407 | 10 | 28 | 0 | 24 | 365 | 459 | 26% | **4.6** |
| **SL13** | Sub-Total | WB | 1,568 | 1,418 | 102 | 61 | 7 | 21 | 1,677 | 1,499 | -11% | **4.5** | 1,302 | 1,232 | 58 | 57 | 3 | 32 | 1,363 | 1,321 | -3% | **1.1** |
| 13.1 | Harbour Dr | EB | 448 | 579 | 32 | 27 | 6 | 8 | 486 | 613 | 26% | **5.4** | 602 | 690 | 25 | 19 | 8 | 6 | 635 | 715 | 13% | **3.1** |
| 13.2 | Albany St | EB | 491 | 275 | 29 | 13 | 2 | 2 | 522 | 290 | -44% | **11.5** | 461 | 202 | 30 | 8 | 1 | 1 | 492 | 211 | -57% | **15.0** |
| 24-1 | Stadium Dr | EB | 414 | 442 | 16 | 25 | 4 | 15 | 434 | 481 | 11% | **2.2** | 396 | 393 | 13 | 20 | 2 | 16 | 411 | 430 | 5% | **0.9** |
| **SL13** | Sub-Total | EB | 1,353 | 1,295 | 77 | 65 | 12 | 25 | 1,442 | 1,385 | -4% | **1.5** | 1,459 | 1,285 | 68 | 46 | 11 | 24 | 1,538 | 1,355 | -12% | **4.8** |
| **SL13** | **TOTAL** | | 2,921 | 2,713 | 179 | 125 | 19 | 46 | 3,119 | 2,884 | -8% | **4.3** | 2,761 | 2,518 | 126 | 103 | 14 | 55 | 2,901 | 2,676 | -8% | **4.3** |
| **SL14** | **Toomina Rd Screenline** | | | | | | | | | | | | | | | | | | | | | |
| 14.1 | Hi-Tech Dr | WB | 146 | 162 | 20 | 25 | 0 | 9 | 166 | 196 | 18% | **2.2** | 92 | 124 | 17 | 19 | 0 | 7 | 109 | 150 | 37% | **3.6** |
| 14.2 | Sawtell Rd | WB | 248 | 328 | 25 | 23 | 2 | 7 | 275 | 359 | 30% | **4.7** | 469 | 433 | 17 | 13 | 0 | 4 | 486 | 450 | -8% | **1.7** |
| 20-10 | Coorabin Cres | WB | 81 | 93 | 3 | 3 | 0 | 0 | 84 | 96 | 14% | **1.3** | 94 | 138 | 1 | 2 | 0 | 0 | 95 | 140 | 48% | **4.2** |
| 20-11 | Bangalee Cres | WB | 55 | 20 | 12 | 1 | 0 | 0 | 67 | 21 | -69% | **6.9** | 104 | 57 | 0 | 1 | 0 | 0 | 104 | 58 | -44% | **5.1** |
| 14.5 | Amaroo Cresent | WB | 103 | 78 | 4 | 6 | 0 | 0 | 107 | 85 | -21% | **2.3** | 96 | 261 | 4 | 4 | 0 | 0 | 100 | 265 | 165% | **12.2** |
| 14.6 | Kintorie Cresent | WB | 15 | 67 | 1 | 1 | 0 | 0 | 16 | 68 | 325% | **8.0** | 33 | 88 | 2 | 1 | 0 | 0 | 35 | 88 | 153% | **6.8** |
| 14.7 | Mirroola Cresent | WB | 36 | 35 | 1 | 1 | 0 | 0 | 37 | 36 | -2% | **0.1** | 40 | 61 | 2 | 1 | 0 | 0 | 42 | 62 | 47% | **2.7** |
| 14.8 | Linden Ave | WB | 172 | 267 | 14 | 5 | 0 | 2 | 186 | 274 | 47% | **5.8** | 157 | 187 | 11 | 4 | 1 | 1 | 169 | 192 | 14% | **1.7** |
| 14.9 | Playford Ave | WB | 25 | 15 | 1 | 1 | 0 | 0 | 26 | 15 | -41% | **2.4** | 54 | 41 | 4 | 1 | 0 | 0 | 58 | 41 | -29% | **2.4** |
| 26-6 | Lyons Rd | WB | 200 | 200 | 8 | 7 | 0 | 1 | 208 | 208 | 0% | **0.0** | 308 | 114 | 4 | 3 | 1 | 0 | 313 | 118 | -62% | **13.3** |
| **SL14** | Sub-Total | WB | 1,081 | 1,266 | 89 | 73 | 2 | 19 | 1,172 | 1,358 | 16% | **5.2** | 1,447 | 1,503 | 62 | 49 | 2 | 11 | 1,511 | 1,563 | 3% | **1.3** |
| 14.1 | Hi-Tech Dr | EB | 87 | 92 | 22 | 26 | 0 | 11 | 109 | 128 | 18% | **1.8** | 167 | 207 | 22 | 19 | 0 | 6 | 189 | 233 | 23% | **3.0** |
| 14.2 | Sawtell Rd | EB | 349 | 440 | 26 | 22 | 0 | 6 | 375 | 469 | 25% | **4.6** | 404 | 466 | 17 | 16 | 0 | 5 | 421 | 486 | 15% | **3.0** |
| 20-10 | Coorabin Cres | EB | 126 | 113 | 0 | 2 | 0 | 0 | 126 | 115 | -8% | **1.0** | 71 | 65 | 0 | 2 | 0 | 0 | 71 | 67 | -5% | **0.4** |
| 20-11 | Bangalee Cres | EB | 126 | 73 | 6 | 1 | 0 | 0 | 132 | 74 | -44% | **5.7** | 57 | 43 | 2 | 1 | 0 | 0 | 59 | 44 | -25% | **2.0** |
| 14.5 | Amaroo Cresent | EB | 184 | 239 | 2 | 5 | 0 | 0 | 186 | 245 | 32% | **4.0** | 62 | 120 | 1 | 4 | 0 | 0 | 63 | 125 | 98% | **6.4** |
| 14.6 | Kintorie Cresent | EB | 49 | 85 | 2 | 1 | 0 | 0 | 51 | 86 | 68% | **4.2** | 19 | 68 | 1 | 1 | 0 | 0 | 20 | 69 | 245% | **7.3** |
| 14.7 | Mirroola Cresent | EB | 50 | 59 | 1 | 1 | 0 | 0 | 51 | 60 | 18% | **1.3** | 36 | 30 | 1 | 1 | 0 | 0 | 37 | 30 | -18% | **1.1** |
| 14.8 | Linden Ave | EB | 211 | 171 | 11 | 6 | 0 | 1 | 222 | 178 | -20% | **3.1** | 121 | 245 | 5 | 4 | 0 | 1 | 126 | 249 | 98% | **9.0** |
| 14.9 | Playford Ave | EB | 74 | 48 | 4 | 1 | 0 | 0 | 78 | 49 | -37% | **3.6** | 48 | 18 | 2 | 1 | 0 | 0 | 50 | 18 | -63% | **5.4** |
| 26-6 | Lyons Rd | EB | 255 | 122 | 10 | 5 | 1 | 0 | 266 | 127 | -52% | **9.9** | 242 | 177 | 3 | 3 | 1 | 0 | 246 | 181 | -26% | **4.4** |
| **SL14** | Sub-Total | EB | 1,511 | 1,442 | 84 | 71 | 1 | 18 | 1,596 | 1,532 | -4% | **1.6** | 1,227 | 1,439 | 54 | 52 | 1 | 12 | 1,282 | 1,503 | 17% | **5.9** |
| **SL14** | **TOTAL** | | 2,592 | 2,708 | 173 | 144 | 3 | 38 | 2,768 | 2,889 | 4% | **2.3** | 2,674 | 2,941 | 116 | 101 | 3 | 24 | 2,793 | 3,066 | 10% | **5.0** |
| **SL21** | **Airport** | | | | | | | | | | | | | | | | | | | | | |
| 21-1 | Airport Dr | WB | 71 | 82 | 1 | 3 | 0 | 1 | 72 | 85 | 19% | **1.5** | 118 | 149 | 1 | 2 | 0 | 1 | 119 | 152 | 28% | **2.8** |
| 21-2 | Christmas Bells Rd | WB | 20 | 29 | 8 | 4 | 1 | 1 | 29 | 34 | 16% | **0.8** | 40 | 57 | 0 | 3 | 0 | 1 | 40 | 61 | 53% | **3.0** |
| **SL21** | Sub-Total | WB | 91 | 111 | 9 | 6 | 1 | 2 | 101 | 119 | 18% | **1.7** | 158 | 207 | 1 | 5 | 0 | 2 | 159 | 214 | 34% | **4.0** |
| 21-1 | Airport Dr | EB | 81 | 108 | 0 | 2 | 0 | 1 | 81 | 111 | 36% | **3.0** | 92 | 102 | 0 | 1 | 0 | 1 | 92 | 104 | 13% | **1.2** |
| 21-2 | Christmas Bells Rd | EB | 26 | 47 | 8 | 3 | 2 | 1 | 36 | 51 | 43% | **2.3** | 15 | 35 | 2 | 3 | 2 | 1 | 19 | 39 | 104% | **3.7** |
| **SL21** | Sub-Total | EB | 107 | 155 | 8 | 5 | 2 | 2 | 117 | 162 | 38% | **3.8** | 107 | 137 | 2 | 5 | 2 | 2 | 111 | 143 | 29% | **2.8** |
| **SL21** | **TOTAL** | | 198 | 266 | 17 | 11 | 3 | 4 | 218 | 281 | 29% | **4.0** | 265 | 343 | 3 | 10 | 2 | 3 | 270 | 356 | 32% | **4.9** |
| **SL22** | **Big Banana** | | | | | | | | | | | | | | | | | | | | | |
| 22-1a | Diggers Beach Rd | EB | 12 | 9 | 1 | 1 | 0 | 0 | 13 | 10 | -25% | **1.0** | 45 | 15 | 0 | 0 | 0 | 0 | 45 | 15 | -66% | **5.4** |
| 22-2 | Island View Close | EB | 11 | 43 | 0 | 2 | 0 | 0 | 11 | 45 | 306% | **6.4** | 26 | 44 | 0 | 2 | 0 | 1 | 26 | 46 | 78% | **3.4** |
| **SL22** | Sub-Total | EB | 23 | 52 | 1 | 2 | 0 | 0 | 24 | 54 | 127% | **4.9** | 71 | 59 | 0 | 2 | 0 | 1 | 71 | 62 | -13% | **1.1** |
| 22-1a | Diggers Beach Rd, | WB | 14 | 33 | 0 | 1 | 0 | 0 | 14 | 35 | 151% | **4.3** | 18 | 39 | 0 | 1 | 0 | 0 | 18 | 41 | 127% | **4.2** |
| 22-2 | Island View Close | WB | 20 | 15 | 1 | 1 | 0 | 0 | 21 | 16 | -23% | **1.1** | 19 | 15 | 0 | 1 | 0 | 0 | 19 | 16 | -16% | **0.7** |
| **SL22** | Sub-Total | WB | 34 | 49 | 1 | 2 | 0 | 0 | 35 | 51 | 47% | **2.5** | 37 | 55 | 0 | 2 | 0 | 0 | 37 | 57 | 53% | **2.9** |

| | | | AM (8-9) | | | | | | | | | | PM (16-17) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | **TT obs** | **TT mod** | **TT %** | **GEH** | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | **TT obs** | **TT mod** | **TT %** | **GEH** |
| **SL22** | **TOTAL** | | 57 | 101 | 2 | 4 | 0 | 1 | 59 | 106 | 79% | **5.2** | 108 | 114 | 0 | 4 | 0 | 1 | 108 | 119 | 10% | **1.0** |
| **SL23** | **Baringa Private Hospital** | | | | | | | | | | | | | | | | | | | | | |
| | Hospital | EB | 60 | 61 | 1 | 1 | 0 | 0 | 61 | 63 | 3% | **0.2** | 29 | 31 | 0 | 0 | 0 | 0 | 29 | 32 | 9% | **0.5** |
| 23-1 | Mackays Rd | EB | 111 | 79 | 6 | 3 | 0 | 0 | 117 | 82 | -30% | **3.5** | 86 | 70 | 5 | 1 | 0 | 0 | 91 | 72 | -21% | **2.1** |
| **SL23** | Sub-Total | EB | 171 | 140 | 7 | 4 | 0 | 0 | 178 | 145 | -19% | **2.6** | 115 | 102 | 5 | 1 | 0 | 1 | 120 | 103 | -14% | **1.6** |
| | Hospital | WB | 25 | 26 | 1 | 1 | 0 | 0 | 26 | 27 | 5% | **0.3** | 51 | 53 | 0 | 0 | 0 | 0 | 51 | 53 | 5% | **0.3** |
| 23-1 | Mackays Rd | WB | 88 | 74 | 6 | 2 | 0 | 0 | 94 | 77 | -18% | **1.8** | 109 | 70 | 6 | 2 | 0 | 1 | 115 | 72 | -37% | **4.4** |
| **SL23** | Sub-Total | WB | 113 | 101 | 7 | 4 | 0 | 0 | 120 | 104 | -13% | **1.5** | 160 | 123 | 6 | 2 | 0 | 1 | 166 | 126 | -24% | **3.3** |
| **SL23** | **TOTAL** | | 284 | 241 | 14 | 8 | 0 | 1 | 298 | 249 | -16% | **2.9** | 275 | 224 | 11 | 3 | 0 | 1 | 286 | 229 | -20% | **3.5** |

# B1.3 Screenline Validation Off-Peak and Rest of Day

| | | | OP (9-16) | | | | | | | | | RD (17-8) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| SL1 | External Screenline | | | | | | | | | | | | | | | | | | | |
| 1.1 | Pacific Hwy | SB | 2,265 | 2,280 | 325 | 331 | 207 | 209 | 2,797 | 2,820 | 1% | 2,084 | 2,114 | 214 | 214 | 235 | 235 | 2,533 | 2,563 | 1% |
| 1.3 | Eastern Dorrigo Way | EB | 33 | 33 | 1 | 1 | 0 | 0 | 34 | 34 | 0% | 22 | 22 | 1 | 1 | 0 | 0 | 23 | 23 | 0% |
| 1.4 | Glennifer Rd | EB | 75 | 75 | 7 | 7 | 0 | 0 | 82 | 82 | 0% | 34 | 34 | 3 | 3 | 0 | 0 | 37 | 37 | 0% |
| 1.5 | Pacific Hwy | NB | 4,377 | 4,381 | 270 | 268 | 325 | 322 | 4,972 | 4,971 | 0% | 2,982 | 2,984 | 167 | 167 | 630 | 630 | 3,779 | 3,781 | 0% |
| 1.6 | Pine Creek Way | NB | 100 | 46 | 10 | 4 | 0 | 0 | 110 | 49 | -55% | 44 | 39 | 0 | 2 | 2 | 0 | 46 | 41 | -11% |
| SL1 | Sub-Total | IB | 6,850 | 6,815 | 613 | 610 | 532 | 531 | 7,995 | 7,956 | 0% | 5,166 | 5,193 | 385 | 387 | 867 | 865 | 6,418 | 6,445 | 0% |
| 1.1 | Pacific Hwy | NB | 2,330 | 2,327 | 246 | 242 | 180 | 201 | 2,756 | 2,769 | 0% | 2,156 | 2,102 | 176 | 143 | 448 | 446 | 2,780 | 2,690 | -3% |
| 1.3 | Eastern Dorrigo Way | WB | 33 | 27 | 1 | 1 | 0 | 0 | 34 | 28 | -19% | 14 | 15 | 0 | 0 | 0 | 0 | 14 | 15 | 4% |
| 1.4 | Glennifer Rd | WB | 66 | 66 | 5 | 5 | 0 | 0 | 71 | 71 | 1% | 42 | 43 | 4 | 4 | 0 | 0 | 46 | 46 | 1% |
| 1.5 | Pacific Hwy | SB | 4,233 | 4,166 | 319 | 319 | 353 | 305 | 4,905 | 4,790 | -2% | 3,360 | 3,329 | 227 | 243 | 461 | 442 | 4,048 | 4,014 | -1% |
| 1.6 | Pine Creek Way | SB | 88 | 55 | 7 | 3 | 0 | 0 | 95 | 58 | -39% | 45 | 37 | 0 | 3 | 0 | 0 | 45 | 40 | -11% |
| SL1 | Sub-Total | OB | 6,750 | 6,641 | 578 | 569 | 533 | 506 | 7,861 | 7,716 | -2% | 5,617 | 5,525 | 407 | 392 | 909 | 888 | 6,933 | 6,805 | -2% |
| SL1 | TOTAL | | 13,600 | 13,456 | 1,191 | 1,179 | 1,065 | 1,037 | 15,856 | 15,672 | -1% | 10,783 | 10,718 | 792 | 779 | 1,776 | 1,753 | 13,351 | 13,250 | -1% |
| SL2 | Boambee Creek Screenline | | | | | | | | | | | | | | | | | | | |
| 29.1 | Pacific Hwy | NB | 6,556 | 7,104 | 641 | 566 | 277 | 343 | 7,474 | 8,013 | 7% | 4,570 | 5,170 | 393 | 317 | 554 | 640 | 5,517 | 6,127 | 11% |
| 2.2 | Hogbin Dr | NB | 4,204 | 4,235 | 232 | 349 | 26 | 57 | 4,462 | 4,641 | 4% | 2,376 | 2,677 | 127 | 198 | 25 | 38 | 2,528 | 2,913 | 15% |
| SL2 | Sub-Total | NB | 10,760 | 11,339 | 873 | 915 | 303 | 400 | 11,936 | 12,654 | 6% | 6,946 | 7,847 | 520 | 515 | 579 | 678 | 8,045 | 9,039 | 12% |
| 29.1 | Pacific Hwy | SB | 6,331 | 7,502 | 742 | 625 | 332 | 330 | 7,405 | 8,458 | 14% | 4,812 | 5,529 | 490 | 403 | 457 | 454 | 5,759 | 6,386 | 11% |
| 2.2 | Hogbin Dr | SB | 4,378 | 4,343 | 245 | 356 | 9 | 59 | 4,632 | 4,758 | 3% | 2,417 | 2,339 | 87 | 202 | 12 | 49 | 2,516 | 2,589 | 3% |
| SL2 | Sub-Total | SB | 10,709 | 11,846 | 987 | 981 | 341 | 389 | 12,037 | 13,216 | 10% | 7,229 | 7,867 | 577 | 605 | 469 | 503 | 8,275 | 8,975 | 8% |
| SL2 | TOTAL | | 21,469 | 23,185 | 1,860 | 1,897 | 644 | 789 | 23,973 | 25,870 | 8% | 14,175 | 15,714 | 1,097 | 1,120 | 1,048 | 1,181 | 16,320 | 18,015 | 10% |
| SL3 | Creek Screenline | | | | | | | | | | | | | | | | | | | |
| 3.1 | Spagnolos Rd | NB | 25 | 25 | 3 | 2 | 0 | 0 | 28 | 27 | -2% | 27 | 23 | 2 | 0 | 0 | 1 | 29 | 24 | -18% |
| 3.2 | William Sharp Dr | NB | 126 | 82 | 12 | 5 | 0 | 0 | 138 | 86 | -38% | 90 | 68 | 11 | 3 | 0 | 0 | 101 | 71 | -29% |
| 3.3 | Shephards Ln | NB | 1,443 | 1,057 | 149 | 74 | 9 | 7 | 1,601 | 1,138 | -29% | 1,009 | 736 | 94 | 39 | 3 | 5 | 1,106 | 780 | -30% |
| 3.4 | Robin St | NB | 456 | 253 | 23 | 3 | 0 | 0 | 479 | 255 | -47% | 197 | 79 | 8 | 1 | 0 | 0 | 205 | 79 | -61% |
| 3.5 | Gundagai St | WB | 1,464 | 953 | 83 | 40 | 5 | 1 | 1,552 | 994 | -36% | 983 | 726 | 45 | 19 | 3 | 3 | 1,031 | 748 | -27% |
| 3.6 | Pacific Hwy | NB | 7,951 | 7,505 | 791 | 660 | 538 | 270 | 9,280 | 8,435 | -9% | 5,348 | 3,928 | 436 | 400 | 541 | 497 | 6,325 | 4,824 | -24% |
| 3.7 | Hogbin Dr | NB | 4,929 | 4,449 | 124 | 320 | 4 | 100 | 5,057 | 4,869 | -4% | 2,530 | 3,206 | 34 | 183 | 0 | 146 | 2,564 | 3,534 | 38% |
| 3.8 | Orlando St | NB | 2,519 | 1,750 | 210 | 79 | 10 | 13 | 2,739 | 1,842 | -33% | 1,145 | 1,085 | 83 | 49 | 6 | 12 | 1,234 | 1,145 | -7% |
| SL3 | Sub-Total | NB | 18,913 | 16,072 | 1,395 | 1,183 | 566 | 391 | 20,874 | 17,646 | -15% | 11,329 | 9,850 | 713 | 693 | 553 | 663 | 12,595 | 11,205 | -11% |
| 3.1 | Spagnolos Rd | SB | 25 | 23 | 0 | 2 | 0 | 0 | 25 | 26 | 4% | 28 | 22 | 0 | 1 | 0 | 0 | 28 | 23 | -19% |
| 3.2 | William Sharp Dr | SB | 128 | 88 | 8 | 5 | 0 | 0 | 136 | 92 | -32% | 102 | 76 | 8 | 2 | 0 | 0 | 110 | 78 | -29% |
| 3.3 | Shephards Ln | SB | 1,408 | 1,000 | 145 | 77 | 13 | 6 | 1,566 | 1,083 | -31% | 1,055 | 865 | 114 | 42 | 4 | 5 | 1,173 | 912 | -22% |
| 3.4 | Robin St | SB | 423 | 215 | 26 | 3 | 0 | 0 | 449 | 218 | -52% | 208 | 98 | 7 | 1 | 0 | 0 | 215 | 98 | -54% |
| 3.5 | Gundagai St | EB | 1,652 | 751 | 99 | 34 | 0 | 2 | 1,751 | 787 | -55% | 1,021 | 701 | 47 | 17 | 0 | 1 | 1,068 | 720 | -33% |
| 3.6 | Pacific Hwy | SB | 7,047 | 6,605 | 821 | 713 | 487 | 262 | 8,355 | 7,580 | -9% | 5,138 | 4,070 | 602 | 493 | 382 | 417 | 6,122 | 4,980 | -19% |
| 3.7 | Hogbin Dr | SB | 3,949 | 4,267 | 140 | 350 | 24 | 122 | 4,113 | 4,739 | 15% | 2,142 | 3,470 | 56 | 187 | 4 | 84 | 2,202 | 3,741 | 70% |
| 3.8 | Orlando St | SB | 2,946 | 1,705 | 208 | 91 | 19 | 15 | 3,173 | 1,811 | -43% | 1,299 | 1,135 | 85 | 51 | 11 | 12 | 1,395 | 1,197 | -14% |
| SL3 | Sub-Total | SB | 17,578 | 14,653 | 1,447 | 1,275 | 543 | 407 | 19,568 | 16,335 | -17% | 10,993 | 10,436 | 919 | 793 | 401 | 519 | 12,313 | 11,748 | -5% |
| SL3 | TOTAL | | 36,491 | 30,725 | 2,842 | 2,458 | 1,109 | 798 | 40,442 | 33,981 | -16% | 22,322 | 20,285 | 1,632 | 1,486 | 954 | 1,182 | 24,908 | 22,953 | -8% |
| SL4 | Bonville Creek Screenline | | | | | | | | | | | | | | | | | | | |
| 4.1 | N Bonville RD | NB | 422 | 298 | 31 | 18 | 0 | 1 | 453 | 317 | -30% | 286 | 262 | 11 | 10 | 1 | 1 | 298 | 273 | -8% |
| 4.2 | Pine Creek Way | NB | 764 | 811 | 81 | 63 | 4 | 11 | 849 | 885 | 4% | 382 | 615 | 33 | 32 | 2 | 8 | 417 | 655 | 57% |
| SL4 | Sub-Total | NB | 5,578 | 5,713 | 334 | 373 | 273 | 334 | 6,185 | 6,421 | 4% | 3,313 | 4,022 | 168 | 217 | 690 | 641 | 4,171 | 4,879 | 17% |
| 4.1 | N Bonville RD | SB | 440 | 341 | 24 | 21 | 0 | 1 | 464 | 363 | -22% | 249 | 249 | 14 | 8 | 2 | 1 | 265 | 258 | -3% |
| 4.2 | Pine Creek Way | SB | 703 | 787 | 49 | 59 | 7 | 11 | 759 | 857 | 13% | 438 | 618 | 25 | 35 | 3 | 8 | 466 | 661 | 42% |
| 4.3 | Pacific Hwy | SB | 4,251 | 4,373 | 229 | 340 | 317 | 305 | 4,797 | 5,018 | 5% | 2,927 | 3,480 | 167 | 251 | 604 | 442 | 3,698 | 4,173 | 13% |
| SL4 | Sub-Total | SB | 5,394 | 5,501 | 302 | 420 | 324 | 316 | 6,020 | 6,238 | 4% | 3,614 | 4,347 | 206 | 294 | 609 | 451 | 4,429 | 5,092 | 15% |
| SL4 | TOTAL | | 10,972 | 11,215 | 636 | 793 | 597 | 651 | 12,205 | 12,658 | 4% | 6,927 | 8,368 | 374 | 511 | 1,299 | 1,092 | 8,600 | 9,971 | 16% |
| SL5 | Korora boundary | | | | | | | | | | | | | | | | | | | |
| 29.5 | Bennetts Rd | NB | 65 | 69 | 6 | 7 | 0 | 1 | 71 | 77 | 9% | 46 | 50 | 4 | 4 | 0 | 1 | 50 | 55 | 10% |
| 29.9 | Pacific Hwy | NB | 5,899 | 6,483 | 579 | 665 | 361 | 258 | 6,839 | 7,406 | 8% | 5,128 | 4,318 | 365 | 372 | 536 | 419 | 6,029 | 5,109 | -15% |

| | | | OP (9-16) | | | | | | | | | RD (17-8) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| 25-2 | James Small Dr | NB | 781 | 985 | 11 | 23 | 0 | 1 | 792 | 1,008 | 27% | 590 | 592 | 9 | 16 | 0 | 2 | 599 | 609 | 2% |
| 2.2 | Hogbin Dr | NB | 4,204 | 4,235 | 232 | 349 | 26 | 57 | 4,462 | 4,641 | 4% | 2,376 | 2,677 | 127 | 198 | 25 | 38 | 2,528 | 2,913 | 15% |
| SL5 | Sub-Total | NB | 10,949 | 11,772 | 828 | 1,043 | 387 | 317 | 12,164 | 13,133 | 8% | 8,140 | 7,636 | 505 | 590 | 561 | 460 | 9,206 | 8,685 | -6% |
| 29.5 | Bennetts Rd | SB | 60 | 56 | 8 | 7 | 0 | 2 | 68 | 64 | -6% | 39 | 52 | 2 | 4 | 0 | 1 | 41 | 57 | 38% |
| 29.9 | Pacific Hwy | SB | 5,678 | 6,422 | 764 | 695 | 376 | 228 | 6,818 | 7,344 | 8% | 4,531 | 4,760 | 540 | 487 | 376 | 405 | 5,447 | 5,651 | 4% |
| 25-2 | James Small Dr | SB | 759 | 1,032 | 10 | 27 | 1 | 1 | 770 | 1,060 | 38% | 495 | 638 | 16 | 12 | 0 | 1 | 512 | 650 | 27% |
| 2.2 | Hogbin Dr | SB | 4,378 | 4,343 | 245 | 356 | 9 | 59 | 4,632 | 4,758 | 3% | 2,417 | 2,339 | 87 | 202 | 12 | 49 | 2,516 | 2,589 | 3% |
| SL5 | TOTAL | | 21,824 | 23,625 | 1,855 | 2,129 | 773 | 606 | 24,452 | 26,359 | 8% | 15,622 | 15,424 | 1,150 | 1,294 | 949 | 915 | 17,722 | 17,633 | -1% |
| SL6 | North Ring Screenline | | | | | | | | | | | | | | | | | | | |
| 29.10 | Pacific Hwy | SB | 5,678 | 6,422 | 764 | 695 | 376 | 228 | 6,818 | 7,344 | 8% | 4,531 | 4,760 | 540 | 487 | 376 | 405 | 5,447 | 5,651 | 4% |
| 6.2 | Bruxner Park Rd | EB | 179 | 106 | 13 | 14 | 0 | 4 | 192 | 124 | -36% | 91 | 84 | 4 | 9 | 0 | 9 | 95 | 102 | 8% |
| 29.4 | Coramba Rd | EB | 1,360 | 1,285 | 123 | 145 | 27 | 24 | 1,510 | 1,454 | -4% | 908 | 998 | 79 | 78 | 6 | 18 | 993 | 1,094 | 10% |
| 29.2 | N Boambee Rd | EB | 108 | 38 | 6 | 4 | 5 | 0 | 119 | 43 | -64% | 52 | 29 | 0 | 2 | 1 | 1 | 53 | 31 | -41% |
| 6.5 | Englands Rd | EB | 122 | 40 | 23 | 5 | 3 | 1 | 148 | 47 | -68% | 73 | 36 | 11 | 3 | 3 | 1 | 87 | 39 | -55% |
| 29.1 | Pacific Hwy | NB | 6,556 | 7,104 | 641 | 566 | 277 | 343 | 7,474 | 8,013 | 7% | 4,570 | 5,170 | 393 | 317 | 554 | 640 | 5,517 | 6,127 | 11% |
| 2.2 | Hogbin Dr | NB | 4,204 | 4,235 | 232 | 349 | 26 | 57 | 4,462 | 4,641 | 4% | 2,376 | 2,677 | 127 | 198 | 25 | 38 | 2,528 | 2,913 | 15% |
| SL6 | Sub-Total | IB | 18,207 | 19,231 | 1,802 | 1,778 | 714 | 657 | 20,723 | 21,666 | 5% | 12,601 | 13,753 | 1,154 | 1,094 | 965 | 1,110 | 14,720 | 15,957 | 8% |
| 29.10 | Pacific Hwy | NB | 5,899 | 6,483 | 579 | 665 | 361 | 258 | 6,839 | 7,406 | 8% | 5,128 | 4,318 | 365 | 372 | 536 | 419 | 6,029 | 5,109 | -15% |
| 6.2 | Bruxner Park Rd | WB | 202 | 92 | 15 | 14 | 0 | 3 | 217 | 110 | -49% | 95 | 81 | 8 | 9 | 0 | 5 | 103 | 95 | -8% |
| 29.4 | Coramba Rd | WB | 1,311 | 1,402 | 113 | 146 | 24 | 28 | 1,448 | 1,576 | 9% | 1,020 | 1,033 | 71 | 77 | 6 | 24 | 1,097 | 1,134 | 3% |
| 29.2 | N Boambee Rd | WB | 100 | 44 | 6 | 5 | 9 | 1 | 115 | 50 | -57% | 56 | 35 | 1 | 2 | 4 | 1 | 61 | 37 | -39% |
| 6.5 | Englands Rd | WB | 118 | 46 | 29 | 6 | 1 | 1 | 148 | 53 | -64% | 83 | 32 | 12 | 3 | 1 | 1 | 96 | 36 | -63% |
| 29.1 | Pacific Hwy | SB | 6,331 | 7,502 | 742 | 625 | 332 | 330 | 7,405 | 8,458 | 14% | 4,812 | 5,529 | 490 | 403 | 457 | 454 | 5,759 | 6,386 | 11% |
| 2.2 | Hogbin Dr | SB | 4,378 | 4,343 | 245 | 356 | 9 | 59 | 4,632 | 4,758 | 3% | 2,417 | 2,339 | 87 | 202 | 12 | 49 | 2,516 | 2,589 | 3% |
| SL6 | Sub-Total | OB | 18,339 | 19,914 | 1,729 | 1,817 | 736 | 681 | 20,804 | 22,411 | 8% | 13,611 | 13,365 | 1,034 | 1,068 | 1,016 | 953 | 15,661 | 15,385 | -2% |
| SL6 | TOTAL | | 36,546 | 39,145 | 3,531 | 3,594 | 1,450 | 1,338 | 41,527 | 44,077 | 6% | 26,212 | 27,118 | 2,188 | 2,161 | 1,981 | 2,063 | 30,381 | 31,342 | 3% |
| SL7 | Woolgoolga Creek Screenline | | | | | | | | | | | | | | | | | | | |
| 7.1 | Pacific Hwy | NB | 2,050 | 2,073 | 195 | 229 | 151 | 152 | 2,396 | 2,453 | 2% | 1,672 | 1,742 | 143 | 140 | 383 | 334 | 2,198 | 2,216 | 1% |
| 7.2 | Solitary Islands Way | NB | 2,580 | 1,810 | 241 | 154 | 14 | 57 | 2,835 | 2,021 | -29% | 1,407 | 1,396 | 130 | 79 | 4 | 83 | 1,541 | 1,559 | 1% |
| SL7 | Sub-Total | NB | 4,630 | 3,883 | 436 | 383 | 165 | 209 | 5,231 | 4,474 | -14% | 3,079 | 3,138 | 273 | 219 | 387 | 418 | 3,739 | 3,775 | 1% |
| 7.1 | Pacific Hwy | SB | 2,131 | 2,318 | 340 | 334 | 185 | 178 | 2,656 | 2,831 | 7% | 2,246 | 2,172 | 249 | 229 | 210 | 226 | 2,705 | 2,626 | -3% |
| SL7 | Sub-Total | SB | 4,624 | 3,754 | 564 | 457 | 194 | 204 | 5,382 | 4,416 | -18% | 3,948 | 3,275 | 394 | 301 | 217 | 259 | 4,559 | 3,834 | -16% |
| SL7 | TOTAL | | 9,254 | 7,637 | 1,000 | 839 | 359 | 414 | 10,613 | 8,890 | -16% | 7,027 | 6,413 | 667 | 520 | 604 | 677 | 8,298 | 7,609 | -8% |
| SL8 | South Screenline | | | | | | | | | | | | | | | | | | | |
| 25-10 | Coff St | WB | 3,912 | 1,979 | 71 | 122 | 2 | 26 | 3,985 | 2,126 | -47% | 2,315 | 1,312 | 55 | 69 | 1 | 22 | 2,371 | 1,402 | -41% |
| 25-24 | Vernon St | WB | 722 | 280 | 17 | 8 | 0 | 5 | 739 | 293 | -60% | 425 | 197 | 10 | 4 | 0 | 4 | 435 | 205 | -53% |
| 25-11 | Harbour Dr | WB | 1,726 | 1,675 | 12 | 83 | 0 | 12 | 1,738 | 1,770 | 2% | 1,136 | 1,234 | 9 | 43 | 0 | 9 | 1,145 | 1,286 | 12% |
| 25-12 | Moonee St | WB | 1,860 | 590 | 82 | 24 | 2 | 6 | 1,944 | 620 | -68% | 1,174 | 419 | 51 | 14 | 1 | 5 | 1,226 | 437 | -64% |
| 25-23 | Market St | WB | 301 | 213 | 26 | 10 | 1 | 5 | 328 | 228 | -31% | 188 | 147 | 21 | 6 | 0 | 4 | 209 | 156 | -25% |
| 25-13 | Albany St | WB | 1,975 | 1,121 | 41 | 11 | 2 | 1 | 2,018 | 1,132 | -44% | 1,274 | 823 | 30 | 9 | 1 | 1 | 1,305 | 832 | -36% |
| 25-22 | Valley St | WB | 54 | 326 | 3 | 35 | 0 | 16 | 57 | 377 | 562% | 33 | 140 | 1 | 19 | 0 | 14 | 35 | 173 | 400% |
| 8.10 | Thompsons Rd | WB | 1,376 | 875 | 151 | 60 | 4 | 12 | 1,531 | 948 | -38% | 719 | 650 | 60 | 33 | 1 | 9 | 780 | 692 | -11% |
| 25-15 | Hurley Dr | WB | 1,140 | 776 | 86 | 90 | 16 | 28 | 1,242 | 894 | -28% | 701 | 497 | 80 | 48 | 16 | 24 | 796 | 568 | -29% |
| 24-3 | Cook Dr | WB | 2,635 | 2,969 | 158 | 206 | 47 | 65 | 2,840 | 3,240 | 14% | 1,580 | 1,362 | 156 | 111 | 38 | 54 | 1,774 | 1,527 | -14% |
| 24-2 | Isle Dr | WB | 1,545 | 1,355 | 52 | 46 | 0 | 2 | 1,597 | 1,404 | -12% | 979 | 884 | 35 | 32 | 0 | 3 | 1,013 | 918 | -9% |
| 8.13 | Stadium Dr | WB | 2,005 | 2,003 | 205 | 151 | 34 | 101 | 2,244 | 2,256 | 1% | 1,246 | 2,279 | 79 | 72 | 18 | 66 | 1,343 | 2,417 | 80% |
| SL8 | Sub-Total | WB | 19,251 | 14,162 | 904 | 846 | 108 | 278 | 20,263 | 15,286 | -25% | 11,770 | 9,941 | 587 | 460 | 77 | 212 | 12,433 | 10,613 | -15% |
| 25-10 | Coff St | EB | 3,862 | 1,475 | 42 | 94 | 2 | 24 | 3,906 | 1,593 | -59% | 2,721 | 1,062 | 33 | 55 | 2 | 20 | 2,756 | 1,136 | -59% |
| 25-24 | Vernon St | EB | 219 | 188 | 0 | 11 | 0 | 2 | 219 | 201 | -8% | 122 | 142 | 0 | 5 | 0 | 3 | 122 | 151 | 24% |
| 25-11 | Harbour Dr | EB | 1,651 | 1,487 | 9 | 48 | 0 | 12 | 1,660 | 1,547 | -7% | 1,164 | 1,356 | 11 | 37 | 0 | 9 | 1,175 | 1,401 | 19% |
| 25-12 | Moonee St | EB | 2,575 | 298 | 83 | 12 | 1 | 4 | 2,659 | 313 | -88% | 1,746 | 227 | 71 | 8 | 1 | 2 | 1,818 | 236 | -87% |
| 25-23 | Market St | EB | 605 | 926 | 18 | 70 | 0 | 9 | 623 | 1,006 | 61% | 433 | 532 | 16 | 29 | 0 | 7 | 448 | 568 | 27% |
| 25-13 | Albany St | EB | 1,726 | 917 | 52 | 46 | 1 | 18 | 1,779 | 982 | -45% | 1,330 | 812 | 39 | 22 | 2 | 16 | 1,371 | 849 | -38% |
| 25-22 | Valley St | EB | 46 | 85 | 2 | 8 | 0 | 0 | 48 | 94 | 96% | 35 | 79 | 1 | 6 | 0 | 0 | 36 | 85 | 137% |
| 8.10 | Thompsons Rd | EB | 1,474 | 1,046 | 186 | 60 | 5 | 18 | 1,665 | 1,125 | -32% | 758 | 752 | 72 | 32 | 0 | 13 | 830 | 797 | -4% |
| 24-3 | Cook Dr | EB | 2,539 | 2,769 | 146 | 208 | 37 | 68 | 2,722 | 3,045 | 12% | 1,735 | 1,330 | 119 | 112 | 30 | 59 | 1,884 | 1,501 | -20% |

| | | | OP (9-16) | | | | | | | | | RD (17-8) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| 24-2 | Isle Dr | EB | 1,565 | 1,248 | 52 | 53 | 0 | 3 | 1,617 | 1,304 | -19% | 1,202 | 1,076 | 40 | 39 | 0 | 4 | 1,242 | 1,119 | -10% |
| 8.13 | Stadium Dr | EB | 2,054 | 1,904 | 212 | 131 | 23 | 81 | 2,289 | 2,116 | -8% | 1,139 | 2,070 | 83 | 74 | 13 | 139 | 1,235 | 2,283 | 85% |
| **SL8** | Sub-Total | EB | 19,081 | 12,995 | 883 | 836 | 90 | 270 | 20,054 | 14,102 | -30% | 13,015 | 9,906 | 547 | 467 | 63 | 300 | 13,625 | 10,672 | -22% |
| **SL8** | **TOTAL** | | 38,332 | 27,158 | 1,787 | 1,682 | 198 | 548 | 40,317 | 29,388 | -27% | 24,785 | 19,847 | 1,134 | 927 | 140 | 512 | 26,058 | 21,285 | -18% |
| **SL9** | **North Screenline** | | | | | | | | | | | | | | | | | | | |
| 25-25 | Bay Dr | WB | 531 | 289 | 26 | 8 | 0 | 1 | 557 | 298 | -47% | 389 | 158 | 16 | 4 | 0 | 1 | 405 | 163 | -60% |
| 22-1 | Diggers Beach Rd | WB | 196 | 133 | 3 | 8 | 0 | 0 | 199 | 141 | -29% | 145 | 94 | 3 | 3 | 0 | 0 | 148 | 97 | -34% |
| 9.3 | Macauleys Headland Dr | WB | 22 | 215 | 0 | 5 | 0 | 0 | 22 | 221 | 903% | 9 | 109 | 0 | 3 | 0 | 0 | 9 | 112 | 1143% |
| 25-3 | Arthur St | WB | 3,908 | 3,980 | 49 | 260 | 2 | 37 | 3,959 | 4,277 | 8% | 2,497 | 2,607 | 46 | 154 | 2 | 23 | 2,545 | 2,784 | 9% |
| 25-4 | Park Beach Rd | WB | 3,520 | 3,442 | 76 | 74 | 1 | 5 | 3,597 | 3,521 | -2% | 2,082 | 944 | 56 | 47 | 2 | 3 | 2,140 | 993 | -54% |
| 25-5 | Orlando St | WB | 3,522 | 2,426 | 170 | 167 | 20 | 53 | 3,712 | 2,646 | -29% | 2,296 | 1,492 | 139 | 85 | 15 | 35 | 2,450 | 1,612 | -34% |
| 9.7 | Rose Ave | NB | 57 | 20 | 5 | 1 | 0 | 0 | 62 | 21 | -66% | 22 | 12 | 0 | 0 | 0 | 0 | 22 | 12 | -44% |
| 25-8 | Melittas Ave | WB | 69 | 543 | 0 | 44 | 0 | 20 | 69 | 607 | 779% | 46 | 345 | 0 | 23 | 0 | 13 | 46 | 381 | 736% |
| **SL9** | Sub-Total | WB | 11,825 | 11,050 | 329 | 567 | 23 | 116 | 12,177 | 11,732 | -4% | 7,485 | 5,760 | 261 | 319 | 19 | 75 | 7,765 | 6,154 | -21% |
| 25-25 | Bay Dr | EB | 427 | 312 | 23 | 8 | 0 | 1 | 450 | 321 | -29% | 318 | 183 | 19 | 5 | 0 | 1 | 336 | 189 | -44% |
| 22-1 | Diggers Beach Rd | EB | 310 | 328 | 3 | 10 | 0 | 0 | 313 | 338 | 8% | 213 | 162 | 5 | 4 | 0 | 0 | 217 | 166 | -24% |
| 9.3 | Macauleys Headland Dr | EB | 142 | 23 | 9 | 3 | 0 | 0 | 151 | 26 | -83% | 105 | 22 | 5 | 1 | 0 | 0 | 110 | 23 | -79% |
| 25-3 | Arthur St | EB | 2,222 | 4,045 | 56 | 67 | 2 | 5 | 2,280 | 4,116 | 81% | 1,558 | 2,458 | 44 | 52 | 3 | 4 | 1,605 | 2,514 | 57% |
| 25-4 | Park Beach Rd | EB | 3,596 | 3,797 | 47 | 77 | 1 | 6 | 3,644 | 3,880 | 6% | 2,162 | 1,055 | 40 | 51 | 2 | 4 | 2,204 | 1,109 | -50% |
| 25-5 | Orlando St | EB | 3,173 | 2,402 | 158 | 377 | 7 | 82 | 3,338 | 2,862 | -14% | 2,628 | 1,728 | 119 | 210 | 8 | 66 | 2,755 | 2,005 | -27% |
| 9.7 | Rose Ave | SB | 197 | 80 | 9 | 7 | 0 | 1 | 206 | 88 | -57% | 62 | 49 | 2 | 4 | 0 | 2 | 64 | 54 | -16% |
| 25-8 | Melittas Ave | EB | 199 | 446 | 8 | 39 | 1 | 16 | 208 | 501 | 141% | 150 | 277 | 6 | 19 | 0 | 20 | 156 | 315 | 103% |
| **SL9** | **TOTAL** | | 22,091 | 22,483 | 642 | 1,154 | 34 | 226 | 22,767 | 23,864 | 5% | 14,680 | 11,692 | 500 | 665 | 32 | 172 | 15,212 | 12,528 | -18% |
| **SL10** | **Moonee Beach Screenline** | | | | | | | | | | | | | | | | | | | |
| 10.1 | Diamond Head Dr | WB | 859 | 592 | 35 | 36 | 1 | 0 | 895 | 628 | -30% | 807 | 483 | 22 | 21 | 0 | 1 | 830 | 505 | -39% |
| 10.2 | Fiddaman Rd | WB | 788 | 755 | 68 | 124 | 4 | 39 | 860 | 918 | 7% | 563 | 651 | 42 | 85 | 0 | 89 | 605 | 825 | 36% |
| 10.3 | Moonee Beach Rd | WB | 879 | 424 | 59 | 19 | 12 | 5 | 950 | 448 | -53% | 551 | 344 | 34 | 11 | 5 | 8 | 590 | 363 | -39% |
| **SL10** | Sub-Total | WB | 2,526 | 1,771 | 162 | 179 | 17 | 44 | 2,705 | 1,994 | -26% | 1,921 | 1,478 | 98 | 116 | 5 | 98 | 2,025 | 1,692 | -16% |
| 10.1 | Diamond Head Dr | EB | 904 | 687 | 58 | 38 | 1 | 0 | 963 | 726 | -25% | 798 | 450 | 40 | 21 | 1 | 0 | 838 | 472 | -44% |
| 10.2 | Fiddaman Rd | EB | 780 | 727 | 60 | 131 | 2 | 44 | 842 | 901 | 7% | 578 | 638 | 40 | 75 | 0 | 56 | 618 | 769 | 24% |
| 10.3 | Moonee Beach Rd | EB | 1,528 | 863 | 94 | 65 | 9 | 17 | 1,631 | 944 | -42% | 826 | 659 | 42 | 39 | 4 | 19 | 872 | 717 | -18% |
| **SL10** | Sub-Total | EB | 3,212 | 2,276 | 212 | 234 | 12 | 61 | 3,436 | 2,571 | -25% | 2,202 | 1,747 | 122 | 135 | 5 | 75 | 2,328 | 1,957 | -16% |
| **SL10** | **TOTAL** | | 5,738 | 4,047 | 374 | 413 | 29 | 105 | 6,141 | 4,565 | -26% | 4,123 | 3,225 | 220 | 252 | 10 | 173 | 4,353 | 3,649 | -16% |
| **SL11** | **Boambee East Screenline** | | | | | | | | | | | | | | | | | | | |
| 11.1 | Sawtell Rd | WB | 2,301 | 2,488 | 145 | 175 | 24 | 45 | 2,470 | 2,707 | 10% | 1,503 | 1,596 | 75 | 86 | 11 | 36 | 1,589 | 1,717 | 8% |
| 11.2 | Bruce King Dr | WB | 202 | 182 | 13 | 3 | 3 | 0 | 218 | 186 | -15% | 143 | 135 | 10 | 1 | 0 | 0 | 153 | 137 | -11% |
| 11.3 | Lyons Rd | WB | 1,926 | 1,633 | 79 | 65 | 4 | 13 | 2,009 | 1,710 | -15% | 1,428 | 1,366 | 29 | 32 | 2 | 13 | 1,459 | 1,411 | -3% |
| **SL11** | Sub-Total | WB | 4,429 | 4,303 | 237 | 243 | 31 | 57 | 4,697 | 4,603 | -2% | 3,074 | 3,097 | 114 | 119 | 13 | 49 | 3,201 | 3,265 | 2% |
| 11.1 | Sawtell Rd | EB | 2,052 | 2,370 | 119 | 135 | 31 | 36 | 2,202 | 2,541 | 15% | 1,130 | 1,361 | 58 | 71 | 14 | 31 | 1,202 | 1,463 | 22% |
| 11.2 | Bruce King Dr | EB | 807 | 925 | 52 | 62 | 1 | 12 | 860 | 999 | 16% | 601 | 636 | 32 | 35 | 1 | 9 | 634 | 679 | 7% |
| 11.3 | Lyons Rd | EB | 1,753 | 1,613 | 63 | 59 | 21 | 15 | 1,837 | 1,686 | -8% | 1,197 | 1,165 | 36 | 24 | 8 | 13 | 1,241 | 1,201 | -3% |
| **SL11** | Sub-Total | EB | 4,612 | 4,908 | 234 | 256 | 53 | 62 | 4,899 | 5,226 | 7% | 2,928 | 3,161 | 126 | 130 | 23 | 53 | 3,077 | 3,343 | 9% |
| **SL11** | **TOTAL** | | 9,041 | 9,211 | 471 | 499 | 84 | 119 | 9,596 | 9,829 | 2% | 6,002 | 6,257 | 240 | 249 | 36 | 102 | 6,278 | 6,608 | 5% |
| **SL12** | **Hogbin Dr North Screenline** | | | | | | | | | | | | | | | | | | | |
| 12.2 | Park Beach Rd | WB | 1,748 | 1,529 | 84 | 6 | 2 | 2 | 1,834 | 1,536 | -16% | 790 | 458 | 34 | 4 | 0 | 0 | 824 | 461 | -44% |
| 12.3 | Boultwood St | WB | 150 | 817 | 6 | 42 | 0 | 15 | 156 | 874 | 460% | 99 | 276 | 2 | 30 | 0 | 33 | 101 | 339 | 236% |
| 12.4 | Prince St | WB | 234 | 142 | 7 | 8 | 0 | 0 | 241 | 149 | -38% | 150 | 97 | 0 | 4 | 0 | 0 | 150 | 101 | -33% |
| 12.5 | Orlando St | WB | 3,192 | 1,709 | 183 | 124 | 27 | 61 | 3,402 | 1,894 | -44% | 1,670 | 1,107 | 83 | 65 | 7 | 97 | 1,760 | 1,268 | -28% |
| 12.6 | Watsonia Ave | SB | 8 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | -100% | 6 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | -100% |
| 12.7 | Watsonia Ave | WB | 221 | 254 | 12 | 6 | 0 | 0 | 233 | 261 | 12% | 139 | 191 | 4 | 4 | 0 | 0 | 143 | 195 | 36% |
| **SL12** | Sub-Total | WB | 7,960 | 6,592 | 472 | 408 | 31 | 111 | 8,463 | 7,112 | -16% | 4,109 | 4,440 | 206 | 234 | 8 | 152 | 4,323 | 4,826 | 12% |
| 12.1 | Arthur St | EB | 2,301 | 2,065 | 155 | 27 | 5 | 2 | 2,461 | 2,094 | -15% | 1,050 | 2,080 | 61 | 17 | 0 | 2 | 1,111 | 2,098 | 89% |
| 12.2 | Park Beach Rd | EB | 1,770 | 2,045 | 67 | 54 | 6 | 1 | 1,843 | 2,101 | 14% | 919 | 761 | 32 | 30 | 1 | 14 | 952 | 805 | -15% |
| 12.3 | Boultwood St | EB | 132 | 16 | 10 | 1 | 0 | 21 | 142 | 38 | -73% | 84 | 11 | 3 | 0 | 0 | 0 | 87 | 11 | -87% |
| 12.4 | Prince St | EB | 262 | 113 | 6 | 8 | 0 | 0 | 268 | 122 | -55% | 168 | 100 | 4 | 5 | 0 | 0 | 172 | 104 | -40% |
| 12.5 | Orlando St | EB | 2,978 | 1,939 | 284 | 353 | 14 | 109 | 3,276 | 2,401 | -27% | 1,641 | 1,597 | 99 | 188 | 7 | 78 | 1,747 | 1,863 | 7% |

| | | | OP (9-16) | | | | | | | | | RD (17-8) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | TT obs | TT mod | TT % |
| 12.6 | Watsonia Ave | NB | 89 | 94 | 1 | 2 | 0 | 0 | 90 | 96 | 7% | 53 | 55 | 1 | 1 | 0 | 0 | 54 | 56 | 4% |
| 12.7 | Watsonia Ave | EB | 171 | 163 | 10 | 4 | 0 | 0 | 181 | 167 | -8% | 99 | 119 | 4 | 2 | 0 | 0 | 103 | 121 | 18% |
| **SL12** | Sub-Total | EB | 7,703 | 6,436 | 533 | 449 | 25 | 134 | 8,261 | 7,019 | -15% | 4,014 | 4,722 | 204 | 242 | 8 | 95 | 4,226 | 5,058 | 20% |
| **SL12** | **TOTAL** | | 15,663 | 13,028 | 1,005 | 857 | 56 | 246 | 16,724 | 14,130 | -16% | 8,123 | 9,163 | 410 | 475 | 16 | 246 | 8,549 | 9,884 | 16% |
| **SL13** | **Hogbin Dr South Screenline** | | | | | | | | | | | | | | | | | | | |
| 13.1 | Harbour Dr | WB | 3,392 | 3,595 | 188 | 187 | 18 | 35 | 3,598 | 3,817 | 6% | 1,515 | 2,695 | 78 | 102 | 5 | 26 | 1,598 | 2,823 | 77% |
| 13.2 | Albany St | WB | 2,647 | 512 | 194 | 21 | 8 | 3 | 2,849 | 537 | -81% | 1,165 | 395 | 67 | 12 | 0 | 3 | 1,232 | 410 | -67% |
| 24-1 | Stadium Dr | WB | 2,215 | 2,549 | 132 | 170 | 16 | 101 | 2,363 | 2,820 | 19% | 1,733 | 2,746 | 106 | 84 | 15 | 66 | 1,854 | 2,896 | 56% |
| **SL13** | Sub-Total | WB | 8,254 | 6,656 | 514 | 377 | 42 | 140 | 8,810 | 7,173 | -19% | 4,413 | 5,836 | 251 | 198 | 20 | 95 | 4,684 | 6,129 | 31% |
| 13.1 | Harbour Dr | EB | 3,508 | 3,531 | 203 | 140 | 51 | 33 | 3,762 | 3,704 | -2% | 1,805 | 2,612 | 97 | 85 | 21 | 23 | 1,923 | 2,720 | 41% |
| 13.2 | Albany St | EB | 2,558 | 812 | 198 | 64 | 2 | 8 | 2,758 | 884 | -68% | 1,199 | 454 | 82 | 23 | 0 | 7 | 1,281 | 483 | -62% |
| 24-1 | Stadium Dr | EB | 1,982 | 2,447 | 125 | 148 | 17 | 81 | 2,124 | 2,675 | 26% | 1,471 | 2,389 | 82 | 84 | 13 | 139 | 1,565 | 2,612 | 67% |
| **SL13** | Sub-Total | EB | 8,048 | 6,790 | 526 | 352 | 70 | 121 | 8,644 | 7,262 | -16% | 4,475 | 5,454 | 261 | 192 | 34 | 169 | 4,769 | 5,815 | 22% |
| **SL14** | **Toomina Rd Screenline** | | | | | | | | | | | | | | | | | | | |
| 14.1 | Hi-Tech Dr | WB | 689 | 718 | 150 | 134 | 2 | 41 | 841 | 893 | 6% | 482 | 531 | 49 | 73 | 3 | 34 | 534 | 637 | 19% |
| 14.2 | Sawtell Rd | WB | 2,406 | 2,118 | 149 | 119 | 6 | 28 | 2,561 | 2,265 | -12% | 1,346 | 1,142 | 82 | 66 | 5 | 24 | 1,433 | 1,231 | -14% |
| 20-10 | Coorabin Cres | WB | 442 | 586 | 10 | 15 | 0 | 1 | 452 | 602 | 33% | 313 | 362 | 7 | 10 | 0 | 1 | 320 | 372 | 16% |
| 20-11 | Bangalee Cres | WB | 479 | 234 | 8 | 5 | 0 | 0 | 487 | 239 | -51% | 296 | 127 | 10 | 4 | 0 | 0 | 306 | 131 | -57% |
| 14.5 | Amaroo Cresent | WB | 421 | 982 | 13 | 31 | 0 | 0 | 434 | 1,014 | 134% | 251 | 496 | 5 | 18 | 0 | 0 | 256 | 514 | 101% |
| 14.6 | Kintorie Cresent | WB | 150 | 380 | 6 | 6 | 0 | 0 | 156 | 386 | 148% | 89 | 240 | 4 | 5 | 0 | 0 | 93 | 244 | 163% |
| 14.7 | Mirroola Cresent | WB | 152 | 233 | 8 | 5 | 1 | 0 | 161 | 238 | 48% | 102 | 125 | 5 | 2 | 1 | 0 | 108 | 127 | 17% |
| 14.8 | Linden Ave | WB | 759 | 1,040 | 65 | 34 | 2 | 8 | 826 | 1,082 | 31% | 492 | 778 | 26 | 18 | 2 | 8 | 520 | 803 | 54% |
| 14.9 | Playford Ave | WB | 235 | 152 | 19 | 4 | 0 | 0 | 254 | 156 | -39% | 177 | 98 | 4 | 2 | 0 | 0 | 181 | 100 | -45% |
| 26-6 | Lyons Rd | WB | 1,586 | 611 | 49 | 24 | 1 | 2 | 1,636 | 637 | -61% | 1,102 | 470 | 38 | 13 | 2 | 3 | 1,142 | 485 | -58% |
| **SL14** | Sub-Total | WB | 7,319 | 7,054 | 477 | 378 | 12 | 80 | 7,808 | 7,512 | -4% | 4,650 | 4,366 | 230 | 209 | 13 | 69 | 4,893 | 4,643 | -5% |
| 14.1 | Hi-Tech Dr | EB | 794 | 818 | 146 | 137 | 1 | 40 | 941 | 995 | 6% | 353 | 546 | 48 | 71 | 4 | 30 | 405 | 647 | 60% |
| 14.2 | Sawtell Rd | EB | 2,589 | 2,372 | 175 | 128 | 5 | 32 | 2,769 | 2,532 | -9% | 1,345 | 1,334 | 87 | 77 | 6 | 27 | 1,438 | 1,437 | 0% |
| 20-10 | Coorabin Cres | EB | 479 | 387 | 10 | 12 | 0 | 0 | 489 | 399 | -18% | 385 | 322 | 6 | 7 | 0 | 0 | 391 | 329 | -16% |
| 20-11 | Bangalee Cres | EB | 473 | 344 | 11 | 8 | 0 | 0 | 484 | 353 | -27% | 330 | 161 | 10 | 4 | 0 | 0 | 339 | 165 | -51% |
| 14.5 | Amaroo Cresent | EB | 452 | 910 | 12 | 32 | 0 | 0 | 464 | 943 | 103% | 241 | 576 | 1 | 20 | 0 | 0 | 242 | 596 | 146% |
| 14.6 | Kintorie Cresent | EB | 137 | 390 | 3 | 7 | 0 | 0 | 140 | 397 | 184% | 83 | 239 | 3 | 3 | 0 | 0 | 86 | 242 | 182% |
| 14.7 | Mirroola Cresent | EB | 173 | 203 | 7 | 5 | 0 | 0 | 180 | 208 | 16% | 104 | 134 | 2 | 4 | 0 | 0 | 106 | 138 | 30% |
| 14.8 | Linden Ave | EB | 817 | 1,084 | 49 | 32 | 0 | 9 | 866 | 1,125 | 30% | 493 | 707 | 17 | 18 | 0 | 8 | 510 | 733 | 44% |
| 14.9 | Playford Ave | EB | 288 | 135 | 10 | 4 | 0 | 0 | 298 | 139 | -53% | 192 | 100 | 9 | 3 | 1 | 0 | 202 | 103 | -49% |
| 26-6 | Lyons Rd | EB | 1,426 | 635 | 57 | 23 | 1 | 3 | 1,484 | 662 | -55% | 986 | 468 | 41 | 11 | 3 | 3 | 1,030 | 481 | -53% |
| **SL14** | Sub-Total | EB | 7,628 | 7,280 | 480 | 389 | 7 | 84 | 8,115 | 7,754 | -4% | 4,512 | 4,585 | 224 | 217 | 14 | 67 | 4,749 | 4,869 | 3% |
| **SL14** | **TOTAL** | | 14,947 | 14,335 | 957 | 767 | 19 | 165 | 15,923 | 15,266 | -4% | 9,162 | 8,951 | 454 | 426 | 27 | 136 | 9,642 | 9,512 | -1% |
| 21-1 | Airport Dr | WB | 637 | 744 | 8 | 17 | 0 | 4 | 645 | 765 | 19% | 377 | 453 | 9 | 14 | 1 | 4 | 387 | 471 | 22% |
| 21-2 | Christmas Bells Rd | WB | 171 | 218 | 40 | 20 | 9 | 4 | 220 | 243 | 10% | 116 | 154 | 33 | 11 | 7 | 4 | 157 | 168 | 7% |
| **SL21** | Sub-Total | WB | 808 | 962 | 48 | 38 | 9 | 8 | 865 | 1,008 | 16% | 493 | 607 | 42 | 25 | 9 | 7 | 544 | 639 | 18% |
| 21-1 | Airport Dr | EB | 710 | 782 | 10 | 19 | 1 | 5 | 721 | 806 | 12% | 433 | 505 | 9 | 13 | 0 | 4 | 442 | 522 | 18% |
| 21-2 | Christmas Bells Rd | EB | 190 | 194 | 38 | 18 | 7 | 4 | 235 | 216 | -8% | 166 | 154 | 32 | 10 | 5 | 3 | 203 | 167 | -18% |
| **SL21** | Sub-Total | EB | 900 | 976 | 48 | 37 | 8 | 9 | 956 | 1,022 | 7% | 599 | 659 | 41 | 23 | 5 | 7 | 645 | 689 | 7% |
| **SL21** | **TOTAL** | | 1,708 | 1,938 | 96 | 74 | 17 | 17 | 1,821 | 2,029 | 11% | 1,092 | 1,265 | 83 | 48 | 14 | 14 | 1,188 | 1,328 | 12% |
| **SL22** | **Big Banana** | | | | | | | | | | | | | | | | | | | |
| 22-1a | Diggers Beach Rd | EB | 307 | 55 | 3 | 3 | 1 | 0 | 311 | 58 | -81% | 176 | 40 | 2 | 1 | 0 | 0 | 178 | 41 | -77% |
| 22-2 | Island View Close | EB | 181 | 234 | 4 | 10 | 0 | 2 | 185 | 245 | 33% | 112 | 144 | 2 | 5 | 0 | 1 | 114 | 150 | 32% |
| **SL22** | Sub-Total | EB | 488 | 289 | 7 | 12 | 1 | 2 | 496 | 304 | -39% | 288 | 184 | 3 | 6 | 0 | 2 | 292 | 191 | -34% |
| 22-1a | Diggers Beach Rd | WB | 280 | 221 | 3 | 6 | 0 | 2 | 283 | 230 | -19% | 141 | 122 | 1 | 4 | 0 | 2 | 142 | 127 | -10% |
| 22-2 | Island View Close | WB | 273 | 75 | 7 | 4 | 0 | 0 | 280 | 79 | -72% | 145 | 65 | 5 | 3 | 0 | 0 | 150 | 68 | -55% |
| **SL22** | Sub-Total | WB | 553 | 296 | 10 | 11 | 0 | 2 | 563 | 309 | -45% | 286 | 186 | 6 | 7 | 0 | 3 | 292 | 195 | -33% |
| **SL22** | **TOTAL** | | 1,041 | 586 | 17 | 23 | 1 | 4 | 1,059 | 613 | -42% | 574 | 370 | 10 | 13 | 0 | 4 | 584 | 386 | -34% |
| **SL23** | **Baringa Private Hospital** | | | | | | | | | | | | | | | | | | | |
| | Hospital | EB | 295 | 322 | 4 | 5 | 0 | 1 | 299 | 328 | 10% | 233 | 250 | 2 | 2 | 0 | 2 | 235 | 253 | 8% |
| 23-1 | Mackays Rd | EB | 648 | 458 | 34 | 14 | 0 | 2 | 682 | 474 | -30% | 484 | 345 | 24 | 6 | 0 | 3 | 507 | 354 | -30% |
| **SL23** | Sub-Total | EB | 943 | 781 | 38 | 19 | 0 | 2 | 981 | 802 | -18% | 717 | 594 | 26 | 8 | 0 | 5 | 742 | 607 | -18% |

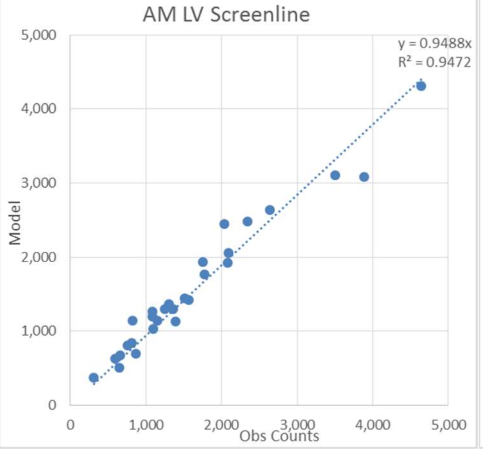
| | | | OP (9-16) | | | | | | | | | RD (17-8) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Road Name | Dir. | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | **TT obs** | **TT mod** | **TT %** | LV obs | LV mod | MCV obs | MCV mod | HCV obs | HCV mod | **TT obs** | **TT mod** | **TT %** |
| | Hospital | WB | 326 | 336 | 4 | 5 | 0 | 1 | 330 | 342 | 4% | 202 | 214 | 4 | 4 | 0 | 1 | 206 | 219 | 6% |
| 23-1 | Mackays Rd | WB | 730 | 445 | 33 | 14 | 0 | 2 | 763 | 461 | -40% | 473 | 317 | 29 | 8 | 0 | 1 | 502 | 327 | -35% |
| **SL23** | Sub-Total | WB | 1,056 | 781 | 37 | 19 | 0 | 3 | 1,093 | 804 | -26% | 675 | 531 | 33 | 13 | 0 | 2 | 708 | 546 | -23% |
| **SL23** | **TOTAL** | | 1,999 | 1,562 | 75 | 38 | 0 | 5 | 2,074 | 1,606 | -23% | 1,392 | 1,125 | 59 | 21 | 0 | 7 | 1,451 | 1,152 | -21% |

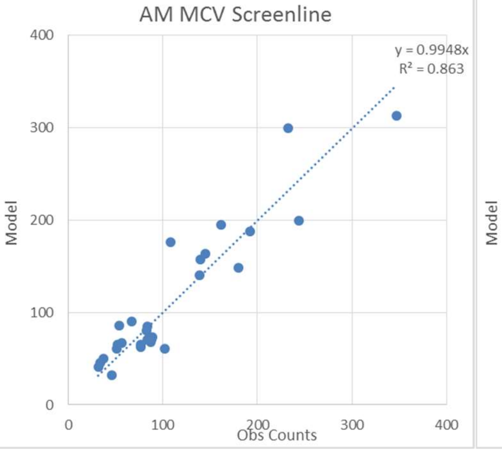
# Appendix C

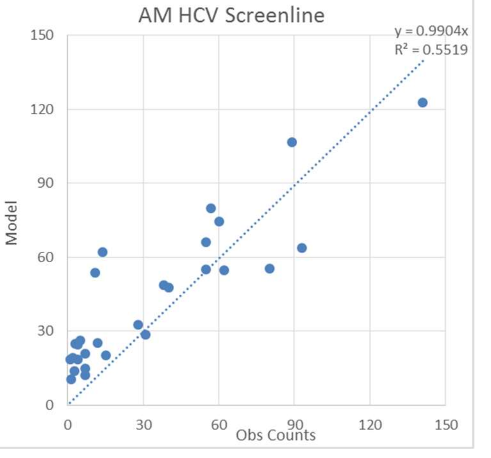
## Strategic Model - Count Scatter Plots

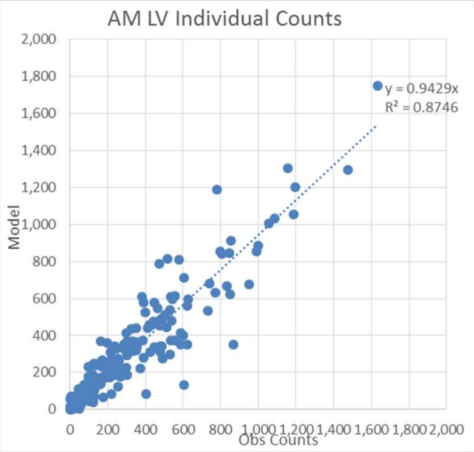
# C1 CHSTM – Traffic Count Scatter Plots

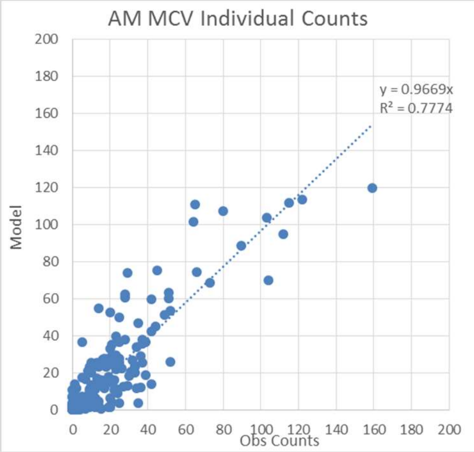
## 1. AM Scatter Plots

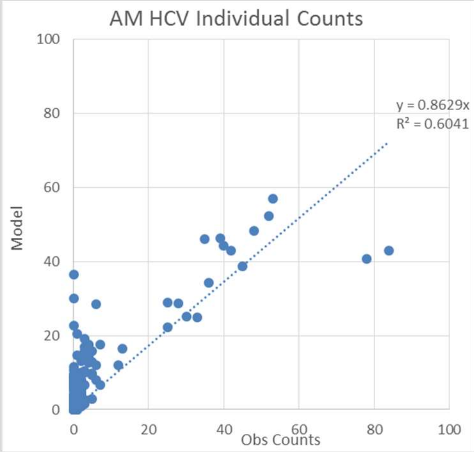


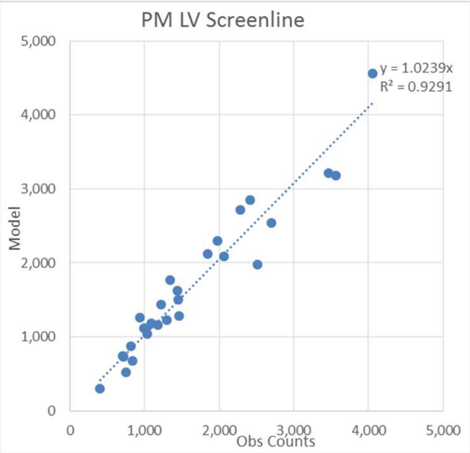



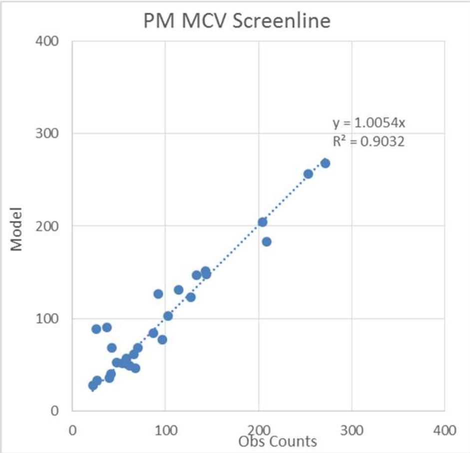


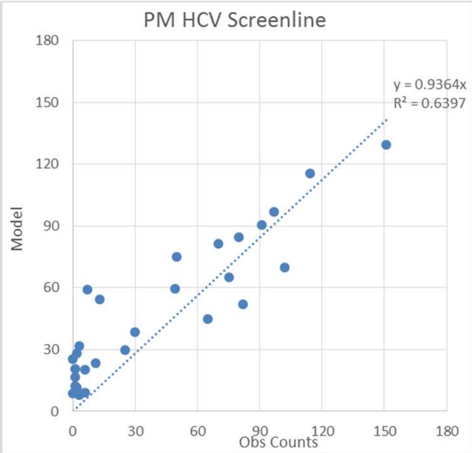



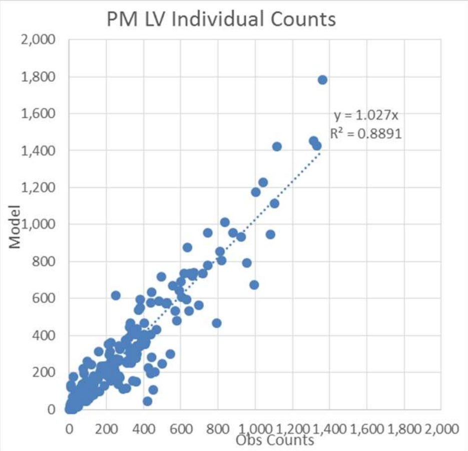



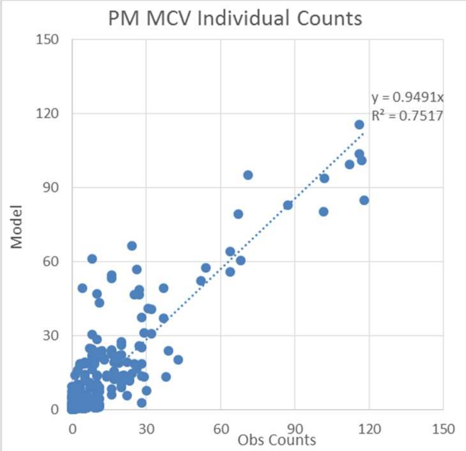

## 2. PM Scatter Plots

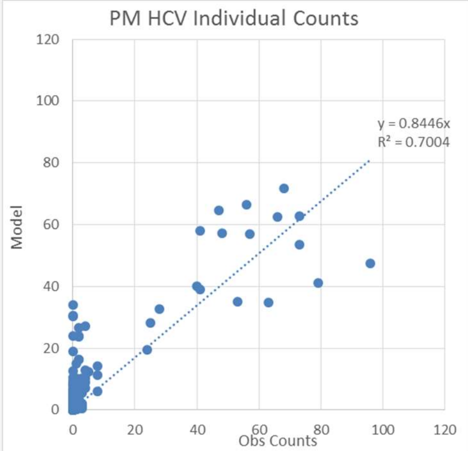


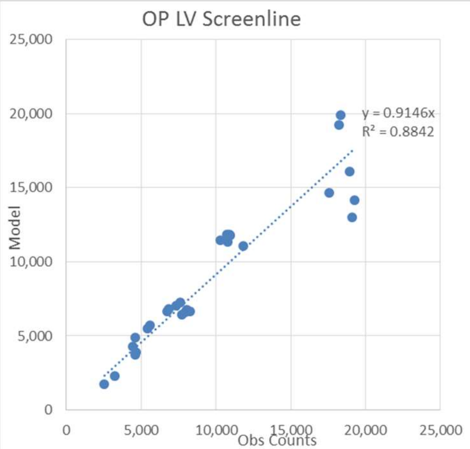



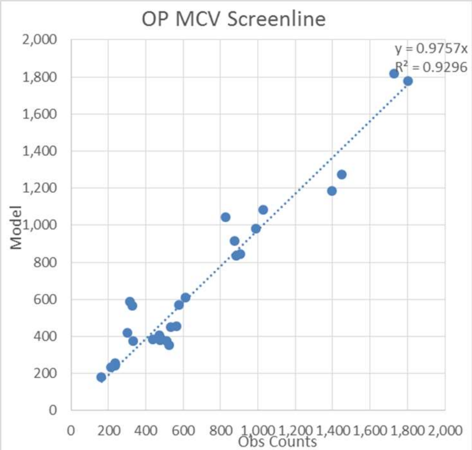


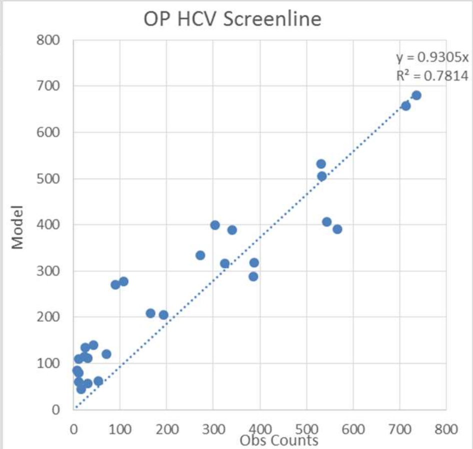



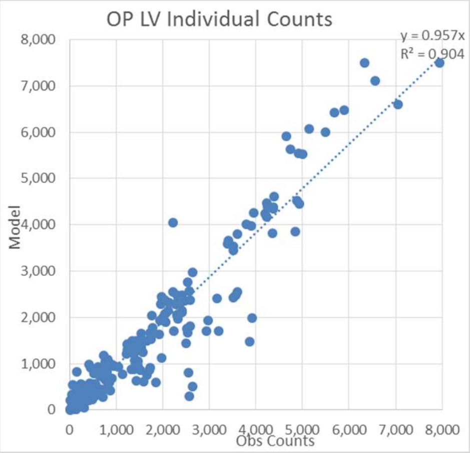



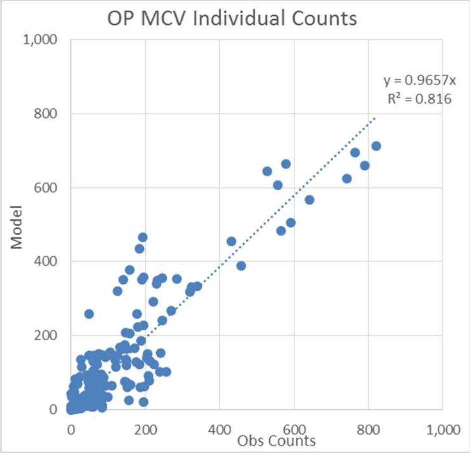

## 3. OP Scatter Plots

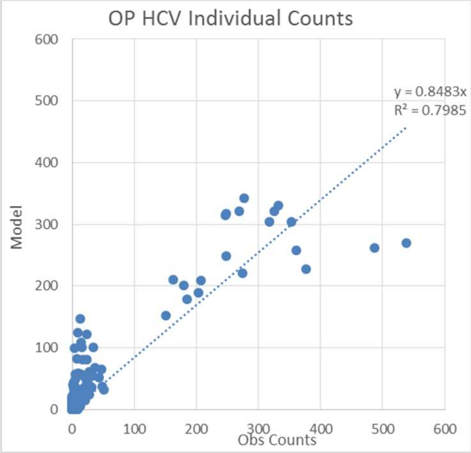


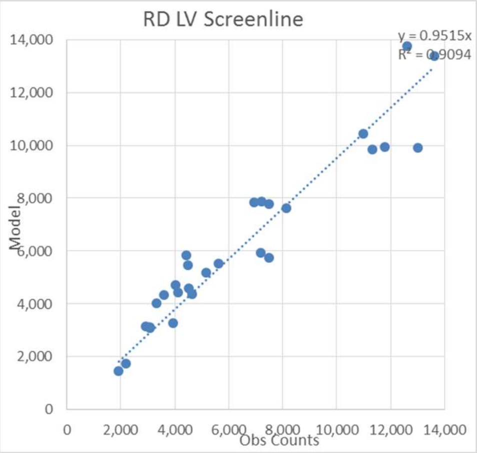



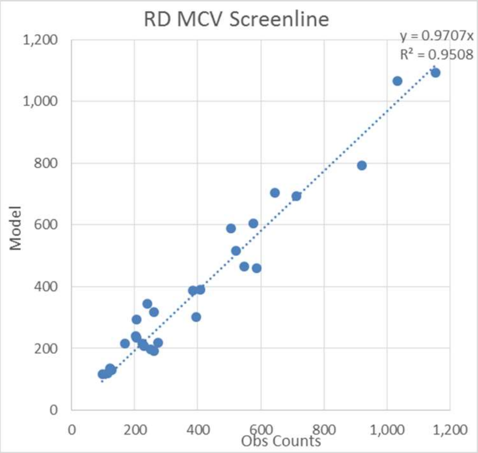


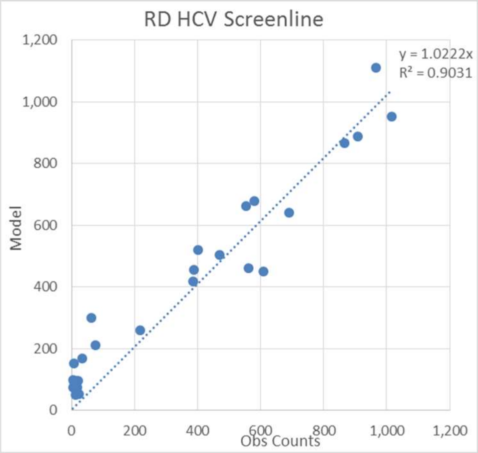



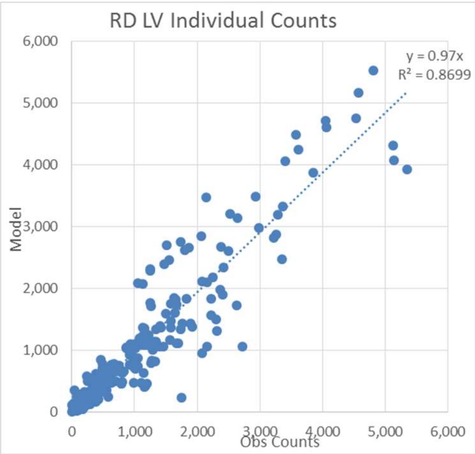



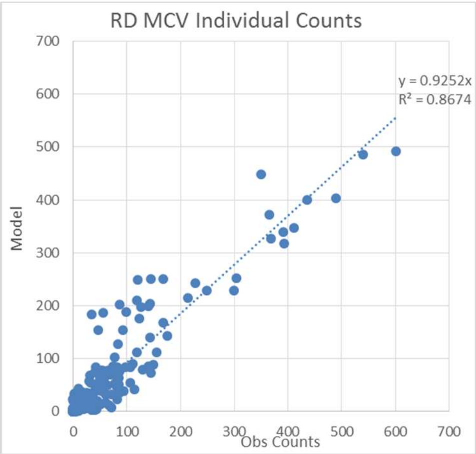

## 4. RD Scatter Plots

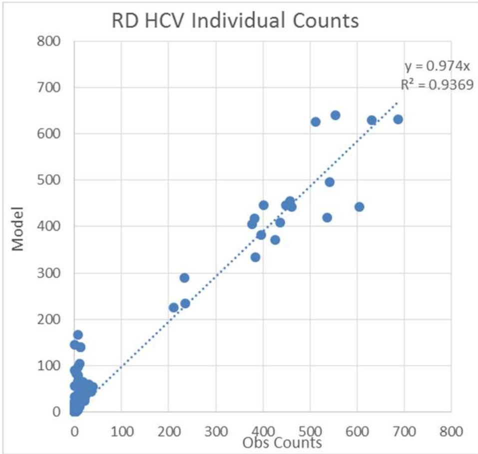



RD LV Individual Counts
y = 0.97x
R² = 0.8699
Model
Obs Counts
0
1,000
2,000
3,000
4,000
5,000
6,000

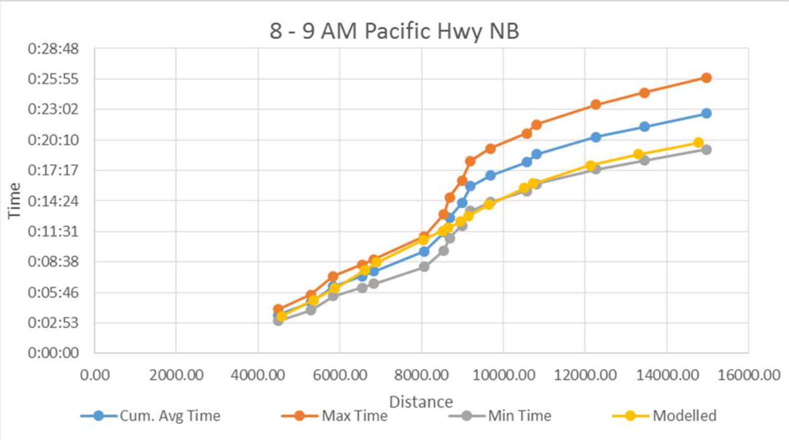

RD MCV Individual Counts
y = 0.9252x
R² = 0.8674
Model
Obs Counts
0
100
200
300
400
500
600
700

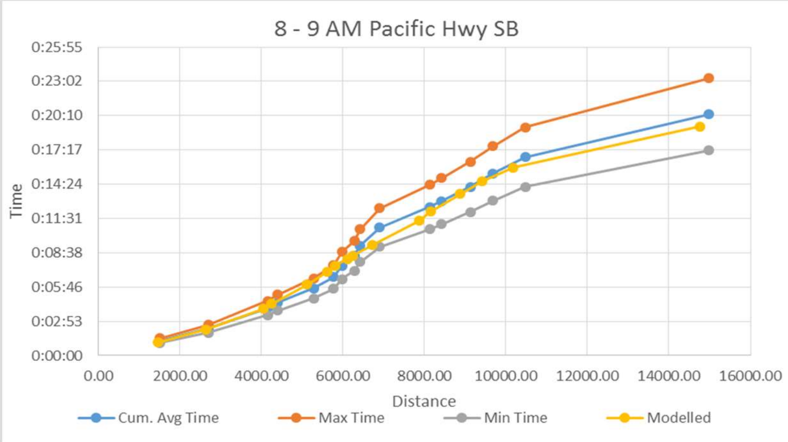

RD HCV Individual Counts
y = 0.974x
R² = 0.9369
Model
Obs Counts
0
100
200
300
400
500
600
700
800

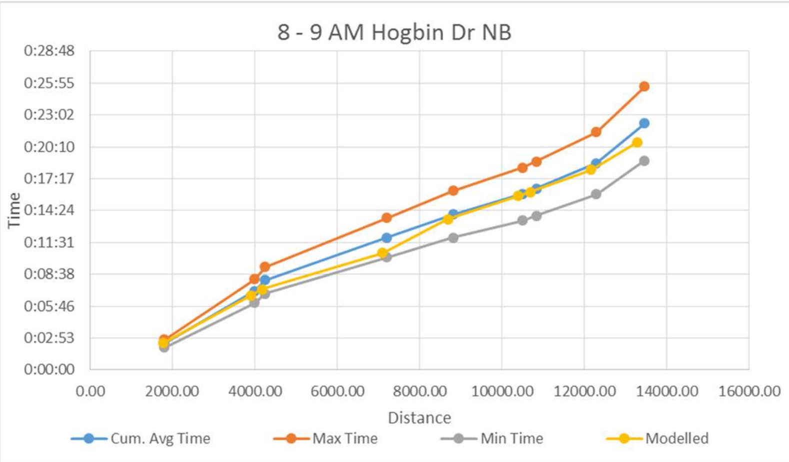
# Appendix D

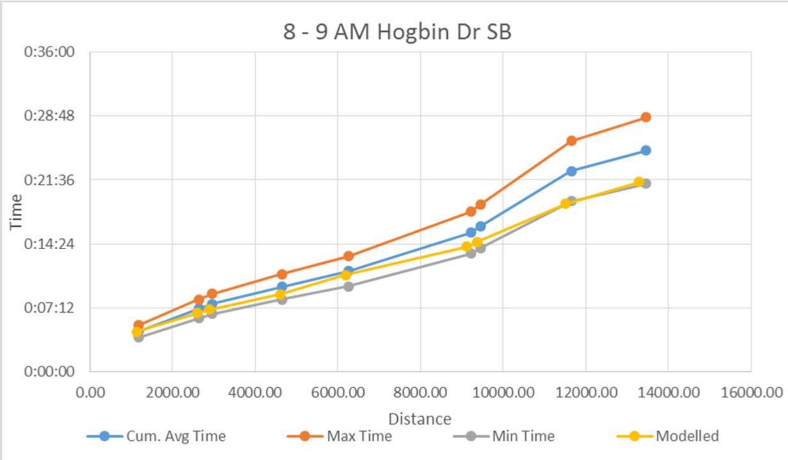
Strategic Model - Journey Time Comparisons

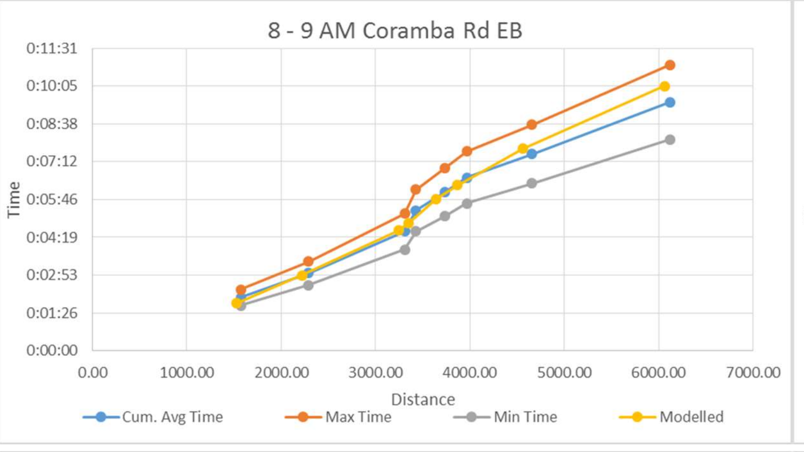
# D1 AM Peak travel time comparisons (CHSTM)

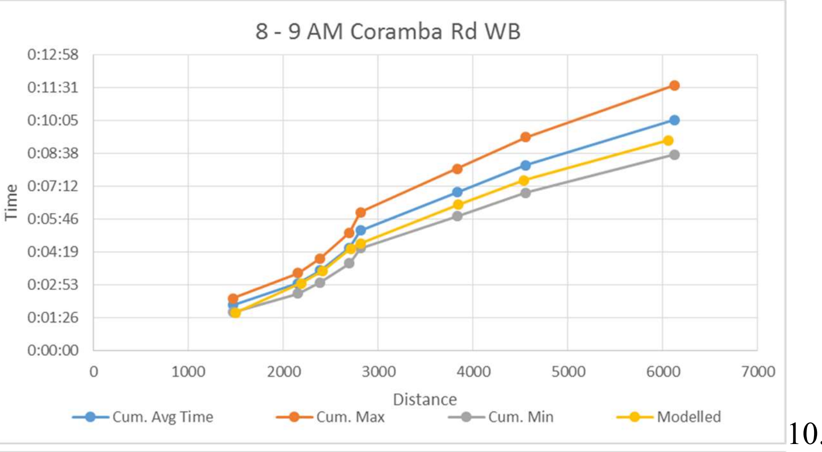


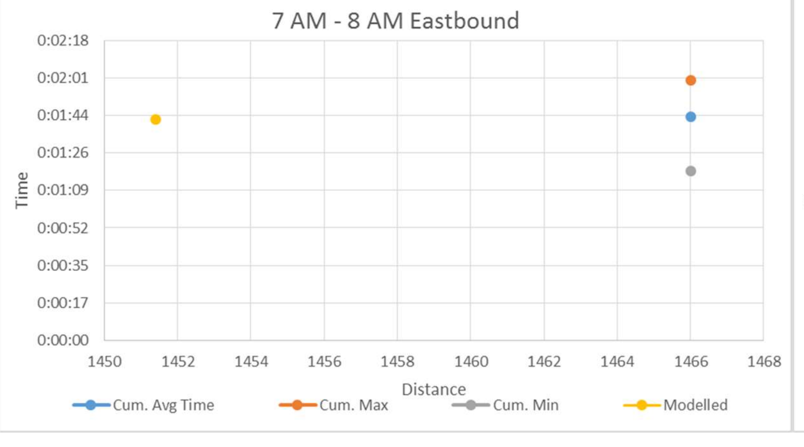



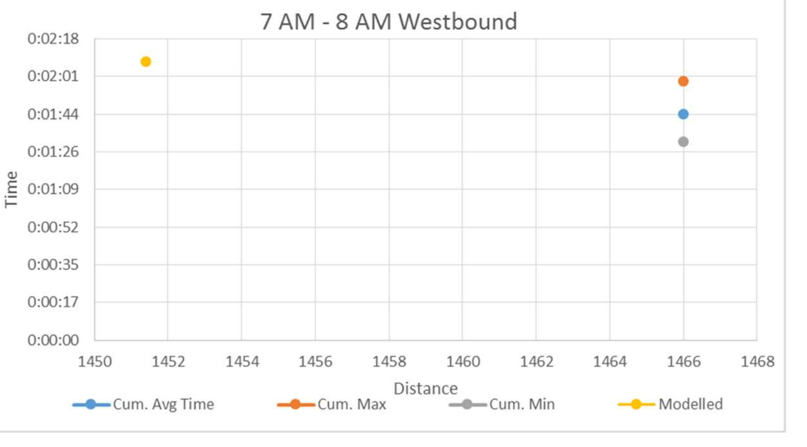




8 - 9 AM Coramba Rd EB
Time
Distance
Cum. Avg Time
Max Time
Min Time
Modelled

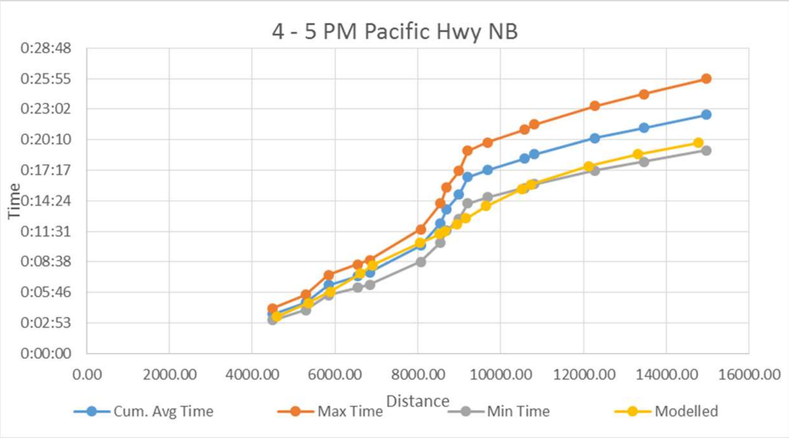

8 - 9 AM Coramba Rd WB
Time
Distance
Cum. Avg Time
Cum. Max
Cum. Min
Modelled

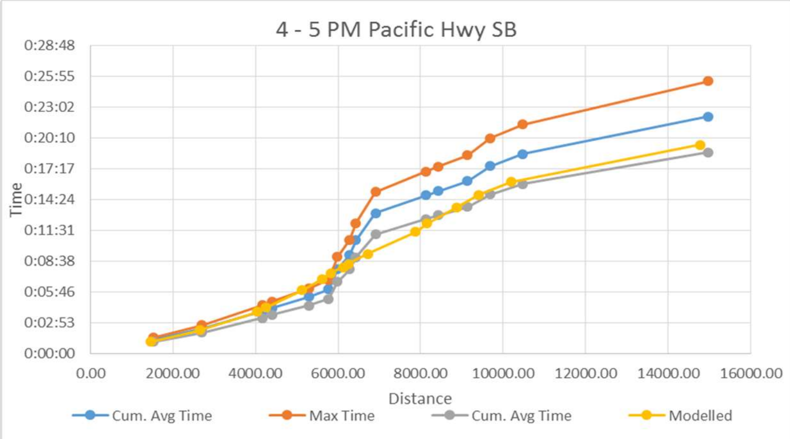
10.5

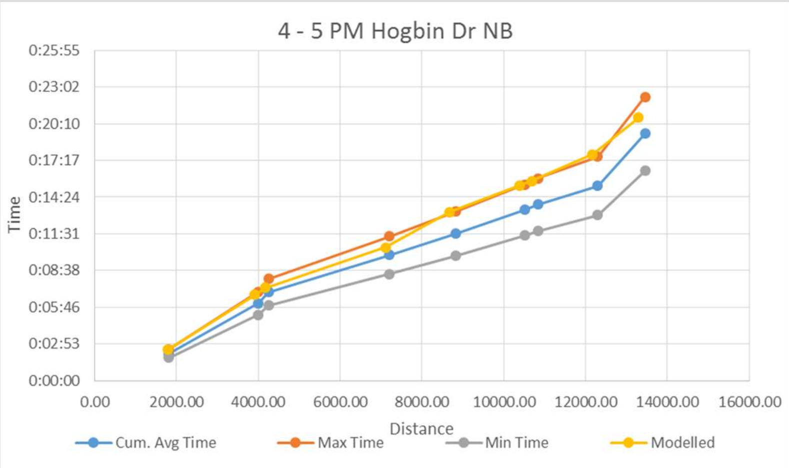

7 AM - 8 AM Eastbound
Time
Distance
Cum. Avg Time
Cum. Max
Cum. Min
Modelled

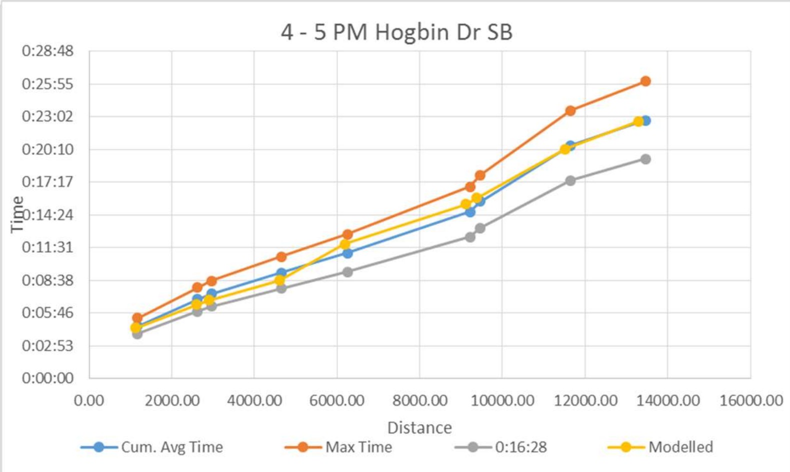

7 AM - 8 AM Westbound
Time
Distance
Cum. Avg Time
Cum. Max
Cum. Min
Modelled

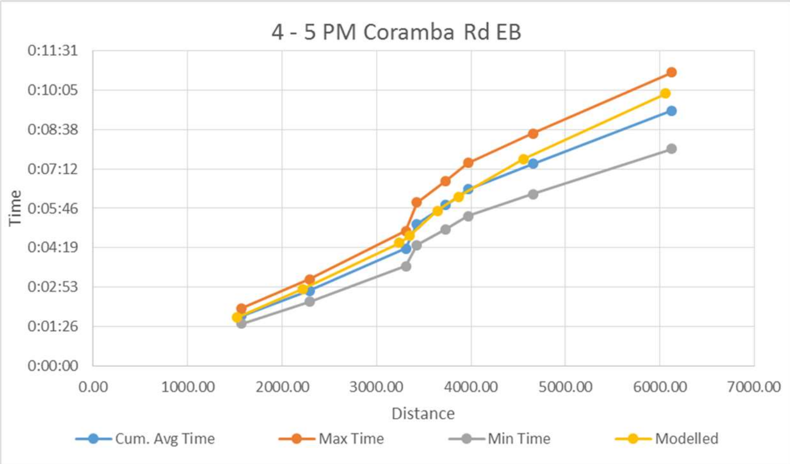
# D2 PM peak travel time comparisons (CHSTM)

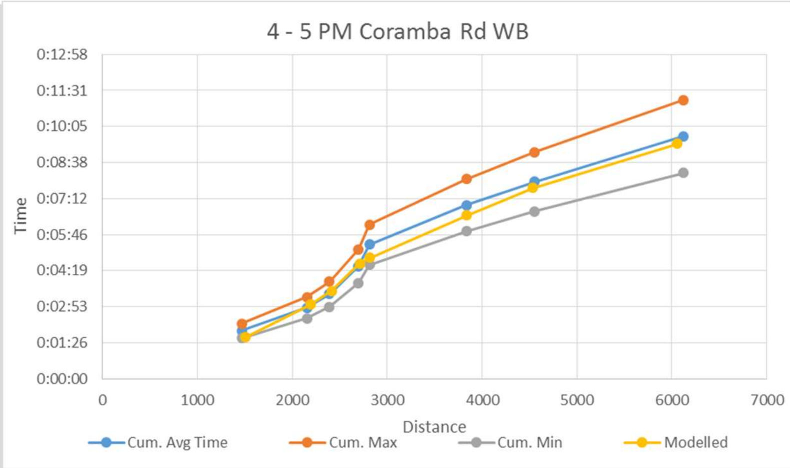


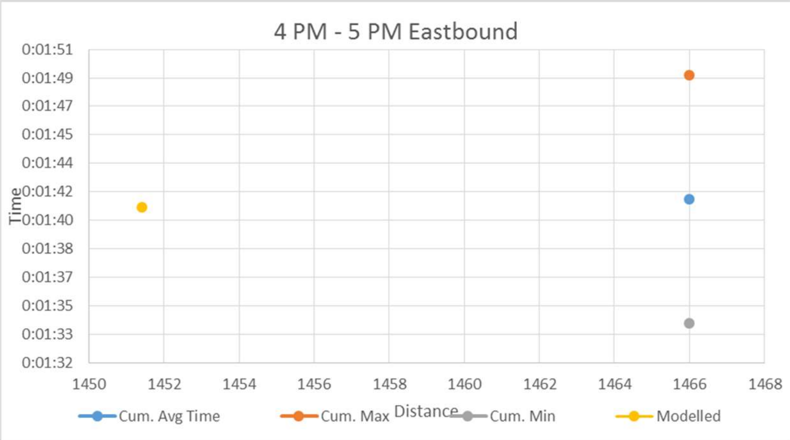



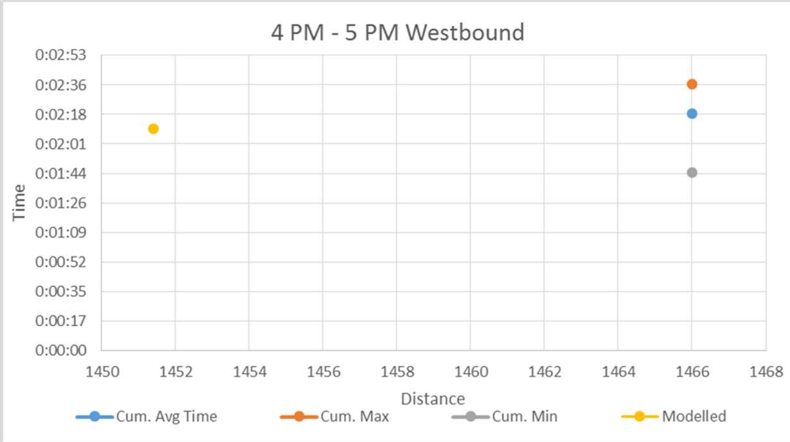




4 - 5 PM Coramba Rd EB
0:11:31
0:10:05
0:08:38
0:07:12
0:05:46
0:04:19
0:02:53
0:01:26
0:00:00
Time
0.00
1000.00
2000.00
3000.00
4000.00
5000.00
6000.00
7000.00
Distance
Cum. Avg Time
Max Time
Min Time
Modelled


4 - 5 PM Coramba Rd WB
0:12:58
0:11:31
0:10:05
0:08:38
0:07:12
0:05:46
0:04:19
0:02:53
0:01:26
0:00:00
Time
0
1000
2000
3000
4000
5000
6000
7000
Distance
Cum. Avg Time
Cum. Max
Cum. Min
Modelled


4 PM - 5 PM Eastbound
0:01:51
0:01:49
0:01:47
0:01:45
0:01:44
0:01:42
0:01:40
0:01:38
0:01:37
0:01:35
0:01:33
0:01:32
Time
1450
1452
1454
1456
1458
1460
1462
1464
1466
1468
Distance
Cum. Avg Time
Cum. Max
Cum. Min
Modelled


4 PM - 5 PM Westbound
0:02:53
0:02:36
0:02:18
0:02:01
0:01:44
0:01:26
0:01:09
0:00:52
0:00:35
0:00:17
0:00:00
Time
1450
1452
1454
1456
1458
1460
1462
1464
1466
1468
Distance
Cum. Avg Time
Cum. Max
Cum. Min
Modelled

# Appendix E

Traffic Model - Signal Timings Calibration

# E1 Traffic Model - Signal Timings Calibration

The tables below provide a comparison between observed signal timings extracted from SCATS IDM data (June 2016) and the timings assumed in the 2017 Coffs Harbour Traffic Model.

| Intersection | TCS | AM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| Pacific Hwy / Harbour Dr | 657 | 127 | 130 | 2% | A | 74 | 69 | -5 |
| | | | | | B | 19 | 21 | 2 |
| | | | | | C | 34 | 40 | 6 |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Coff St | 1501 | 127 | 130 | 2% | A | 66 | 60 | -6 |
| | | | | | B | 0 | 0 | |
| | | | | | C | 0 | 0 | |
| | | | | | D | 25 | 22 | -3 |
| | | | | | E | 18 | 22 | 4 |
| | | | | | F | 19 | 26 | 7 |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Orlando St | 1554 | 132 | 130 | -2% | A | 50 | 50 | 0 |
| | | | | | B | 0 | 0 | |
| | | | | | C | 1 | 0 | -1 |
| | | | | | D | 30 | 30 | 0 |
| | | | | | E | 26 | 26 | 0 |
| | | | | | F | 24 | 24 | 0 |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Albany St | 1582 | 128 | 130 | 2% | A | 49 | 41 | -8 |
| | | | | | B | 6 | 18 | 12 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 36 | 38 | 2 |
| | | | | | E | 19 | 20 | 1 |
| | | | | | F | 19 | 13 | -6 |
| | | | | | G | 0 | 0 | |

| Intersection | TCS | AM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| Pacific Hwy / Park Beach Rd | 1723 | 131 | 130 | -1% | A | 83 | 78 | -5 |
| | | | | | B | 22 | 30 | 8 |
| | | | | | C | 20 | 22 | 2 |
| | | | | | D | 7 | 0 | -7 |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Park Ave | 2808 | 128 | 130 | 2% | A | 60 | 59 | -1 |
| | | | | | B | 1 | 0 | -1 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 32 | 28 | -4 |
| | | | | | E | 19 | 27 | 8 |
| | | | | | F | 15 | 16 | 1 |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Marcia St | 3548 | Missing Data | 80 | N/A | A | 0 | 50 | |
| | | | | | B | 0 | 0 | |
| | | | | | C | 0 | 0 | |
| | | | | | D | 0 | 18 | |
| | | | | | E | 0 | 12 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Cook Dr | 3550 | 131 | 130 | -1% | A | 66 | 63 | -3 |
| | | | | | B | 1 | 0 | -1 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 26 | 25 | -1 |
| | | | | | E | 9 | 13 | 4 |
| | | | | | F | 0 | 0 | |
| | | | | | G | 30 | 29 | -1 |
| Pacific Hwy / Isle Dr | 3565 | 131 | 130 | -1% | A | 68 | 68 | 0 |
| | | | | | B | 0 | 0 | |
| | | | | | C | 7 | 6 | -1 |
| | | | | | D | 17 | 17 | 0 |
| | | | | | E | 17 | 20 | 3 |
| | | | | | F | 21 | 19 | -2 |
| | | | | | G | 0 | 0 | |

| Intersection | TCS | AM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| Harbour Dr / Curacoa St | 3763 | 65 | 65 | 0% | A | 42 | 44 | 2 |
| | | | | | B | 23 | 21 | -2 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Hurley Dr | 4205 | 127 | 130 | 2% | A | 90 | 87 | -3 |
| | | | | | B | 22 | 23 | 1 |
| | | | | | C | 15 | 20 | 5 |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Beryl St | 4565 | 127 | 130 | 2% | A | 98 | 73 | -25 |
| | | | | | B | 3 | 17 | 14 |
| | | | | | C | 27 | 40 | 13 |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Halls Rd | Missing TCS | Missing Data | 130 | N/A | A | | 96 | |
| | | | | | B | | 12 | |
| | | | | | C | | 22 | |
| | | | | | D | | | |
| | | | | | E | | | |
| | | | | | F | | | |
| | | | | | G | | | |
| Pacific Hwy / Bangale Cres | Missing TCS | Missing Data | 90 | N/A | A | | 27 | |
| | | | | | B | | 27 | |
| | | | | | C | | 18 | |
| | | | | | D | | 18 | |
| | | | | | E | | | |
| | | | | | F | | | |

| Intersection | TCS | AM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| | | | | | G | | | |

| Intersection | TCS | PM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| Pacific Hwy / Harbour Dr | 657 | 124 | 130 | 5% | A | 64 | 65 | 1 |
| | | | | | B | 20 | 25 | 5 |
| | | | | | C | 38 | 40 | 2 |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Coff St | 1501 | 124 | 130 | 5% | A | 60 | 60 | 0 |
| | | | | | B | 0 | 0 | |
| | | | | | C | 0 | 0 | |
| | | | | | D | 31 | 34 | 3 |
| | | | | | E | 15 | 17 | 2 |
| | | | | | F | 19 | 19 | 0 |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Orlando St | 1554 | 138 | 130 | -6% | A | 51 | 54 | 3 |
| | | | | | B | 0 | 0 | |
| | | | | | C | 1 | 0 | -1 |
| | | | | | D | 30 | 28 | -2 |
| | | | | | E | 30 | 27 | -3 |
| | | | | | F | 25 | 21 | -4 |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Albany St | 1582 | 124 | 130 | 5% | A | 57 | 56 | -1 |
| | | | | | B | 2 | 12 | 10 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 24 | 23 | -1 |
| | | | | | E | 22 | 22 | 0 |
| | | | | | F | 17 | 17 | 0 |
| | | | | | G | 0 | 0 | |

| Intersection | TCS | PM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| Pacific Hwy / Park Beach Rd | 1723 | 139 | 130 | -6% | A | 83 | 78 | -5 |
| | | | | | B | 25 | 23 | -2 |
| | | | | | C | 19 | 18 | -1 |
| | | | | | D | 11 | 11 | 0 |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Park Ave | 2808 | 123 | 130 | 6% | A | 54 | 60 | 6 |
| | | | | | B | 7 | 0 | -7 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 26 | 25 | -1 |
| | | | | | E | 20 | 27 | 7 |
| | | | | | F | 16 | 18 | 2 |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Marcia St | 3548 | 131 | 130 | -1% | A | 86 | 85 | -1 |
| | | | | | B | 1 | 0 | -1 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 28 | 28 | 0 |
| | | | | | E | 17 | 17 | 0 |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Cook Dr | 3550 | 123 | 130 | 6% | A | 64 | 64 | 0 |
| | | | | | B | 1 | 0 | -1 |
| | | | | | C | 0 | 0 | |
| | | | | | D | 26 | 26 | 0 |
| | | | | | E | 9 | 16 | 7 |
| | | | | | F | 0 | 0 | |
| | | | | | G | 23 | 24 | 1 |
| Pacific Hwy / Isle Dr | 3565 | 124 | 130 | 5% | A | 61 | 65 | 4 |
| | | | | | B | 0 | 0 | |
| | | | | | C | 4 | 0 | -4 |
| | | | | | D | 24 | 26 | 2 |
| | | | | | E | 16 | 17 | 1 |
| | | | | | F | 21 | 22 | 1 |
| | | | | | G | 0 | 0 | |

| Intersection | TCS | PM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| Harbour Dr / Curacoa St | 3763 | Missing Data | 65 | N/A | A | 0 | 42 | |
| | | | | | B | 0 | 23 | |
| | | | | | C | 0 | 0 | |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Hurley Dr | 4205 | 123 | 130 | 6% | A | 87 | 90 | 3 |
| | | | | | B | 16 | 17 | 1 |
| | | | | | C | 20 | 23 | 3 |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Beryl St | 4565 | 125 | 130 | 4% | A | 98 | 78 | -20 |
| | | | | | B | 6 | 19 | 13 |
| | | | | | C | 21 | 33 | 12 |
| | | | | | D | 0 | 0 | |
| | | | | | E | 0 | 0 | |
| | | | | | F | 0 | 0 | |
| | | | | | G | 0 | 0 | |
| Pacific Hwy / Halls Rd | Missing TCS | Missing Data | 130 | N/A | A | | 94 | |
| | | | | | B | | 14 | |
| | | | | | C | | 22 | |
| | | | | | D | | | |
| | | | | | E | | | |
| | | | | | F | | | |
| | | | | | G | | | |
| Pacific Hwy / Bangale Cres | Missing TCS | Missing Data | 90 | N/A | A | | 27 | |
| | | | | | B | | 27 | |
| | | | | | C | | 18 | |
| | | | | | D | | 18 | |
| | | | | | E | | | |
| | | | | | F | | | |

| Intersection | TCS | PM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cycle Time (s) | | | Phase Timings (s) | | | |
| | | Observed | Modelled | Difference | Phase | Observed | Modelled | Absolute Difference |
| | | | | | G | | | |

# Appendix F

Traffic Model - Traffic Count Comparisons

# F1 Link Volume Comparisons

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Pacific Hwy and Shopping Centre Access | Shopping Centre Access | W | Dep | 109 | 124 | 1.4 | 63 | 88 | 2.9 |
| Shopping Centre and Arthur St | Arthur St | E | App | 394 | 496 | 4.8 | 454 | 464 | 0.5 |
| Shopping Centre and Arthur St | Arthur St | E | Dep | 356 | 314 | 2.3 | 365 | 279 | 4.8 |
| Shopping Centre and Arthur St | Shopping Centre | S | App | 111 | 153 | 3.7 | 409 | 656 | 10.7 |
| Shopping Centre and Arthur St | Shopping Centre | S | Dep | 370 | 432 | 3.1 | 381 | 433 | 2.6 |
| Shopping Centre and Arthur St | Arthur St | W | App | 617 | 628 | 0.4 | 614 | 559 | 2.3 |
| Shopping Centre and Arthur St | Arthur St | W | Dep | 396 | 530 | 6.2 | 731 | 967 | 8.1 |
| Shopping Centre and Arthur St | Arthur St | E | App | 364 | 462 | 4.8 | 458 | 467 | 0.4 |
| Shopping Centre and Arthur St | Shopping Centre | S | App | 25 | 14 | 2.5 | 105 | 107 | 0.2 |
| Shopping Centre and Arthur St | Shopping Centre | S | Dep | 64 | 73 | 1.1 | 61 | 62 | 0.1 |
| Shopping Centre and Arthur St | Arthur St | W | App | 353 | 311 | 2.3 | 321 | 260 | 3.6 |
| Shopping Centre and Arthur St | Arthur St | W | Dep | 328 | 407 | 4.1 | 453 | 465 | 0.6 |
| Park Beach Rd and Shopping Centre | Park Beach Rd | N | App | 421 | 336 | 4.4 | 505 | 358 | 7.1 |
| Park Beach Rd and Shopping Centre | Park Beach Rd | N | Dep | 299 | 298 | 0.1 | 537 | 429 | 4.9 |
| Park Beach Rd and Shopping Centre | Shopping Centre | E | App | 146 | 73 | 7.0 | 534 | 287 | 12.2 |
| Park Beach Rd and Shopping Centre | Shopping Centre | E | Dep | 324 | 97 | 15.6 | 465 | 175 | 16.2 |
| Park Beach Rd and Shopping Centre | Park Beach Rd | S | App | 283 | 266 | 1.0 | 295 | 310 | 0.9 |
| Park Beach Rd and Shopping Centre | Park Beach Rd | S | Dep | 214 | 298 | 5.3 | 360 | 481 | 5.9 |
| Park Beach Rd and Shopping Centre | Walter Morris Cl | W | App | 163 | 159 | 0.3 | 180 | 240 | 4.1 |
| Park Beach Rd and Shopping Centre | Walter Morris Cl | W | Dep | 176 | 139 | 2.9 | 152 | 107 | 4.0 |
| Hogbin Dr and Shopping Centre | Hogbin Dr | N | App | 511 | 487 | 1.1 | 1066 | 1126 | 1.8 |
| Hogbin Dr and Shopping Centre | Hogbin Dr | N | Dep | 1175 | 1270 | 2.7 | 664 | 637 | 1.1 |
| Hogbin Dr and Shopping Centre | Hogbin Dr | S | App | 1202 | 1271 | 2.0 | 658 | 637 | 0.8 |
| Hogbin Dr and Shopping Centre | Hogbin Dr | S | Dep | 515 | 490 | 1.1 | 1074 | 1125 | 1.5 |
| Toormina Rd and Minorca Pl | Toormina Rd | N | App | 555 | 530 | 1.1 | 886 | 833 | 1.8 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Toormina Rd and Minorca Pl | Minorca Pl | E | App | 10 | 22 | 3.0 | 68 | 128 | 6.1 |
| Toormina Rd and Minorca Pl | Minorca Pl | E | Dep | 193 | 199 | 0.4 | 387 | 422 | 1.7 |
| Toormina Rd and Minorca Pl | Toormina Rd | S | App | 719 | 694 | 0.9 | 523 | 525 | 0.1 |
| Toormina Rd and Minorca Pl | Coorabin Cres | W | App | 126 | 210 | 6.5 | 71 | 103 | 3.4 |
| Toormina Rd and Minorca Pl | Coorabin Cres | W | Dep | 84 | 152 | 6.3 | 95 | 139 | 4.1 |
| Toormina Rd and Shopping Centre | Toormina Rd | N | App | 310 | 288 | 1.3 | 500 | 490 | 0.4 |
| Toormina Rd and Shopping Centre | Shopping Centre | E | App | 155 | 160 | 0.4 | 507 | 418 | 4.1 |
| Toormina Rd and Shopping Centre | Shopping Centre | E | Dep | 143 | 71 | 7.0 | 141 | 68 | 7.1 |
| Toormina Rd and Shopping Centre | Toormina Rd | S | App | 671 | 556 | 4.6 | 366 | 357 | 0.5 |
| Toormina Rd and Shopping Centre | Toormina Rd | S | Dep | 339 | 273 | 3.8 | 664 | 641 | 0.9 |
| Toormina Rd and Shopping Centre | Bangalee Cres | W | App | 132 | 56 | 7.8 | 59 | 31 | 4.2 |
| Toormina Rd and Shopping Centre | Bangalee Cres | W | Dep | 67 | 21 | 6.9 | 104 | 62 | 4.6 |
| Shopping Centre and Minorie Dr | Shopping Centre | N | App | 29 | 47 | 2.9 | 167 | 165 | 0.2 |
| Shopping Centre and Minorie Dr | Shopping Centre | N | Dep | 100 | 126 | 2.4 | 104 | 176 | 6.1 |
| Shopping Centre and Minorie Dr | Minorie Dr | E | App | 72 | 103 | 3.3 | 90 | 158 | 6.1 |
| Shopping Centre and Minorie Dr | Minorie Dr | E | Dep | 77 | 68 | 1.1 | 157 | 180 | 1.8 |
| Shopping Centre and Minorie Dr | Minorie Dr | W | App | 132 | 93 | 3.7 | 158 | 134 | 2.0 |
| Shopping Centre and Minorie Dr | Minorie Dr | W | Dep | 56 | 49 | 1.0 | 154 | 102 | 4.6 |
| Hogbin Dr and Airport Dr | Hogbin Dr | N | App | 1144 | 1181 | 1.1 | 1033 | 1041 | 0.2 |
| Hogbin Dr and Airport Dr | Airport Dr | E | App | 72 | 77 | 0.6 | 119 | 135 | 1.4 |
| Hogbin Dr and Airport Dr | Airport Dr | E | Dep | 81 | 115 | 3.4 | 92 | 96 | 0.4 |
| Hogbin Dr and Airport Dr | Hogbin Dr | S | App | 1305 | 1351 | 1.3 | 1026 | 1055 | 0.9 |
| Hogbin Dr and Christmas Bells Rd | Hogbin Dr | N | App | 1127 | 1235 | 3.1 | 1002 | 1047 | 1.4 |
| Hogbin Dr and Christmas Bells Rd | Christmas Bells Rd | E | App | 29 | 25 | 0.8 | 40 | 99 | 7.1 |
| Hogbin Dr and Christmas Bells Rd | Christmas Bells Rd | E | Dep | 36 | 44 | 1.3 | 19 | 46 | 4.7 |
| Hogbin Dr and Christmas Bells Rd | Hogbin Dr | S | App | 1363 | 1343 | 0.5 | 1059 | 1094 | 1.1 |
| Hogbin Dr and Christmas Bells Rd | Hogbin Dr | S | Dep | 1098 | 1201 | 3.0 | 992 | 1035 | 1.4 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Pacific Hwy and Diggers Beach Rd | Diggers Beach Rd | E | App | 36 | 19 | 3.2 | 26 | 90 | 8.4 |
| Pacific Hwy and Diggers Beach Rd | Diggers Beach Rd | E | Dep | 31 | 26 | 0.9 | 60 | 108 | 5.2 |
| Pacific Hwy and Diggers Beach Rd | Diggers Beach Rd | W | Dep | 14 | 28 | 3.1 | 18 | 42 | 4.4 |
| Pacific Hwy and Island View Close | Island View Close | W | App | 11 | 37 | 5.3 | 26 | 33 | 1.3 |
| Pacific Hwy and Island View Close | Island View Close | W | Dep | 21 | 24 | 0.6 | 19 | 20 | 0.2 |
| Mackays Rd and Hospital | Mackays Rd | N | App | 83 | 93 | 1.1 | 86 | 67 | 2.2 |
| Mackays Rd and Hospital | Mackays Rd | S | App | 117 | 101 | 1.5 | 91 | 117 | 2.5 |
| Mackays Rd and Hospital | Hospital | W | App | 14 | 11 | 0.8 | 30 | 37 | 1.2 |
| Mackays Rd and Hospital | Hospital | W | Dep | 40 | 41 | 0.2 | 21 | 24 | 0.6 |
| Mackays Rd and Hospital | Mackays Rd | N | App | 71 | 81 | 1.1 | 71 | 45 | 3.4 |
| Mackays Rd and Hospital | Mackays Rd | N | Dep | 68 | 43 | 3.4 | 76 | 83 | 0.8 |
| Mackays Rd and Hospital | Mackays Rd | S | App | 87 | 59 | 3.3 | 78 | 91 | 1.4 |
| Mackays Rd and Hospital | Hospital | W | App | 12 | 14 | 0.6 | 21 | 27 | 1.2 |
| Mackays Rd and Hospital | Hospital | W | Dep | 21 | 19 | 0.4 | 8 | 12 | 1.3 |
| Mackays Rd and Bray St | Mackays Rd | N | App | 94 | 104 | 1.0 | 115 | 103 | 1.1 |
| Mackays Rd and Bray St | Bray St | E | App | 205 | 183 | 1.6 | 411 | 391 | 1.0 |
| Mackays Rd and Bray St | Bray St | E | Dep | 435 | 371 | 3.2 | 305 | 254 | 3.1 |
| Mackays Rd and Bray St | Mackays Rd | S | App | 462 | 392 | 3.4 | 285 | 282 | 0.2 |
| Mackays Rd and Bray St | Mackays Rd | S | Dep | 209 | 205 | 0.3 | 415 | 404 | 0.5 |
| Hogbin Dr and Stadium Dr | Hogbin Dr | N | App | 1128 | 1126 | 0.1 | 1126 | 1048 | 2.4 |
| Hogbin Dr and Stadium Dr | Stadium Dr | E | App | 137 | 192 | 4.3 | 267 | 287 | 1.2 |
| Hogbin Dr and Stadium Dr | Stadium Dr | E | Dep | 354 | 403 | 2.5 | 109 | 113 | 0.4 |
| Hogbin Dr and Stadium Dr | Hogbin Dr | S | App | 1038 | 1109 | 2.2 | 633 | 710 | 3.0 |
| Hogbin Dr and Stadium Dr | Hogbin Dr | S | Dep | 816 | 781 | 1.2 | 1108 | 1049 | 1.8 |
| Hogbin Dr and Stadium Dr | Stadium Dr | W | App | 434 | 503 | 3.2 | 411 | 425 | 0.7 |
| Hogbin Dr and Stadium Dr | Stadium Dr | W | Dep | 478 | 395 | 4.0 | 365 | 254 | 6.3 |
| Pacific Hwy and Isle Dr | Pacific Hwy | N | App | 1253 | 1128 | 3.6 | 1403 | 1334 | 1.9 |
| Pacific Hwy and Isle Dr | Pacific Hwy | N | Dep | 1571 | 1381 | 4.9 | 1376 | 1282 | 2.6 |
| Pacific Hwy and Isle Dr | Isle Dr | E | App | 117 | 101 | 1.5 | 274 | 248 | 1.6 |
| Pacific Hwy and Isle Dr | Isle Dr | E | Dep | 344 | 292 | 2.9 | 134 | 131 | 0.3 |
| Pacific Hwy and Isle Dr | Pacific Hwy | S | App | 1339 | 1271 | 1.9 | 888 | 903 | 0.5 |
| Pacific Hwy and Isle Dr | Pacific Hwy | S | Dep | 940 | 897 | 1.4 | 1333 | 1269 | 1.8 |
| Pacific Hwy and Isle Dr | Isle Dr | W | App | 380 | 295 | 4.6 | 455 | 358 | 4.8 |
| Pacific Hwy and Isle Dr | Isle Dr | W | Dep | 234 | 218 | 1.1 | 177 | 161 | 1.2 |
| Shopping Carpark and Cook Dr | Shopping Carpark | N | App | 9 | 0 | 4.2 | 4 | 0 | 2.8 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Shopping Carpark and Cook Dr | Shopping Carpark | N | Dep | 11 | 0 | 4.7 | 2 | 0 | 2.0 |
| Shopping Carpark and Cook Dr | Cook Dr | E | App | 175 | 212 | 2.7 | 236 | 327 | 5.4 |
| Shopping Carpark and Cook Dr | Cook Dr | E | Dep | 260 | 285 | 1.5 | 116 | 222 | 8.2 |
| Shopping Carpark and Cook Dr | Bunnings | S | App | 67 | 44 | 3.1 | 156 | 141 | 1.2 |
| Shopping Carpark and Cook Dr | Bunnings | S | Dep | 103 | 91 | 1.2 | 132 | 85 | 4.5 |
| Shopping Carpark and Cook Dr | Cook Dr | W | App | 367 | 312 | 3.0 | 246 | 245 | 0.1 |
| Shopping Carpark and Cook Dr | Cook Dr | W | Dep | 244 | 197 | 3.2 | 392 | 409 | 0.8 |
| Apollo Dr and Bray St | Apollo Dr | N | App | 129 | 150 | 1.8 | 91 | 60 | 3.6 |
| Apollo Dr and Bray St | Apollo Dr | N | Dep | 69 | 54 | 1.9 | 142 | 129 | 1.1 |
| Apollo Dr and Bray St | Bray St | E | App | 374 | 350 | 1.3 | 527 | 574 | 2.0 |
| Apollo Dr and Bray St | Bray St | E | Dep | 549 | 469 | 3.5 | 414 | 361 | 2.7 |
| Apollo Dr and Bray St | Joyce St | S | App | 119 | 162 | 3.6 | 190 | 246 | 3.8 |
| Apollo Dr and Bray St | Joyce St | S | Dep | 308 | 374 | 3.6 | 176 | 167 | 0.7 |
| Apollo Dr and Bray St | Bray St | W | App | 548 | 412 | 6.2 | 349 | 260 | 5.1 |
| Apollo Dr and Bray St | Bray St | W | Dep | 244 | 179 | 4.5 | 425 | 480 | 2.6 |
| Pacific Hwy and Old Coast Rd | Pacific Hwy | N | App | 1824 | 2006 | 4.2 | 875 | 856 | 0.6 |
| Pacific Hwy and Old Coast Rd | Pacific Hwy | N | Dep | 699 | 708 | 0.3 | 1518 | 1536 | 0.5 |
| Pacific Hwy and Old Coast Rd | Pacific Hwy | S | App | 713 | 755 | 1.6 | 1543 | 1574 | 0.8 |
| Pacific Hwy and Old Coast Rd | Pacific Hwy | S | Dep | 1878 | 2039 | 3.6 | 902 | 846 | 1.9 |
| Pacific Hwy and Old Coast Rd | Old Coast Rd | W | App | 100 | 81 | 2.0 | 64 | 11 | 8.7 |
| Pacific Hwy and Old Coast Rd | Old Coast Rd | W | Dep | 60 | 71 | 1.4 | 62 | 50 | 1.6 |
| Pacific Hwy and James Small Dr | Pacific Hwy | N | App | 2015 | 2033 | 0.4 | 919 | 846 | 2.5 |
| Pacific Hwy and James Small Dr | Pacific Hwy | N | Dep | 724 | 758 | 1.2 | 1547 | 1577 | 0.8 |
| Pacific Hwy and James Small Dr | James Small Dr | E | App | 163 | 197 | 2.5 | 92 | 111 | 1.9 |
| Pacific Hwy and James Small Dr | James Small Dr | E | Dep | 100 | 147 | 4.2 | 171 | 203 | 2.3 |
| Pacific Hwy and James Small Dr | Pacific Hwy | S | App | 816 | 896 | 2.7 | 1747 | 1790 | 1.0 |
| Pacific Hwy and James Small Dr | Pacific Hwy | S | Dep | 2193 | 2235 | 0.9 | 1027 | 957 | 2.2 |
| Pacific Hwy and James Small Dr | Bruxner Park Rd | W | App | 39 | 31 | 1.4 | 32 | 18 | 2.8 |
| Pacific Hwy and James Small Dr | Bruxner Park Rd | W | Dep | 16 | 18 | 0.5 | 45 | 26 | 3.2 |
| Pacific Hwy and Arthur St | Pacific Hwy | N | App | 438 | 487 | 2.3 | 182 | 188 | 0.4 |
| Pacific Hwy and Arthur St | Pacific Hwy | N | Dep | 228 | 268 | 2.5 | 733 | 650 | 3.2 |
| Pacific Hwy and Arthur St | Arthur St | E | App | 439 | 551 | 5.0 | 728 | 947 | 7.6 |
| Pacific Hwy and Arthur St | Arthur St | E | Dep | 592 | 625 | 1.3 | 580 | 560 | 0.8 |
| Pacific Hwy and Arthur St | Pacific Hwy | S | App | 258 | 338 | 4.6 | 297 | 368 | 3.9 |
| Pacific Hwy and Arthur St | Pacific Hwy | S | Dep | 101 | 273 | 12.6 | 146 | 515 | 20.3 |
| Pacific Hwy and Arthur St | Matrascolas Rd | W | App | 104 | 96 | 0.8 | 438 | 432 | 0.3 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Pacific Hwy and Arthur St | Matrascolas Rd | W | Dep | 318 | 306 | 0.7 | 186 | 205 | 1.4 |
| Pacific Hwy and Park Beach Rd | Pacific Hwy | N | App | 1862 | 2172 | 6.9 | 1130 | 1351 | 6.3 |
| Pacific Hwy and Park Beach Rd | Park Beach Rd | E | App | 306 | 298 | 0.5 | 537 | 429 | 4.9 |
| Pacific Hwy and Park Beach Rd | Park Beach Rd | E | Dep | 428 | 335 | 4.8 | 483 | 358 | 6.1 |
| Pacific Hwy and Park Beach Rd | Pacific Hwy | S | App | 1251 | 1302 | 1.4 | 1838 | 1904 | 1.5 |
| Pacific Hwy and Orlando St | Pacific Hwy | N | App | 1984 | 2273 | 6.3 | 1503 | 1632 | 3.3 |
| Pacific Hwy and Orlando St | Orlando St | E | App | 418 | 492 | 3.5 | 703 | 691 | 0.5 |
| Pacific Hwy and Orlando St | Orlando St | E | Dep | 763 | 898 | 4.7 | 400 | 421 | 1.0 |
| Pacific Hwy and Orlando St | Pacific Hwy | S | App | 973 | 1085 | 3.5 | 1459 | 1570 | 2.9 |
| Pacific Hwy and Orlando St | Bray St | W | App | 688 | 618 | 2.7 | 553 | 461 | 4.1 |
| Pacific Hwy and Orlando St | Bray St | W | Dep | 418 | 392 | 1.3 | 713 | 655 | 2.2 |
| Pacific Hwy and Carpark | Pacific Hwy | N | App | 1645 | 1850 | 4.9 | 1263 | 1364 | 2.8 |
| Pacific Hwy and Carpark | Carpark | E | App | 7 | 12 | 1.6 | 13 | 34 | 4.3 |
| Pacific Hwy and Carpark | Carpark | E | Dep | 8 | 24 | 4.0 | 7 | 16 | 2.7 |
| Pacific Hwy and Carpark | Pacific Hwy | S | App | 997 | 1089 | 2.8 | 1515 | 1620 | 2.7 |
| Pacific Hwy and Carpark | Argyll St | W | App | 22 | 29 | 1.4 | 23 | 16 | 1.6 |
| Pacific Hwy and Carpark | Argyll St | W | Dep | 65 | 44 | 2.8 | 79 | 108 | 3.0 |
| Pacific Hwy and Bailey Ave | Pacific Hwy | N | App | 1577 | 1747 | 4.2 | 1257 | 1323 | 1.8 |
| Pacific Hwy and Bailey Ave | Pacific Hwy | S | App | 940 | 938 | 0.1 | 1500 | 1510 | 0.3 |
| Pacific Hwy and Bailey Ave | Bailey Ave | W | App | 95 | 184 | 7.5 | 49 | 90 | 4.9 |
| Pacific Hwy and Bailey Ave | Bailey Ave | W | Dep | 66 | 134 | 6.8 | 98 | 98 | 0.0 |
| Pacific Hwy and Melittas Ave | Pacific Hwy | N | App | 1617 | 1816 | 4.8 | 1274 | 1340 | 1.8 |
| Pacific Hwy and Melittas Ave | Melittas Ave | E | App | 4 | 4 | 0.0 | 10 | 16 | 1.7 |
| Pacific Hwy and Melittas Ave | Melittas Ave | E | Dep | 43 | 66 | 3.1 | 29 | 30 | 0.2 |
| Pacific Hwy and Melittas Ave | Pacific Hwy | S | App | 993 | 1086 | 2.9 | 1511 | 1584 | 1.9 |
| Pacific Hwy and Melittas Ave | Wentworth Ave | W | App | 13 | 6 | 2.3 | 16 | 29 | 2.7 |
| Pacific Hwy and Melittas Ave | Wentworth Ave | W | Dep | 4 | 0 | 2.8 | 7 | 0 | 3.7 |
| Pacific Hwy and Melittas Ave | Pacific Hwy | N | App | 1534 | 1674 | 3.5 | 1176 | 1243 | 1.9 |
| Pacific Hwy and Melittas Ave | Melittas Ave | E | App | 112 | 115 | 0.3 | 114 | 146 | 2.8 |
| Pacific Hwy and Melittas Ave | Melittas Ave | E | Dep | 134 | 133 | 0.1 | 126 | 87 | 3.8 |
| Pacific Hwy and Melittas Ave | Pacific Hwy | S | App | 935 | 936 | 0.0 | 1543 | 1428 | 3.0 |
| Pacific Hwy and Melittas Ave | Marcia St | W | App | 190 | 116 | 6.0 | 143 | 112 | 2.7 |
| Pacific Hwy and Melittas Ave | Marcia St | W | Dep | 148 | 122 | 2.2 | 186 | 49 | 12.6 |
| Pacific Hwy and Beryl St | Pacific Hwy | N | App | 1605 | 1624 | 0.5 | 1305 | 1326 | 0.6 |
| Pacific Hwy and Beryl St | Pacific Hwy | S | App | 1133 | 1106 | 0.8 | 1642 | 1690 | 1.2 |
| Pacific Hwy and Beryl St | Beryl St | W | App | 540 | 435 | 4.8 | 232 | 299 | 4.1 |
| Pacific Hwy and Beryl St | Beryl St | W | Dep | 206 | 217 | 0.8 | 275 | 274 | 0.1 |

| Intersection | Road | App | Dir | AM | | | PM | | |
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| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Pacific Hwy and Coff St | Pacific Hwy | N | App | 1979 | 2032 | 1.2 | 1397 | 1594 | 5.1 |
| Pacific Hwy and Coff St | Coff St | E | App | 313 | 210 | 6.4 | 795 | 637 | 5.9 |
| Pacific Hwy and Coff St | Coff St | E | Dep | 873 | 787 | 3.0 | 506 | 504 | 0.1 |
| Pacific Hwy and Coff St | Pacific Hwy | S | App | 828 | 875 | 1.6 | 980 | 1026 | 1.5 |
| Pacific Hwy and Coff St | Pacific Hwy | S | Dep | 1203 | 1206 | 0.1 | 945 | 1009 | 2.0 |
| Pacific Hwy and Coff St | Coff St | W | App | 220 | 169 | 3.7 | 216 | 136 | 6.0 |
| Pacific Hwy and Harbour Dr | Pacific Hwy | N | App | 1056 | 1242 | 5.5 | 991 | 1123 | 4.1 |
| Pacific Hwy and Harbour Dr | Harbour Dr | E | App | 193 | 169 | 1.8 | 338 | 222 | 6.9 |
| Pacific Hwy and Harbour Dr | Pacific Hwy | S | App | 821 | 844 | 0.8 | 929 | 976 | 1.5 |
| Pacific Hwy and Harbour Dr | W High St | W | App | 327 | 353 | 1.4 | 318 | 355 | 2.0 |
| Pacific Hwy and Harbour Dr | W High St | W | Dep | 278 | 215 | 4.0 | 458 | 368 | 4.4 |
| Pacific Hwy and Moonee St | Pacific Hwy | N | App | 951 | 1228 | 8.4 | 875 | 1029 | 5.0 |
| Pacific Hwy and Moonee St | Moonee St | E | App | 229 | 242 | 0.8 | 367 | 419 | 2.6 |
| Pacific Hwy and Moonee St | Moonee St | E | Dep | 429 | 495 | 3.1 | 430 | 322 | 5.6 |
| Pacific Hwy and Moonee St | Pacific Hwy | S | App | 816 | 751 | 2.3 | 927 | 797 | 4.4 |
| Pacific Hwy and Moonee St | Pacific Hwy | S | Dep | 1066 | 1048 | 0.6 | 947 | 980 | 1.1 |
| Pacific Hwy and Moonee St | Moonee St | W | App | 433 | 321 | 5.8 | 303 | 283 | 1.2 |
| Pacific Hwy and Moonee St | Moonee St | W | Dep | 129 | 159 | 2.5 | 187 | 246 | 4.0 |
| Pacific Hwy and Albany St | Pacific Hwy | N | App | 926 | 881 | 1.5 | 940 | 888 | 1.7 |
| Pacific Hwy and Albany St | Albany St | E | App | 316 | 180 | 8.6 | 435 | 265 | 9.1 |
| Pacific Hwy and Albany St | Albany St | E | Dep | 499 | 596 | 4.1 | 267 | 344 | 4.4 |
| Pacific Hwy and Albany St | Pacific Hwy | S | App | 1380 | 1238 | 3.9 | 1436 | 1489 | 1.4 |
| Pacific Hwy and Albany St | Combine St | W | App | 722 | 746 | 0.9 | 405 | 336 | 3.6 |
| Pacific Hwy and Albany St | Combine St | W | Dep | 387 | 272 | 6.3 | 631 | 573 | 2.4 |
| Pacific Hwy and Halls Rd | Pacific Hwy | N | App | 1580 | 1521 | 1.5 | 1414 | 1420 | 0.2 |
| Pacific Hwy and Halls Rd | Pacific Hwy | N | Dep | 1565 | 1545 | 0.5 | 1645 | 1667 | 0.5 |
| Pacific Hwy and Halls Rd | Pacific Hwy | S | App | 1484 | 1409 | 2.0 | 1579 | 1622 | 1.1 |
| Pacific Hwy and Halls Rd | Halls Rd | W | App | 228 | 226 | 0.1 | 162 | 115 | 4.0 |
| Pacific Hwy and Halls Rd | Halls Rd | W | Dep | 125 | 112 | 1.2 | 137 | 139 | 0.2 |
| Pacific Hwy and Hurley Dr | Pacific Hwy | N | App | 1519 | 1493 | 0.7 | 1295 | 1349 | 1.5 |
| Pacific Hwy and Hurley Dr | Hurley Dr | E | App | 117 | 123 | 0.5 | 209 | 272 | 4.1 |
| Pacific Hwy and Hurley Dr | Hurley Dr | E | Dep | 155 | 188 | 2.5 | 108 | 136 | 2.5 |
| Pacific Hwy and Hurley Dr | Pacific Hwy | S | App | 1418 | 1410 | 0.2 | 1376 | 1480 | 2.8 |
| Pacific Hwy and Cook Dr | Pacific Hwy | N | App | 1375 | 1431 | 1.5 | 1295 | 1342 | 1.3 |
| Pacific Hwy and Cook Dr | Cook Dr | E | App | 227 | 197 | 2.1 | 372 | 403 | 1.6 |
| Pacific Hwy and Cook Dr | Cook Dr | E | Dep | 274 | 312 | 2.2 | 162 | 246 | 5.9 |
| Pacific Hwy and Cook Dr | Pacific Hwy | S | App | 1397 | 1393 | 0.1 | 1200 | 1279 | 2.2 |
| Pacific Hwy and Cook Dr | Cook Dr | W | App | 378 | 337 | 2.2 | 378 | 324 | 2.9 |
| Pacific Hwy and Cook Dr | Cook Dr | W | Dep | 496 | 466 | 1.4 | 246 | 271 | 1.6 |
| Pacific Hwy and Stadium Dr | Pacific Hwy | N | App | 984 | 886 | 3.2 | 1377 | 1251 | 3.5 |
| Pacific Hwy and Stadium Dr | Stadium Dr | E | App | 336 | 289 | 2.7 | 419 | 293 | 6.7 |
| Pacific Hwy and Stadium Dr | Stadium Dr | E | Dep | 627 | 582 | 1.8 | 363 | 326 | 2.0 |

| Intersection | Road | App | Dir | AM | | | PM | | |
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| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Pacific Hwy and Stadium Dr | Englands Rd | W | App | 195 | 95 | 8.3 | 347 | 215 | 7.9 |
| Pacific Hwy and Stadium Dr | Englands Rd | W | Dep | 229 | 225 | 0.3 | 100 | 106 | 0.6 |
| Pacific Hwy and Lindsays Rd | Pacific Hwy | N | Dep | 669 | 671 | 0.1 | 286 | 321 | 2.0 |
| Pacific Hwy and Lindsays Rd | Lindsays Rd | E | App | 680 | 666 | 0.5 | 459 | 456 | 0.1 |
| Pacific Hwy and Lindsays Rd | Pacific Hwy | S | App | 72 | 161 | 8.2 | 75 | 121 | 4.6 |
| Pacific Hwy and Lindsays Rd | Lindsays Rd | W | App | 411 | 330 | 4.2 | 152 | 173 | 1.6 |
| Pacific Hwy and Lindsays Rd | Lindsays Rd | W | Dep | 249 | 229 | 1.3 | 247 | 244 | 0.2 |
| Pacific Hwy and Lindsays Rd | Pacific Hwy | N | App | 326 | 264 | 3.6 | 466 | 443 | 1.1 |
| Pacific Hwy and Lindsays Rd | Pacific Hwy | N | Dep | 16 | 0 | 5.7 | 18 | 7 | 3.1 |
| Pacific Hwy and Lindsays Rd | Lindsays Rd | E | App | 603 | 591 | 0.5 | 377 | 343 | 1.8 |
| Pacific Hwy and Lindsays Rd | Lindsays Rd | E | Dep | 374 | 351 | 1.2 | 408 | 406 | 0.1 |
| Pacific Hwy and Lindsays Rd | Pacific Hwy | S | Dep | 104 | 92 | 1.2 | 111 | 101 | 1.0 |
| Pacific Hwy and Lindsays Rd | Lindsays Rd | W | App | 245 | 253 | 0.5 | 153 | 182 | 2.2 |
| Pacific Hwy and Lyons Rd | Pacific Hwy | N | Dep | 506 | 458 | 2.2 | 245 | 289 | 2.7 |
| Pacific Hwy and Lyons Rd | Lyons Rd | E | App | 497 | 448 | 2.3 | 357 | 352 | 0.3 |
| Pacific Hwy and Lyons Rd | Pacific Hwy | S | App | 107 | 140 | 3.0 | 139 | 95 | 4.1 |
| Pacific Hwy and Lyons Rd | Pine Creek Way | W | App | 321 | 246 | 4.5 | 195 | 194 | 0.1 |
| Pacific Hwy and Lyons Rd | Pine Creek Way | W | Dep | 217 | 163 | 3.9 | 243 | 202 | 2.7 |
| Pacific Hwy and Lyons Rd | Pacific Hwy | N | App | 228 | 256 | 1.8 | 326 | 373 | 2.5 |
| Pacific Hwy and Lyons Rd | Lyons Rd | E | App | 441 | 407 | 1.7 | 348 | 403 | 2.8 |
| Pacific Hwy and Lyons Rd | Lyons Rd | E | Dep | 291 | 355 | 3.6 | 353 | 401 | 2.5 |
| Pacific Hwy and Lyons Rd | Pacific Hwy | S | Dep | 82 | 75 | 0.8 | 159 | 170 | 0.9 |
| Pacific Hwy and Lyons Rd | Lyons Rd | W | App | 201 | 216 | 1.0 | 203 | 150 | 4.0 |
| Pacific Hwy and Grafton St and Valley St | Pacific Hwy | N | App | 1364 | 1324 | 1.1 | 1245 | 1139 | 3.1 |
| Pacific Hwy and Grafton St and Valley St | Grafton St | N | App | 2 | 3 | 0.6 | 7 | 1 | 3.0 |
| Pacific Hwy and Grafton St and Valley St | Valley St | E | App | 8 | 6 | 0.8 | 9 | 6 | 1.1 |
| Pacific Hwy and Grafton St and Valley St | Valley St | E | Dep | 1 | 5 | 2.3 | 8 | 7 | 0.4 |
| Pacific Hwy and Grafton St and Valley St | Ridge St | S | App | 1 | 8 | 3.3 | 3 | 5 | 1.0 |
| Pacific Hwy and Grafton St and Valley St | Ridge St | S | Dep | 6 | 19 | 3.7 | 10 | 38 | 5.7 |
| Pacific Hwy and Grafton St and Valley St | Pacific Hwy | S | App | 1380 | 1229 | 4.2 | 1436 | 1474 | 1.0 |
| Pacific Hwy and Grafton St and Valley St | Pacific Hwy | S | Dep | 1368 | 1314 | 1.5 | 1246 | 1109 | 4.0 |
| Pacific Hwy and Market St | Market St | E | App | 25 | 19 | 1.3 | 62 | 47 | 2.0 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Pacific Hwy and Market St | Market St | E | Dep | 163 | 172 | 0.7 | 77 | 145 | 6.5 |
| Pacific Hwy and Market St | Market St | W | App | 69 | 99 | 3.3 | 60 | 41 | 2.7 |
| Pacific Hwy and Market St | Market St | W | Dep | 15 | 27 | 2.6 | 5 | 6 | 0.4 |
| Pacific Hwy and Vernon St | Vernon St | E | App | 56 | 40 | 2.3 | 124 | 120 | 0.4 |
| Pacific Hwy and Vernon St | Vernon St | E | Dep | 15 | 0 | 5.5 | 27 | 0 | 7.3 |
| Pacific Hwy and Bay Dr | Pacific Hwy | N | App | 2183 | 2263 | 1.7 | 1020 | 967 | 1.7 |
| Pacific Hwy and Bay Dr | Bay Dr | E | App | 96 | 87 | 0.9 | 89 | 71 | 2.0 |
| Pacific Hwy and Bay Dr | Bay Dr | E | Dep | 92 | 71 | 2.3 | 96 | 56 | 4.6 |
| Pacific Hwy and Bay Dr | Pacific Hwy | S | App | 856 | 929 | 2.4 | 1785 | 1786 | 0.0 |
| Pacific Hwy and W Korora Rd | Pacific Hwy | N | App | 2190 | 2290 | 2.1 | 1049 | 974 | 2.4 |
| Pacific Hwy and W Korora Rd | Pacific Hwy | S | App | 838 | 930 | 3.1 | 1792 | 1799 | 0.2 |
| Pacific Hwy and W Korora Rd | Pacific Hwy | S | Dep | 2187 | 2298 | 2.3 | 1046 | 973 | 2.3 |
| Pacific Hwy and W Korora Rd | W Korora Rd | W | App | 11 | 14 | 0.8 | 12 | 2 | 3.8 |
| Pacific Hwy and W Korora Rd | W Korora Rd | W | Dep | 7 | 3 | 1.8 | 17 | 19 | 0.5 |
| Hogbin Dr and Orlando St | Hogbin Dr | N | App | 648 | 653 | 0.2 | 541 | 522 | 0.8 |
| Hogbin Dr and Orlando St | Hogbin Dr | N | Dep | 591 | 589 | 0.1 | 830 | 896 | 2.2 |
| Hogbin Dr and Orlando St | Orlando St | E | App | 325 | 392 | 3.5 | 412 | 501 | 4.2 |
| Hogbin Dr and Orlando St | Orlando St | E | Dep | 430 | 420 | 0.5 | 337 | 346 | 0.5 |
| Hogbin Dr and Orlando St | Hogbin Dr | S | App | 692 | 680 | 0.5 | 882 | 821 | 2.1 |
| Hogbin Dr and Orlando St | Hogbin Dr | S | Dep | 806 | 731 | 2.7 | 625 | 631 | 0.2 |
| Hogbin Dr and Orlando St | Orlando St | W | App | 566 | 484 | 3.6 | 436 | 404 | 1.6 |
| Hogbin Dr and Orlando St | Orlando St | W | Dep | 404 | 474 | 3.3 | 479 | 377 | 4.9 |
| Orlando St and Marina Dr | Orlando St | N | App | 402 | 406 | 0.2 | 368 | 304 | 3.5 |
| Orlando St and Marina Dr | Orlando St | N | Dep | 244 | 356 | 6.5 | 281 | 361 | 4.5 |
| Orlando St and Marina Dr | Marina Dr | E | App | 145 | 185 | 3.1 | 274 | 264 | 0.6 |
| Orlando St and Marina Dr | Marina Dr | E | Dep | 162 | 206 | 3.2 | 265 | 266 | 0.1 |
| Orlando St and Marina Dr | Orlando St | S | App | 247 | 360 | 6.5 | 283 | 407 | 6.7 |
| Orlando St and Marina Dr | Orlando St | S | Dep | 388 | 393 | 0.3 | 379 | 349 | 1.6 |
| Hogbin Dr and Harbour Dr | Hogbin Dr | N | App | 799 | 756 | 1.5 | 651 | 645 | 0.2 |
| Hogbin Dr and Harbour Dr | Hogbin Dr | N | Dep | 696 | 705 | 0.3 | 782 | 846 | 2.2 |
| Hogbin Dr and Harbour Dr | Harbour Dr | E | App | 549 | 374 | 8.1 | 580 | 390 | 8.6 |
| Hogbin Dr and Harbour Dr | Harbour Dr | E | Dep | 575 | 651 | 3.1 | 587 | 586 | 0.0 |
| Hogbin Dr and Harbour Dr | Hogbin Dr | S | App | 879 | 781 | 3.4 | 788 | 827 | 1.4 |
| Hogbin Dr and Harbour Dr | Hogbin Dr | S | Dep | 823 | 676 | 5.4 | 782 | 626 | 5.9 |
| Hogbin Dr and Harbour Dr | Harbour Dr | W | App | 513 | 652 | 5.8 | 688 | 681 | 0.3 |
| Hogbin Dr and Harbour Dr | Harbour Dr | W | Dep | 646 | 526 | 5.0 | 556 | 491 | 2.8 |
| Albany St and Hogbin Dr and City Hill Dr | Albany St | N W | App | 478 | 464 | 0.6 | 431 | 462 | 1.5 |
| Albany St and Hogbin Dr and City Hill Dr | Albany St | N W | Dep | 708 | 605 | 4.0 | 478 | 389 | 4.3 |
| Albany St and Hogbin Dr and City Hill Dr | Hobgin Dr | N | App | 848 | 806 | 1.5 | 817 | 659 | 5.8 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Albany St and Hogbin Dr and City Hill Dr | Hobgin Dr | N | Dep | 938 | 788 | 5.1 | 821 | 822 | 0.0 |
| Albany St and Hogbin Dr and City Hill Dr | Howard St | E | App | 49 | 32 | 2.7 | 53 | 60 | 0.9 |
| Albany St and Hogbin Dr and City Hill Dr | Howard St | E | Dep | 38 | 35 | 0.5 | 40 | 61 | 3.0 |
| Albany St and Hogbin Dr and City Hill Dr | Hogbin Dr | S | App | 1412 | 1361 | 1.4 | 1103 | 1151 | 1.4 |
| Albany St and Hogbin Dr and City Hill Dr | City Hill Dr | W | App | 11 | 1 | 4.1 | 31 | 0 | 7.9 |
| Albany St and Hogbin Dr and City Hill Dr | City Hill Dr | W | Dep | 8 | 2 | 2.7 | 3 | 6 | 1.4 |
| Hogbin Dr and Sawtell Rd | Hogbin Dr | N | App | 514 | 505 | 0.4 | 1074 | 1117 | 1.3 |
| Hogbin Dr and Sawtell Rd | Hogbin Dr | N | Dep | 1205 | 1278 | 2.1 | 658 | 642 | 0.6 |
| Hogbin Dr and Sawtell Rd | Sawtell Rd | E | App | 570 | 631 | 2.5 | 397 | 382 | 0.8 |
| Hogbin Dr and Sawtell Rd | Sawtell Rd | E | Dep | 229 | 306 | 4.7 | 429 | 595 | 7.3 |
| Hogbin Dr and Sawtell Rd | Hogbin Dr | S | App | 819 | 833 | 0.5 | 521 | 537 | 0.7 |
| Hogbin Dr and Sawtell Rd | Sawtell Rd | W | App | 454 | 490 | 1.7 | 439 | 403 | 1.8 |
| Hogbin Dr and Sawtell Rd | Sawtell Rd | W | Dep | 366 | 347 | 1.0 | 475 | 370 | 5.1 |
| Lyons Rd and Hogbin Dr | Lyons Rd | N | App | 266 | 245 | 1.3 | 246 | 259 | 0.8 |
| Lyons Rd and Hogbin Dr | Lyons Rd | N | Dep | 208 | 183 | 1.8 | 313 | 314 | 0.1 |
| Lyons Rd and Hogbin Dr | Hogbin Dr | E | App | 158 | 115 | 3.7 | 386 | 368 | 0.9 |
| Lyons Rd and Hogbin Dr | Hogbin Dr | E | Dep | 355 | 333 | 1.2 | 216 | 189 | 1.9 |
| Lyons Rd and Hogbin Dr | Lyons Rd | S | App | 359 | 324 | 1.9 | 255 | 232 | 1.5 |
| Lyons Rd and Hogbin Dr | Lyons Rd | S | Dep | 220 | 167 | 3.8 | 358 | 355 | 0.2 |
| York St and Arthur St | Arthur St | E | App | 324 | 382 | 3.1 | 390 | 373 | 0.9 |
| York St and Arthur St | Arthur St | E | Dep | 342 | 289 | 3.0 | 323 | 266 | 3.3 |
| York St and Arthur St | York St | S | App | 42 | 79 | 4.8 | 61 | 94 | 3.7 |
| York St and Arthur St | York St | S | Dep | 24 | 23 | 0.2 | 55 | 36 | 2.8 |
| York St and Arthur St | Arthur St | W | App | 357 | 309 | 2.6 | 368 | 296 | 4.0 |
| Spagnolos Rd and Corramba Rd | Spagnolos Rd | N | App | 7 | 23 | 4.1 | 3 | 2 | 0.6 |
| Spagnolos Rd and Corramba Rd | Spagnolos Rd | N | Dep | 9 | 7 | 0.7 | 5 | 10 | 1.8 |
| Spagnolos Rd and Corramba Rd | Corramba Rd | E | App | 145 | 158 | 1.1 | 385 | 379 | 0.3 |
| Spagnolos Rd and Corramba Rd | Corramba Rd | W | App | 494 | 514 | 0.9 | 197 | 208 | 0.8 |
| Spagnolos Rd and Corramba Rd | Corramba Rd | W | Dep | 146 | 153 | 0.6 | 386 | 370 | 0.8 |
| Roselands Dr and Coramba Rd | Roselands Dr | N | App | 70 | 50 | 2.6 | 22 | 15 | 1.6 |
| Roselands Dr and Coramba Rd | Roselands Dr | N | Dep | 25 | 35 | 1.8 | 48 | 30 | 2.9 |
| Roselands Dr and Coramba Rd | Coramba Rd | E | App | 155 | 161 | 0.5 | 420 | 405 | 0.7 |
| Roselands Dr and Coramba Rd | Coramba Rd | E | Dep | 555 | 556 | 0.0 | 216 | 218 | 0.1 |
| Roselands Dr and Coramba Rd | Coramba Rd | W | App | 502 | 538 | 1.6 | 203 | 210 | 0.5 |
| Loaders Ln and Coramba Rd | Loaders Ln | N | App | 42 | 53 | 1.6 | 23 | 15 | 1.8 |
| Loaders Ln and Coramba Rd | Loaders Ln | N | Dep | 20 | 19 | 0.2 | 38 | 32 | 1.0 |

| | | | | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| **Intersection** | **Road** | **App** | **Dir** | **Obs** | **Mod** | **GEH** | **Obs** | **Mod** | **GEH** |
| Loaders Ln and Coramba Rd | Coramba Rd | E | App | 183 | 195 | 0.9 | 454 | 457 | 0.1 |
| Loaders Ln and Coramba Rd | Coramba Rd | E | Dep | 610 | 651 | 1.6 | 236 | 251 | 1.0 |
| Loaders Ln and Coramba Rd | Coramba Rd | W | App | 579 | 600 | 0.9 | 224 | 238 | 0.9 |
| Loaders Ln and Coramba Rd | Coramba Rd | W | Dep | 174 | 177 | 0.2 | 427 | 427 | 0.0 |
| Robin St and Coramba Rd | Robin St | N | App | 179 | 130 | 3.9 | 100 | 123 | 2.2 |
| Robin St and Coramba Rd | Robin St | N | Dep | 210 | 190 | 1.4 | 94 | 68 | 2.9 |
| Robin St and Coramba Rd | Coramba Rd | E | App | 327 | 338 | 0.6 | 639 | 613 | 1.0 |
| Robin St and Coramba Rd | Coramba Rd | E | Dep | 860 | 742 | 4.2 | 341 | 408 | 3.5 |
| Robin St and Coramba Rd | Gailer Dr | S | App | 97 | 24 | 9.4 | 96 | 69 | 3.0 |
| Robin St and Coramba Rd | Gailer Dr | S | Dep | 121 | 183 | 5.0 | 83 | 23 | 8.2 |
| Robin St and Coramba Rd | Coramba Rd | W | App | 866 | 883 | 0.6 | 334 | 323 | 0.6 |
| Robin St and Coramba Rd | Coramba Rd | W | Dep | 278 | 263 | 0.9 | 651 | 625 | 1.0 |
| Azalea Ave and Coramba Rd | Coramba Rd | E | App | 154 | 233 | 5.7 | 383 | 476 | 4.5 |
| Azalea Ave and Coramba Rd | Coramba Rd | E | Dep | 588 | 590 | 0.1 | 253 | 318 | 3.8 |
| Azalea Ave and Coramba Rd | Azalea Ave | S | App | 259 | 196 | 4.2 | 446 | 291 | 8.1 |
| Azalea Ave and Coramba Rd | Azalea Ave | S | Dep | 385 | 288 | 5.3 | 282 | 224 | 3.6 |
| Azalea Ave and Coramba Rd | Coramba Rd | W | App | 871 | 791 | 2.8 | 352 | 428 | 3.8 |
| Azalea Ave and Coramba Rd | Coramba Rd | W | Dep | 311 | 342 | 1.7 | 646 | 647 | 0.0 |
| Lyster St and Coramba Rd | Coramba Rd | E | App | 206 | 241 | 2.3 | 386 | 462 | 3.7 |
| Lyster St and Coramba Rd | Lyster St | S | App | 96 | 80 | 1.7 | 158 | 191 | 2.5 |
| Lyster St and Coramba Rd | Lyster St | S | Dep | 156 | 179 | 1.8 | 109 | 158 | 4.2 |
| Lyster St and Coramba Rd | Coramba Rd | W | App | 638 | 548 | 3.7 | 337 | 318 | 1.0 |
| Lyster St and Coramba Rd | Coramba Rd | W | Dep | 225 | 228 | 0.2 | 443 | 446 | 0.1 |
| Moonee St and Coramba Rd | Moonee St | N | App | 347 | 248 | 5.7 | 387 | 233 | 8.7 |
| Moonee St and Coramba Rd | Moonee St | S | App | 398 | 325 | 3.8 | 443 | 416 | 1.3 |
| Moonee St and Coramba Rd | Coramba Rd | W | App | 526 | 463 | 2.8 | 364 | 369 | 0.3 |
| Gordon St and Harbour Dr | Gordon St | N | App | 561 | 553 | 0.3 | 674 | 692 | 0.7 |
| Gordon St and Harbour Dr | Gordon St | N | Dep | 718 | 682 | 1.4 | 705 | 675 | 1.1 |
| Gordon St and Harbour Dr | Harbour Dr | E | App | 583 | 460 | 5.4 | 700 | 505 | 7.9 |
| Gordon St and Harbour Dr | Gordon St | S | App | 446 | 426 | 1.0 | 470 | 465 | 0.2 |
| Gordon St and Harbour Dr | Gordon St | S | Dep | 372 | 170 | 12.3 | 522 | 267 | 12.8 |
| Gordon St and Harbour Dr | Harbour Dr | W | App | 285 | 304 | 1.1 | 262 | 241 | 1.3 |
| Gordon St and Park Ave | Gordon St | N | App | 342 | 168 | 10.9 | 520 | 337 | 8.8 |
| Gordon St and Park Ave | Gordon St | N | Dep | 495 | 521 | 1.2 | 477 | 400 | 3.7 |
| Gordon St and Park Ave | Park Ave | E | App | 113 | 123 | 0.9 | 156 | 254 | 6.8 |
| Gordon St and Park Ave | Park Ave | E | Dep | 187 | 210 | 1.6 | 249 | 152 | 6.9 |
| Gordon St and Park Ave | Gordon St | S | App | 510 | 461 | 2.2 | 388 | 326 | 3.3 |
| Gordon St and Park Ave | Gordon St | S | Dep | 380 | 309 | 3.8 | 453 | 440 | 0.6 |
| Gordon St and Park Ave | Park Ave | W | App | 368 | 446 | 3.9 | 503 | 384 | 5.7 |
| Gordon St and Park Ave | Park Ave | W | Dep | 271 | 158 | 7.7 | 388 | 308 | 4.3 |
| Earl St and Harbour Dr | Earl St | N | App | 59 | 53 | 0.8 | 248 | 253 | 0.3 |
| Earl St and Harbour Dr | Earl St | N | Dep | 119 | 171 | 4.3 | 185 | 253 | 4.6 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Earl St and Harbour Dr | Harbour Dr | E | App | 620 | 384 | 10.5 | 597 | 435 | 7.1 |
| Earl St and Harbour Dr | Harbour Dr | E | Dep | 653 | 751 | 3.7 | 759 | 634 | 4.7 |
| Earl St and Harbour Dr | Earl St | S | App | 439 | 407 | 1.6 | 476 | 235 | 12.8 |
| Earl St and Harbour Dr | Earl St | S | Dep | 314 | 193 | 7.6 | 312 | 264 | 2.8 |
| Earl St and Harbour Dr | Harbour Dr | W | App | 542 | 729 | 7.4 | 576 | 737 | 6.3 |
| Earl St and Albany St | Earl St | N | App | 225 | 263 | 2.4 | 292 | 331 | 2.2 |
| Earl St and Albany St | Earl St | N | Dep | 496 | 545 | 2.1 | 385 | 282 | 5.6 |
| Earl St and Albany St | Albany St | E | App | 626 | 548 | 3.2 | 521 | 475 | 2.1 |
| Earl St and Albany St | Albany St | E | Dep | 515 | 555 | 1.7 | 438 | 470 | 1.5 |
| Earl St and Albany St | Earl St | S | App | 406 | 444 | 1.8 | 357 | 222 | 7.9 |
| Earl St and Albany St | Earl St | S | Dep | 260 | 203 | 3.7 | 314 | 334 | 1.1 |
| Earl St and Albany St | Albany St | W | App | 488 | 256 | 12.0 | 423 | 287 | 7.2 |
| Gordon St and Albany St | Gordon St | N | App | 329 | 299 | 1.7 | 437 | 435 | 0.1 |
| Gordon St and Albany St | Gordon St | N | Dep | 549 | 447 | 4.6 | 379 | 321 | 3.1 |
| Gordon St and Albany St | Albany St | E | App | 454 | 208 | 13.5 | 464 | 235 | 12.2 |
| Gordon St and Albany St | Gordon St | S | App | 164 | 161 | 0.2 | 65 | 67 | 0.2 |
| Gordon St and Albany St | Gordon St | S | Dep | 153 | 250 | 6.8 | 84 | 253 | 13.0 |
| Gordon St and Albany St | Albany St | W | App | 547 | 561 | 0.6 | 350 | 473 | 6.1 |
| Gordon St and Albany St | Albany St | W | Dep | 289 | 265 | 1.4 | 427 | 342 | 4.3 |
| Pacific Hwy (16.1) - 1km South Of Moonee Beach | Pacific Hwy | | NB | 573 | 675 | 4.1 | 1128 | 1207 | 2.3 |
| Pacific Hwy (16.1) - 1km South Of Moonee Beach | Pacific Hwy | | SB | 1296 | 1451 | 4.2 | 765 | 783 | 0.6 |
| Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | Hogbin Dr | | NB | 1044 | 1186 | 4.3 | 578 | 647 | 2.8 |
| Hogbin Dr (2.2) - 300m North Of Hi-Tech Dr | Hogbin Dr | | SB | 544 | 575 | 1.3 | 951 | 1059 | 3.4 |
| Bruce King Dr (11.2) - 50m East Of Pacific Hwy | Bruce King Dr | | WB | 32 | 83 | 6.7 | 54 | 76 | 2.7 |
| Bruce King Dr (11.2) - 50m East Of Pacific Hwy | Bruce King Dr | | EB | 107 | 159 | 4.5 | 225 | 251 | 1.7 |
| Pacific Hwy (4.3) - 400m North Of Bonville Station Rd Overpass | Pacific Hwy | | NB | 919 | 976 | 1.9 | 670 | 739 | 2.6 |
| Pacific Hwy (4.3) - 400m North Of Bonville Station Rd Overpass | Pacific Hwy | | SB | 532 | 546 | 0.6 | 909 | 815 | 3.2 |
| Spagnolos Rd (3.1) - 450m North Of Coramba Rd | Spagnolos Rd | | NB | 3 | 15 | 4.0 | 8 | 17 | 2.5 |
| Spagnolos Rd (3.1) - 450m North Of Coramba Rd | Spagnolos Rd | | SB | 11 | 33 | 4.7 | 4 | 4 | 0.0 |
| William Sharp Dr (3.2) - 300m SW Of Sherpards Ln | William Sharp Dr | | NB | 41 | 45 | 0.6 | 25 | 17 | 1.7 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| William Sharp Dr (3.2) - 300m SW Of Sherpards Ln | William Sharp Dr | | SB | 25 | 18 | 1.5 | 33 | 28 | 0.9 |
| Shephards Ln (3.3) - 300m North Of Coramba Rd | Shephards Ln | | NB | 241 | 245 | 0.3 | 317 | 303 | 0.8 |
| Shephards Ln (3.3) - 300m North Of Coramba Rd | Shephards Ln | | SB | 336 | 313 | 1.3 | 277 | 237 | 2.5 |
| Robin St (3.4) - 400m North Of Coramba Rd | Robin St | | NB | 132 | 85 | 4.5 | 73 | 58 | 1.9 |
| Robin St (3.4) - 400m North Of Coramba Rd | Robin St | | SB | 143 | 113 | 2.7 | 88 | 65 | 2.6 |
| Gundagai St (3.5) - 100m West Of Murdock St | Gundagai St | | WB | 172 | 233 | 4.3 | 390 | 417 | 1.3 |
| Gundagai St (3.5) - 100m West Of Murdock St | Gundagai St | | EB | 500 | 450 | 2.3 | 307 | 266 | 2.4 |
| Orlando St (3.8) - 50m South Of Vost St | Orlando St | | NB | 271 | 350 | 4.5 | 419 | 519 | 4.6 |
| Orlando St (3.8) - 50m South Of Vost St | Orlando St | | SB | 556 | 489 | 2.9 | 364 | 280 | 4.7 |
| Macauleys Headland Dr (9.3) - 20m East Of Pacific Hwy | Macauleys Headland Dr | | WB | 3 | 0 | 2.4 | 4 | 0 | 2.8 |
| Macauleys Headland Dr (9.3) - 20m East Of Pacific Hwy | Macauleys Headland Dr | | EB | 54 | 62 | 1.1 | 22 | 9 | 3.3 |
| Thompsons Rd (8.10) - 20m East Of Pacific Hwy | Thompsons Rd | | WB | 259 | 219 | 2.6 | 241 | 338 | 5.7 |
| Thompsons Rd (8.10) - 20m East Of Pacific Hwy | Thompsons Rd | | EB | 312 | 342 | 1.7 | 263 | 199 | 4.2 |
| Arthur St (12.1) - 40m West Of Hogbin Dr N | Arthur St | | WB | 356 | 387 | 1.6 | 523 | 563 | 1.7 |
| Arthur St (12.1) - 40m West Of Hogbin Dr N | Arthur St | | EB | 482 | 389 | 4.5 | 371 | 276 | 5.3 |
| Park Beach Rd (12.2) - 40m West Of Hogbin Dr N | Park Beach Rd | | WB | 232 | 198 | 2.3 | 283 | 275 | 0.5 |
| Park Beach Rd (12.2) - 40m West Of Hogbin Dr N | Park Beach Rd | | EB | 215 | 258 | 2.8 | 304 | 303 | 0.1 |
| Boultwood St (12.3) - 30m West Of Hogbin Dr N | Boultwood St | | WB | 16 | 14 | 0.5 | 37 | 46 | 1.4 |
| Boultwood St (12.3) - 30m West Of Hogbin Dr N | Boultwood St | | EB | 19 | 10 | 2.4 | 21 | 46 | 4.3 |
| Prince St (12.4) - 30m West Of Hogbin Dr N | Prince St | | WB | 26 | 34 | 1.5 | 53 | 66 | 1.7 |
| Prince St (12.4) - 30m West Of Hogbin Dr N | Prince St | | EB | 49 | 59 | 1.4 | 39 | 22 | 3.1 |

| Intersection | Road | App | Dir | AM Obs | AM Mod | AM GEH | PM Obs | PM Mod | PM GEH |
|---|---|---|---|---|---|---|---|---|---|
| Watsonia Ave (12.6) - 60m NE Of Gentlemen St | Watsonia Ave | | NB | 16 | 22 | 1.4 | 23 | 20 | 0.6 |
| Watsonia Ave (12.6) - 60m NE Of Gentlemen St | Watsonia Ave | | SB | 2 | 0 | 2.0 | 2 | 0 | 2.0 |
| Watsonia Ave (12.7) - Just West of Hogbin Dr | Watsonia Ave | | WB | 58 | 88 | 3.5 | 65 | 61 | 0.5 |
| Watsonia Ave (12.7) - Just West of Hogbin Dr | Watsonia Ave | | EB | 39 | 67 | 3.8 | 24 | 41 | 3.0 |
| Pacific Hwy (29.1) - 700m South Of Stadium Dr | Pacific Hwy | | NB | 1887 | 1828 | 1.4 | 1051 | 1131 | 2.4 |
| Pacific Hwy (29.1) - 700m South Of Stadium Dr | Pacific Hwy | | SB | 944 | 953 | 0.3 | 1621 | 1507 | 2.9 |
| N Boambee Rd (29.2) - 100m West Of Highlander Dr | N Boambee Rd | | WB | 11 | 8 | 1.0 | 17 | 12 | 1.3 |
| N Boambee Rd (29.2) - 100m West Of Highlander Dr | N Boambee Rd | | EB | 22 | 26 | 0.8 | 18 | 1 | 5.5 |
| Bennetts Rd (29.5) - 200m West Of Coramba Rd | Bennetts Rd | | WB | 7 | 2 | 2.4 | 14 | 31 | 3.6 |
| Bennetts Rd (29.5) - 200m West Of Coramba Rd | Bennetts Rd | | EB | 15 | 41 | 4.9 | 15 | 18 | 0.7 |
| Englands Rd (6.5) - 400m West Of Isles Dr | Englands Rd | | WB | 17 | 31 | 2.9 | 29 | 42 | 2.2 |
| Englands Rd (6.5) - 400m West Of Isles Dr | Englands Rd | | EB | 32 | 40 | 1.3 | 25 | 30 | 1.0 |
| Blacker Close (15.1) - 50m East Of Donn-Patterson Dr | Blacker Close | | WB | 77 | 84 | 0.8 | 45 | 36 | 1.4 |
| Blacker Close (15.1) - 50m East Of Donn-Patterson Dr | Blacker Close | | EB | 32 | 28 | 0.7 | 62 | 81 | 2.2 |
| Lamberts Rd (15.2) - 30m East Of Sawtell Rd | Lamberts Rd | | WB | 136 | 129 | 0.6 | 68 | 61 | 0.9 |
| Lamberts Rd (15.2) - 30m East Of Sawtell Rd | Lamberts Rd | | EB | 59 | 54 | 0.7 | 115 | 94 | 2.1 |
| Royal Palm Dr (15.3) - 20m West Of Lyons Rd | Royal Palm Dr | | WB | 33 | 27 | 1.1 | 70 | 58 | 1.5 |
| Royal Palm Dr (15.3) - 20m West Of Lyons Rd | Royal Palm Dr | | EB | 73 | 74 | 0.1 | 42 | 34 | 1.3 |
| Lake Dr (15.5) - 50m North Of N Boambee Rd | Lake Dr | | NB | 46 | 43 | 0.4 | 80 | 79 | 0.1 |
| Lake Dr (15.5) - 50m North Of N Boambee Rd | Lake Dr | | SB | 107 | 78 | 3.0 | 58 | 57 | 0.1 |
| Hi-Tech Dr (14.1) - 30m West Of Hogbin Dr | Hi-Tech Dr | | WB | 166 | 265 | 6.7 | 109 | 117 | 0.8 |

| Intersection | Road | App | Dir | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs | Mod | GEH | Obs | Mod | GEH |
| Hi-Tech Dr (14.1) - 30m West Of Hogbin Dr | Hi-Tech Dr | | EB | 109 | 103 | 0.6 | 189 | 194 | 0.4 |
| Amaroo Cresent (14.5) - 30m West Of Toormina Rd | Amaroo Cresent | | WB | 107 | 87 | 2.0 | 100 | 193 | 7.7 |
| Amaroo Cresent (14.5) - 30m West Of Toormina Rd | Amaroo Cresent | | EB | 186 | 244 | 4.0 | 63 | 81 | 2.1 |
| Kintorie Cresent (14.6) - 30m West Of Toormina Rd | Kintorie Cresent | | WB | 16 | 10 | 1.7 | 35 | 107 | 8.5 |
| Kintorie Cresent (14.6) - 30m West Of Toormina Rd | Kintorie Cresent | | EB | 51 | 13 | 6.7 | 20 | 76 | 8.1 |
| Mirroola Cresent (14.7) - 30m west of Toormina Rd | Mirroola Cresent | | WB | 37 | 7 | 6.4 | 42 | 42 | 0.0 |
| Mirroola Cresent (14.7) - 30m west of Toormina Rd | Mirroola Cresent | | EB | 51 | 67 | 2.1 | 37 | 12 | 5.1 |
| Linden Ave (14.8) - 30m West Of Toormina Rd | Linden Ave | | WB | 186 | 148 | 2.9 | 169 | 130 | 3.2 |
| Linden Ave (14.8) - 30m West Of Toormina Rd | Linden Ave | | EB | 222 | 149 | 5.4 | 126 | 179 | 4.3 |
| Playford Ave (14.9) - 30m West of Toormina Rd | Playford Ave | | WB | 26 | 17 | 1.9 | 58 | 51 | 0.9 |
| Playford Ave (14.9) - 30m West of Toormina Rd | Playford Ave | | EB | 78 | 65 | 1.5 | 50 | 34 | 2.5 |
| Hogbin Drive mid block between Prince St and Boultwood St | Hogbin Drive | | SB | 568 | 575 | 0.3 | 538 | 483 | 2.4 |
| Hogbin Drive mid block between Prince St and Boultwood St | Hogbin Drive | | NB | 549 | 505 | 1.9 | 679 | 789 | 4.1 |
| Park Beach Road mid block Hogbin Drive to Ocean Parade | Park Beach Road | | WB | 80 | 111 | 3.2 | 74 | 134 | 5.9 |
| Park Beach Road mid block Hogbin Drive to Ocean Parade | Park Beach Road | | EB | 94 | 78 | 1.7 | 134 | 129 | 0.4 |
| BP service Stn entrance Pacific Hwy 300m north of Englands Rd | Kindell Place | | NB | 88 | 73 | 1.7 | 71 | 65 | 0.7 |
| Phil Hawthorne Drive 200m north of Stadium Drive | Phil Hawthorne Drive | | SB | 25 | 27 | 0.4 | 192 | 170 | 1.6 |
| Phil Hawthorne Drive 200m north of Stadium Drive | Phil Hawthorne Drive | | NB | 159 | 183 | 1.8 | 25 | 25 | 0.0 |

# F2 Screenline Volume Comparisons

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 1 North/south - north of Bruxner Park Road (AM) | Northbound | Pacific Hwy | 724 | 758 | 34 | 5% | 1.2 |
| | Northbound | James Small Dr | 100 | 147 | 47 | 47% | 4.2 |
| | **Northbound** | **TOTAL** | **824** | **905** | **81** | **10%** | **2.8** |
| | Southbound | Pacific Hwy | 2015 | 2033 | 18 | 1% | 0.4 |
| | Southbound | James Small Dr | 163 | 197 | 34 | 21% | 2.5 |
| | **Southbound** | **TOTAL** | **2178** | **2230** | **52** | **2%** | **1.1** |
| | **Overall** | **TOTAL** | **3002** | **3135** | **133** | **4%** | **2.4** |

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 2 North/south - across Coffs Creek (AM) | Northbound | Shephards Ln | 241 | 245 | 4 | 2% | 0.3 |
| | Northbound | Robin St | 132 | 85 | -47 | -36% | 4.5 |
| | Northbound | Gundagai St | 172 | 233 | 61 | 35% | 4.3 |
| | Northbound | Pacific Hwy | 1133 | 1106 | -27 | -2% | 0.8 |
| | Northbound | Hogbin Dr | 696 | 705 | 9 | 1% | 0.3 |
| | Northbound | Orlando St | 271 | 350 | 79 | 29% | 4.5 |
| | **Northbound** | **TOTAL** | **2645** | **2724** | **79** | **3%** | **1.5** |
| | Southbound | Shephards Ln | 336 | 313 | -23 | -7% | 1.3 |
| | Southbound | Robin St | 143 | 113 | -30 | -21% | 2.7 |
| | Southbound | Gundagai St | 500 | 450 | -50 | -10% | 2.3 |
| | Southbound | Pacific Hwy | 1979 | 2032 | 53 | 3% | 1.2 |
| | Southbound | Hogbin Dr | 799 | 756 | -43 | -5% | 1.5 |
| | Southbound | Orlando St | 556 | 489 | -67 | -12% | 2.9 |
| | **Southbound** | **TOTAL** | **4313** | **4153** | **-160** | **-4%** | **2.5** |
| | **Overall** | **TOTAL** | **6958** | **6877** | **-81** | **-1%** | **1.0** |

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 3 North/south - south of Englands Road (AM) | Northbound | Pacific Hwy | 1887 | 1828 | -59 | -3% | 1.4 |
| | Northbound | Hogbin Dr | 944 | 953 | 9 | 1% | 0.3 |
| | **Northbound** | **TOTAL** | **2831** | **2781** | **-50** | **-2%** | **0.9** |
| | Southbound | Pacific Hwy | 1038 | 1109 | 71 | 7% | 2.2 |
| | Southbound | Hogbin Dr | 816 | 781 | -35 | -4% | 1.2 |
| | **Southbound** | **TOTAL** | **1854** | **1890** | **36** | **2%** | **0.8** |
| | **Overall** | **TOTAL** | **4685** | **4671** | **-14** | **0%** | **0.2** |

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 4 East/west along western side of Hogbin Drive (AM) | Eastbound | Arthur St | 482 | 389 | -93 | -19% | 4.5 |
| | Eastbound | Park Beach Rd | 215 | 258 | 43 | 20% | 2.8 |
| | Eastbound | Boultwood Dr | 19 | 10 | -9 | -47% | 2.4 |
| | Eastbound | Prince St | 49 | 59 | 10 | 20% | 1.4 |
| | Eastbound | Orlando St | 566 | 484 | -82 | -14% | 3.6 |
| | Eastbound | Watsonia Ave | 39 | 67 | 28 | 72% | 3.8 |
| | Eastbound | Harbour Dr | 513 | 652 | 139 | 27% | 5.8 |
| | Eastbound | Albany St | 478 | 464 | -14 | -3% | 0.6 |
| | Eastbound | Stadium Dr | 434 | 503 | 69 | 16% | 3.2 |
| | **Eastbound** | **TOTAL** | **2795** | **2886** | **91** | **3%** | **1.7** |
| | Westbound | Arthur St | 356 | 387 | 31 | 9% | 1.6 |
| | Westbound | Park Beach Rd | 232 | 198 | -34 | -15% | 2.3 |
| | Westbound | Boultwood Dr | 16 | 14 | -2 | -13% | 0.5 |
| | Westbound | Prince St | 26 | 34 | 8 | 31% | 1.5 |
| | Westbound | Orlando St | 404 | 474 | 70 | 17% | 3.3 |
| | Westbound | Watsonia Ave | 58 | 88 | 30 | 52% | 3.5 |
| | Westbound | Harbour Dr | 646 | 526 | -120 | -19% | 5.0 |
| | Westbound | Albany St | 708 | 605 | -103 | -15% | 4.0 |
| | Westbound | Stadium Dr | 478 | 395 | -83 | -17% | 4.0 |
| | **Westbound** | **TOTAL** | **2924** | **2721** | **-203** | **-7%** | **3.8** |
| | **Overall** | **TOTAL** | **5719** | **5607** | **-112** | **-2%** | **1.5** |

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 1 North/south - north of Bruxner Park Road (PM) | Northbound | Pacific Hwy | 1547 | 1577 | 30 | 2% | 0.8 |
| | Northbound | James Small Dr | 171 | 203 | 32 | 19% | 2.3 |
| | **Northbound** | **TOTAL** | **1718** | **1780** | **62** | **4%** | **1.5** |
| | Southbound | Pacific Hwy | 919 | 846 | -73 | -8% | 2.5 |
| | Southbound | James Small Dr | 92 | 111 | 19 | 21% | 1.9 |
| | **Southbound** | **TOTAL** | **1011** | **957** | **-54** | **-5%** | **1.7** |
| | **Overall** | **TOTAL** | **2729** | **2737** | **8** | **0%** | **0.2** |

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 2 North/south - across Coffs Creek (PM) | Northbound | Shephards Ln | 317 | 303 | -14 | -4% | 0.8 |
| | Northbound | Robin St | 73 | 58 | -15 | -21% | 1.9 |
| | Northbound | Gundagai St | 390 | 417 | 27 | 7% | 1.3 |
| | Northbound | Pacific Hwy | 1642 | 1690 | 48 | 3% | 1.2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Northbound | Hogbin Dr | 782 | 846 | 64 | 8% | 2.2 |
| | Northbound | Orlando St | 419 | 519 | 100 | 24% | 4.6 |
| | **Northbound** | **TOTAL** | **3623** | **3833** | **210** | **6%** | **3.4** |
| | Southbound | Shephards Ln | 277 | 237 | -40 | -14% | 2.5 |
| | Southbound | Robin St | 88 | 65 | -23 | -26% | 2.6 |
| | Southbound | Gundagai St | 307 | 266 | -41 | -13% | 2.4 |
| | Southbound | Pacific Hwy | 1397 | 1594 | 197 | 14% | 5.1 |
| | Southbound | Hogbin Dr | 651 | 645 | -6 | -1% | 0.2 |
| | Southbound | Orlando St | 364 | 280 | -84 | -23% | 4.7 |
| | **Southbound** | **TOTAL** | **3084** | **3087** | **3** | **0%** | **0.1** |
| | **Overall** | **TOTAL** | **6707** | **6920** | **213** | **3%** | **2.6** |

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 3 North/south - south of Englands Road (PM) | Northbound | Pacific Hwy | 1051 | 1131 | 80 | 8% | 2.4 |
| | Northbound | Hogbin Dr | 1621 | 1507 | -114 | -7% | 2.9 |
| | **Northbound** | **TOTAL** | **2672** | **2638** | **-34** | **-1%** | **0.7** |
| | Southbound | Pacific Hwy | 633 | 710 | 77 | 12% | 3.0 |
| | Southbound | Hogbin Dr | 1108 | 1049 | -59 | -5% | 1.8 |
| | **Southbound** | **TOTAL** | **1741** | **1759** | **18** | **1%** | **0.4** |
| | **Overall** | **TOTAL** | **4413** | **4397** | **-16** | **0%** | **0.2** |

| Screenline | Direction | Location | Observed | Modelled | Difference | % Difference | GEH |
|---|---|---|---|---|---|---|---|
| 4 East/west along western side of Hogbin Drive (PM) | Eastbound | Arthur St | 371 | 276 | -95 | -26% | 5.3 |
| | Eastbound | Park Beach Rd | 304 | 303 | -1 | 0% | 0.1 |
| | Eastbound | Boultwood Dr | 21 | 46 | 25 | 119% | 4.3 |
| | Eastbound | Prince St | 39 | 22 | -17 | -44% | 3.1 |
| | Eastbound | Orlando St | 436 | 404 | -32 | -7% | 1.6 |
| | Eastbound | Watsonia Ave | 24 | 41 | 17 | 71% | 3.0 |
| | Eastbound | Harbour Dr | 688 | 681 | -7 | -1% | 0.3 |
| | Eastbound | Albany St | 431 | 462 | 31 | 7% | 1.5 |
| | Eastbound | Stadium Dr | 411 | 425 | 14 | 3% | 0.7 |
| | **Eastbound** | **TOTAL** | **2725** | **2660** | **-65** | **-2%** | **1.3** |
| | Westbound | Arthur St | 523 | 563 | 40 | 8% | 1.7 |
| | Westbound | Park Beach Rd | 283 | 275 | -8 | -3% | 0.5 |
| | Westbound | Boultwood Dr | 37 | 46 | 9 | 24% | 1.4 |
| | Westbound | Prince St | 53 | 66 | 13 | 25% | 1.7 |
| | Westbound | Orlando St | 479 | 377 | -102 | -21% | 4.9 |
| | Westbound | Watsonia Ave | 65 | 61 | -4 | -6% | 0.5 |
| | Westbound | Harbour Dr | 556 | 491 | -65 | -12% | 2.8 |
| | Westbound | Albany St | 478 | 389 | -89 | -19% | 4.3 |
| | Westbound | Stadium Dr | 365 | 254 | -111 | -30% | 6.3 |
| | **Westbound** | **TOTAL** | **2839** | **2522** | **-317** | **-11%** | **6.1** |
| | **Overall** | **TOTAL** | **5564** | **5182** | **-382** | **-7%** | **5.2** |

# Appendix G

CHSTM Model User Guide

# G1 How to install

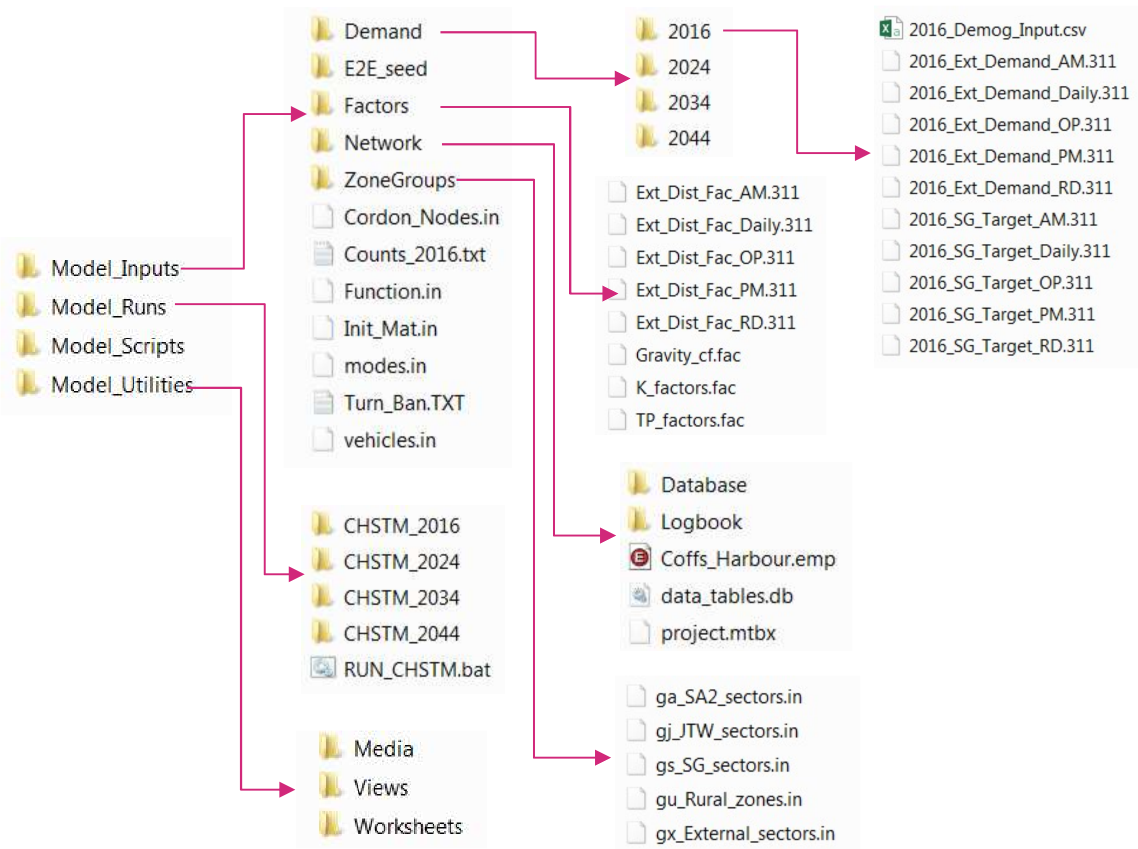
The Coffs Harbour Strategic Transport Model (CHSTM) was developed in python scripts utilising the EMME platform in version 4.2.7. The model should be compatible with slightly earlier version of EMME, but it is suggested to operate the model in EMME v4.2.7 or later versions.

The delivered model will come with a single zip file named “CHSTM.zip” around 18 MB. Unzip the file to a desire folder location and it will create a model folder named “CHSTM” and an excel spreadsheet named “Managing_Coffs_Harbour_Demand_Master_v1.xlsm”.


This document discusses about the model file structure and how to operate the model. For model structure and other detailed technical specifications, please refer to the main document of “Model Development Report”.

# G2 Model file structure

In folder “CHSTM”, it has the following **Main Folders** illustrated in figure below.



**Model_Inputs** folder contains all the necessary model input files just in this location. It includes demand inputs of each model year in the "Demand" subfolder, scenario networks in the "Network" subfolder, factors, coefficients, and parameters in the "Factors" subfolder, and zone partition files in the "ZoneGroups" subfolder. This "Model_Inputs" folder also contains all the important transaction files to establish the database including modes, vehicles, and functions.

**Model_Runs** folder are the location to save all the model run scenarios generated for projects / studies based on defined input files. This folder currently does not contain any completed model run from the supplied model zip file. However it will be discussed in the following contents about how to establish scenario model runs.

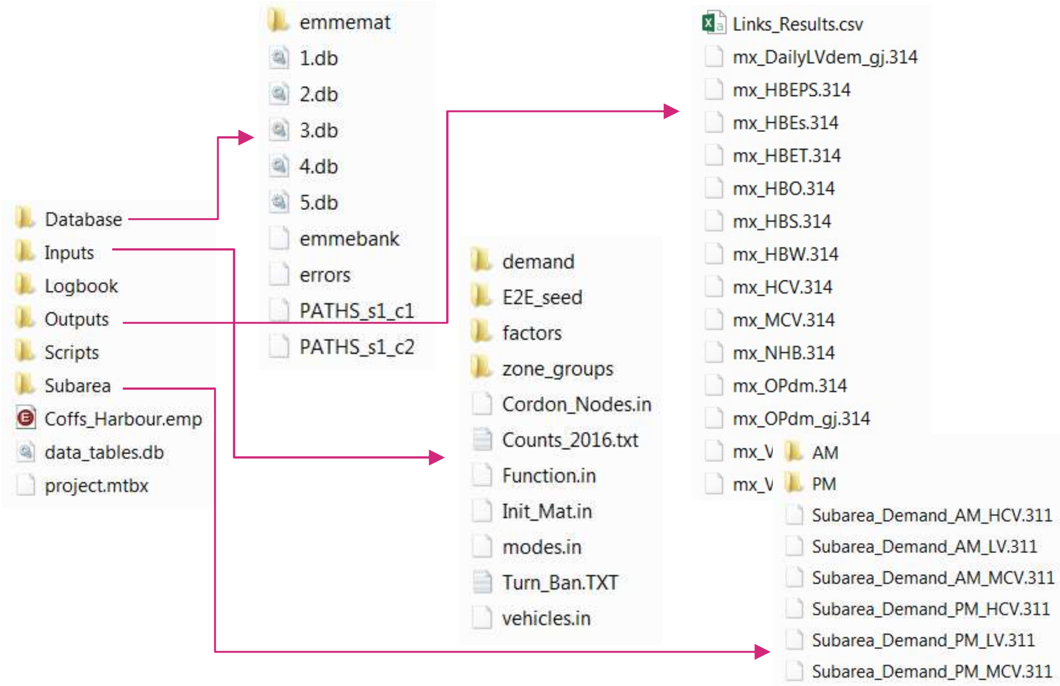
**Model_Scripts** folder contains all the developed python scripts to carry out the model runs. The scripts were named in a numerical order following the procedures of the model run.

| Script group | Script name | Description |
|---|---|---|
| Group 0 – build model | C0_0_build_databank | Batchin volume delay functions, vehicles |
| | C0_1_prepare_network_TP | Create time period scenarios from selected network |
| | C0_2_initialise_all_matrices | Initialise all matrices to allow a clean model run |
| | C0_3_prepare_matrices | Prepare required matrices for a model run |
| Group 1 – trip generation | C1_0_import_demog | Batchin demographic inputs from selected demand files |
| | C1_1_trip_generation | Process trip generations (production & attraction) |
| Group 2 – trip distribution, mode split, external demand process | C2_0_transfer_generalised_cost | Transfer generalised cost from current to previous (not run in the initial run loop) |
| | C2_1_gravity_model | Process trip distribution (running gravity model) |
| | C2_2_mode_calculation | Process mode split (using fixed mode share factors by distance) |
| | C2_3_external_model | Process external traffic demand from selected demand files |
| Group 3 – time period split, special generator process | C3_1_aggregate_demand_TP | Aggregate demand by purpose into vehicle classes |
| | C3_2_special_generator | Process special generator demand from selected demand files |
| | C3_3_add_external_TP | Aggregate external demand to overall demand by vehicle class to be ready for assignment of each time period |
| Group 4 –traffic assignment, calculate generalised cost convergence check | C4_1_prepare_initial_skim | Assign unit matrix to get initial network cost skims (only run once during model establishment) |
| | C4_2_assignment_TP | Process traffic assignment by vehicle class by time period |
| | C4_3_calculate_generalised_cost | Calculate generalised cost of each time period |
| | C4_4_convergence_check | Check model run convergence for each time period |
| Group 5 – result aggregation and export | C5_1_aggregate_result_Daily | Aggregate time period model results to the daily total scenario |
| | C5_2_export_model_results | Export model link results of each time period and daily totals |
| | C5_3_export_e2e_seed | Export external to external demand seeds (only for 2016) |
| | C5_4_calculate_mat_sum | Summarise matrix totals by purpose |
| Group 9 – other utility scripts | C9_0_copy_scenario | Utility script to copy scenario within the databank |
| | C9_0_select_link_TP | Utility script to undertake selectlink analysis |

| | | |
|---|---|---|
| | C9_0_subarea_process | Utility script to extract subarea cordon demand after model run |

**Model_Utilities** folder contains the established worksheets in the "Worksheets" subfolder, supporting shape files in the "Media" subfolder, and predefined view extent in the "Views" subfolder. Files in here are publicly accessible from each scenario model run for easy file maintenance.

Up on the completion of each full model run, a scenario model folder will be generated under the **Model_Runs** folder. Each scenario model will has its own folder following the EMME standard structure. The scenario folder structure is illustrated in the following figure.




**Database** folder contains the modelled scenario emmebank, network shape database files, path files from the assignment process, and the "emmemat" folder contains all the full emme matrices.

**Inputs** folder contains the relevant input files to establish the scenario model run. The files here are generally copies from the main **Model_Inputs** folder with relevant demand inputs from the selected demand scenarios.

**Logbook** folder contains the model run logs. This will be discussed in more details in the later section of this Appendix.

**Outputs** folder saves the model run output files including link results, trip matrices by each trip purposes.

**Script** folder is empty by default but scripts can be saved in this location to perform model runs or processes on an established databank. Model runs through batch file will be based on script in the **Model_Scripts** folder.

**Subarea** folder saves the subarea model databank and extracted subarea demand matrices for mesoscophic model inputs.

# G3 Manage model inputs

The demand and network are the two input variables used to establish model run scenarios during this study. The input files relate to the demand side include demographic and land use data, external traffic demand, and special generators traffic demand. The network include two scenarios as with or without bypass options which are the 2016 base case network to reflect the existing travel condition in 2016, and with Coffs Harbour Bypass built on top of the 2016 base case.

## G3.1 Manage demographic and land use scenarios

The demand inputs are managed in a single spreadsheet named "Managing_Coffs_Harbour_Demand_Master_v1.xlsm". This spreadsheet include the base year demographic and land use of Coffs Harbour in 2016 and the future year forecasts of 2024, 2034, and 2044. It also summarises the totals of each year for comparison and growth rate calculation in tab "Summary_Check". The detailed population and land use categorisation and the process of future year forecast has been documented in the main model development report.

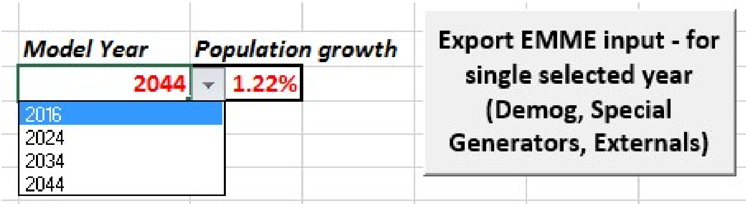
Traffic counts at the external cordon have been used as the external demand inputs into the model. The 2016 traffic counts have been used for the 2016 scenario. The demand of future years has been estimated based on the same population growth rate and used as each relevant future year input.

Similarly, traffic counts at the special generator locations have been used as the special generator inputs into the model. The inputs are used as control totals to control the total vehicle demand in and out of the special generator zones. The 2016 traffic counts have been used for the 2016 scenario. The same population growth rate has been used to estimate the future year demand at special generators.

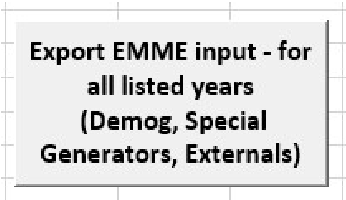
All the above demand data will be managed and processed in the same spreadsheet, and be exported into the EMME compatible input format for model batchin. Should the user needs to make any updates to the future demographic forecast for Coffs Harbour, the changes should be made in the relevant tab of the model year (e.g. tab "Demog_2044"). The spreadsheet will automatically calculate the new growth rate based on new population forecast, and update the external and special generators demand for the relevant model year.

To export demand inputs data for EMME, the user will need to ensure a valid folder location to save the files. The desire location will be .\Model_Inputs\Demand with model year subfolders exist for the relevant model years. Files saved in the location will be accessible during the modelling process.

Then the desire output location need to be specified in cell B2 in tab "Summary_Check". The user then can select the interested model year from a dropdown list in cell B22. Cell C22 will show the calculated population growth rate (compounding growth from base year 2016) for sense checks. Once the model year is selected, click the button "Export EMME input – for single selected year", the excel will save all the demand inputs in EMME format into the folder of the selected year.




User can also click button "Export EMME input – for all listed years" to export the demand for all years at once into each folder of the listed years. It is also ok for the user to insert new model years. However, the same data structure should be maintained.




## G3.2 Manage network scenarios

The network scenarios of CHSTM are managed in a particular EMME databank in the **Network** folder under **Model_Inputs**.

The current model only include two network scenarios as in the following:

- 1011 – 2016 Base Case network
- 1012 – 2016 Base Case network + Coffs Harbour Bypass

The interested network scenario can be specified by inputting the scenario ID (e.g. 1011) in the model specifications prior to the model run. Additional network scenarios can be added to the database for testing.

# G4 How to run

There are two ways to run the CHSTM.

1. Batch run

To run a model without an existing databank, it requires to run the model through specifications in the model run batch file. Model run will be undertaken in non-GUI.

2. Modeller shell run

To run a model with an existing databank, it requires to run the model through modeller shell. Model run will be undertaken with opening EMME GUI.

## G4.1 Perform batch run (standard model run)

This approach allows user to run the CHSTM for multiple models in a sequence. It runs a little faster as the model run process does not require opening EMME GUI (non-GUI run). The model run will access the python scripts saved in the **Model_Scripts** folder.

Firstly, make sure all the relevant input files are available to undertake the model runs. For example, all the demand inputs are available in the Model_Inputs/Demand folder for model batchin, and the all the relevant network scenarios exist in the network scenario management databank.

Then, open the batch file "RUN_CHSTM.bat" in the **Model_Runs** folder using text editing tool (**DO NOT double click**). Specify the variables for each model run scenario. Examples are shown in the following figure with one line representing one scenario model run (line 12 to 19).

```
1  @echo off
2  :: IMPORTANT NOTE
3  :: ensure that %EMMEPATH% is set correctly in the environment variables (to the version used for this model run)
4  
5  :: SYNTAX
6  :: %1               %2              %3             %4              %5              %6          %7                         %8
7  :: [python path]    [script name]   [model_id]     [model_year]    [network_scen]  [max_loop]  [Convergence_critieria]  [exte
8  :: To process subarea matrice at the end of model run(s), put "subarea" for variable 9, any other string to not run, cannot l
9  :: Make sure all nodes inside subarea are tagged in file "Cordon_Nodes.in"
10 ::::::::::::::::::::::::::::::::::::::::::::::
11 
12 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2016 2016 1011 10 0.001 0.014 subarea
13 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2024 2024 1011 10 0.001 0.014 subarea
14 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2034 2034 1011 10 0.001 0.014 subarea
15 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2044 2044 1011 10 0.001 0.014 subarea
16 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2016_BP 2016 1012 10 0.001 0.014 no_subarea
17 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2024_BP 2024 1012 10 0.001 0.014 no_subarea
18 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2034_BP 2034 1012 10 0.001 0.014 no_subarea
19 "%EMMEPATH%\Python27\python.exe" "..\Model_Scripts\_batchrun_CHSTM.py" CHSTM_2044_BP 2044 1012 10 0.001 0.014 no_subarea
20 
21 pause
22 ::cd   ..\
23 :end
```

The variables are listed in the following table.

| ID | Variable | Description |
|---|---|---|
| 1 | Python patch | Emmepath location to execute python application (DO NOT change) |
| 2 | Script name | Location and name of main model runs script (DO NOT change) |
| 3 | Model name | Model scenario name – scenario run folder will be created under this name |
| 4 | Model year | Mode year for demand inputs, also used as the title of scenario (i.e. 2044) |
| 5 | Network scenario | Selected network scenario ID for model run (i.e. 1011) |
| 6 | Maximum loop | The maximum loops for model run if convergence is not achieved (i.e. 10) |
| 7 | Convergence criteria | The convergence criteria to exit the demand loop if achieved (i.e. 0.001) |
| 8 | External to external demand growth | Defined a fixed growth rate for external to external growth (i.e. 0.014) |
| 9 | Extract subarea demand | Whether to extract subarea demand after model run (set "subarea" to extract, or any other string to not extract, DO NOT leave blank) |

Lastly, save the changes made to the batch file and double click the file to undertake model runs. The model run time will depend on machine specifications and the model convergence status. The base year 2016 model in the tested machine took 3 loops to converge with ~10 minutes run time. The future year

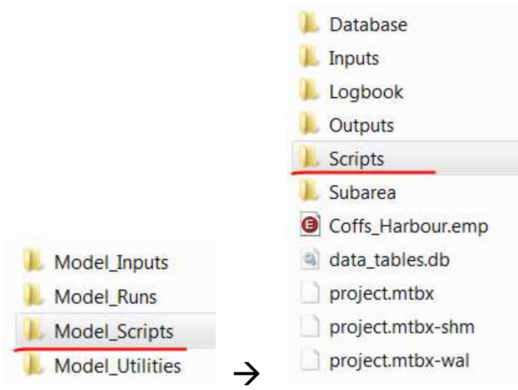
2044 base case do nothing scenario on the same machine took 7 loops to converge with ~20 minutes run time.

Please note, if a scenario name is defined as the same name of an existing model scenario in the same **Model_Runs** folder, the existing model folder will be deleted and then immediately re-created for the new run. Please make a backup copy of the model if it needs to be retained.

## G4.2 Perform modeller shell run (customised model run)

Alternatively, the user can undertake a full or partial model run using an existing databank. This requires to open the existing databank, and open EMME prompt tool. This approach will allow user to customise the model with different inputs (non-standard), test different factors and / or parameters for sensitivities. This also allows user to develop customised python scripts for model run or model testing purposes.

This approach does not have access to the python scripts saved in the **Model_Scripts** folder by default. User will need to respecify the python path location in EMME options. Alternatively, all the python scripts in the **Model_Scripts** folder can be copied into the **Scripts** folder in the scenario model for process.




Firstly, copy all the scripts in **Model_Scripts** folder to the **Scripts** folder of the interested scenario. Make changes to the model inputs in the scenario folder if required.

Then, open script "Full_Model_Run.py" in text editing tool, change the model run specifications (similar as the variables described in the other method).

Lastly, open the scenario databank, and open EMME prompt tool. Type in: execfile("Full_Model_Run.py") to perform a full model run in EMME GUI.

Please note, each scripts can be run individually in this way. For example, calling execfile("C4_2_assignment_TP.py") in the EMME prompt tool it can run the assignment process. Some scripts require specification for variables, so make sure the variables to be changed to the desire values. Otherwise it will run the process based on the default variables (predefined in the scripts).

# G5 Model tools

Some additional tools have been developed during this project for the purpose of result analysis. Those include python scripts to export model outputs, established worksheets for model results checks in geographic format.

## G5.1 Utility Scripts

The utility scripts are those included in script group 5 and group 9 for result exporting, and model post processing including selectlink analysis, and subarea process.

| Script group | Script name | Description |
|---|---|---|
| Group 5 – result aggregation and export | C5_1_aggregate_result_Daily | Aggregate time period model results to the daily total scenario |
| | C5_2_export_model_results | Export model link results of each time period and daily totals |
| | C5_3_export_e2e_seed | Export external to external demand seeds (only for 2016) |
| | C5_4_calculate_mat_sum | Summarise matrix totals by purpose |
| Group 9 – other utility scripts | C9_0_copy_scenario | Utility script to copy scenario within the databank |
| | C9_0_select_link_TP | Utility script to undertake selectlink analysis |
| | C9_0_subarea_process | Utility script to extract subarea cordon demand after model run |

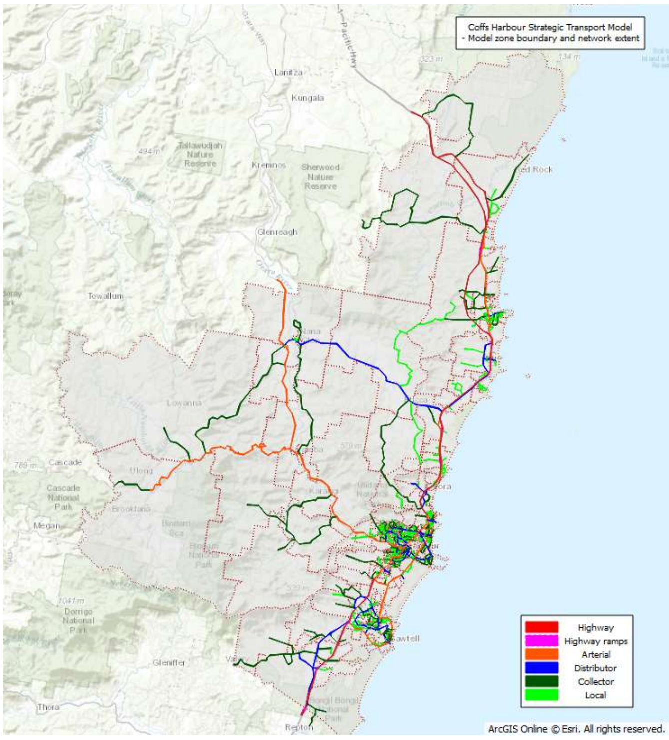
## G5.2 Worksheets

The following table lists the worksheets developed for model result checking.

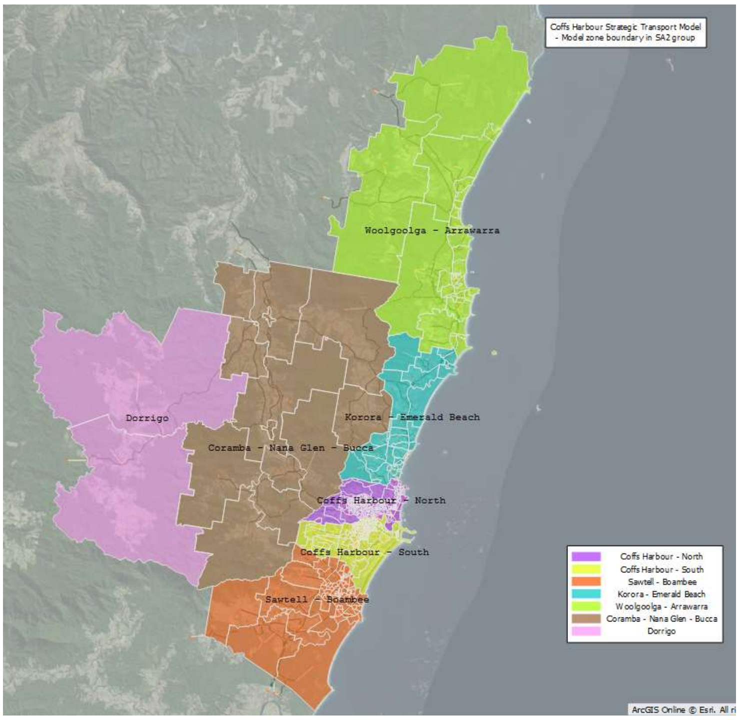
| Worksheet | Description |
|---|---|
| Model_zone_network_overview.emw | Check CHSTM modelled network and zones extent |
| Road_Hierarchy_plot.emw | Check network cording – link hierarchy |
| Road_impedance_plot.emw | Check network coding – link impedance |
| Road_lanes_plot.emw | Check network coding – number of lanes |
| Check_Zone_groups.emw | Check model zone groups |
| ChecK_Zone_values.emw | Check zone values in horizontal bars (i.e. total population, employment) |
| Compare_to_counts.emw | Compare modelled traffic volumes to base year 2016 traffic counts by each time period or daily |

| | |
|---|---|
| Link_Volume_AM.emw | Link volume plot to display modelled AM, PM, daily link volumes. |
| Link_Volume_PM.emw | |
| Link_Volume_Daily.emw | |
| Link_VOC_Plot.emw | Plot link volume over capacity ratio |
| Compare_sceanrios_link_volume_AM.emw | Compare modelled AM, PM, daily traffic volume between two scenarios (require import the reference case scenario to undertake comparison – import scenario 5 from the other databank as the result include all time periods and daily |
| Compare_sceanrios_link_volume_PM.emw | |
| Compare_sceanrios_link_volume_Daily.emw | |
| Select_Link_12_bin.emw | Check selectlink volumes (need to perform selectlink process first) |

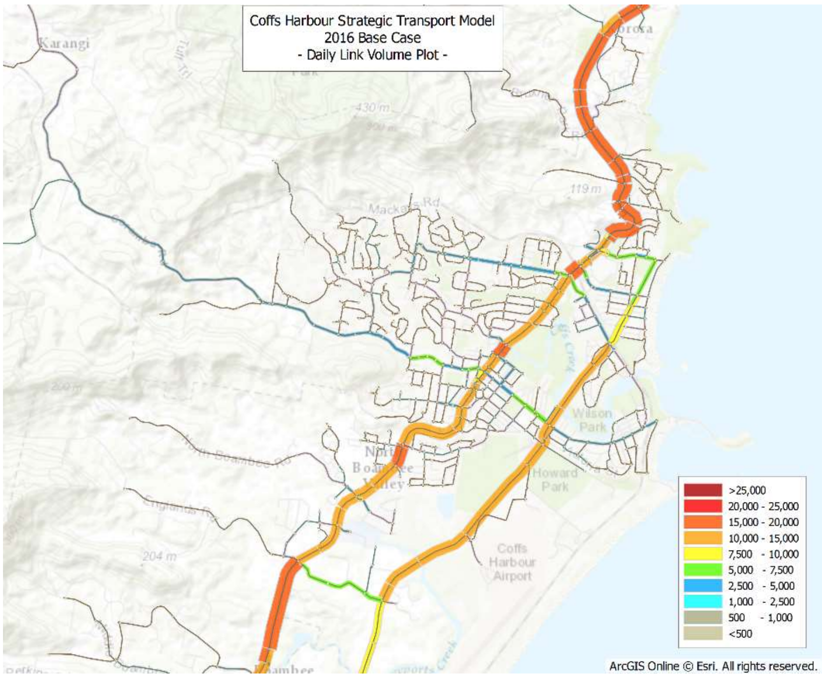
Some examples of the above worksheets are presented below to show the network view of the relevant worksheet.



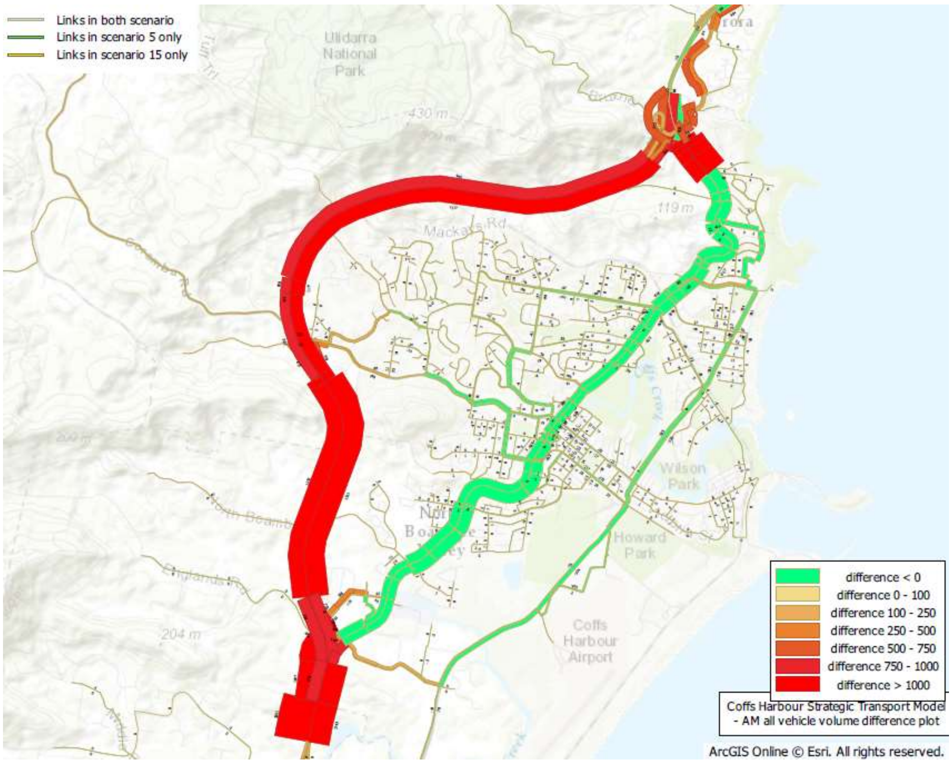

Model zone and network overview worksheet




Zone group worksheet




Daily link volume worksheet




Link volume difference worksheet

# G6 Model run logs

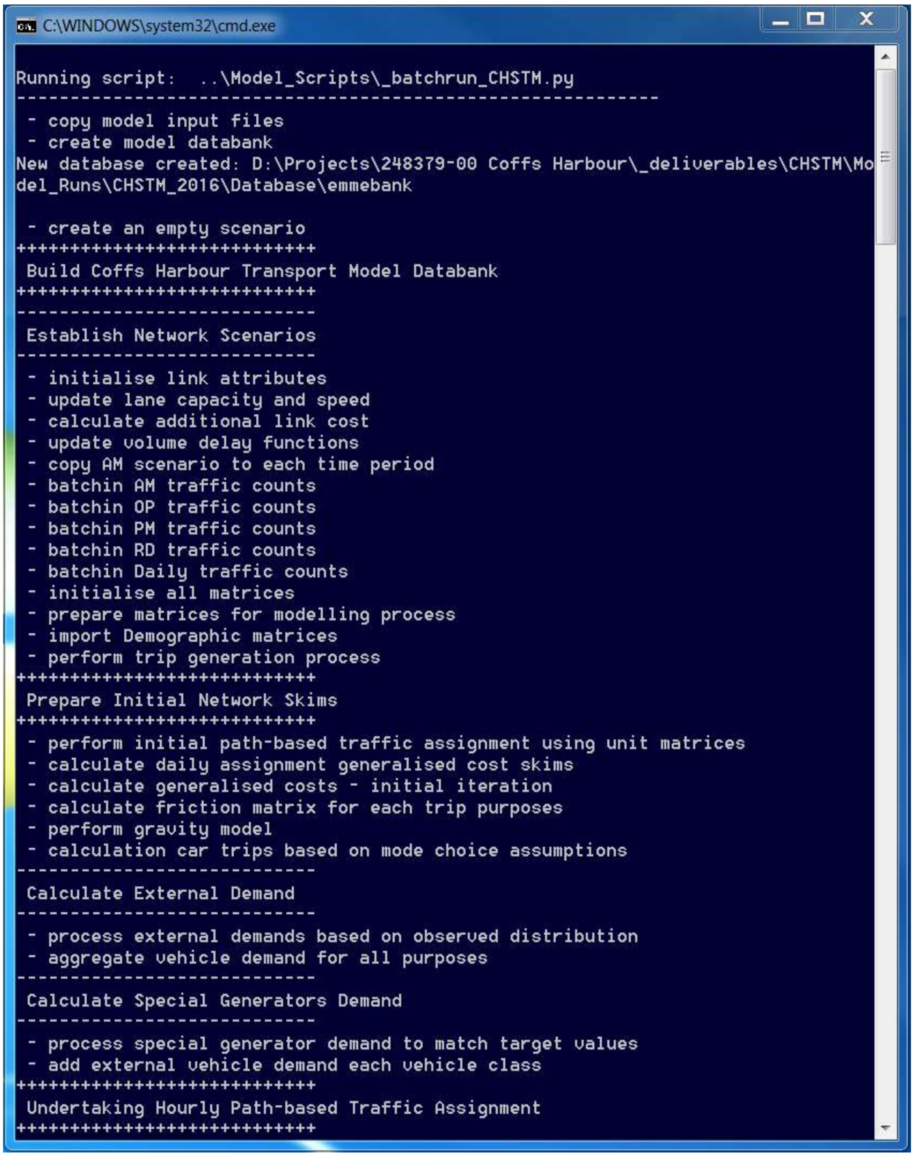
Model run logs will be displayed and recorded during the model runs either through batch run process or modeller shell process.

## G6.1 Screen prints

During model run (either through batch run process or modeller shell process), the model run status messages will be printed in the prompt window. It prints each key step of the model processes so that the user can know the completed and current steps of the model run. This will help user to debug errors with quickly identify the process which stuck with the error.

It also record the time taken for each model iteration as well as the total run time after completion. It displays the model convergence status so that user can estimate the remaining time may be required to achieve model convergence.

Example screenshots of the screen prints are presented in figures below.


C:\WINDOWS\system32\cmd.exe
Running script: ..\Model_Scripts_batchrun_CHSTM.py
------------------------------------------------------------
- copy model input files
- create model databank
New database created: D:\Projects\248379-00 Coffs Harbour_deliverables\CHSTM\Model_Runs\CHSTM_2016\Database\emmebank
- create an empty scenario
++++++++++++++++++++++++++++
Build Coffs Harbour Transport Model Databank
++++++++++++++++++++++++++++
----------------------------
Establish Network Scenarios
----------------------------
- initialise link attributes
- update lane capacity and speed
- calculate additional link cost
- update volume delay functions
- copy AM scenario to each time period
- batchin AM traffic counts
- batchin OP traffic counts
- batchin PM traffic counts
- batchin RD traffic counts
- batchin Daily traffic counts
- initialise all matrices
- prepare matrices for modelling process
- import Demographic matrices
- perform trip generation process
++++++++++++++++++++++++++++
Prepare Initial Network Skims
++++++++++++++++++++++++++++
- perform initial path-based traffic assignment using unit matrices
- calculate daily assignment generalised cost skims
- calculate generalised costs - initial iteration
- calculate friction matrix for each trip purposes
- perform gravity model
- calculation car trips based on mode choice assumptions
----------------------------
Calculate External Demand
----------------------------
- process external demands based on observed distribution
- aggregate vehicle demand for all purposes
----------------------------
Calculate Special Generators Demand
----------------------------
- process special generator demand to match target values
- add external vehicle demand each vehicle class
++++++++++++++++++++++++++++
Undertaking Hourly Path-based Traffic Assignment
++++++++++++++++++++++++++++

C:\WINDOWS\system32\cmd.exe

```
 - calculate generalised costs for time period RD
 - calculate friction matrix for each trip purposes
++++++++++++++++++++++++++++
 Demand Loops - iteration 1
++++++++++++++++++++++++++++
 - transfer weighted generalised cost from current iteration to the previous
 - perform gravity model
 - calculation car trips based on mode choice assumptions
----------------------------
 Calculate External Demand
----------------------------
 - process external demands based on observed distribution
 - aggregate vehicle demand for all purposes
----------------------------
 Calculate Special Generators Demand
----------------------------
 - process special generator demand to match target values
 - add external vehicle demand each vehicle class
++++++++++++++++++++++++++++
 Undertaking Hourly Path-based Traffic Assignment
++++++++++++++++++++++++++++
 - matrix sliding and rounding for time period AM
 - perform path-based traffic assignment for time period AM
 - calculate intra-zonal skims for time period AM
 - calculate generalised costs for time period AM
 - matrix sliding and rounding for time period OP
 - perform path-based traffic assignment for time period OP
 - calculate intra-zonal skims for time period OP
 - calculate generalised costs for time period OP
 - matrix sliding and rounding for time period PM
 - perform path-based traffic assignment for time period PM
 - calculate intra-zonal skims for time period PM
 - calculate generalised costs for time period PM
 - matrix sliding and rounding for time period RD
 - perform path-based traffic assignment for time period RD
 - calculate intra-zonal skims for time period RD
 - calculate generalised costs for time period RD
 - calculate friction matrix for each trip purposes
 - calculate relative standard error for model convergence check
 - AM scenario is not converged at value 0.189956083894
 - OP scenario is not converged at value 0.172599196434
 - PM scenario is not converged at value 0.201314300299
 - RD scenario is not converged at value 0.148630693555
 Iteration run time 00:01:52
++++++++++++++++++++++++++++
 Demand Loops - iteration 2
++++++++++++++++++++++++++++
 - transfer weighted generalised cost from current iteration to the previous
 - perform gravity model
 - calculation car trips based on mode choice assumptions
----------------------------
```

C:\WINDOWS\system32\cmd.exe

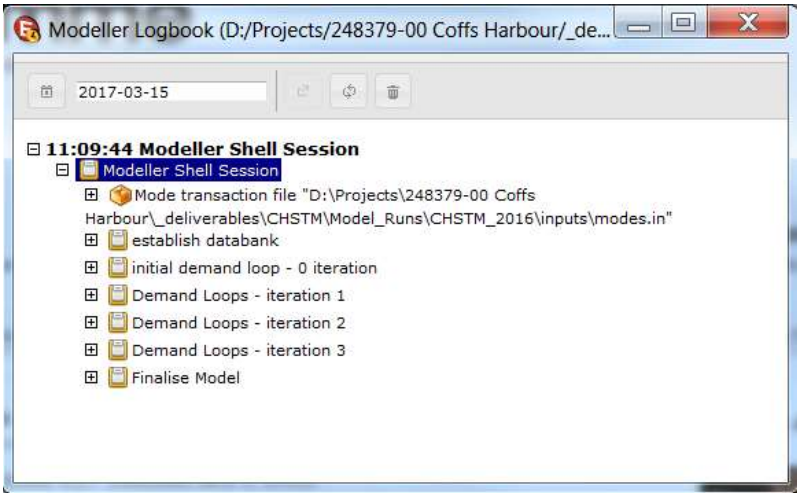
```
 - calculate generalised costs for time period PM
 - matrix sliding and rounding for time period RD
 - perform path-based traffic assignment for time period RD
 - calculate intra-zonal skims for time period RD
 - calculate generalised costs for time period RD
 - calculate friction matrix for each trip purposes
 - calculate relative standard error for model convergence check
 - AM scenario is converged at value 0.000897250662092
 - OP scenario is converged at value 0.000806427153293
 - PM scenario is converged at value 0.000912324758247
 - RD scenario is converged at value 0.000581340456847
Model converged at iteration 3! Prepare for daily totals...
 Iteration run time 00:01:54
++++++++++++++++++++++++++++
 Finalise Model
++++++++++++++++++++++++++++
 Prepare Daily Scenario Result
 - temporary Daily Assignment Scenario 6 removed in this step
++++++++++++++++++++++++++++
 Perform subarea traffic AM and PM peak periods
++++++++++++++++++++++++++++
subarea traffic process finished
 - prepare subarea matrices
 Total model run time 00:10:17
```

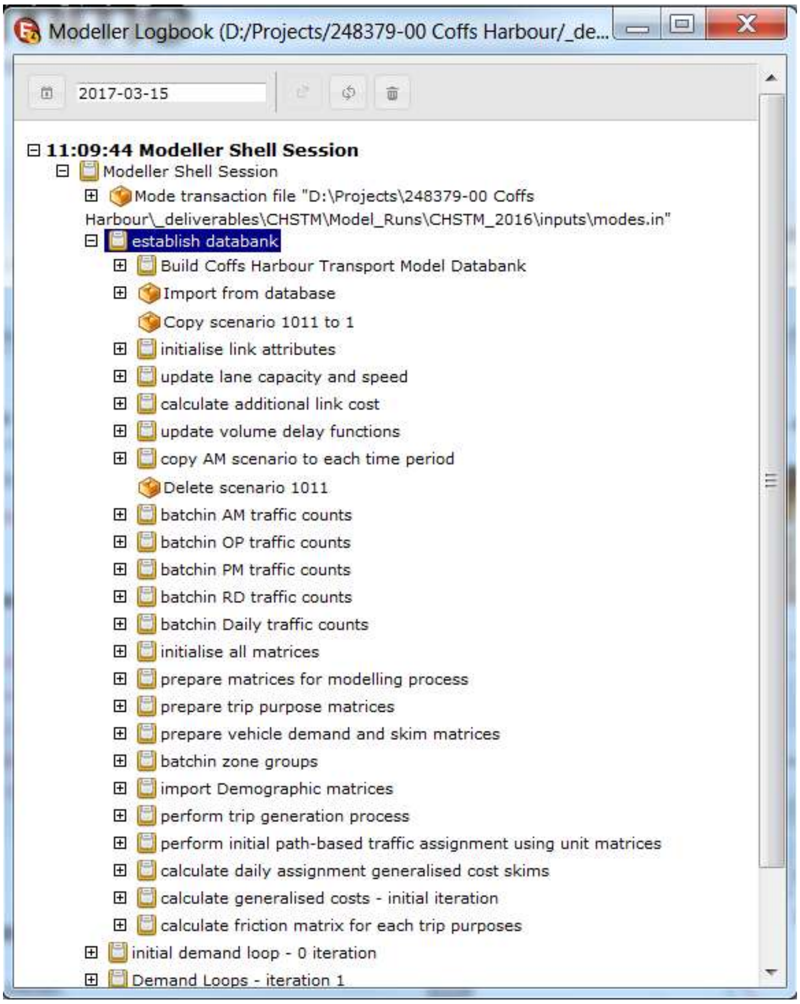
## G6.2 Model logbook

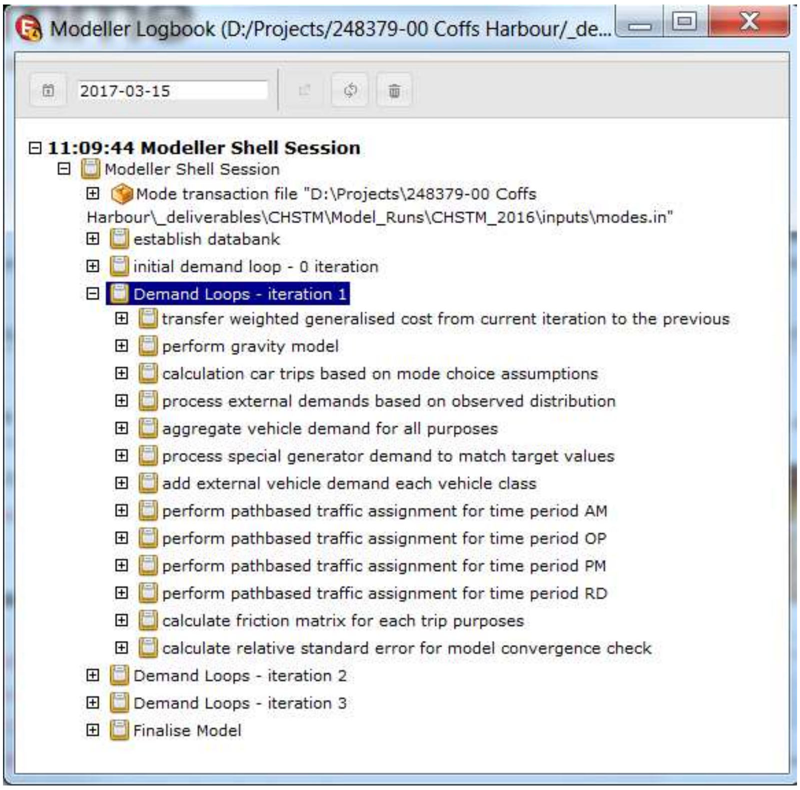
The process also saves the model run logs simultaneously during each model run. User can open the modeller logbook (during or after model runs in either batch run or modeller shell process) to check the status of the current or completed scenario model run.

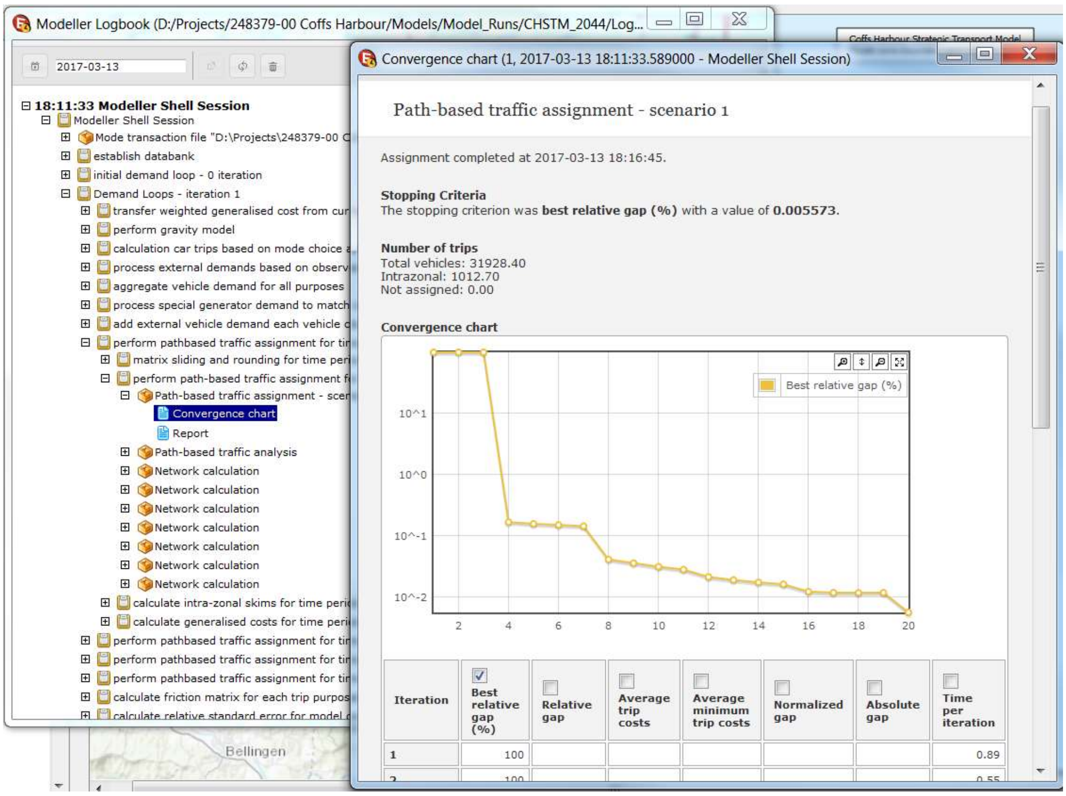
It also allows the user to check result stepwise to understand the model process, or for the purpose of model diagnoses.

The example screenshots blow illustrate the file structure of the established model logbook. Each scenario model run will have its own logbook for model run status and results checking.




Modeller Logbook (D:/Projects/248379-00 Coffs Harbour/_de...
2017-03-15
11:09:44 Modeller Shell Session
Modeller Shell Session
Mode transaction file "D:\Projects\248379-00 Coffs Harbour_deliverables\CHSTM\Model_Runs\CHSTM_2016\inputs\modes.in"
establish databank
Build Coffs Harbour Transport Model Databank
Import from database
Copy scenario 1011 to 1
initialise link attributes
update lane capacity and speed
calculate additional link cost
update volume delay functions
copy AM scenario to each time period
Delete scenario 1011
batchin AM traffic counts
batchin OP traffic counts
batchin PM traffic counts
batchin RD traffic counts
batchin Daily traffic counts
initialise all matrices
prepare matrices for modelling process
prepare trip purpose matrices
prepare vehicle demand and skim matrices
batchin zone groups
import Demographic matrices
perform trip generation process
perform initial path-based traffic assignment using unit matrices
calculate daily assignment generalised cost skims
calculate generalised costs - initial iteration
calculate friction matrix for each trip purposes
initial demand loop - 0 iteration
Demand Loops - iteration 1


Modeller Logbook (D:/Projects/248379-00 Coffs Harbour/_de...
2017-03-15
11:09:44 Modeller Shell Session
Modeller Shell Session
Mode transaction file "D:\Projects\248379-00 Coffs Harbour_deliverables\CHSTM\Model_Runs\CHSTM_2016\inputs\modes.in"
establish databank
initial demand loop - 0 iteration
Demand Loops - iteration 1
transfer weighted generalised cost from current iteration to the previous
perform gravity model
calculation car trips based on mode choice assumptions
process external demands based on observed distribution
aggregate vehicle demand for all purposes
process special generator demand to match target values
add external vehicle demand each vehicle class
perform pathbased traffic assignment for time period AM
perform pathbased traffic assignment for time period OP
perform pathbased traffic assignment for time period PM
perform pathbased traffic assignment for time period RD
calculate friction matrix for each trip purposes
calculate relative standard error for model convergence check
Demand Loops - iteration 2
Demand Loops - iteration 3
Finalise Model


Modeller Logbook (D:/Projects/248379-00 Coffs Harbour/Models/Model_Runs/CHSTM_2044/Log...
2017-03-13
18:11:33 Modeller Shell Session
Modeller Shell Session
Mode transaction file "D:\Projects\248379-00 C
establish databank
initial demand loop - 0 iteration
Demand Loops - iteration 1
transfer weighted generalised cost from cur
perform gravity model
calculation car trips based on mode choice a
process external demands based on observ
aggregate vehicle demand for all purposes
process special generator demand to match
add external vehicle demand each vehicle c
perform pathbased traffic assignment for ti
matrix sliding and rounding for time per
perform path-based traffic assignment f
Path-based traffic assignment - scen
Convergence chart
Report
Path-based traffic analysis
Network calculation
Network calculation
Network calculation
Network calculation
Network calculation
Network calculation
Network calculation
calculate intra-zonal skims for time peri
calculate generalised costs for time peri
perform pathbased traffic assignment for ti
perform pathbased traffic assignment for ti
perform pathbased traffic assignment for ti
calculate friction matrix for each trip purpos
Bellingen
Coffs Harbour Strategic Transport Model
Convergence chart (1, 2017-03-13 18:11:33.589000 - Modeller Shell Session)
Path-based traffic assignment - scenario 1
Assignment completed at 2017-03-13 18:16:45.
Stopping Criteria
The stopping criterion was best relative gap (%) with a value of 0.005573.
Number of trips
Total vehicles: 31928.40
Intrazonal: 1012.70
Not assigned: 0.00
Convergence chart
Best relative gap (%)
10^1
10^0
10^-1
10^-2
2
4
6
8
10
12
14
16
18
20
Iteration
Best relative gap (%)
Relative gap
Average trip costs
Average minimum trip costs
Normalized gap
Absolute gap
Time per iteration
1
100
0.89

# Appendix H

CHTM - Model Plots

# H1 CHTM Model Plots

Plot list from the Coffs Harbour Traffic Model:

1. 2024 AM Do Minimum – Network Flow
2. 2024 PM Do Minimum – Network Flow
3. 2024 AM Project – Network Flow
4. 2024 PM Project – Network Flow
5. 2024 AM Do Minimum versus 2024 AM Project – Network Flow
6. 2024 PM Do Minimum versus 2024 PM Project – Network Flow
7. 2044 AM Do Minimum – Network Flow
8. 2044 PM Do Minimum – Network Flow
9. 2044 AM Project – Network Flow
10. 2044 PM Project – Network Flow
11. 2044 AM Do Minimum versus 2044 AM Project – Network Flow
12. 2044 PM Do Minimum versus 2044 PM Project – Network Flow
13. 2016 AM Base – Select Link Flow for Pacific Hwy north of Bruxner Park Rd
14. 2016 PM Base – Select Link Flow for Pacific Hwy north of Bruxner Park Rd
15. 2016 AM Base – Select Link Flow for Pacific Hwy south of Englands Rd
16. 2016 PM Base – Select Link Flow for Pacific Hwy south of Englands Rd
17. 2016 AM Project – Select Link Flow for Pacific Hwy north of Bruxner Park Rd
18. 2016 AM Project – Select Link Flow for Bypass north of Coramba Rd
19. 2016 AM Project – Select Link Flow for Bypass south of Coramba Rd
20. 2016 AM Project – Select Link Flow for Bypass south of Englands Rd

# Appendix B

## Kororo Public School Transport Observations

# File Note

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| | | | |
|---|---|---|---|
| Project title | Coffs Harbour Bypass | Job number | 248379-40 |
| cc | | File reference | |
| Prepared by | Catherine Bennie | Date | 24 May 2019 |
| Subject | Kororo Public School transport observations | | |

# 1 Introduction

A site visit to the Kororo Public School was carried out on Wednesday 29 November 2016 to better understand the parking operations surrounding the school. On the day of the site visit, Austraffic were carrying out road user surveys at multiple locations within the site area. The purpose of this technical note is to detail both the site visit findings and to confirm the results of the traffic demand surveys. A diagrammatical site layout is shown in the figure below.

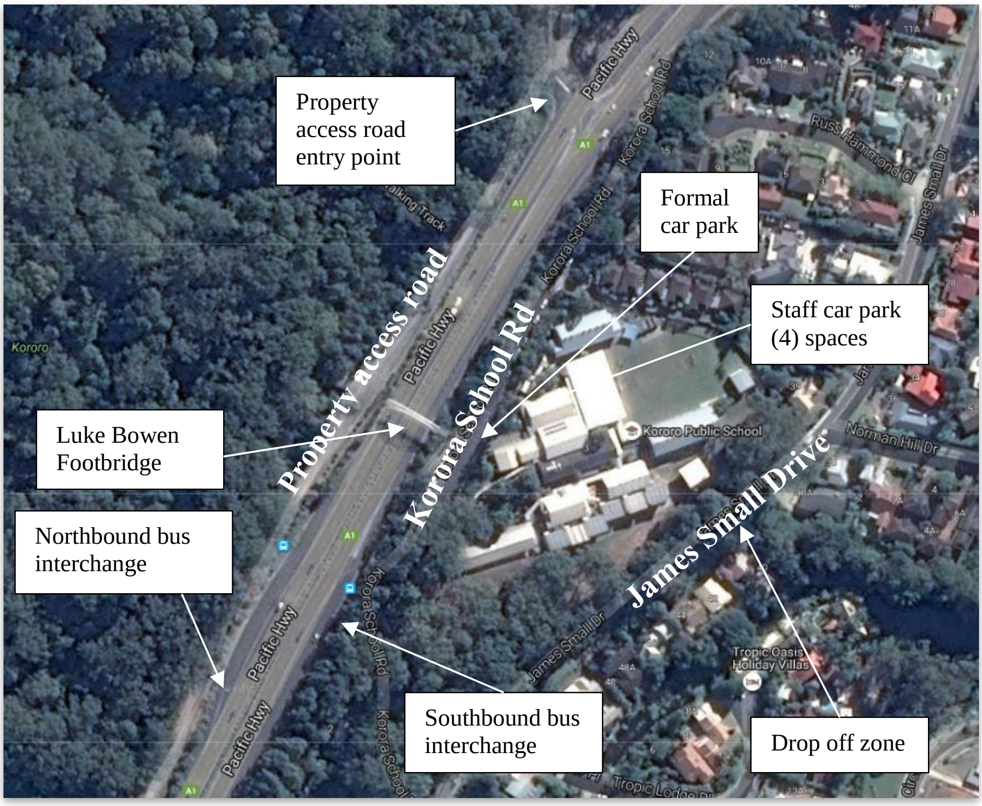


Figure 1 - Site area

# 2 Site visit findings

## 2.1 James Small Drive

James Small Drive is a two lane, two-way road way with parking lanes provided on both sides. A pedestrian footpath is located on the western (i.e. alongside Kororo Public School) side of James Small Drive. There are two drop-off / pick-up areas on James Small Drive adjacent to the Kororo Public School, with one on either side of the road. James Small Drive intersects with the Pacific Highway just north of the Kororo Public School and reconnects again with the Pacific Highway further south.

During the morning peak, it was observed that James Small Drive was used for both quick drop-off (mostly at the designated areas), or parents would park and then accompany their child to school. Observations however also demonstrated that James Small Drive appeared to be used for both the Kororo Public School and the nearby bus interchange. The drop-off / pick-up area on the northern side of James Small Drive was mostly used for access to the school, however earlier in the morning peak there were instances when it was being used for drop-offs for the nearby bus interchange on the Pacific Highway.

## 2.2 Korora School Road

Korora School Road is a one lane, one-way road (southbound) connecting the Pacific Highway to James Small Drive. At the Kororo Public School, there is a drop-off / pick-up area along the school frontage with a formal car park opposite, and a small (four spaces) staff parking area within the school. The main entrance to the school is located just north of the drop-off / pick-up area. There is a pedestrian overpass, Luke Bowen Footbridge, which connects the property access road and Korora School Road opposite the main entrance to the school. There are no footpaths provided on Korora School Road north or south of the formal car parking area and drop-off / pick-up area.

The drop-off / pick-up area alongside the school frontage is signed to restrict long term parking during school peaks i.e. 8:00-9:30am and 2:30-4:00pm. During the morning peak, at this drop off zone, it was observed that generally the driver remains in their vehicle as their children walk into the school.

During the morning peak, typically cars park briefly in the formal car parking area and parents then walk the children into the school. Once the car parking area is at capacity, vehicles start parking informally south-west of the drop-off / pick-up area on both sides of the road and stay for extended periods. There were also at least six instances of cars parking informally north of the car park on Korora School Road. In both of these instances, it is possible that these were cars driven by staff, as the vehicles were not observed to depart until after the afternoon peak period.

During the afternoon peak period, for an approximate 10-minute period (just after the school bell rings), vehicles start to wait within Korora School Road for an available parking space. As Korora School Road is a one lane, one-way road, this results in vehicles queuing north towards the Pacific Highway. During the site visit however, queuing was not observed to reach the intersection of Pacific Highway / Korora School Road.

## 2.3 Bus interchange

There are two existing bus stops (one northbound and one southbound) adjacent to the Pacific Highway, just south of the Kororo Public School. Buses can access the stops directly from the Pacific Highway, with both areas being separated from the highway by concrete barriers. Each bus zone is approximately 120m in length. Multiple buses utilise the interchange to pick-up / drop-off students to the Kororo Public School and to also provide an opportunity for students to change buses to reach their appropriate destination. It should be noted that there is no timetable present at these bus interchanges and hence is not used for public transport outside of school use.

During the morning peak, a maximum of seven buses were parked at the southbound interchange simultaneously. No buses were observed to use the northbound interchange during the morning peak period.

During the afternoon peak, multiple groups of Kororo Public School children were walked over the bridge to the buses by a school representative. Children alighting the arriving northbound buses either waited at the interchange for their bus or were picked up from either the property access road or James Small Drive.

It should be noted that not all school buses stopped at the interchanges during the morning and afternoon peak periods.

## 2.4 Property access road

The property access road is located to the west of the Pacific Highway, adjacent to the northbound bus interchange and just north of the Luke Bowen Footbridge. It is a short, dead-end road and is wide enough for vehicles to carry out a 3-point turn. No footpaths are provided on the property access road.

Occasionally throughout the morning peak, the property access road was used by vehicles as an informal short-term drop-off / pick-up area, with only a small number of parents parking and walking their younger children over the Pacific Highway using the Luke Bowen Footbridge. The service road was observed as being utilised mostly for the students accessing the bus interchange, with the remainder attending Kororo Public School.

Majority of vehicles utilising the property access road were travelling northbound on Pacific Highway and drop in to the service road briefly before continuing on their trip. During the morning peak, the property access road remained mostly empty due to the quick turnover of vehicles. However, during the evening peak period, the property access road was more heavily utilised by vehicles to pick-up children.

## 2.5 AM peak observations

- 7:30am – James Small Drive: four cars parked
- 7:45am – Korora School Road drop-off / pick-up area: six car parked
- 7:50am – Property access road: vehicles start to use for drop-off / pick-up
- 7:58 am – Southbound bus interchange: first school bus arrives
- 8:15 am – Southbound bus interchange: six buses stored, all waiting with children in each

- 8:20am – Korora School Road formal car park: at capacity (excluding persons with disability PWD spaces)
- 8:25 am – Southbound bus interchange: all buses depart
- 8:40 am – School bell to signify start of the school day.

| | |
|---|---|
|   |  |
| Korora School Road Car Park 7:40am (facing SB) | Korora School Road Car Park 7:40am (facing NB) |
|  |  |
| Staff car park entrance 7:40am | Korora School Road north of Car Park 7:40am (facing SB) |
|  |   |
| Bus interchange 7:45am (facing SB from Luke Bowen Footbridge) | Southbound bus interchange at 8:15am |

# File Note

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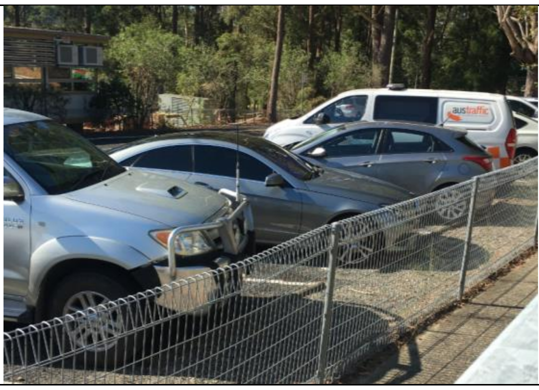

Korora School Road Car Park 8:20am (facing SB)

Korora School Road south of car park 8:30am (facing SB)

Korora School Road north of Car Park 8:30am (facing NB) – assumed staff parking

Korora School Road 8:40 am south of Car Park (facing NB)

Korora School Road 8:40am south of car park (facing SB)

James Small Drive 8:40am north of Korora School Road (facing NB)

James Small Drive drop-off / pick-up alongside School 8:45am (facing SB)

Property access road 9am (facing NB)

## 2.6 PM peak observations

- 2:20pm – James Small Drive: at least five of the parked vehicles were early parents waiting
- 2:30pm – Korora School Road: at least two of the parked vehicles were early parents waiting
- 2:35pm – property access road: at least three of the parked vehicles were early parents
- 2:50pm – Korora School Road: vehicles parked (parents waiting) along entire length of Korora School Road
- 3:00pm – Parents leave cars and walk towards the school to pick up children
- 3:00pm – Korora School Road drop-off / pick-up: vehicles start parking in the designated area
- 3:10pm – School bell to signify the completion of the school day. All car parks (formal and informal) are taken, vehicles stop and wait for an available space within Korora School Road resulting in vehicles queuing back towards the Highway
- 3:20pm – significantly less vehicles were present surrounding the school, with a portion of the formal car parking spaces vacated and no more queuing of vehicles on Korora School Road towards the Pacific Highway. Majority of cars parked on property access road have departed
- 3:20pm – Northbound bus interchange: two buses stopped and wait for Kororo Public School children to board before departing
- 3:35pm – Northbound bus interchange: bus arrives to pick up / drop off children. Bus departs after children have finished boarding
- 3:35pm – Southbound bus interchange: bus arrives to pick up Kororo Public School children and departs shortly after
- 3:40pm – Northbound bus interchange: final bus arrives to pick up / drop off school children
- 3:40pm – Southbound bus interchange: final bus arrives to pick up / drop off school children.

| | |
|---|---|
|  |  |
| James Small Drive at 2:20pm (facing NB) | Korora School Road at 2:30pm south of school entrance (facing SB) |

# File Note

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Korora School Road at 2:30pm north of School entrance (facing NB)

Property access road at 2:35pm north of Luke Bowen Footbridge (facing SB)

Property access road at 2:35pm north of Luke Bowen Footbridge (facing NB)

Korora School Road at 2:45pm south of School car park (facing SB)

Korora School Road at 2:45pm south of car park (facing SB)

Korora School Road at 2:45pm south of car park (facing NB)


James Small Drive at 2:50pm at Korora School Road intersection (facing NB)

Property access road at 3pm (facing NB)

# File Note

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| | |
|---|---|
|  |  |
| Korora School Road at 3:10pm north of school entrance (facing NB) | Korora School Road at 3:15pm at formal car park (facing NB) |
|  |  |
| James Small Drive at 3:15pm at Korora School Road intersection (facing NB) | Students crossing Luke Bowen Footbridge at 3:20pm from eastern side of Pacific Highway |
|  |  |
| Korora School Road at 3:45pm south of school entrance (facing NB) | James Small Drive at 3:45pm at Korora School Road intersection (facing NB) |

## 3 Traffic count summary

A number of surveys were carried out by Austraffic during the morning and afternoon school peak periods on Wednesday 30 November 2016 through to Friday 2 December 2016:

- Intersection counts (including pedestrian and cyclists)
- Bus counts
- Parking occupancy surveys.

A summary of each of the counts carried out is detailed in this section of the report with count data results provided as an appendix.

### 3.1 Intersection counts

The intersection counts carried out by Austraffic, were located at the following locations:

- Pacific Highway / James Small Drive
- Pacific Highway / Old Coast Road
- Pacific Highway / Korora School Road
- Korora School Road / James Small Drive
- James Small Drive / Norman Hill Drive.

The results of the intersection counts demonstrate that the majority of pedestrian / cyclist movements occurred at the James Small Drive intersections surveyed, with little to no pedestrians observed at the Pacific Highway intersection. This is commensurate with what would be expected considering the road typologies and relative speeds of adjacent vehicles.

A summary of the traffic volumes observed surrounding the school are as follows:

- James Small Drive (north of Korora School Road) – 190 to 220 vehicles per hour (vph) (two-way)
- Korora School Road – 100 to 115vph (one-way)
- Old Coast Road – 105 to 175vph (two-way) with busiest periods observed during the Friday surveys.

### 3.2 Bus counts

Bus counts were carried out at the northbound and southbound bus interchanges adjacent to the Kororo Public School on the Pacific Highway.

The results of the bus counts demonstrate similar findings to the site visit:

- Heavy usage of the southbound interchange during the morning peak, and northbound interchange during the afternoon peak
- Maximum of seven buses parked simultaneously at either interchanges in one direction

- Morning peak is between 8:00 to 8:20am
- Afternoon peak is between 3:30 to 3:50pm.

## 3.3 Parking demand

Parking demand / occupancy surveys were undertaken by Austraffic within the following areas:

- Zone Group A: Korora School Road – 82 parking space supply
- Zone Group B: James Small Drive – 80 parking space supply
- Zone Group C: Old Coast Road – 15 parking space supply
- Zone Group D: Property access road – 110 parking space supply.

These parking zones are shown in Figure 2.

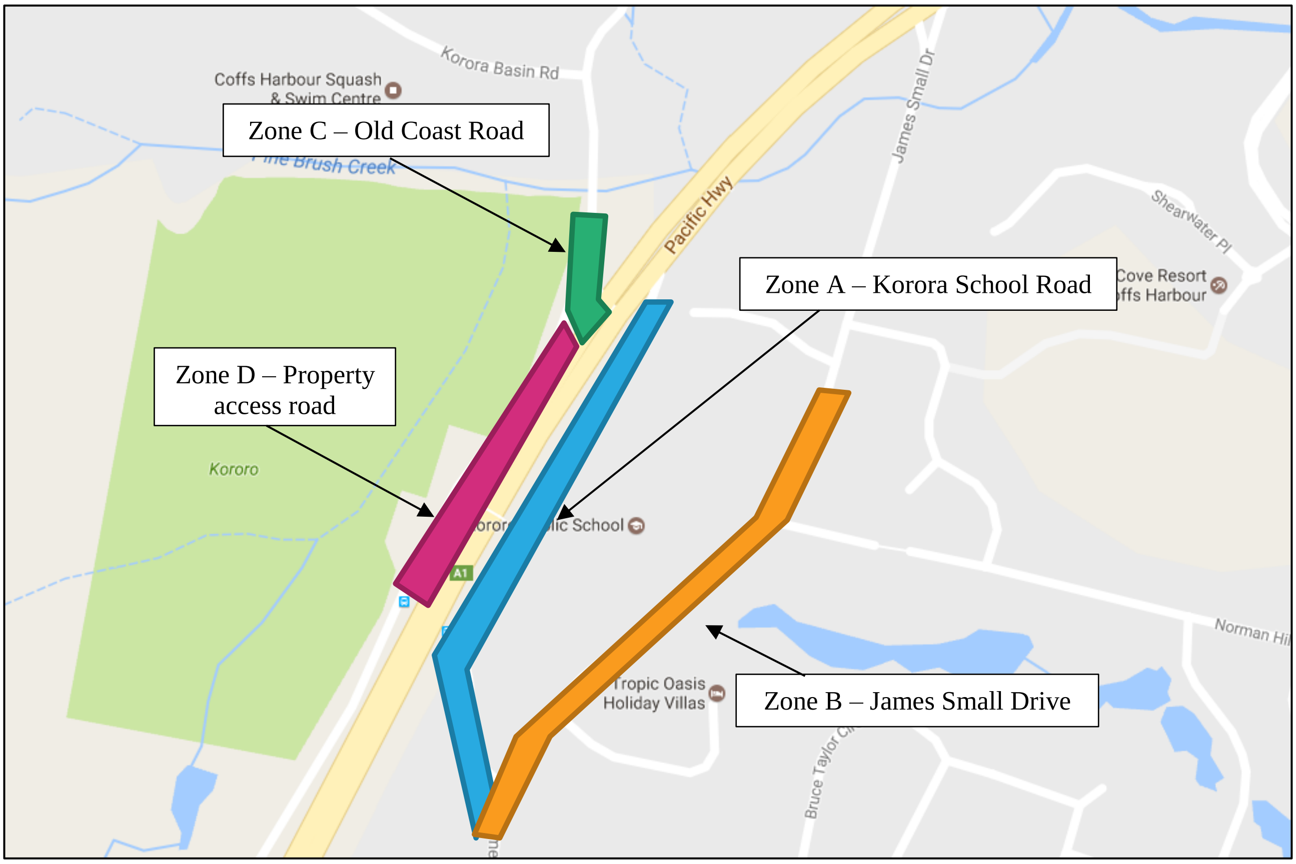


Figure 2 – Austraffic surveyed areas

The parking occupancy results of the survey during the same day as the site visit are presented in the following graphs. The results of the parking occupancy survey are similar to the findings of the site visit:

- A steady increase in occupancy at all locations during the morning peak until 8:50am;
- Short intense peak during the afternoon between 2:50pm and 3:10pm
- Formal car park 100% occupied by 8:20am through to 8:50am

# File Note

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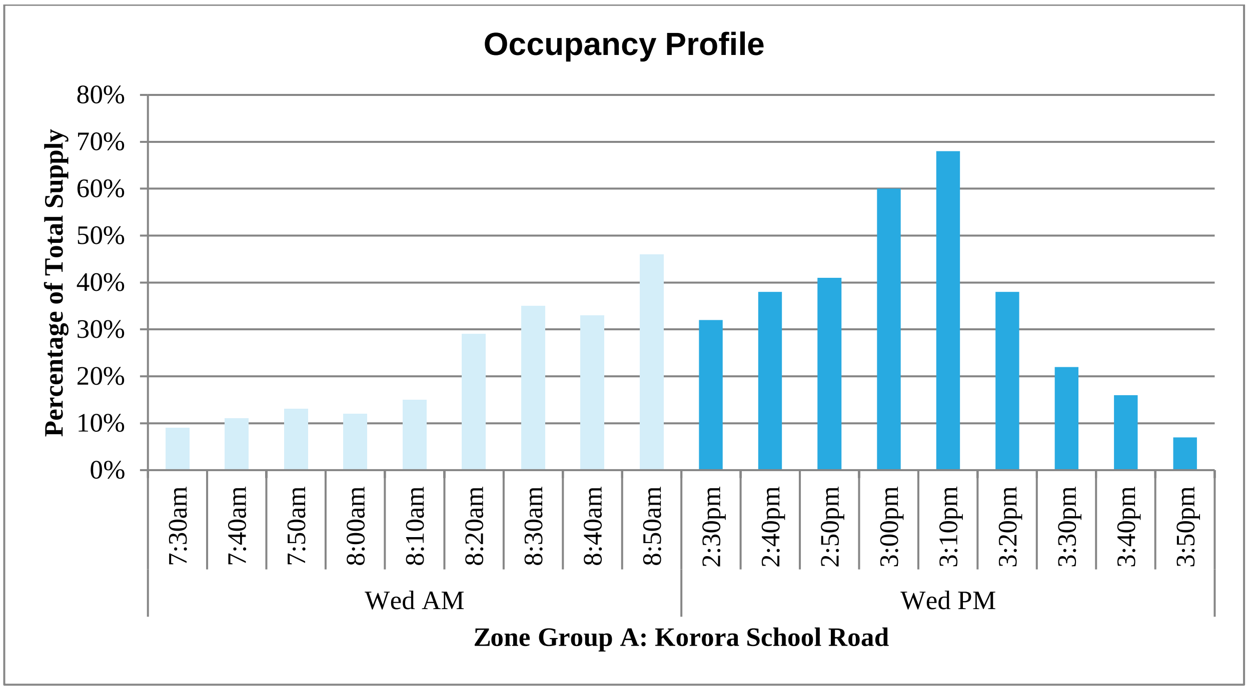
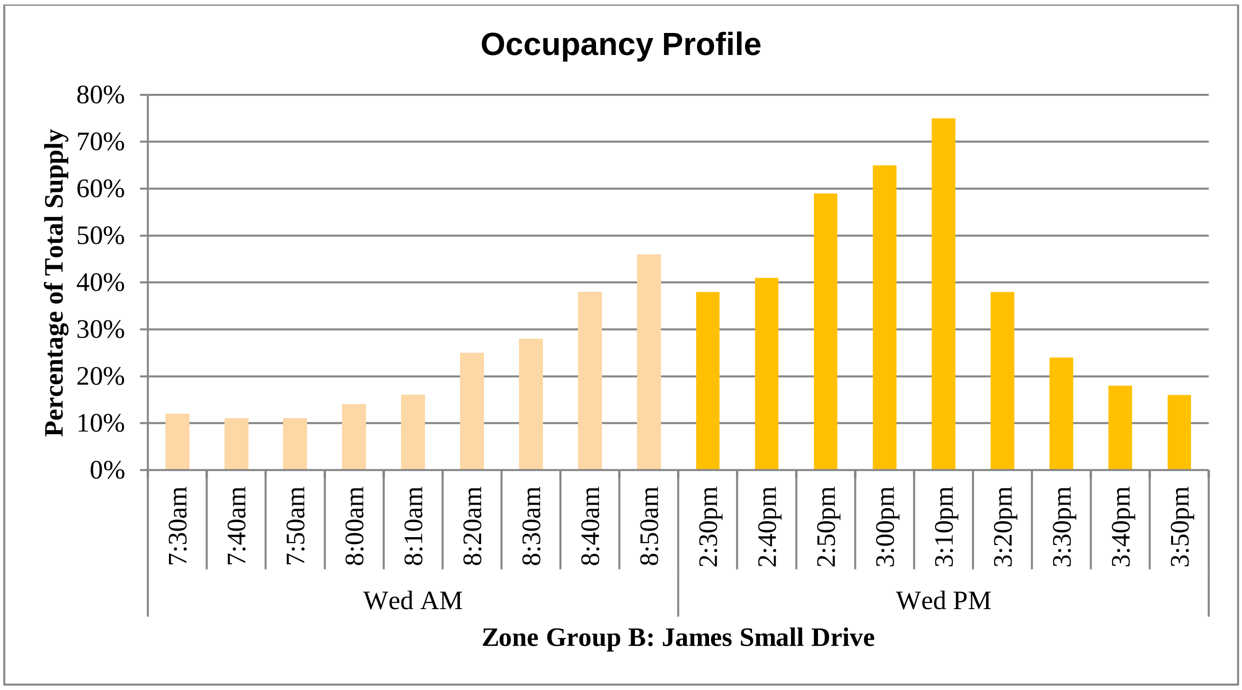
- All areas surveyed demonstrated that parking demand was greatest during the evening peak surrounding the Kororo Public School.

It is noted that the parking occupancy results over all three days surveyed demonstrate similar parking patterns.



# File Note

248379-40 24 May 2019