RoadNet

FINAL
Traffic Impact Study

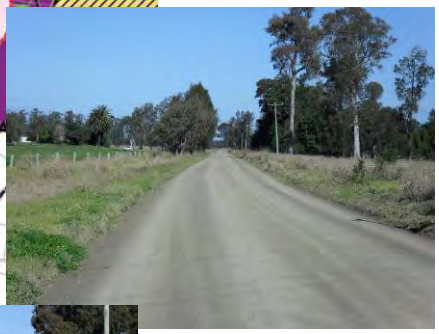
for

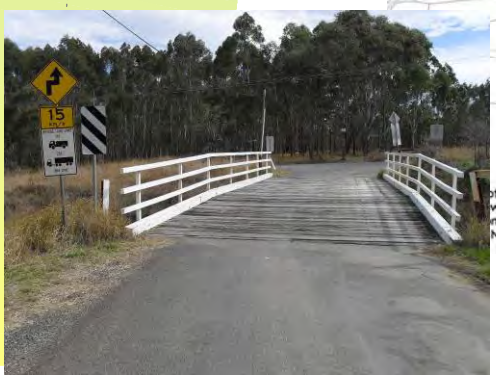
Proposed Brimbin New Town

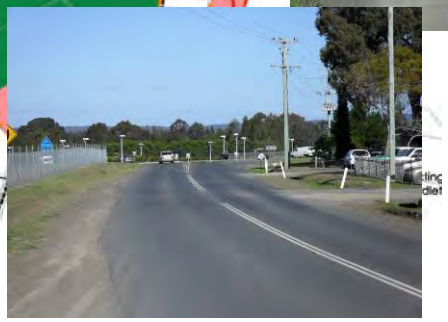
for

Roche Group Pty Ltd

July 2013







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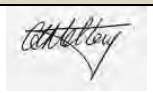
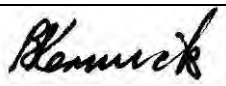
Prepared by:	Craig Nethery	
Reviewed by:	Brian Kerwick	

Craig Nethery is a Design Technician with over 29 years experience in road design and traffic engineering. Craig commenced work with Hastings Council working on designs for roads and traffic management schemes at Lighthouse Beach Port Macquarie, Ocean Drive Lake Cathie and roadwork at Wauchope and Laurieton before moving to RoadNet as Senior Road Designer. He is a member of the Institute of Public Works Engineering Australia and an accredited Traffic Controller and Road Safety Auditor.

Brian Kerwick is an experienced traffic planner with 30 years experience. Brian has a degree in Environmental Planning and has qualifications in road design and traffic engineering. He is a member of the Australian Institute of Traffic Planning and Management, the Planning Institute of Australia and is a Lead Road Safety Auditor. Brian worked for the NSW Roads and Traffic Authority for 18 years in design, traffic, environmental planning and road safety positions and has had 12 years in consulting. He is the Managing Director of RoadNet. Brian has completed numerous Traffic Impa **This page left intentionally blank** *N and Southeast Queensland.*

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Final	12 April 2012	Final Report	
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Final (Rev3)	23 July 2013	Final Report Rev 3 as result of GTCC review of Final Draft studies	

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Table of Contents

Tables

Figures

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EXECUTIVE SUMMARY

A new community is proposed at Brimbin that will accommodate approximately 20,000 people when fully developed. In addition, there would be approximately 413 000m² (GFA) of industrial development including bulky goods. Other associated services such as Neighbourhood Shops, Commercial Offices, a Shopping Centre, Community Services, Sporting Clubs and School will be provided for. Development will be staged over a period of at least 30 years.

Roche Group Pty Ltd has commissioned RoadNet Pty Ltd to prepare a traffic study for the Brimbin New Town with an anticipated start in 2014.

The study takes account of all proposed development in the wider locality to year 2044 and accounts for growth in through traffic on the Pacific Highway. The impact of this growth to year 2027 has already been assessed on the southern approach to Taree. In 2008, RoadNet completed the 'Manning River Drive Traffic Study' for Greater Taree City Council. The study looked at the route from Victoria Street to the Old Bar Road interchange. The study took account of possible future traffic from the Brimbin proposal. That study identified a cost of $663 per residential lot from the Brimbin development (8300 lots) to contribute towards the cost of upgrading Manning River Drive, constructing another road crossing of the Manning River and improving the Pacific Highway Interchange at Old Bar Road.

This traffic study builds on the 2008 study and examines traffic impacts within Taree, the northern Pacific Highway interchange at Cundletown, road linkages to Taree, Coopernook and Lansdowne.

Traffic from surrounding future development (with and without the Brimbin development) has been assigned to the road network and an assessment made as to the capacity of roads and intersections in years 2010, 2017 and 2027 to be consistent with the 2008 study. It also looks at the ultimate development assumed to occur in 2044. For traffic modelling purposes it is assumed that there will be a uniform rate of growth for 30 years, at which time the Brimbin New Town will be fully developed. In practice, the rate will vary with economic conditions and demographic influences. It is possible that the development period may extend beyond 30 years.

The site is located 8km to the north of the Taree CBD and 17km southwest of Coopernook. Its close proximity to Taree will create a strong attraction between Taree and the Brimbin New Town for services, shopping, education and employment offered in Taree, especially in the initial stages of the development. Taree is a regional centre that provides higher order services to the Manning Valley and beyond. This attraction will generate a high proportion of external trips to and from the Brimbin New Town each day. The strength of the attraction will reduce over time as the Brimbin New Town reaches milestones in population levels that would cause it to have its own schools, employment and services. The rate of traffic growth will therefore change over time with traffic volumes gradually changing from external trips to internal trips as Brimbin grows.

As an indication, all development traffic would be external up to a population of about 5,000 people. By this level there would be a primary school and some local shops (possibly a small IGA) creating some local employment. Some community facilities already exist at nearby Lansdowne and Coopernook and these would attract patronage in the early stages. Approaching 10,000 people, Brimbin would attract a major shopping centre (e.g. Coles, Woolworth's) and a high school, and local employment would increase. As the new town

grows further, more service industries and local jobs would be expected. Traffic modelling reflects the resultant changes in travel patterns over time (See Appendix C for the Development Trip Generation Table).

The study identified a range of options to manage the increased traffic volumes during the life of the development. These options are presented with respect to a staging program where the amount of development will trigger the upgrade requirements at full development for each stage. The timing of the upgrades within each stage will be dependent on internal development triggers where increases in traffic generation / volumes and capacity will impact on the external road network.

These staging requirements can be related to base years with Stage 1 to be completed by year 2021, Stage 2 by year 2028, Stage 3 by year 2035 and Stage 4 by year 2044.

Development of the Brimbin New Town will result in significant upgrades being required to the external road network.

The resultant external road network upgrades will require significant capital costs for the implementation of these upgrades. Table 1.0 provides a summary of the staging requirements, external road network upgrade thresholds and estimates costs for upgrades to the external road network.

Only construction costs have been provided for the external road network upgrades. Project development costs were not provided as there is design constraints (i.e. flooding) related to the project that will need further detailed analysis / assessment in order to determine the detailed design requirements.

As part of the required external road network upgrades there are 3 significant items adding substantially to the upgrade costs. They are:

- Realignment and grade separation of the rail crossing at Kundle Kundle ($ 8 530 362.50)
- Construction of the Cundletown Bypass ($ 11 675 114.01)
- Construction of a Northern Link (Option A) between Taree and the Township ($ 27 097 376.98)

For planning purposes an amount of 15% can be added to the construction costs to give an indication of the overall project infrastructure cost for the development. This 15% would account for planning, design and construction supervision. Table 2.0 provides a summary of overall costs for the development as well as each stage.

Existing flooding issues will have some impacts on the upgrading of the external road network. Greater Taree City Council has provided preliminary advice that “any road network upgrades will need to take into account providing acceptable emergency access to a bigger centre with medical services available”.

In setting up the trip generation for this development a community services component, which could include medical servicing was allowed for in the modelling. Further detailed investigation will need to be carried out as to the extent of the services to be provided so as to possibly minimise the capital upgrade costs for the external road network to satisfy the necessary emergency access requirements in relation to flooding.

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 1:	1.1	Two Lane Roundabout for Brimbin Township Access Intersection B.	- Brimbin Access Road = 400 vph	The roundabout has been designed as a large rural roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.	• $ 610 175.50
Stage 1 A:	1A.1	Signalise Manning River Drive/Lansdowne Road Intersection	- 1,000 vph southbound on Lansdowne Road - 15,000 AADT on Lansdowne Road	The existing roundabout intersection is inadequate. - Queuing and delays exceed capacity of Lansdowne Road approach in the AM peak. - Peak period tidal flow with long queues on the eastbound Manning River Drive approach in the PM peak as a result of traffic heading towards Brimbin. - Additional 2 lane right turn from Manning River Drive to Lansdowne Road (Stage 2) should be implemented at this stage for construction purposes.	• $ 2 291 052.50 (includes Stage 2 requirement of 2 right turn lanes from Manning River Drive to Lansdowne Road)

Table 1.0: Proposed Development Staging and External Road Network Upgrade Costs

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 1 A:	1A.2	CHR for the Airport Drive/Lansdowne Road intersection including 2 lanes on Lansdowne Road from Airport Drive to Manning River Drive (southbound)	- Lansdowne Road = 600 vph (6,000 AADT)	The existing intersection is inadequate. - Right turn from Lansdowne Road to Airport Drive blocking through traffic. - Insufficient gaps for vehicles entering/exiting the Airport.	• $1 884 761.00
	1A.3	'Seagull' Intersection at the Brimbin Road / Lansdowne Road Intersection.	- Lansdowne Road = 600 vph (6,000 AADT)	The existing intersection is inadequate. - Insufficient gaps for turning traffic on Brimbin Road as a result of through traffic on Lansdowne Road. - Turning traffic on Lansdowne Road restricts through traffic and exacerbates safety concerns at intersection.	• $ 2 103 718.00

Table 1.0: Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 1 A:	1A.4	Two Lane Roundabout for Brimbin Township Access Intersection A.	- Brimbin Access Road = 400 vph	The roundabout has been designed as a large rural roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.	• $ 610 175.50
Stage 2:	2.1	Two lane Roundabout for Brimbin Township Access Intersection C.	- Brimbin Access Road = 400 vph	Priority controlled intersection is insufficient with through and turning traffic volumes on Lansdowne Road limiting side road gaps to undertake movements. This creates long queues and delays into Brimbin, and safety issues. The roundabout has been designed as a large rural roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.	• $ 610 175.50
	2.2	Two lane right turn on the eastern approach to the Manning River Drive / Lansdowne Road intersection.	- Right Turn = 400vph	Single right turn lane into Lansdowne Road is insufficient in length and queues extend out of turn pocket and impact through movements. Should be implemented as part of Stage 1A.1 works for construction purposes.	• Costs included in Stage 1A.1.

Table 1.0: Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 2:	2.3	Northern Link (Option A) – North Taree to Brimbin Connection including all associated intersection upgrades (Mudford Street, Myuna Close, and Brimbin Road).	- Lansdowne Road = 2,500 vph between Brimbin Road and Manning River Drive (25,000 AADT)	There is insufficient capacity on Lansdowne Road to cater for the increased traffic volumes as a result of the Stage 2 Brimbin Township. This is due to a combination of single lane each way on Lansdowne Road and across Dawson River Bridge on Manning River Drive. The Northern Link will attract traffic from Lansdowne Road.	• $27 097 376.98
	2.4	Realignment/grade separation of Lansdowne Road at the rail crossing.	- Full development of Stage 2 - Grade separation should coincide with realignment of Lansdowne Road.	Required to mitigate the impacts of delays and queuing at the existing level rail crossing of Lansdowne Road at Kundle Kundle. Also requires southbound on ramp at southern end of realignment	• $8 530 362.50

Table 1.0: Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
	3.1	Two continuous through lanes westbound on Manning River Drive between Phillip Street and Cowper Street	- Manning River Drive = 2,400 vph	The existing converge from two lanes to one lane westbound on Manning River Drive after Phillip Street causes ineffective use of the stand-up lane at intersection and queuing east, impacting on the Manning River Drive Lansdowne Road intersection and the Airport access. A second westbound lane west of Phillip Street will free up traffic flow and reduce queuing towards the east.	• $ 543 064.50
	3.2	Cundletown Bypass	- Main Street = 1,800 vph	Without a bypass the constant and increased flow of traffic through Cundletown creates insufficient gaps for turning traffic and property accesses. This exacerbates safety and amenity issues through Cundletown particularly for residents, local businesses and the school zone.	• $ 11 675 114.01
Stage 4:	No further upgrades required.				

Table 1.0: Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Road	Stage 1 Works	Stage 1A Works	Stage 2 Works	Stage 3 Works	Stage 4 Works
Manning River Drive	Nil	$2 291 052.50	Included in Stage 1 Works	$543 064.50	Nil
Lansdowne Road	$610 175.50	$4 558 654.50	$9 140 538.00		Nil
Cundletown Bypass	Nil	Nil	Nil	$11 675 114.01	Nil
Northern Link Road (Mudford St, Myuna Cl & Brimbin Rd)	Nil	Nil	$27 097 376.98	Nil	Nil
Stage Totals	**$610 175.50**	**$6 849 707.00**	**$36 237 914.98**	**$12 218 178.51**	**Nil**
				Total	**$555 915 975.99**

Table 2.0: Summary of Estimated Costs for Upgrades to the External Road Network

In an attempt to reduce the requirement for substantial road network upgrades a public transport scenario was tested, which determined that a highly ambitious Public Transport mode share of 30% during the peak periods would be required to reduce traffic volumes between Taree and the Brimbin New Town that would negate the upgrade requirements.

The existing rail line that currently links Taree to the proposed Brimbin New Town may provide an opportunity to develop a high quality public transport corridor by using either buses or trains between the two centres. However, the effectiveness of this proposal depends greatly on providing an attractive service with significant travel time savings in comparison to on-road travel.

Further analysis is required on the associated costs and feasibility of a high frequency public transport option as opposed to the required upgrades.

In order to reduce a dependence on Lansdowne Road and Manning River Drive / Princes Street by development generated traffic, a connection between the Brimbin New Town and the Pacific Highway was tested generally along the existing Kundle Kundle Road / Moto Road alignment with an interchange to be provided at the Pacific Highway end of the route. An alternate option approximately 1.20km to the north of Kundle Kundle Road running along the southern boundary of the development land and joining back to the original option at Moto Road was also tested. These options were not favoured by Council or the RMS and were abandoned in favour of a connection between north Taree and the Brimbin New Town (Northern Link, Option A) and the Cundletown Bypass. This option is tested in this analysis and presented as a recommended upgrade.

The Northern Link connection creates an additional direct route between the northern section of Taree and the south western area of the Brimbin New Town and reduces the dependence on Lansdowne Road and Manning River Drive. Without the construction of the Northern Link the following upgrades would be required:

- Upgrading Lansdowne Road to 4 lanes between Airport Drive and Brimbin Road
- Upgrading Manning River Drive to 4 lanes between Gregory Close and Lansdowne Road including the duplication of the Dawson River Bridge

Where the duplication of the Dawson River Bridge at Manning River Drive would not be required, a bridge approximately twice the length (210m) would need to be constructed as part of the Mudford Street (preferred option) or Kanangra Drive extension over the Dawson River.

The Mudford Street or Kanangra Drive extension will attract a high volume of vehicles (approx. 18 000vpd) with its direct connection, which would have flow on impacts for both the northern section of the Taree road network and the integration with the Brimbin New Town. This will require the implementation of signals with the connection to the Brimbin New Town and construction of Mudford Street or upgrade of Kanangra Drive and its roundabout intersection with Bushland Drive to signals. The additional traffic is expected to be dispersed through Taree at either of these intersections with no formal assessment made past this point.

It is noted that Greater Taree City Council has recently obtained funding through the Regional Development Australia Fund for a proposed future transport hub known as the "Northern Gateway" Regional Transport Access Infrastructure. Part of this funding allocation will include the construction of the Cundletown Bypass, upgrades to Lansdowne Road / Manning River Drive intersection and the duplication of the Dawson River Bridge on Manning River Drive.

In recognition of these works being constructed in advance of the Brimbin development consideration should be given to the utilisation of this new infrastructure instead of constructing the Northern Link from Brimbin to North Taree. Upgrades / duplication of Lansdowne Road would be required if this option to be pursued. The timing of for the upgrades would be consistent with the proposed timing for the Northern Link from Brimbin to North Taree.

This study has recommended sections of Lansdowne Road between Manning River Drive and the Brimbin New Town be upgraded as part of this development. There remain sections of Lansdowne Road (Option B) outside the scope of this study that will require further investigation for upgrading as a result of the Northern Gateway development.

- North of the airport access to south of Brimbin Road.
- North of Brimbin Road to southern boundary of development (realignment of Lansdowne Road)

1.0 INTRODUCTION

Brimbin has been recognised as a growth area for the Mid North Coast region as part of the New South Wales Government's Mid North Coast Regional Strategy which takes in the areas from the Great Lakes north to the Clarence Valley. The strategy applies for the period of 2006 to 2031 with reviews to be conducted every 5 years.

The purpose of the strategy is to ensure that adequate land is available to accommodate the projected housing and employment needs for the region over the next 25 years. The strategy sets the policy to govern how and where growth will occur in the region. It is expected growth can and will occur in the region. The strategy will place limits on growth in some areas where it is considered impacts on environmental / cultural assets and natural resources is said to be high. The strategy also addresses the need to provide employment land (industrial and the like) to provide increased capacity for new jobs within the region.

The strategy incorporates the specific regional infrastructure requirement needs identified in the State Infrastructure Strategy 2008-09 to 2017-18. Infrastructure planning for the region will take into account the broad planning framework identified by the regional strategy so that future population growth is supported by services and associated infrastructure.

Roche Group Pty Ltd have engaged RoadNet Pty Ltd to complete a traffic study to assess the impacts of the proposal (*refer to section 2.0, The Proposal*) on the local road network and provide estimated costs for recommended upgrades to the network where required.

The study examines existing and future traffic conditions for the road network and quantifies capacity constraints. Options to manage future traffic are identified and analysed using site inspections, traffic surveys, accident data, population projections, network modelling and discussions with Council and Roads and Maritime Services (RMS – formally RTA) Officers. This study concludes with an overall traffic management strategy for the network including the timing of possible improvements dependant on the amount of development required to trigger the upgrade requirements. Ways of funding the necessary infrastructure are also discussed.

A network traffic model (Paramics) has been developed to quantify the impacts of the development options along with indicating the staging requirements for the road network upgrades.

2.0 THE PROPOSAL

Roche Group proposes to develop the Brimbin site into 8,000 dwellings along with a mixture of residential, medium density residential, seniors living, rural residential and rural sites. Approximately 118 hectares of employment land consisting of industrial and bulky goods retail is also proposed. Commercial land areas are also proposed comprising a shopping centre, neighbourhood shopping centre, clubs, schools and community services.

The site is generally bounded by Brimbin Road to the south, Brimbin Nature Reserve and Yarratt State Forest to the west, Lansdowne River (Potential Conservation Land) to the east and Upper Lansdowne Road to the north of the study area. Figure 2.1 and Appendix A shows the draft structure plan provided by Roche Group Pty Ltd for the study area.

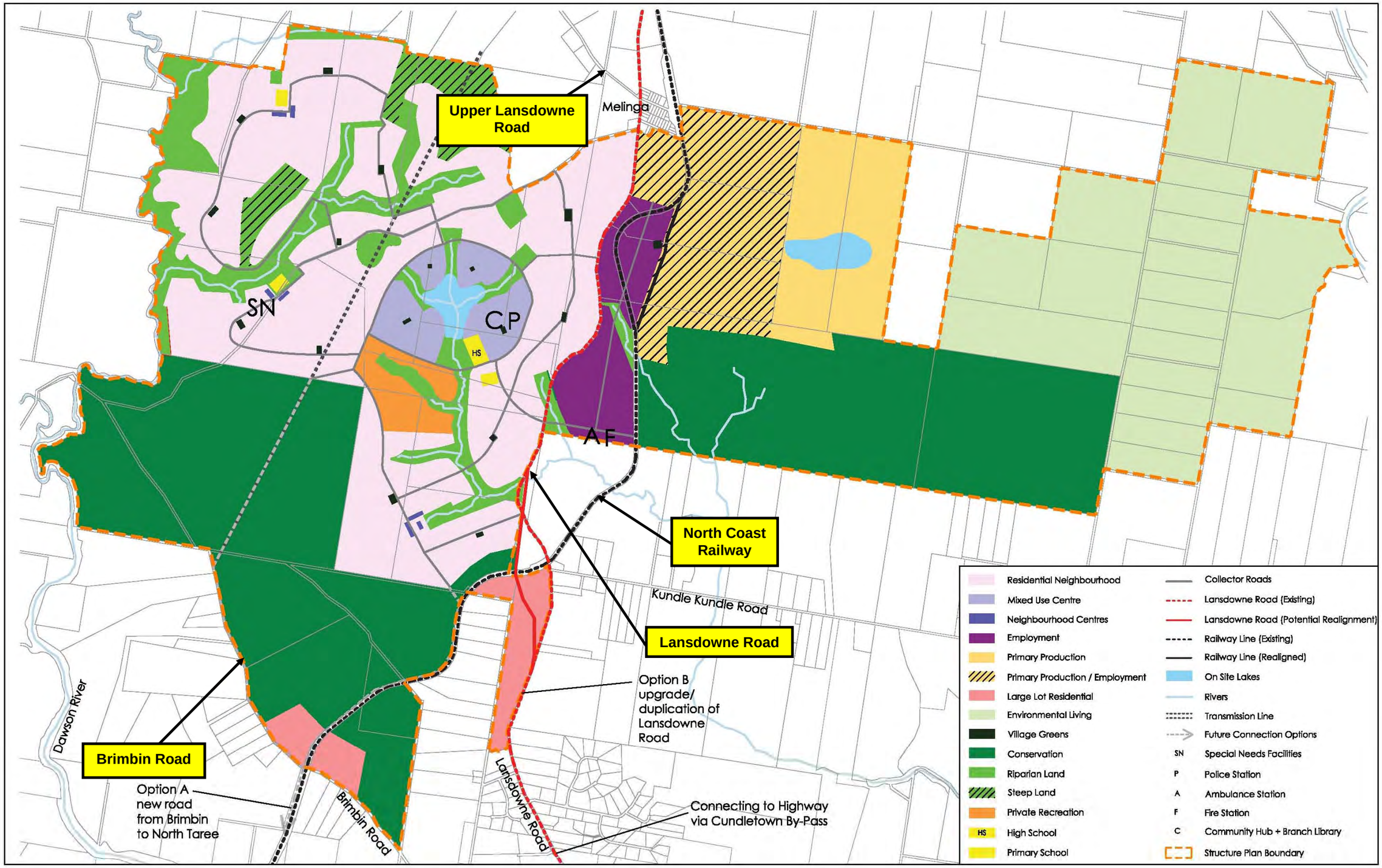


Figure 2.1: Draft Structure Plan

3.0 SCOPE

Brimbin has been recognised as a growth area for the Mid North Coast region as part of the New South Wales Government's Mid North Coast Regional Strategy which will generate additional traffic on the surrounding local and regional road network. Traffic generated by the proposal is calculated and assigned to the road network (See Appendix C for the Development Trip Generation Table).

Traffic volume calculations are based on a structure plan provided by Roche Group Pty Ltd along with recent planning and traffic studies updated where necessary to suit current conditions. The study examines the impact of future traffic on the local and regional road network, in particular links to and from the new community via Manning River Drive and Lansdowne Road.

Additional accesses to the site from north Taree also been assessed throughout the design process including options for a northern link to Brimbin Road and an east west link known as the Cundletown Bypass linking Lansdowne Road via Manning River Drive to the west and Princes Street, Cundletown to the east.

As part of the road network assessment the following has been identified to aid in assessing development costs for the proposal:

- Additional roads and links
- Road hierarchy within the area of investigation
- Need for and priority for upgrading an existing rail crossing
- Intersection upgrades required – taking all road users into account including existing and proposed residential, commercial and industrial uses
- Upgrades required to the regional road network as a result of the development (consultation with the Council and RMS where relevant), and in particular at what stages within the development will these be required

The study describes existing traffic conditions (2010 base model) for the road network within the study area and quantifies the impact of future volumes based on a four stage development process over a period of thirty two years (2044). The Paramics model demonstrates the impacts based on these parameters.

The Paramics modelling will provide conclusions as to the upgrade requirements for the external road network along with an indication as to the staging triggers for these upgrades. Estimates of Costs based on today's figures will be provided to complete these external road network upgrades for inclusion in an overall development strategy for the Brimbin New Town.

A visual inspection and assessment of the external road network was carried out to determine existing network constraints. Taking this information into account a detailed design assessment has been carried for the roads in the external road networks that are required to be upgraded as a result of the outcomes provided by the Paramics modelling.

The accident history for the road network within the study area has been examined to ensure that any existing safety issues are addressed in the formulation of traffic management strategies.

The needs of cyclists and pedestrians on a regional basis have been considered along with public transport requirements for the proposed Brimbin New Town.

4.0 ISSUES

The main traffic flow and safety issues identified in this study are listed below:

- Capacity / increase in traffic volumes for the local road network (i.e. Manning River Drive and Lansdowne Road)
- Capacity of existing 2 lane bridge over the Dawson River at Cundletown
- Capacity of the existing railway level crossing located at Kundle Kundle on Lansdowne Road
- Capacity of the existing 2 lane roundabout at the Manning River Drive / Lansdowne Road intersection
- Potential river crossing and route options for a proposed northern link to the community
- Road network upgrade costs associated with the development of the Brimbin New Town

5.0 METHODOLOGY

5.1 Study Methodology

Existing traffic studies were reviewed and relevant information extract to see what additional data was needed to construct a traffic model for the locality.

Traffic surveys and intersection counts were carried out at locations agreed with Council and the Client during the week ending 30th July 2010. Also, detector loop traffic data for the signalised intersections along Manning River Drive (Victoria Street) was obtained from RMS.

Roche Group provided a draft structure plan for the proposed development for which a Paramics model was developed.

The Paramics model was set up for the study area and validated against existing count data to reflect existing conditions – delays and queuing. The model was constructed with road geometry and cross section details.

A trip table was developed from the draft structure plan provided and interpolation of turning movements at intersections was undertaken to establish origins and destinations.

Traffic generation and a trip table were calculated for the future development of the Brimbin New Town using the Draft Structure Plan provided. (See Appendix C for the Development Trip Generation Table).

Natural traffic growth using population projections and existing Regional Traffic Studies was also calculated. This additional traffic was added to the existing road network in the Paramics model. The impacts of the additional traffic were quantified and additional facilities were then added to the model, e.g. additional travel lanes, until a satisfactory level of service was achieved for the target years.

Accident data was examined for the last five year period to identify any existing safety issues on the identified routes and road network.

Preliminary findings of the Paramics modelling were presented to the Client and relevant Council Officers at Greater Taree City Council Chambers in October 2010. Following the

presentation the Client provided comments and additional information as to possible staging. The Paramics model and the report were adjusted accordingly.

To address comments and requests for additional information from Council and the RMS in regard to the Paramics model and validation of the model, additional traffic surveys, travel time surveys, and intersection counts were undertaken on the 21st July 2011.

New AM and PM base models were then developed based on the 2011 base year in accordance with RMS's Paramics Modelling Calibration and Validation manual. Once the new base models were approved by the RMS future scenarios within the model were adjusted and expanded to suit requests from Council and the RMS.

Potential upgrades to the road network were then derived from the modelling and estimates of costs (to a strategic level) prepared for recommended works.

Existing signalised intersections on Manning River Drive, future proposed signalised intersections, and the Cundletown Interchange was modelled using SIDRA 5.1. This was requested by the RMS to assist in validating the Paramics model and to determine existing and future operation of the intersections.

The capacity of the level crossing of Lansdowne Road at Kundle Kundle was assessed within the Paramics model to determine queuing and delays during the peak hours when the existing crossing is active. Train frequency, type and time boom gates are active was obtained from information from the ARTC and site surveys undertaken on the 21st July 2011. The determining factor for assessing the impacts of the level crossing was the length of queues at each development stage and the effect of this queuing on intersections on Lansdowne Road north and south of the crossing.

5.2 Design Upgrade Methodology

A visual assessment of the road network was carried out to aid in determining the upgrade requirements to be derived from the network modelling. Extensive site inspections and investigations were carried out to quantify site conditions and the costs / needs for road improvements.

The following roads have been assessed:

- Pacific Highway – Coopernook / Harrington Road Intersection to South Taree Interchange
- Manning River Drive (Chatham Avenue, Main & Princes Streets, Cundletown) – Cowper Street to Pacific Highway
- Lansdowne Road (Coopernook Road and George Gibson Drive) – Pacific Highway to Manning River Drive
- Bushland Drive (Gipps Street) – Wingham Road to Cowper Street
- Brimbin Road – Lansdowne Road to end of road formation
- Moto Road – Kundle Kundle Road to Ghinni Ghinni Creek
- Kundle Kundle Road – Lansdowne Road to Moto Road
- Oakvale Road (including Tine Street) – Lansdowne Road to end of road formation (north)
- Myuna Close – water treatment plant to Brimbin Road
- Kanangra Drive – Bushland Drive to northern end of road
- Mumford Road – Bushland Drive to northern end of road including unformed paper road section

- Urara Lane – Kanangra Drive to North Coast Railway

As part of the visual assessment, videos and photos of each road were taken along with obtaining information for assets, such as bridges, from the relevant authorities.

A desktop assessment was then conducted for the horizontal and vertical alignments of each road in accordance with the RMS Road Design Guide (RDG).

A summary of the Visual Assessments for each road is provided in Section 10 of this report.

A detailed design assessment has been completed for each of the roads that are recommended for upgrade as a result of the modelling outcomes using all the relevant design standards and guides such as the RDG, Austroads Guide to Road Design, Australian Standards and Greater Taree City Council's version of AusSpec Design Specifications.

The detailed design assessment of the roads to be upgraded can be found in Section 11 of this report.

6.0 REVIEW OF PLANNING STUDIES

Recent studies have been reviewed and relevant information used in this report. The main documents reviewed are summarised below. These main documents also refer to a number of other recent studies which have been reviewed but do not warrant specific mention in this Report. The documents reviewed include:

- Transportation Environmental Consultants (TEC), *Greater Taree Road Study (1996)*
- Connell Wagner, *Brimbin Local Environmental Study Baseline Environmental Assessment (Excerpt – 2004)*
- RoadNet Pty Ltd, *Manning River Drive Route Study (2007)*

7.0 EXISTING TRAFFIC CONDITIONS

The Brimbin New Town area consists of gently undulating rural paddocks used for grazing. Lansdowne Road and the North Coast Railway line run in a north / south direction through the site.

The study primarily involves examining existing and future traffic conditions within the Brimbin New Town development area and the connecting road network between Taree and the Pacific Highway. Upgrades to the road network will be provided as a result of the Paramics modelling. The upgrades are to be completed based on a recommended construction staging program with respect to the amount of lots / dwellings and employment lands developed along with employment lands, and ancillary development infrastructure such as schools, shops and community needs triggering the required upgrades for each stage.

A description of the existing road network is provided as part of the Visual Assessment for the study in Section 10.

7.1 Traffic Patterns

Manning River Drive provides the main northern connection between Taree and the Pacific Highway and locally to Lansdowne and Coopernook via Lansdowne Road. Lansdowne Road runs to the north off Manning River Drive, past the Airport, through the development site and

onto the small village of Lansdowne. Lansdowne Road then continues to rejoin the Pacific Highway at Coopernook. Lansdowne Road has numerous substandard horizontal curves requiring advanced speed warning signage especially on the section between Lansdowne and Coopernook. Four railway level crossing sites are located along the length of Lansdowne Road.

Greater Taree City Council has advised it is the intention for Bushland Drive to be designated as the local heavy vehicle route once the extension of Bushland Drive between Kurrajong Crescent and Phillips Street is completed.

7.2 Traffic Volumes

Traffic volumes for this study have been obtained from various sources – Greater Taree City Council counts, Detector Loop Data from signalised intersections, vehicle classification counts and manual intersection counts. Table 7.2.1 provides the Annual Average Daily Traffic (AADT) for the roads assessed in this study.

Location	(AADT)
Pacific Highway (at George Gibson Drive)	7 660 (28 July 2010)
Pacific Highway (at Harrington Road)	9 250 (28 July 2010)
Pacific Highway (at Old Bridge Road)	9 090 (28 July 2010)
Pacific Highway (at Ghinni Ghinni Creek)	10 987 (1995)
Pacific Highway (at Ghinni Ghinni Creek)	12 903 (1998)
Pacific Highway (at Ghinni Ghinni Creek)	13 747 (2001)
Pacific Highway (at Ghinni Ghinni Creek)	17 918 (2004)
Pacific Highway (at Cundletown Interchange)	5 870 (28 July 2010)
Pacific Highway (at South Taree Interchange)	13 833 (1995)
Pacific Highway (at South Taree Interchange)	16 149 (1998)
Pacific Highway (at South Taree Interchange)	17 045 (2001)
Pacific Highway (at South Taree Interchange)	20 238 (2004)
Pacific Highway (at South Taree Interchange)	20 640 (28 July 2010)
Victoria Street (at Pulteney Street)	11 000 (23 June 2010)
Victoria Street (at Manning Street)	11 150 (23 June 2010)
Victoria Street (at Macquarie Street)	12 390 (23 June 2010)
Chatham Avenue (at Pioneer Street)	10 080 (30 June 2010)
Chatham Avenue (at Cowper Street)	11 096 (30 June 2010)
Manning River Drive (at Phillips Street)	11 970 (30 June 2010)
Manning River Drive (at Lansdowne Road)	9 465 (28 July 2010)
Lansdowne Road (at Brimbin Road)	2 465 (28 July 2010)
Bushland Drive (at Kanangra Drive)	3 730 (28 July 2010)

Table 7.2.1: AADT's for roads assessed in Study Area

7.3 Travel Speeds

Existing posted speed limits for the road network are provided as part of the Visual Assessment of each road in Section 10.

The RMS has recently conducted a review of the posted speed limits along Lansdowne Road and has made minor changes.

7.4 Cyclists and Pedestrians

Provision for cyclists to travel safely along the section of the Pacific Highway within the study area is by way of 2 to 3.0m wide sealed shoulders.

As pedestrian access along the Pacific Highway is not encouraged due to the high vehicle speeds, no formal provision of pedestrian facilities is provided along the route.

Parts of Manning River Drive have provision of 1.50 to 2.0m sealed shoulders along the section within the study area. Pedestrian access along Manning River Drive is provided formally and informally by way of concrete footpaths and grass verges. All other roads assessed within the study area generally do not provide for pedestrians or cyclists. These roads are of a rural formation with unsealed shoulders. Cyclists travel in the travel lane with no separate cycle lane provided.

New roads and upgrades to the external road network will incorporate pedestrian and cycleway facilities where practicable to promote safe pedestrian access and cycling.

The detailed design assessment for this project will include the provision of on road cycle lanes to provide safe cycling along the arterial corridors for connection between Taree and the Brimbin New Town. The provision of pedestrian facilities external to the Brimbin New Town development will be minimal due to distances to attractors (i.e. Taree).

It is assumed in planning the internal road network the Client will provide sufficient pedestrian and cyclist facilities (on and off road paths and lanes) for connection to the arterial network.

7.5 Public Transport

Eggins Comfort Coaches services what is known as the Taree town area providing public and school bus services. The northern boundary for this service area is at the roundabout at Manning River Drive and Lansdowne Road. Greenfields Bus Company of Lansdowne provides school bus services along Lansdowne Road, Kundle Kundle Road and Brimbin Road.

Growth of the development should also result in the expansion of the public transport system with further planning required for this.

8.0 ACCIDENT ANALYSIS

The RMS accident database has been examined for the last 5 years of data up until September 2009. One hundred and thirty one (131) crashes were reported within that timeframe, with ten (10) fatalities reported on the section of the Pacific Highway within the study area. Sixty Nine (69) crashes involved injuries.

Table 8.1 provides a summary of the accident data for the road network.

The Pacific Highway is the main north south major arterial road providing connection along the eastern seaboard with an AADT of 18 000 vehicles per day. Ten fatalities have been recorded on the Pacific Highway for the 5 year period and this would be of concern to the RMS. However, in terms of this study, the proposed development will add only a relatively minor increase in traffic and would not change the fundamental causes of those accidents.

Road safety is expected to improve on the local road network with the proposed Brimbin New Town development because new works will be constructed to current standards and any deficiencies will therefore be rectified.

LOCATION	Accidents			
	Fatality	Injury	Non - Casualty	***TOTAL***
Pacific Highway – Between Coopernook Road / Harrington Road Intersections and the South Taree Interchange	10	35 (1)	25	***70 (1)***
Manning River Drive – Between Cowper Street & Pacific Highway	0	6	13	***19***
Lansdowne Road	0	19	15	***34***
Bushland Drive	0	8 (1)	4	***12 (1)***
Brimbin Road	No Accidents Reported			
Moto Road	No Accidents Reported			
Kundle Kundle Road	0	1	1	***2***
Oakvale Road	No Accidents Reported			
Total	***10***	***69***	***58***	***137 (2)***

Note: - Numbers represented in brackets are pedestrian injuries.

Table 8.1: Summary of Accident Data (For year ending 2009)

A further analysis of the statistics provided can be provided with the respect to the RMS's NSW Speed Zoning Guidelines. When conducting a statistical crash analysis, it is important to note clusters of crashes which may affect the crash rate. Clusters of crashes may indicate localized problems that are best addressed through engineering treatments.

A crash rate can be determined for a section of road as follows:

$$\text{Crash Rate} = \frac{\text{No. of Crashes} \times 10^8}{[\text{Length of road (km)} \times \text{AADT} \times 365 \times \text{No. of Years (crash data)}]}$$

Therefore the crash rate for this section of the Pacific Highway is 9.90 based on the above formula. Table 3.1 of the guide provides a typical crash rate of 20 (total crashes per 100 million vehicle kilometers).

9.0 TRAFFIC MODELLING

9.1 General

Traffic modelling has been carried out to assess the impacts and needs of future traffic volumes on the existing network configuration and potential future road networks upgrades in relation to the Brimbin New Town development.

An iterative process has been adopted to identify deficiencies and test improvement options (e.g. lanes, intersection treatments) to improve capacity.

A Paramics Model was developed for the area to determine the traffic impacts and required upgrades to the external road network as a result of the Proposal.

As requested by the RMS, intersection modelling was also undertaken using SIDRA 5.1 for all affected and proposed signalised intersections in the study area, and the Cundletown interchange.

9.2 Paramics Model

A Paramics micro simulation model was developed for the Study Area to assign expected future traffic volumes to various network options.

The study area encompasses a large portion of the Greater Taree area, including 20km of the Pacific Highway as well as the towns of Taree, Cundletown, Coopernook and the proposed Brimbin New Town.

Base models for existing conditions in year 2011 were developed and approved by the RMS. Future development scenarios were then developed as follows:

- Completion of Stage 1 – 2021
- Completion of Stage 2 – 2028
- Completion of Stage 3 – 2035
- Completion of Stage 4 – 2042

The Paramics Model assesses the impacts of traffic generated at each of these stages and determines the required upgrades to the external road network as a result of the additional traffic.

The following sections summarise the finding of the Paramics assessment. The full Paramics modelling report undertaken by Bitzios Consulting is provided in Appendix D. This details the modelling process, methodology, findings and validation and calibration of the model.

9.2.1 Scope

Following the initial assessment of the preliminary Brimbin Structure Plan, a report detailing the findings was provided to the RMS and Council. Correspondence received by RMS and Council on this initial report, as well as a revised structure plan for Brimbin required the traffic assessment to be revised, as outlined in this report. Specifically, the revisions to previous work included the following:

- revision of the assessment based on comments received by RMS and Council;
- development and validation of base and future traffic simulation models for the existing road network using Paramics micro-simulation software and in accordance with RMS Guidelines;

- development of future year Paramics models and testing the implementation of different stages of the Brimbin Township development;
- assessment of the required road network improvements as a result of traffic generated by the proposed Brimbin Township development; and
- assessment of a number of potential road network options and provide recommendation to the design team.

Options were tested within the model to determine the most appropriate method of providing access to the Brimbin Community which would be acceptable to both the RMS and Council. These included:

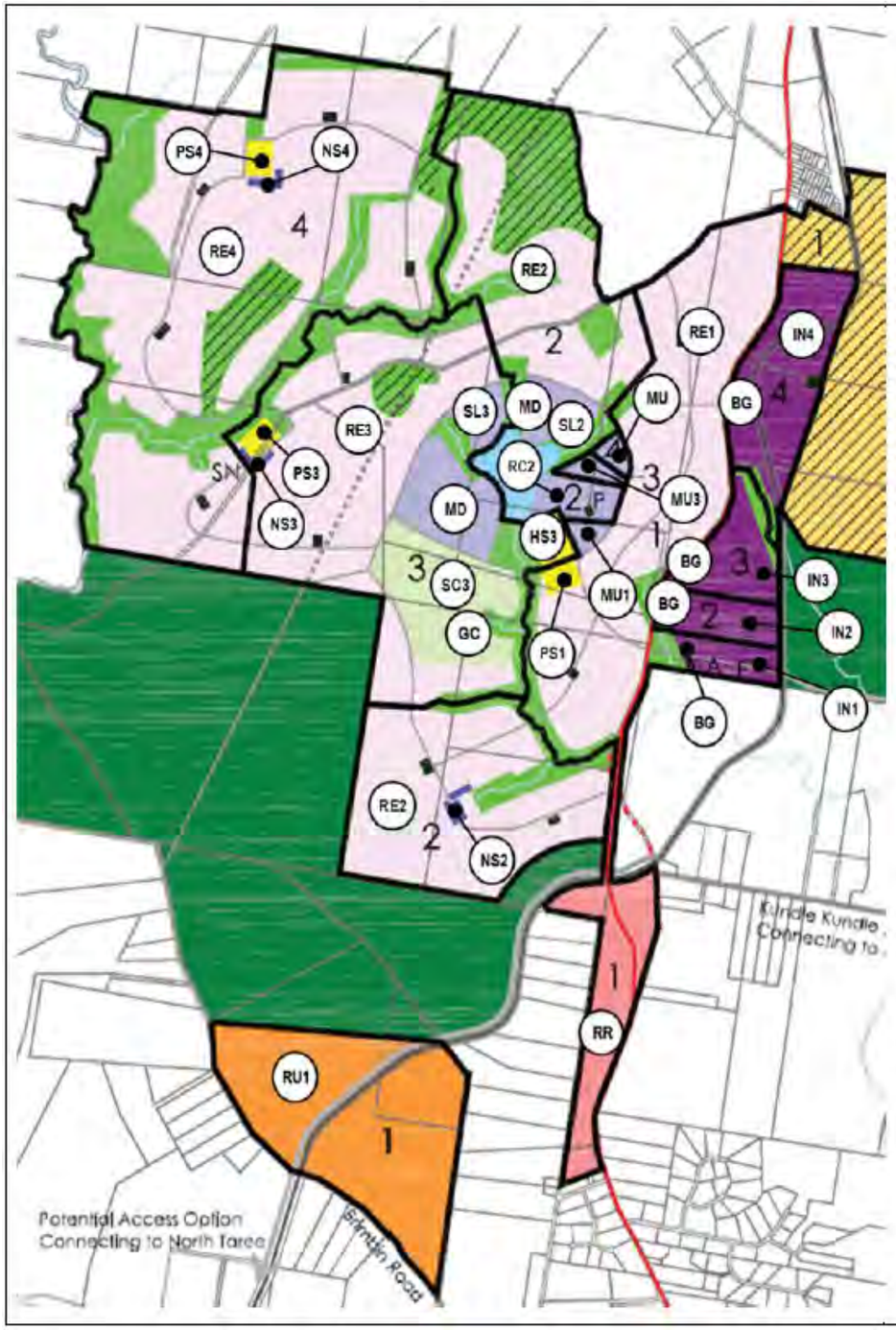
- the Cundletown Bypass linking Lansdowne Road via Manning River Drive to the west and Princes Street, Cundletown to the east
- Access via Lansdowne Road only;
- A new connection to the northern areas of Taree (Northern Link, Option A);

This report presents the options favoured by Council and the RMS.

9.2.2 Proposed Development and Staging

A staging plan was developed in conjunction with Roche Group which is shown in the follow figure. Traffic generation at each stage is shown in the Development Trip Generation Table shown in Appendix C.

The proposed access intersections to the development from Lansdowne Road are also shown in Figure 9.2.2.1 below. The Draft Structure Plan includes 3 access points to Lansdowne Road. Road upgrade requirements for each stage are required at full development of that stage and have triggers in terms of traffic volumes for when they are required.



Stage	Development Year	Map Reference	Type	Size
1	2014 - 2021	IN1 BG1	Employment (Industrial and Bulky Goods)	13ha
		MU1	Mixed Use Centre (Retail and Commercial)	3.5ha
		PS1	Primary School	3ha
		RE1	Residential	180ha
		RR1 RU1	Large Lot and Rural Residential	43ha
2	2021 - 2028	IN2 BG2	Employment (Industrial and Bulky Goods)	18.5ha
		RC2	Mixed Use Centre (Regional Shopping Centre)	14ha
		NS2	Neighbourhood Shops	2,500m2 GFA
		RE2	Residential	191ha
		MD2 SL2	Mixed Use Centre (Medium Density and Seniors)	14ha
3	2028-2035	GC3 SC3	Private Recreation (Golf and Sporting Club)	52ha
		HS3	High School	6ha
		IN3 BG3	Employment (Industrial and Bulky Goods)	27ha
		MU3	Mixed Use Centre (Retail and Commercial)	4ha
		NS3	Neighbourhood Shops	2,500m2 GFA
		PS3	Primary School	3ha
		RE3	Residential	149ha
		MD3 SL3	Mixed Use Centre (Medium Density and Seniors)	40ha
4	2035-2042	IN4 BG4	Employment (Industrial and Bulky Goods)	59.5ha
		MU4	Mixed Use Centre (Retail and Commercial)	4.5ha
		NS4	Neighbourhood Shops	2,500m2 GFA
		PS4	Primary School	3ha
		RE4	Residential	226ha

Figure 9.2.2.1: Staging Landuse Breakdown

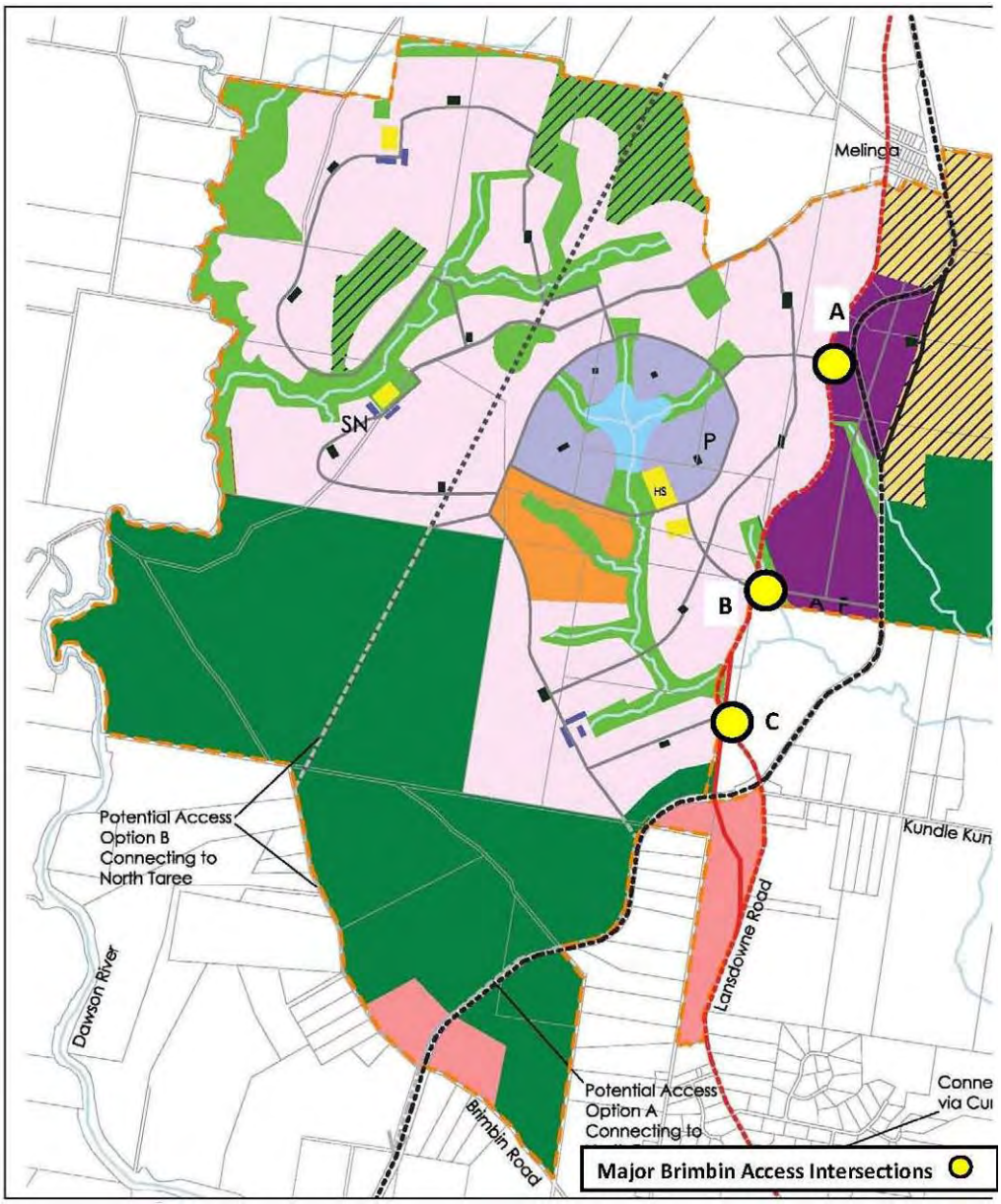


Figure 9.2.2.2: Proposed Access Intersections

9.2.3 Stage 1 Assessment Summary

Stage 1 has been separated into Stage 1 and Stage 1A. It is envisaged Stage 1 roadworks would be constructed prior to any development to allow access to the site and development to occur. The remaining roadworks associated with Stage 1A would be constructed as triggered by development but generally are required at full development of Stage 1.

A summary of the recommended upgrades as determined by the Paramics Model at Stage 1 of the development are shown below.

Stage	Location	Required Upgrades
1.1	Brimbin Access Intersection B	Provide a two lane roundabout at Brimbin Access Intersection B. Roundabout to be designed as a large roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.
1A.1	Manning River Dr / Lansdowne Rd Intersection	Existing roundabout upgraded to a signalised intersection. Two lane approach on Lansdowne Road lengthened and left turn slip lane added. Manning River Drive (westbound) approach right turning lane added as well as a two lane through movement. Slip lane from Manning River Drive (eastbound) to Lansdowne Road into extended merging lane.
1A.2	Lansdowne Road / Airport Access Intersection	Channelised Right Turn (CHR) lane from Lansdowne Rd to the Airport access providing storage for right turns. Two lanes southbound from the Airport Access to Manning River Drive to allow for vehicles exiting the Airport and reduce queue lengths backing into intersection.
1A.3	Lansdowne Road / Brimbin Road Intersection	Existing 'T' intersections to be upgraded to a priority controlled 'Seagull configuration' intersection. This includes a Channelised Right Turn (CHR) treatment and an Auxiliary Left Turn (AUL) treatment from Lansdowne Road to Brimbin Road as well as a southbound acceleration lane on Lansdowne Road for vehicles exiting Brimbin Road.
1A.4	Brimbin Access Intersection A	Provide a two lane roundabout at Brimbin Access Intersection A. Roundabout to be designed as a large roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.

Table 9.2.3.1: Stage 1 Required Upgrades

9.2.4 Stage 2 Assessment Summary

A summary of the recommended upgrades as determined by the Paramics Model at Stage 2 of the development are shown below. All upgrades are required at full development of Stage 2.

Stage	Location	Required Upgrades
2.1	Brimbin Access Intersection C	Provide a two lane roundabout at Brimbin Access Intersection C. Roundabout to be designed as a large roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.
2.2	Manning River Dr / Lansdowne Rd Intersection	Single right turn lane into Lansdowne Road is insufficient in length and queues extend out of turn pocket and impact through movements. Provide a two lane right turn on the eastern approach.
2.3	Northern Link (Option A) – North Taree to Brimbin Connection	Implementation of a 'Northern Link' connecting North Taree to Brimbin. Provides an additional linkage to Taree via Mudford Street (preferred Option) and reduces the dependence on Lansdowne Road as the primary access. A signalised intersection will need to be constructed at Bushland Drive. Construction of a new section of Mudford Street from Bushland Drive to the Dawson River will be required. Provide a connection to Brimbin Road by way of a channelised 'T' intersection. Signalise the new 3-way Northern Link / Brimbin Access Road Intersection (connection of Northern Link to Brimbin internal road). Further details of the Northern Link are included in Section 9.2.8.
2.4	Lansdowne Road Level Crossing and Realignment	Grade separation/realignment of Lansdowne Road required to mitigate the traffic impacts from the existing level crossing of Lansdowne Road. Further details of the assessment of the level crossing are included in Section 9.2.9.

Table 9.2.4.1: Stage 2 Required Upgrades

9.2.5 Stage 3 Assessment Summary

A summary of the recommended upgrades as determined by the Paramics Model at Stage 3 of the development are shown below. All upgrades are required at full development of Stage 3.

Stage	Location	Required Upgrades
3.1	Manning River Drive	Provide two continuous through lanes westbound on manning River Drive between Phillip Street and Cowper Street to reduce the impacts of queuing at the Phillip Street intersection back to Lansdowne Road.
3.2	Cundletown Bypass	Inclusion of the Cundletown Bypass as per Council planning and alignment. Further details of the Cundletown Bypass are given in Section 9.2.7.

Table 9.2.5.1: Stage 3 Required Upgrades

9.2.6 Stage 4 Assessment Summary

Stage 4 of the Brimbin Township does not require any further mitigation measures or upgrades to the traffic network from that required in Stage 3.

9.2.7 Cundletown Bypass

A corridor for a bypass of Cundletown known as the "Cundletown Bypass" has been identified by Greater Taree City Council. This corridor is shown in Appendix F.

The traffic volumes through Cundletown have been analysed to establish an appropriate time for the implementation of the Cundletown Bypass. The Cundletown Bypass is considered to be required when traffic volumes increase to a level that would impact on property access amenity and turning movements within Cundletown. Given that Cundletown residents have previously seen a significant reduction in traffic volumes through the town as a result of the Pacific Highway bypass in 2000, it would not be desirable to re-increase traffic volumes through Cundletown that would deteriorate the pedestrian and residential amenity back to the original levels.

It is recommended the Cundletown Bypass be constructed upon completion of Stage 2 and prior to Stage 3 of the Brimbin New Town.

Greater Taree City Council has recently obtained funding for a future transport hub in the Cundletown area. As part of this funding allocation includes the construction of the Cundletown Bypass it is considered this infrastructure should not be required to be constructed as part of the Brimbin development as the transport hub will require the bypass be constructed prior to the staging requirements of Brimbin.

9.2.8 Northern Link (Option A)

Two options for the Northern Link connection between Taree and Brimbin were assessed with the model in relation to utilisation and traffic impacts at each end of the connection. The figure below shows the two main Northern Link options with an alternate connection for the eastern option.

As discussed for the Cundletown Bypass, should the bypass plus upgrades / duplication of Lansdowne Road and the duplication of the Dawson River on Manning River Drive be constructed as part of the transport hub project prior to the staging requirements for the Brimbin development then consideration should be given to the utilisation of this new infrastructure instead of constructing the Northern Link from Brimbin to North Taree.

The timing of the abovementioned works would be consistent with the proposed timing for the Northern Link from Brimbin to North Taree.

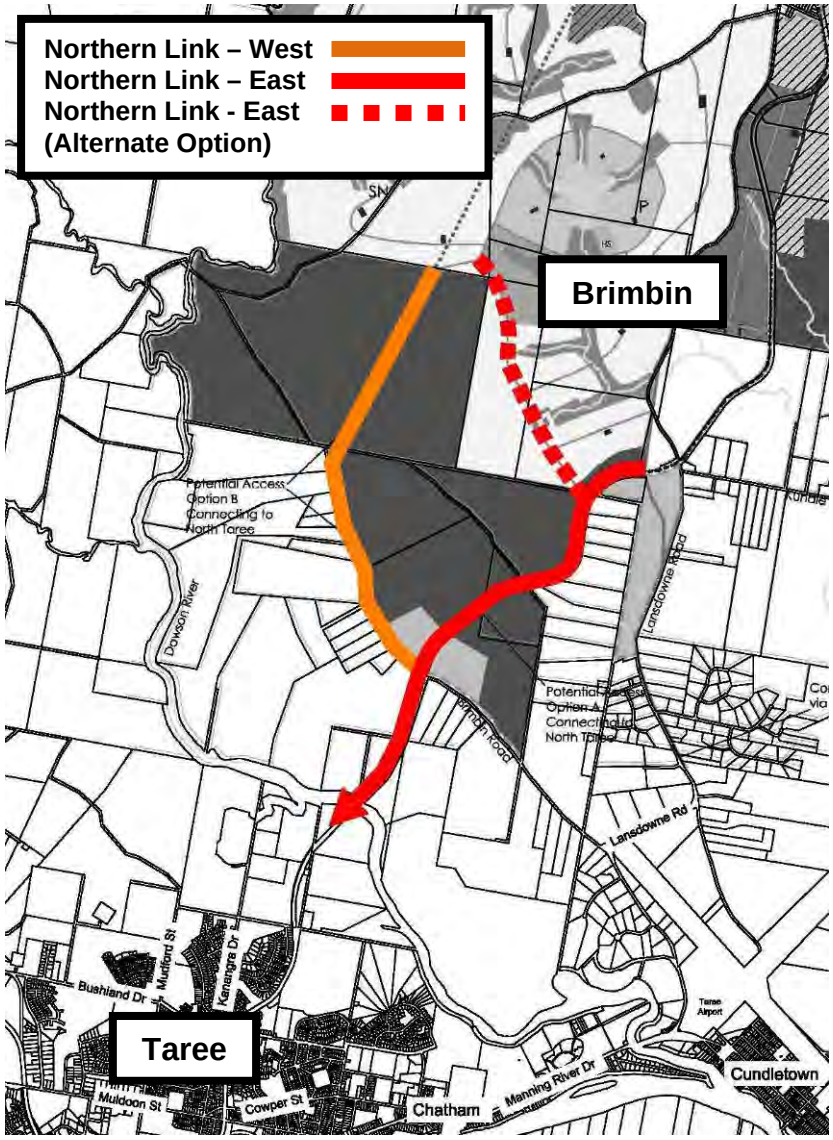


Figure 9.2.8.1: Assessed Northern Link Options

When reviewing these options within the model, it was noted that both northern link options attract a similar volume of traffic. The main difference between the two options is at the northern end of each link. The Northern Link 'west A' option connects to the Brimbin Township directly while the 'east' option connects to Lansdowne Road to the south of the Brimbin Township. The 'east' option therefore requires all Brimbin Township trips to utilise Lansdowne Road. This creates a pinch point on Lansdowne Road between the Northern Link (east) intersection and the Brimbin Township. Excessive queues and failure of the two lane roundabout intersections occur as a result of the Northern Link 'east' option.

Consideration of an alternate eastern option via the internal collector road system could improve the excessive queuing at the Lansdowne Road intersection. This option would provide a filtered connection back to Lansdowne Road via the nominated development access points A, B or C. Further detailed assessment of this option will be completed at the development application stage where a detailed assessment of the internal road network will be carried out.

The Northern Link 'west' is the superior performing of the two options as the link creates an additional parallel connection between Taree and Brimbin providing an alternative route from Lansdowne Road. This would generally follow the existing Brimbin Road, continuing north into the development via the existing transmission line.

Traffic signals will need to the installed at the intersection of Bushland Drive and Mudford Street along with the construction of the unformed section of Mudford Street between Bushland Drive and the Dawson River.

As part of these works a two lane bridge over the Dawson River will need to be constructed linking to Brimbin Road with a new road via Myuna Close.

The connection to Brimbin Road would be upgraded to a Channelised intersection with priority given to the Northern Link.

The connection of the Northern Link to the internal road network at the northern end of the road will also require signals.

The provision of the Northern Link will provide the following key benefits to the surrounding road network and Greater Taree area:

- reduces the dependence on Lansdowne as the single route in and out of Brimbin and need for high level upgrades such as four lanes and signals;
- reduces the number of vehicles passing the Taree Airport, which has been identified for future expansion; and
- provides an alternate route for emergency vehicles between Brimbin and Taree.

9.2.9 Lansdowne Road Level Crossing

The existing rail crossing on Lansdowne Road at Kundle Kundle, just south of the development, is a level crossing as shown in the figure below.

Figure 9.2.9.1: Existing Level Crossing

The proposed Brimbin Township includes the possible realignment of Lansdowne Road at Kundle Kundle as shown in the figure below in order to provide a grade separated crossing of the railway. The timing of the grade separation has been determined by the expected delays and queuing on Lansdowne Road while the boom gates are active, and the impacts of these queues on the operation of Lansdowne Road and nearby intersections.

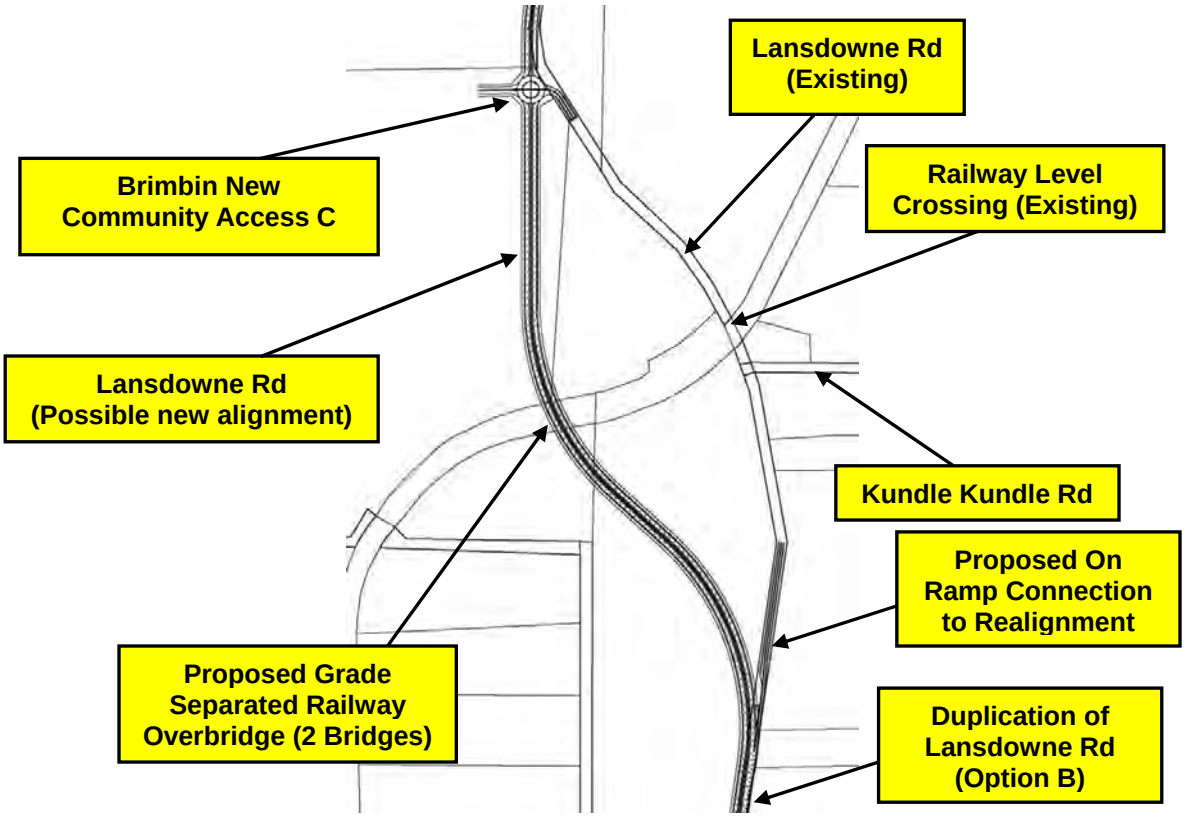


Figure 9.2.9.2: Possible Lansdowne Road Realignment and Railway Crossing

The frequency of freight and passenger trains was obtained from the ARTC. On average 6 passenger trains and 10 freight trains travel through the crossing daily. The timing of these movements at the nearby village of Melinga (4.7km north of the crossing via the railway) have been advised by the ARTC and have been adjusted to represent times directly at the level crossing. These are as follows:

Passenger Trains – fixed schedule:

Northbound	- 12:50	Southbound	- 01:14
	- 17:18		- 10:57
	- 21:43		- 15:57

Freight Trains – these do not run to a fixed schedule, however a snapshot of Wednesday (typically a busy day of the week) 15th July 2011 has been provided by the ARTC:

Northbound	- 10:02	Southbound	- 04:03
	- 12:06		- 05:09
	- 17:41		- 05:56
	- 18:52		

Surveys were undertaken at the site on 21st July 2011 to determine train lengths and time the level crossing is active. The results are as follows:

Freight Train	Time – 10:32am Direction – Northbound Carriages (including engines) – 75 Level Crossing Active – 127 seconds
Passenger Train	Time – 10:57am Direction – Southbound Carriages (including engines) – 8 Level Crossing Active – 44 seconds
Freight Train	Time – 12:10am Direction – Northbound Carriages (including engines) – 44 Level Crossing Active – 83 seconds
Passenger Train	Time – 12:50pm Direction – Northbound Carriages (including engines) – 8 Level Crossing Active – 48 seconds

Advice from the ARTC indicate freight trains can be up to 1500m in length, while passenger trains usually have 7 carriages (including engines) but during holidays run 9 carriages (including engines). It is difficult to determine the length of the freight trains surveyed due to varied carriage length, however it is assumed the surveyed freight train with 75 carriages was close to the maximum length of 1500m.

Therefore, for the purposes of analysis it has been assumed the crossing could be active for up to as maximum of 150 seconds for freight trains and 60 seconds for passenger trains. This

would account for longer freight trains than those counted, passenger trains at peak holiday times, and trains travelling at slower speeds than those surveyed.

The level crossing has been assessed within the Paramics Model using a 150 seconds stoppage time to allow for the maximum sized freight train to cross Lansdowne Road once within each peak hour period. Passenger trains have not been assessed as these do not occur during the peak hours.

These queues and delays at the crossing, as determined in the model, are not considered to be significantly detrimental to the Lansdowne Road traffic as this stoppage only occurs once per peak and queues quickly clear and return to normal. However, if train frequencies were to increase in the peak hour periods then the impacts would increase substantially to drivers travel times between Brimbin and surrounding areas.

As a result, it is recommended that the rail crossing on Lansdowne Road be grade separated. The modelling results indicate that grade separation would be required at the full development of Stage 2 of the Brimbin Township. However, increased train frequencies may warrant the grade separation before the completion of Stage 1 of the Brimbin Township.

Further details on queue lengths determined by the model are detailed in the full Paramics modelling report undertaken by Bitzios Consulting provided in Appendix D.

9.2.10 Oakvale Road as an Alternative to Lansdowne Road

Oakvale Road has been identified as an alternative to Lansdowne Road, between Brimbin Road and the level crossing, for connection to the development to and from the south. This would involve a major upgrade of Oakvale Road and would tie into the realignment of Lansdowne Road and grade separated crossing of the railway in this section. If Oakvale Road were adopted as the main route through this section it would need to be implemented in conjunction with the realignment of Lansdowne Road and grade separation of the rail crossing which would not occur until completion of Stage 2.

If implemented, this option would provide a straighter horizontal alignment and a slightly shorter travel distance than Lansdowne Road. Lansdowne Road through this section would then become a local access road for residential properties and the large lot residential land within Stage 1 of the development.

This option has not been included in the Paramics Model as it would not change the traffic volumes on Lansdowne Road or have any impact on the traffic patterns in the area. From a traffic modelling perspective, Oakvale Road would slightly improve travel distance by approximately 400m, providing around a 30 second travel time saving compared to Lansdowne Road. This is not expected to vary route choice or traffic volumes between using this route and using the Northern Link to/from Brimbin. Therefore, ultimate traffic volumes on Oakvale Road are likely to be consistent with previous estimates for the same section of Lansdowne Road. The only expected difference in volumes would be a negligible difference due to minor differences in minor road and property access between each route and a negligible volume from generated Stage 1 large lot residential which would use Lansdowne Road.

There is approximately an even number of property access to both Lansdowne Road and Oakvale Road. However, the properties at the southern end of Oakvale are quite close to the road and it is likely property acquisition would be required to construct Oakvale Road to the required standard. Oakvale Road would require widening of the existing road reserve and significant works to achieve the required road standard. Also, as the southern section of

Oakvale Road currently includes a number of residential homes within relative proximity to the Oakvale Road, speed limits along this section may need to be reduced to maintain safe property access and therefore limit any potential travel time savings.

Lansdowne Road (Option B) through the section has a number of minor road intersections with priority given to Lansdowne Road. As part of the Oakvale Road option, Brimbin Road and Lansdowne Road intersection would need to be realigned to provide priority to Brimbin Road and Lansdowne Road (south). Similarly, the Oakvale Road and Brimbin Road would need to be realigned to provide priority to Oakvale Road. This would create additional intersections with the Oakvale Road route.

The Oakvale Road option as an alternative route to the development to Lansdowne Road (Option B) is a viable option however would not result in any real benefits and would involve significant unnecessary costs and infrastructure works. Both Lansdowne Road and Oakvale Road have a similar number of fronting properties, and both options require minor road intersections with the main route, so there would be no benefit gained in that respect. Due to the close proximity of residences to the potential upgraded Oakvale Road, the required intersection changes, significant infrastructure costs and lack of benefit in traffic patterns and efficiency, it is considered Oakvale Road would be better suited to its current role as an effective service road for residential access, particularly with the increase in traffic volumes.

9.3 SIDRA Intersection Modelling

As requested by the RMS, SIDRA intersection modelling has been used to supplement the Paramics model, providing more localised assessment of intersections. This has been undertaken for all existing signalised intersections affected proposed signalised intersections, and the Cundletown Interchange.

SIDRA intersection 5.1 has been used. This is an intersection-modelling program accepted by traffic and local government authorities across Australia. Performance is based on delay times and is expressed as 'Level of Service' (LOS), as detailed below:

Level of Service (LOS)

A – Free Flows
B – Stable flow with slight delays
C – Stable flows with acceptable delays
D – Approaching unstable flows, with tolerable delays
E – Unstable flows, congestion, with intolerable delays
F – Forced flows

9.3.1 Existing Signalised Intersections

Existing signalised intersections along Manning River Drive and Victoria Street were modelled for the existing 2011 AM and PM peak hour operation and at full development of the Brimbin Township at Stage 4. The future scenario includes the Brimbin development, natural traffic growth and additional traffic from other identified growth areas such as Old Bar and Foster. This has been done to verify results contained in the Paramics Model and to assess localised impacts at the intersections.

Intersections modelled were:

- Victoria Street and Commerce Street
- Victoria Street and Pulteney Street

- Victoria Street and Manning Street
- Victoria Street and Macquarie Street
- Manning River Drive and Pioneer Street
- Manning River Drive and Cowper Street
- Manning River Drive and Phillip Street

Traffic volumes for the AM and PM weekday peak hours were obtained from manual intersection counts undertaken on the 21st July 2011. Signal operation information, including phasing, cycle times and coordination, was obtained from the RMS. Future traffic volumes and signal operation information for the full development of the Brimbin New Town were obtained from the Paramics Model outputs.

The existing scenario was modelled for the existing layout, and signal phasing and timings. The future scenario was modelled with the existing layout and signal phasing, but with adjusted signal timings where required. A summary of the modelling results for each intersection is provided in Appendix E. The total 'LOS' for each intersection, at each scenario, is given in the table below.

Intersection	Existing – 2011 Intersection 'LOS'		Future – 2042 Intersection 'LOS'	
	AM	PM	AM	PM
Victoria St / Commerce St	B	E	C	F
Victoria St / Pulteney St	B	B	B	B
Victoria St / Manning St	B	B	B	B
Victoria St / Macquarie St	B	B	B	C
Manning River Dr / Pioneer St	A	A	A	A
Manning River Dr / Cowper St	B	B	A	A
Manning River Dr / Phillip St	B	B	B	B

Notes
'LOS' is the total intersection. Individual movements may have varying results which are shown in Appendix E.

Table 9.3.1.1: Existing Signalised Intersection Performance Summary

The modelling summary shows most of the existing signalised intersections will operate at the same level of service, or slightly worse at full development provided adjustments to signal timings are made to suite traffic movements. The exception is the intersection of Manning River Drive and Cowper Street which showed an improvement in operation due to improved signal timing.

The reason only slight changes to the intersections are anticipated is due to dispersement of traffic through the CBD, which will dilute the additional volumes at each intersection and alter the traffic movements. Changes to the signal timings to suit the change in traffic patterns improved the operation at the intersection. The increase in traffic at these intersections is due to a combination of natural traffic growth, other developments and the Brimbin development. It is therefore considered the New Brimbin Community will have only a minimal contribution to the deterioration in operation of these intersections.

It is possible the operation of these intersections may deteriorate further into the future past full development of the Brimbin New Town due to increased traffic associated with natural traffic growth and additional traffic from other identified growth areas such as Old Bar and Foster. The previous *Manning River Drive Route Study (2007)* undertaken by RoadNet Pty Ltd, and associated Paramics model, identified a large volume of traffic entering and existing Taree over the Manning River Bridge from these intensified development areas. It was determined duplication of the Manning River Bridge and bypassing of the CBD for some traffic would be required in order for Victoria Street and associated signalised intersections to continue to operate adequately. As proposed in the previous report, this could be done by constructing a second bridge just north of the CBD.

9.3.2 Cundletown Interchange

The existing Cundletown interchange, connecting Manning River Drive with the Pacific Highway, was modelled for the existing 2011 AM and PM peak hour operation and at full development of the Brimbin Township at Stage 4.

Traffic volumes for the AM and PM weekday peak hours for existing 2011 volumes and future full development volumes were obtained from the Paramics Model outputs.

The modelling shows the existing interchange, in its current form, operates adequately in both the AM and PM peak hours. The interchange is also expected to operate adequately with additional traffic associated with the Brimbin New Town at future stages with minor increases in delays and degrees of saturation (percentage of maximum flow for each lane). Modelling results are shown in Appendix E.

9.3.3 Proposed Signalised Intersections

Proposed signalised intersections associated with the Brimbin New Town have been modelled in both the AM and PM peak hours at full development. The proposed signalised intersections modelled were:

- Mudford Street and Bushland Drive (Preferred Option) or
- Kanangra Drive and Bushland Drive (Option 3)
- Manning River Drive and Lansdowne Road
- Northern Link (north) and Brimbin Internal Access Road

Mudford Street / Kanangra Drive and Bushland Drive

The Mudford Street / Kanangra Drive and Bushland Drive intersection options, at the southern end of the Northern Link, were assessed within the Paramics Model. This found the intersection would require the following upgrades at full development of the Brimbin New Town:

- Signalise intersection
- Dedicated right turn pockets on all approaches, and
- Left turn slip lanes to/from the northern Mudford Street / Kanangra Drive (Northern Link) approach.

The intersection turn pockets used in the Paramics Model were conceptual only, with the practical signalised intersection requirements to de determined closer to implementation to be in accordance with RMS and Council standards. In option 1 the section of Mudford Street connecting with Bushland Drive is unformed and will require the construction of an

intersection at this location. The existing roundabout configuration of the Bushland Drive and Kanangra Drive intersection (option 3) and generous road reserves should allow for the required intersection upgrades.

Modelling of the intersection with SIDRA 5.1 gives an understanding of how the intersection will operate at full development in the above configuration and an indication of the required turn lane lengths. The intersection modelling results are based on traffic volumes, intersection configuration and signal phasing determined by the Paramics Model. Signal timing has been determined as the optimum signal timing as determined by SIDRA 5.1. A summary of the intersection modelling is given below; full results are given in Appendix E.

The modelling shows the intersection will operate at a LOS 'C' for both the AM and PM peaks at full development in 2042. The longest delays and queues will occur to through and left turning movements and will be the longest on the northern approach. The left turn slip lanes into and out of the northern approach are required due to the high volume of traffic making these turns.

The right turn movement on all approaches does not result in excessive queuing and long right turn pockets are not considered necessary. The modelling results in Appendix E show the queue lengths for each right turn. The longest queue for the right turn form each approach, in either the AM or PM peak, is summarised below. The right turn pocket lane lengths should be constructed to accommodate these queues in accordance with RMS and Council standards.

Northern approach right turn – 98m

Southern approach right turn – 13m

Western approach right turn – 2m

Eastern approach right turn – 42m

Manning River Drive and Lansdowne Road

Manning River Drive and Lansdowne Road intersection was assessed within the Paramics Model. This found the intersection would require the following upgrades at full development of the Brimbin New Town:

- Signalise Intersection
- Two lane approach on Lansdowne Road lengthened and left turn slip lane added (80m length).
- Duel right turn lanes added to the Manning River Drive eastern approach (130m length) as well as a two lane through movement, and
- Slip lane added from Manning River Drive western approach (50m length) to Lansdowne Road into extended merging lane (150m length).

Modelling of the intersection with SIDRA 5.1 gives an understanding of how the intersection will operate at full development in the above configuration. The intersection modelling results are based on traffic volumes, intersection configuration and signal phasing and timings as determined by the Paramics Model. A summary of the intersection modelling is given below; full results are given in Appendix E.

The modelling shows the intersection will operate at a LOS 'B' for both the AM and PM peaks at full development in 2042. The longest delays and queues will occur to the right turn out of Lansdowne Road and the right turn into Lansdowne Road from Manning River Drive, however these can be accommodated by the recommended upgrades of these approaches.

Northern Link (north) and Brimbin Internal Access Road

Northern Link (north) and Brimbin Internal Access Road intersection was assessed within the Paramics Model. This found the intersection would require the following upgrades at full development of the Brimbin New Town:

- Provide a 3-way signalised intersection
- Dedicated right turn pocket on the Northern Link approach
- Dedicated left turn lanes on the Brimbin Access Road approaches, and
- Single lane exit from each approach.

Modelling of the intersection with SIDRA 5.1 gives an understanding of how the intersection will operate at full development in the above configuration. The intersection modelling results are based on traffic volumes, intersection configuration and signal phasing as determined by the Paramics Model. Signal timing has been determined as the optimum signal timing as determined by SIDRA 5.1, turn lane lengths have been determined from the results of the modelling. A summary of the intersection modelling is given below; full results are given in Appendix E.

The modelling shows the intersection will operate at a LOS 'B' for both the AM and PM peaks at full development. The longest queues will occur for the right turn through lane out of Brimbin Access Road on the north approach into the Northern Link, and the left turn through lane out of the Northern Link into Brimbin Access Road north. This is the major movement at the intersection and as such dedication turn lanes into Brimbin Access Road southeast have been provided. Analysis of these lane shows that queuing in the through lane does not affect the movement from the dedicated turn lane.

The modelling results in Appendix E show the queue lengths for each right turn. The longest queue for each approach, in either the AM or PM peak, is summarised below. The dedicated turn lanes lengths, including right turn pocket and dedicated left turn lanes should be constructed to accommodate these queues in accordance with RMS and Council standards.

Northern approach	– Right turn through lane – 246m
	– Dedicated left turn lane – 5m
Southeast approach	– Right turn through lane – 36m
	– Dedicated left turn lane – 34m
Southwest approach	– Left turn through lane – 89m
	– Dedicated right turn lane – 11m

10.0 Visual Route Assessment Summary

10.1 Pacific Highway (Coopernook to Taree South)

10.1.1 Existing Traffic Conditions

The Pacific Highway (State Highway No 10) is the main arterial route connecting towns in the region to each other along with being a major freight route between Brisbane, Sydney, and Melbourne and beyond.

Presently the Pacific Highway is undergoing a major upgrade. The section of the highway in the vicinity of the study area has been upgraded over the last 5 to 10 years to divided dual carriageway alignment with interchanges at Cundletown and South Taree providing connection to Taree, Old Bar and Wingham.

The Pacific Highway formerly ran through the Taree CBD. A bypass to the east of the town was completed in year 2000.

The old Highway is now classified as a Regional Road and is under the care and control of Greater Taree City Council. It attracts maintenance and minor improvement funds from the NSW RMS.

The horizontal alignment of the bypass is to freeway standard with numerous local access roads joining the highway alignment along the Coopernook / Cundletown section. The vertical alignment is generally flat in this section transforming to undulating in the section from Cundletown to the south.

The Pacific Highway has 10 local roads intersecting its alignment along this section of the route.

- Harrington Road
- Old Bridge Road
- Croki Road
- Walls Lane
- Moto Road
- Ghinni Ghinni School Road
- Oxley Bend Road
- Emerton Close
- Princes Street (Cundletown Interchange)
- Old Bar Road (South Taree Interchange)

There are 8 dual bridge crossings along this section of the Pacific Highway with 2 long crossings of the Manning River (South Arm) and 1 crossing of the Manning River (North Arm) at Coopernook.

The posted speed limit of the Pacific Highway is 100km/h between Coopernook and Cundletown and 110km/h from Cundletown south.

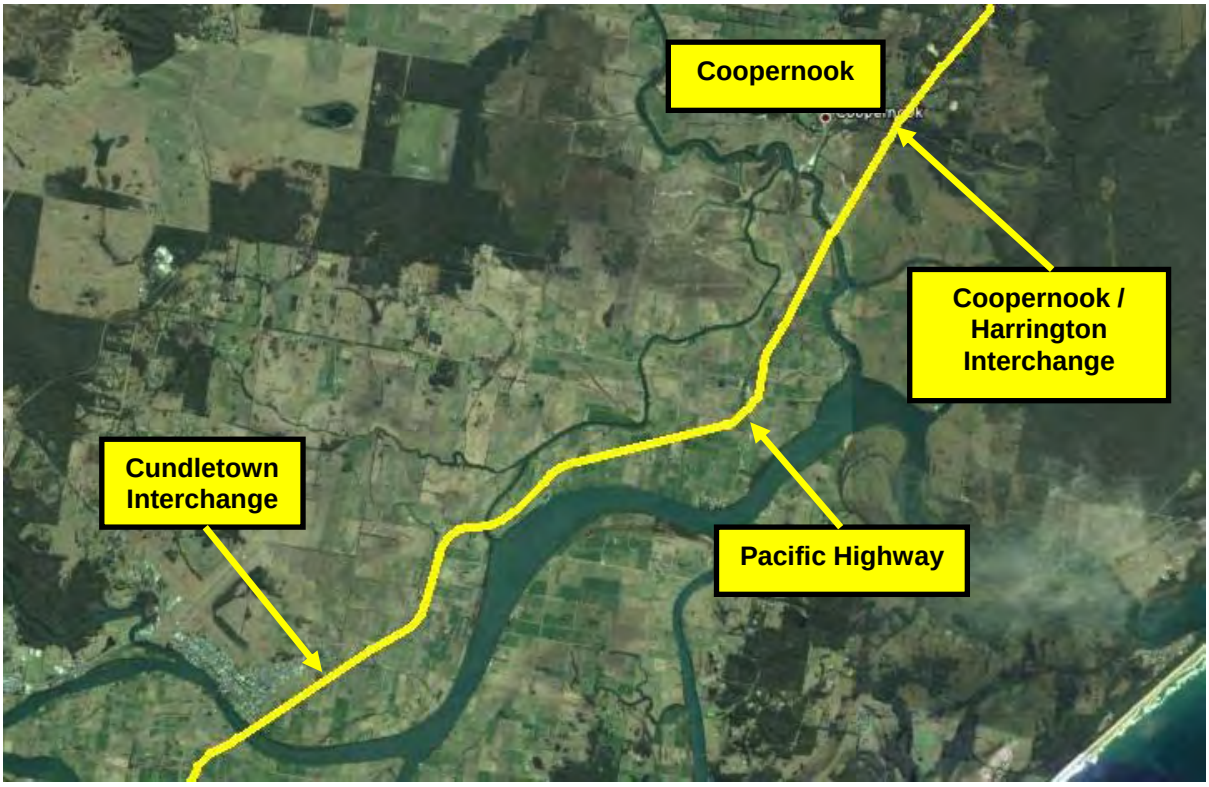


Figure 10.1.1.1: Pacific Highway, Coopernook to Cundletown Interchange

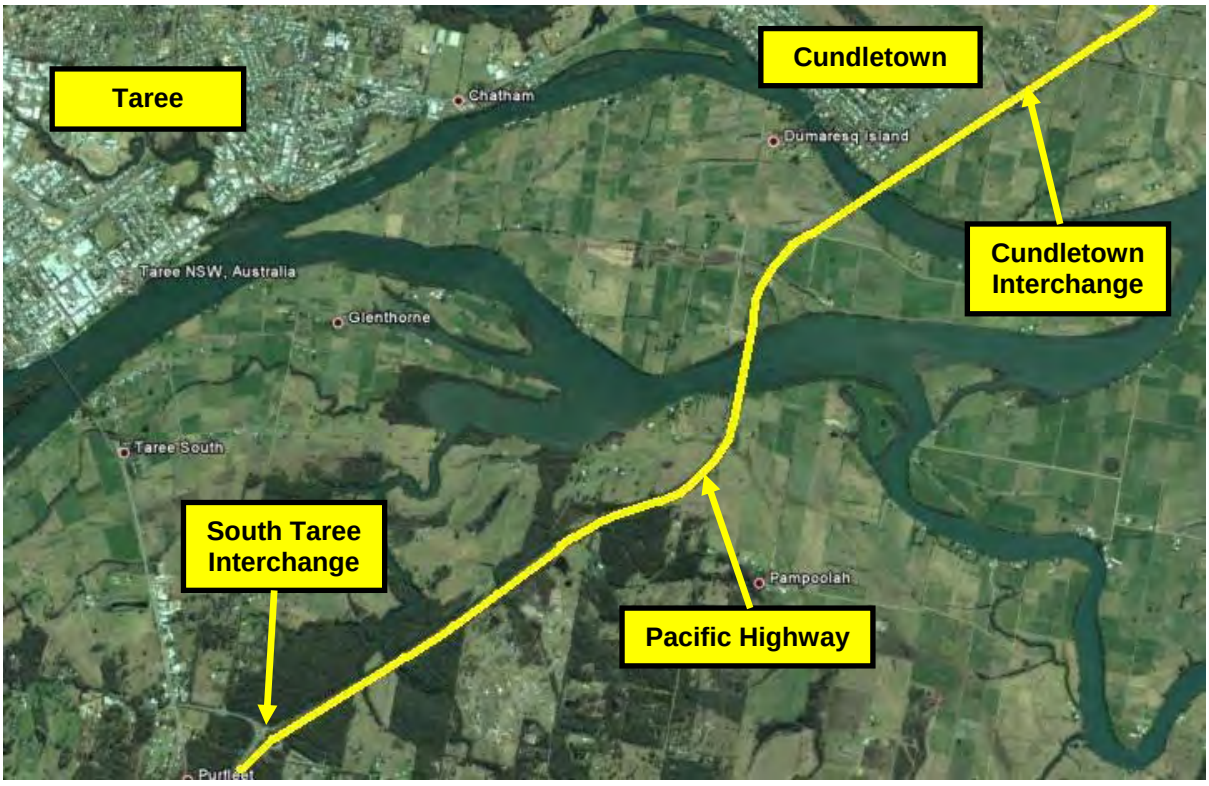


Figure 10.1.1.2: Pacific Highway, Cundletown Interchange to South Taree Interchange

10.1.2 Route Investigation

Road: - Pacific Highway between Coopernook / Harrington Road Intersection and the South Taree Interchange.

Inspected by: - Craig Nethery
Inspection Date: - Friday 16 July 2010

Distance (kms)	Identification	Condition	
00	Intersection of the Pacific Highway and Harrington Road (Lansdowne Road)	• Highway Standard • Good Sight Distance	 Pacific Hwy Northbound Carriageway south of Harrington Road

Table 10.1.2.1: Route Investigation – Pacific Highway

Distance (kms)	Identification	Condition	
3.26	Pacific Highway (Drury's Stockfeed Access)	• Highway Standard • Good Sight Distance	 Pacific Hwy Northbound Carriageway
11.31	Pacific Highway (Cundletown Interchange)	• Highway Standard • Good Sight Distance	 Pacific Hwy Southbound Carriageway
11.31	Pacific Highway (Cundletown Interchange)	• Highway Standard • Good Sight Distance	 Pacific Hwy Northbound Carriageway
18.77	Pacific Highway (South Taree Interchange)	• Highway Standard • Good Sight Distance	 Pacific Hwy Southbound Carriageway

Table 10.1.2.1: Route Investigation – Pacific Highway (cont'd)

10.2 Manning River Drive (Cowper Street to Pacific Highway)

10.2.1 Existing Traffic Conditions

Manning River Drive (Chatham Avenue, Main & Princes Streets, and Cundletown) has been identified as providing connection to and from the Taree and its southern environs in relation to the Brimbin New Town area. Manning River Drive is generally of arterial urban standard (kerb & gutter) varying to arterial rural road standard on the northern and southern outskirts of Taree and Cundletown. Manning River Drive as it is now known used to be the Pacific Highway before the Taree Bypass was opened in 2000.

The section of Manning River Drive between Cowper Street Gregory Close is of urban arterial standard with two (2) travel lanes in each direction with additional parking lanes and auxiliary turn lanes where required. Generally the travel lanes are 3.50m wide with 2.50m wide parking lanes. Kerb and gutter is provided along the edge of the road formation with formed footways outside the kerb and gutter.

The section of Manning River Drive between Gregory Close and Albert Street, Cundletown is of rural arterial road standard varying from one to two travel lanes in each direction along this section. The width of the travel lanes in this section are generally 3.50m with 2.0m wide half sealed gravel shoulders.

The final section of Manning River Drive to be assessed for this study from Albert Street and to Arkana Avenue, Cundletown reverts back to an urban standard formation with a single travel lane in each direction with parking lanes and kerb and gutter along formation edge. Generally the width of the travel lanes in this section are form 3.20 to 3.50m wide with 2.10 to 2.50m wide parking lanes.

This section of Manning River Drive is generally considered to be flat in elevation varying from 0.5% to 3% in longitudinal grade. Both the horizontal and vertical alignment is in keeping with the existing posted speed environments with the no substandard horizontal curves or vertical crests observed.

Manning River Drive has twenty (20) local public roads and four (4) major private accesses intersecting its alignment. Recommended treatment options (where required) will be provided as part of the detailed design assessment for this project.

Manning River Drive has 2 posted speed environments along this section including one special school speed zone:

- 60km/h – Cowper Street to Pacific Highway
- 40km/h School Speed Zone for Manning Valley Anglican College- 120m south west of Arkana Avenue to 200m north east of Arkana Avenue

There is one major bridge structure located along this section of Manning River Drive:

- Dawson River Bridge (Cundletown)

For this section of Manning River Drive there is various traffic facilities provided to improve traffic flows, road safety and provide safe crossing points for pedestrians.

- Cowper Street intersection – traffic signals, signalised pedestrian crossings in Manning River Drive and Cowper Street

- Bligh Street intersection – channelised intersection with right turn in lane and right turn out acceleration / merge lane
- Gregory Close intersection – right & left in lanes
- Keith Coleman Drive intersection – right turn & left turn in lanes
- John Street intersection – right turn in lane
- Phillips Street intersection – traffic signals, signalised pedestrian crossings in Manning River Drive and Phillips Street
- Lansdowne Road intersection – 2 lane roundabout
- Queen St intersection – marked pedestrian crossing (eastern side of Queen St)
- Manning Valley Anglican College Access – right turn lane in and pedestrian refuge in Manning River Drive
- Various other turn lanes exist to private developments along the length

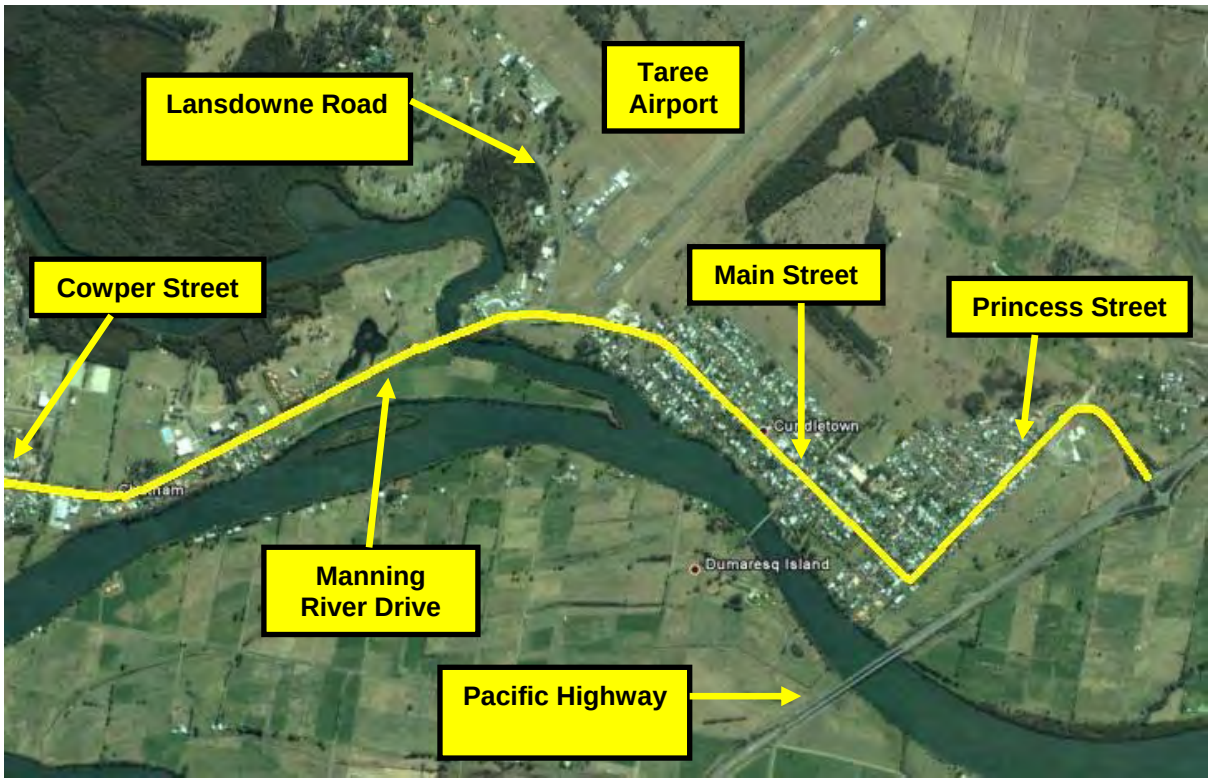


Figure 10.2.1.1: Manning River Drive (Main Street, Princes Street), Cowper Street to Cundletown Interchange

10.2.2 Route Investigation

Road: - Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

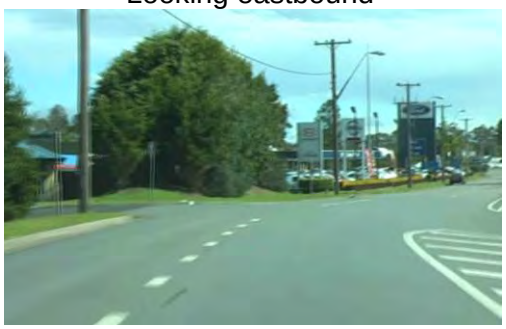
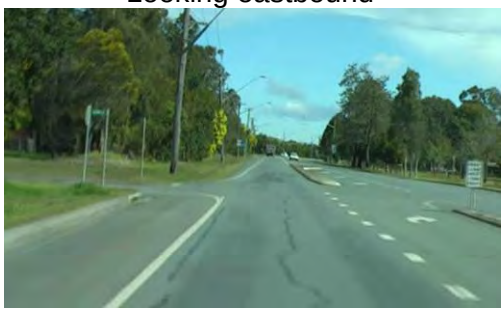
Distance (kms)	Identification	Condition	
00	Intersection of the Manning River Drive (Chatham Avenue) & Cowper Street	• Urban Arterial Road Standard • Some pavement rehabilitation required at intersection • Good Sight Distance	
0.40	Intersection of the Manning River Drive & Gregory Close	• Urban Arterial Road Standard • 2 lanes to 1 lane merge at Gregory Close eastbound • 1 lane to 2 lane diverge at Gregory Close westbound	 Looking eastbound  Looking westbound
0.85	Manning River Drive	• Urban Arterial Road Standard • Channelised Intersection of Manning River Drive & Keith Coleman Drive • Diverge from 1 lane to 2 lanes • Channelised Intersection of Manning River Drive & John Street • Good Sight Distance	 Looking eastbound  Looking westbound

Table 10.2.2.1: Route Investigation – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway

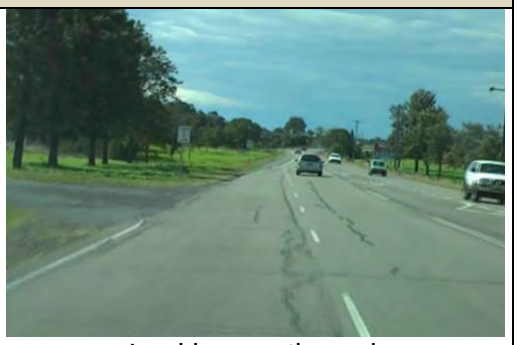
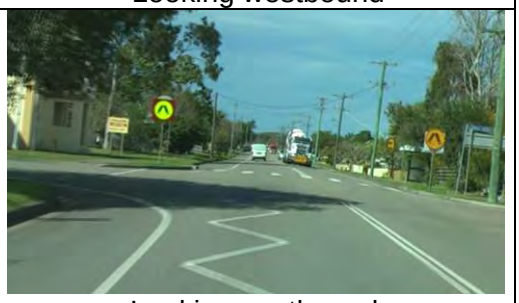
Distance (kms)	Identification	Condition	
1.31	Manning River Drive	• Urban Arterial Road Standard • 2 lanes to 1 lane merge at Nuluma Retirement Village • Good Sight Distance • Pavement in reasonable condition. Some longitudinal cracking.	 Looking eastbound
1.92	Manning River Drive	• Bridge over Dawson River (see section 10.2.5 for bridge assessment)	 Looking westbound
3.54	Manning River Drive (Main Street)	• Marked Pedestrian Crossing • Good Sight Distance • Pavement in good condition	 Looking eastbound  Looking westbound

Table 10.2.2.1: Route Investigation – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway (cont'd)

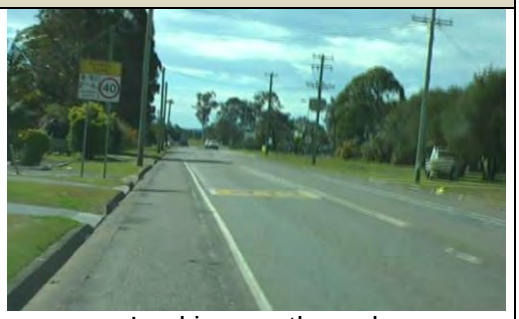
Distance (kms)	Identification	Condition	
4.63	Manning River Drive (Princes Street)	• Start of 40km/h School Zone posted speed limit (Eastbound)	 Looking eastbound
4.82	Manning River Drive (Princes Street)	• Pedestrian Refuge • Pavement in reasonable condition. Some pavement failures at location.	 Looking eastbound
4.95	Manning River Drive (Princes Street)	• Bend • End of 40km/h School Zone posted speed limit (Eastbound)	 Looking eastbound

Table 10.2.2.1: Route Investigation – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway (cont'd)

10.2.3 Existing Horizontal Alignment

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED	
0.344 – 0.491	60	250	147	70	140	
1.743 – 1.829	60	220	195	70	140	
2.121– 2.144	60	100	23	60	100	(Arc length below minimum)[1]
2.223 – 2.325	60	500	102	60	100	
2.430 – 2.522	60	500	92	60	100	(Arc length below minimum)[1]
2.694 – 2.783	60	200	89	60	100	(Arc length below minimum)[2]
3.967 – 4.125	60	100	158	60	100	
4.921 – 5.091	60	100	169	60	100	

Table 10.2.3.1: Existing Horizontal Alignment Data – Manning River Drive

The horizontal alignment of Manning River Drive is typical of a highway standard formation as it was formerly the Pacific Highway which ran through Taree until being bypassed in 2000. The horizontal alignment is consistent with the 60km/h speed limit through the study area.

The vertical alignment of Manning River Drive is generally flat with 0.5% to 5.0% longitudinal grade for its length. There are generally no sight distance issues.

A detailed assessment of both the horizontal and vertical alignment will be completed as part of any upgrade recommendations for the proposed road network for the Brimbin New Town project.

10.2.4 Intersections

Manning River Drive has numerous local public roads and private accesses intersecting its alignment. Of these, 20 local roads along the section of Manning River Drive have been assessed as part of this study, these are:

- Cowper Street
- McRae Avenue
- Bligh Street

- Gregory Close
- John Street
- Phillip Street
- Lansdowne Road
- Albert Street (south), Cundletown
- Albert Street (north), Cundletown
- King Street
- Edwards Street
- Crown Street
- Else Street
- Queen Street
- Beltana Close
- Victoria Street
- High Street
- George Street
- Denison Street
- Arkana Avenue

Of the private accesses intersecting Manning River Drive along this section, there are 4 major accesses. These are:

- Rest Area Access at Ch.0.64km
- Keith Coleman Drive (Manning Aquatic Leisure Centre Access) at Ch.0.85km
- Nuluma Retirement Village Access at Ch.1.33km
- Manning Valley Anglican College at Ch.4.79km

Road: - Manning River Drive (Chatham Avenue, Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway)

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

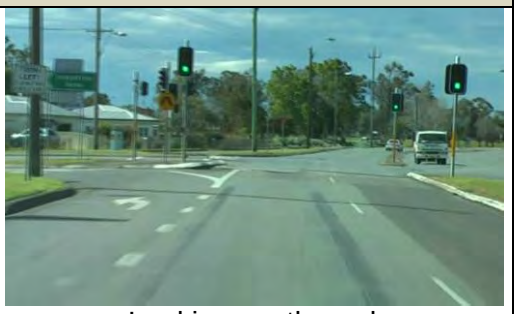
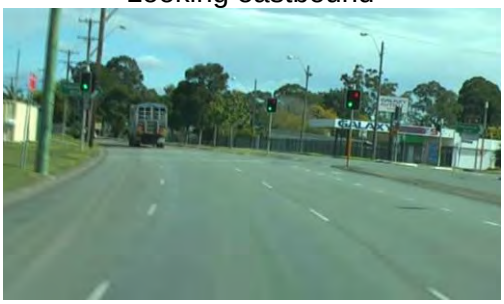
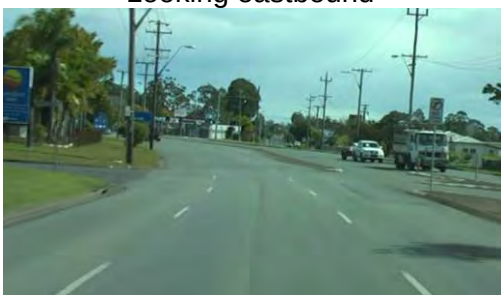
Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of the Manning River Drive (Chatham Avenue) & Cowper Street	• Urban Arterial Road Standard • Intersection Signalised • Some pavement rehabilitation required at intersection • Good Sight Distance	 Looking eastbound  Looking westbound
0.18	Intersection of the Manning River Drive & Bligh Street	• Urban Arterial Road Standard • Left turn in & out only (eastbound) • All turn movements (westbound) • Pavement in good condition • Good Sight Distance	 Looking eastbound  Looking westbound

Table 10.2.4.1: Route Investigation (Intersections) – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway

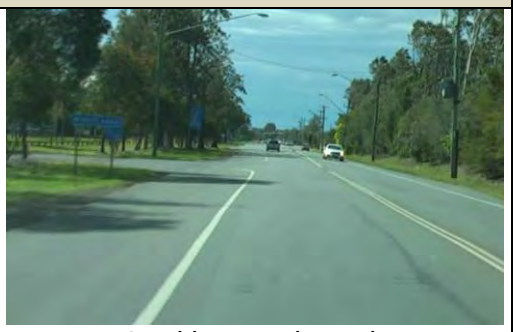
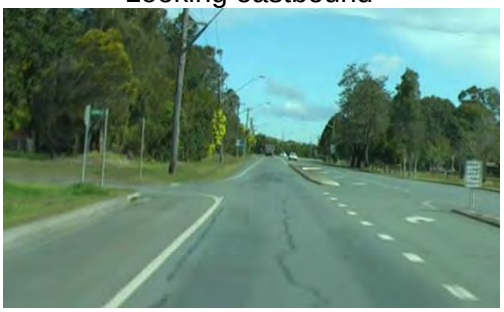
Distance (kms)	Identification	Intersection Type & Condition	
0.64	Manning River Drive & Rest Area access	• All turn movements (westbound) • Pavement in good condition • Good Sight Distance	 Looking eastbound
0.85	Manning River Drive & Keith Coleman Drive / John Street	• Urban Arterial Road Standard • Diverge from 1 lane to 2 lanes • Pavement in reasonable condition. Some longitudinal cracking. • Good Sight Distance	 Looking eastbound  Looking westbound
1.08	Manning River Drive & Phillip Street (Access to McDonalds Restaurant)	• Urban Arterial Road Standard • Intersection Signalised • Pavement in good condition • Good Sight Distance	 Looking eastbound

Table 10.2.4.1: Route Investigation (Intersections) – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway (cont'd)

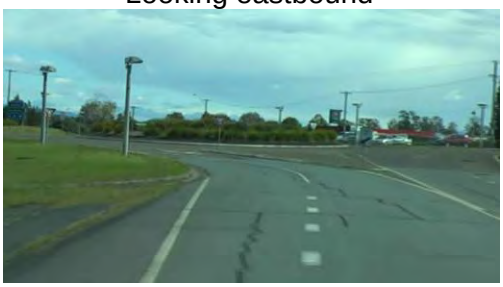
Distance (kms)	Identification	Intersection Type & Condition	
1.08	Manning River Drive & Phillip Street (Access to McDonalds Restaurant)	• Urban Arterial Road Standard • Intersection Signalised • Pavement in good condition • Good Sight Distance	 Looking westbound
1.33	Manning River Drive (at Nuluma Retirement Village Access)	• Urban Arterial Road Standard • 2 lanes to 1 lane merge at Nuluma Retirement Village Access • Pavement in reasonable condition. Some longitudinal cracking. • Good Sight Distance	 Looking eastbound
2.27	Manning River Drive & Lansdowne Road	• 2 lane Roundabout • Pavement in reasonable condition. Some longitudinal cracking. • Good Sight Distance	 Looking eastbound  Looking westbound

Table 10.2.4.1: Route Investigation (Intersections) – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway (cont'd)

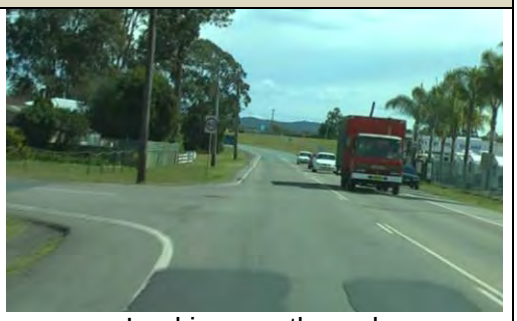
Distance (kms)	Identification	Intersection Type & Condition	
2.69	Manning River Drive (Main Street) & Albert Street (south)	• Pavement in good condition • Good Sight Distance	 Looking westbound
2.74	Manning River Drive (Main Street) & Albert Street (north)	• Pavement in good condition • Good Sight Distance	 Looking eastbound
3.08	Manning River Drive (Main Street) & King Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound
3.26	Manning River Drive (Main Street) & Edwards Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound

Table 10.2.4.1: Route Investigation (Intersections) – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway (cont'd)

Distance (kms)	Identification	Intersection Type & Condition	
3.31	Manning River Drive (Main Street) & Crown Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound
3.35	Manning River Drive (Main Street) & Else Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound
3.53	Manning River Drive (Main Street) & Queen Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound
3.83	Manning River Drive (Main Street) & Beltana Close		 Looking westbound
3.87	Manning River Drive (Main Street) & Victoria Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound

Table 10.2.4.1: Route Investigation (Intersections) – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway (cont'd)

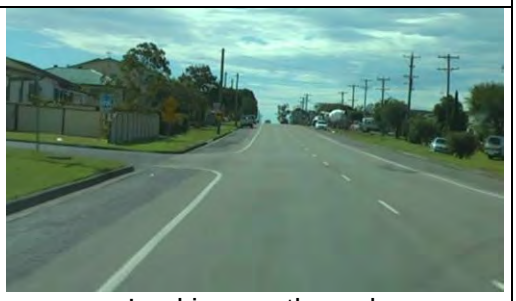
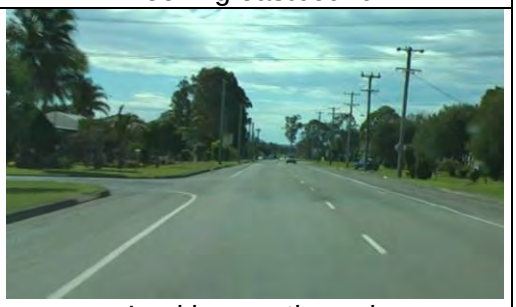
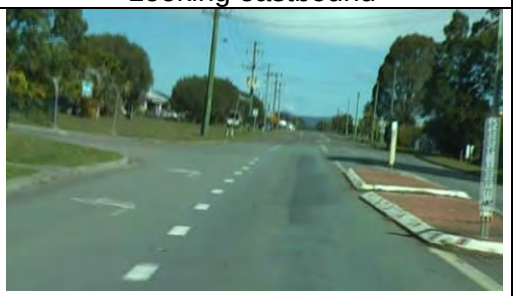
Distance (kms)	Identification	Intersection Type & Condition	
4.17	Manning River Drive (Princes Street) & High Street	• Approach Sight Distance (ASD) available (eastbound) not Safe Intersection Sight Distance (SISD) • Pavement in good condition • Good Sight Distance	 Looking westbound
4.29	Manning River Drive (Princes Street) & George Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound
4.54	Manning River Drive (Princes Street) & Denison Street	• Pavement in good condition • Good Sight Distance	 Looking eastbound
4.75	Manning River Drive (Princes Street) & Arkana Avenue	• Pavement in reasonable condition. Some pavement failures. • Good Sight Distance	 Looking eastbound
4.79	Manning River Drive (Princes Street) & Manning Valley Anglican College Access	• Pavement in reasonable condition. Some pavement failures. • Good Sight Distance	 Looking westbound

Table 10.2.4.1: Route Investigation (Intersections) – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway (cont'd)

10.2.5 Bridges

There is one major bridge structure located along Manning River Drive:

- Dawson River Bridge (Cundletown) – 110.3m long (6 spans), 6.5m wide (kerb to kerb). Of the 6 spans, 2 are reinforced concrete beams on the Taree side with 3 similar spans on the Cundletown side. The centre span is made up of a 6 bay steel truss structure. The bridge structure is the responsibility of the RMS with Greater Taree City Council responsible for the road approaches. The bridge is RMS heritage listed built in 1933.

Distance (kms)	Identification	Condition	
1.92	Manning River Drive (Bridge over Dawson River)	• Pavement in reasonable condition. Some longitudinal cracking on approaches.	 Looking eastbound  Looking westbound

Table 10.2.5.1: Route Investigation (Bridges) – Manning River Drive Chatham Avenue, (Main & Princes Streets, Cundletown) between Cowper Street and the Pacific Highway

Upgrades of the bridge where required will be dealt with in the detail design assessment of this report.

10.3 Lansdowne Road (Coopernook to Manning River Drive)

10.3.1 Existing Traffic Conditions

Lansdowne Road has been identified as providing connection to and from the Taree / Wingham areas in relation to the Brimbin New Town area. Lansdowne Road is generally of rural road standard varying to urban standard (kerb & gutter) through the village of Coopernook.

The section from the Pacific Highway to George Gibson Drive generally has a formation width of 7.0m pavement with 2.0m wide gravel shoulders on each edge. The section between George Gibson Drive and Macquarie Street, Coopernook is of variable width taking into account intersection widening for turn lanes which were originally provided as part of the old Pacific Highway alignment. The section through the village of Coopernook is generally a 10m urban formation between kerbs, changing to a rural formation of 6m pavement with 0.5m shoulders. This rural formation is generally provided for the rest of Lansdowne Road.

Lansdowne Road has numerous local public and private access roads intersecting its alignment with some of these locations having poor approach sight distance (ASD) and poor safe intersection sight distance (SISD). These locations will be addressed in the detailed design assessment of this report.

The route varies from undulating to flat in sections. There are advanced warning advisory speed signs provided for substandard horizontal curves along Lansdowne Road *(see horizontal curve data for locations)*. It was observed during the visual route assessment and the subsequent desktop review that there were substandard crests along the route in relation to the posted speed limit. These locations will be addressed as part of the detail design assessment for this project where required.

Lansdowne Road has 7 posted speed environments along its route plus 2 special school speed zones:

- 60km/h – Pacific Highway to High Street, Coopernook (40km/h School Speed Zone for Coopernook Public School).
- 80km/h – High Street, Coopernook to Lansdowne Village.
- 60 km/h – Croki Street to Morrison Lane, Lansdowne Village (40km/h School Speed Zone for Lansdowne Public School).
- 80km/h - Morrison Lane, Lansdowne Village to Melinga.
- 90km/h – Melinga to Brimbin Road.
- 70km/h – Brimbin Road to Taree Airport.
- 60km/h Taree Airport to Manning River Drive Roundabout.

There are 4 major bridge / culvert structures located along Lansdowne Road:

- Coopernook Creek Culvert (Coopernook)
- Koolah Creek Bridge – 14.0m long, 6.6m wide (kerb to kerb)
- Cross Creek Bridge (Lansdowne) – 24.7m long, 6.0m wide (kerb to kerb)
- Lansdowne River Bridge - 45.0m long, 4.4m wide (guardrail to guardrail)

There are 4 railway level crossings located along the route of Lansdowne Road. At each of these locations Lansdowne Road crosses the railway perpendicular to the rail alignment with the exception of the Kundle Kundle Road location where it crosses at approximately 70 degrees to the railway alignment.

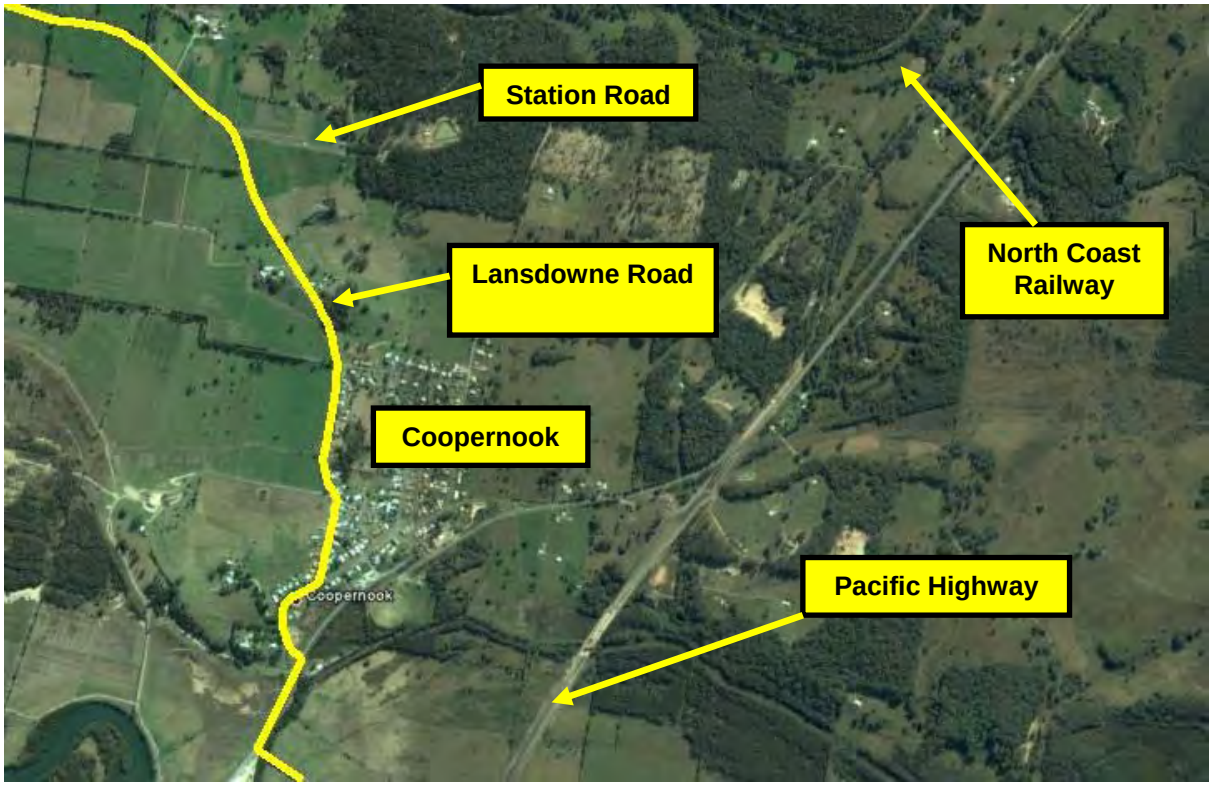


Figure 10.3.1.1: Lansdowne Road, Pacific Highway to Station Road

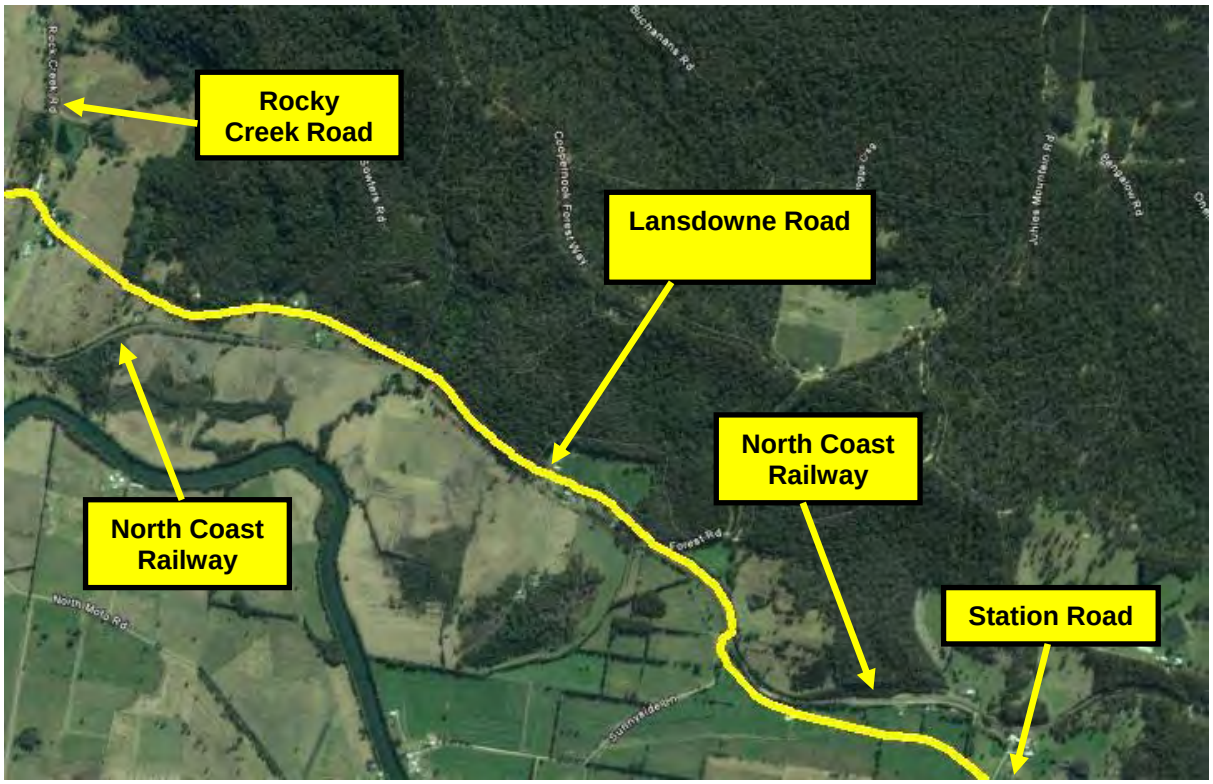


Figure 10.3.1.2: Lansdowne Road, Station Road to Rocky Creek Road

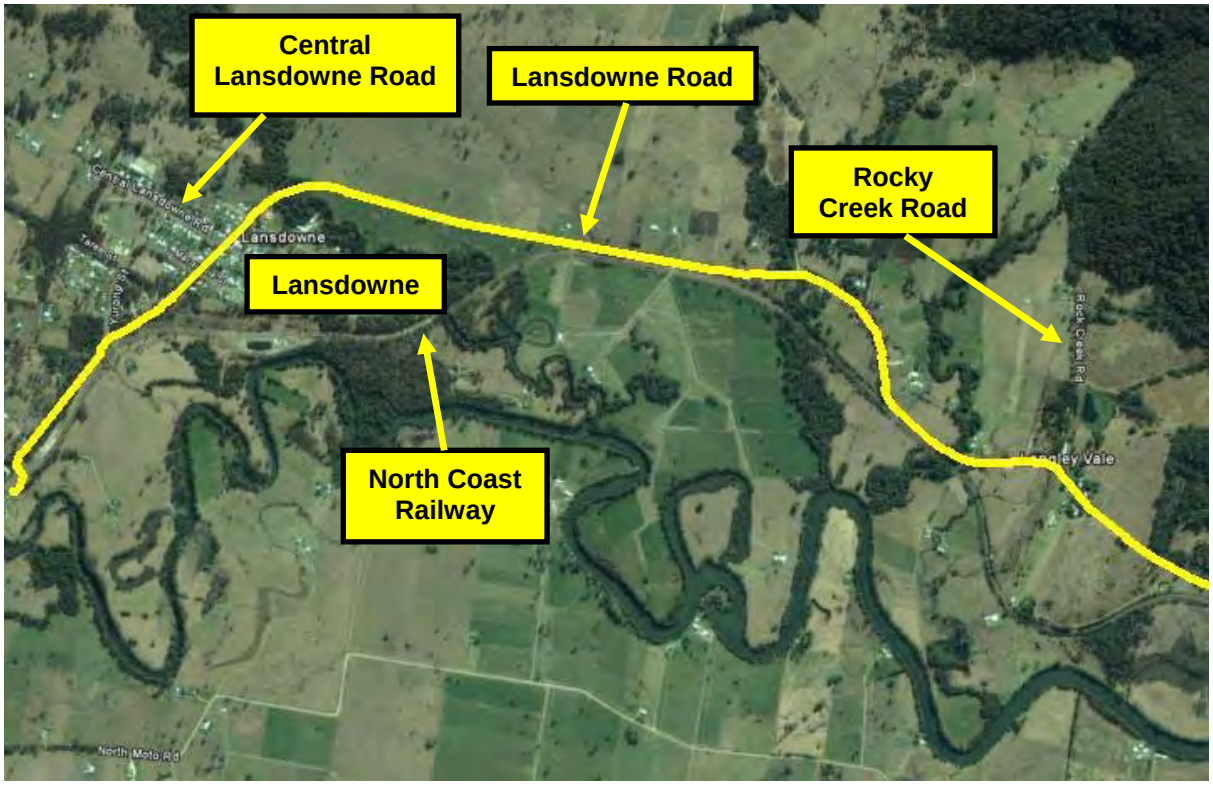


Figure 10.3.1.3: Lansdowne Road, Rocky Creek Road to Lansdowne Village

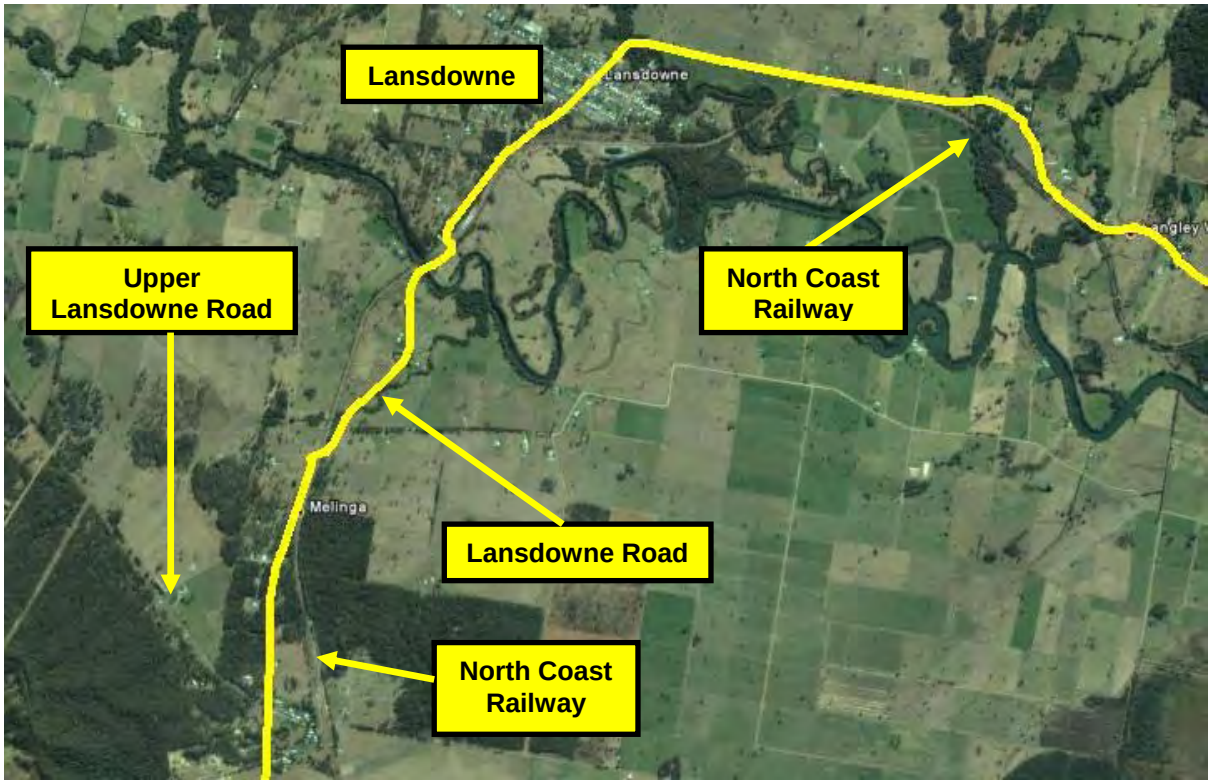


Figure 10.3.1.4: Lansdowne Road, Lansdowne Village to Upper Lansdowne Road

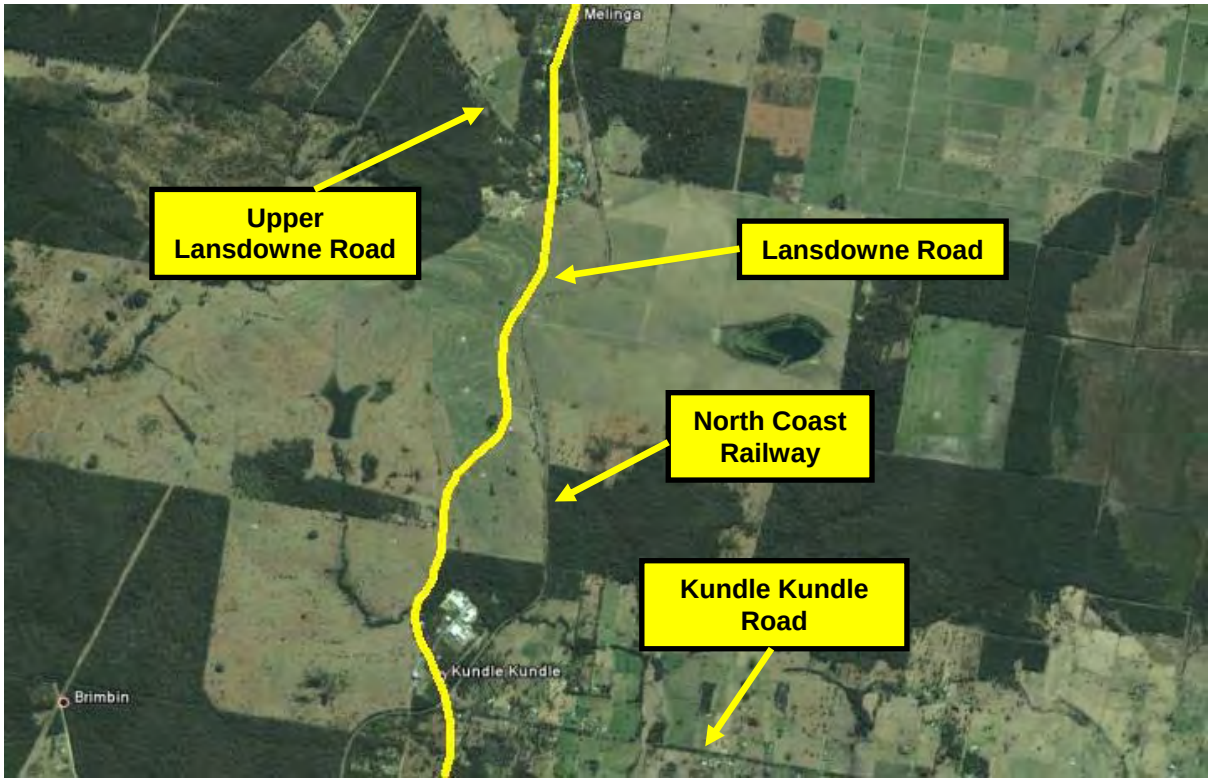


Figure 10.3.1.5: Lansdowne Road, Upper Lansdowne Road to Kundle Kundle Road

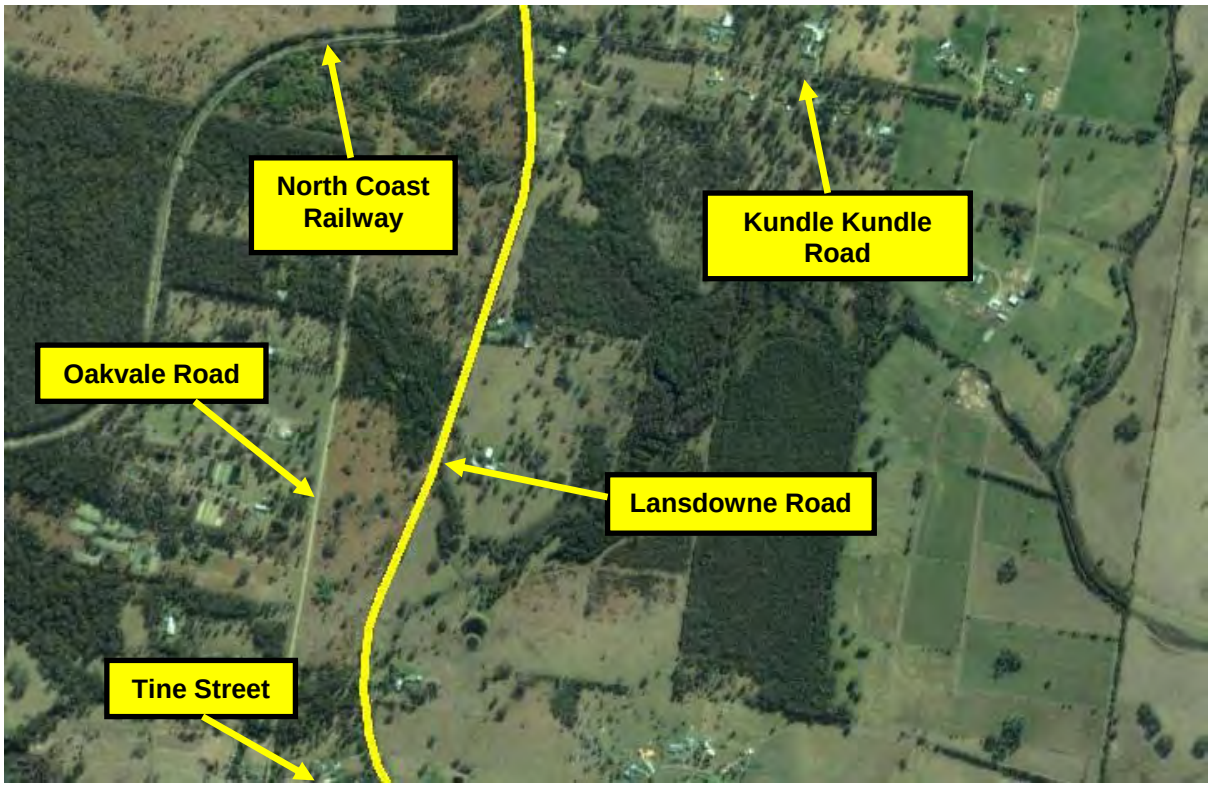


Figure 10.3.1.6: Lansdowne Road, Kundle Kundle Road to Tine Street

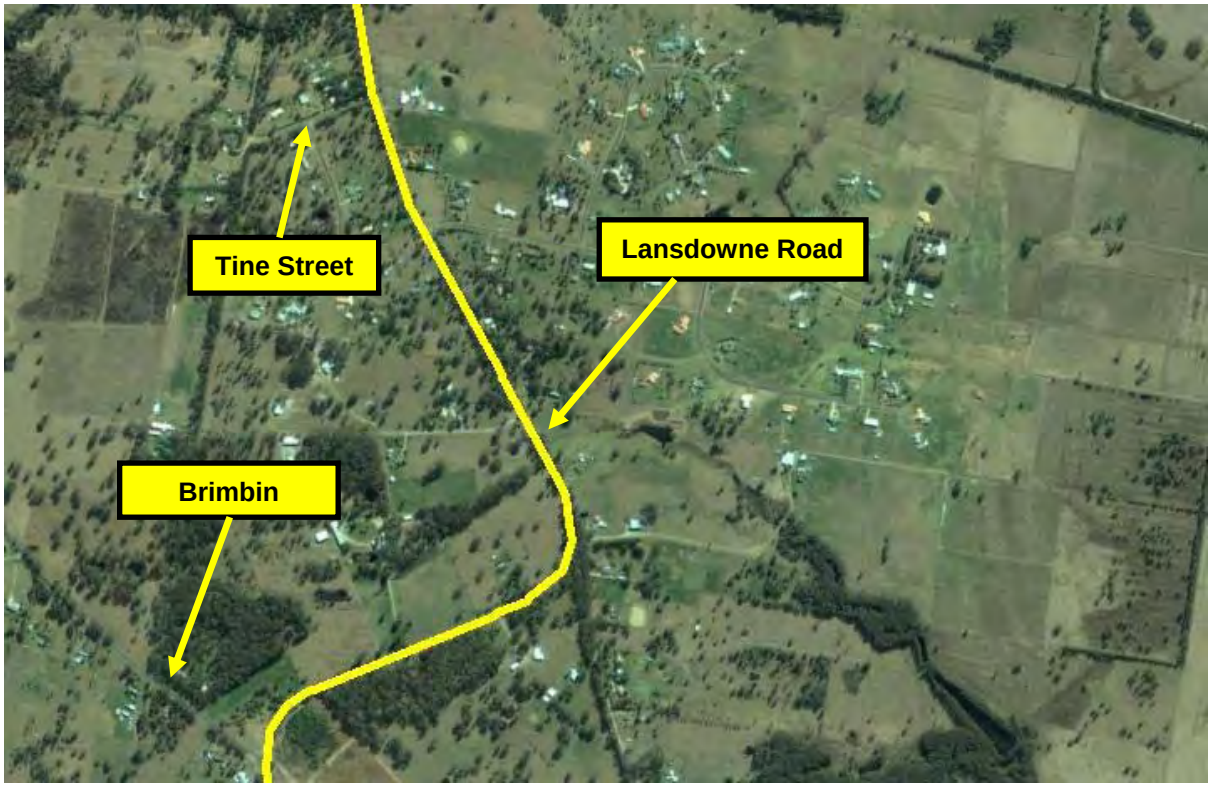


Figure 10.3.1.7: Lansdowne Road, Tine Street to Brimbin Road

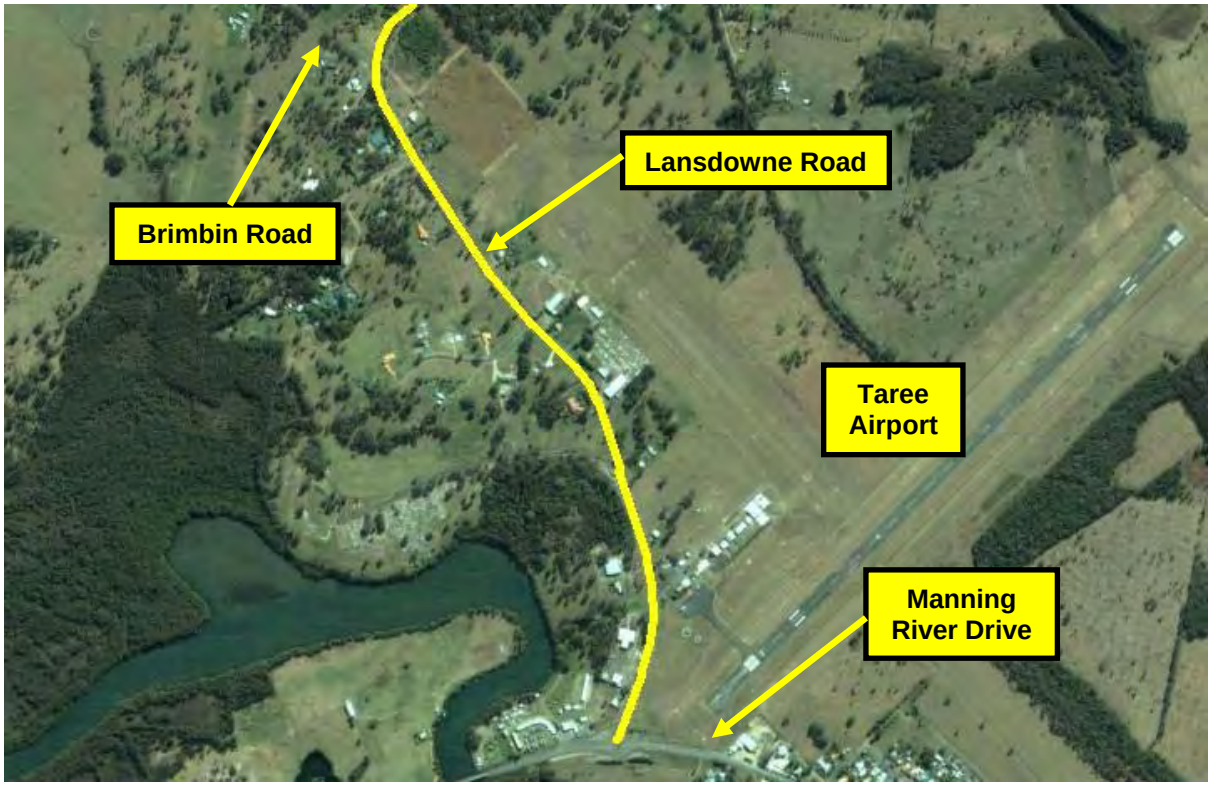


Figure 10.3.1.8: Lansdowne Road, Brimbin Road to Manning River Drive

10.3.2 Route Investigation

Road: - Lansdowne Road via Coopernook Road and Macquarie Street, Coopernook. Between the Pacific Highway and Manning River Drive, Taree.

Inspected by: - Craig Nethery

Inspection Date: - Friday 16 July 2010

Distance (kms)	Identification	Condition	
00	Intersection of the Pacific Highway & Coopernook Road (Lansdowne Road)	• Highway Standard • Good Sight Distance	 Pacific Highway looking northbound
0.25	Coopernook Road (Lansdowne Road)	• Rural Road Standard • 2 x 3.50m Travel lanes & 2m Shoulders • Pavement in good condition • 60km/h posted speed limit	 Coopernook Road looking westbound
0.80	Intersection of Harrington Road (Lansdowne Road) & George Gibson Drive	• Highway Standard • Good Sight Distance	
1.00	George Gibson Drive (Lansdowne Road)	• Old Pacific Highway formation • Level Grade • 60km/h posted speed limit • Good Sight Distance	 George Gibson Drive looking north

Table 10.3.2.1: Route Investigation – Lansdowne Road

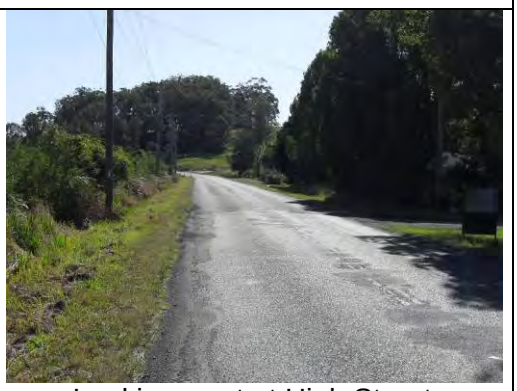
Distance (kms)	Identification	Condition	
1.14	Intersection of George Gibson Drive & Lansdowne Road (Macquarie Street)	• Old Pacific Highway formation • Level Grade • 10.8m kerb to kerb @ school • Poor wearing course in Lansdowne Road (Macquarie Street) • 60km/h posted speed limit • (40km/h school zone)	
1.40	Lansdowne Road (West Street)	• Urban Road Formation • 9.7m kerb to kerb • New Kerb & Gutter • New wearing course on formation edge	
1.79	Lansdowne Road (West Street) east of High Street	• Rural Road Formation • 6.0m seal, no shoulders • Poor wearing course, heavy patching	 Looking west at High Street
1.79	Lansdowne Road (West Street) east of High Street	• Rural Road Formation • 6.0m seal, no shoulders • Poor wearing course, heavy patching	 Looking east at High Street

Table 10.3.2.1: Route Investigation – Lansdowne Road (cont'd)

Distance (kms)	Identification	Condition	
2.28	Lansdowne Road- Property Access (LHS)	• Crest • Poor vertical & horizontal sight distance	 Looking westbound
2.38	Lansdowne Road		• 80km/h posted speed limit (Westbound)
4.26	Lansdowne Road (Railway Level Crossing)		
9.21	Lansdowne Road	• Pavement 5.8m wide • Poor pavement condition	
10.64	Lansdowne Road		• 60km/h posted speed limit (Westbound)
11.04	Lansdowne Road (Lansdowne Village centre)	• Rural Road Formation, no kerb & gutter	
11.68	Lansdowne Road		• 80km/h posted speed limit (Westbound)
12.28	Lansdowne Road (Railway Level Crossing)		
13.66	Lansdowne Road (Railway Level Crossing)		
14.06	Lansdowne Road		• 90km/h posted speed limit (Westbound)
19.45	Lansdowne Road (Railway Level Crossing)	• Reconstruction of approaches being carried out (16/7/2010)	
23.07	Lansdowne Road		• 70km/h posted speed limit (Westbound)
23.71	Lansdowne Road		• 60km/h posted speed limit (Westbound)
24.25	Intersection of Manning River Drive & Lansdowne Road	• 2 lane Roundabout • Pavement in reasonable condition. Some longitudinal cracking. • Good Sight Distance	

Table 10.3.2.1: Route Investigation – Lansdowne Road (cont'd)

10.3.3 Existing Horizontal Alignment

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS	ACTION REQUIRED
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED		
15.05						Upper Lansdowne Road Intersection	
15.111 – 15.193	90	1000	82	100 +	470 (Arc length below minimum)		None
15.311 – 15.416	90	1000	105	100 +	470 (Arc length below minimum)		None
15.510 – 15.688	90	320	178	80	180 (Dangerous Curve Range) (Arc length below minimum)		Redesign curve to 280m curve radius
15.922 – 16.297	90	500	375	100	280		None
16.598 – 16.888	90	300	289	80	180 (Dangerous Curve Range)		Redesign curve to 280m curve radius
17.148 – 17.407	90	380	258	90	230 (Dangerous Curve Range)	Existing W1-3, Speed Advisory (85km/h) Signs (S/B & N/B)	None
17.862 – 17.955	90	360	93	90	230 (Dangerous Curve Range)	Existing W1-3, Speed Advisory (75km/h) Signs (S/B)	None

Table 10.3.3.1: Existing Horizontal Alignment Data – Lansdowne Road

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS	RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS	COMMENTS	ACTION REQUIRED

	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED		
18.308 – 18.455	90	180	147	70	140	Existing W1-3, Speed Advisory (75km/h) Signs (S/B & N/B)	Redesign curve to 240m curve radius
18.612 – 18.701	90	280	90	80	180 (Arc length below minimum)	Existing W1-3, Speed Advisory (65km/h) Signs (S/B & N/B)	Provide CHR Intersection Treatment to define left curve alignment
18.754 – 18.840	90	280	85	80	180 (Arc length below minimum)	Existing W1-3 sign provided	None
18.979 – 19.086	90	280	107	80	180 (Arc length below minimum)		Install W1-3 & Speed Advisory signs
19.312 – 19.407	90	280	95	80	180 (Arc length below minimum)	Existing W1-3, Speed Advisory (75km/h) Signs (S/B & N/B)	None
19.949 – 20.080	90	2000	131	100 +	470 (Arc length below minimum)		None
20.587 – 20.693	90	600	106	100 +	470 (Arc length below minimum)		Redesign curve to 460m curve radius
20.956 – 21.012	90	280	56	80	180 (Arc length below minimum)	Existing W1-3, Speed Advisory (85km/h) Signs (S/B & N/B)	None

Table 10.3.3.1: Existing Horizontal Alignment Data – Lansdowne Road (cont'd)

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS	ACTION REQUIRED
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED		
21.414 – 21.578	90	1500	164	100 +	470 (Arc length below minimum)		None
21.660 – 21.959	90	170	300	70	140	Existing W1-3 sign provided (S/B & N/B)	Install Speed Advisory Sign (S/B)
22.442 – 22.728	70	170	286	70	140	Existing W1-3 sign provided (N/B)	None
22.789 – 22.882	70	1500	94	100 +	470 (Arc length below minimum)		None
23.108 – 23.299	70	800	191	100 +	470 (Arc length below minimum)		None
23.362 – 23.552	70	360	190	90	230 (Dangerous Curve Range) (Arc length below minimum)	Existing W1-3 sign provided (S/B & N/B)	Redesign curve to 280m curve radius
23.847 – 24.088	60	360	242	90	230 (Dangerous Curve Range) (Arc length below minimum)		Redesign curve to 280m curve radius
24.250							

Table 10.3.3.1: Existing Horizontal Alignment Data – Lansdowne Road (cont'd)

It should be noted further detailed assessment of this section of Lansdowne Road will need to be completed in order to determine the future posted speed limit and road alignment.

10.3.4 Intersections

Lansdowne Road has numerous local public and private access roads intersecting its alignment. Of these, 31 local roads, and the Pacific Highway intersect along its route.

- Pacific Highway (Coopernook Road)
- George Gibson Drive (part of route)
- Macquarie Street, Coopernook (part of route)
- High Street, Coopernook
- Emmo Lane (Station Road)
- Coopernook Station Road
- Sunnyside Lane
- Forest Road
- Langley Vale Road
- Fern Ridge Lane
- Koolah Creek Road
- Croki Street, Lansdowne Village
- Central & East Lansdowne Road, Lansdowne Village
- Macquarie Street, Lansdowne Village
- Yurong Street, Lansdowne Village
- Morrison Lane, Lansdowne Village
- Paringa Close
- North Moto Road
- Upper Lansdowne Road / Station Street
- Dawson Street
- Kundle Kundle Road
- Tine Street
- Clovernook Drive
- Jasmine Close
- Arbour Lane
- Old Lansdowne Road
- Brimbin Road
- Farmborough Close
- Audral Close
- Dawson Cemetery Road
- Manning River Drive

Road: - Lansdowne Road via Coopernook Road and Macquarie Street, Coopernook. Between the Pacific Highway and Manning River Drive, Taree.

Inspected by: - Craig Nethery
Inspection Date: - Friday 16 July 2010

Distance (kms)	Identification	Intersection Type & Condition	
From Pacific Highway, Coopernook 00	Intersection of the Pacific Highway & Coopernook Road (Lansdowne Road)	• Channelised Seagull intersection with left turn lane • Highway Standard • Good Sight Distance	 Pacific Highway looking northbound
0.80	Intersection of Coopernook Road (Lansdowne Road) & George Gibson Drive	• Type CHR intersection layout with left slip in and out • Highway Standard • Good Sight Distance	 George Gibson Drive looking north  George Gibson Drive looking south

Table 10.3.4.1: Route Investigation (Intersections) – Lansdowne Road

Distance (kms)	Identification	Intersection Type & Condition	
1.14	Intersection of George Gibson Drive & Lansdowne Road (Macquarie Street)	• Old Pacific Highway formation • Type BAR intersection layout • Level Grade • 10.8m kerb to kerb @ school • Poor wearing course in Lansdowne Road (Macquarie Street) • 60km/h posted speed limit • 40km/h school zone • Good Sight Distance	 George Gibson Drive looking north  George Gibson Drive looking south  Lansdowne Road looking west
2.85	Intersection of Lansdowne Road & Station Road	• Type BAR intersection layout • Bitumen sealed side road • Good Sight Distance	
4.85	Intersection of Lansdowne Road & Coopernook Forest Road	• Type BAR intersection layout • Gravel formation on side road • Restricted Sight Distance to the West – Rock Batter	

Table 10.3.4.1: Route Investigation (Intersections) – Lansdowne Road (cont'd)

Distance (kms)	Identification	Intersection Type & Condition	
7.52	Intersection of Lansdowne Road & Langley Vale Road	• Type BAR intersection layout • Bitumen sealed side road at Intersection • Restricted Sight Distance to the East – Horizontal Alignment	
8.61	Intersection of Lansdowne Road & Fern Ridge Lane	• Type BAR intersection layout • Gravel formation on side road • Restricted Sight Distance to the East – Horizontal Alignment	
8.91	Intersection of Lansdowne Road & Koolah Creek Road	• Type BAR intersection layout • Gravel formation on side road • Restricted Sight Distance, East – Horizontal Alignment, West – Bridge Rail	
10.99	Intersection of Lansdowne Road & Central & East Lansdowne Road	• Urban type intersection layout • Bitumen sealed cross junction with kerb & gutter on side roads • Good Sight Distance	
11.13	Intersection of Lansdowne Road & Macquarie Street	• Urban type intersection layout • Bitumen sealed cross junction with no kerb & gutter • Good Sight Distance	
11.63	Intersection of Lansdowne Road & Yurong Street	• Type BAR intersection layout • Bitumen sealed side road • Pavement in Good Condition • Good Sight Distance	

Table 10.3.4.1: Route Investigation (Intersections) – Lansdowne Road (cont'd)

Distance (kms)	Identification	Intersection Type & Condition	
11.70	Intersection of Lansdowne Road & Morrison Lane	• Type BAR intersection layout • Bitumen sealed side road • Pavement in Good Condition • Good Sight Distance	
12.29	Intersection of Lansdowne Road & Paringa Close	• Type BAR intersection layout • Pavement in Good Condition • Gravel formation on side road • Restricted Sight Distance, East – Railway Level Crossing	
13.48	Intersection of Lansdowne Road & North Moto Road	• Type BAR intersection layout • Some Pavement failures at intersection • Bitumen sealed on side road at Intersection • Good Sight Distance	
15.05	Intersection of Lansdowne Road & Upper Lansdowne Road / Station Street	• Type BAR intersection layout • Some Pavement failures at intersection • Bitumen sealed on Upper Lansdowne Road & Gravel formation on Station Street • Good Sight Distance	
15.35	Intersection of Lansdowne Road & Dawson Street	• Type BAR intersection layout • Pavement in Good Condition • Gravel formation on side road • Good Sight Distance	

Table 10.3.4.1: Route Investigation (Intersections) – Lansdowne Road (cont'd)

Distance (kms)	Identification	Intersection Type & Condition	
19.12	Intersection of Lansdowne Road & United Group Access (East)	• Type BAR intersection layout • Pavement in Good Condition • Bitumen sealed on side road • Restricted Sight Distance, South – horizontal & Vertical Alignment	
19.30	Intersection of Lansdowne Road & United Group Access (West)	• Type BAR intersection layout • Pavement in Good Condition • Bitumen sealed on side road • Good Sight Distance	
19.60	Intersection of Lansdowne Road & Kundle Kundle Road	• Type BAR intersection layout • Pavement in Good Condition • Bitumen sealed on side road • Restricted Sight Distance, North – Railway Level Crossing	
21.29	Intersection of Lansdowne Road & Tine Street (Oakvale Road)	• Type BAR intersection layout • Pavement in Good Condition • Bitumen sealed on side road • Good Sight Distance	
21.58	Intersection of Lansdowne Road & Clovernook Drive	• Type BAR intersection layout • Pavement in Good Condition • Bitumen sealed on side road • Good Sight Distance	

Table 10.3.4.1: Route Investigation (Intersections) – Lansdowne Road (cont'd)

Distance (kms)	Identification	Intersection Type & Condition	
22.08	Intersection of Lansdowne Road & Jasmine Close	• Type BAR intersection layout • Some Pavement Failures at intersection • Bitumen sealed on side road at Intersection • Good Sight Distance	
22.37	Intersection of Lansdowne Road & Arbour Lane	• Type BAR intersection layout • Some Pavement Failures at intersection • Gravel formation on side road • Restricted Sight Distance, South – Horizontal Alignment	
22.37	Intersection of Lansdowne Road & Old Lansdowne Road	• Type BAR intersection layout • Some Pavement Failures at intersection • Gravel formation on side road • Restricted Sight Distance, North & South – Horizontal Alignment	
23.27	Intersection of Lansdowne Road & Brimbin Road	• Type BAR intersection layout • Pavement in Good Condition • Bitumen sealed on side road • Restricted Sight Distance, North – Horizontal Alignment	
23.46	Intersection of Lansdowne Road & Farmborough Close	• Type BAR intersection layout • Pavement in Good Condition • Bitumen sealed on side road • Good Sight Distance	

Table 10.3.4.1: Route Investigation (Intersections) – Lansdowne Road (cont'd)

Distance (kms)	Identification	Intersection Type & Condition	
23.96	Intersection of Lansdowne Road & Audral Close	• Type BAR intersection layout • Some Pavement Failures at intersection • Bitumen sealed on side road • Good Sight Distance	
24.25	Intersection of Manning River Drive & Lansdowne Road	• 2 lane Roundabout • Pavement in reasonable condition. Some longitudinal cracking. • Good Sight Distance	

Table 10.3.4.1: Route Investigation (Intersections) – Lansdowne Road (cont'd)

10.3.5 Bridges

There are 4 major bridge / culvert structures located along Lansdowne Road:

- Coopernook Creek Culvert (Coopernook) – 9.5m wide (guardrail to guardrail) 2 x 3.5m travel lanes
- Rock Creek Bridge - 14.0m long, 6.6m wide (kerb to kerb)
- Koolah Creek Bridge – 14.0m long, 6.6m wide (kerb to kerb)
- Cross Creek Bridge (Lansdowne) – 24.7m long, 6.0m wide (kerb to kerb)
- Lansdowne River Bridge - 45.0m long, 4.4m wide (guardrail to guardrail)

Upgrades of the bridges / culvert where required will be dealt with further as part of the detail design assessment where required.

Road: - Lansdowne Road via Coopernook Road and Macquarie Street, Coopernook. Between the Pacific Highway and Manning River Drive, Taree.

Inspected by: - Craig Nethery
Inspection Date: - Friday 16 July 2010

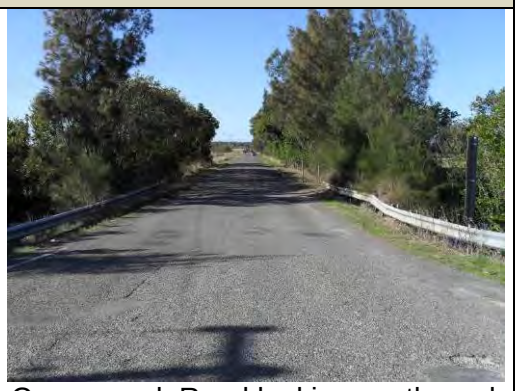
Distance (kms)	Identification	Condition	
From Pacific Highway, Coopernook 0.78	Harrington Road (Lansdowne Road) at the intersection with George Gibson Drive	• Culvert • 9.5m Guardrail to Guardrail • 3.50m travel lanes	 Coopernook Road looking eastbound
7.97	Lansdowne Road	• Concrete Bridge • 14m Long • 6.6m kerb to kerb	 Lansdowne Road looking eastbound
10.69	Lansdowne Road	• Concrete Bridge • 24.7m Long • 6.0m kerb to kerb	 Lansdowne Road looking eastbound
12.47	Lansdowne Road	• Concrete Bridge (single lane) • 45.0m Long • 4.4m Guardrail to Guardrail	 Lansdowne Road looking eastbound

Table 10.3.5.1: Route Investigation (Bridges) – Lansdowne Road

10.3.6 Facilities (Railway Level Crossings)

There are 4 railway level crossings located along the route of Lansdowne Road. At each of these locations Lansdowne Road crosses the railway perpendicular to the alignment with the exception of the Kundle Kundle Road location where it crosses at approximately 70 degrees to the railway alignment.

Upgrades of the railway level crossings where required will be dealt with further as part of the detail design assessment where required.

Road: - Lansdowne Road via Coopernook Road and Macquarie Street, Coopernook. Between the Pacific Highway and Manning River Drive, Taree.

Inspected by: - Craig Nethery
Inspection Date: - Friday 16 July 2010

Distance (kms)	Identification	Condition	
4.26	Lansdowne Road	• Railway Level Crossing • (No Boom Gates) • 6.7m formation, 0.5m shoulders • Adequate Sight Distance for Vehicles	 At Railway Level Crossing

Table 10.3.6.1: Route Investigation (Facilities) – Lansdowne Road

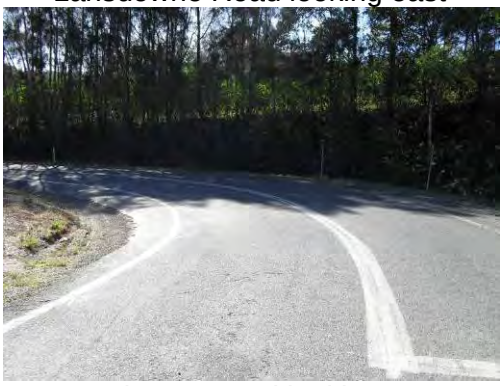
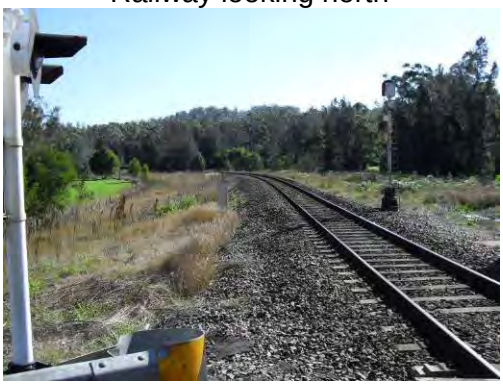
Distance (kms)	Identification	Condition	
4.26	Lansdowne Road	• Railway Level Crossing • (No Boom Gates) • 6.7m formation, 0.5m shoulders • Adequate Sight Distance for Vehicles	 Lansdowne Road looking east  Lansdowne Road looking west  Railway looking north  Railway looking south

Table 10.3.6.1: Route Investigation (Facilities) – Lansdowne Road (cont'd)

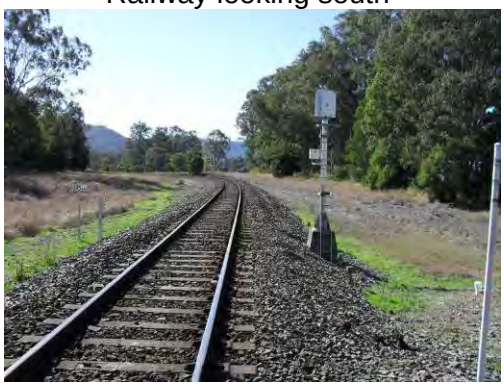
Distance (kms)	Identification	Condition	
12.28	Lansdowne Road	• Railway Level Crossing • (No Boom Gates) • 6.7m formation, 0.5m shoulders • Adequate Sight Distance for Vehicles	 At Railway Level Crossing (western side)  At Railway Level Crossing  Railway looking south  Railway looking north

Table 10.3.6.1: Route Investigation (Facilities) – Lansdowne Road (cont'd)

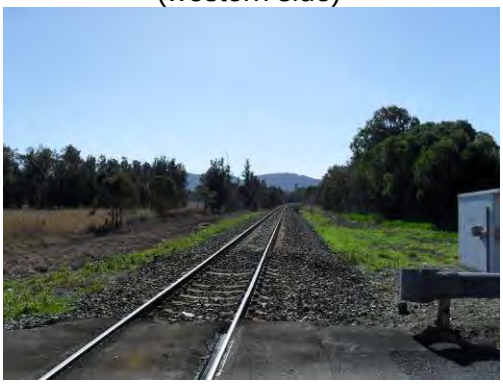
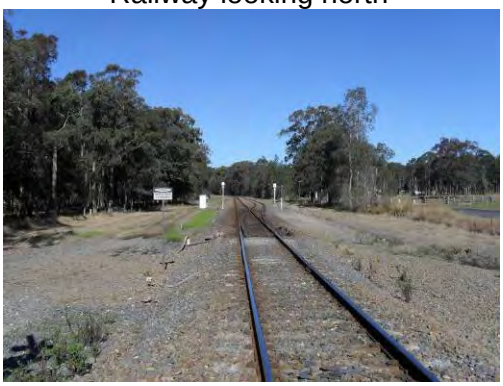
Distance (kms)	Identification	Condition	
13.66	Lansdowne Road	• Railway Level Crossing • (No Boom Gates) • 7.6m formation, 0.5m shoulders • Adequate Sight Distance for Vehicles	 At Railway Level Crossing (eastern side)  At Railway Level Crossing (western side)  Railway looking north  Railway looking south

Table 10.3.6.1: Route Investigation (Facilities) – Lansdowne Road (cont'd)

Distance (kms)	Identification	Condition	
19.45	Lansdowne Road	• Railway Level Crossing • 6.4m formation, 0.5m shoulders • Recently upgraded to include boom gates, flashing lights and increased warning signage • Sight Distance for Vertical Alignment substandard each side of rail track	 Approach Signage (eastern side)  At Railway Level Crossing (eastern side)  At Railway Level Crossing (western side)  Railway looking north

Table 10.3.6.1: Route Investigation (Facilities) – Lansdowne Road (cont'd)

Distance (kms)	Identification	Condition	
			 Railway looking south

Table 10.3.6.1: Route Investigation (Facilities) – Lansdowne Road (cont'd)

10.4 Bushland Drive (Wingham Road to Manning River Drive via Gipps & Cowper Streets)

10.4.1 Existing Traffic Conditions

Bushland Drive has been identified by Greater Taree City Council as being a future heavy vehicle route providing connection from Wingham through Taree onto the Pacific Highway. Presently Bushland Drive terminates at Kurrajong Crescent. Figure 10.4.1.1 indicates the alignment for the extension of Bushland Drive provided by Greater Taree City Council.

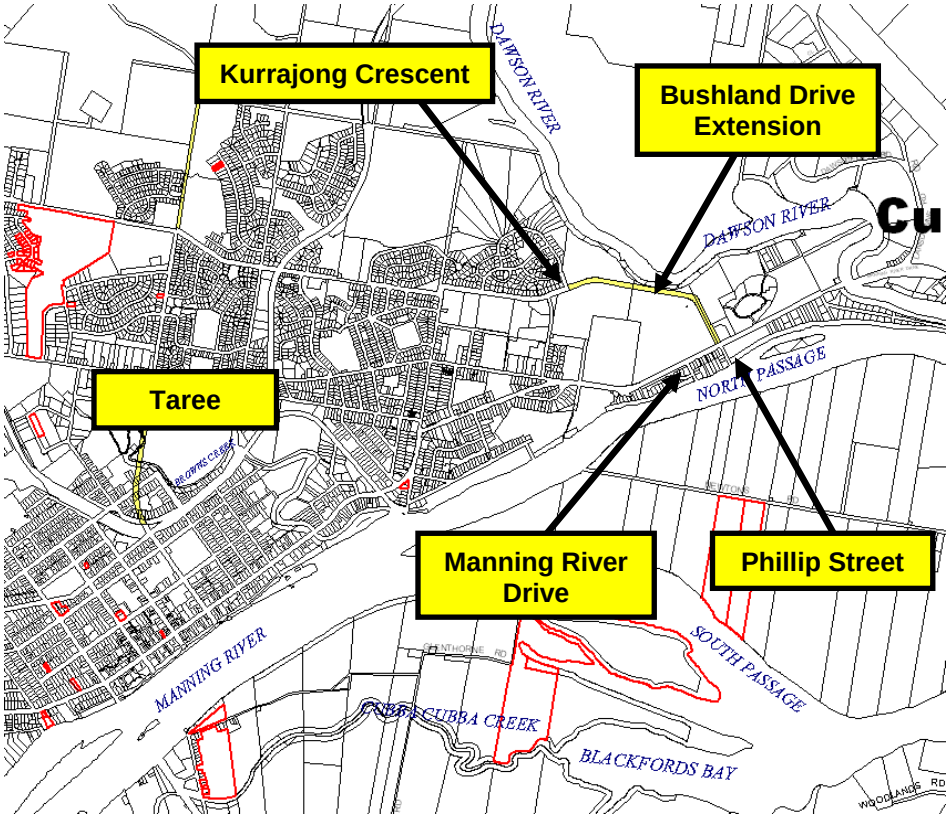


Figure 10.4.1.1: Concept for Bushland Drive Extension

Bushland Drive varies from urban standard (kerb & gutter) to rural road standard depending on the location.

- Chainage 00km (Wingham Road) to Ch.0.31km – 13.0m wide, kerb to kerb
- Ch.0.31km to Grey Gum Road – 12.0m wide formation, kerb left hand side
- Grey Gum Road to Ch.0.81km - 13.0m wide, kerb to kerb
- Ch.0.81km to Mudford Street – 6.0m wide bitumen seal and 1.50m wide gravel shoulders
- Mudford Street to Ch.2.16km – 10.0m wide formation, kerb right hand side
- Ch.2.16 to Railway Level Crossing - 13.0m wide, kerb to kerb
- Railway Level Crossing to Palanas Drive – 7.0m wide bitumen seal and 1.50m wide gravel shoulders
- Palanas Drive to Oxley Street - 9.0m wide formation, kerb right hand side
- Oxley Street to Gipps Street – 10.8m wide, kerb to kerb
- Gipps Street to Kurrajong Crescent - 9.0m wide formation, kerb left hand side

Bushland Drive has numerous local side streets and private accesses (e.g. driveways) abutting its alignment. Assessments of these intersections will be completed as part of the detailed design assessment of this report where required.

The route varies from undulating to flat in sections. It was observed during the visual route assessment and the subsequent desktop review that there were substandard crests along the route in relation to the posted speed limit. These locations will be addressed as part of the detail design assessment for this project where required.

Bushland Drive has 3 posted speed environments along its route plus 2 special school speed zones:

- 70km/h – Wingham Road to Ch1.41km (just west of Barton Street)
- 60km/h – Ch1.41km (just west of Barton Street) to Ch3.10km (just west of Oxley Street) (40km/h School Speed Zone for Manning Gardens Primary School).
- 50 km/h – Ch3.10km (just west of Oxley Street) to Kurrajong Crescent (40km/h School Speed Zone for Chatham High School)

There are no major bridges or culvert structures located along Bushland Drive.

There is 1 railway level crossing located along the route of Bushland Drive. At this location Bushland Drive crosses the railway at approximately 70 degrees to the railway alignment.

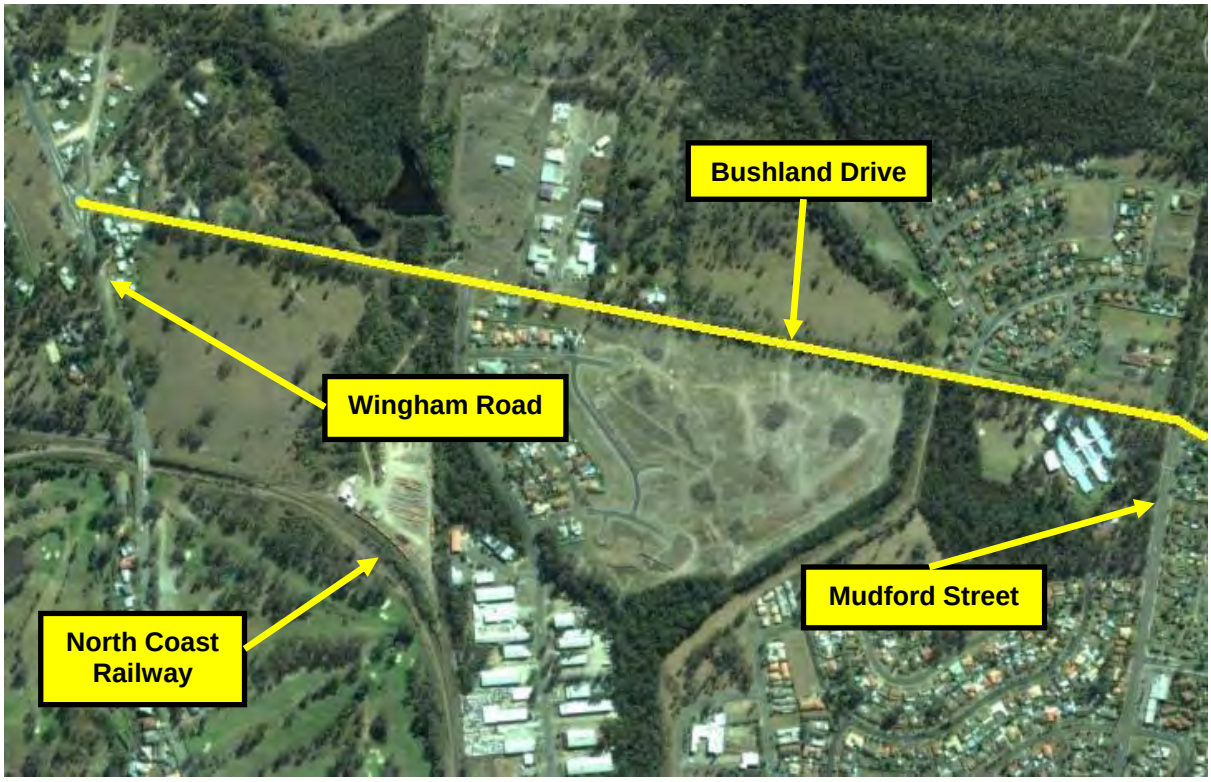


Figure 10.4.1.2: Bushland Drive, Wingham Road to Mudford Street

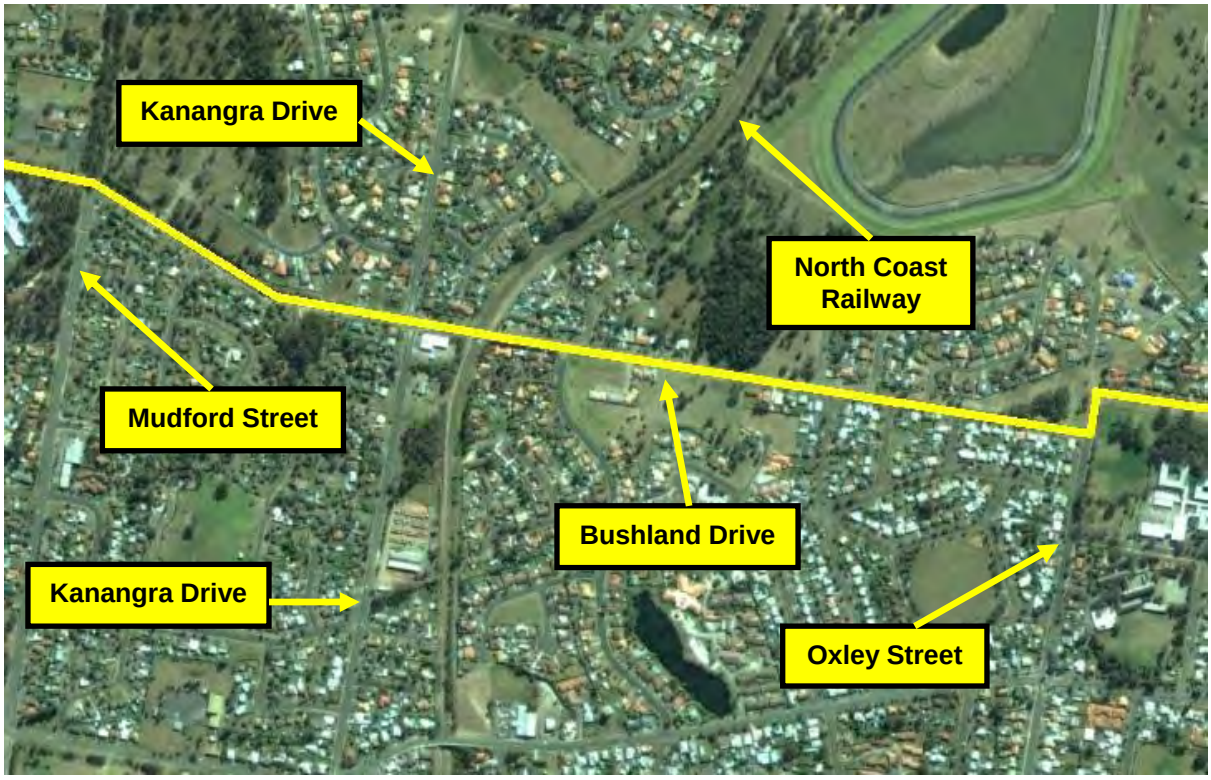


Figure 10.4.1.3: Bushland Drive, Mudford Street to Oxley Street

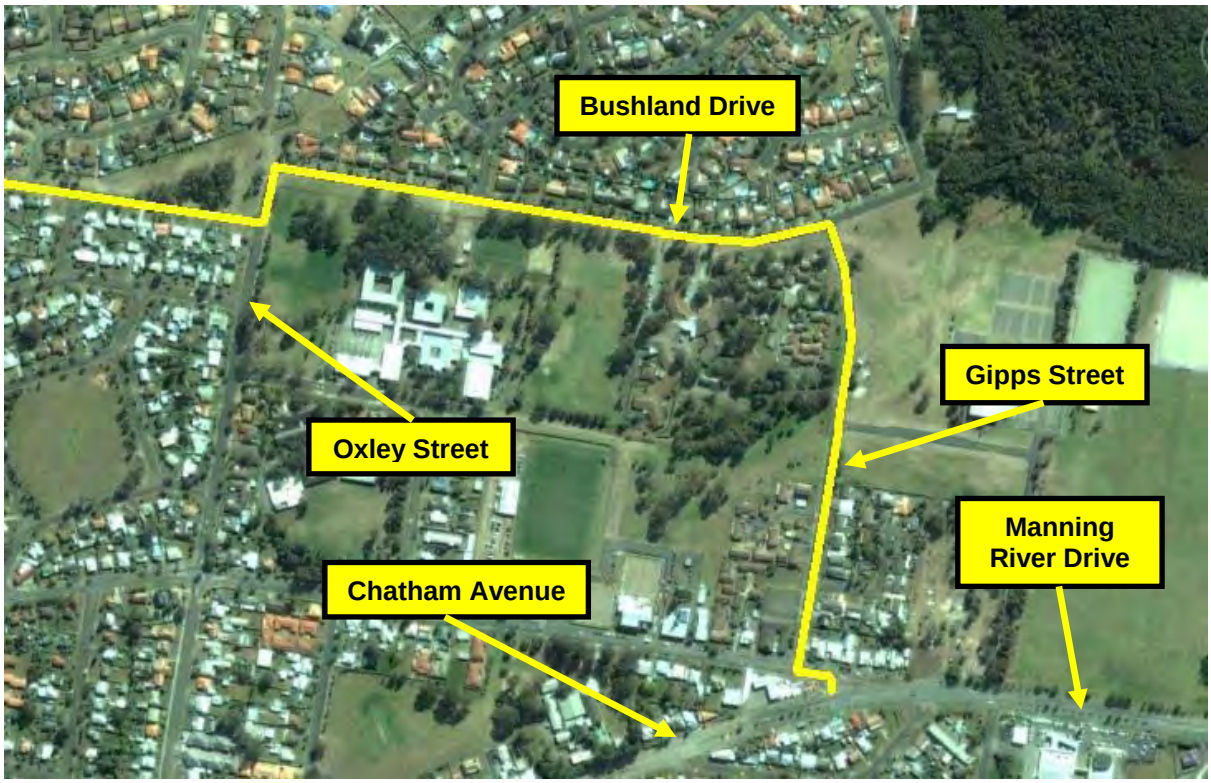


Figure 10.4.1.4: Bushland Drive, Oxley Street to Gipps Street

10.4.2 Route Investigation

Road: - Bushland Drive, between Wingham Road and Kurrajong Crescent

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

Distance (kms)	Identification	Condition	
00	Intersection of the Wingham Road and Bushland Drive	• 2 lane Roundabout • Pavement in reasonable condition. Pavement Failures on Circulating Pavement of Roundabout. • Good Sight Distance	

Table 10.4.2.1: Route Investigation – Bushland Drive

0.02	Bushland Drive	• Urban Sub Arterial Formation • 13m Kerb to Kerb • Some Pavement Failures along lip of kerb • 70km/h Posted speed Limit	 Looking eastbound
0.70	Bushland Drive	• Start of Rural Road Formation (No Kerb & Gutter) • 6.0m Bitumen Seal & 1.50m Gravel Shoulders	 Looking eastbound
1.41	Bushland Drive	• Rural Road Formation • Some pavement failures • 60km/h Posted speed Limit	 Looking eastbound
1.32	Bushland Drive	• Urban Sub Arterial Formation • Kerb & Gutter at school crossing • 40km/h School Zone (Start)	
1.50	Bushland Drive	• 10.0m Formation 5.8m Kerb to Centreline, 4.2m to Edge of Pavement	
1.84	Bushland Drive	• Rural Road Formation • 40km/h School Zone (End)	
2.04	Bushland Drive	• Urban Sub Arterial Formation • 13m Kerb to Kerb • Pavement in Good Condition	

Table 10.4.2.1: Route Investigation – Bushland Drive (cont'd)

Distance (kms)	Identification	Condition	
2.41	Bushland Drive	• Railway Level Crossing • Urban Sub Arterial Formation • Some heavy patching of pavement at rail crossing	 Looking eastbound
2.6	Bushland Drive	• 9.0m Formation 4.5m Kerb to Centreline, 4.5m to Edge of Pavement • Some Poor Pavement Conditions	
3.10	Bushland Drive	• Pavement in Good Condition • 50km/h Posted speed Limit	 Looking eastbound
3.33	Bushland Drive	• Pavement in Good Condition • 40km/h School Zone (Start)	 Looking eastbound
3.4	Bushland Drive	• Urban Collector Road Formation • 10.8m Kerb to Kerb • Some Pavement Failures along kerb line	
3.88	Bushland Drive	• Urban Collector Road Formation • 40km/h School Zone (End)	

Table 10.4.2.1: Route Investigation – Bushland Drive (cont'd)

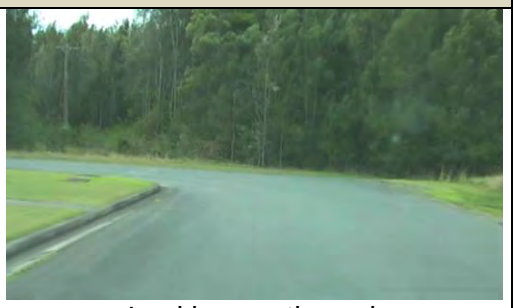
Distance (kms)	Identification	Condition	
4.18	Intersection of Bushland Drive & Kurrajong Crescent,	• Urban Collector Road Formation • End of Bushland Drive Formation	 Looking eastbound
00	Gipps Street (Alternate Route)	• Urban Collector Road Formation • 11.0m Kerb to Kerb	 Looking southbound
0.55	Intersection of Gipps Street & Manning River Drive (Chatham Avenue) (Alternate Route)		

Table 10.4.2.1: Route Investigation – Bushland Drive (cont'd)

10.4.3 Existing Horizontal Alignment

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED	
1.703 – 1.784	70	200	81	70	140 (Arc length below minimum)	
2.017 – 2.103	60	200	86	70	140 (Arc length below minimum)	
3.366						Oxley St
3.417 – 3.442	50	15	22	-60		
3.902 – 4.035	50	250	133	80	180 (Arc length below minimum)	
4.158	50					Kurrajong Crescent

Table 10.4.3.1: Existing Horizontal Alignment Data – Bushland Drive

10.4.4 Intersections

Bushland Drive has numerous local public and private access roads intersecting its alignment. Of these, 23 local roads intersect along its route. These are:

- Wingham Road
- Grey Gum Road
- Flametree Close
- Barton Street
- Mudford Street
- Dunoon Street
- Kanangra Drive
- Palanas Drive
- Manikato Place
- Lawson Crescent
- Wells Street
- Wentworth Street
- Kerle Street
- Flinders Street
- North Street
- Oxley Street
- Jacaranda Avenue

- Gipps Street (alternate route)
- Kurrajong Crescent (end of Bushland Drive alignment)
- Recreation Drive (alternate route)
- Whitby Close (alternate route)
- Cowper Street (alternate route)
- Chatham Avenue / Manning River Drive (alternate route)

Road: - Bushland Drive, between Wingham Road and Kurrajong Crescent

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

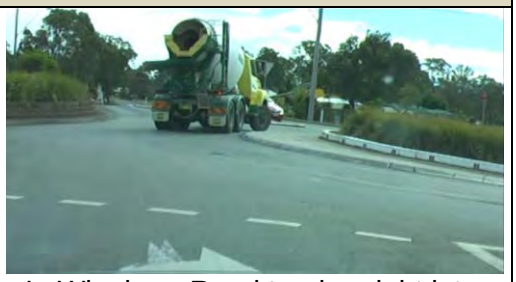
Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of Wingham Road and Bushland Drive Existing 2 Lane roundabout	• 2 lane Roundabout • Pavement in reasonable condition. Pavement Failures on Circulating Pavement of Roundabout. • Good Sight Distance	 In Wingham Road turning right into Bushland Drive
0.15	Intersection of Bushland Drive & Bunnings Access	• Type AUR turn treatment • Intersection layout has the ability to cause rear end accidents with existing configuration	 In Bushland Drive eastbound
0.61	Intersection of Bushland Drive & Grey Gum Road	• Urban T Junction with Central Median in Grey Gum Road • Poor Vertical Alignment sight distance to the east	 In Bushland Drive eastbound

Table 10.4.4.1: Route Investigation (Intersections) – Bushland Drive

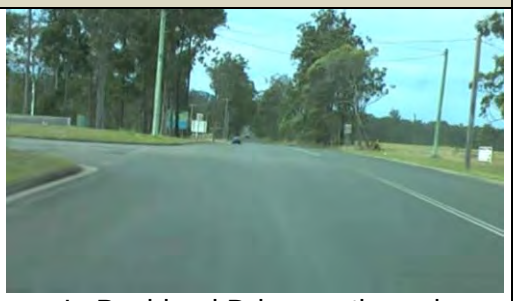
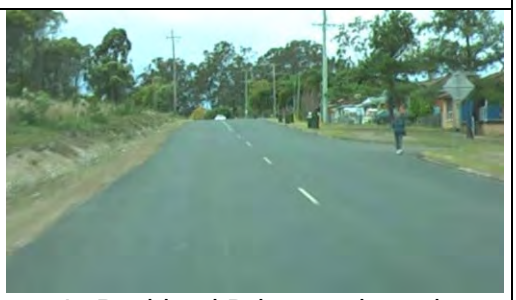
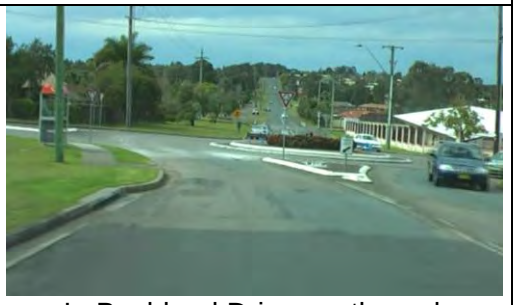
Distance (kms)	Identification	Intersection Type & Condition	
0.75	Intersection of Bushland Drive & Flame Tree Close	• Urban T Junction • Poor Vertical Alignment sight distance to the east • Pavement in Good Condition • Kerb & Gutter in both roads	 In Bushland Drive eastbound
1.42	Intersection of Bushland Drive & Barton Street	• Rural Type BAR layout • Good Sight Distance • Heavy Pavement Patching at Intersection	 In Bushland Drive eastbound
1.75	Intersection of Bushland Drive & Mudford Street	• Rural Type BAR layout with kerb and gutter in Mudford Street • Poor Horizontal Alignment sight distance to the east • Heavy Edge Patching at Intersection in Bushland Drive	 In Bushland Drive eastbound
1.95	Intersection of Bushland Drive & Dunoon Street	• Urban T Junction with kerb and gutter in Dunoon Street • Pavement in Good Condition • Good Sight Distance	 In Bushland Drive eastbound
2.30	Intersection of Bushland Drive & Kanangra Drive	• Existing single lane roundabout • Existing boundary fence on southwest corner, sight distance issue • Pavement Failures through roundabout	 In Bushland Drive eastbound

Table 10.4.4.1: Route Investigation (Intersections) – Bushland Drive (cont'd)

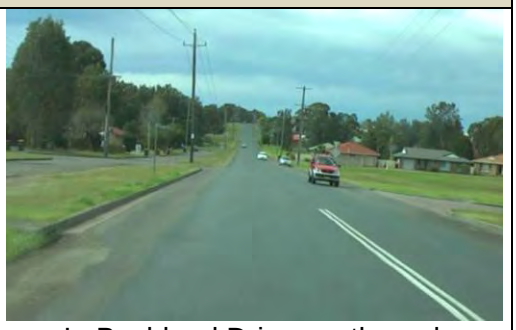
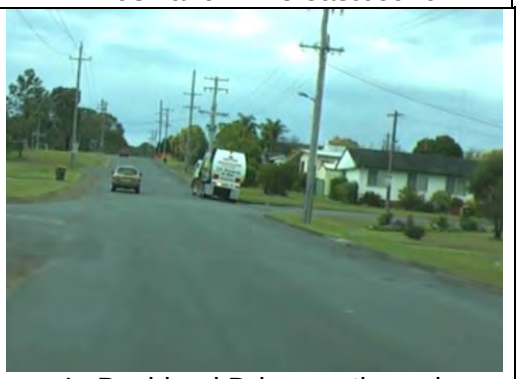
Distance (kms)	Identification	Intersection Type & Condition	
2.54	Intersection of Bushland Drive & Palanas Drive	• Urban T Junction • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Bushland Drive eastbound
2.57	Intersection of Bushland Drive Manikato Place	• Urban T Junction • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Bushland Drive eastbound
2.94	Intersection of Bushland Drive & Lawson Crescent	• Urban T Junction • No Kerb & Gutter in Lawson Street at intersection • Some Pavement Edge Failures • Good Sight Distance	 In Bushland Drive eastbound
2.97	Intersection of Bushland Drive & Wells Street	• Urban T Junction • No Kerb & Gutter in Bushland Drive at intersection • Some Pavement Edge Failures • Good Sight Distance	 In Bushland Drive eastbound

Table 10.4.4.1: Route Investigation (Intersections) – Bushland Drive (cont'd)

Distance (kms)	Identification	Intersection Type & Condition	
3.03	Intersection of Bushland Drive & Wentworth Street	• Urban T Junction • No Kerb & Gutter in Wentworth Street at intersection • Some Pavement Edge Failures • Good Sight Distance	 In Bushland Drive eastbound
3.07	Intersection of Bushland Drive & Kerle Street	• Urban T Junction • No Kerb & Gutter in Bushland Drive at intersection • Some Pavement Edge Failures • Good Sight Distance	 In Bushland Drive eastbound
3.12	Intersection of Bushland Drive & Flinders Street	• Urban T Junction • No Kerb & Gutter in Flinders Street at intersection • Poor Vertical Alignment sight distance to the east • Some Pavement Edge Failures	 In Bushland Drive eastbound
3.17	Intersection of Bushland Drive & North Street	• Urban T Junction • No Kerb & Gutter in Bushland Drive at intersection • Some Pavement Edge Failures • Good Sight Distance	 In Bushland Drive eastbound

Table 10.4.4.1: Route Investigation (Intersections) – Bushland Drive (cont'd)

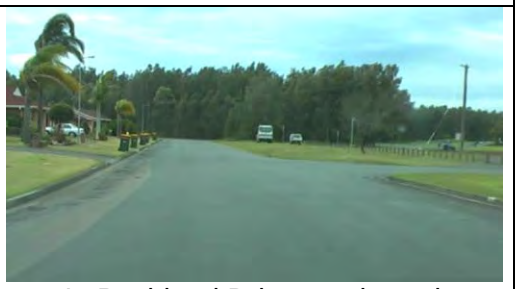
Distance (kms)	Identification	Intersection Type & Condition	
3.38	Intersection of Bushland Drive & Oxley Street	• Urban T Junction • No Kerb & Gutter on northwest corner of intersection • Some Pavement Edge Failures • Good Sight Distance	 In Bushland Drive eastbound
3.67	Intersection of Bushland Drive & Jacaranda Avenue	• Urban T Junction • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Bushland Drive eastbound
4.06	Intersection of Bushland Drive & Gipps Street	• Urban T Junction • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Bushland Drive eastbound
4.18	Intersection of Bushland Drive & Kurrajong Crescent	• Urban T Junction (End of Bushland Drive Formation) • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Bushland Drive eastbound
0.23 (Alternate Route)	Intersection of Gipps Street & Recreation Drive	• Urban T Junction • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Gipps Street eastbound

Table 10.4.4.1: Route Investigation (Intersections) – Bushland Drive (cont'd)

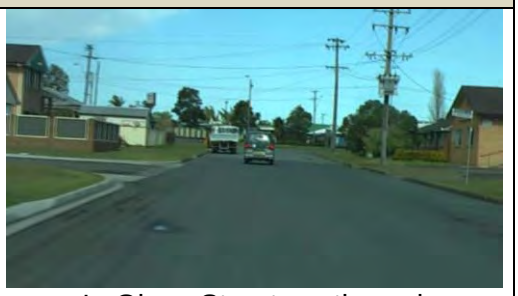
Distance (kms)	Identification	Intersection Type & Condition	
0.41 (Alternate Route)	Intersection of Gipps Street & Whitby Close	• Urban T Junction • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Gipps Street eastbound
0.50 (Alternate Route)	Intersection of Gipps Street & Cowper Street	• Urban T Junction • Kerb & Gutter in both roads • Pavement in Good Condition • Good Sight Distance	 In Gipps Street eastbound

Table 10.4.4.1: Route Investigation (Intersections) – Bushland Drive (cont'd)

10.4.5 Bridges

There are no bridges or major culverts along this route to be assessed.

10.4.6 Facilities (Railway Level Crossings)

There is 1 railway level crossing located approximately 110m east of Kanangra Drive along the route of Bushland Drive. At this location Bushland Drive crosses the railway at approximately 70 degrees to the railway alignment.

Upgrades of the railway level crossings where required will be dealt with further as part of the detail design assessment where required.

Distance (kms)	Identification	Condition	
2.41	Bushland Drive	• Railway Level Crossing	 Bushland Drive looking eastbound

Table 10.4.5.1: Route Investigation (Facilities) – Bushland Drive

10.5 Brimbin Road

10.5.1 Existing Traffic Conditions

Brimbin Road is a rural road providing access to Lansdowne Road for approximately 20 residences. The road is approximately 4.3km in length, and runs generally south-east to north-west. The existing road is sealed for 2.4km from Lansdowne Road to the North coast Railway, while the western portion (approx. 1.9km) is unsealed gravel formation. The existing road ends at an unsealed cul-de-sac at the north-east, with a number of tracks leading off into surrounding bushland.

The road width varies between 7m at the eastern end to approximately 5m on the unsealed section. The roadway generally includes a grassed verge and table drains, with no shoulders.

Access to properties along the length of Brimbin Road is generally via sealed or unsealed rural driveways, with most including a piped culvert and headwalls, aligned with the adjacent grassed table drains.

There are 2 roads that intersect with Brimbin Road:

- Oakvale Road – Ch. 0.29km (gravel formation)
- Myuna Close – Ch.2.30km (bitumen seal formation)

There is one major bridge (concrete railway overbridge) located along Brimbin Road.

Brimbin Road has an unrestricted posted speed limit, although speed is governed by the existing gravel formation and tight bends located along its route.

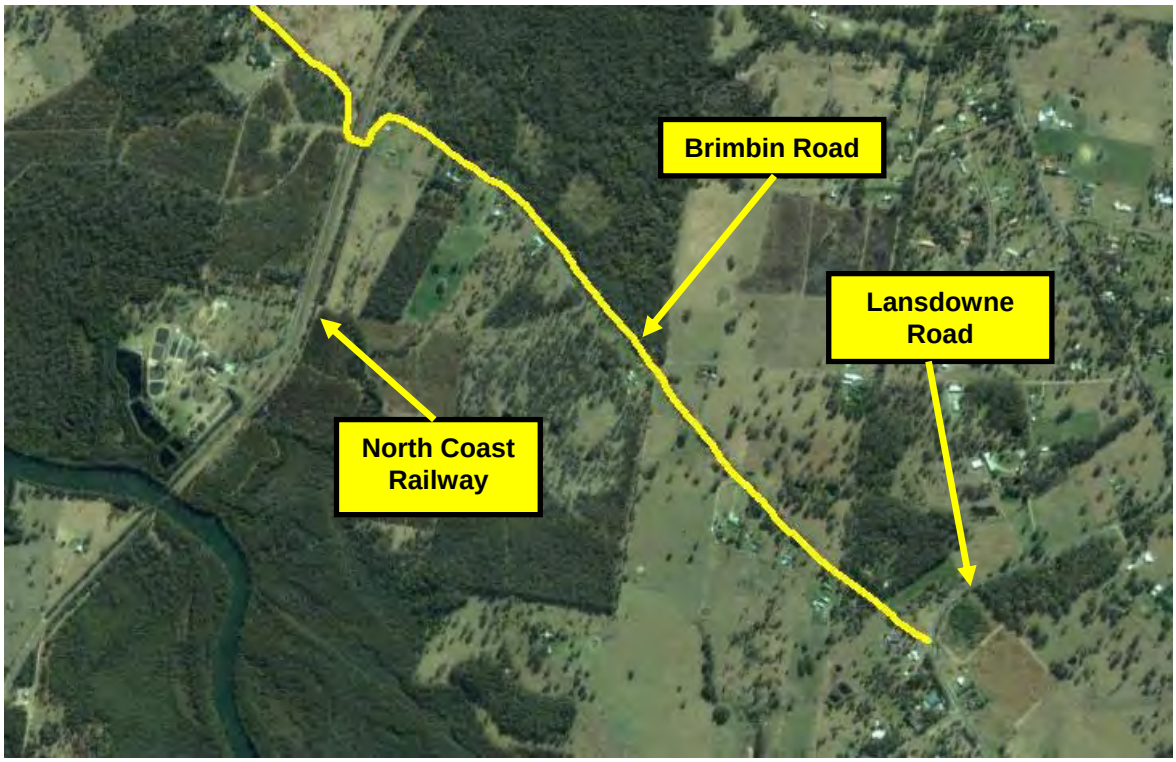


Figure 10.5.1.1: Brimbin Road, Lansdowne Road to North Coast Railway

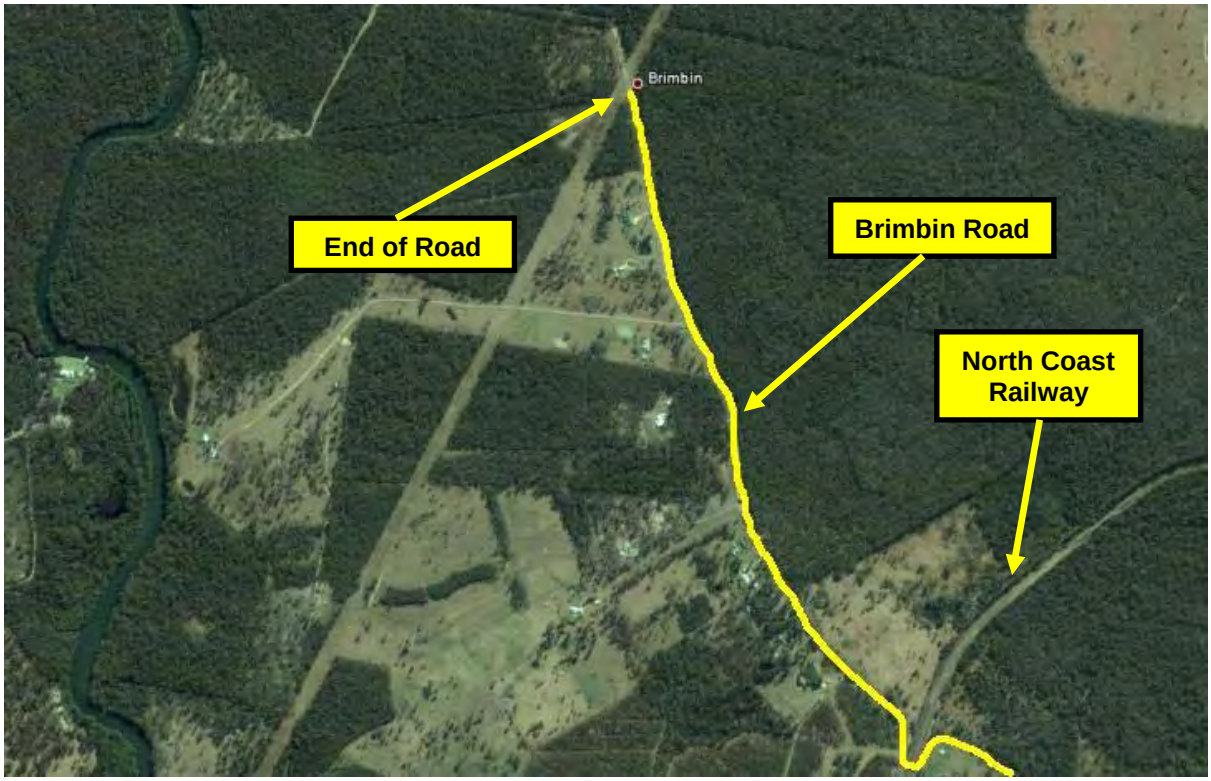


Figure 10.5.1.2: Brimbin Road, North Coast Railway to End of Road Formation

10.5.2 Route Investigation

Road: - Brimbin Road, between Lansdowne Road and end for road (gravel section)

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

Distance (kms)	Identification	Condition	
00	Intersection of Brimbin Road and Lansdowne Road	• Type BAR intersection treatment • Pavement in Good Condition • Horizontal Alignment in both directions does not meet the SISD requirements.	 In Brimbin Road looking east towards Lansdowne Road
1.50	Brimbin Road	• Rural Road Formation • 7.0m Bitumen Seal & 1. 0m Gravel Shoulders • Pavement in Good Condition	 Looking westbound
2.28	Brimbin Road (Concrete Railway Overbridge)	• Two-way concrete railway overbridge currently under construction (21/7/2011) • Replacing existing timber railway overbridge and realigning Brimbin Road through the section	
2.36	Brimbin Road	• End of Bitumen Seal Formation • 7.0m Bitumen Seal & 1.0m Gravel Shoulders • Start of Gravel Formation 5.20m wide, no shoulders • Gravel recently graded at time of audit	 Looking westbound

Table 10.5.2.1: Route Investigation – Brimbin Road

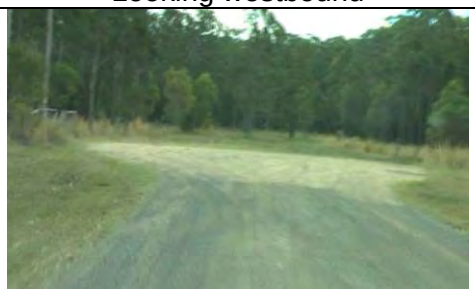
Distance (kms)	Identification	Condition	
2.50	Brimbin Road	• Gravel Formation, 5.20m wide, no shoulders • Gravel recently graded at time of audit	 Looking westbound
4.33	Brimbin Road	• End of road (gravel section) • Gravel Formation, 5.20m wide, no shoulders	 Looking westbound

Table 10.5.2.1: Route Investigation – Brimbin Road (cont'd)

10.5.3 Existing Horizontal Alignment

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED	
00						Int'n with Lansdowne Road
0.398 – 0.498	Unrestricted	500	100	100	460	
0.895 – 1.161	Unrestricted	1500	265	100	460	
1.196 – 1.267	Unrestricted	300	71	100	460 (Arc length below minimum)	
1.364 – 1.438	Unrestricted	300	73	100	460 (Arc length below minimum)	

Table 10.5.3.1: Existing Horizontal Alignment Data – Brimbin Road

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED	
1.438 – 1.892	Unrestricted	915	454	100	460	
2.271 – 2.286	Unrestricted			100		Bridge over railway
2.315	Unrestricted			100		Unsealed west of this point
2.651 – 2.766	Unrestricted	380	115	100	460 (Arc length below minimum)	
3.115 – 3.210	Unrestricted	200	95	100	460 (Arc length below minimum)	
3.337 – 3.498	Unrestricted	400	161	100	460 (Arc length below minimum)	
3.761 – 3.865	Unrestricted	400	104	100	460 (Arc length below minimum)	
4.312						End of road

Table 10.5.3.1: Existing Horizontal Alignment Data – Brimbin Road (cont'd)

10.5.4 Intersections

There are two roads that intersection with Brimbin Road:

- Oakvale Road – Ch. 0.29km (gravel formation)
- Myuna Close – Ch.2.30km (bitumen seal formation)

Road: - Brimbin Road, between Lansdowne Road and end for road (gravel section)

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of Lansdowne Road & Brimbin Road	• Type BAR intersection layout • Pavement in good condition • Bitumen sealed on side road • Restricted Sight Distance, north – horizontal alignment	 In Brimbin Road looking north  In Brimbin Road looking south
0.29	Intersection of Brimbin Road & Oakvale Road	• Rural property access layout • Gravel track formation on side road • Pavement on main road in good condition • Good Sight Distance	 In Brimbin Road westbound, Oakvale Road on right
2.30	Intersection of Brimbin Road & Myuna Close	• Type BAR intersection layout • Some Pavement Failures at Intersection • Bitumen sealed on side road	 In Brimbin Road looking down Myuna Close

Table 10.5.4.1: Route Investigation (Intersections) – Brimbin Road

10.5.5 Bridges

There is one major bridge located along Brimbin Road.

This is a Railway Overbridge under the control of CRIA (Country Rail Infrastructure Authority). At the time of inspection bridge was a timber bridge 16.5m long and 4.6m wide (kerb to kerb). As of July 2011 a two-way concrete bridge was being constructed to replace the existing timber bridge and realign Brimbin Road through the section. This new bridge is now complete.

Road: - Brimbin Road, between Lansdowne Road and end of road (gravel section)

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

Distance (kms)	Identification	Condition	
2.28	Brimbin Road	• Concrete Railway Overbridge (Under ARTC Control)	

Table 10.5.5.1: Route Investigation (Bridges) – Brimbin Road

10.6 Moto Road (Pacific Highway to Ghinni Ghinni Creek)

10.6.1 Existing Traffic Conditions

Moto Road is a gravel rural road formation located in flat rural grazing land. Moto Road provides connection to properties located on the western side of Jones Island via the Pacific Highway and Old Bridge Road in the north and the Pacific Highway in the south.

The gravel formation is generally 5.0m to 6.0m wide with no formal shoulder. Verges are provided to drain water from the crown of the road.

There are 3 roads that intersection with Moto Road:

- Whites Road – Ch.00 (gravel formation)
- Kundle Kundle Road – Ch.2.40km (gravel formation)
- Pacific Highway – Ch.4.70km (bitumen seal formation)

There is a single lane timber bridge over Ghinni Ghinni Creek (Dickenson Bridge) located approximately 1.32km from the intersection with the Pacific Highway.

Moto Road has an unrestricted posted speed limit, although speed is governed by the existing gravel formation and tight bends located along its route.

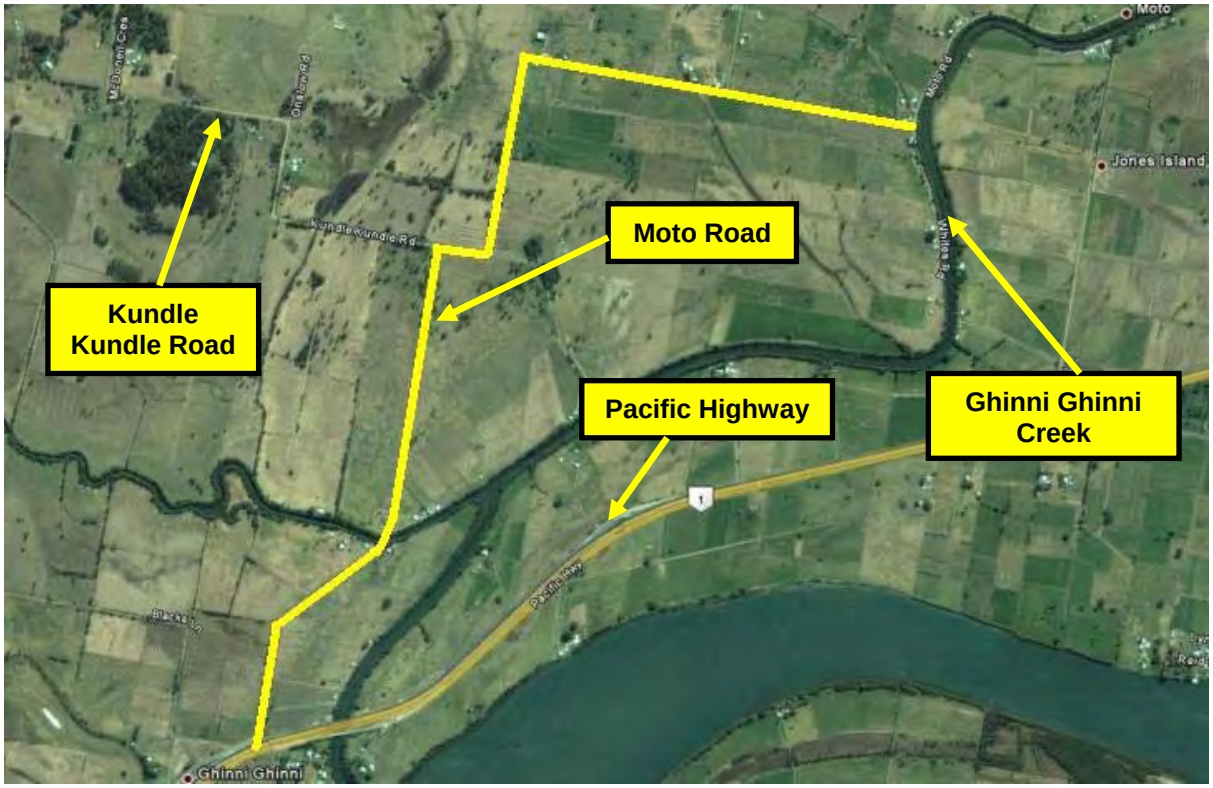


Figure 10.6.1.1: Moto Road, Pacific Highway to Ghinni Ghinni Creek

10.6.2 Route Investigation

Road: - Moto Road – Pacific Highway to Moto Road / Whites Road Intersection

Inspected by: - Craig Nethery
Inspection Date: - Friday 16 July 2010

Distance (kms)	Identification	Condition	
00	Intersection of the Pacific Highway and Moto Road	• Rural road formation • Bitumen seal from Pacific Hwy to Ch0.25 • Some Pavement Failures • 5.8m wide gravel pavement	 End of bitumen seal 240m north of highway intersection

Table 10.6.2.1: Route Investigation – Moto Road

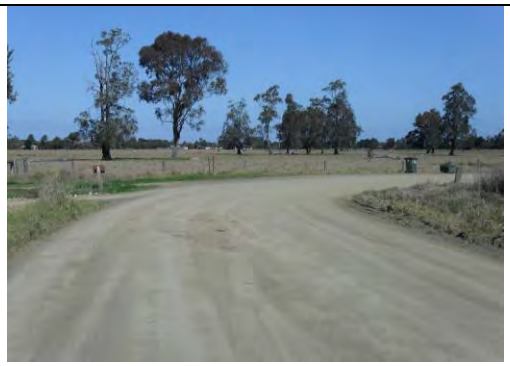
Distance (kms)	Identification	Condition	
0.30	Right hand bend	• Rural road formation • Good Gravel Pavement • 5.8m wide gravel pavement	 Looking westbound
0.70	Left hand bend	• Rural road formation • Good Gravel Pavement • 5.8m wide gravel pavement	 Looking westbound
1.32	Timber Bridge over Ghinni Ghinni Creek (Dickenson Bridge)	• Single Lane Bridge 36m long, 5.1m wide	
2.30	Intersection of Moto Road and Kundle Kundle Road	• Rural road formation • Good Gravel Pavement • 5.8m wide gravel pavement	
2.50	Right hand bend	• Rural road formation • Good Gravel Pavement • 5.8m wide gravel pavement	 Looking westbound

Table 10.6.2.1: Route Investigation – Moto Road (cont'd)

Distance (kms)	Identification	Condition	
3.30	Left hand bend	• Rural road formation • Good Gravel Pavement • 5.8m wide gravel pavement	 Looking westbound
4.86	Intersection of Moto Road and Whites Road at Ghinni Ghinni Creek	• Rural road formation • Good Gravel Pavement • 5.8m wide gravel pavement	

Table 10.6.2.1: Route Investigation – Moto Road (cont'd)

10.6.3 Existing Horizontal Alignment

The horizontal alignment of Moto Road generally consists of a series of straights with changes of direction achieved mainly by 90 degree bends.

There are generally no sight distance issues. The only issue could be constraints associated with the single lane timber bridge over Ghinni Ghinni Creek (Dickenson Bridge) with oncoming traffic having to give way to each other to negotiate the bridge.

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED	
00	Unrestricted					Pacific Highway Intersection
0.351 – 0.393	Unrestricted	40	42	-60		
0.774 – 0.799	Unrestricted	40	25	-60		
1.280 – 1.295	Unrestricted	25	15	-60		

Table 10.6.3.1: Existing Horizontal Alignment Data – Moto Road

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED	
1.316	Unrestricted					Dickenson Bridge over Ghinni Ghinni Creek
1.332 – 1.350	Unrestricted	35	18	-60		
1.350 – 1.385	Unrestricted	45	35	-60		
2.438	Unrestricted					Kundle Kundle Rd Intersection
2.600 – 2.623	Unrestricted	15	23	-60		
3.342 – 3.384	Unrestricted	25	42	-60		
4.862	Unrestricted					Whites Road

Table 10.6.3.1: Existing Horizontal Alignment Data – Moto Road (cont'd)

The vertical alignment of Moto Road is generally flat (0.5 to 1.0% longitudinal grade) for its length.

A detailed assessment of the horizontal and vertical alignments has not been carried out for Moto Road as generally it is of an acceptable standard for its present use. Upgrade recommendations will be provided if it is found Moto Road will be used as part of the road network for the Brimbin New Town project.

10.6.4 Intersections

There are 3 roads that intersect with Moto Road:

- Whites Road – Ch.00 (gravel formation)
- Kundle Kundle Road – Ch.2.40km (gravel formation)
- Pacific Highway – Ch.4.70km (bitumen seal formation)

Road: - Moto Road – Pacific Highway to Moto Road / Whites Road Intersection

Inspected by: - Craig Nethery
Inspection Date: - Friday 16 July 2010

Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of the Pacific Highway and Moto Road	• Channelised Seagull / U turn Bay intersection with left slip in. • Highway Standard • Good Sight Distance	 End of bitumen seal 240m north of Highway intersection
2.40	Intersection of Moto Road and Kundle Kundle Road	• Type BAR intersection layout • Gravel formation on side road • 5.8m wide gravel pavement • Good Sight Distance	 Looking north towards Kundle Kundle Road  Looking west in Kundle Kundle Road  Looking east in Moto Road

Table 10.6.4.1: Route Investigation (Intersections) – Moto Road

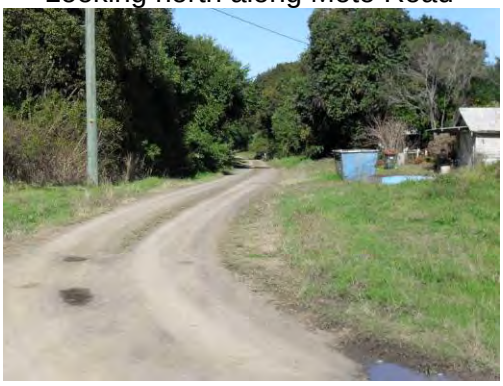
Distance (kms)	Identification	Intersection Type & Condition	
4.86	Intersection of Moto Road and Whites Road at Ghinni Ghinni Creek	• Type BAR intersection layout • Gravel formation on side road • 5.8m wide gravel pavement • Good Sight Distance	 Looking west along Moto Road  Looking north along Moto Road  Looking south along Whites Road

Table 10.6.4.1: Route Investigation (Intersections) – Moto Road (cont'd)

10.6.5 Bridges

There is one timber bridge located along Moto Road on the section under investigation:

- Dickenson Bridge – 36.0m long, 4.6m wide (bridge rail to bridge rail)

Based on data provided by Greater Taree City Council the bridge has a load rating of 15T tonnes.

Road: - Moto Road – Pacific Highway to Moto Road / Whites Road Intersection

Inspected by: - Craig Nethery
Inspection Date: - Friday 16 July 2010

Distance (kms)	Identification	Condition	
1.32	Timber Bridge over Ghinni Ghinni Creek	• Single Lane Bridge 36m long, 5.1m wide (3 span) • Estimated remaining life of current service potential 5 years. (Provided by GTCC)	 Moto Road north of timber bridge over Ghinni Ghinni Creek  Northern side of timber bridge over Ghinni Ghinni Creek

Table 10.6.5.1: Route Investigation (Bridges) – Moto Road

10.7 Kundle Kundle Road (Lansdowne Road to Moto Road)

10.7.1 Existing Traffic Conditions

Kundle Kundle Road is a rural road formation located in flat to undulating rural grazing land. Just over 4.2kms of Kundle Kundle Road between Lansdowne Road and Onslow Road is bitumen sealed with the section from Onslow Road to Moto Road being gravel formation.

Kundle Kundle Road provides connection from the Pacific Highway in the east via Moto Road through to the Lansdowne and the Brimbin area.

The gravel formation is generally 5 to 6.0m wide with no formal shoulder with verges provided to drain water from the crown of the road.

There are five roads that intersect with Kundle Kundle Road:

- Lansdowne Road – Ch.00
- Oak Drive – Ch.1.01km
- McDonell Crescent – Ch.3.91km
- Onslow Road – Ch.4.58km
- Moto Road – Ch.5.58km

There are no bridges located along Kundle Kundle Road. There are several culverts located along its route.

Kundle Kundle Road has an unrestricted posted speed limit, although speed is governed by the existing gravel formation and tight bends located along its route.

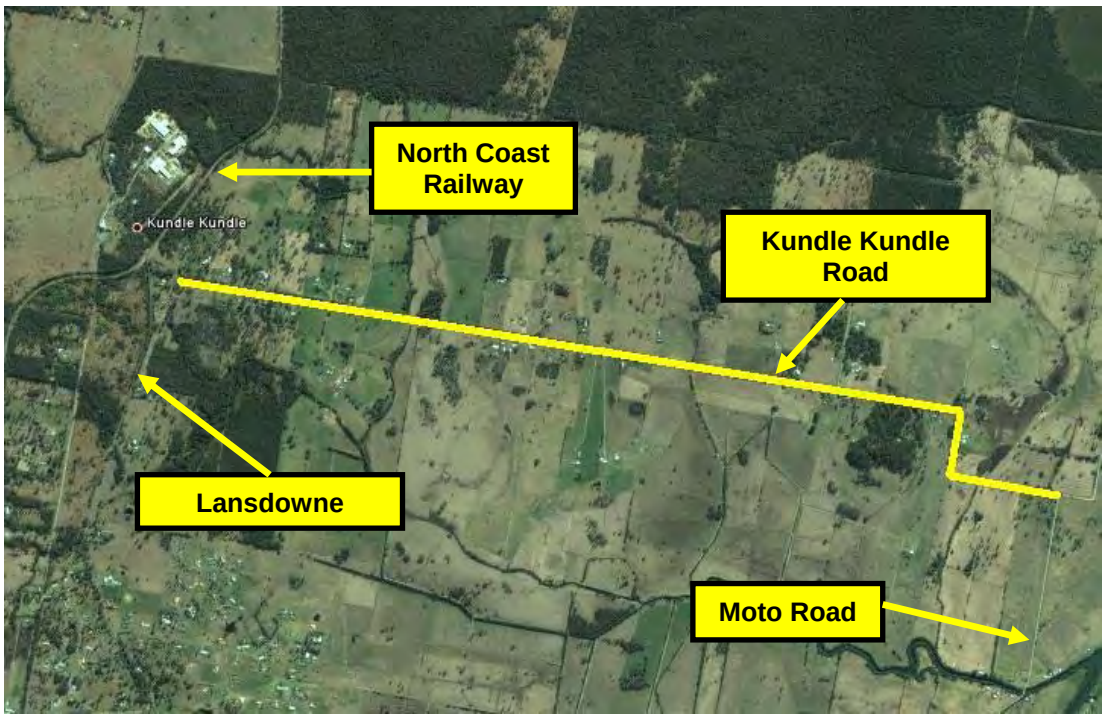


Figure 10.7.1.1: Kundle Kundle Road, Lansdowne Road to Moto Road

10.7.2 Route Investigation

Road: - Kundle Kundle Road, between Lansdowne Road and Moto Road

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

Distance (kms)	Identification	Condition	
00	Intersection of the Lansdowne Road and Kundle Kundle Road	• Western shoulder in Lansdowne Road in poor quality. • ARTC presently reconstructing adjacent level crossing. • Poor Sight Distance on Northern side of intersection.	 In Kundle Kundle Road looking west towards Lansdowne Road
0.05	Kundle Kundle Road	• 6.0m Bitumen Seal • No Gravel Shoulders • Pavement in Good Condition	 In Kundle Kundle Road looking east
4.24	Kundle Kundle Road	• 6.0m Bitumen Seal • No Gravel Shoulders • Pavement in Good Condition	 In Kundle Kundle Road looking east

Table 10.7.2.1: Route Investigation – Kundle Kundle Road

Distance (kms)	Identification	Condition	
4.55	Kundle Kundle Road	• Sharp Bend • Start of Bitumen Seal • 6.0m Bitumen Seal • No Gravel Shoulders • Pavement in Good Condition	 In Kundle Kundle Road looking east
4.63	Kundle Kundle Road	• End of Bitumen Seal • 6.0m Bitumen Seal • No Gravel Shoulders • Pavement in Good Condition	 In Kundle Kundle Road eastbound
4.93	Kundle Kundle Road	• Sharp Bend • Gravel Pavement Formation • 5.80m Wide, No shoulders	 In Kundle Kundle Road eastbound
5.58	Intersection of the Kundle Kundle Road and Moto Road	• Type BAR intersection layout • Gravel Pavement Formation • Good Sight Distance	 At Moto Road looking west

Table 10.7.2.1: Route Investigation – Kundle Kundle Road (cont'd)

10.7.3 Existing Horizontal Alignment

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS	ACTION REQUIRED
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED		
00						Lansdowne Road Intersection	
4.596 – 4.651	Unrestricted	35	55	60		Existing W2-9, Speed Advisory (25km/h) Signs (S/B & N/B), Kundle Kundle Rd at Onslow Rd	To be upgraded to meet design speed requirements
5.90	Unrestricted					Moto Rd (Ch3.30)	
7.40	Unrestricted					Whites Rd (Ch.4.70)	

Table 10.7.3.1: Existing Horizontal Alignment Data – Kundle Kundle Road / Moto Road

10.7.4 Intersections

There are 5 roads that intersect with Kundle Kundle Road:

- Lansdowne Road – Ch.00
- Oak Drive – Ch.1.01km
- McDonell Crescent – Ch.3.91km
- Onslow Road – Ch.4.58km
- Moto Road – Ch.5.58km

Road: - Kundle Kundle Road, between Lansdowne Road and Moto Road

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of the Lansdowne Road and Kundle Kundle Road Type BAR intersection layout with sealed shoulder widening in Lansdowne Road.	• Western shoulder in Lansdowne Road in poor quality. • Poor Sight Distance on Northern side of intersection.	 In Kundle Kundle Road looking west towards Lansdowne Road
1.01	Intersection of the Kundle Kundle Road and Oak Drive Type BAR intersection layout	• Type BAR intersection layout • Oak Drive is Gravel Formation. • Good Sight Distance • Poor Bitumen Pavement at intersection	 In Kundle Kundle Road eastbound
3.91	Intersection of the Kundle Kundle Road and McDonell Crescent Type BAR intersection layout	• Type BAR intersection layout • McDonell Crescent is gravel formation • Sight Distance constraints (trees) will need to addressed in McDonell Crescent • Poor bitumen pavement at intersection	 At McDonell Crescent looking east  At McDonell Crescent looking west

Table 10.7.4.1: Route Investigation (Intersection) – Kundle Kundle Road

Distance (kms)	Identification	Intersection Type & Condition	
4.58	Intersection of the Kundle Kundle Road and Onslow Road Type BAR intersection layout	• Type BAR intersection layout • Bitumen pavement at intersection • 6.0m wide gravel pavement • Good Sight Distance • Poor horizontal alignment in Kundle Kundle Road. • Onslow Road is gravel formation.	 In Kundle Kundle Road, westbound looking at Onslow Road
5.58	Intersection of the Kundle Kundle Road and Moto Road Type BAR intersection layout	• Type BAR intersection layout • Good Sight Distance • Gravel formation on both roads • 5.8m wide gravel pavement	 At Moto Road looking west

Table 10.7.4.1: Route Investigation (Intersection) – Kundle Kundle Road (cont'd)

10.7.5 Bridges

There are no bridges located along Kundle Kundle Road. There are several culverts located along its route.

Road: - Kundle Kundle Road, between Lansdowne Road and Moto Road

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

Distance (kms)	Identification	Condition	
0.10	Kundle Kundle Road	• Culvert (actual size not available)	 In Kundle Kundle Road looking east

Table 10.7.5.1: Route Investigation (Bridges) – Kundle Kundle Road

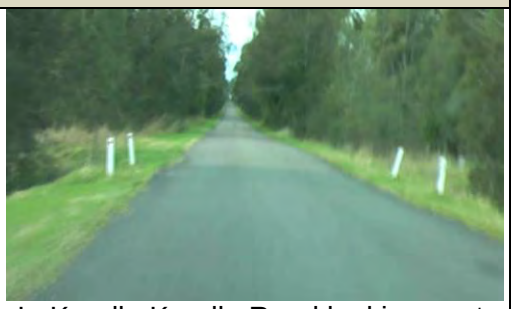
Distance (kms)	Identification	Condition	
1.40	Kundle Kundle Road	• Culvert (actual size not available)	 In Kundle Kundle Road looking east
5.12	Kundle Kundle Road	• Culvert (actual size not available)	 In Kundle Kundle Road looking east

Table 10.7.5.1: Route Investigation (Bridges) – Kundle Kundle Road (cont'd)

10.8 Oakvale Road (North of Tine Street)

10.8.1 Existing Traffic Conditions

Tine Street is a bitumen seal formation 5.8m wide connecting Oakvale Road with Lansdowne Road.

Oakvale Road runs from Brimbin Road to approximately 2.8km north where it terminates. Tine Street intersects with Oakvale Road and links it with Lansdowne Road.

Between Tine Street and the northern end, Oakvale Road is a gravel formation, 4.0m wide with 0.5m wide gravel shoulders running through a rural residential area terminating at a turn around to the north.

Between Tine Street and Brimbin Road, the road is generally of a lesser standard than of that described above being merely a gravel track with very little vehicular traffic use.

Assessment is made of Tine Street and Oakvale Road north of Tine Street to its termination. This forms the main trafficked roadway with the major movement at the Oakvale Road and Tine Street intersection being the movements between Oakvale Road and Tine Street. Oakvale Road south of Tine Street has not been assessed.

There two roads that intersect with this route:

- Premier Drive with Tine Street – Ch.0.16km (bitumen seal formation)
- Tine Street and Oakvale Road – Ch.0.32km (bitumen seal formation)

There are no major bridge structures along the route just two culverts located at chainage 0.55km and 1.49km.

Oakvale Road and Tine Street have an unrestricted speed limit, although speed is governed by the existing alignment and gravel formation.

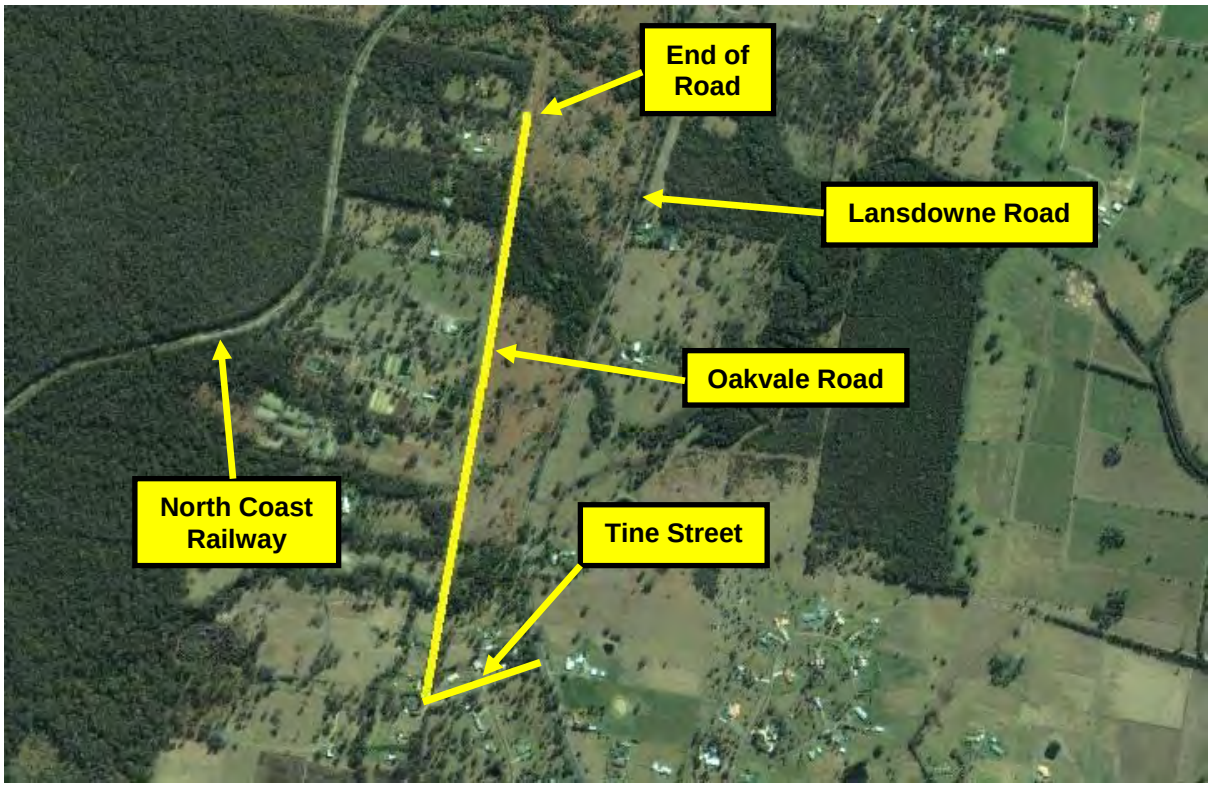


Figure 10.8.1.1: Oakvale Road, Tine Street to End of Road - North

10.8.2 Route Investigation

Road: - Tine Street and Oakvale Road (north of Tine Street to end of road)

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

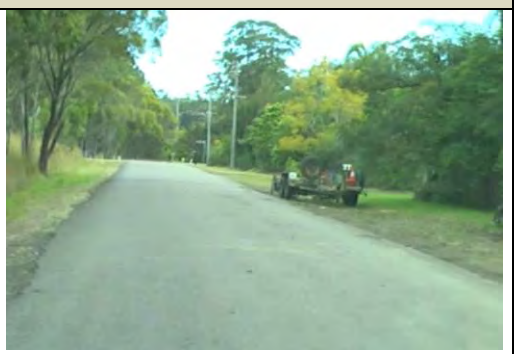
Distance (kms)	Identification	Condition	
00	Intersection of Lansdowne Road and Tine Street	• 5.80m bitumen seal • 1.0m gravel shoulders • Pavement in good condition	 In Tine Street looking west

Table 10.8.2.1: Route Investigation – Oakvale Road

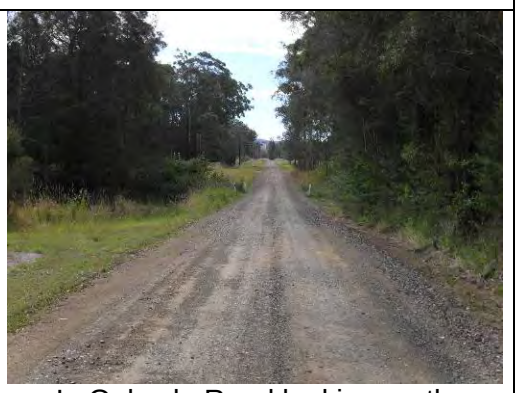
Distance (kms)	Identification	Condition	
0.16	Tine Street intersection with Premier Drive	• Bitumen seal formation	
0.32	Oakvale Road	• End of bitumen seal • Start of gravel formation	
0.44	Oakvale Road	• 4.0m wide gravel formation • 0.5m wide shoulders • Some pavement rutting observed	 In Oakvale Road looking north
0.55	Oakvale Road	• Culvert (actual size not available) • 4.0m wide gravel formation • 0.5m wide shoulders • Some pavement rutting observed	 In Oakvale Road looking north
1.49	Oakvale Road	• Culvert (actual size not available) • 4.0m wide gravel formation • 0.5m wide shoulders • Some pavement rutting observed	 In Oakvale Road looking north
1.75	Oakvale Road	• End of Road (Cul de Sac) • 4.0m wide gravel formation 0.5m wide shoulders • Some pavement rutting observed	 In Oakvale Road looking north

Table 10.8.2.1: Route Investigation – Oakvale Road (cont'd)

10.8.3 Existing Horizontal Alignment

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED	
00	Unrestricted					Lansdowne Road Intersection
0.16	Unrestricted					Premier Drive Intersection (Tine St)
0.256 – 1.050	Unrestricted	25	53	-60		
1.75	Unrestricted					End of Oakvale Road

Table 10.8.3.1: Existing Horizontal Alignment Data – Oakvale Road

10.8.4 Intersections

There are 3 roads that intersect with Tine Street / Oakvale Road, plus the terminating cul de sac:

- Lansdowne Road – Ch.00 (Tine Street)
- Premier Drive – Ch.0.16km (Tine Street)
- Tine Street and Oakvale Road – Ch.0.32km
- Oakvale Road (end of road) – Ch.1.75km

Road: - Tine Street and Oakvale Road (north of Tine Street to end of road)

Inspected by: - Craig Nethery
Inspection Date: - Thursday 19 August 2010

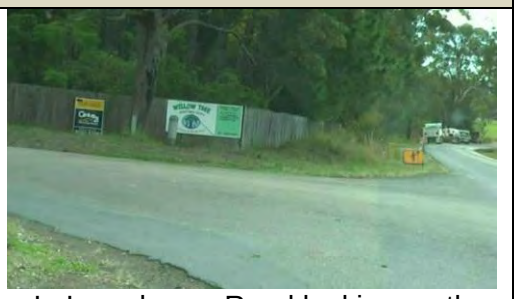
Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of Lansdowne Road and Tine Street	• Type BAR intersection layout • Bitumen formation on both roads • Good Sight Distance	 In Lansdowne Road looking north

Table 10.8.4.1: Route Investigation (Intersections) – Oakvale Road

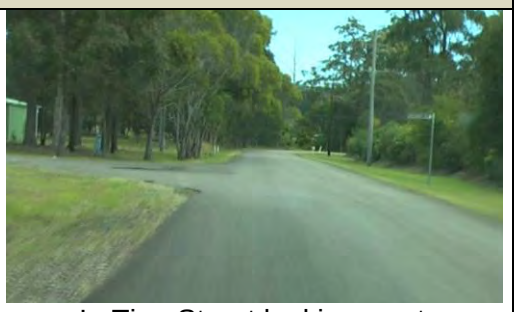
Distance (kms)	Identification	Intersection Type & Condition	
0.16	Intersection of Tine Street and Premier Drive	• Type BAR intersection layout • Bitumen formation on both roads • Sight Distance is not acceptable for design speed standard (unrestricted)	 In Tine Street looking west
0.32	Intersection of Tine Street and Oakvale Road	• Type BAR intersection layout • Bitumen formation on both roads • Sight Distance to the north acceptable. • Sight Distance to the south restricted	 In Tine Street looking west
1.75	Oakvale Road	• End of Road (Cul de Sac) • 4.0m wide gravel formation • 0.5m wide shoulders • Some pavement rutting observed	 In Oakvale Road looking north

Table 10.8.4.1: Route Investigation (Intersections) – Oakvale Road (cont'd)

10.8.5 Bridges

There are no major bridge structures along this route. There are two culverts along the route as outlined in the above route investigation.

10.9 Myuna Close

10.9.1 Existing Traffic Conditions

Myuna Close runs north south parallel to the North Coast Railway and provides access to the water treatment plant in the south connecting it to Brimbin Road in the north. The road terminates at the access to the water treatment plant.

There are no intersections along its route apart from its connection with Brimbin Road.

There are no major bridge structures along the route.

Myuna Close has an unrestricted speed limit, although speed is governed by the existing narrow road width and short road length.

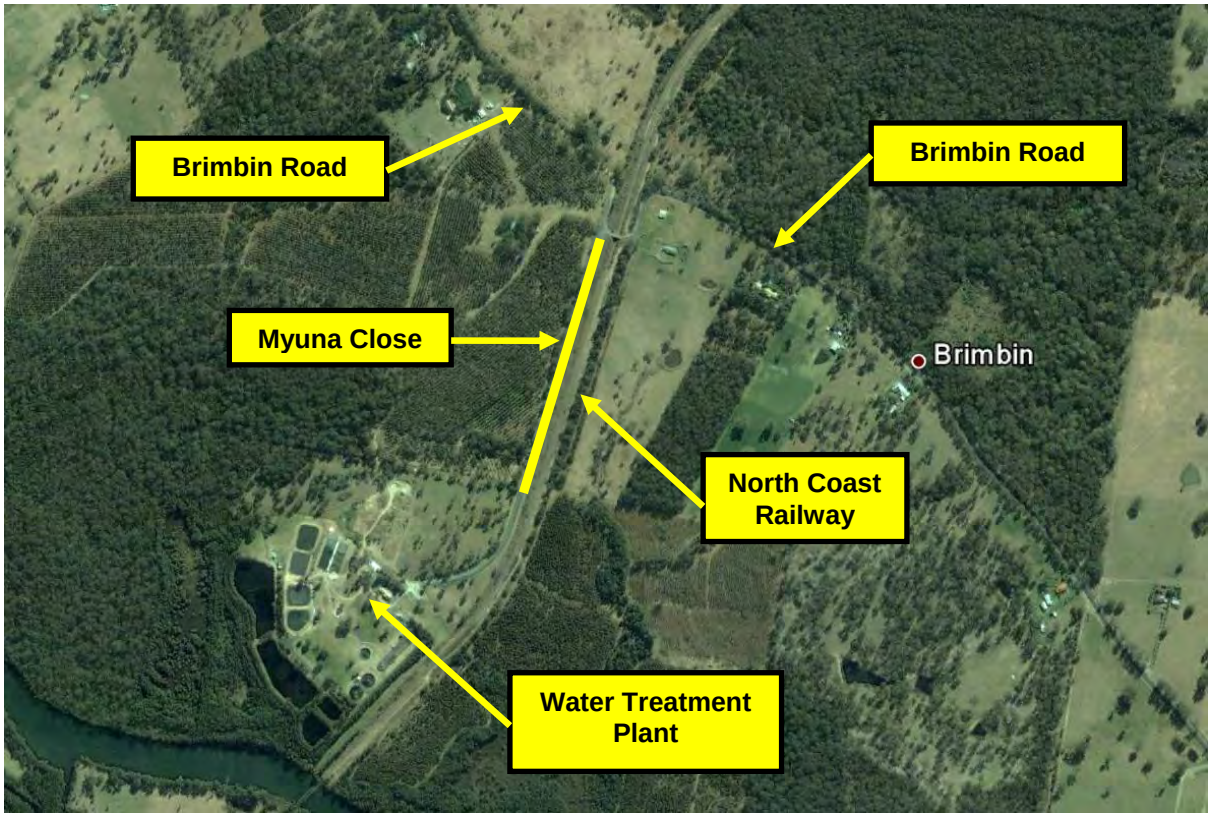


Figure 10.9.1.1: Myuna Close

10.9.2 Route Investigation

Road: - Myuna Close

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

Distance (kms)	Identification	Condition	
00	Intersection of Myuna Close and Brimbin Road	• 7.0m bitumen seal • Narrow gravel shoulders • Pavement in reasonable condition with minor pothole maintenance	 Myuna Close looking south

Table 10.9.2.1: Route Investigation – Myuna Close

Distance (kms)	Identification	Condition	
0.48	End of Myuna Close at access to the water treatment plant	• 5.0m bitumen seal • Informal unsealed turn around area • Pavement in reasonable condition with minor pothole maintenance	 End of Myuna Close looking south

Table 10.9.2.1: Route Investigation – Myuna Close (cont'd)

10.9.3 Existing Horizontal Alignment

Myuna Close is on a straight horizontal alignment.

10.9.4 Intersections

There is 1 road and 1 access connecting with Myuna Close:

- Brimbin Road – Ch.00
- Access to water treatment plant (end of road) – Ch.0.48km

The timber bridge over the railway on Brimbin Road just east of Myuna Close is currently being replaced With Brimbin Road being realigned. This will realign the intersection with Brimbin Road and Myuna Close.

Road: - Myuna Close

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of Myuna Close and Brimbin Road	• Type BAR intersection layout • Bitumen Formation on both roads • Sight distance limited in both directions on Brimbin Road. This will be improved with the realignment of Brimbin Road and relocation of the intersection.	 In Brimbin Road looking south

Table 10.9.4.1: Route Investigation (Intersections) – Myuna Close

10.9.5 Bridges

There are no major bridge structures along this route.

10.10 Kanangra Drive (between Bushland Drive and northern end of road)

10.10.1 Existing Traffic Conditions

Kanangra Drive runs from its intersection with High Street and Railway Street on the outskirts of the Taree CBD to the St Joseph's Primary School on the northern outskirts of Taree where the road terminates. The southern section generally has an urban setting while the northern section is in typically a more rural setting.

Between Bushland Drive and the northern terminating end the road has a sealed bitumen surface with a varying road width. Generally parking and kerb and gutter is provided on the southern section of the road with no provision on the northern section. Its horizontal alignment though this section is straight.

There are 9 roads that intersect with Kanangra Drive between Bushland Drive and the northern terminating end:

- Bushland Drive – Ch.0.00km
- Talawong Drive – Ch.0.10km
- Orana Crescent – Ch.0.14km
- Timbarra Close – Ch.0.24km
- Orana Crescent – Ch.0.31km
- Killawarra Drive – Ch.0.49km
- Alonbar Crescent – Ch.0.68km
- Urara Lane – Ch.0.95km
- End of Road (cul de sac) – Ch.1.54km

There are no major bridge structures along the route.

Kanangra Drive has 2 posted speed environments along this section including 1 special school speed zone:

- 50km/h – south of St Joseph's Primary School
- 40km/h School Speed Zone for St Joseph's Primary School – to northern end of road

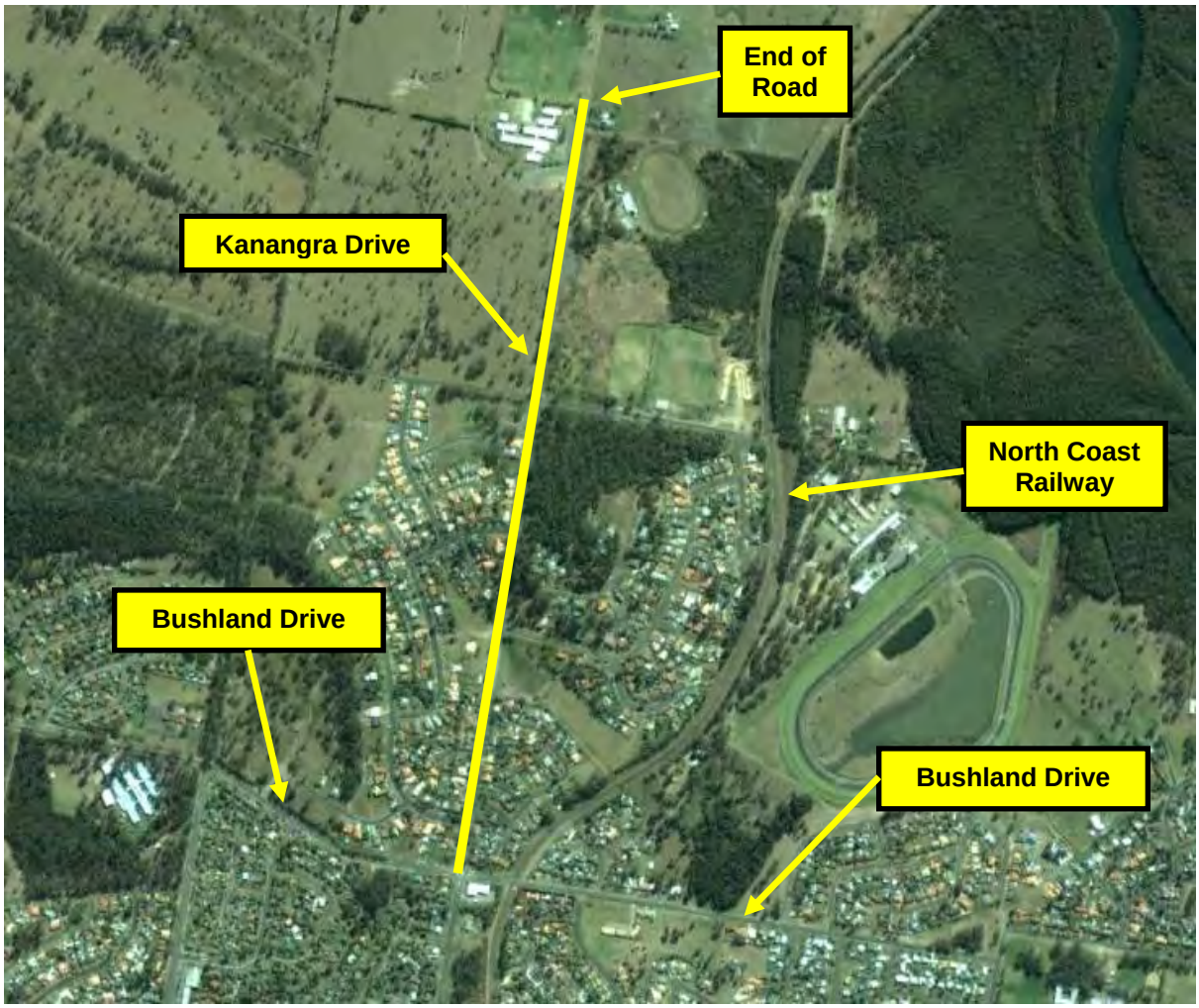


Figure 10.10.1.1: Kanangra Drive, Bushland Drive to End of Road

10.10.2 Route Investigation

Road: - Kanangra Drive, Bushland Dr to End of Road

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

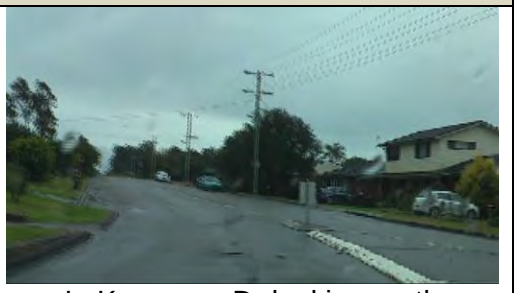
Distance (kms)	Identification	Condition	
00	Intersection of Kanangra Dr and Bushland Dr	• Single lane roundabout • Bitumen seal • Urban setting	 In Kanangra Dr looking north

Table 10.10.2.1: Route Investigation – Kanangra Dr, between Bush land Dr and End of Road

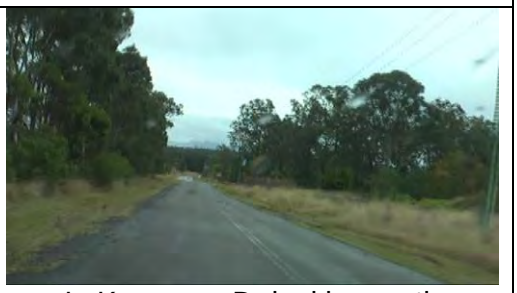
Distance (kms)	Identification	Condition	
0.16	Kanangra Dr	• Urban formation 12.0m wide • Kerb and gutter and parallel parking on both sides	 In Kanangra Dr looking north
0.53	Kanangra Dr	• 8.0m wide sealed formation • Gravel shoulders • No parking provision	 In Kanangra Dr looking north
0.88	Kanangra Dr	• 10.0m wide sealed formation • Parallel parking and kerb and gutter provided on western side • No parking and gravel shoulder provided on eastern side	 In Kanangra Dr looking north
1.15	Kanangra Dr	• Rural setting 7.5m wide sealed formation • No parking provision • Gravel shoulders	 In Kanangra Dr looking north
1.45	Kanangra Dr	• Rural setting fronting school • 6.5m wide sealed formation • Kerb and gutter provided on western side. • Gravel shoulder on eastern side • No parking provision	 In Kanangra Dr looking north

Table 10.10.2.1: Route Investigation – Kanangra Dr, between Bush land Dr and End of Road (cont'd)

Distance (kms)	Identification	Condition	
	Kanangra Dr	• End of Road cul de sac • End of sealed formation • Unsealed turn around area	 In Kanangra Dr looking north

Table 10.10.2.1: Route Investigation – Kanangra Dr, between Bush land Dr and End of Road (cont'd)

10.10.3 Existing Horizontal Alignment

The existing horizontal alignment of Kanangra Drive between Bushland Drive and the northern end of road is straight.

Kanangra Drive, between Bushland Drive and the end of the road in the north, is on a straight horizontal alignment.

10.10.4 Intersections

There are 9 roads that intersect with Kanangra Drive between Bushland Drive and the northern terminating end:

- Bushland Drive – Ch.0.00km
- Talawong Drive – Ch.0.10km
- Orana Crescent – Ch.0.14km
- Timbarra Close – Ch.0.24km
- Orana Crescent – Ch.0.31km
- Killawarra Drive – Ch.0.49km
- Alonbar Crescent – Ch.0.68km
- Urara Lane – Ch.0.95km
- End of Road (cul de sac) – Ch.1.54km

Road: - Kanangra Drive, Bushland Drive to End of Road

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

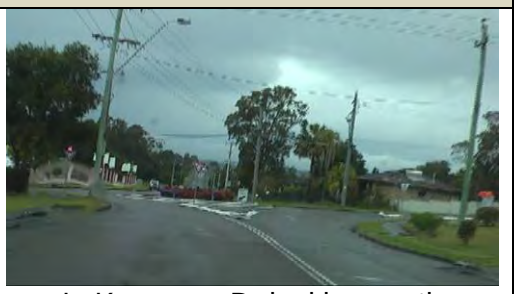
Distance (kms)	Identification	Intersection Type & Condition	
00	Intersection of Kanangra Dr and Bushland Dr	• 2 lane roundabout • Bitumen Formation on both roads • Kerb and gutter on all legs	 In Kanangra Dr looking south
0.10	Intersection of Kanangra Dr and Talawong Dr	• Urban BAR/BAL intersection layout • Bitumen formation on both roads • Kerb and gutter on all legs	
0.14	Intersection of Kanangra Dr and Orana Cres	• Urban BAR/BAL intersection layout • Bitumen formation on both roads • Kerb and gutter on all legs	
0.24	Intersection of Kanangra Dr and Timbarra Close	• Urban BAR/BAL intersection layout • Bitumen formation on both roads • Kerb and gutter on all legs	
0.31	Intersection of Kanangra Dr and Orana Cres	• Urban BAR/BAL intersection layout • Bitumen formation on both roads • Kerb and gutter on all legs	
0.49	Intersection of Kanangra Dr and Killawarra Dr	• Urban BAR/AUL intersection layout • Bitumen formation on both roads • Some kerb and gutter	 In Kanangra Dr looking north

Table 10.10.4.1: Route Investigation (Intersections) – Kanangra Drive, between Bushland Drive and End of Road

Distance (kms)	Identification	Intersection Type & Condition	
0.68	Intersection of Kanangra Dr and Alonbar Cres	• Urban BAR/BAL intersection layout • Bitumen formation on both roads • Kerb and gutter on western side • Gravel shoulder on eastern side	
0.95	Intersection of Kanangra Dr and Urara Lane	• 4 way intersection • Priority given to Kanangra Dr • No turn lanes • No kerb and gutter • Gravel shoulders	 In Kanangra Dr looking north
1.54	End of Road (cul de sac)	• End of Road cul de sac • End of sealed formation • Unsealed turn around area	 In Kanangra Dr looking north

Table 10.10.4.1: Route Investigation (Intersections) – Kanangra Drive, between Bushland Drive and End of Road (cont'd)

10.10.5 Bridges

There are no major bridge structures along this route.

10.11 Mudford Street (north of Bushland Drive)

10.11.1 Existing Traffic Conditions

Mudford Street runs north south in the northern section of Taree. The section north of Bushland Drive is an unformed paper road apart from a small narrow sealed section providing access to Nundoobah Retreat and connecting to St Joseph's Drive.

As this section is not yet formed there are no intersections along its route apart from the small sealed section which connects to St Joseph's Drive. When constructed the road would connect to Bushland Drive where the existing southern formed section connects. There is also the possibility some residential roads may connect to Mudford Street when constructed.

There are no major bridge structures along the route.

The sealed section has an unrestricted speed limit, although speed is governed by the existing narrow road width and short road length.

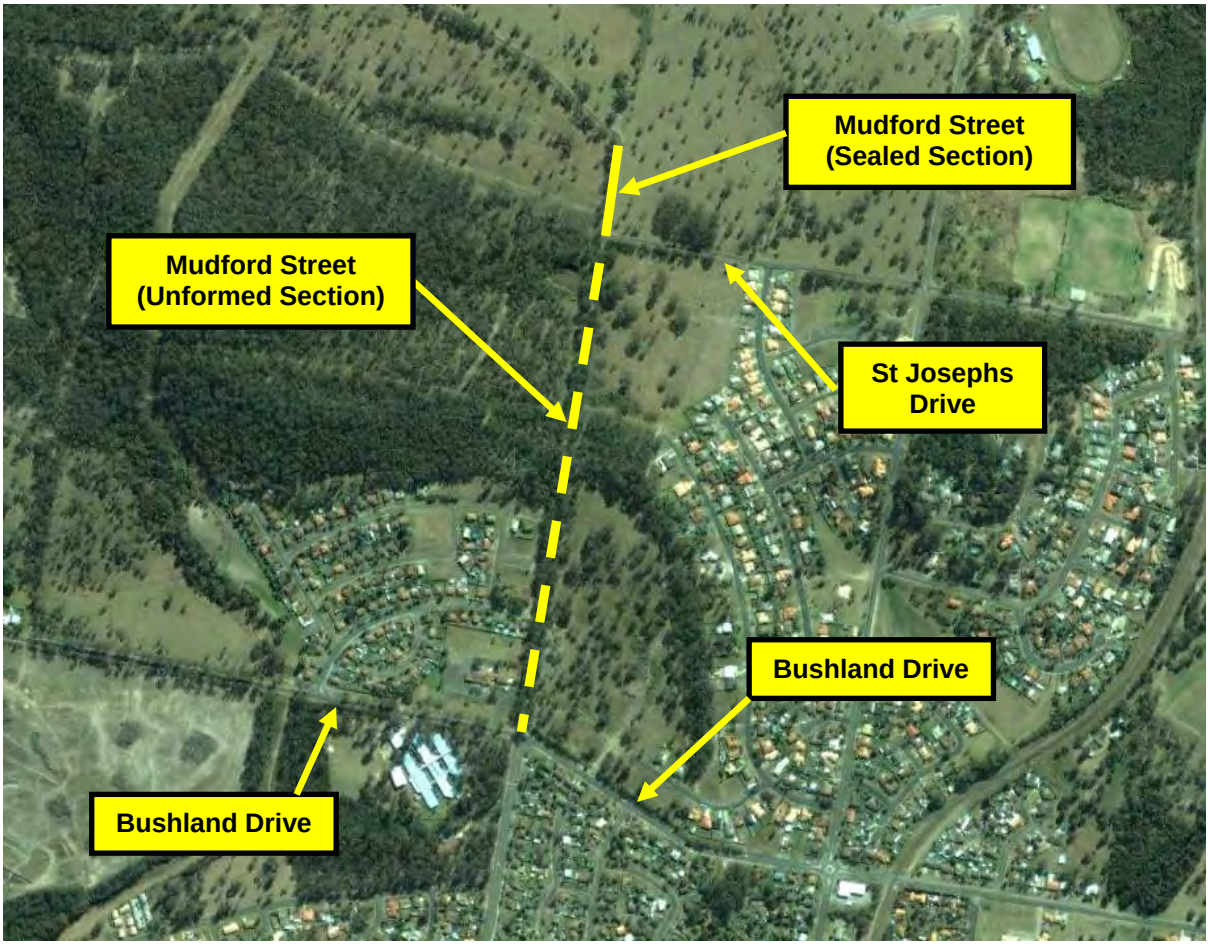


Figure 10.11.1.1: Mudford Street, North of Bushland Drive

10.11.2 Route Investigation

Road: - Mudford Street, north of Bushland Drive

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

Distance (kms)	Identification	Condition	
00	Mudford Street road reserve at Bushland Drive (northern side)	• Unformed paper road	 Mudford Street road reserve looking north from Bushland Drive

Table 10.11.2.1: Route Investigation – Mudford Street, North of Bushland Drive

Distance (kms)	Identification	Condition	
0.20	Mudford Street road reserve at Barton Street cul de sac	• Unformed paper road	 Mudford Street road reserve looking north
0.81	Mudford Street – end of unformed paper road, start of sealed section. Intersection with St Joseph Drive	• 3.0m bitumen seal • Gravel shoulders	 Mudford Street looking south
0.96	Mudford Street end of road. Access to Nundoobah Retreat.	• 3.0m bitumen seal • Gravel shoulders	 Mudford Street looking north

Table 10.11.2.1: Route Investigation – Mudford Street, North of Bushland Drive (cont'd)

10.11.3 Existing Horizontal Alignment

Mudford Street, north of Bushland Drive is on a straight horizontal alignment.

10.11.4 Intersections

There is 1 potential intersection, 1 intersection and 1 access connecting with this section of Mudford Street:

- Bushland Drive (potential intersection) – Ch.00
- St Joseph Drive – Ch.0.81km
- Nundoobah Retreat access – Ch.0.96km

Road: - Mudford Street, north of Bushland Drive

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

Distance (kms)	Identification	Intersection Type & Condition	
00	Mudford Street road reserve at Bushland Drive (northern side)	• Intersection is currently a BAR/BAL T intersection with the southern leg of Mudford Street • The northern leg of Mudford Street is an unformed paper road	 Mudford Street road reserve looking north from Bushland Drive
0.81	Mudford Street – end of unformed paper road, start of sealed section. Intersection with St Joseph Drive	• 90° bend from St Joseph Drive to northern leg of Mudford Street • Southern leg of Mudford Street not formed	 Mudford Street looking south
0.96	Mudford Street end of road. Access to Nundoobah Retreat.	• End of road • No formal turn around area	 Mudford Street looking north

Table 10.11.4.1: Route Investigation (Intersections) – Mudford Street, North of Bushland Drive

10.11.5 Bridges

There are no major bridge structures along this route.

10.12 Urara Lane

10.12.1 Existing Traffic Conditions

Urara Lane runs east west between Kanangra Drive and the North Coast Railway.

There are 2 intersections along the route and an end of road cul de sac.

There are no major bridge structures along the route.

The sealed section has an unrestricted speed limit, although speed is governed by the existing narrow road width and short road length.

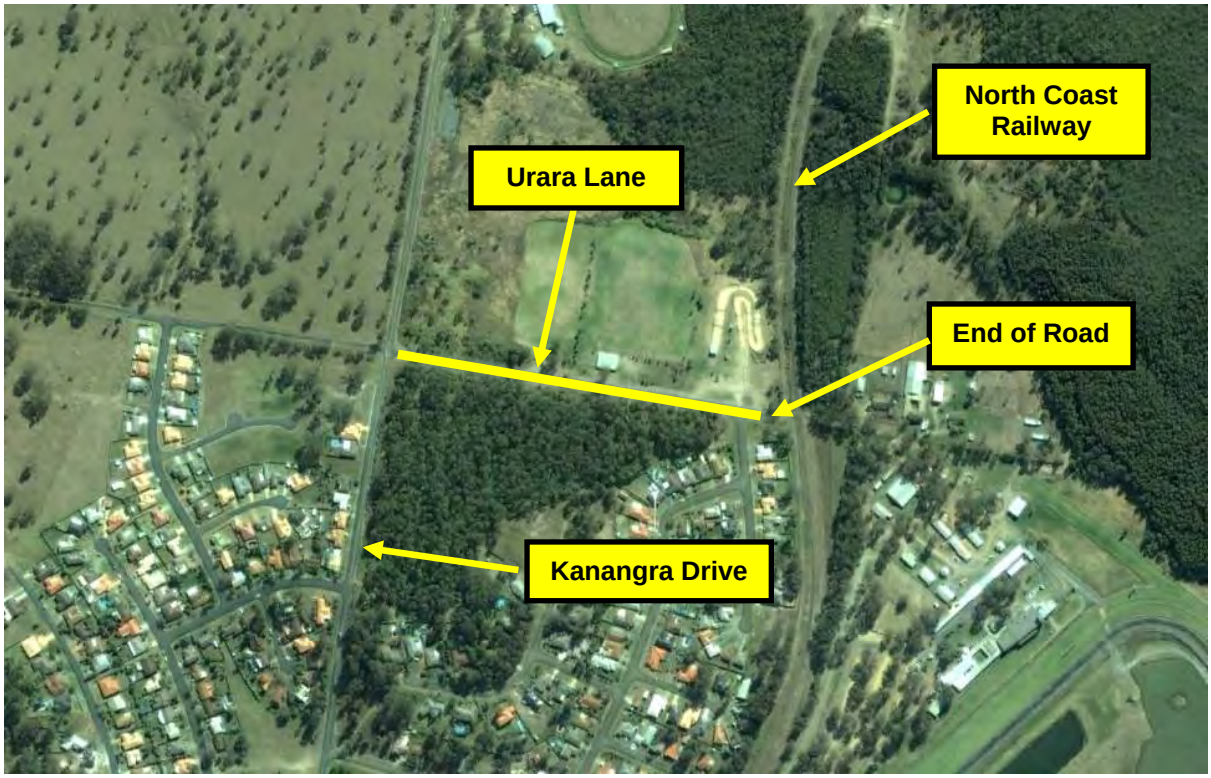


Figure 10.12.1.1: Urara Lane

10.12.2 Route Investigation

Road: - Urara Lane

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

Distance (kms)	Identification	Condition	
00	Urara Lane at Kanangra Drive	• 6.0m sealed formation • No kerb and gutter • Gravel shoulders • Pavement in good condition	
0.27	Urara Lane	• 6.0m sealed formation • No kerb and gutter • Gravel shoulders • Pavement in good condition	 Urara Lane looking east
0.43	Urara Lane end of road cul de sac	• 6.0m sealed formation • Gravel shoulders • Pavement in fair condition	 Urara Lane looking east

Table 10.12.2.1: Route Investigation – Urara Lane

10.12.3 Existing Horizontal Alignment

Urara lane is on a straight horizontal alignment.

10.12.4 Intersections

There are 2 intersections along the route and an end of road cul de sac:

- Kanangra Drive / St Joseph Drive – Ch.00
- Lakkari Close – Ch.0.27km
- End of road cul de sac – Ch.0.43km

Road: - Urara Lane

Inspected by: - Matt Murphy
Inspection Date: - Thursday 21 July 2011

Distance (kms)	Identification	Intersection Type & Condition	
00	Urara Lane intersection with Kanangra Drive and St Joseph Drive	• 4-way cross intersection • Priority given to Kanangra Drive • No turn lanes • No kerb and gutter • Gravel shoulders	 Urara Lane looking west
0.40	Urara Lane intersection with Lakkari Close	• Urban BAR/BAL intersection layout • Bitumen formation on both roads • Kerb and gutter in Lakkari Close • Gravel shoulder on eastern side	 Urara Lane looking east
0.43	Urara Lane end of road cul de sac	• End of road • No formal turn around area • No kerb and gutter • Gravel shoulders	 Urara Lane looking east

Table 10.12.4.1: Route Investigation (Intersections) – Urara Lane

10.11.5 Bridges

There are no major bridge structures along this route.

11.0 DETAILED DESIGN ASSESSMENT

The Paramics network modelling has recommended the following external roads be upgraded, and new roads constructed, to reflect the increased traffic flows based on the agreed staging:

- 2 lanes on Lansdowne Road from Airport Drive to Manning River Drive (southbound)
- Realignment/grade separation of Lansdowne Road at the Kundle Kundle Rail Crossing
- Construction of the Cundletown Bypass
- Implementation of a Northern Link Connection from North Taree to the Brimbin New Town including all associated intersection upgrades (Mudford Street - Preferred Option 1, Brimbin Road, Myuna Close)
- Two continuous through lanes westbound on Manning River Drive between Phillip Street and Cowper Street.

Detailed Design Assessments will be completed for the above roads with all the other roads assessed as part of the visual route assessment not requiring further investigation.

11.1 RMS Road Design Guide (RDG) Requirements

For the purposes of this assessment the requirements of the new suite of Austroads Guide to Road Design will be used to set the design cross section, horizontal and vertical alignment standards.

11.2 Greater Taree City Council Design (AusSpec) Requirements

Provided below is an extract of Greater Taree City Council's Table D1.5 – Characteristics of Roads in Residential Road Networks as part of Council's Development Design Specification suite for Urban and Rural Roads.

Category / Characteristics	Collector Road	Commercial Road	Industrial Road	Distributor Road	Sub Arterial Road	2 Lane Arterial Road	4 Lane Arterial road
Max. No of vehicles / day (VPD)	6000	10 000	10 000	10 000	20 000	>20 000	>20 000
Carriageway Width (m)	11	13	13	15	16	16	25 (Note 9)
Verge Width (m)	4.5	5	5	4.5 (min)	4.5 (min)	4.5 (min)	4.5 (min)

Table 11.2.1: Greater Taree City Council's Characteristics of Roads in Residential Road Networks (Table D1.5 Local AusSpec Design Specifications)

Category / Characteristics	Collector Road	Commercial Road	Industrial Road	Distributor Road	Sub Arterial Road	2 Lane Arterial Road	4 Lane Arterial road
Road Reserve Width (m)	20	23	23	24	25	25	34 (min 32)
Lane Widths (m)	2.5, 3.3, 2.5 (Note 11)	3,3.5,3.5,3	3,3.5,3.5, 3	4,3.5,3.5,4	4.5,3.5, 3.5,4.5	3,1.5,3. 5,3.5,1. 5,3	3.0,1.5, 3.0,3.5, 3.0,3.5, 3.0, 1.5,3.0
Lane Type (Note 16)	P,L,L,P	P,L,L,P	P,L,L,P	P,L,L,P	PC,L,L, PC	P,C,L,L, P,C	P,C,L,L, M,L,L, C,P
Line Marking Required	Intersections only Optional elsewhere (Traffic Calming)	Y	Y	Y	Y	Y	Y
Kerb Type	Barrier (SA)	Barrier (SA)	Barrier (SA)	Barrier (SA)	Barrier (SA)		
Footpath	Y	CBD Paving	Y	Optional	Optional	N	N
Design Speed (km/h)	50 Max.	50 Max.	50 Max.	60	80	100	110
Min. distance between intersections	200	150	150	200	500	500	500
Max. Longitudinal Grade (%)	12	5	10	10	10	10	10
Min. Longitudinal Grade (%)	1	1	1	1	1	1	1
Crossfall (%)	3	3	3	3	3	3	3
Superelevation	N/A	N/A	N/A	N/A if 60 km/h	Require d	Require d	Require d
Pavement Surface Treatment	AC 40mm Thick (Note 13)	AC 40mm Thick	Reinf. Conc. Or AC 40mm Thick	AC 40mm Thick	AC 40mm Thick	AC 40mm Thick	AC 40mm Thick
Pavement Design Traffic (ESA's)	1×10^6 ESA	10^7 ESA	10^7 ESA	3×10^6 ESA	10^7 ESA	10^7 ESA	By Traffic Analysis

Notes

1. One way daily volumes for interrupted traffic flow. To be calculated at 70% of design life.
2. Other design criteria to be in accordance with RMS and AUSTROADS Road Design Guidelines.
3. ESA – Equivalent Standard Axles.
4. Traffic volumes to be estimated using RMS Guide to Traffic Generating Developments.
5. VPD includes total catchment of vehicles (i.e. all lower road categories to be included)
6. Roundabout pavement design to be 5×10^7 ESA's.
7. Edge restraints are required each side if pavement is AC.
8. Including 7mm prime seal.
9. Upgrade of existing 2 lane road to a 4 lane road can have a carriageway width of 22.50m by reducing the median width to 0.50m
10. Lane Type: - P = Parking, C = Cycleway, L = Travel Lane.
11. P = 2.3m wide minimum (Austroads Standard)

Table 11.2.1: Greater Taree City Council's Characteristics of Roads in Residential Road Networks (Table D1.5 Local AusSpec Design Specifications) (cont'd)

11.3 Update of Standards to be Considered

Austroads is in the process of rationalising and updating its suite of technical publications. Those under the Technology Program will be grouped into seven guides, each comprising a number of parts. The seven guides will cover:

- Bridge Technology
- Pavement Technology
- Project Delivery
- Project Evaluation
- Transport Planning
- Road Design
- Traffic Management

Each of the Austroads Asset Management and Road Safety Programs also has a guide that is relevant to the design process.

The communiqué following Austroads Council Meeting No 34 of 29th October 2004 stated in part:

"At the last meeting Council agreed to new arrangements for the development of guides which are intended to ensure that new Austroads publications meet the needs of jurisdictions and that they are adopted widely as the primary national reference by member organisations in each relevant area of practice. At this meeting revised arrangements for the sign-off of guides were adopted. It was agreed that where the practices in a jurisdiction vary from the guide these will be referenced in the relevant sections of guide (sic) and direction provided to the source of the jurisdictional explanatory material."

11.3.1 Traffic Lane Widths

The Austroads Guide to Road Design, Part 3 – Geometric Design states that lanes widths in residential, commercial and industrial areas are typically determined by the local council authority. Also, given the variable nature of these types of developments, in terms of scale and traffic mix, designers should seek guidance regarding the choice of traffic lane width from the relevant local council authority.

Provided below is an extract from Part 3 (Pp 35, Table 4.3 – Urban Arterial road widths) outlining the required lanes widths for urban arterial roads. This generally conforms to Council's Table D1.5 – Characteristics of Roads in Residential Road Networks. The exception being Austroads Part 3 has a greater consideration for heavy vehicle volumes.

Element	Lane width (m)	Comments
General traffic lane	3.3 – 3.5	General traffic lane widths to be used for all roads
	3.0 – 3.3	For use on low speed roads with low truck volumes
Service road lane	3.4 – 5.5	Range of lane widths on service roads (refer to Section 4.11)
Wide kerbside lane	4.2	Locations where there are high truck volumes (additional width provided for trucks)
	4.2 – 4.5	Locations where motorists and cyclists use the same lane (refer Section 4.8.11 and Commentary 7)
HOV lane	3.5 – 4.5	Bus lane (refer Section 4.9.2)
	3.3	Tram/light rail vehicle lane (refer Section 4.9.3)
Minimum width between kerb and channel (to provide for passing of broken down vehicles)	5.0	Width of a single lane suitable for use in a left turn slip lane, or two lane, two way divided road with a raised median
	2 × 4.0 (8.0)	Width of two lanes that provide for two lines of traffic to (slowly) pass a broken down vehicle

Table 11.3.1.1: Austroads Urban Arterial Road Widths

When considering traffic lane widths for rural roads in Austroads Part 3, the following table (Pp 37, Table 4.5 – Single carriageway rural road widths) is provided.

Element	Design AADT				
	1 – 150	150 – 500	500 – 1,000	1,000 – 3,000	> 3,000
Traffic lanes[1]	3.7 (1 x 3.7)	6.2 (2 x 3.1)	6.2 – 7.0 (2 x 3.1/3.5)	7.0 (2 x 3.5)	7.0 (2 x 3.5)
Total shoulder	2.5	1.5	1.5	2.0	2.5
Minimum shoulder seal [2],[3],[4],[5],[6]	0	0.5	0.5	1.0	1.5
Total carriageway	8.7	9.2	9.2 – 10.0	11.0	12.0

1. Traffic lane widths include centre-lines but are exclusive of edge-lines.
2. Where significant numbers of cyclists use the roadway, consideration should be given to fully sealing the shoulders. Suggest use of a maximum size 10mm seal within a 20 km radius of towns.
3. Wider shoulder seals may be appropriate depending on requirements for maintenance costs, soil and climatic conditions or to accommodate the tracked width requirements for Large Combination Vehicles.
4. Short lengths of wider shoulder seal or lay-bys to be provided at suitable locations to provide for discretionary stops.
5. Full width shoulder seals may be appropriate adjacent to safety barriers and on the high side of superelevation.
6. A minimum 7.0 m seal should be provided on designated heavy vehicle routes (or where the AADT contains more than 15% heavy vehicles).

Table 11.3.1.2: Austroads Single Carriageway Rural Road Widths

The following table (Austroads Part 3, Pp 37, Table 4.6 – Dual carriageway rural road widths) is provided for the determination of lanes widths on dual carriageway roads.

Element	Design AADT	
	<20,000	>20,000
Traffic lanes[1]	3.5	3.5
Shoulder		
▪ Left	2.5	3.0
▪ Median	1.0	1.0
Shoulder seal[2, 3]		
▪ Left	1.5	3.0
▪ Median	1.0	1.0

1. Traffic lane widths include lane lines but are exclusive of edge lines.
2. Wider shoulder seals may be appropriate depending on requirements for cyclists, maintenance costs, and soil and climatic conditions.
3. Full width shoulder seals are appropriate beside road safety barriers and on the high side of superelevation.

Table 11.3.1.3: Austroads Dual Carriageway Rural Road Widths

Council's Table D1.5 – Characteristics of Roads in Residential Road Networks generally conforms to the requirements of the above Austroads Part 3 tables, although the minimum width required for a central median is 0.8m, not 0.50m as can be reduced to when widening an existing formation. This will be dealt with further in section 11.3.3 Medians.

11.3.2 Shoulders

Council's Table D1.5 – Characteristics of Roads in Residential Road Networks requires widths of 1.50m for cycle lanes for design speeds of 80km/h and over.

The Austroads Guide to Traffic Engineering Practice Part 14 – Bicycles (Pp 20, Table 4.1 – Exclusive Bicycle Lanes & Sealed Shoulder Dimensions) requires desirable cycle lane widths of 2.0m with an acceptable range of 1.8-2.7m for roads with a speed limit of 80km/h. Roads with a speed limit of 100km/h require desirable cycle lane widths of 2.5m with an acceptable range of 2.0-3.0m.

The Austroads new Guide to Road Design, Part 3 – Geometric Design requires a minimum sealed shoulder width of 2.0m where the consideration of cyclist needs are required. This is consistent with the requirements of the Austroads Guide to Traffic Engineering Practice Part 14 – Bicycles and therefore will be used in completing assessments for this project.

11.3.3 Medians

The following table (Austroads Part 3, Pp 55, Table 4.14 – Median widths) is provided for the determination of median widths for various situations and road classifications.

To restrict cross-median movements on major urban roads, the use of kerbed medians is recommended.

Median function	Minimum width (m)
Separate traffic flows with a rigid (concrete) safety barrier (1) (no provision for shoulder or allowance for shy line effects) (2)	0.8
Shelter a small sign	1.2
Shelter signal pedestals or lighting poles	2.0
Shelter pedestrians (provision for Tactile Ground Surface Indicators) and traffic signals	2.5
Shelter turning vehicles and traffic signals	6.0
Shelter crossing vehicles	7.0
For planting and drainage	10.0
Recovery area	15.0

1. Widths measured to edge of traffic lane, as there is no kerb and channel associated with concrete barriers.
2. Refer to the Guide to Road Design – Part 6: Roadside Design, Safety and Barriers (2009d) for clearance requirements to safety barriers.

Table 11.3.3.1: Austroads Median Widths

As previously stated the use of 0.5m wide medians is not accepted by the Austroads design guide as specified in Council's Table D1.5 – Characteristics of Roads in Residential Road Networks. Therefore, for the purposes of this assessment the Austroads requirements will be used.

11.4 Pacific Highway Detailed Assessment

The existing Pacific Highway will not be changes as a result of the Proposal.

Through the design and assessment process the possibility of a Kundle Kundle Link road to the Brimbin New Town was considered and would have included the construction of a new interchange at Kundle Kundle. However, this link was not favoured by Council or the RMS and was therefore abandoned and is not included in this assessment.

11.5 Lansdowne Road (Airport Drive to Manning River Drive) Detailed Assessment

11.5.1 Cross Section

The existing cross section of Lansdowne Road is generally a two lane rural road formation with travel lanes widths varying between 2.8m and 3.5m and shoulders widths of between 0.5m and 2.0m with table drains along the edge of the road formation where required.

The modelling recommends Lansdowne Road remain at 2 lanes in each direction apart from the section between Airport Drive and Manning River Drive which would require 2 southbound lanes for intersection capacity. Therefore in accordance with Austroads Geometric Design requirements the following design cross section will be used for this section:

Proposed Road Classification	Rural Arterial
Design Traffic Volume (AADT)	27 750 vpd (Full Development) 2 758 vph (AM Peak)
Design Speed Limit	80km/h
Posted Speed Limit	70km/h

Item	Requirement (Y/N)	Comments
Travel Lane	Y	1 x 3.5m lane (northbound) 2 x 3.5m lanes (southbound) Austroads Part 3 (Pp 35, Table 4.3 – Urban arterial road width)
Median	Y	Between Intersections – 3.0m (Council AusSpec Design Specifications) At Intersections – 6.0m Austroads Part 3 (Pp 55, Table 4.14 – Median width)
Shoulder	Y	2.0m wide shoulder / cycle lane each carriageway edge Austroads Part 3 (Pp 40, Table 4.7 – Shoulder width)
Footway / Verge	Y	4.50m each side of carriageway edge (Council AusSpec Design Specifications)

Table 11.5.1.1: Design Cross Section Requirements – Lansdowne Road between Airport Drive and Manning River Drive

11.5.2 Horizontal Alignment

This section of Lansdowne Road has a straight horizontal alignment. No upgrades of the horizontal alignment are required as part of the works.

11.5.3 Vertical Alignment

This section of Lansdowne Road has a level vertical alignment. No upgrades of the vertical alignment are required as part of the works.

11.6 Lansdowne Road (Realignment/Grade Separation of the Railway Crossing at Kundle Kundle) Detailed Assessment

11.6.1 Cross Section

The existing cross section of Lansdowne Road is generally a two lane rural road formation with travel lanes widths varying between 2.8m and 3.5m and shoulders widths of between 0.5m and 2.0m with table drains along the edge of the road formation where required.

The modelling recommends grade separation and realignment of Lansdowne Road at the Kundle Kundle railway crossing. Lansdowne Road would remain as 2 lanes in each direction for this upgraded section. Therefore in accordance with Austroads Geometric Design requirements the following design cross section will be used for this section:

Proposed Road Classification	Rural Arterial
Design Traffic Volume (AADT)	25 500 vpd (Full Development) 2 500 vph (AM Peak)
Design Speed Limit	80km/h
Posted Speed Limit	70km/h

Item	Requirement (Y/N)	Comments
Travel Lane	Y	1 x 3.5m lanes (each direction) Austroads Part 3 (Pp 35, Table 4.3 – Urban arterial road width)
Median	Y	Between Intersections – 3.0m (Council AusSpec Design Specifications) At Intersections – 6.0m Austroads Part 3 (Pp 55, Table 4.14 – Median width)
Shoulder	Y	2.0m wide shoulder / cycle lane each carriageway edge Austroads Part 3 (Pp 40, Table 4.7 – Shoulder width)
Footway / Verge	Y	4.50m each side of carriageway edge (Council AusSpec Design Specifications)

Table 11.6.1.1: Design Cross Section Requirements – Lansdowne Road – Realignment/Grade Separation of the Railway Crossing at Kundle Kundle

11.6.2 Horizontal Alignment

Figure 11.6.2.2 provides the horizontal alignment detail of the realignment of Lansdowne Road at the railway crossing along with the location of the proposed grade separated railway overbridges.

Access to properties along the bypassed section of Lansdowne Road will be maintained via the Brimbin New Town Access C and a southbound on ramp connecting to the realignment in the south.

Access to and from Kundle Kundle Road will be maintained via the existing intersection with

Lansdowne Road.

It is assumed at this stage the existing railway level crossing will remain open providing a north south connection for local traffic. Further assessment and consultation by Greater Taree City Council with the Australian Rail Track Commission (ARTC) will be required to determine the future operation of the level crossing.

It should be noted further detailed assessment and design consideration will be given to an alternate option of maintaining the existing Lansdowne Road alignment with grade separation to be provided at the location of the existing railway level crossing.

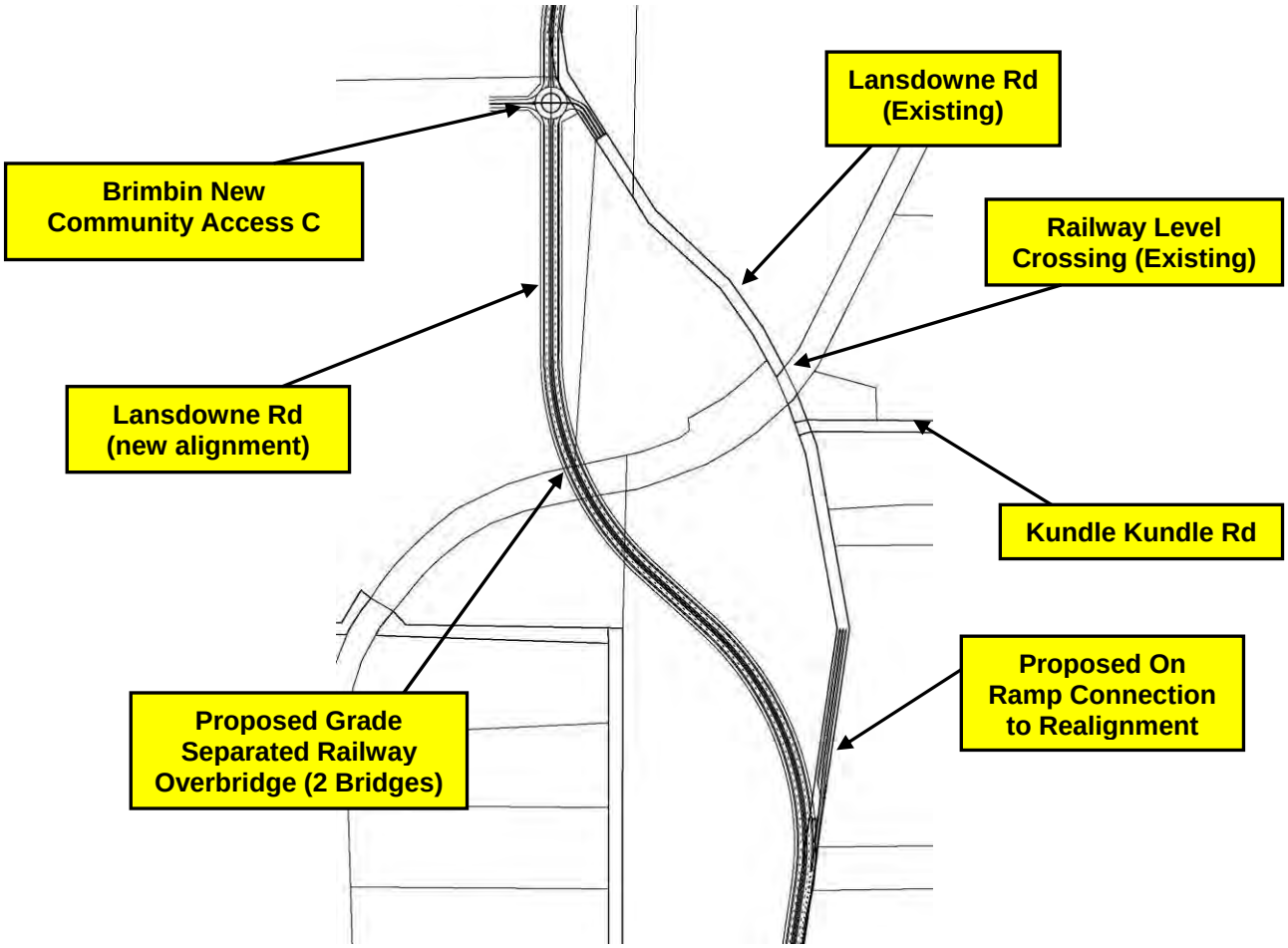


Figure 11.6.2.2: Detail for Realigned Lansdowne Road and Extension of Kundle Kundle Road

11.6.3 Vertical Alignment

As this section of Lansdowne Road is to be realigned away from the existing alignment as part of the Brimbin New Town project it is assumed these sight distance issues will be resolved as part of the detail design.

11.7 Cundletown Bypass

11.7.1 Cross Section

The modelling recommends the Cundletown Bypass be constructed to 1 lane in each direction. Therefore in accordance with Austroads Geometric Design requirements the following design cross section will be used:

Proposed Road Classification	Rural Arterial
Design Traffic Volume (AADT)	36 500 vpd (Full Development), 1 143 vph (AM Peak)
Design Speed Limit	80km/h
Posted Speed Limit	70km/h

Item	Requirement (Y/N)	Comments
Travel Lane	Y	1 x 3.5m lane (each direction) Austroads Part 3 (Pp 35, Table 4.3 – Urban arterial road width)
Median	Y	Between Intersections – 3.0m (Council AusSpec Design Specifications) At Intersections – 6.0m Austroads Part 3 (Pp 55, Table 4.14 – Median width)
Shoulder	Y	2.0m wide shoulder / cycle lane each carriageway edge Austroads Part 3 (Pp 40, Table 4.7 – Shoulder width)
Footway / Verge	Y	4.50m each side of carriageway edge (Council AusSpec Design Specifications)

Table 11.7.1.1: Design Cross Section Requirements – Cundletown Bypass

11.7.2 Horizontal Alignment

The indicative alignment of the proposed Cundletown Bypass has been provided by the Greater Taree City Council and is shown in the figure below. As this alignment is indicative only and would be subject to change depending on the planning process, a detailed assessment has not been made. Generally however, this should be designed and constructed in accordance with Council, RMS and Austroads guidelines as listed above.

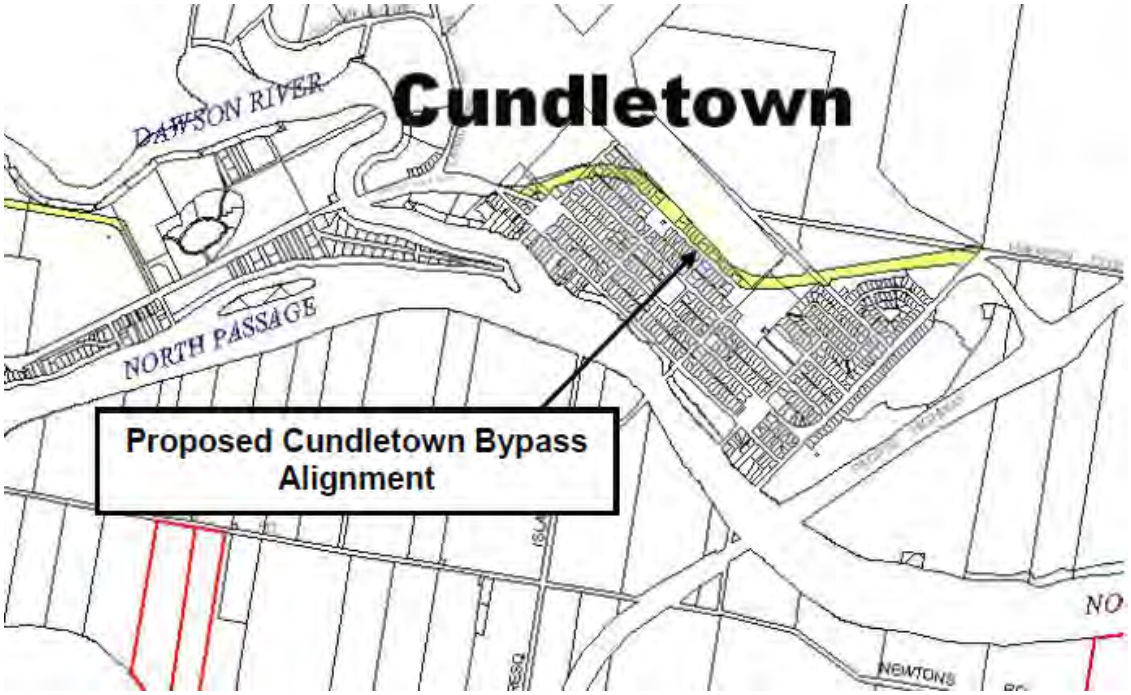


Table 11.7.2.1: Proposed Cundletown Bypass Alignment

11.7.3 Vertical Alignment

The vertical alignment of the Cundletown Bypass will be assessed at the detailed design stage.

11.8 Northern Link (Option A) – North Taree to New Brimbin Community

The Northern Link (Option A) was assessed in the Paramics Model for the development.

The Northern Link reduces the dependence on Lansdowne Road and Manning River Drive. Without the construction of the Northern Link the following upgrades would be required as an alternative:

- upgrading Lansdowne Road to four lanes south of Brimbin Road
- upgrading of Manning River Drive including the duplication of Dawson River Bridge

Two options were considered for connection of the Northern Link to the New Brimbin Community. The first would follow the existing Railway Line (via Myuna Close) and connect to Lansdowne Road south of the Brimbin development. The second would connect to the western section of the Brimbin development via Myuna Close and the western section of Brimbin Road and was determined as the most appropriate option as discussed in Section 9.2.8.

Three options have been considered for the connection of the Northern Link to North Taree for this assessment as shown in Figure 11.8.1.

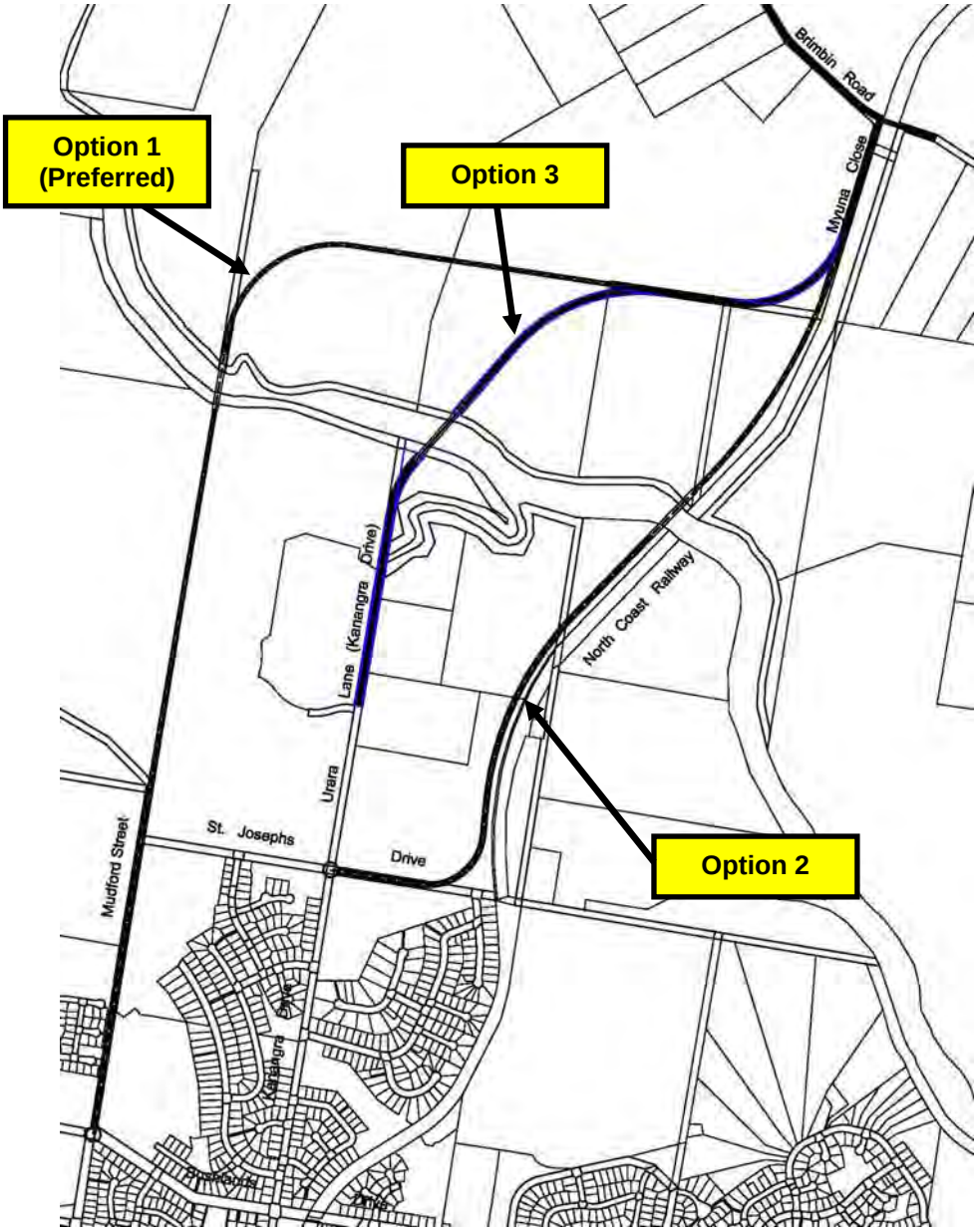


Figure 11.8.1: Upgrade Options for the Northern Link Connection to North Taree

Greater Taree City Council has recently completed a Traffic Study for the future traffic needs of the Taree CBD taking into account development such as the Brimbin New Town to the north and Old Bar to the east of Taree.

The study took into account the modelling of the Northern Link as part of the Brimbin development.

Option 1, the preferred option will be via Mudford Street from Bushland Drive to a proposed road corridor north of the existing Mudford Street and north of the Dawson River. This option will require major property acquisition for the road corridor and the construction of Mudford Street north of Bushland Drive within the existing road reserve. This option will require the longest road construction and longest travel distance for vehicles.

Option 2 will be via St Joseph's Drive from Kanangra Drive to a proposed road corridor running parallel along the western boundary of the North Coast Railway corridor and the Dawson Wastewater Treatment Plant connecting to Myuna Close. This option will also require major property acquisition for the road corridor and also require the relocation of

waste water infrastructure located along the western boundary of the rail corridor. This option will also require the relocation of existing Council maintained playing fields and BMX track fronting Urara Lane. Environmental impacts could be greater for this option taking into account the social impacts for the playing field and related impacts for the relocation of the wastewater infrastructure.

Option 3 will be constructed as an extension of Urara Lane (Kanangra Drive) over the Dawson River through to connect with Myuna Close and onto Brimbin Road. Option 3 generally follows existing paper (crown) road corridors with the only property acquisition required being on the northern side of the Dawson River through land zoned R1 in Greater Taree City Council's LEP (2010). Option 1 will have minimal perceived environmental impacts, being mainly the bridge crossing over the Dawson River.

The extension of Mudford Street (Option 1), as the preferred option, has been used in the assessment in this report and in the Paramics Modelling of the development.

It is noted that Greater Taree City Council has recently obtained funding through the Regional Development Australia Fund for a proposed future transport hub known as the "Northern Gateway" Regional Transport Access Infrastructure. Part of this funding allocation will include the construction of the Cundletown Bypass, upgrades to Lansdowne Road / Manning River Drive intersection and the duplication of the Dawson River Bridge on Manning River Drive.

In recognition of these works being constructed in advance of the Brimbin development consideration should be given to the utilisation of this new infrastructure instead of constructing the Northern Link from Brimbin to North Taree. Upgrades / duplication of Lansdowne Road would be required if this option to be pursued. The timing of for the upgrades would be consistent with the proposed timing for the Northern Link from Brimbin to North Taree.

11.8.1 Cross Section

The modelling recommends the Northern Link, for its full length, be constructed to 1 lane in each direction. Therefore in accordance with Austroads Geometric Design requirements the following design cross section will be used:

Proposed Road Classification	Rural Arterial
Design Traffic Volume (AADT)	18 000 vpd (Full Development), 1 800 vph (AM Peak)
Design Speed Limit	90km/h
Posted Speed Limit	80km/h

Item	Requirement (Y/N)	Comments
Travel Lane	Y	1 x 3.5m lane (each direction) Austroads Part 3 (Pp 35, Table 4.3 – Urban arterial road width)
Median	Y	Between Intersections – 3.0m (Council AusSpec Design Specifications) At Intersections – 6.0m Austroads Part 3 (Pp 55, Table 4.14 – Median width)
Shoulder	Y	2.0m wide shoulder / cycle lane each carriageway edge Austroads Part 3 (Pp 40, Table 4.7 – Shoulder width)
Footway / Verge	Y	4.50m each side of carriageway edge (Council AusSpec Design Specifications)

Table 11.8.1.1: Design Cross Section Requirements – Northern Link

11.8.2 Horizontal Alignment

Kanangra Drive is on a straight alignment north of Bushland Drive. The existing posted speed limit is 60km/h, however in the vicinity of the school at the northern end the speed limit is 40km/h during school times. No upgrades to the horizontal alignment are required as part of the works. No changes to the existing speed limits are envisaged as part of the works.

The existing unformed section of Mudford Street is on a straight alignment north of Bushland Drive. As there is no physical road present further detailed assessment / design of this section of Mudford Street will need to be undertaken if this is the preferred alignment to be used.

Myuna Close is on a straight alignment for its full length and has an unrestricted speed limit. No upgrades to the horizontal alignment are required as part of the works. The speed limit adopted for the Northern Link will apply to the Myuna Close section.

Table 11.8.2.1 provides a summary of the existing horizontal alignment for Brimbin Road from the railway overbridge to the end of its formation. The existing posted speed limit is considered to be unrestricted with no posted advisory speed. The existing horizontal alignment generally conforms to with what would be an advisory speed limit of 100km/h.

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS	ACTION REQUIRED
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED		
2.271 – 2.286	Unrestricted			100		Railway Overbridge	
2.315	Unrestricted			100		Unsealed west of this point	
2.651 – 2.766	Unrestricted	380	115	100	460 (Arc length below minimum)		To be realigned
3.115 – 3.210	Unrestricted	200	95	100	460 (Arc length below minimum)		To be realigned
3.337 – 3.498	Unrestricted	400	161	100	460 (Arc length below minimum)		To be realigned
3.761 – 3.865	Unrestricted	400	104	100	460 (Arc length below minimum)		To be realigned
4.312						End of road	

Table 11.8.2.1: Existing Horizontal Alignment Data – Brimbin Road

The reduction in the posted speed limit to 80km/h and realignment of Brimbin Road for the section from the North Coast Railway to the end of the formation to reflect the proposed design speed limit of 90km/h will remove the need for the use of advisory curve speed warning signs.

Table 11.8.2.2 provides the proposed horizontal alignment upgrades for Brimbin Road.

CHAINAGE	EXISTING ALIGNMENT		PROPOSED ALIGNMENT		COMMENTS
	CURVE RADIUS	POSTED SPEED LIMIT	CURVE RADIUS	DESIGN SPEED	
2.651 – 2.766	380	Unrestricted	280	90	REALIGNED FROM EXISTING
3.115 – 3.210	200	Unrestricted	280	90	REALIGNED FROM EXISTING
3.337 – 3.498	400	Unrestricted	280	90	REALIGNED FROM EXISTING
3.761 – 3.865	400	Unrestricted	280	90	END OF REALIGNMENT
4.312					

Table 11.8.2.2: Proposed Horizontal Upgrade Alignment Data – Brimbin Road

As previously stated the gravel section of Brimbin Road needs to be upgraded to conform to the proposed design cross section. As a result of this the horizontal alignment will be adjusted so as to minimise property acquisition for the existing properties on the western side of Brimbin Road.

The alignment of new roads to connect Mudford Street or Kanangra Drive and Myuna Close, including the bridge over the Dawson River, are indicative only and will depend on planning, surveys and environmental assessment. Generally however, these should be designed and constructed in accordance with Council, RMS and Austroads guidelines as listed above.

11.8.3 Vertical Alignment

The vertical alignment of Kanangra Drive north of Bushland Drive is undulating in sections. However, generally there are no sight distance issues along the study route therefore no upgrades are required as part of the works.

The vertical alignment of the existing unformed section of Mudford Street is generally on a flat grade north of Bushland Drive. As there is no physical road present further detailed assessment / design of this section of Mudford Street will need to be undertaken if this is the preferred alignment to be used.

Myuna Close generally has a level vertical alignment. No upgrades of the vertical alignment are required as part of the works.

The vertical alignment of Brimbin Road is generally flat (0.5 to 5.0% longitudinal grade) for its length with generally no sight distance issues along the route other than at the railway overbridge.

11.9 Manning River Drive (Phillip Street to Cowper Street) Detailed Assessment

11.9.1 Cross Section

The existing cross section of Manning River Drive between Cowper Street and the Pacific Highway varies between two travel lanes in each direction to a single lane in each direction.

The modelling recommends Manning River Drive be upgraded to two lanes westbound between Phillip Street and Cowper Street with the remaining sections of the road to remain as

existing. Therefore in accordance with Austroads Geometric Design requirements the following design cross section will be used:

Proposed Road Classification	Urban Arterial
Design Traffic Volume (AADT)	26 700 vpd (Full Development), 2 671 vph (PM Peak)
Design Speed Limit	70km/h
Posted Speed Limit	70km/h

Item	Requirement (Y/N)	Comments
Travel Lane	Y	2 x 3.5m lanes (westbound) 1 x 3.5m lane (eastbound) Austroads Part 3 (Pp 35, Table 4.3 – Urban arterial road width)
Median	Y	Between Intersections – 3.0m (Council AusSpec Design Specifications) At Intersections – 6.0m Austroads Part 3 (Pp 55, Table 4.14 – Median width)
Shoulder	Y	2.0m wide shoulder / cycle lane each carriageway edge Austroads Part 3 (Pp 40, Table 4.7 – Shoulder width)
Footway / Verge	Y	4.50m each side of carriageway edge (Council AusSpec Design Specifications)

Table 11.9.1.1: Design Cross Section Requirements – Manning River Drive Phillip St to Cowper St

11.9.2 Horizontal Alignment

Table 11.9.2.1 provides a summary of the existing horizontal alignment for Manning River Drive through the study area from the Cowper Street intersection to the bend in Princes Street on the northern outskirts of Cundletown.

The horizontal alignment generally conforms to the existing posted speed limits for the route with the only exception being at the Lansdowne Road roundabout where it is accepted travel speeds are less through roundabouts.

CHAINAGE	EXISITNG ALIGNMENT CONDITIONS			RMS ROAD DESIGN GUIDE (RDG) REQUIREMENTS		COMMENTS	ACTION REQUIRED
	POSTED SPEED LIMIT	CURVE RADIUS Approx (metres)	CURVE ARC LENGTH Approx. (metres)	DESIGN SPEED	MINIMUM DESIGN ARC LENGTH REQUIRED		
0.000	70			70		Cowper St Intersection	
0.344 – 0.491	70	250	147	70	140		None
1.090	70			70		Phillip St Intersection	

Table 11.9.2.1: Existing Horizontal Alignment Data – Manning River Drive Phillip St to Cowper St

11.9.3 Vertical Alignment

The vertical alignment of Manning River Drive through this section is generally flat with generally no sight distance issues along the section. No upgrades are required to the vertical alignment through this section.

12.0 Estimated Road Upgrade Costs

Estimated road upgrade costs have been based on the Visual and Detailed Design Assessment and the Staging of Road Network Upgrades summarised below as a result of the network modelling.

It should be noted the values provided are for construction costs only. No contingencies have been allowed for in providing these estimates not directly related to construction.

Due to certain unknown design constraints an overall project cost has not been provided. An amount of 15% (planning, survey and design) can be added to the construction costs to give an indication of the overall project costs for planning purposes.

Minor upgrade allowances have been provided for the existing intersections not nominated for upgrading as result of the Brimbin New Town Development. Further analysis of these intersections should be carried out by the individual developer should future development occur in these areas (i.e. rezoning from rural residential to residential).

12.1 Staging of Road Network Upgrades

The network modelling completed for the Brimbin New Town project has made the following recommendations with regard to the staging of the external road network upgrades. Table 12.1.1 provides a summary of the upgrade requirements based on the four stages.

Stage	External Road Infrastructure Requirements	
Stage 1: Initial Project Startup including construction of site access	1.1	Two Lane Roundabout for Brimbin Township Access Intersection B.
Stage 1A: Industrial and Bulky Goods: 13ha (45,500m^2 GFA) Retail and Commercial: 3.5ha (13,125m^2 GFA) Primary School: 3ha (120 Students) Residential: 180ha (1594 Tenements) Large Lot and Rural Residential: 43ha (111 Tenements)	1.1A	Signalise Manning River Drive/Lansdowne Road Intersection. *Stage 2 right turn lanes (2.2) should be constructed as part of these works and have been included in the construction costs of 1.1A.*
	1.2A	CHR for the Airport Drive / Lansdowne Road intersection including 2 lanes Lansdowne Road from Airport Drive to Manning River Drive (southbound)
	1.3A	"Seagull" intersection at the Brimbin Road / Lansdowne Road intersection.
Stage 2: Industrial and Bulky Goods: 18.5ha (64,750m^2 GFA) Regional Shopping Centre: 14ha (24,500m^2 GFA) Neighbourhood Shops: 2,500m² GFA Residential: 191ha (1688 Tenements) Medium Density and Seniors: 14ha (334 Tenements)	2.1	Two Lane Roundabouts for Brimbin Township Access Intersection C.
	2.2	Two lane right turn on the eastern approach to the Manning River Dr / Lansdowne Road intersection. *These should be constructed as part of stage 1 works (1.1A). Therefore costs have been included in 1.1A.*
	2.3	Northern Link (Option A) – North Taree to Brimbin Connection including all associated intersection upgrades (Mudford Street, Brimbin Road)
	2.4	Realignment / grade separation of Lansdowne Road at the rail crossing.

Table 12.1.1: Summary of Proposed External Road Network Upgrade Staging Requirements

Stage	External Road Infrastructure Requirements	
Stage 3: Golf Club and Sporting Club; 52ha High School: 6ha (480 Students) Industrial and Bulky Goods: 27ha (94,500m^2 GFA) Retail and Commercial: 4ha (15,000m^2 GFA) Neighbourhood Shops: 2,500m² GFA Primary School: 3ha (120 Students) Residential: 149ha (1317 Tenements) Medium Density and Seniors: 40ha (929 Tenements)	3.1	Two continuous through lanes westbound on Manning River Drive between Phillip Street and Cowper Street.
	3.2	Inclusion of the Cundletown Bypass as per Council planning and alignment.
Stage 4: Industrial and Bulky Goods: 59.5ha (208,250m2 GFA) Retail and Commercial: 4.5ha (16,875m2 GFA) Neighbourhood Shops: 2,500m² GFA Primary School: 3ha (120 Students) Residential: 226ha (2000 Tenements)		No required upgrades.

Table 12.1.1: Summary of Proposed External Road Network Upgrade Staging Requirements (cont'd)

Note: Internal intersections within the Brimbin New Town need to be implemented as required, and implementing four (4) lanes on Lansdowne Road needs to be taken into consideration when implementing prior infrastructure requirements.

12.2 Unit Rates

The following unit rates have been used to calculate the infrastructure upgrade costs at today's prices (2010) in relation to the development of the Brimbin New Town Project.

Traffic Control	5% to 10% of Infrastructure Upgrade Costs (depending on impacts to existing traffic flows)

Utility / Service Relocations		5% to 10% of Infrastructure Upgrade Costs
Earthworks (inc. Clearing & Grubbing, Topsoil Stripping, Pavement Excavation & Bulk Earthworks)		$110.00 / m³
SA Kerb & Gutter		$65.00 / metre
SF Median Kerb		$45.00 / metre
Wearing Course	50mm Thick AC	$35.00 / m²
	Bitumen Seal	$8.00 / m²
Unbound Pavement	Base Course (DGB)	$60.00 / m³
	SubBase Course (DGS)	$60.00 / m³
Linemarking	Lane Line	$5.00 / m
	Edge Lines	$5.00 / m
	Continuity Lines	$5.00 / m
	Hold Lines	$60.00 / m²
	Arrows	$110.00 each
	RRPM's	$30.00 each
Signposting (allowance)		0.5% of Sub Total Costs
Landscaping	Topsoil (100mm thick)	$50.00 / m²
	Turfing	$10.00 / m²
	Hydromulch	$8.00 / m²
	Mass Bed Planting	$130.00 / m²
Streetlighting		$8 000.00 / pole
Property Acquisition		$130 000.00 / ha (Rural / Residential) $ 25 000.00 / ha (Rural)
Existing Intersection Upgrade		$ 75 000.00 each

12.3 Road Network Upgrade Costs

12.3.1 Manning River Drive

Estimated upgrade cost will be provided based on the following staging schedule requirements for Manning River Drive.

Stage	Upgrade Requirements
Stage 1	• Nil Upgrades
Stage 1A	• Signalise Manning River Drive/Lansdowne Road Intersection. *Stage 2 right turn lanes (2.2) should be constructed as part of these works and have been included in the construction costs of 1.1A.*
Stage 2	• Two lane right turn on the eastern approach to the Manning River Dr / Lansdowne Road intersection. *These should be constructed as part of stage 1 works (1.1A). Therefore costs have been included in 1.1A.*
Stage 3	• Two continuous through lanes westbound on Manning River Drive between Phillip Street and Cowper Street.
Stage 4	• Nil Upgrades

Table 12.3.1.1: Upgrade Staging Schedule for Manning River Drive

The upgrade of the Manning River Drive and Lansdowne road intersection will require removal of the existing 2 lane roundabout traffic facility and replaced with a signalised intersection. The Paramics modelling suggests there be an additional 2 westbound right turn lanes provided in stage 2 however from a construction point of view it is reasonable to assume these work will be completed as part of the stage 1 upgrade works.

The section between Cowper Street and Phillip Street will need to have an additional lane constructed on the westbound side so as to provide the 2 continuous through lanes for this direction. Some adjustment of the linemarking for the right turn bays etc. will be required as part of these works.

Summary of Upgrade Costs for Manning River Drive (Stage 1A - Signalise Manning River Drive & Lansdowne Rd Intersection)					
Item		*Quantity*	*Rate*	*Unit*	*Amount*
Earthworks (all)		3000	$ 110.00	m^3	$ 330,000.00
Stormwater Drainage		1	$350,000.00	item	$ 350,000.00
SA Kerb & Gutter		600	$ 65.00	l/m	$ 39,000.00
SF Median Kerb		1200	$ 45.00	l/m	$ 54,000.00
50mm AC		9000	$ 35.00	m^2	$ 315,000.00
Base Course	200mm (DGB)	2000	$ 60.00	m^3	$ 120,000.00
Subbase Course	200mm (DGS)	2000	$ 60.00	m^3	$ 120,000.00
Lane Lines		500	$ 5.00	m	$ 2,500.00
Edge Lines		600	$ 5.00	m	$ 3,000.00
Continuity Lines		450	$ 5.00	m	$ 2,250.00
Hold Lines		50	$ 60.00	m^2	$ 3,000.00
Arrows		60	$ 110.00	ea	$ 6,600.00
RRPM's		200	$ 30.00	ea	$ 6,000.00
Signposting		1	$ 40,000.00	item	$ 40,000.00
Topsoil (100mm)		300	$ 50.00	m^3	$ 15,000.00
Turfing (3m wide each side)		2700	$ 10.00	m^2	$ 27,000.00
Landscaping (Central Median)		500	$ 130.00	m^2	$ 65,000.00
Hydromulch (1.50m wide each side)		1000	$ 8.00	m^2	$ 8,000.00
Streetlighting		20	$ 8,000.00	pole	$ 160,000.00
Property Acquisition		0.5	$130,000.00	ha	$ 65,000.00
			Total of Road Upgrades		***$ 1,731,350.00***
Traffic Signal Installation					*$ 300,000.00*
Utility / Service Relocations Allowance (10% of sub total cost)					*$ 173,135.00*
Traffic Control (5% of sub total cost)					*$ 86,567.50*
				Total	***$ 2,291,052.50***

Figure 12.3.1.1: Summary of Stage 1A Upgrade Costs for Manning River Drive – Signalise Manning River Drive & Lansdowne Road (including Stage 2 works)

Summary of Upgrade Costs for Manning River Drive (Stage 3 Works)					
Item		*Quantity*	*Rate*	*Unit*	*Amount*
Earthworks (all)		875	$ 110.00	m^3	$ 96,250.00
Stormwater Drainage		1	$ 50,000.00	item	$ 50,000.00
SA Kerb & Gutter		1000	$ 65.00	l/m	$ 65,000.00
SF Median Kerb		500	$ 45.00	l/m	$ 22,500.00
50mm AC		1750	$ 35.00	m^2	$ 61,250.00
Base Course	200mm (DGB)	350	$ 60.00	m^3	$ 21,000.00
Subbase Course	200mm (DGS)	380	$ 60.00	m^3	$ 22,800.00
Lane Lines		700	$ 5.00	m	$ 3,500.00
Edge Lines		1200	$ 5.00	m	$ 6,000.00
Continuity Lines		500	$ 5.00	m	$ 2,500.00
Hold Lines		30	$ 60.00	m^2	$ 1,800.00
Arrows		13	$ 110.00	ea	$ 1,430.00
RRPM's		65	$ 30.00	ea	$ 1,950.00
Signposting		1	$ 10,000.00	item	$ 10,000.00
Topsoil (100mm)		175	$ 50.00	m^3	$ 8,750.00
Turfing (3m wide each side)		1500	$ 10.00	m^2	$ 15,000.00
Landscaping (Central Median)		250	$ 130.00	m^2	$ 32,500.00
Hydromulch (1.50m wide each side)		250	$ 8.00	m^2	$ 2,000.00
Streetlighting		6	$ 8,000.00	pole	$ 48,000.00
Intersection Upgrades		0	$ 75,000.00	ea	$ -
Property Acquisition		0	$130,000.00	ha	$ -
			Total of Road Upgrades		***$ 472,230.00***
Utility / Service Relocations Allowance (10% of sub total cost)					*$ 47,223.00*
Traffic Control (5% of sub total cost)					*$ 23,611.50*
				Total	***$ 543,064.50***

Figure 12.3.1.2: Summary of Stage 3 Upgrade Costs for Manning River Drive (Cowper Street to Phillip Street)

12.3.2 Lansdowne Road

Estimated upgrade cost will be provided based on the following staging schedule requirements for Lansdowne Road.

Stage	Upgrade Requirements
Stage 1	• Two Lane Roundabout for Brimbin Township Access Intersection B.
Stage 1A	• Two Lane Roundabout for Brimbin Township Access Intersection A. • CHR for the Airport Drive / Lansdowne Road intersection including 2 lanes Lansdowne Road from Airport Drive to Manning River Drive (southbound) • "Seagull" intersection at the Brimbin Road / Lansdowne Road intersection.
Stage 2	• Two Lane Roundabout for Brimbin Township Access Intersection C. • Realignment / grade separation of Lansdowne Road at the rail crossing.
Stage 3	• Nil Upgrades
Stage 4	• Nil Upgrades

Table 12.3.2.1: Upgrade Staging Schedule for Lansdowne Road

The structure plan provided by Roche Group indicates a section of Lansdowne Road will be realigned as part of the development of this project. The realignment generally starts 650m south of the existing Kundle Kundle Road intersection and rejoins the existing alignment just north of the existing United Group access. The total length of Lansdowne Road to be upgraded as part of this project measures approximately 9.60km.

The following estimate of costs for upgrades do not take into account any upgrades at the Manning River Drive intersection. These have been costed in the Manning River Drive upgrades.

This study has recommended sections of Lansdowne Road between Manning River Drive and the Brimbin New Town be upgraded as part of this development. There remain sections of Lansdowne Road outside the scope of this study that will require further investigation for upgrading as a result of the Northern Gateway development.

- Brimbin Road to southern boundary of development (realignment of Lansdowne Road)

Summary of Upgrade Costs for Lansdowne Road (Stage 1 - 1 x 2 Lane Roundabout)						
Item		*Quantity*	*Rate*	*Unit*		*Amount*
Earthworks (all)		1500	$ 110.00	m³		$ 165,000.00
Stormwater Drainage		1	$ 100,000.00	item		$ 100,000.00
SA Kerb & Gutter		250	$ 65.00	l/m		$ 16,250.00
SF Median Kerb		200	$ 45.00	l/m		$ 9,000.00
SO V Drain		200	$ 80.00	l/m		$ 16,000.00
50mm AC		2600	$ 35.00	m²		$ 91,000.00
Base Course	200mm (DGB)	560	$ 60.00	m³		$ 33,600.00
Subbase Course	200mm (DGS)	600	$ 60.00	m³		$ 36,000.00
Lane Lines		320	$ 5.00	m		$ 1,600.00
Edge Lines		320	$ 5.00	m		$ 1,600.00
Continuity Lines		15	$ 5.00	m		$ 75.00
Hold Lines		7	$ 60.00	m²		$ 420.00
Arrows		15	$ 110.00	ea		$ 1,650.00
RRPM's		50	$ 30.00	ea		$ 1,500.00
Signposting		1	$ 10,000.00	item		$ 10,000.00
Topsoil (100mm)		105	$ 50.00	m³		$ 5,250.00
Turfing (3m wide each side)		700	$ 10.00	m²		$ 7,000.00
Hydromulch (1.50m wide each side)		500	$ 8.00	m²		$ 4,000.00
Streetlighting		6	$ 8,000.00	pole		$ 48,000.00
Property Acquisition		0.052	$ 130,000.00	ha		$ 6,760.00
				Total of Road Upgrades		***$ 554,705.00***
Utility / Service Relocations Allowance						
(5% of sub total cost)						*$ 27,735.25*
Traffic Control						
(5% of sub total cost)						*$ 27,735.25*
					Total	***$ 610,175.50***

Figure 12.3.2.1: Summary of Stage 1 Upgrade Costs for Lansdowne Road – 1 x 2 Lane Roundabout into the Brimbin New Town

Summary of Upgrade Costs for Lansdowne Road (Stage 1A - 1 x 2 Lane Roundabout)						
Item		*Quantity*	*Rate*	*Unit*		*Amount*
Earthworks (all)		1500	$ 110.00	m³		$ 165,000.00
Stormwater Drainage		1	$ 100,000.00	item		$ 100,000.00
SA Kerb & Gutter		250	$ 65.00	l/m		$ 16,250.00
SF Median Kerb		200	$ 45.00	l/m		$ 9,000.00
SO V Drain		200	$ 80.00	l/m		$ 16,000.00
50mm AC		2600	$ 35.00	m²		$ 91,000.00
Base Course	200mm (DGB)	560	$ 60.00	m³		$ 33,600.00
Subbase Course	200mm (DGS)	600	$ 60.00	m³		$ 36,000.00
Lane Lines		320	$ 5.00	m		$ 1,600.00
Edge Lines		320	$ 5.00	m		$ 1,600.00
Continuity Lines		15	$ 5.00	m		$ 75.00
Hold Lines		7	$ 60.00	m²		$ 420.00
Arrows		15	$ 110.00	ea		$ 1,650.00
RRPM's		50	$ 30.00	ea		$ 1,500.00
Signposting		1	$ 10,000.00	item		$ 10,000.00
Topsoil (100mm)		105	$ 50.00	m³		$ 5,250.00
Turfing (3m wide each side)		700	$ 10.00	m²		$ 7,000.00
Hydromulch (1.50m wide each side)		500	$ 8.00	m²		$ 4,000.00
Streetlighting		6	$ 8,000.00	pole		$ 48,000.00
Property Acquisition		0.052	$ 130,000.00	ha		$ 6,760.00
				Total of Road Upgrades		***$ 554,705.00***
Utility / Service Relocations Allowance						
(5% of sub total cost)						*$ 27,735.25*
Traffic Control						
(5% of sub total cost)						*$ 27,735.25*
					Total	***$ 610,175.50***

Figure 12.3.2.2: Summary of Stage 1A Upgrade Costs for Lansdowne Road – 1 x 2 Lane Roundabout into the Brimbin New Town

Summary of Upgrade Costs for Lansdowne Road (Stage 1A - Manning River Drive to Airport Drive)						
Item		*Quantity*		*Rate*	*Unit*	*Amount*
Earthworks (all)		2475	$	110.00	m³	$ 272,250.00
Stormwater Drainage		1	$	250,000.00	item	$ 250,000.00
SA Kerb & Gutter		100	$	65.00	l/m	$ 6,500.00
SF Median Kerb		300	$	45.00	l/m	$ 13,500.00
SO V Drain		550	$	80.00	l/m	$ 44,000.00
AC Wearing course	(Roundabouts)	6000	$	35.00	m²	$ 210,000.00
Base Course	200mm (DGB)	3600	$	60.00	m³	$ 216,000.00
Subbase Course	200mm (DGS)	3900	$	60.00	m³	$ 234,000.00
Lane Lines		600	$	5.00	m	$ 3,000.00
Edge Lines		600	$	5.00	m	$ 3,000.00
Continuity Lines		150	$	5.00	m	$ 750.00
Hold Lines		6	$	60.00	m²	$ 360.00
Arrows		3	$	110.00	ea	$ 330.00
RRPM's		50	$	30.00	ea	$ 1,500.00
Signposting		1	$	20,000.00	item	$ 20,000.00
Topsoil (100mm)		135	$	50.00	m³	$ 6,750.00
Turfing (3m wide each side)		900	$	10.00	m²	$ 9,000.00
Landscaping (Central Median)		1500	$	130.00	m²	$ 195,000.00
Hydromulch (1.50m wide each side)		900	$	8.00	m²	$ 7,200.00
Streetlighting		8	$	8,000.00	pole	$ 72,000.00
Property Acquisition		0.3	$	130,000.00	ha	$ 39,000.00
				Total of Road Upgrades		***$ 1,604,140.00***
Utility / Service Relocations Allowance						
(10% of sub total cost)						*$ 160,414.00*
Traffic Control						
(5% of sub total cost)						*$ 80,207.00*
					Total	***$ 1,844,761.00***

Figure 12.3.2.3: Summary of Stage 1A Upgrade Costs for Lansdowne Road – Manning River Drive to Airport Drive

Summary of Upgrade Costs for Lansdowne Road (Stage 1A - Brimbin Road Intersection Upgrade)						
Item		*Quantity*		*Rate*	*Unit*	*Amount*
Earthworks (all)		6500	$	110.00	m³	$ 715,000.00
Stormwater Drainage		1	$	75,000.00	item	$ 75,000.00
SO V Drain		600	$	80.00	l/m	$ 48,000.00
Bitumen Seal		4200	$	8.00	m²	$ 33,600.00
Base Course	200mm (DGB)	1140	$	60.00	m³	$ 68,400.00
Subbase Course	200mm (DGS)	1200	$	60.00	m³	$ 72,000.00
Lane Lines		300	$	5.00	m	$ 1,500.00
Edge Lines		600	$	5.00	m	$ 3,000.00
Continuity Lines		200	$	5.00	m	$ 1,000.00
Hold Lines		5	$	60.00	m²	$ 300.00
Arrows		12	$	110.00	ea	$ 1,320.00
RRPM's		220	$	30.00	ea	$ 6,600.00
Signposting		1	$	15,000.00	item	$ 15,000.00
Topsoil (100mm)		300	$	50.00	m³	$ 15,000.00
Turfing (3m wide each side)		500	$	10.00	m²	$ 5,000.00
Hydromulch (1.50m wide each side)		1200	$	8.00	m²	$ 9,600.00
Streetlighting		12	$	8,000.00	pole	$ 96,000.00
Property Acquisition		5.1	$	130,000.00	ha	$ 663,000.00
				Total of Road Upgrades		***$ 1,829,320.00***
Utility / Service Relocations Allowance						
(10% of sub total cost)						*$ 182,932.00*
Traffic Control						
(5% of sub total cost)						*$ 91,466.00*
					Total	***$ 2,103,718.00***

Figure 12.3.2.4: Summary of Stage 1A Upgrade Costs for Lansdowne Road – Brimbin Road Intersection

Summary of Upgrade Costs for Lansdowne Road (Stage 2 - 1 x 2 Lane Roundabout)						
Item		*Quantity*	*Rate*	*Unit*		*Amount*
Earthworks (all)		1500	$ 110.00	m³		$ 165,000.00
Stormwater Drainage		1	$ 100,000.00	item		$ 100,000.00
SA Kerb & Gutter		250	$ 65.00	l/m		$ 16,250.00
SF Median Kerb		200	$ 45.00	l/m		$ 9,000.00
SO V Drain		200	$ 80.00	l/m		$ 16,000.00
50mm AC		2600	$ 35.00	m²		$ 91,000.00
Base Course	200mm (DGB)	560	$ 60.00	m³		$ 33,600.00
Subbase Course	200mm (DGS)	600	$ 60.00	m³		$ 36,000.00
Lane Lines		320	$ 5.00	m		$ 1,600.00
Edge Lines		320	$ 5.00	m		$ 1,600.00
Continuity Lines		15	$ 5.00	m		$ 75.00
Hold Lines		7	$ 60.00	m²		$ 420.00
Arrows		15	$ 110.00	ea		$ 1,650.00
RRPM's		50	$ 30.00	ea		$ 1,500.00
Signposting		1	$ 10,000.00	item		$ 10,000.00
Topsoil (100mm)		105	$ 50.00	m³		$ 5,250.00
Turfing (3m wide each side)		700	$ 10.00	m²		$ 7,000.00
Hydromulch (1.50m wide each side)		500	$ 8.00	m²		$ 4,000.00
Streetlighting		6	$ 8,000.00	pole		$ 48,000.00
Property Acquisition		0.052	$ 130,000.00	ha		$ 6,760.00
				Total of Road Upgrades		***$ 554,705.00***
Utility / Service Relocations Allowance						
(5% of sub total cost)						*$ 27,735.25*
Traffic Control						
(5% of sub total cost)						*$ 27,735.25*
					Total	***$ 610,175.50***

Figure 12.3.2.5: Summary of Stage 2 Upgrade Costs for Lansdowne Road – 1 x 2 Lane Roundabout in the Brimbin New Town

Summary of Upgrade Costs for Lansdowne Road (Stage 2 - Realignment, Grade Separated Rail Overbridge & (Lansdowne Rd Southbound On Ramp)						
Item		*Quantity*	*Rate*	*Unit*		*Amount*
Earthworks (all)		28500	$ 110.00	m³		$ 3,135,000.00
Stormwater Drainage		1	$ 200,000.00	item		$ 200,000.00
SO V Drain		1600	$ 80.00	l/m		$ 128,000.00
50mm AC		13400	$ 35.00	m²		$ 469,000.00
Base Course	200mm (DGB)	17000	$ 60.00	m³		$ 1,020,000.00
Subbase Course	200mm (DGS)	18400	$ 60.00	m³		$ 1,104,000.00
Lane Lines		1500	$ 5.00	m		$ 7,500.00
Edge Lines		3000	$ 5.00	m		$ 15,000.00
RRPM's		188	$ 30.00	ea		$ 5,625.00
Signposting		1	$ 20,000.00	item		$ 20,000.00
Topsoil (100mm)		675	$ 50.00	m³		$ 33,750.00
Turfing (3m wide each side)		4500	$ 10.00	m²		$ 45,000.00
Hydromulch (1.50m wide each side)		9000	$ 8.00	m²		$ 72,000.00
Streetlighting		38	$ 8,000.00	pole		$ 300,000.00
				Total of Road Upgrades		***$ 6,554,875.00***
Utility / Service Relocations Allowance						
(5% of sub total cost)						*$ 327,743.75*
Traffic Control						
(5% of sub total cost)						*$ 327,743.75*
Kundle Kundle Rail Overbridge (2 Bridges)						
(Based on 60m long x 11m wide)		660	$ 2,000.00	m²		$ 1,320,000.00
					Total	***$ 8,530,362.50***

Figure 12.3.2.6: Summary of Stage 2 Upgrade Costs for Lansdowne Road – Realignment of Lansdowne Road (1 lane in each Direction)

12.3.3 Cundletown Bypass

The Cundletown Bypass will require the construction of a new road formation through a proposed road corridor to be located to the northeast of the Cundletown township. The estimate has made allowance for the provision of an intersection at the western end (Manning River Drive) and the eastern end (Princes Street). Due to the location of the proposed alignment some allowance has been made for noise attenuation measures to be provided as part of the construction works.

Estimated upgrade cost will be provided based on the following staging schedule requirements for Lansdowne Road.

Stage	Upgrade Requirements
Stage 1	• Nil Upgrades
Stage 1A	• Nil Upgrades
Stage 2	• Nil Upgrades
Stage 3	• Cundletown Bypass
Stage 4	• Nil Upgrades

Table 12.3.3.1: Upgrade Staging Schedule for Cundletown Bypass

Summary of Upgrade Costs for Cundletown Bypass

Item	*Quantity*	*Rate*	*Unit*	*Amount*
Earthworks (all)	49350	$ 110.00	m^3	$ 5,428,500.00
Stormwater Drainage	1	$ 500,000.00	item	$ 500,000.00
50mm AC	9407	$ 8.00	m^2	$ 75,256.00
Base Course 200mm (DGB)	10582	$ 60.00	m^3	$ 634,920.00
Subbase Course 200mm (DGS)	11757	$ 60.00	m^3	$ 705,420.00
Lane Lines	2350	$ 5.00	m	$ 11,750.00
Edge Lines	4700	$ 5.00	m	$ 23,500.00
Hold Lines	10	$ 60.00	m^2	$ 600.00
RRPM's	294	$ 30.00	ea	$ 8,812.50
Signposting	1	$ 20,000.00	item	$ 20,000.00
Topsoil (100mm)	2350	$ 50.00	m^3	$ 117,500.00
Hydromulch (1.50m wide each side)	23500	$ 8.00	m^2	$ 188,000.00
Intersection Upgrades	2	$ 500,000.00	ea	$ 1,000,000.00
Property Acquisition	10	$ 130,000.00	ha	$ 1,300,000.00
Noise Attenuation	1	$ 1,000,000.00	item	$ 1,000,000.00
		Total of Road Upgrades		***$ 11,014,258.50***
Utility / Service Relocations Allowance				
(1% of sub total cost)				*$ 110,142.59*
Traffic Control				
(5% of sub total cost)				*$ 550,712.93*
			Total	***$ 11,675,114.01***

Figure 12.3.3.1: Summary of Stage 3 Upgrade Costs for Cundletown Bypass

A funding amount for property acquisition has been included as part of the construction costs estimates for Cundletown Bypass.

It is noted that most of the property acquisitions for the bypass have already been secured by Council. Discussions will need to be held with Council to determine what proportion of cost will be required to be borne by this development as there is also a benefit to the broader community with the construction of this road.

12.3.4 Summary of Construction Upgrade Costs for the Northern Link - Option A, (Mudford Street or Kanangra Drive, Myuna Close and Brimbin Road)

The preferred alignment option for the Northern Link (Option A) as part of this development is via Mudford Street (Option 1). This option will require the construction of the unformed section of Mudford Street north of Bushland Drive and the southern bank of the Dawson River with a bridge crossing of the river at this point. From the northern bank of the Dawson River a new road is to be constructed joining up with the southern end of Myuna Close.

Option 2 will require an extension of Kanangra Drive between Bushland Drive and the southern bank of the Dawson River. From the northern bank of the Dawson River a new road is to be constructed joining up with the southern end of Myuna Close at a similar location as provided in option 1.

Option 3 will require the construction of a new road from the intersection of Kanangra Drive and St Josephs Drive in the south running parallel to the western side of the North Coast Railway line to the southern bank of the Dawson River with a bridge crossing of the river at this point. From the northern bank of the Dawson River a new road is to be constructed joining up with the southern end of Myuna Close at a similar location as provided in options 1 and 2.

There will be a requirement to upgrade the length of Myuna Close in the above options as part of the Northern Link. The section of the Northern Link north of Brimbin Road is considered to internal to the development, so no construction estimate has been provided, as this report deals with the road network upgrades external to the site.

Also part of the construction of the Northern Link all existing intersections along the route will be required to be upgraded with the following intersections requiring major upgrades.

- Bushland Drive & Mudford Street or Kanangra Drive – Traffic Signals.
- Kanangra Drive, St Joseph's Drive & Urara Lane – Small Mountable Roundabout. (Not required in Mudford Street option)
- Brimbin Road & Myuna Close – Channelised Intersection.

Between Bushland Drive and St Joseph's Drive there are six existing intersections that will need upgrading (mainly linemarking and provision of right turn bays) as part of the upgrade of Kanangra Drive.

Estimated upgrade cost will be provided based on the following staging schedule requirements for the Northern Link.

Stage	Upgrade Requirements
Stage 1	• Nil Upgrades
Stage 1A	• Nil Upgrades
Stage 2	• Northern Link (Mudford Street, Myuna Close and Brimbin Road)
Stage 3	• Nil Upgrades
Stage 4	• Nil Upgrades

Table 12.3.4.1: Upgrade Staging Schedule for Cundletown Bypass

Summary of Upgrade Costs for Kanangra Drive Extension						
Item		*Quantity*	*Rate*	*Unit*		*Amount*
Earthworks (all)		57100	$ 110.00	m³		$ 6,281,000.00
Stormwater Drainage		1	$ 500,000.00	item		$ 500,000.00
SA Kerb & Gutter		1850	$ 65.00	l/m		$ 120,250.00
50mm AC		9345	$ 35.00	m²		$ 327,075.00
Bitumen Seal		21230	$ 8.00	m²		$ 169,840.00
Base Course	200mm (DGB)	2020	$ 60.00	m³		$ 121,200.00
Subbase Course	200mm (DGS)	4635	$ 60.00	m³		$ 278,100.00
Lane Lines		2855	$ 5.00	m		$ 14,275.00
Edge Lines		5710	$ 5.00	m		$ 28,550.00
RRPM's		357	$ 30.00	ea		$ 10,706.25
Signposting		1	$ 15,000.00	item		$ 15,000.00
Topsoil (100mm)		2569.5	$ 50.00	m³		$ 128,475.00
Turfing (3m wide each side)		17130	$ 10.00	m²		$ 171,300.00
Hydromulch (1.50m wide each side)		8565	$ 8.00	m²		$ 68,520.00
Streetlighting		25	$ 8,000.00	m²		$ 200,000.00
Property Acquisition (Rural)		1.26	$ 25,000.00	ha		$ 31,500.00
Property Acquisition (Rural / Res)		0.61	$ 130,000.00	ha		$ 79,300.00
Intersection Upgrade (Bushlands Dr)		1	$ 500,000.00	item		$ 500,000.00
Intersection Upgrade (St Josephs Dr)		1	$ 75,000.00	item		$ 75,000.00
Intersection Upgrade (Minor Roads)		6	$ 75,000.00	item		$ 450,000.00
			Total of Road Upgrades			***$ 9,570,091.25***
Utility / Service Relocations Allowance						
(5% of sub total cost)						*$ 478,504.56*
Traffic Control						
(5% of sub total cost)						*$ 478,504.56*
Traffic Signal Installation						*$ 300,000.00*
Bridge Construction						
(Based on 210m long x 14m wide)		2940	$ 2,000.00	$2,000.00		$ 5,880,000.00
					Total	***$ 16,707,100.38***

Figure 12.3.4.1: Summary of Stage 2 Upgrade Costs for the Northern Link (Mudfrod Street or Kanangra Drive)

Summary of Upgrade Costs for Myuna Close Upgrade							
Item		*Quantity*		*Rate*	*Unit*		*Amount*
Earthworks (all)		9000	$	110.00	m^3	$	990,000.00
Stormwater Drainage		1	$	150,000.00	item	$	150,000.00
50mm AC		9900	$	35.00	m^2	$	346,500.00
Base Course	200mm (DGB)	10800	$	60.00	m^3	$	648,000.00
Subbase Course	200mm (DGS)	11700	$	60.00	m^3	$	702,000.00
Lane Lines		900	$	5.00	m	$	4,500.00
Edge Lines		1800	$	5.00	m	$	9,000.00
RRPM's		113	$	30.00	ea	$	3,375.00
Signposting		1	$	10,000.00	item	$	10,000.00
Topsoil (100mm)		810	$	50.00	m^3	$	40,500.00
Turfing (3m wide each side)		5400	$	10.00	m^2	$	54,000.00
Hydromulch (1.50m wide each side)		2700	$	8.00	m^2	$	21,600.00
Property Acquisition (Rural)		0.51	$	25,000.00	ha	$	12,750.00
					Total of Road Upgrades	***$***	***2,992,225.00***
Utility / Service Relocations Allowance							
(5% of sub total cost)						*$*	*149,611.25*
Traffic Control							
(5% of sub total cost)						*$*	*149,611.25*
					Total	***$***	***3,291,447.50***

Figure 12.3.4.2: Summary of Stage 2 Upgrade Costs for the Northern Link (Myuna Close)

Summary of Upgrade Costs for Brimbin Road							
Item		*Quantity*		*Rate*	*Unit*		*Amount*
Earthworks (all)		23000	$	110.00	m^3	$	2,530,000.00
Stormwater Drainage		1	$	50,000.00	item	$	50,000.00
Bitumen Seal		9207	$	8.00	m^2	$	73,656.00
Base Course	200mm (DGB)	27600	$	60.00	m^3	$	1,656,000.00
Subbase Course	200mm (DGS)	29900	$	60.00	m^3	$	1,794,000.00
Lane Lines		2300	$	5.00	m	$	11,500.00
Edge Lines		4600	$	5.00	m	$	23,000.00
RRPM's		288	$	30.00	ea	$	8,625.00
Signposting		1	$	10,000.00	item	$	10,000.00
Topsoil (100mm)		2070	$	50.00	m^3	$	103,500.00
Turfing (3m wide each side)		13800	$	10.00	m^2	$	138,000.00
Hydromulch (1.50m wide each side)		6900	$	8.00	m^2	$	55,200.00
					Total of Road Upgrades	***$***	***6,453,481.00***
Utility / Service Relocations Allowance							
(5% of sub total cost)						*$*	*322,674.05*
Traffic Control							
(5% of sub total cost)						*$*	*322,674.05*
					Total	***$***	***7,098,829.10***

Figure 12.3.4.3: Summary of Stage 2 Upgrade Costs for the Northern Link (Brimbin Road)

An amount for property acquisition has been provided as part of the construction costs for Northern Link. Historically Councils undertake these procedures. Further negotiations with Council will be required as to what costs are to be born by this development as there is also a benefit to the community with the construction of this road.

12.3.5 Summary of Construction Upgrade Costs for the External Road Network

Table 12.3.6.1 provides a summary of the overall construction costs for the upgrades to the external road network. An amount of 15% can be added to these figures for planning purposes to include planning, survey and design.

Road	Stage 1 Works	Stage 1A Works	Stage 2 Works	Stage 3 Works	Stage 4 Works
Manning River Drive	Nil	$2 291 052.50	Included in Stage 1 Works	$543 064.50	Nil
Lansdowne Road	$610 175.50	$4 558 654.50	$9 140 538.00	$	Nil
Cundletown Bypass	Nil	Nil	Nil	$11 675 114.01	Nil
Northern Link (Option A) (Mudford St, Myuna Cl & Brimbin Rd)	Nil	Nil	$27 097 376.98	Nil	Nil
Stage Totals	**$610 175.50**	**$6 849 707.00**	**$36 237 914.98**	**$12 218 178.51**	**Nil**
				Total	**$55 915 975.99**

Table 12.3.5.1: Summary of Overall Construction Costs for Upgrades to the External Road Network

13.0 CONCLUSIONS

The proposed Brimbin New Town development has been modelled to determine the required road network upgrades as a result of the proposed development. For the purpose of modelling the changes within the development and identifying the requirements over time, the proposed development has been divided into a series four stages.

Progression of the development from Stage 1 through to Stage 4 is expected to result in an increased level of internalisation of traffic distribution from 12.5% in 2021 to 55% in 2044.

Stage 1 provision of access to Brimbin New Town

- Two Lane Roundabout for Brimbin Township Access Intersection B.

Full development of Stage 1A in 2021 requires the following road network upgrades:

- Signalise Manning River Drive/Lansdowne Road Intersection to include:
  - Two lane approach on Lansdowne
  - Road lengthened and left turn slip lane added.
  - Manning River Drive (westbound) approach right turning lane added as well as a two lane through movement.
  - Slip lane from Manning River Drive (eastbound) to Lansdowne Road into extended merging lane.
  - Additional 2 lane right turn from Manning River Drive to Lansdowne Road (Stage 2) should be implemented at this stage for construction purposes.
- CHR for the Airport Drive/Lansdowne Road intersection including 2 lanes on Lansdowne Road from Airport Drive to Manning River Drive (southbound)
- 'Seagull' Intersection at the Brimbin Road / Lansdowne Road Intersection.
- Two Lane Roundabout for Brimbin Township Access Intersection A.

Full development of Stage 2 in 2028 requires the following upgrades:

- Two lane Roundabout for Brimbin Township Access Intersection C.
- Two lane right turn on the eastern approach to the Manning River Drive / Lansdowne Road intersection.
  - Should be implemented as part of Stage 1A.1 works for construction purposes.
- Northern Link (Option A) – North Taree to Brimbin Connection including all associated intersection upgrades (Mudford Street, Myuna Close, and Brimbin Road).
- Realignment/grade separation of Lansdowne Road at the rail crossing.

Full development of Stage 3 in 2035 requires the following road network upgrades:

- Two continuous through lanes westbound on Manning River Drive between Phillip Street and Cowper Street
- Cundletown Bypass

Full development of Stage 4 in 2044 requires the following road network upgrades:

- No additional upgrades required as a result of Stage 4.

A Public Transport scenario was tested, which determined that a highly ambitious Public Transport mode share of 30% during the peak periods would be required to reduce traffic volumes between Taree and the Brimbin New Town that would not warrant the need to duplicate the Dawson River Bridge.

The existing rail line that currently links Taree to the proposed Brimbin New Town may provide an opportunity to develop a high quality Public Transport corridor by using either buses or trains between the two centres. However, the effectiveness of this proposal depends greatly on providing an attractive service with significant travel time savings in comparison to on-road.

The following provides an indication of the infrastructure upgrade required with respect to the provision of a public transport system to service the Brimbin New Town.

- Widening of the rail corridor and rail bridge to cater for buses on rail link,
- Construction of a railway Station at the Brimbin New Town,
- Upgrading of existing Taree railway station to cater for extra movements,
- Provision of park and ride facilities at each station,
- Extra buses would be required for local trips in Taree and the Brimbin New Town.

The Northern Link (Option A) connection between the north of Taree and the Brimbin New Town (Mudford Street extension is the preferred option) will provide a direct link between the two towns. With Greater Taree City Council obtaining funding through the Regional Development Australia Fund for a future transport hub known as the “Northern Gateway Regional Transport Access Infrastructure” for works including the construction of the Cundletown Bypass, upgrades to Lansdowne Road / Manning River Drive intersection and the duplication of the Dawson River Bridge on Manning River Drive, and given that these works will be constructed prior to the commencement of the Brimbin development consideration should be given to the Brimbin new town utilising this new infrastructure.

This new infrastructure could adequately cater for the Brimbin development, rather than providing what could be considered surplus infrastructure with the Northern Link. This option however would require upgrades / duplication of Lansdowne Road at a time consistent with when the Northern Link is scheduled for construction.

The internal road network in the Brimbin New Town is expected to require the construction of signalised intersections for pedestrian movements at specific locations of high pedestrian movements such as around the schools and shopping areas. It is recommended to undertake further analysis of the internal road network upon development of detailed land use components within the proposed Brimbin New Town development.

Development of the Brimbin New Town will result in significant upgrades being required for the adjoining road network. The modelling has provided the upgrades required based on a development staging scenario. These upgrades will be required to be constructed at full development for each stage prior to the commencement of the next stage. Construction of the upgrades within each stage dependant on internal development triggers within the stage (i.e. traffic generation / volumes and road capacity).

The resultant external road network upgrades will require significant capital costs for the implementation of these upgrades. Table 13.1 provides a summary of the staging requirements, external road network upgrade thresholds and estimates costs for upgrades to the external road network. Table 13.2 provides a summary of the overall construction costs including costs for each stage.

Construction costs only, have been provided for the external road network upgrades. Project development costs were not provided as there are design constraints (i.e. flooding) related to the project that will need further detailed analysis / assessment in order to determine the detailed design requirements.

For planning purposes an amount of 15% can be added to the construction costs to give an indication of the overall project infrastructure cost for the development.

Existing flooding issues will have some impacts on the upgrading of the external road network. Greater Taree City Council has provided preliminary advice that “any road network upgrades will need to take into account providing acceptable emergency access to a bigger centre with medical services available”.

In setting up the trip generation for this development a community services component, which could include medical servicing was allowed for in the modelling. Further detailed investigation will need to be carried out as to the extent of the services to be provided so as to possibly to minimise the capital upgrade costs for the external road network to satisfy the necessary emergency access requirements in relation flooding.

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 1:	1.1	Two Lane Roundabout for Brimbin Township Access Intersection B.	- Brimbin Access Road = 400 vph	The roundabout has been designed as a large rural roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.	• $ 610 175.50
Stage 1 A:	1A.1	Signalise Manning River Drive/Lansdowne Road Intersection	- 1,000 vph southbound on Lansdowne Road - 15,000 AADT on Lansdowne Road	The existing roundabout intersection is inadequate. - Queuing and delays exceed capacity of Lansdowne Road approach in the AM peak. - Peak period tidal flow with long queues on the eastbound Manning River Drive approach in the PM peak as a result of traffic heading towards Brimbin. - Additional 2 lane right turn from Manning River Drive to Lansdowne Road (Stage 2) should be implemented at this stage for construction purposes.	• $ 2 291 052.50 (includes Stage 2 requirement of 2 right turn lanes from Manning River Drive to Lansdowne Road)

Table 13.1: Proposed Development Staging and External Road Network Upgrade Costs

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 1 A:	1A.2	CHR for the Airport Drive/Lansdowne Road intersection including 2 lanes on Lansdowne Road from Airport Drive to Manning River Drive (southbound)	- Lansdowne Road = 600 vph (6,000 AADT)	The existing intersection is inadequate. - Right turn from Lansdowne Road to Airport Drive blocking through traffic. - Insufficient gaps for vehicles entering/exiting the Airport.	• $1 884 761.00
	1A.3	'Seagull' Intersection at the Brimbin Road / Lansdowne Road Intersection.	- Lansdowne Road = 600 vph (6,000 AADT)	The existing intersection is inadequate. - Insufficient gaps for turning traffic on Brimbin Road as a result of through traffic on Lansdowne Road. - Turning traffic on Lansdowne Road restricts through traffic and exacerbates safety concerns at intersection.	• $ 2 103 718.00

Table 13.1: Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 1 A:	1A.4	Two Lane Roundabout for Brimbin Township Access Intersection A.	- Brimbin Access Road = 400 vph	The roundabout has been designed as a large rural roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.	• $ 610 175.50
Stage 2:	2.1	Two lane Roundabout for Brimbin Township Access Intersection C.	- Brimbin Access Road = 400 vph	Priority controlled intersection is insufficient with through and turning traffic volumes on Lansdowne Road limiting side road gaps to undertake movements. This creates long queues and delays into Brimbin, and safety issues. The roundabout has been designed as a large rural roundabout to cater for future potential traffic volumes and heavy vehicles accessing future employment lands.	• $ 610 175.50
	2.2	Two lane right turn on the eastern approach to the Manning River Drive / Lansdowne Road intersection.	- Right Turn = 400vph	Single right turn lane into Lansdowne Road is insufficient in length and queues extend out of turn pocket and impact through movements. Should be implemented as part of Stage 1A.1 works for construction purposes.	• Costs included in Stage 1A.1.

Table 13.1:Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
Stage 2:	2.3	Northern Link (Option A) – North Taree to Brimbin Connection including all associated intersection upgrades (Mudford Street, Myuna Close, and Brimbin Road).	- Lansdowne Road = 2,500 vph between Brimbin Road and Manning River Drive (25,000 AADT)	There is insufficient capacity on Lansdowne Road to cater for the increased traffic volumes as a result of the Stage 2 Brimbin Township. This is due to a combination of single lane each way on Lansdowne Road and across Dawson River Bridge on Manning River Drive. The Northern Link will attract traffic from Lansdowne Road.	• $27 097 376.98
	2.4	Realignment/grade separation of Lansdowne Road at the rail crossing.	- Full development of Stage 2 - Grade separation should coincide with realignment of Lansdowne Road.	Required to mitigate the impacts of delays and queuing at the existing level rail crossing of Lansdowne Road at Kundle Kundle. Also requires southbound on ramp at southern end of realignment	• $8 530 362.50

Table 13.1: Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Staging	External Road Infrastructure Requirements		Road Network Upgrade Thresholds	Comments	Threshold Construction Costs
	3.1	Two continuous through lanes westbound on Manning River Drive between Phillip Street and Cowper Street	- Manning River Drive = 2,400 vph	The existing converge from two lanes to one lane westbound on Manning River Drive after Phillip Street causes ineffective use of the stand-up lane at intersection and queuing east, impacting on the Manning River Drive Lansdowne Road intersection and the Airport access. A second westbound lane west of Phillip Street will free up traffic flow and reduce queuing towards the east.	• $ 543 064.50
	3.2	Cundletown Bypass	- Main Street = 1,800 vph	Without a bypass the constant and increased flow of traffic through Cundletown creates insufficient gaps for turning traffic and property accesses. This exacerbates safety and amenity issues through Cundletown particularly for residents, local businesses and the school zone.	• $ 11 675 114.01
Stage 4:	No further upgrades required.				

Table 13.1: Proposed Development Staging and External Road Network Upgrade Costs (cont'd)

Road	Stage 1 Works	Stage 1A Works	Stage 2 Works	Stage 3 Works	Stage 4 Works
Manning River Drive	Nil	$2 291 052.50	Included in Stage 1 Works	$543 064.50	Nil
Lansdowne Road	$610 175.50	$4 558 654.50	$9 140 538.00		Nil
Cundletown Bypass	Nil	Nil	Nil	$11 675 114.01	Nil
Northern Link (Option A) (Mudford St, Myuna Cl & Brimbin Rd)	Nil	Nil	$27 097 376.98	Nil	Nil
Stage Totals	**$610 175.50**	**$6 849 707.00**	**$36 237 914.98**	**$12 218 178.51**	**Nil**
				Total	**$55 915 975.99**

Table 13.2: Summary of Estimated Costs for Upgrades to the External Road Network

14.0 RECOMMENDATIONS

The following recommendations are provided based on the outcomes of Traffic Modelling, Visual Assessment and Detailed Design Assessment of this study for the external road network for the proposed Brimbin New Town Development.

It is recommended the external road network upgrades be implemented generally in accordance with the indicative development staging requirements provided in this study. However, the Staging Schedule is indicative only and may change due to market demands. Therefore upgrades should only be implemented when "triggered" by the traffic volumes required for each upgrade as outlined in this report, regardless of the Staging Schedule.

Appendix A

Draft Structure Plan

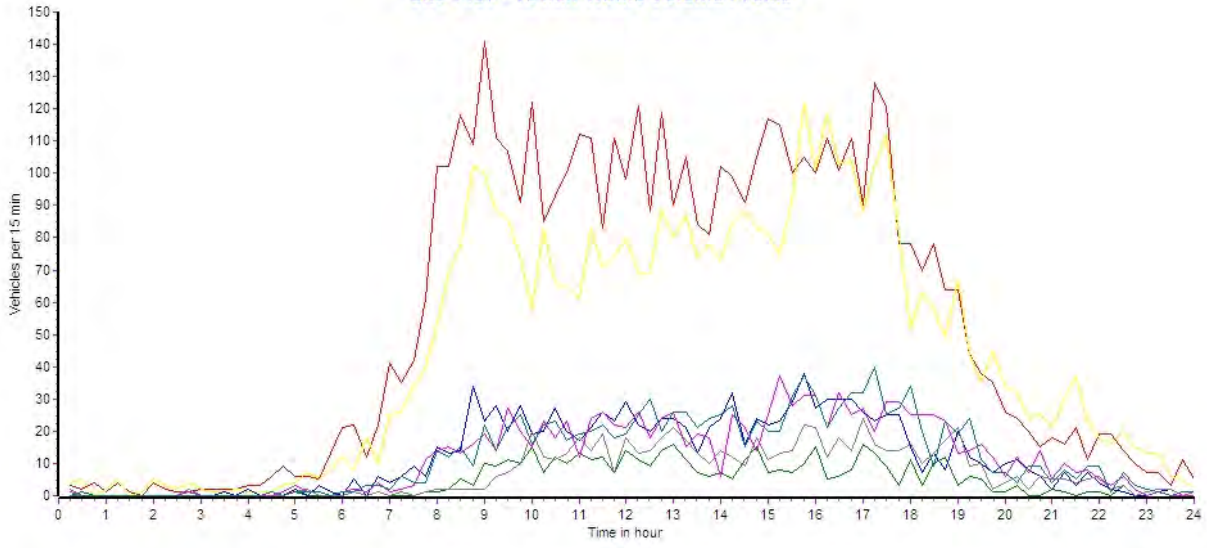
Appendix B

Detector Loop Count Data & Intersection Count Summary

SCATS Traffic Reporter
Volume profile On Wednesday 23 June 2010 filename MAY_20100623.vs

Printed Tuesday 06 July 2010 10:42 Page 1 of 1

Site 1497 - 15 min Traffic Volume Profile



Vic nthbnd thru left det:1.	Daily Total	5213	AM peak 08:15 - 09:15	479	PM peak 16:30 - 17:30	450
Vic nthbnd r det:2.	Daily Total	441	AM peak 10:15 - 11:15	46	PM peak 12:00 - 13:00	50
Vic sthbnd thru left det:5.	Daily Total	4331	AM peak 08:30 - 09:30	376	PM peak 15:30 - 16:30	445
vic sthbnd right det:4.	Daily Total	1147	AM peak 08:30 - 09:30	105	PM peak 15:30 - 16:30	125
Manning wstbnd det:7.	Daily Total	679	AM peak 10:30 - 11:30	64	PM peak 15:30 - 16:30	73
Manning eastbnd left det:6.	Daily Total	1142	AM peak 11:00 - 12:00	93	PM peak 15:00 - 16:00	127
Mann east thru right det:8.	Daily Total	1169	AM peak 09:30 - 10:30	86	PM peak 16:15 - 17:15	131

Site: 1497 Wednesday, 23 June 2010 Traffic Flow filename:MAY_20100623.vs

Wednesday, 23 June 2010

Vic nthbnd thru left, Detector: 1

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	3	4	2	2	3	6	22	35	102	111	85	111
:30	2	1	1	2	6	5	12	42	118	107	93	83
:45	4	0	1	2	9	13	22	61	109	91	100	111
:60	1	4	2	3	6	21	41	102	141	122	112	98
Hourly Total	10	9	6	9	24	45	97	240	470	431	390	403

AM Total: 2134 AM peak 479 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	121	105	99	115	111	128	70	44	24	16	19	7
:30	88	84	91	100	101	121	78	38	20	21	14	3
:45	119	81	105	105	111	78	64	35	15	11	10	11
:60	90	102	117	100	90	78	64	26	18	19	7	5
Hourly Total	418	372	412	420	413	405	276	143	77	67	50	26

PM Total: 3079 PM peak 450 16:30 - 17:30

Daily Total 5213

Vic nthbnd r, Detector: 2

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	1	0	2	9	7	11
:30	1	0	0	0	0	0	0	0	5	11	12	12
:45	0	0	0	0	0	0	1	1	3	10	10	7
:60	0	0	0	0	1	1	0	1	10	15	13	14
Hourly Total	1	0	0	0	1	1	2	2	20	45	42	44

AM Total: 158 AM peak 46 10:15 - 11:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	11	11	5	8	5	13	3	6	3	1	0	1
:30	9	7	11	7	6	9	10	5	0	0	3	0
:45	14	6	15	10	8	3	12	1	0	1	0	0
:60	16	7	7	15	16	11	3	1	2	1	0	0
Hourly Total	50	31	38	40	35	36	28	13	5	3	3	1

PM Total: 283 PM peak 50 12:00 - 13:00

Daily Total 441

Vic sthbnd thru left, Detector: 5

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	4	5	3	1	1	7	8	26	69	88	83	83
:30	5	0	2	1	1	5	18	34	77	86	66	71
:45	0	1	4	2	3	8	10	40	102	74	65	74
:60	2	5	2	1	4	12	25	53	100	58	61	80
Hourly Total	11	11	11	5	9	32	61	153	348	306	275	308

AM Total: 1530 AM peak 376 08:30 - 09:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	69	87	84	75	119	102	63	44	32	30	16	13
:30	69	74	88	92	103	112	58	35	24	37	20	6
:45	89	78	83	122	104	81	49	45	25	23	15	5
:60	80	73	81	101	88	52	67	34	21	18	13	2
Hourly Total	307	312	336	390	414	347	237	158	102	108	64	26

PM Total: 2801 PM peak 445 15:30 - 16:30

Daily Total 4331

vic sthbnd right, Detector: 4

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	5	6	13	28	20	21
:30	0	0	0	1	0	3	0	9	14	20	27	26
:45	0	0	0	0	0	1	6	6	34	28	20	23
:60	0	0	0	2	2	0	4	15	23	19	17	29
Hourly Total	0	0	0	3	2	4	15	36	84	95	84	99

AM Total: 422 AM peak 105 08:30 - 09:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	22	21	32	23	30	23	7	12	11	7	2	1
:30	20	13	16	29	30	25	13	10	8	3	1	2
:45	24	21	24	38	30	25	8	7	6	7	0	0
:60	24	24	22	27	26	15	20	10	2	4	0	0
Hourly Total	90	79	94	117	116	88	48	39	27	21	3	3

PM Total: 725 PM peak 125 15:30 - 16:30

Daily Total 1147

Manning wstbnd, Detector: 7

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	1	0	0	0	0	2	1	1	2	6	12	14
:30	0	0	0	0	0	0	0	0	2	7	11	19
:45	0	0	2	0	0	0	1	1	2	10	13	7
:60	0	0	0	0	1	0	0	2	2	20	18	18
Hourly Total	1	0	2	0	1	2	2	4	8	43	54	58

AM Total: 175 AM peak 64 10:30 - 11:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	13	17	12	13	12	16	10	9	6	5	2	2
:30	14	13	9	14	18	14	13	10	2	4	3	2
:45	18	10	18	22	14	14	17	2	6	5	0	0
:60	21	14	11	21	24	16	21	4	5	6	1	1
Hourly Total	66	54	50	70	68	60	61	25	19	20	6	5

PM Total: 504 PM peak 73 15:30 - 16:30

Daily Total 679

Manning eastbnd left, Detector: 6

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	2	0	0	0	0	1	2	2	15	14	23	24
:30	0	0	0	0	0	1	1	3	13	27	18	26
:45	0	0	1	0	1	0	4	11	16	20	23	22
:60	0	0	0	0	3	1	1	14	19	15	12	21
Hourly Total	2	0	1	0	4	3	8	30	63	76	76	93

AM Total: 356 AM peak 93 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	26	15	25	37	21	20	25	14	12	10	3	1
:30	18	19	21	28	32	29	25	16	7	7	6	0
:45	24	18	14	31	25	29	23	12	14	8	2	0
:60	26	6	25	31	27	25	13	6	5	5	0	0
Hourly Total	94	58	85	127	105	103	86	48	38	30	11	1

PM Total: 786 PM peak 127 15:00 - 16:00

Daily Total 1142

Mann east thru right, Detector: 8

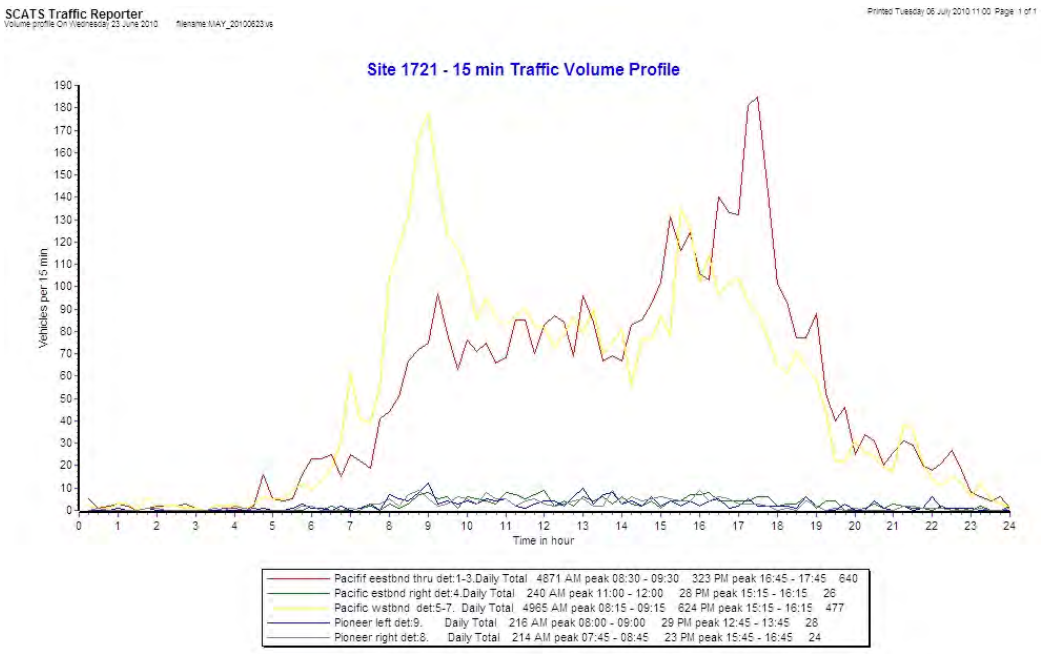
	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	1	1	6	12	14	22	20
:30	0	0	0	0	1	1	3	4	15	21	23	22
:45	0	0	0	0	0	0	3	4	9	25	17	18
:60	0	0	0	0	1	1	2	14	22	16	19	19
Hourly Total	0	0	0	0	2	3	9	28	58	76	81	79

AM Total: 336 AM peak 86 09:30 - 10:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	25	26	28	20	21	40	20	24	4	8	1	1
:30	30	21	15	31	27	25	9	11	9	5	7	0
:45	20	24	23	37	32	27	23	7	9	9	3	1
:60	26	25	20	31	32	34	19	7	4	9	2	1
Hourly Total	101	96	86	119	112	126	71	49	26	31	13	3

PM Total: 833 PM peak 131 16:15 - 17:15

Daily Total 1169



Site: 1721 Wednesday, 23 June 2010 Traffic Flow filename:MAY_20100623.vs

Wednesday, 23 June 2010

Pacifif eestbnd thru, Detectors: 1-3

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	5	2	2	0	0	4	23	22	51	97	71	85
:30	1	0	2	0	2	5	25	19	67	79	75	85
:45	2	1	3	1	16	16	15	41	72	63	66	70
:60	3	2	1	1	5	23	25	44	75	76	68	83
Hourly Total	11	5	8	2	23	48	88	126	265	315	280	323

AM Total: 1494 AM peak 323 08:30 - 09:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	87	84	83	131	103	181	93	52	34	31	21	6
:30	84	67	85	116	140	185	77	40	31	29	27	4
:45	69	69	92	124	133	142	77	46	20	20	18	6
:60	96	67	102	106	132	101	88	25	26	18	8	1
Hourly Total	336	287	362	477	508	609	335	163	111	98	74	17

PM Total: 3377 PM peak 640 16:45 - 17:45

Daily Total 4871

Pacific estbnd right, Detector: 4

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	0	1	1	5	5	7
:30	0	0	0	0	1	0	2	2	3	6	4	5
:45	0	1	0	0	0	0	0	0	7	1	3	7
:60	0	0	0	0	0	2	0	3	8	6	8	9
Hourly Total	0	1	0	0	1	2	2	6	19	18	20	28

AM Total: 97 AM peak 28 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	2	4	3	4	8	4	3	4	1	2	2	2
:30	4	6	2	4	4	6	3	4	3	1	0	0
:45	2	3	4	7	4	6	6	0	1	1	1	0
:60	6	6	1	7	4	2	1	0	3	0	0	2
Hourly Total	14	19	10	22	20	18	13	8	8	4	3	4

PM Total: 143 PM peak 26 15:15 - 16:15

Daily Total 240

Pacific wstbnd , Detectors: 5-7

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	2	3	2	0	0	5	13	41	118	148	85	87
:30	1	0	2	2	3	9	19	39	131	123	95	90
:45	1	6	1	2	6	12	31	55	167	117	86	83
:60	3	1	1	3	5	9	61	104	178	106	83	82
Hourly Total	7	10	6	7	14	35	124	239	594	494	349	342

AM Total: 2221 AM peak 624 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	73	90	56	78	114	93	61	44	26	38	11	12
:30	79	70	76	135	97	88	71	22	24	36	15	5
:45	86	75	76	126	101	77	64	22	19	21	12	3
:60	79	81	87	102	104	65	59	31	18	14	6	2
Hourly Total	317	316	295	441	416	323	255	119	87	109	44	22

PM Total: 2744 PM peak 477 15:15 - 16:15

Daily Total 4965

Pioneer left, Detector: 9

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	1	1	5	3	3	2
:30	0	0	0	0	0	1	0	3	4	4	5	1
:45	0	1	0	0	1	3	2	0	8	3	4	3
:60	1	0	0	0	0	1	0	7	12	4	5	4
Hourly Total	1	1	0	0	1	5	3	11	29	14	17	10

AM Total: 92 AM peak 29 08:00 - 09:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	4	3	4	4	4	5	2	0	0	2	1	0
:30	2	7	2	2	5	2	1	0	4	0	1	0
:45	6	8	6	4	1	2	6	3	1	1	1	0
:60	10	3	2	2	2	2	2	0	0	6	1	0
Hourly Total	22	21	14	12	12	11	11	3	5	9	4	0

PM Total: 124 PM peak 28 12:45 - 13:45

Daily Total 216

Pioneer right, Detector: 8

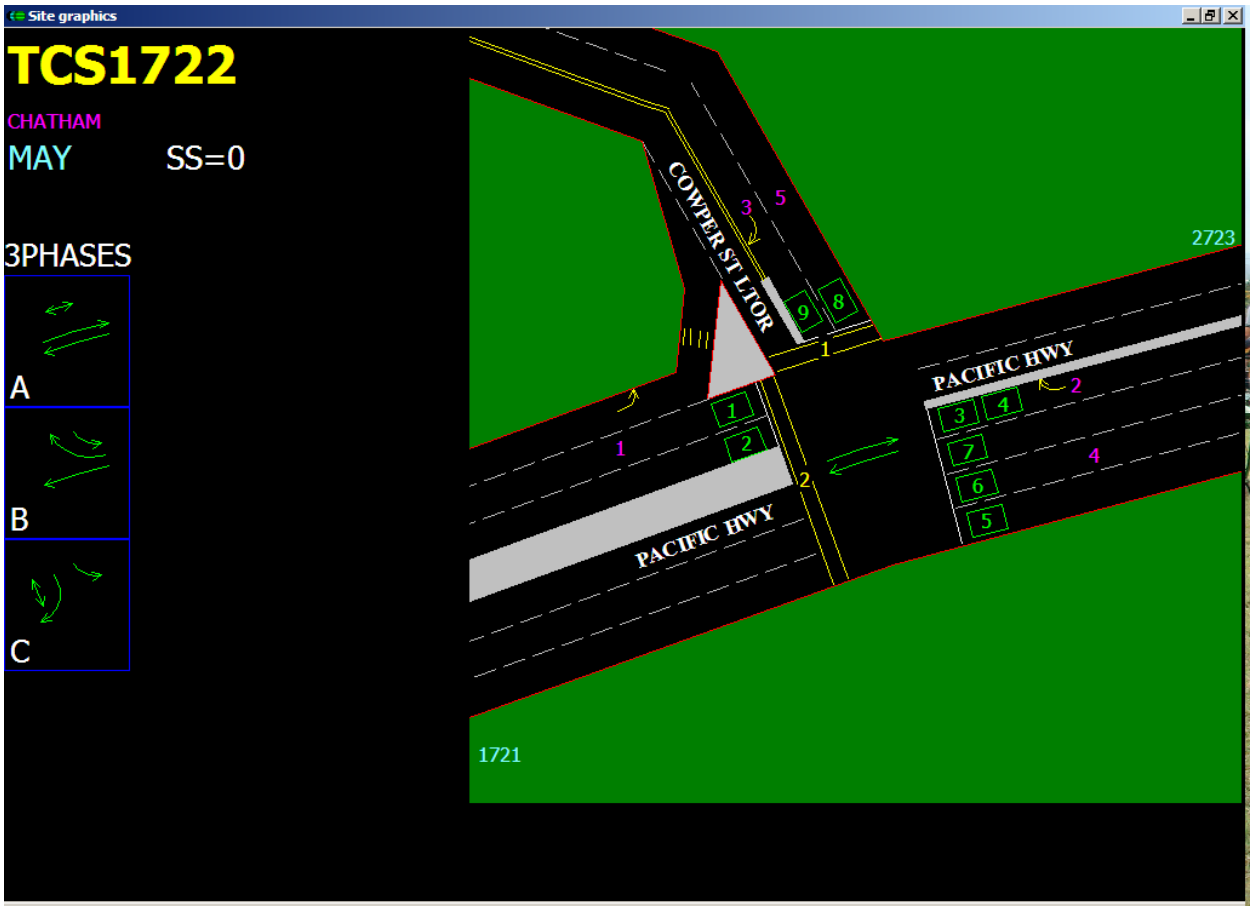
	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	1	0	0	0	2	2	3	2
:30	1	0	0	1	0	0	0	3	7	3	8	4
:45	0	1	0	0	0	2	0	3	9	6	5	5
:60	0	1	0	2	0	2	1	5	5	5	5	3
Hourly Total	1	2	0	3	1	4	1	11	23	16	21	14

AM Total: 97 AM peak 23 07:45 - 08:45

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	2	2	6	5	4	3	1	0	0	2	1	1
:30	3	2	4	4	6	3	0	1	0	2	0	0
:45	4	9	5	4	5	2	4	0	0	1	0	0
:60	5	3	6	9	3	0	2	1	0	1	0	1
Hourly Total	14	16	21	22	18	8	7	2	0	6	1	2

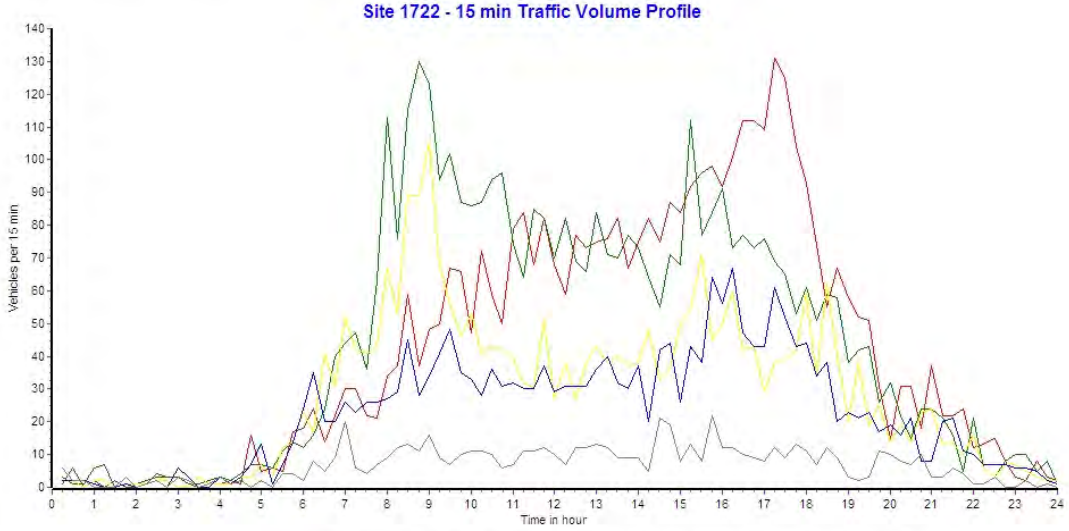
PM Total: 117 PM peak 24 15:45 - 16:45

Daily Total 214



SCATS Traffic Reporter
Volume profile On Wednesday 30 June 2010 filename MAY_20100630.vs
Printed Tuesday 06 July 2010 11:10 Page 1 of 1

Site 1722 - 15 min Traffic Volume Profile



pacific estbnd det:1-2. Daily Total 4096 AM peak 10:45 - 11:45 313 PM peak 16:30 - 17:30 477
Pacific wstbnd thru det:5-7.Daily Total 4258 AM peak 08:15 - 09:15 462 PM peak 15:00 - 16:00 364
Pacific wstbnd right det:4.Daily Total 2742 AM peak 08:15 - 09:15 351 PM peak 15:15 - 16:15 226
Cowper left det:8. Daily Total 2194 AM peak 08:45 - 09:45 158 PM peak 15:30 - 16:30 234
Cowper right det:9. Daily Total 656 AM peak 08:00 - 09:00 52 PM peak 14:15 - 15:15 61

Site: 1722 Wednesday, 30 June 2010 Traffic Flow filename:MAY_20100630.vs

Wednesday, 30 June 2010

pacific estbnd, Detectors: 1-2

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	1	0	1	1	2	6	24	30	37	50	72	84
:30	6	2	4	0	1	5	14	22	59	67	59	68
:45	0	0	3	1	16	17	22	21	37	66	50	82
:60	2	0	3	1	5	18	30	34	48	47	79	68
Hourly Total	9	2	11	3	24	46	90	107	181	230	260	302

AM Total: 1265 AM peak 313 10:45 - 11:45

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	59	76	82	92	101	131	74	52	31	22	13	2
:30	77	82	75	96	112	125	55	51	31	22	15	8
:45	73	67	87	98	112	104	67	31	18	24	8	3
:60	75	75	84	92	109	93	58	15	37	12	3	2
Hourly Total	284	300	328	378	434	453	254	149	117	80	39	15

PM Total: 2831 PM peak 477 16:30 - 17:30

Daily Total 4096

Pacific wstbnd thru, Detectors: 5-7

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	3	7	2	1	2	6	16	47	76	94	87	64
:30	1	0	3	1	4	11	24	36	115	102	94	85
:45	1	1	3	2	7	14	40	63	130	87	96	82
:60	6	1	3	3	7	12	44	113	123	86	74	70
Hourly Total	11	9	11	7	20	43	124	259	444	369	351	301

AM Total: 1949 AM peak 462 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	82	71	64	112	73	69	51	42	22	21	6	10
:30	69	70	55	77	77	65	59	43	15	16	3	5
:45	66	77	71	84	73	53	58	26	24	5	8	8
:60	84	73	68	91	76	61	38	32	24	21	10	1
Hourly Total	301	291	258	364	299	248	206	143	85	63	27	24

PM Total: 2309 PM peak 364 15:00 - 16:00

Daily Total 4258

Pacific wstbnd right, Detector: 4

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	2	2	1	0	1	3	17	42	53	68	41	32
:30	2	0	2	3	3	12	41	41	89	56	43	30
:45	0	1	2	1	3	14	31	43	89	46	42	51
:60	2	1	0	1	7	23	52	67	105	53	39	27
Hourly Total	6	4	5	5	14	52	141	193	336	223	165	140

AM Total: 1284 AM peak 351 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	38	38	48	54	60	38	34	38	19	13	6	5
:30	27	40	33	71	42	39	62	19	14	13	3	3
:45	38	37	36	45	43	42	41	25	23	10	7	2
:60	43	38	50	50	29	59	20	14	24	16	7	2

Hourly Total	146	153	167	220	174	178	157	96	80	52	23	12

PM Total: 1458 PM peak 226 15:15 - 16:15

Daily Total 2742

Cowper left, Detector: 8

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	2	0	1	3	1	1	35	23	29	41	28	30
:30	2	0	2	0	3	7	20	26	45	48	36	30
:45	2	1	0	0	7	14	20	26	28	35	31	37
:60	1	0	6	3	13	24	26	27	34	33	32	29
Hourly Total	7	1	9	6	24	46	101	102	136	157	127	126

AM Total: 842 AM peak 158 08:45 - 09:45

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	31	40	20	43	67	61	34	21	16	20	7	6
:30	31	32	42	38	47	52	38	23	21	21	7	5
:45	31	30	44	64	43	43	20	17	8	11	7	2
:60	36	37	26	56	43	44	23	19	8	10	6	1
Hourly Total	129	139	132	201	200	200	115	80	53	62	27	14

PM Total: 1352 PM peak 234 15:30 - 16:30

Daily Total 2194

Cowper right, Detector: 9

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	6	0	1	2	1	0	8	6	12	9	11	11
:30	2	0	2	0	2	4	5	4	13	7	10	11
:45	2	3	0	1	0	4	9	7	11	10	6	12
:60	0	0	3	3	2	2	20	9	16	11	7	10
Hourly Total	10	3	6	6	5	10	42	26	52	37	34	44

AM Total: 275 AM peak 52 08:00 - 09:00

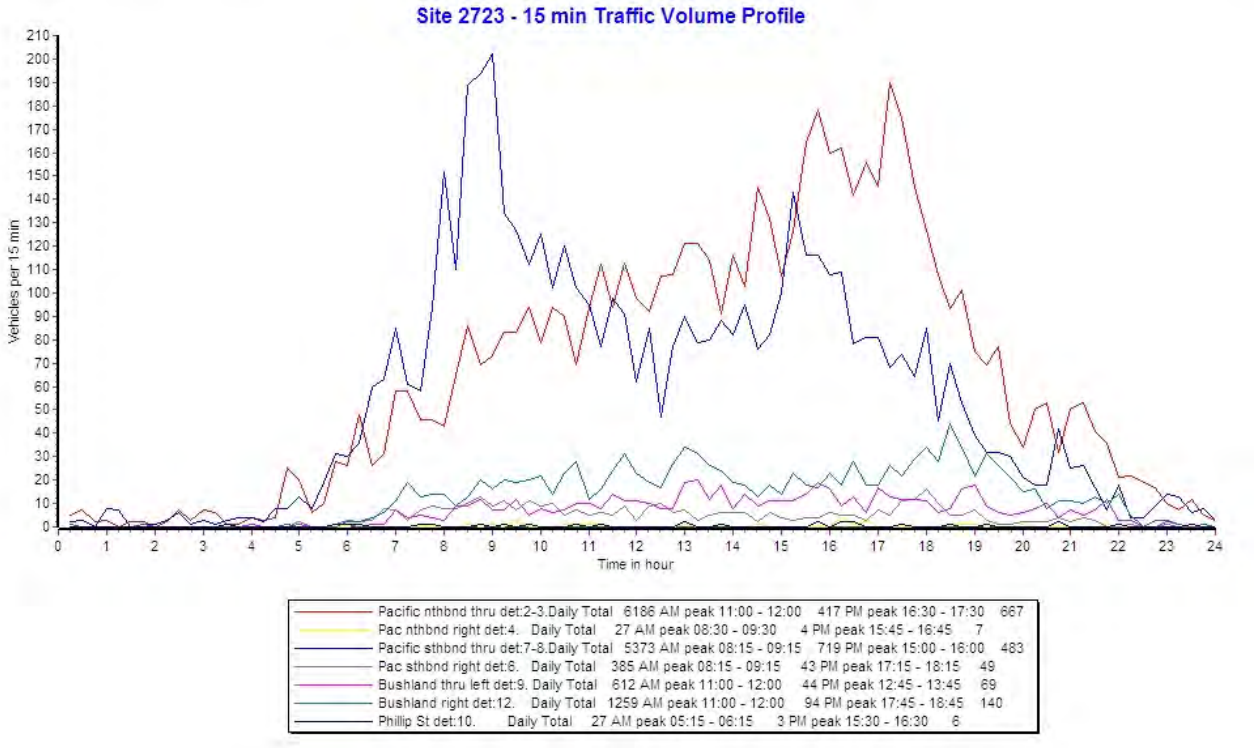
	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	7	12	5	13	12	12	7	2	8	3	1	2
:30	12	9	21	8	10	9	12	3	7	6	3	0
:45	12	9	19	22	9	13	9	11	10	4	0	1
:60	13	9	8	12	8	11	3	10	3	1	0	0
Hourly Total	44	39	53	55	39	45	31	26	28	14	4	3

PM Total: 381 PM peak 61 14:15 - 15:15

Daily Total 656

SCATS Traffic Reporter
Volume profile On Wednesday 30 June 2010 filename:MAY_20100630.ws

Printed Tuesday 06 July 2010 11:26 Page 1 of 1



Site: 2723 Wednesday, 30 June 2010 Traffic Flow filename:MAY_20100630.vs

Wednesday, 30 June 2010

Pacific nthbnd thru, Detectors: 2-3

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	5	0	2	6	3	6	48	58	65	83	94	112
:30	7	2	7	1	4	10	26	46	86	83	90	94
:45	2	2	3	1	25	28	31	46	69	94	69	113
:60	3	0	7	4	20	26	58	43	73	79	94	98
Hourly Total	17	4	19	12	52	70	163	193	293	339	347	417

AM Total: 1926 AM peak 417 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	92	121	103	126	162	190	108	69	50	53	22	7
:30	107	114	145	164	142	175	93	77	53	41	19	12
:45	108	91	132	178	156	145	101	44	32	36	17	5
:60	121	116	107	160	146	127	75	34	50	21	10	3
Hourly Total	428	442	487	628	606	637	377	224	185	151	68	27

PM Total: 4260 PM peak 667 16:30 - 17:30

Daily Total 6186

Pac nthbnd left, Detector: 1

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	0	0	0	0	0	0
:30	0	0	0	0	0	0	0	0	0	0	0	0
:45	0	0	0	0	0	0	0	0	0	0	0	0
:60	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	0	0	0	0	0	0	0	0	0	0	0	0
:30	0	0	0	0	0	0	0	0	0	0	0	0
:45	0	0	0	0	0	0	0	0	0	0	0	0
:60	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0

Daily Total 0

Pac nthbnd right, Detector: 4

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	1	0	0	0	0	1
:30	0	0	0	0	0	0	0	0	1	3	1	0
:45	0	0	0	0	0	0	0	0	0	0	1	0
:60	0	0	0	0	0	0	0	0	1	0	1	0
Hourly Total	0	0	0	0	0	0	1	0	2	3	3	1

AM Total: 10 AM peak 4 08:30 - 09:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	0	0	0	0	4	0	0	0	0	0	0	0
:30	0	0	1	0	1	0	1	1	0	0	0	1
:45	0	1	0	0	2	0	1	0	0	1	0	0
:60	1	0	0	0	0	0	1	1	0	0	0	0
Hourly Total	1	1	1	0	7	0	3	2	0	1	0	1

PM Total: 17 PM peak 7 15:45 - 16:45

Daily Total 27

Pacific sthbnd thru, Detectors: 7-8

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	2	7	3	1	2	8	36	61	110	134	102	77
:30	3	0	6	3	8	19	60	58	189	127	120	98
:45	0	1	1	4	8	31	63	94	194	112	102	91
:60	8	1	3	4	13	30	85	152	202	125	95	62
Hourly Total	13	9	13	12	31	88	244	365	695	498	419	328

AM Total: 2715 AM peak 719 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	85	79	95	143	109	68	45	32	18	26	4	13
:30	47	80	76	116	78	74	70	32	18	17	4	6
:45	77	88	82	116	81	64	53	30	42	7	9	8
:60	90	82	100	108	81	85	39	21	25	18	14	3
Hourly Total	299	329	353	483	349	291	207	115	103	68	31	30

PM Total: 2658 PM peak 483 15:00 - 16:00

Daily Total 5373

Pac sthbnd right, Detector: 6

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	2	3	8	11	10	6
:30	0	0	0	0	0	0	3	7	10	7	5	5
:45	0	0	0	0	0	1	8	9	13	11	7	9
:60	0	0	0	0	2	3	7	8	9	9	5	3
Hourly Total	0	0	0	0	2	4	20	27	40	38	27	23

AM Total: 181 AM peak 43 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	9	3	6	3	5	5	10	3	2	4	1	0
:30	10	5	2	4	5	11	5	1	2	3	0	0
:45	6	6	6	4	3	12	5	1	4	0	0	0
:60	7	6	4	6	7	16	7	2	2	0	1	0
Hourly Total	32	20	18	17	20	44	27	7	10	7	2	0

PM Total: 204 PM peak 49 17:15 - 18:15

Daily Total 385

Bushland thru left, Detector: 9

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	0	4	9	7	6	8
:30	0	0	0	0	0	0	1	5	9	12	7	14
:45	0	0	0	0	0	1	1	4	12	5	10	11
:60	0	0	0	1	1	1	7	3	7	8	10	11
Hourly Total	0	0	0	1	1	2	9	16	37	32	33	44

AM Total: 175 AM peak 44 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	10	20	14	11	9	13	6	9	8	5	3	1
:30	8	12	9	14	13	12	8	6	10	7	0	0
:45	8	18	11	19	6	12	16	5	4	12	0	0
:60	19	8	11	16	17	11	18	6	7	3	2	0
Hourly Total	45	58	45	60	45	48	48	26	29	27	5	1

PM Total: 437 PM peak 69 12:45 - 13:45

Daily Total 612

Bushland right, Detector: 12

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	1	0	0	0	0	0	2	19	9	20	14	16
:30	0	0	0	0	0	0	4	13	13	19	23	24
:45	0	1	0	0	1	0	6	14	20	20	28	31
:60	0	0	0	0	0	2	11	14	16	22	12	23
Hourly Total	1	1	0	0	1	2	23	60	58	81	77	94

AM Total: 398 AM peak 94 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	19	31	18	23	18	26	28	31	16	10	5	1
:30	17	26	13	18	28	22	44	26	8	13	0	0
:45	27	24	18	17	18	29	34	21	11	10	3	1
:60	34	19	14	23	18	34	22	15	11	14	3	0
Hourly Total	97	100	63	81	82	111	128	93	46	47	11	2

PM Total: 861 PM peak 140 17:45 - 18:45

Daily Total 1259

Phillip St, Detector: 10

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	1	0	0	1	0	1
:30	0	0	0	1	0	0	0	1	0	0	0	0
:45	0	0	0	0	0	1	0	1	1	1	1	0
:60	0	0	0	0	0	1	0	0	0	0	0	0
Hourly Total	0	0	0	1	0	2	1	2	1	2	1	1

AM Total: 11 AM peak 3 05:15 - 06:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	0	0	0	0	2	0	0	1	0	0	0	0
:30	0	0	0	0	2	1	1	0	0	0	0	1
:45	0	1	0	2	0	0	0	0	2	0	0	0
:60	2	0	0	0	0	0	0	0	0	1	0	0
Hourly Total	2	1	0	2	4	1	1	1	2	1	0	1

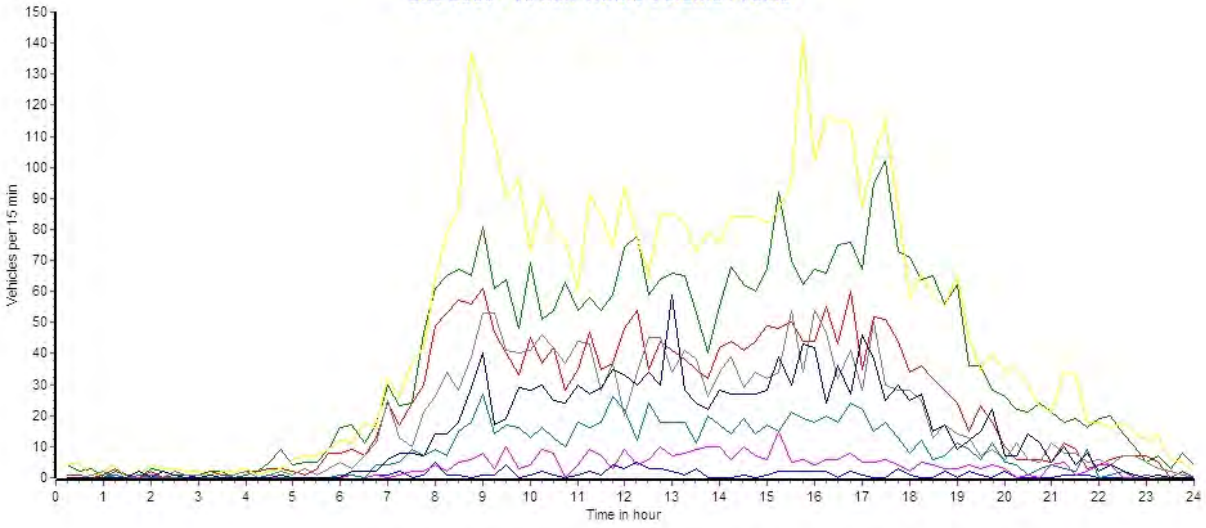
PM Total: 16 PM peak 6 15:30 - 16:30

Daily Total 27

SCATS Traffic Reporter
Volume profile On Wednesday 23 June 2010 filename MAY_20100623.vs

Printed Tuesday 06 July 2010 10:53 Page 1 of 1

Site 2969 - 15 min Traffic Volume Profile



Vic nthbnd thru left det:1.	Daily Total 2251	AM peak 08:00 - 09:00 227	PM peak 15:45 - 16:45 202
vic nthbnd thru righ det:2.	Daily Total 3554	AM peak 08:00 - 09:00 278	PM peak 17:00 - 18:00 341
vic sthbnd thru det:6.	Daily Total 4648	AM peak 08:30 - 09:30 458	PM peak 15:30 - 16:30 475
vic sthbnd left det:5.	Daily Total 82	AM peak 11:00 - 12:00 10	PM peak 12:00 - 13:00 13
vic sthbnd right det:4.	Daily Total 1852	AM peak 08:45 - 09:45 187	PM peak 15:15 - 16:15 189
macq wstbnd det:8.	Daily Total 318	AM peak 11:00 - 12:00 28	PM peak 14:15 - 15:15 38
macq estbnd thru rig det:9.	Daily Total 819	AM peak 11:00 - 12:00 82	PM peak 16:00 - 17:00 84
macq estbnd left det:7.	Daily Total 1445	AM peak 11:00 - 12:00 124	PM peak 15:00 - 16:00 154

Site: 2969 Wednesday, 23 June 2010 Traffic Flow filename:MAY_20100623.vs

Wednesday, 23 June 2010

Vic nthbnd thru left, Detector: 1

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	1	3	0	2	2	1	9	17	53	47	37	47
:30	1	1	1	1	3	3	7	24	57	40	42	35
:45	0	0	1	1	3	8	13	30	56	33	28	37
:60	1	2	1	2	2	8	24	49	61	45	35	48
Hourly Total	3	6	3	6	10	20	53	120	227	165	142	167

AM Total: 922 AM peak 227 08:00 - 09:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	54	38	44	48	55	52	36	15	6	11	6	5
:30	35	35	41	50	43	51	32	23	6	9	7	0
:45	44	32	44	44	60	44	28	18	6	3	7	2
:60	41	42	49	44	35	34	24	10	5	4	7	0
Hourly Total	174	147	178	186	193	181	120	66	23	27	27	7

PM Total: 1329 PM peak 202 15:45 - 16:45

Daily Total 2251

vic nthbnd thru righ, Detector: 2

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	4	2	2	2	2	5	17	23	65	61	51	58
:30	2	1	1	2	5	5	11	24	67	64	54	54
:45	3	0	1	0	9	9	17	47	65	48	63	59
:60	0	3	1	1	4	16	30	61	81	69	54	74
Hourly Total	9	6	5	5	20	35	75	155	278	242	222	245

AM Total: 1297 AM peak 278 08:00 - 09:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	78	65	68	92	66	95	64	36	22	18	20	7
:30	59	53	62	70	75	102	65	36	21	19	14	3
:45	64	40	60	62	76	73	56	28	24	16	10	8
:60	66	55	67	67	67	71	62	26	21	19	5	4
Hourly Total	267	213	257	291	284	341	247	126	88	72	49	22

PM Total: 2257 PM peak 341 17:00 - 18:00

Daily Total 3554

vic sthbnd thru, Detector: 6

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	4	4	3	1	1	7	11	26	79	109	91	91
:30	5	0	3	2	2	7	18	37	86	90	79	85
:45	0	1	2	2	3	9	16	42	137	96	77	74
:60	2	4	2	3	6	12	32	64	122	73	61	94
Hourly Total	11	9	10	8	12	35	77	169	424	368	308	344

AM Total: 1775 AM peak 458 08:30 - 09:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	77	82	84	86	116	103	65	45	35	34	16	14
:30	65	73	84	95	115	115	59	35	30	33	18	6
:45	85	79	84	142	114	87	55	40	23	18	14	5
:60	85	76	82	102	87	58	65	34	21	18	12	2
Hourly Total	312	310	334	425	432	363	244	154	109	103	60	27

PM Total: 2873 PM peak 475 15:30 - 16:30

Daily Total 4648

vic sthbnd left, Detector: 5

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	1	2	1	1	2	2
:30	0	0	0	0	0	0	0	0	1	4	1	1
:45	0	0	1	0	0	0	1	1	0	0	0	4
:60	0	0	0	0	0	0	1	5	1	1	1	3
Hourly Total	0	0	1	0	0	0	3	8	3	6	4	10

AM Total: 35 AM peak 10 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	5	1	0	2	2	0	0	2	0	1	0	1
:30	3	3	1	2	0	0	0	1	0	1	0	0
:45	3	0	0	2	2	3	2	0	0	1	0	0
:60	2	0	1	2	1	1	0	2	0	0	0	0
Hourly Total	13	4	2	8	5	4	2	5	0	3	0	1

PM Total: 47 PM peak 13 12:00 - 13:00

Daily Total 82

vic sthbnd right, Detector: 4

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	3	3	13	34	53	46	43
:30	0	0	2	0	1	1	7	10	28	41	42	28
:45	1	0	1	1	2	3	11	21	39	40	37	37
:60	2	0	1	2	1	5	25	26	53	41	44	20
Hourly Total	3	0	4	3	4	12	46	70	154	175	169	128

AM Total: 768 AM peak 187 08:45 - 09:45

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	34	41	39	34	47	50	25	13	11	8	4	3
:30	45	38	29	54	32	30	13	7	6	8	7	2
:45	45	26	34	34	41	28	17	9	5	5	7	1
:60	34	34	32	54	28	28	14	6	11	6	5	0
Hourly Total	158	139	134	176	148	136	69	35	33	27	23	6

PM Total: 1084 PM peak 189 15:15 - 16:15

Daily Total 1852

macq wstbnd, Detector: 8

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	1	1	2	3	9	9
:30	0	0	0	0	0	0	0	2	5	10	8	7
:45	0	0	0	0	0	0	1	2	6	3	0	3
:60	0	1	0	0	0	0	0	4	8	4	4	9
Hourly Total	0	1	0	0	0	0	2	9	21	20	21	28

AM Total: 102 AM peak 28 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	4	8	6	15	6	5	5	4	0	5	4	1
:30	6	9	10	5	6	6	4	3	1	1	0	0
:45	10	10	7	6	8	4	3	4	0	2	0	0
:60	7	10	6	4	5	2	3	3	4	4	0	0
Hourly Total	27	37	29	30	25	17	15	14	5	12	4	1

PM Total: 216 PM peak 38 14:15 - 15:15

Daily Total 318

macq estbnd thru rig, Detector: 9

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	1	0	0	0	0	1	5	7	14	16	16
:30	0	0	0	0	1	0	0	9	15	17	13	18
:45	0	1	0	0	0	0	4	7	18	16	10	26
:60	0	0	0	0	0	1	4	9	27	13	18	22
Hourly Total	0	2	0	0	1	1	9	30	67	60	57	82

AM Total: 309 AM peak 82 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	12	18	14	15	20	15	12	9	4	3	1	0
:30	24	11	19	21	18	18	6	6	1	2	2	0
:45	18	20	14	19	24	13	7	11	3	9	0	0
:60	18	17	17	18	22	8	11	5	4	0	1	0
Hourly Total	72	66	64	73	84	54	36	31	12	14	4	0

PM Total: 510 PM peak 84 16:00 - 17:00

Daily Total 819

macq estbnd left, Detector: 7

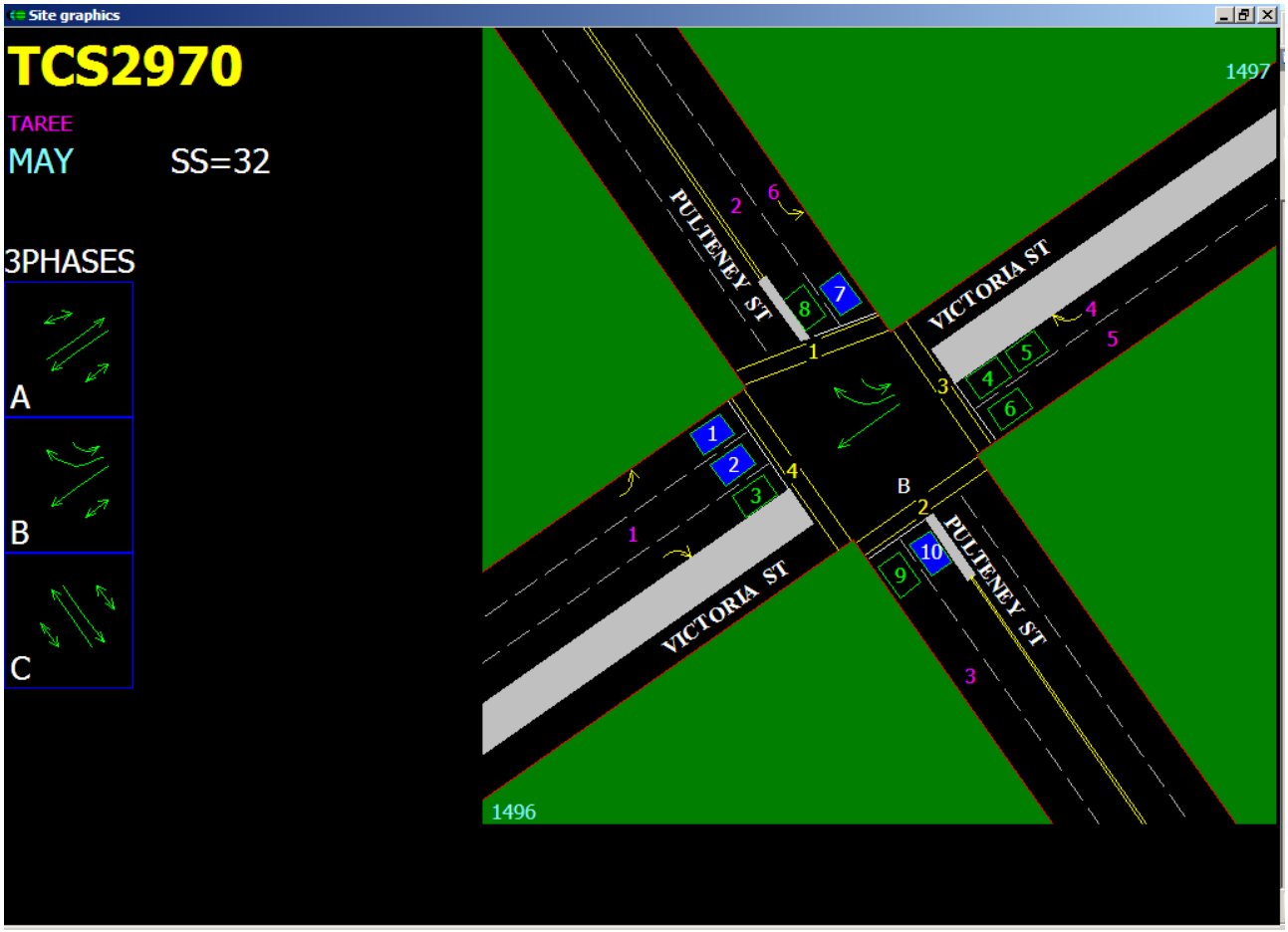
	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	2	1	0	0	2	8	14	17	30	27
:30	0	0	1	0	0	0	2	8	18	19	25	29
:45	0	2	0	0	1	0	2	7	29	29	24	35
:60	0	0	0	0	0	0	6	14	40	28	30	33
Hourly Total	0	2	3	1	1	0	12	37	101	93	109	124

AM Total: 483 AM peak 124 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	30	28	27	39	24	38	27	12	7	10	4	1
:30	34	24	27	30	36	25	15	15	14	4	2	0
:45	30	22	27	43	27	30	17	22	11	8	1	0
:60	59	28	28	42	46	25	9	7	5	2	0	0
Hourly Total	153	102	109	154	133	118	68	56	37	24	7	1

PM Total: 962 PM peak 154 15:00 - 16:00

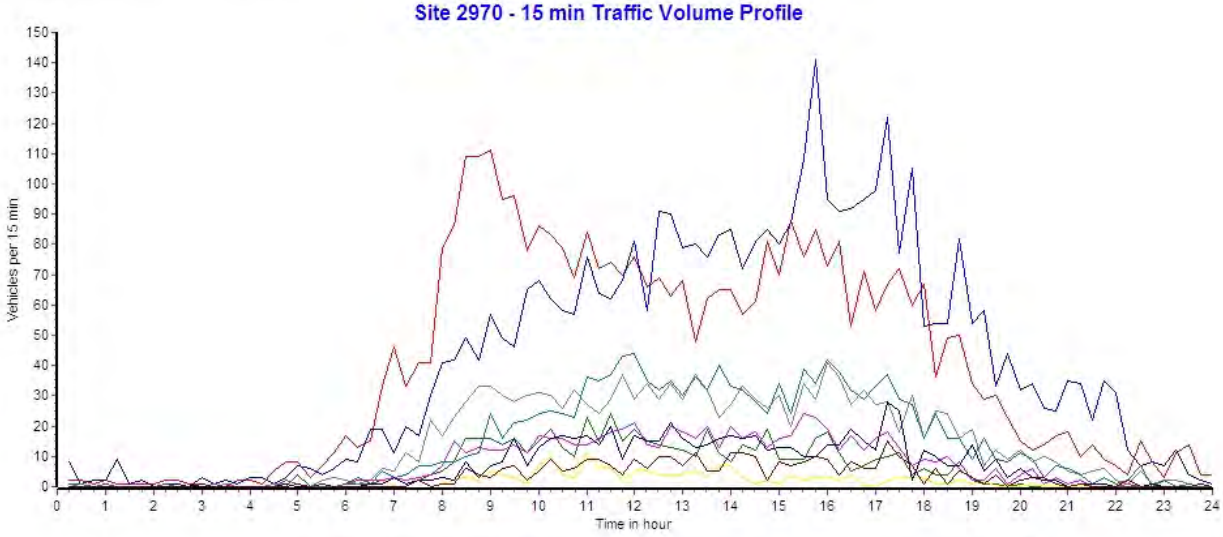
Daily Total 1445



SCATS Traffic Reporter
Volume profile On Wednesday 30 June 2010 filename MAY_20100630.vs

Printed Tuesday 06 July 2010 10:27 Page: 1 of 1

Site 2970 - 15 min Traffic Volume Profile



Vic Nthbnd thru det:2.	Daily Total 3815	AM peak 08:15 - 09:15 424	PM peak 15:00 - 16:00 322
Vic Nthbnd left det:1.	Daily Total 566	AM peak 10:45 - 11:45 77	PM peak 12:00 - 13:00 54
Vic Nthbnd right det:3.	Daily Total 166	AM peak 10:00 - 11:00 28	PM peak 13:00 - 14:00 22
Vic sthbnd thru left det:6.	Daily Total 4017	AM peak 11:00 - 12:00 275	PM peak 15:15 - 16:15 435
Vic sthbnd right det:5.	Daily Total 1438	AM peak 08:15 - 09:15 124	PM peak 15:15 - 16:15 140
Pult estbnd thru R det:8.	Daily Total 706	AM peak 11:00 - 12:00 74	PM peak 15:00 - 16:00 83
Pult estbnd left det:7.	Daily Total 1376	AM peak 11:00 - 12:00 159	PM peak 15:15 - 16:15 153
Pult wstbnd thru ri det:10.	Daily Total 639	AM peak 10:30 - 11:30 67	PM peak 16:30 - 17:30 80
Pult wstbnd thru l det:9.	Daily Total 318	AM peak 10:30 - 11:30 31	PM peak 12:15 - 13:15 38

Site: 2970 Wednesday, 30 June 2010 Traffic Flow filename:MAY_20100630.vs

Wednesday, 30 June 2010

Vic Nthbnd thru, Detector: 2

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	2	1	2	0	1	3	13	33	86	95	83	72
:30	2	1	2	0	5	7	15	41	109	96	79	74
:45	1	1	1	2	8	11	33	41	109	78	69	70
:60	2	1	1	2	8	17	46	79	111	86	84	76
Hourly Total	7	4	6	4	22	38	107	194	415	355	315	292

AM Total: 1759 AM peak 424 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	66	48	57	88	81	67	36	29	12	10	4	11
:30	69	62	61	76	53	72	49	30	14	14	15	14
:45	63	65	81	85	71	60	50	23	17	9	8	4
:60	68	65	70	73	58	67	34	15	18	7	3	4
Hourly Total	266	240	269	322	263	266	169	97	61	40	30	33

PM Total: 2056 PM peak 322 15:00 - 16:00

Daily Total 3815

Vic Nthbnd left, Detector: 1

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	1	0	0	1	0	8	14	19	15
:30	0	0	0	0	1	0	1	2	16	16	13	24
:45	0	0	0	0	0	0	2	4	16	11	10	15
:60	1	0	0	0	4	1	0	5	16	15	23	19
Hourly Total	1	0	0	1	5	1	4	11	56	56	65	73

AM Total: 273 AM peak 77 10:45 - 11:45

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	15	10	14	9	11	10	4	1	0	1	0	0
:30	14	19	12	9	5	11	4	1	0	0	0	0
:45	13	11	19	16	7	4	8	0	0	0	0	0
:60	12	8	9	18	9	6	2	1	0	0	0	0
Hourly Total	54	48	54	52	32	31	18	3	0	1	0	0

PM Total: 293 PM peak 54 12:00 - 13:00

Daily Total 566

Vic Nthbnd right, Detector: 3

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	0	0	2	4	10	6
:30	0	0	0	0	0	0	0	3	3	3	4	6
:45	0	0	0	0	0	0	2	0	2	1	3	2
:60	0	0	0	0	1	0	0	1	5	7	11	5
Hourly Total	0	0	0	0	1	0	2	4	12	15	28	19

AM Total: 81 AM peak 28 10:00 - 11:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	5	5	3	4	2	2	1	2	1	0	1	0
:30	4	3	1	2	4	3	1	0	0	0	0	0
:45	4	7	2	3	0	3	2	0	0	0	0	0
:60	4	7	1	3	0	3	1	0	0	1	0	0
Hourly Total	17	22	7	12	6	11	5	2	1	1	1	0

PM Total: 85 PM peak 22 13:00 - 14:00

Daily Total 166

Vic sthbnd thru left, Detector: 6

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	8	9	1	1	3	6	8	20	42	49	62	64
:30	1	1	1	2	1	4	19	17	49	46	58	62
:45	2	2	0	1	3	6	19	30	42	65	57	68
:60	2	0	3	3	7	9	11	41	57	68	76	81
Hourly Total	13	12	5	7	14	25	57	108	190	228	253	275

AM Total: 1187 AM peak 275 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	58	80	72	87	91	122	54	58	34	34	12	12
:30	91	76	81	108	92	77	54	33	26	22	7	4
:45	90	83	85	141	95	105	82	44	25	35	8	2
:60	79	85	80	95	98	53	54	32	35	31	7	1
Hourly Total	318	324	318	431	376	357	244	167	120	122	34	19

PM Total: 2830 PM peak 435 15:15 - 16:15

Daily Total 4017

Vic sthbnd right, Detector: 5

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	1	0	0	0	0	0	1	11	23	30	30	24
:30	0	0	0	1	1	2	2	8	28	28	26	29
:45	0	0	0	0	1	3	6	22	33	30	32	37
:60	0	0	0	0	0	2	5	17	33	31	27	29
Hourly Total	1	0	0	1	2	7	14	58	117	119	115	119

AM Total: 553 AM peak 124 08:15 - 09:15

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	34	37	33	20	36	28	25	7	8	4	1	2
:30	29	32	29	34	27	18	24	12	10	5	5	1
:45	34	23	26	29	32	30	16	9	8	6	1	0
:60	29	27	30	41	27	16	19	12	5	2	2	0
Hourly Total	126	119	118	124	122	92	84	40	31	17	9	3

PM Total: 885 PM peak 140 15:15 - 16:15

Daily Total 1438

Pult estbnd thru R, Detector: 8

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	2	2	15	12	16	16
:30	0	0	0	0	0	1	2	3	11	14	16	18
:45	0	0	0	0	0	0	2	4	13	11	14	19
:60	1	0	0	0	1	1	3	7	12	17	14	21
Hourly Total	1	0	0	0	1	2	9	16	51	54	60	74

AM Total: 268 AM peak 74 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	14	16	16	17	12	18	8	2	6	2	1	0
:30	13	20	18	24	17	13	10	6	1	0	0	0
:45	20	13	13	23	12	7	6	1	3	0	1	0
:60	18	20	16	19	16	9	2	4	1	0	0	0
Hourly Total	65	69	63	83	57	47	26	13	11	2	2	0

PM Total: 438 PM peak 83 15:00 - 16:00

Daily Total 706

Pult estbnd left, Detector: 7

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	1	0	1	1	0	0	3	4	8	16	25	35
:30	1	0	0	0	0	0	1	7	10	21	24	37
:45	0	0	0	0	2	0	5	7	11	22	23	43
:60	1	0	0	0	1	1	3	8	24	24	36	44
Hourly Total	3	0	1	1	3	1	12	26	53	83	108	159

AM Total: 450 AM peak 159 11:00 - 12:00

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	35	36	32	24	38	37	24	16	9	4	2	0
:30	32	32	28	39	32	29	16	9	3	1	7	1
:45	35	40	24	34	29	27	16	8	7	3	0	0
:60	30	33	34	42	33	16	9	11	6	1	2	0
Hourly Total	132	141	118	139	132	109	65	44	25	9	11	1

PM Total: 926 PM peak 153 15:15 - 16:15

Daily Total 1376

Pult wstbnd thru ri, Detector: 10

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	0	1	2	8	16	14
:30	0	0	0	0	0	1	1	2	8	16	17	20
:45	0	0	0	0	1	0	1	2	3	7	16	9
:60	0	0	0	0	0	0	3	3	7	13	17	17
Hourly Total	0	0	0	0	1	1	5	8	20	44	66	60

AM Total: 205 AM peak 67 10:30 - 11:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	15	13	16	13	14	28	10	5	3	1	2	0
:30	15	14	17	10	19	25	7	9	2	1	0	0
:45	21	16	12	10	15	2	7	3	2	1	1	1
:60	16	17	13	14	12	12	14	6	0	0	0	0
Hourly Total	67	60	58	47	60	67	38	23	7	3	3	1

PM Total: 434 PM peak 80 16:30 - 17:30

Daily Total 639

Pult wstbnd thru l, Detector: 9

	00:	01:	02:	03:	04:	05:	06:	07:	08:	09:	10:	11:
:15	0	0	0	0	0	0	0	0	1	6	9	9
:30	0	0	0	0	0	1	0	2	6	7	5	7
:45	0	0	0	0	0	0	0	0	4	2	6	4
:60	0	0	1	0	1	0	0	1	3	5	9	9
Hourly Total	0	0	1	0	1	1	0	3	14	20	29	29

AM Total: 98 AM peak 31 10:30 - 11:30

	12:	13:	14:	15:	16:	17:	18:	19:	20:	21:	22:	23:
:15	6	11	11	7	4	15	6	1	3	1	2	0
:30	10	5	10	8	8	10	1	4	3	0	0	0
:45	10	5	2	10	6	7	5	0	1	0	0	1
:60	7	11	8	9	6	1	3	2	0	0	0	0
Hourly Total	33	32	31	34	24	33	15	7	7	1	2	1

PM Total: 220 PM peak 38 12:15 - 13:15

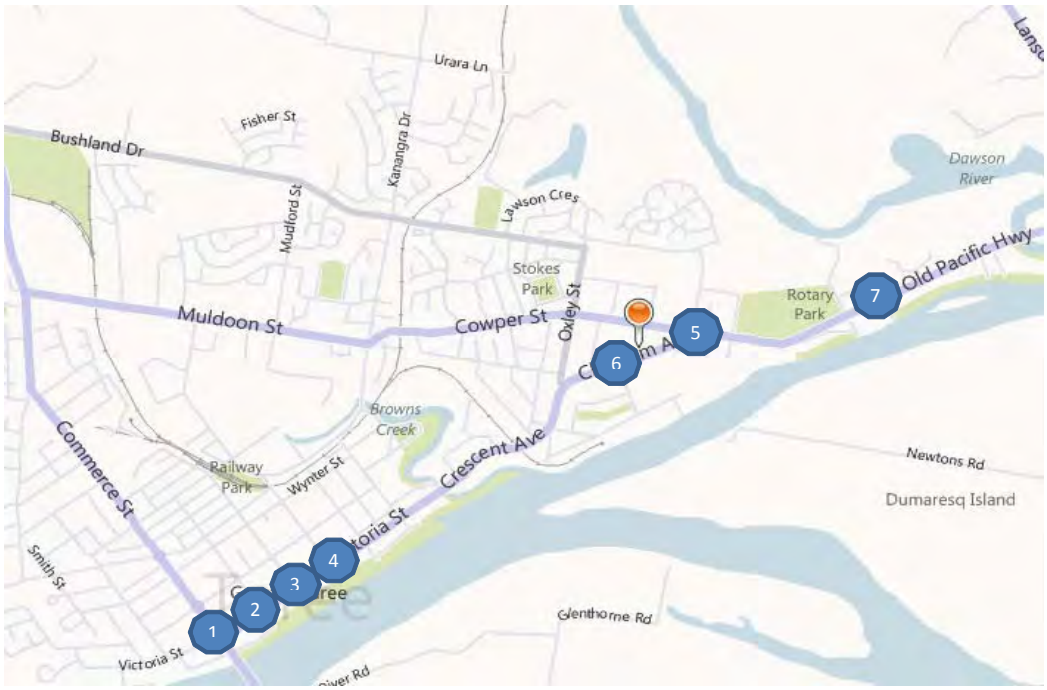
Daily Total 318

Taree Traffic Survey

Vehicle Classifications :- Cars, Medium Trucks, Heavy Trucks & Pedestrians
Survey Date :- Thursday 21st Julu 2011
Survey Time Period :- 7:00- 9:00 am & 4:00 - 6:00 pm
Survey Method :- Video Collection Unit (VCU)

TDC
Traffic Data & Control

Site No.	Site List	No of VCU's
1	Victoria Street & Commerce Street	1
2	Victoria Street & Pulteney Street	1
3	Victoria Street & Manning Street	1
4	Victoria Street & Macquarie Street	1
5	Manning River Drive & Cowper Street	1
6	Manning River Drive & Pioneer Street	1
7	Manning River Drive & Phillip Street	1



Appendix C

Development Trip Generation Table

Stage	Land Use	Hectares (Ha)	Gross Floor Area (GFA) / Units	Peak Hour Trip Generation	Total Trips
1	Industrial	10ha	35,000m²	0.75 / 100 m² (GFA)	263
	Bulky Goods	3ha	10,500 m²	4 / 100 m² (GFA)	420
	Mixed Use Centre	3.5ha	13,125 m² (8,750 m² Office Space) (4,375 m² Community Services)	 2 / 100 m² (GFA) 2 / 100 m² (GFA)	263
	Primary School	3ha	150 students	0.8 per student	120
	Residential	180ha	1,594 Lots	0.85 / lot	1,355
	Rural Residential	43ha	100 Lots	0.85 / lot	85
	Rural	263ha	11 Lots	0.7 / lot	7
2	Industrial	15ha	52,500m²	0.75 / 100 m² (GFA)	394
	Bulky Goods	3.5ha	12,250 m²	4 / 100 m² (GFA)	490
	Mixed Use (Regional Shopping Centre)	14ha	24,500 m² (9,000 m² slow retail) (5,000 m² fast retail) (4,500 m² supermarket) (5,000 m² specialty stores) (1,000 m² offices)	 2 / 100 m² (GFA) 5.1 / 100 m² (GFA) 15.5 / 100 m² (GFA) 4.6 / 100 m² (GFA) 2.2 / 100 m² (GFA)	1,038
	Neighbourhood Shops		2,500 m² (250 m² slow retail) (250 m² fast retail) (1000 m² supermarket) (700 m² specialty stores) (300 m² offices)	 2 / 100 m² (GFA) 5.1 / 100 m² (GFA) 15.5 / 100 m² (GFA) 4.6 / 100 m² (GFA) 2.2 / 100 m² (GFA)	212
	Residential	191ha	1,688 Lots	0.85 / lot	1,435
	Medium Density Residential	14ha	259 Tennaments	0.5 / lot	130
	Seniors Living		75 Tennaments	0.15 / lot	11
3	Sporting Club	52ha			600
	Golf Club				60
	High School	6ha	600 students	0.8 per student	480
	Industrial	20ha	70,000 m²	0.75 / 100 m² (GFA)	525
	Bulky Goods	7ha	24,500 m²	4 / 100 m² (GFA)	980

	Mixed Use Centre	4ha	15,000 m² (10,000 m² Office Space) (5,000 m² Community Services)	 2 / 100 m² (GFA) 2 / 100 m² (GFA)	300
	Neighbourhood Shops		2,500 m² (250 m² slow retail) (250 m² fast retail) (1000 m² supermarket) (700 m² specialty stores) (300 m² offices)	 2 / 100 m² (GFA) 5.1 / 100 m² (GFA) 15.5 / 100 m² (GFA) 4.6 / 100 m² (GFA) 2.2 / 100 m² (GFA)	212
	Primary School	3ha	150 students	0.8 per student	120
	Residential	149ha	1,317 Lots	0.85 / lot	1,120
	Medium Density Residential	40ha	741 Tennaments	0.5 / lot	370
	Seniors Living		215 Tennaments	0.15 / lot	32
4	Industrial	50ha	175,000 m²	0.75 / 100 m² (GFA)	875
	Bulky Goods	9.5ha	33,250 m²	4 / 100 m² (GFA)	1,330
	Mixed Use Centre	4.5ha	16,875 m² (11,250 m² Office Space) (5,625 m² Community Services)	 2 / 100 m² (GFA) 2 / 100 m² (GFA)	338
	Neighbourhood Shops		2,500 m² (250 m² slow retail) (250 m² fast retail) (1000 m² supermarket) (700 m² specialty stores) (300 m² offices)	 2 / 100 m² (GFA) 5.1 / 100 m² (GFA) 15.5 / 100 m² (GFA) 4.6 / 100 m² (GFA) 2.2 / 100 m² (GFA)	212
	Primary School	3ha	150 students	0.8 per student	120
	Residential	226ha	2,000 Lots	0.85 / lot	1,700
Total		1,307	8,001 Lots / Tennaments		15,597

Appendix D

Paramics Modelling Report

Appendix E

SIDRA Intersection Modelling Results

Existing Signalised Intersections

Victoria Street / Commerce Street

MOVEMENT SUMMARY

Site: 2011 AM - Existing

Commerce St and Victoria St Signalised Intersection
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Commerce St SE											
21	L	45	2.3	0.764	20.0	LOS B	31.0	222.7	0.69	0.97	40.5
22	T	967	2.7	0.764	11.8	LOS A	31.0	222.7	0.69	0.67	42.7
23	R	280	5.9	1.000[3]	42.8	LOS D	11.1	81.6	0.94	0.83	27.7
Approach		1293	3.7	1.000	18.8	LOS B	31.0	222.7	0.75	0.71	38.1
North East: Victoria St NE											
24	L	135	6.3	0.182	22.4	LOS B	3.2	23.9	0.57	0.75	37.2
25	T	51	4.2	0.253	37.3	LOS C	2.4	17.6	0.88	0.65	28.0
26	R	31	3.4	0.253	46.8	LOS D	2.4	17.6	0.89	0.77	26.8
Approach		216	5.4	0.253	29.4	LOS C	3.2	23.9	0.69	0.73	32.9
North West: Commerce St NW											
27	L	61	10.3	0.093	28.5	LOS B	1.7	13.1	0.66	0.74	33.8
28	T	320	12.2	0.469	23.8	LOS B	10.7	82.5	0.79	0.67	34.7
Approach		381	11.9	0.469	24.6	LOS B	10.7	82.5	0.76	0.69	34.5
South West: Victoria St SW											
30	L	27	0.0	0.122	15.4	LOS B	0.5	3.4	0.45	0.72	42.0
31	T	78	4.1	0.246	37.2	LOS C	3.0	22.1	0.88	0.68	28.5
Approach		105	3.0	0.246	31.5	LOS C	3.0	22.1	0.77	0.69	31.1
All Vehicles		1995	5.4	1.000	21.7	LOS B	31.0	222.7	0.74	0.71	36.3

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 2011 PM - Existing

Commerce St and Victoria St Signalised Intersection
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Commerce St SE											
21	L	25	0.0	0.260	13.2	LOS A	5.4	38.7	0.37	0.98	45.3
22	T	329	2.2	0.260	5.1	LOS A	5.4	38.7	0.37	0.32	50.9
23	R	161	3.3	0.552	38.0	LOS C	5.8	41.5	0.83	0.78	29.5
Approach		516	2.4	0.552	15.7	LOS B	5.8	41.5	0.51	0.50	41.2
North East: Victoria St NE											
24	L	385	1.6	0.505	24.8	LOS B	10.9	77.4	0.68	0.80	35.6
25	T	55	3.8	0.531	38.5	LOS C	4.8	34.0	0.89	0.68	27.6
26	R	97	1.1	0.531	50.0	LOS D	4.8	34.0	0.95	0.79	25.4
Approach		537	1.8	0.531	30.8	LOS C	10.9	77.4	0.75	0.79	32.3
North West: Commerce St NW											
27	L	69	1.5	0.100	28.3	LOS B	2.0	13.9	0.66	0.74	33.7
28	T	785	2.0	1.080	120.6	LOS F	68.0	484.2	1.00	1.67	13.6
Approach		855	2.0	1.080	113.1	LOS F	68.0	484.2	0.97	1.60	14.3
South West: Victoria St SW											
30	L	3	0.0	0.007	9.1	LOS A	0.0	0.1	0.19	0.67	47.9
31	T	67	1.6	0.224	37.9	LOS C	2.7	18.8	0.89	0.68	28.2
Approach		71	1.5	0.224	36.7	LOS C	2.7	18.8	0.86	0.68	28.7
All Vehicles		1978	2.0	1.080	62.6	LOS E	68.0	484.2	0.79	1.06	21.6

MOVEMENT SUMMARY

Site: 2042 AM - Full Development

Commerce St and Victoria St Signalised Intersection
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Commerce St SE											
21	L	52	2.0	0.788	21.5	LOS B	34.6	247.9	0.72	0.99	39.5
22	T	997	2.4	0.788	13.3	LOS A	34.6	247.9	0.72	0.71	41.5
23	R	279	6.7	1.000[3]	42.9	LOS D	11.0	81.6	0.94	0.83	27.7
Approach		1327	3.6	1.000	19.8	LOS B	34.6	247.9	0.77	0.74	37.5
North East: Victoria St NE											
24	L	191	4.4	0.255	22.9	LOS B	4.7	34.5	0.59	0.77	36.9
25	T	106	2.0	0.566	40.0	LOS C	5.2	36.9	0.92	0.71	27.0
26	R	59	1.8	0.566	51.0	LOS D	5.2	36.9	0.96	0.80	25.5
Approach		356	3.3	0.566	32.7	LOS C	5.2	36.9	0.75	0.76	31.2
North West: Commerce St NW											
27	L	131	4.8	0.192	29.3	LOS C	3.8	28.0	0.69	0.77	33.3
28	T	736	5.3	1.033	84.2	LOS F	53.6	392.0	1.00	1.41	17.6
Approach		866	5.2	1.033	75.9	LOS F	53.6	392.0	0.95	1.31	18.9
South West: Victoria St SW											
30	L	48	0.0	0.217	18.0	LOS B	1.1	7.6	0.54	0.75	40.0
31	T	123	2.6	0.385	38.3	LOS C	5.0	35.5	0.91	0.72	28.0
Approach		172	1.8	0.385	32.6	LOS C	5.0	35.5	0.81	0.73	30.6
All Vehicles		2721	3.9	1.033	40.2	LOS C	53.6	392.0	0.83	0.93	27.7

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 2042 PM - Full Development

Commerce St and Victoria St Signalised Intersection
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Commerce St SE											
21	L	39	2.7	0.515	19.8	LOS B	14.7	106.7	0.61	0.96	40.6
22	T	546	4.0	0.515	11.6	LOS A	14.7	106.7	0.61	0.55	43.4
23	R	212	11.4	0.896	55.7	LOS D	10.2	78.2	0.99	0.91	23.8
Approach		797	5.9	0.896	23.7	LOS B	14.7	106.7	0.71	0.66	35.5
North East: Victoria St NE											
24	L	600	1.4	0.786	27.8	LOS B	20.0	141.5	0.80	0.85	34.0
25	T	104	2.0	0.522	29.8	LOS C	7.3	51.6	0.81	0.65	31.1
26	R	152	0.7	0.522	41.3	LOS C	7.3	51.6	0.89	0.82	28.3
Approach		856	1.4	0.786	30.4	LOS C	20.0	141.5	0.82	0.82	32.5
North West: Commerce St NW											
27	L	134	4.7	0.197	29.3	LOS C	3.9	28.7	0.69	0.77	33.3
28	T	934	4.2	1.302	315.5	LOS F	137.0	993.6	1.00	2.84	6.1
Approach		1067	4.2	1.302	279.7	LOS F	137.0	993.6	0.96	2.58	6.8
South West: Victoria St SW											
30	L	38	0.0	0.126	11.2	LOS A	0.4	2.9	0.31	0.70	45.8
31	T	74	4.3	0.146	28.2	LOS B	2.5	18.0	0.78	0.61	32.4
Approach		112	2.8	0.146	22.4	LOS B	2.5	18.0	0.62	0.64	36.0
All Vehicles		2832	3.8	1.302	122.2	LOS F	137.0	993.6	0.83	1.43	13.6

Victoria Street / Pultney Street

MOVEMENT SUMMARY

Site: 2011 AM Existing

Pulteney St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Pulteney St SE											
21	L	7	0.0	0.131	33.8	LOS C	0.2	1.5	0.65	0.65	29.5
22	T	13	8.3	0.062	27.5	LOS B	0.7	5.3	0.67	0.49	32.2
23	R	13	0.0	0.062	34.8	LOS C	0.7	5.3	0.67	0.78	29.8
Approach		33	3.2	0.131	31.8	LOS C	0.7	5.3	0.66	0.64	30.6
North East: Victoria St NE											
24	L	41	0.0	0.270	11.2	LOS A	3.4	24.3	0.27	0.72	34.6
25	T	262	5.7	0.270	5.5	LOS A	3.4	24.3	0.27	0.23	35.5
26	R	100	2.6	1.000 [3]	24.8	LOS B	2.5	18.0	0.62	0.72	28.3
Approach		402	3.9	1.000	10.8	LOS A	3.4	24.3	0.35	0.40	33.2
North West: Pulteney St NW											
27	L	66	9.5	0.226	17.9	LOS B	1.1	8.0	0.37	0.69	38.7
28	T	20	0.0	0.087	27.7	LOS B	1.1	8.0	0.67	0.51	32.2
29	R	18	5.9	0.087	34.7	LOS C	1.1	8.0	0.67	0.77	29.9
Approach		104	7.1	0.226	22.7	LOS B	1.1	8.0	0.48	0.67	35.4
South West: Victoria St SW											
30	L	56	3.8	0.481	24.1	LOS B	1.3	9.1	0.53	0.67	28.6
31	T	456	7.4	0.648	23.9	LOS B	14.8	110.5	0.77	0.68	26.3
32	R	12	0.0	0.093	25.5	LOS B	0.3	1.9	0.54	0.64	28.1
Approach		523	6.8	0.648	23.9	LOS B	14.8	110.5	0.74	0.67	26.6
All Vehicles		1062	5.6	1.000	19.1	LOS B	14.8	110.5	0.57	0.57	29.7

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 2011 PM Existing

Pulteney St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Pulteney St SE											
21	L	43	0.0	0.779	37.0	LOS C	1.3	8.8	0.73	0.70	28.1
22	T	29	0.0	0.153	28.5	LOS C	1.8	12.8	0.69	0.54	31.6
23	R	31	0.0	0.153	35.8	LOS C	1.8	12.8	0.69	0.80	29.3
Approach		103	0.0	0.779	34.2	LOS C	1.8	12.8	0.71	0.68	29.5
North East: Victoria St NE											
24	L	18	0.0	0.373	11.7	LOS A	5.4	37.8	0.30	0.76	34.4
25	T	415	1.0	0.373	5.9	LOS A	5.4	37.8	0.30	0.26	35.2
26	R	120	0.9	0.866	21.2	LOS B	2.5	18.0	0.46	0.74	29.7
Approach		553	1.0	0.866	9.4	LOS A	5.4	37.8	0.33	0.38	33.7
North West: Pulteney St NW											
27	L	147	0.0	0.473	18.6	LOS B	2.5	17.5	0.41	0.71	38.1
28	T	21	0.0	0.197	29.0	LOS C	2.4	17.1	0.71	0.56	31.2
29	R	56	3.8	0.197	35.9	LOS C	2.4	17.1	0.71	0.76	29.0
Approach		224	0.9	0.473	23.9	LOS B	2.5	17.5	0.51	0.71	34.6
South West: Victoria St SW											
30	L	43	2.4	0.367	23.8	LOS B	1.0	6.9	0.52	0.66	28.7
31	T	248	1.7	0.341	20.5	LOS B	6.5	46.4	0.62	0.52	27.6
32	R	13	0.0	0.113	28.7	LOS C	0.3	2.3	0.59	0.66	27.0
Approach		304	1.7	0.367	21.3	LOS B	6.5	46.4	0.60	0.55	27.8
All Vehicles		1184	1.1	0.866	17.4	LOS B	6.5	46.4	0.47	0.51	31.7

MOVEMENT SUMMARY

Site: 2042 AM - Full Development

Pulteney St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Pulteney St SE											
21	L	20	0.0	0.358	34.2	LOS C	0.6	4.0	0.66	0.67	29.3
22	T	20	5.3	0.103	28.0	LOS B	1.2	8.5	0.68	0.52	31.9
23	R	20	0.0	0.103	35.4	LOS C	1.2	8.5	0.68	0.79	29.5
Approach		60	1.8	0.358	32.5	LOS C	1.2	8.5	0.67	0.66	30.2
North East: Victoria St NE											
24	L	69	0.0	0.458	12.1	LOS A	7.1	50.8	0.33	0.73	34.1
25	T	447	3.8	0.458	6.3	LOS A	7.1	50.8	0.33	0.30	34.8
26	R	94	1.8	1.000[3]	26.7	LOS B	2.5	18.0	0.65	0.72	27.6
Approach		611	2.6	1.000	10.1	LOS A	7.1	50.8	0.38	0.41	33.2
North West: Pulteney St NW											
27	L	162	3.9	0.540	20.4	LOS B	2.8	20.2	0.48	0.72	36.8
28	T	18	0.0	0.131	28.2	LOS B	1.6	11.5	0.69	0.53	31.6
29	R	36	2.9	0.131	35.1	LOS C	1.6	11.5	0.69	0.75	29.4
Approach		216	3.4	0.540	23.5	LOS B	2.8	20.2	0.53	0.71	34.9
South West: Victoria St SW											
30	L	95	2.2	0.815	32.2	LOS C	2.2	15.8	0.77	0.73	25.9
31	T	491	6.9	0.696	24.5	LOS B	16.6	122.8	0.80	0.70	26.0
32	R	29	0.0	0.264	29.2	LOS C	0.8	5.5	0.60	0.68	26.8
Approach		615	5.8	0.815	25.9	LOS B	16.6	122.8	0.79	0.71	26.1
All Vehicles		1501	4.0	1.000	19.4	LOS B	16.6	122.8	0.58	0.59	29.9

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 2042 PM - Full Development

Pulteney St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Pulteney St SE											
21	L	35	0.0	0.625	34.6	LOS C	1.0	7.1	0.67	0.69	29.1
22	T	49	2.1	0.266	29.7	LOS C	3.2	22.6	0.73	0.59	31.0
23	R	51	0.0	0.266	37.0	LOS C	3.2	22.6	0.73	0.82	28.9
Approach		135	0.8	0.625	33.7	LOS C	3.2	22.6	0.71	0.70	29.7
North East: Victoria St NE											
24	L	29	0.0	0.672	13.5	LOS A	14.6	103.6	0.46	0.80	33.6
25	T	745	1.6	0.672	7.7	LOS A	14.6	103.6	0.46	0.42	33.9
26	R	113	2.7	1.000[3]	21.2	LOS B	2.5	18.0	0.55	0.71	29.7
Approach		887	1.8	1.000	9.6	LOS A	14.6	103.6	0.47	0.47	33.2
North West: Pulteney St NW											
27	L	215	2.9	0.718	25.1	LOS B	3.9	27.8	0.66	0.76	33.9
28	T	28	0.0	0.402	31.1	LOS C	5.1	35.9	0.77	0.64	30.0
29	R	122	0.9	0.402	37.9	LOS C	5.1	35.9	0.77	0.79	28.1
Approach		365	2.0	0.718	29.9	LOS C	5.1	35.9	0.71	0.76	31.4
South West: Victoria St SW											
30	L	43	4.9	0.374	23.9	LOS B	1.0	7.0	0.52	0.66	28.7
31	T	363	9.3	0.523	22.4	LOS B	10.8	81.6	0.70	0.61	26.9
32	R	18	0.0	0.209	38.6	LOS C	0.6	4.3	0.74	0.69	24.0
Approach		424	8.4	0.523	23.2	LOS B	10.8	81.6	0.68	0.62	26.9
All Vehicles		1812	3.3	1.000	18.7	LOS B	14.6	103.6	0.59	0.58	30.9

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Victoria Street / Manning Street

MOVEMENT SUMMARY

Site: 2011 AM - Existing

Manning Sreet and Victoria Street Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Manning St SE											
21	L	6	0.0	0.029	34.2	LOS C	0.4	2.7	0.66	0.71	29.6
22	T	3	33.3	0.029	27.0	LOS B	0.4	2.7	0.66	0.46	32.1
23	R	3	0.0	0.029	34.2	LOS C	0.4	2.7	0.66	0.71	29.6
Approach		13	8.3	0.029	32.4	LOS C	0.4	2.7	0.66	0.65	30.3
North East: Victoria St NE											
24	L	12	0.0	0.332	11.5	LOS A	4.5	32.3	0.28	0.76	34.5
25	T	369	2.8	0.332	5.7	LOS A	4.5	32.3	0.28	0.25	35.4
26	R	97	3.3	0.845	34.1	LOS C	3.2	22.7	0.69	0.80	25.3
Approach		478	2.9	0.845	11.6	LOS A	4.5	32.3	0.37	0.37	32.5
North West: Manning St NW											
27	L	73	2.9	0.284	17.8	LOS B	1.2	8.3	0.37	0.69	38.7
28	T	5	0.0	0.122	28.2	LOS B	1.5	10.7	0.68	0.53	31.3
29	R	44	4.8	0.122	35.5	LOS C	1.5	10.7	0.68	0.74	28.9
Approach		122	3.4	0.284	24.6	LOS B	1.5	10.7	0.50	0.70	34.2
South West: Victoria St SW											
30	L	91	4.7	0.756	31.1	LOS C	18.7	138.9	0.84	0.85	26.6
31	T	436	8.0	0.756	25.3	LOS B	18.7	138.9	0.84	0.74	25.6
32	R	19	5.6	0.257	28.3	LOS B	0.5	3.6	0.58	0.68	27.1
Approach		545	7.3	0.756	26.4	LOS B	18.7	138.9	0.83	0.76	25.8
All Vehicles		1158	5.1	0.845	20.2	LOS B	18.7	138.9	0.60	0.59	29.1

MOVEMENT SUMMARY

Site: 2011 PM - Existing

Manning Street and Victoria Street Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Manning St SE											
21	L	38	0.0	0.150	35.6	LOS C	2.0	14.0	0.69	0.76	29.0
22	T	14	0.0	0.150	28.4	LOS B	2.0	14.0	0.69	0.54	31.3
23	R	15	0.0	0.150	35.6	LOS C	2.0	14.0	0.69	0.76	29.0
Approach		66	0.0	0.150	34.1	LOS C	2.0	14.0	0.69	0.71	29.5
North East: Victoria St NE											
24	L	16	6.7	0.343	11.7	LOS A	4.7	33.8	0.29	0.76	34.5
25	T	378	2.5	0.343	5.8	LOS A	4.7	33.8	0.29	0.25	35.3
26	R	122	0.0	0.833	26.8	LOS B	3.3	23.2	0.58	0.78	27.6
Approach		516	2.0	0.833	10.9	LOS A	4.7	33.8	0.36	0.39	33.0
North West: Manning St NW											
27	L	129	0.0	0.500	19.6	LOS B	2.2	15.1	0.45	0.71	37.4
28	T	17	0.0	0.389	31.7	LOS C	5.0	34.8	0.78	0.64	29.5
29	R	128	0.0	0.389	38.9	LOS C	5.0	34.8	0.78	0.79	27.5
Approach		275	0.0	0.500	29.4	LOS C	5.0	34.8	0.62	0.74	31.6
South West: Victoria St SW											
30	L	97	0.0	0.546	28.4	LOS B	11.9	84.2	0.71	0.81	27.3
31	T	298	1.4	0.546	22.6	LOS B	11.9	84.2	0.71	0.62	26.6
32	R	24	0.0	0.323	29.3	LOS C	0.6	4.5	0.60	0.68	26.7
Approach		419	1.0	0.546	24.4	LOS B	11.9	84.2	0.71	0.67	26.8
All Vehicles		1276	1.2	0.833	20.5	LOS B	11.9	84.2	0.55	0.57	30.2

MOVEMENT SUMMARY

Site: 2042 AM - Full Development

Manning Street and Victoria Street Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Manning St SE											
21	L	8	0.0	0.090	35.1	LOS C	1.0	7.0	0.67	0.73	29.1
22	T	4	25.0	0.090	27.9	LOS B	1.0	7.0	0.67	0.51	31.5
23	R	20	0.0	0.090	35.2	LOS C	1.0	7.0	0.67	0.73	29.1
Approach		33	3.2	0.090	34.2	LOS C	1.0	7.0	0.67	0.70	29.4
North East: Victoria St NE											
24	L	59	0.0	0.632	13.2	LOS A	12.8	90.5	0.43	0.78	33.6
25	T	664	1.8	0.632	7.4	LOS A	12.8	90.5	0.43	0.39	34.0
26	R	99	1.6	1.000[3]	37.1	LOS C	3.5	24.6	0.80	0.72	24.4
Approach		822	1.7	1.000	11.4	LOS A	12.8	90.5	0.47	0.46	32.3
North West: Manning St NW											
27	L	199	1.1	0.788	27.3	LOS B	3.5	24.9	0.74	0.77	32.6
28	T	9	0.0	0.116	28.1	LOS B	1.4	10.3	0.68	0.52	31.5
29	R	38	5.6	0.116	35.4	LOS C	1.4	10.3	0.68	0.75	29.1
Approach		246	1.7	0.788	28.6	LOS C	3.5	24.9	0.73	0.76	32.0
South West: Victoria St SW											
30	L	117	3.6	0.925	39.2	LOS C	29.9	220.3	0.98	0.97	24.2
31	T	533	6.5	0.925	33.4	LOS C	29.9	220.3	0.98	0.96	23.1
32	R	19	5.6	0.317	35.9	LOS C	0.6	4.4	0.69	0.69	24.7
Approach		668	6.0	0.925	34.5	LOS C	29.9	220.3	0.97	0.95	23.3
All Vehicles		1769	3.3	1.000	22.9	LOS B	29.9	220.3	0.70	0.69	28.1

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 2042 PM - Full Development

Manning Street and Victoria Street Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Manning St SE											
21	L	16	0.0	0.233	36.6	LOS C	2.7	19.0	0.72	0.78	28.7
22	T	27	3.8	0.233	29.4	LOS C	2.7	19.0	0.72	0.57	30.9
23	R	42	0.0	0.233	36.6	LOS C	2.7	19.0	0.72	0.79	28.7
Approach		85	1.2	0.233	34.3	LOS C	2.7	19.0	0.72	0.72	29.5
North East: Victoria St NE											
24	L	26	0.0	0.732	14.0	LOS A	17.7	125.6	0.51	0.81	33.3
25	T	816	1.4	0.732	8.2	LOS A	17.7	125.6	0.51	0.47	33.5
26	R	105	1.7	1.000[3]	34.3	LOS C	3.5	24.6	0.77	0.74	25.2
Approach		947	1.4	1.000	11.3	LOS A	17.7	125.6	0.54	0.51	32.2
North West: Manning St NW											
27	L	250	0.8	1.000[3]	33.2	LOS C	4.6	32.6	0.97	0.82	29.7
28	T	32	0.0	0.404	31.0	LOS C	5.6	39.4	0.77	0.64	29.9
29	R	133	1.6	0.404	38.2	LOS C	5.6	39.4	0.77	0.80	27.9
Approach		415	1.0	1.000	34.7	LOS C	5.6	39.4	0.89	0.80	29.1
South West: Victoria St SW											
30	L	122	3.4	0.852	33.4	LOS C	23.5	173.8	0.92	0.89	25.8
31	T	474	7.3	0.852	27.6	LOS B	23.5	173.8	0.92	0.83	24.8
32	R	32	3.3	0.601	43.0	LOS D	1.2	8.6	0.81	0.72	22.9
Approach		627	6.4	0.852	29.5	LOS C	23.5	173.8	0.91	0.84	24.9
All Vehicles		2075	2.8	1.000	22.4	LOS B	23.5	173.8	0.73	0.68	28.9

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Victoria Street / Macquarie Street

MOVEMENT SUMMARY

Site: 2011 AM Existing

Macquarie St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Macquarie St SE											
21	L	12	0.0	0.027	34.0	LOS C	0.4	2.7	0.66	0.69	29.5
22	T	1	0.0	0.027	26.8	LOS B	0.4	2.7	0.66	0.46	32.0
23	R	1	0.0	0.027	34.8	LOS C	0.4	2.7	0.66	0.68	30.7
Approach		14	0.0	0.027	33.5	LOS C	0.4	2.7	0.66	0.67	29.8
North East: Victoria St NE											
24	L	6	0.0	0.009	12.6	LOS A	0.1	0.4	0.20	0.67	44.5
25	T	453	2.3	0.393	9.0	LOS A	5.7	41.0	0.31	0.48	46.7
26	R	178	7.1	0.642	26.3	LOS B	4.7	34.9	0.65	0.77	34.9
Approach		637	3.6	0.642	13.9	LOS A	5.7	41.0	0.40	0.56	42.4
North West: Macquarie St NW											
27	L	127	10.7	0.446	19.5	LOS B	2.1	16.4	0.40	0.72	39.2
28	T	1	0.0	0.148	28.5	LOS B	1.8	13.1	0.69	0.54	31.2
29	R	58	5.5	0.148	35.3	LOS C	1.8	13.1	0.69	0.72	29.0
Approach		186	9.0	0.446	24.4	LOS B	2.1	16.4	0.49	0.72	35.5
South West: Victoria St SW											
30	L	88	19.0	0.631	26.1	LOS B	2.1	16.9	0.58	0.69	28.0
31	T	392	5.4	0.614	23.5	LOS B	13.0	95.2	0.75	0.65	27.3
32	R	18	0.0	0.614	29.1	LOS C	13.0	95.2	0.75	0.82	27.2
Approach		498	7.6	0.631	24.2	LOS B	13.0	95.2	0.72	0.67	27.4
All Vehicles		1335	5.8	0.642	19.4	LOS B	13.0	95.2	0.53	0.63	34.1

MOVEMENT SUMMARY

Site: 2011 PM Existing

Macquarie St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Macquarie St SE											
21	L	18	0.0	0.090	34.9	LOS C	1.2	8.4	0.68	0.75	29.4
22	T	12	0.0	0.090	27.7	LOS B	1.2	8.4	0.68	0.51	31.8
23	R	12	0.0	0.090	35.7	LOS C	1.2	8.4	0.68	0.74	30.6
Approach		41	0.0	0.090	33.1	LOS C	1.2	8.4	0.68	0.68	30.4
North East: Victoria St NE											
24	L	2	0.0	0.003	12.6	LOS A	0.0	0.1	0.20	0.66	44.5
25	T	397	2.4	0.344	8.8	LOS A	4.8	34.0	0.29	0.47	47.0
26	R	172	1.2	0.538	23.7	LOS B	4.1	28.7	0.59	0.76	36.3
Approach		571	2.0	0.538	13.3	LOS A	4.8	34.0	0.38	0.56	42.9
North West: Macquarie St NW											
27	L	156	0.7	0.504	20.4	LOS B	2.7	18.7	0.44	0.73	38.4
28	T	2	0.0	0.174	28.8	LOS C	2.1	14.7	0.70	0.55	31.1
29	R	65	1.6	0.174	35.5	LOS C	2.1	14.7	0.70	0.73	28.8
Approach		223	0.9	0.504	24.9	LOS B	2.7	18.7	0.52	0.73	35.1
South West: Victoria St SW											
30	L	59	0.0	0.550	24.4	LOS B	2.1	14.6	0.54	0.70	28.6
31	T	381	0.8	0.550	22.4	LOS B	11.3	79.5	0.70	0.60	27.8
32	R	22	0.0	0.550	28.3	LOS B	11.3	79.5	0.72	0.81	27.5
Approach		462	0.7	0.550	22.9	LOS B	11.3	79.5	0.68	0.63	27.9
All Vehicles		1297	1.3	0.550	19.3	LOS B	11.3	79.5	0.52	0.62	34.3

MOVEMENT SUMMARY

Site: 2042 AM - Full Development

Macquarie St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Macquarie St SE											
21	L	27	0.0	0.079	34.8	LOS C	1.0	7.3	0.67	0.72	29.1
22	T	1	0.0	0.079	27.6	LOS B	1.0	7.3	0.67	0.50	31.6
23	R	7	0.0	0.079	35.6	LOS C	1.0	7.3	0.67	0.71	30.3
Approach		36	0.0	0.079	34.7	LOS C	1.0	7.3	0.67	0.71	29.4
North East: Victoria St NE											
24	L	37	0.0	0.054	12.8	LOS A	0.3	2.3	0.21	0.69	44.4
25	T	772	1.4	0.667	10.7	LOS A	14.4	102.3	0.46	0.58	44.9
26	R	284	4.2	1.000[3]	46.2	LOS D	10.6	76.7	0.94	0.96	26.5
Approach		1093	2.1	1.000	20.0	LOS B	14.4	102.3	0.57	0.68	37.6
North West: Macquarie St NW											
27	L	248	5.5	0.856	31.5	LOS C	5.0	36.4	0.81	0.81	32.2
28	T	1	0.0	0.104	28.1	LOS B	1.2	8.7	0.68	0.52	31.4
29	R	38	8.3	0.104	34.9	LOS C	1.2	8.7	0.68	0.71	29.1
Approach		287	5.9	0.856	31.9	LOS C	5.0	36.4	0.79	0.80	31.8
South West: Victoria St SW											
30	L	91	18.6	0.919	39.0	LOS C	3.5	27.7	0.87	0.81	24.1
31	T	648	3.2	0.919	33.5	LOS C	28.2	202.6	0.97	0.94	24.0
32	R	13	0.0	0.919	39.1	LOS C	28.2	202.6	0.98	0.96	24.3
Approach		752	5.0	0.919	34.2	LOS C	28.2	202.6	0.96	0.92	24.0
All Vehicles		2167	3.6	1.000	26.8	LOS B	28.2	202.6	0.74	0.78	30.5

MOVEMENT SUMMARY

Site: 2042 PM - Full Development

Macquarie St and Victoria St Signals
Signals - Actuated Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Macquarie St SE											
21	L	32	0.0	0.146	35.6	LOS C	1.8	12.9	0.69	0.75	28.9
22	T	8	0.0	0.146	28.4	LOS B	1.8	12.9	0.69	0.54	31.3
23	R	21	0.0	0.146	36.4	LOS C	1.8	12.9	0.69	0.74	30.1
Approach		61	0.0	0.146	34.8	LOS C	1.8	12.9	0.69	0.72	29.7
North East: Victoria St NE											
24	L	22	0.0	0.032	12.7	LOS A	0.2	1.3	0.21	0.68	44.4
25	T	808	1.3	0.697	10.9	LOS A	15.9	112.8	0.48	0.60	44.7
26	R	241	5.2	0.857	46.2	LOS D	9.0	65.7	0.92	0.93	26.5
Approach		1072	2.2	0.857	18.9	LOS B	15.9	112.8	0.57	0.68	38.3
North West: Macquarie St NW											
27	L	228	6.0	0.787	28.1	LOS B	4.2	30.8	0.73	0.78	33.9
28	T	6	0.0	0.319	30.2	LOS C	3.9	28.1	0.75	0.61	30.3
29	R	114	2.8	0.319	37.0	LOS C	3.9	28.1	0.75	0.76	28.3
Approach		348	4.8	0.787	31.0	LOS C	4.2	30.8	0.74	0.77	31.9
South West: Victoria St SW											
30	L	62	27.1	1.000[3]	38.7	LOS C	3.6	27.7	0.95	0.79	24.4
31	T	679	3.1	1.001	55.6	LOS D	38.1	273.3	0.99	1.15	19.2
32	R	25	0.0	1.001	64.4	LOS E	38.1	273.3	1.00	1.20	18.9
Approach		766	4.9	1.001	54.6	LOS D	38.1	273.3	0.99	1.12	19.6
All Vehicles		2247	3.5	1.001	33.4	LOS C	38.1	273.3	0.74	0.84	27.7

Manning River Drive / Pioneer Street

MOVEMENT SUMMARY

Site: 2011 AM Existing

Pioneer St and Manning River Dr Signals
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Pioneer St S											
1	L	23	9.1	0.088	9.7	LOS A	0.1	1.0	0.24	0.69	47.5
3	R	16	20.0	0.043	33.8	LOS C	0.5	3.7	0.79	0.69	31.4
Approach		39	13.5	0.088	19.5	LOS B	0.5	3.7	0.46	0.69	39.3
East: Manning River Dr E											
4	L	13	8.3	0.020	9.0	LOS A	0.0	0.3	0.16	0.67	48.2
5	T	624	1.7	0.264	7.4	LOS A	5.2	37.1	0.48	0.41	48.0
Approach		637	1.8	0.264	7.4	LOS A	5.2	37.1	0.47	0.42	48.0
West: Manning River Dr W											
11	T	271	7.0	0.118	6.7	LOS A	2.0	15.1	0.43	0.35	49.0
12	R	13	0.0	0.056	16.8	LOS B	0.2	1.5	0.46	0.69	41.0
Approach		283	6.7	0.118	7.1	LOS A	2.0	15.1	0.43	0.37	48.6
All Vehicles		959	3.7	0.264	7.8	LOS A	5.2	37.1	0.46	0.41	47.7

MOVEMENT SUMMARY

Site: 2011 PM Existing

Pioneer St and Manning River Dr Signals
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Pioneer St S											
1	L	19	0.0	0.046	8.9	LOS A	0.1	0.5	0.19	0.68	48.1
3	R	20	0.0	0.048	33.3	LOS C	0.6	4.0	0.79	0.70	31.4
Approach		39	0.0	0.048	21.4	LOS B	0.6	4.0	0.50	0.69	37.7
East: Manning River Dr E											
4	L	9	0.0	0.014	8.7	LOS A	0.0	0.2	0.16	0.67	48.2
5	T	339	1.9	0.143	6.8	LOS A	2.6	18.5	0.44	0.36	48.8
Approach		348	1.8	0.143	6.8	LOS A	2.6	18.5	0.43	0.37	48.8
West: Manning River Dr W											
11	T	516	3.1	0.220	7.2	LOS A	4.2	30.0	0.46	0.39	48.3
12	R	20	0.0	0.077	15.3	LOS B	0.3	2.2	0.43	0.69	42.2
Approach		536	2.9	0.220	7.5	LOS A	4.2	30.0	0.46	0.40	48.0
All Vehicles		923	2.4	0.220	7.8	LOS A	4.2	30.0	0.45	0.40	47.8

MOVEMENT SUMMARY

Site: 2042 AM - Full Development

Pioneer St and Manning River Dr Signals
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Pioneer St S											
1	L	47	4.4	0.331	15.3	LOS B	0.9	6.5	0.53	0.75	42.2
3	R	22	14.3	0.058	33.8	LOS C	0.6	5.1	0.79	0.70	31.3
Approach		69	7.6	0.331	21.2	LOS B	0.9	6.5	0.61	0.73	38.0
East: Manning River Dr E											
4	L	18	5.9	0.028	8.9	LOS A	0.1	0.4	0.16	0.67	48.2
5	T	1515	0.7	0.636	10.3	LOS A	17.5	123.4	0.67	0.61	44.5
Approach		1533	0.8	0.636	10.3	LOS A	17.5	123.4	0.67	0.61	44.5
West: Manning River Dr W											
11	T	721	2.6	0.307	7.7	LOS A	6.2	44.6	0.50	0.43	47.7
12	R	22	0.0	0.152	26.4	LOS B	0.6	4.0	0.67	0.73	34.8
Approach		743	2.5	0.307	8.2	LOS A	6.2	44.6	0.50	0.44	47.1
All Vehicles		2345	1.5	0.636	9.9	LOS A	17.5	123.4	0.61	0.56	45.1

MOVEMENT SUMMARY

Site: 2042 PM - Full Development

Pioneer St and Manning River Dr Signals
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Pioneer St S											
1	L	34	6.3	0.189	10.7	LOS A	0.3	2.2	0.31	0.70	46.5
3	R	19	16.7	0.050	33.8	LOS C	0.5	4.4	0.79	0.70	31.3
Approach		53	10.0	0.189	19.0	LOS B	0.5	4.4	0.48	0.70	39.6
East: Manning River Dr E											
4	L	12	9.1	0.019	9.0	LOS A	0.0	0.3	0.16	0.67	48.2
5	T	966	1.1	0.407	8.3	LOS A	9.1	64.0	0.54	0.48	46.8
Approach		978	1.2	0.407	8.3	LOS A	9.1	64.0	0.54	0.48	46.8
West: Manning River Dr W											
11	T	937	2.0	0.397	8.2	LOS A	8.7	62.0	0.54	0.47	46.9
12	R	58	0.0	0.306	20.4	LOS B	1.2	8.6	0.57	0.74	38.5
Approach		995	1.9	0.397	9.0	LOS A	8.7	62.0	0.54	0.49	46.3
All Vehicles		2025	1.8	0.407	8.9	LOS A	9.1	64.0	0.54	0.49	46.4

Manning River Drive / Cowper Street

MOVEMENT SUMMARY

Site: 2011 AM Existing

Cowper St and Manning River Drive Signals
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Manning River Drive E											
5	T	581	2.4	0.218	4.6	LOS A	3.8	27.1	0.38	0.32	51.6
6	R	344	8.3	0.920	49.5	LOS D	14.9	111.8	1.00	0.97	25.5
Approach		925	4.6	0.920	21.3	LOS B	14.9	111.8	0.61	0.56	37.4
North: Cowper Street											
7	L	138	12.2	0.250	9.4	LOS A	0.7	5.2	0.22	0.70	47.9
9	R	29	0.0	0.108	39.7	LOS C	1.0	6.8	0.88	0.72	28.7
Approach		167	10.1	0.250	14.8	LOS B	1.0	6.8	0.34	0.70	42.9
West: Manning River Drive W											
10	L	39	16.2	0.064	11.1	LOS A	0.4	3.1	0.37	0.65	46.2
11	T	194	6.5	0.129	15.9	LOS B	2.2	16.6	0.65	0.51	40.0
Approach		233	8.1	0.129	15.1	LOS B	2.2	16.6	0.60	0.54	41.0
All Vehicles		1325	5.9	0.920	19.4	LOS B	14.9	111.8	0.57	0.58	38.6

MOVEMENT SUMMARY

Site: 2011 PM Existing

Cowper St and Manning River Drive Signals
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Manning River Drive E											
5	T	295	1.8	0.110	4.2	LOS A	1.8	12.5	0.34	0.28	52.2
6	R	175	3.0	0.655	43.6	LOS D	6.4	45.7	0.97	0.80	27.3
Approach		469	2.2	0.655	18.9	LOS B	6.4	45.7	0.57	0.48	39.0
North: Cowper Street											
7	L	206	3.1	0.495	10.0	LOS A	1.7	12.6	0.32	0.73	47.0
9	R	37	5.7	0.141	40.2	LOS C	1.2	8.9	0.88	0.73	28.6
Approach		243	3.5	0.495	14.6	LOS B	1.7	12.6	0.40	0.73	42.8
West: Manning River Drive W											
10	L	31	0.0	0.035	9.1	LOS A	0.2	1.4	0.27	0.64	48.0
11	T	485	0.9	0.268	13.6	LOS A	5.4	38.1	0.63	0.53	41.8
Approach		516	0.8	0.268	13.3	LOS A	5.4	38.1	0.61	0.54	42.1
All Vehicles		1228	1.9	0.655	15.7	LOS B	6.4	45.7	0.56	0.55	41.0

MOVEMENT SUMMARY

Site: 2042 AM - Full Development – Adjusted Signal Timing

Cowper St and Manning River Drive Signals
Signals - Actuated Cycle Time = 64 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Manning River Drive E											
5	T	1477	0.9	0.530	4.6	LOS A	10.4	73.7	0.48	0.44	51.2
6	R	378	7.5	0.686	30.5	LOS C	10.6	79.3	0.91	0.84	32.7
Approach		1855	2.3	0.686	9.8	LOS A	10.6	79.3	0.57	0.52	45.9
North: Cowper Street											
7	L	217	7.8	0.444	12.9	LOS A	3.2	23.6	0.52	0.76	44.4
9	R	34	0.0	0.193	39.6	LOS C	1.0	7.3	0.93	0.72	28.8
Approach		251	6.7	0.444	16.4	LOS B	3.2	23.6	0.58	0.76	41.4
West: Manning River Drive W											
10	L	22	28.6	0.040	11.2	LOS A	0.2	1.8	0.40	0.64	46.3
11	T	711	1.8	0.590	21.3	LOS B	9.6	68.1	0.87	0.75	35.9
Approach		733	2.6	0.590	21.0	LOS B	9.6	68.1	0.86	0.74	36.2
All Vehicles		2838	2.7	0.686	13.3	LOS A	10.6	79.3	0.64	0.60	42.5

MOVEMENT SUMMARY

Site: 2042 PM - Full Development - Adjusted Signal Timing

Cowper St and Manning River Drive Signals
Signals - Actuated Cycle Time = 59 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Manning River Drive E											
5	T	918	1.5	0.342	4.0	LOS A	5.3	37.4	0.42	0.37	52.1
6	R	182	15.6	0.459	30.9	LOS C	4.7	37.2	0.88	0.80	32.6
Approach		1100	3.8	0.459	8.5	LOS A	5.3	37.4	0.50	0.44	47.4
North: Cowper Street											
7	L	253	6.7	0.555	15.9	LOS B	4.1	30.0	0.62	0.81	41.8
9	R	60	0.0	0.318	37.3	LOS C	1.7	12.1	0.94	0.74	29.7
Approach		313	5.4	0.555	20.0	LOS B	4.1	30.0	0.68	0.80	38.8
West: Manning River Drive W											
10	L	51	12.5	0.061	9.3	LOS A	0.3	2.2	0.31	0.65	47.9
11	T	902	1.4	0.656	18.3	LOS B	11.2	79.2	0.88	0.76	37.8
Approach		953	2.0	0.656	17.9	LOS B	11.2	79.2	0.85	0.75	38.2
All Vehicles		2365	3.3	0.656	13.8	LOS A	11.2	79.2	0.66	0.61	42.1

Manning River Drive / Phillip Street

MOVEMENT SUMMARY

Site: 2011 AM Existing

Phillip St and Manning River Drive Signals
Signals - Actuated Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Phillip St SE											
21	L	2	0.0	0.023	53.8	LOS D	0.2	1.3	0.91	0.65	24.4
22	T	1	0.0	0.023	45.6	LOS D	0.2	1.3	0.91	0.58	24.7
23	R	1	0.0	0.023	53.6	LOS D	0.2	1.3	0.91	0.65	24.5
Approach		4	0.0	0.023	51.7	LOS D	0.2	1.3	0.91	0.64	24.5
North East: Manning River Dr NE											
24	L	1	0.0	0.204	17.4	LOS B	5.0	36.2	0.45	0.98	42.1
25	T	835	4.3	0.506	10.9	LOS A	15.9	115.3	0.55	0.49	44.3
26	R	35	0.0	0.170	54.4	LOS D	1.6	11.1	0.92	0.73	24.0
Approach		871	4.1	0.506	12.7	LOS A	15.9	115.3	0.56	0.50	42.9
North West: Phillip St NW											
27	L	25	12.5	0.059	9.5	LOS A	0.1	1.1	0.18	0.68	47.9
28	T	1	0.0	0.190	33.6	LOS C	2.7	19.0	0.84	0.64	28.4
29	R	67	0.0	0.190	41.7	LOS C	2.7	19.0	0.84	0.75	27.9
Approach		94	3.4	0.190	32.9	LOS C	2.7	19.0	0.66	0.73	31.5
South West: Manning River Dr SW											
30	L	51	2.1	0.201	20.6	LOS B	3.4	25.5	0.59	0.85	39.4
31	T	262	8.8	0.201	16.2	LOS B	4.9	36.8	0.61	0.50	39.5
32	R	3	0.0	0.015	37.4	LOS C	0.1	0.8	0.73	0.67	29.5
Approach		316	7.7	0.201	17.1	LOS B	4.9	36.8	0.61	0.56	39.4
All Vehicles		1284	4.9	0.506	15.4	LOS B	15.9	115.3	0.58	0.53	40.8

MOVEMENT SUMMARY

Site: 2011 PM Existing

Phillip St and Manning River Drive Signals
Signals - Actuated Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Phillip St SE											
21	L	1	0.0	0.018	53.7	LOS D	0.1	1.0	0.90	0.65	24.6
22	T	1	0.0	0.018	45.5	LOS D	0.1	1.0	0.90	0.57	24.9
23	R	1	0.0	0.018	53.5	LOS D	0.1	1.0	0.90	0.64	24.6
Approach		3	0.0	0.018	50.9	LOS D	0.1	1.0	0.90	0.62	24.7
North East: Manning River Dr NE											
24	L	2	0.0	0.087	16.4	LOS B	1.9	13.9	0.41	0.97	42.8
25	T	355	3.9	0.216	8.9	LOS A	5.3	38.7	0.44	0.37	46.6
26	R	18	0.0	0.088	53.6	LOS D	0.8	5.6	0.91	0.70	24.2
Approach		375	3.7	0.216	11.0	LOS A	5.3	38.7	0.46	0.39	44.6
North West: Phillip St NW											
27	L	51	0.0	0.167	10.3	LOS A	0.5	3.4	0.25	0.70	46.7
28	T	1	0.0	0.234	34.0	LOS C	3.4	23.7	0.85	0.65	28.2
29	R	83	0.0	0.234	42.1	LOS C	3.4	23.7	0.85	0.76	27.8
Approach		135	0.0	0.234	30.1	LOS C	3.4	23.7	0.63	0.74	32.8
South West: Manning River Dr SW											
30	L	62	0.0	0.397	26.3	LOS B	9.4	67.1	0.68	0.90	36.1
31	T	589	2.7	0.397	19.5	LOS B	11.1	79.6	0.69	0.60	37.3
32	R	4	0.0	0.013	28.0	LOS B	0.1	0.9	0.61	0.67	33.9
Approach		656	2.4	0.397	20.2	LOS B	11.1	79.6	0.69	0.63	37.1
All Vehicles		1168	2.5	0.397	18.5	LOS B	11.1	79.6	0.61	0.56	38.6

MOVEMENT SUMMARY

Site: 2042 AM - Full Development with Recommended Upgrades

Phillip St and Manning River Drive Signals
With Paramics recommended upgrade of 2 westbound lanes to Cowper St
Signals - Actuated Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Phillip St SE											
21	L	6	0.0	0.079	54.8	LOS D	0.6	4.4	0.91	0.69	24.0
22	T	1	0.0	0.079	46.6	LOS D	0.6	4.4	0.91	0.63	24.3
23	R	6	0.0	0.079	54.7	LOS D	0.6	4.4	0.91	0.69	24.0
Approach		14	0.0	0.079	54.1	LOS D	0.6	4.4	0.91	0.69	24.0
North East: Manning River Dr NE											
24	L	7	0.0	0.740	23.1	LOS B	29.9	212.7	0.75	0.96	38.8
25	T	1758	2.0	0.740	14.8	LOS B	29.9	212.9	0.75	0.69	40.5
26	R	127	0.0	0.623	57.7	LOS E	6.2	43.6	0.98	0.79	23.2
Approach		1893	1.9	0.740	17.8	LOS B	29.9	212.9	0.76	0.70	38.6
North West: Phillip St NW											
27	L	59	5.4	0.245	12.3	LOS A	0.9	6.3	0.34	0.71	44.9
28	T	1	0.0	0.240	34.2	LOS C	3.4	24.1	0.85	0.66	28.2
29	R	84	0.0	0.240	42.3	LOS C	3.4	24.1	0.85	0.76	27.7
Approach		144	2.2	0.245	30.0	LOS C	3.4	24.1	0.64	0.74	32.9
South West: Manning River Dr SW											
30	L	60	1.8	0.547	29.7	LOS C	15.0	107.1	0.75	0.92	34.5
31	T	847	2.7	0.547	22.0	LOS B	16.7	119.8	0.76	0.67	35.6
32	R	1	0.0	0.012	51.8	LOS D	0.0	0.3	0.87	0.63	24.7
Approach		908	2.7	0.547	22.5	LOS B	16.7	119.8	0.76	0.69	35.5
All Vehicles		2959	2.1	0.740	20.0	LOS B	29.9	212.9	0.76	0.70	37.2

MOVEMENT SUMMARY

Site: 2042 PM - Full Development with Recommended Upgrades

Phillip St and Manning River Drive Signals
With Paramics recommended upgrade of 2 westbound lanes to Cowper St
Signals - Actuated Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Phillip St SE											
21	L	6	0.0	0.044	54.2	LOS D	0.4	2.7	0.91	0.68	24.2
22	T	1	0.0	0.044	46.0	LOS D	0.4	2.7	0.91	0.61	24.5
23	R	1	0.0	0.044	54.0	LOS D	0.4	2.7	0.91	0.67	24.2
Approach		8	0.0	0.044	53.1	LOS D	0.4	2.7	0.91	0.67	24.2
North East: Manning River Dr NE											
24	L	7	0.0	0.406	18.9	LOS B	11.7	84.2	0.53	0.98	41.2
25	T	951	3.8	0.406	10.7	LOS A	11.7	84.5	0.53	0.47	44.6
26	R	59	0.0	0.289	55.3	LOS D	2.7	19.2	0.93	0.75	23.8
Approach		1017	3.5	0.406	13.3	LOS A	11.7	84.5	0.56	0.49	42.4
North West: Phillip St NW											
27	L	116	2.7	0.470	16.5	LOS B	2.9	20.4	0.52	0.76	41.2
28	T	1	0.0	0.337	35.2	LOS C	5.0	34.9	0.87	0.69	27.8
29	R	119	0.0	0.337	43.3	LOS D	5.0	34.9	0.87	0.78	27.4
Approach		236	1.3	0.470	30.1	LOS C	5.0	34.9	0.70	0.77	32.8
South West: Manning River Dr SW											
30	L	77	1.4	0.665	31.3	LOS C	19.9	141.9	0.82	0.92	33.8
31	T	1033	2.2	0.665	23.6	LOS B	22.0	156.6	0.82	0.74	34.5
32	R	1	0.0	0.005	33.2	LOS C	0.0	0.2	0.67	0.64	31.3
Approach		1111	2.2	0.665	24.2	LOS B	22.0	156.6	0.82	0.75	34.5
All Vehicles		2372	2.7	0.665	20.2	LOS B	22.0	156.6	0.70	0.64	37.2

Cundletown Interchange

MOVEMENT SUMMARY

Cundletown Interchange - 2011 AM

Eastern (Give-Way) and Western (Roundabout) Sides Modeled Separately

Highway and Manning River Drive (Western Side Road)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Highway Sth											
1	L	339	4.7	0.210	6.4	LOS A	0.7	5.3	0.19	0.43	62.4
2	T	242	12.6	0.067	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		581	8.0	0.210	3.7	NA	0.7	5.3	0.11	0.25	81.1
East: Merge to Southbound Hwy											
3	L	88	14.3	0.069	2.0	LOS A	0.2	1.4	0.29	0.17	71.3
North: Highway Nth											
7	T	401	12.6	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
West: Manning River Dr (Merge to Northbound Hwy)											
8	L	120	13.2	0.089	1.9	LOS A	0.2	1.8	0.27	0.16	70.2
All Vehicles		1544	10.4	0.210	2.8	NA	0.7	5.3	0.09	0.17	78.4

Highway and Roundabout (Eastern Side)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North: From Highway Nth (Off Ramp to East Roundabout)											
4	T	1	0.0	0.105	4.6	LOS A	0.6	4.7	0.24	0.34	51.1
5	R	131	8.9	0.103	11.8	LOS A	0.6	4.7	0.24	0.64	45.6
Approach		132	8.8	0.103	11.8	LOS A	0.6	4.7	0.24	0.64	45.7
West: Manning River Dr (Right Turn to Southbound On Ramp)											
6	R	89	14.1	0.055	11.5	LOS A	0.0	0.0	0.00	0.69	46.6
All Vehicles		221	11.0	0.103	11.7	LOS A	0.6	4.7	0.14	0.66	46.0

MOVEMENT SUMMARY

Cundletown Interchange - 2011 PM

Eastern (Give-Way) and Western (Roundabout) Sides Modeled Separately

Highway and Manning River Drive (Western Side Road)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Highway Sth											
1	L	176	7.8	0.112	6.2	LOS A	0.3	2.5	0.10	0.40	64.8
2	T	275	28.7	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		451	20.6	0.112	2.4	NA	0.3	2.5	0.04	0.15	89.2
East: Merge to Southbound Hwy											
3	L	52	12.2	0.038	1.8	LOS A	0.1	0.7	0.26	0.16	71.9
North: Highway Nth											
7	T	361	17.5	0.103	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
West: Manning River Dr (Merge to Northbound Hwy)											
8	L	323	6.2	0.222	1.8	LOS A	0.6	4.6	0.29	0.16	70.0
All Vehicles		1337	14.9	0.222	1.8	NA	0.6	4.6	0.10	0.12	81.5

Highway and Roundabout (Eastern Side)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North: From Highway Nth (Off Ramp to East Roundabout)											
4	T	1	0.0	0.038	4.4	LOS A	0.2	1.6	0.17	0.31	51.9
5	R	47	11.1	0.038	11.7	LOS A	0.2	1.6	0.17	0.64	45.9
Approach		48	10.9	0.038	11.5	LOS A	0.2	1.6	0.17	0.63	46.1
West: Manning River Dr (Right Turn to Southbound On Ramp)											
6	R	53	12.0	0.032	11.5	LOS A	0.0	0.0	0.00	0.70	46.6
All Vehicles		101	11.5	0.038	11.5	LOS A	0.2	1.6	0.08	0.67	46.3

MOVEMENT SUMMARY

Cundletown Interchange - 2042 AM

Eastern (Give-Way) and Western (Roundabout) Sides Modeled Separately

Highway and Manning River Drive (Western Side Road)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Highway Sth											
1	L	1122	4.7	0.739	8.6	LOS A	8.6	62.7	0.52	0.67	54.9
2	T	344	12.6	0.095	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		1466	6.5	0.739	6.6	NA	8.6	62.7	0.39	0.51	67.3
East: Merge to Southbound Hwy											
3	L	602	14.3	0.470	2.8	LOS A	2.1	16.8	0.40	0.29	69.4
North: Highway Nth											
7	T	308	12.6	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
West: Manning River Dr (Merge to Northbound Hwy)											
8	L	174	13.2	0.173	3.1	LOS A	0.5	3.7	0.44	0.27	67.7
All Vehicles		3675	10.1	0.739	4.5	NA	8.6	62.7	0.28	0.34	67.6

Highway and Roundabout (Eastern Side)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North: From Highway Nth (Off Ramp to East Roundabout)											
4	T	61	0.0	0.353	8.0	LOS A	2.2	16.2	0.68	0.69	46.9
5	R	263	8.9	0.353	15.3	LOS B	2.2	16.2	0.68	0.84	43.6
Approach		324	7.2	0.353	13.9	LOS A	2.2	16.2	0.68	0.81	44.1
West: Manning River Dr (Right Turn to Southbound On Ramp)											
6	R	546	14.3	0.336	11.5	LOS A	0.0	0.0	0.00	0.69	46.6
All Vehicles		871	11.7	0.353	12.4	LOS A	2.2	16.2	0.25	0.74	45.7

MOVEMENT SUMMARY

Cundletown Interchange - 2042 PM

Eastern (Give-Way) and Western (Roundabout) Sides Modeled Separately

Highway and Manning River Drive (Western Side Road)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Highway Sth											
1	L	607	7.8	0.386	6.5	LOS A	1.6	11.9	0.23	0.43	61.5
2	T	414	28.7	0.126	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		1021	16.3	0.386	3.9	NA	1.6	11.9	0.13	0.26	80.1
East: Merge to Southbound Hwy											
3	L	589	12.2	0.451	2.7	LOS A	2.0	15.2	0.39	0.28	69.6
North: Highway Nth											
7	T	361	17.5	0.103	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
West: Manning River Dr (Merge to Northbound Hwy)											
8	L	385	6.2	0.326	2.9	LOS A	1.1	8.2	0.44	0.29	67.8
All Vehicles		3207	13.2	0.451	2.9	NA	2.0	15.2	0.19	0.21	72.0

Highway and Roundabout (Eastern Side)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
North: From Highway Nth (Off Ramp to East Roundabout)											
4	T	53	0.0	0.196	7.5	LOS A	1.1	8.2	0.62	0.63	47.7
5	R	126	11.1	0.196	14.8	LOS B	1.1	8.2	0.62	0.82	44.1
Approach		179	7.8	0.196	12.7	LOS A	1.1	8.2	0.62	0.76	45.0
West: Manning River Dr (Right Turn to Southbound On Ramp)											
6	R	546	12.4	0.330	11.4	LOS A	0.0	0.0	0.00	0.69	46.6
All Vehicles		725	11.3	0.330	11.7	LOS A	1.1	8.2	0.15	0.71	46.2

Proposed Signalised Intersections

Kanangra Drive / Bushland Drive

MOVEMENT SUMMARY

Site: 2042 AM - Full Development & Recommended Upgrades – Adjusted Signal Timings

Bushland Dr and Kanangra Dr Signalised Intersection - Full recommended upgrades to intersection by Stage 4 Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kanangra Dr South											
1	L	1	0.0	0.901	62.7	LOS E	11.2	78.5	1.00	1.05	23.0
2	T	214	0.0	0.901	54.5	LOS D	11.2	78.5	1.00	1.05	23.1
3	R	27	0.0	0.121	47.4	LOS D	1.1	7.7	0.92	0.72	26.0
Approach		242	0.0	0.901	53.7	LOS D	11.2	78.5	0.99	1.02	23.4
East: Bushland Dr East											
4	L	40	0.0	0.404	54.8	LOS D	2.3	16.0	1.00	0.74	24.1
5	T	11	0.0	0.404	46.6	LOS D	2.3	16.0	1.00	0.74	24.2
6	R	33	0.0	0.264	54.3	LOS D	1.5	10.2	0.98	0.72	24.0
Approach		83	0.0	0.404	53.6	LOS D	2.3	16.0	0.99	0.73	24.1
North: Kanangra Dr North											
7	L	264	0.0	0.880	40.8	LOS C	36.5	255.5	0.98	1.04	29.3
8	T	522	0.0	0.880	32.9	LOS C	36.5	255.5	0.98	1.02	29.4
9	R	443	0.0	0.524	27.0	LOS B	13.9	97.3	0.77	0.83	34.4
Approach		1229	0.0	0.880	32.5	LOS C	36.5	255.5	0.90	0.96	31.0
West: Bushland Dr West											
10	L	463	0.0	0.482	10.2	LOS A	5.1	35.4	0.36	0.70	46.9
11	T	147	0.0	0.850	51.6	LOS D	7.3	51.2	1.00	0.97	23.8
12	R	4	0.0	0.026	49.8	LOS D	0.2	1.2	0.93	0.65	25.3
Approach		615	0.0	0.850	20.4	LOS B	7.3	51.2	0.52	0.76	38.0
All Vehicles		2169	0.0	0.901	32.2	LOS C	36.5	255.5	0.81	0.90	31.2

MOVEMENT SUMMARY

Site: 2042 PM - Full Development & Recommended Upgrades – Adjusted Signal Timings

Bushland Dr and Kanangra Dr Signalised Intersection - Full recommended upgrades to intersection by Stage 4 Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Kanangra Dr South											
1	L	1	0.0	0.849	43.7	LOS D	30.0	209.8	0.98	1.00	28.8
2	T	626	0.0	0.849	35.5	LOS C	30.0	209.8	0.98	0.98	29.0
3	R	60	0.0	0.085	28.5	LOS B	1.8	12.4	0.67	0.75	33.6
Approach		687	0.0	0.849	34.9	LOS C	30.0	209.8	0.96	0.96	29.3
East: Bushland Dr East											
4	L	28	0.0	0.471	56.7	LOS E	3.1	22.0	1.00	0.76	24.0
5	T	38	0.0	0.471	48.5	LOS D	3.1	22.0	1.00	0.75	24.1
6	R	117	0.0	0.854	64.0	LOS E	6.2	43.1	1.00	0.95	21.7
Approach		183	0.0	0.854	59.7	LOS E	6.2	43.1	1.00	0.88	22.5
North: Kanangra Dr North											
7	L	86	0.0	0.849	51.1	LOS D	19.1	133.7	1.00	1.00	25.9
8	T	302	0.0	0.849	43.2	LOS D	19.1	133.7	1.00	1.00	25.9
9	R	309	0.0	0.720	46.3	LOS D	13.8	96.9	0.98	0.87	26.4
Approach		698	0.0	0.849	45.6	LOS D	19.1	133.7	0.99	0.94	26.1
West: Bushland Dr West											
10	L	409	0.0	0.736	21.5	LOS B	11.3	78.8	0.68	0.80	37.9
11	T	34	0.0	0.274	48.7	LOS D	1.6	11.1	0.99	0.71	24.6
12	R	6	0.0	0.054	55.5	LOS D	0.3	2.0	0.96	0.66	23.7
Approach		449	0.0	0.736	24.0	LOS B	11.3	78.8	0.71	0.79	36.2
All Vehicles		2018	0.0	0.854	38.4	LOS C	30.0	209.8	0.92	0.91	28.5

Manning River Drive / Lansdowne Road

MOVEMENT SUMMARY

Site: 2042 AM - Full Development and Recommended Upgrades

Lansdowne Rd and Manning River Drive Signalised Intersection
Full recommended upgrades to intersection by Stage 4
Signals - Fixed Time Cycle Time = 90 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Manning River Dr											
5	T	1060	0.0	0.462	11.1	LOS A	13.0	91.1	0.61	0.54	44.0
6	R	717	0.0	0.755	40.9	LOS C	16.6	115.9	0.96	0.87	28.3
Approach		1777	0.0	0.755	23.1	LOS B	16.6	115.9	0.75	0.67	35.9
North: Lansdowne Rd											
7	L	726	0.0	0.672	9.9	LOS A	10.5	73.2	0.45	0.73	47.1
9	R	885	0.0	0.858	49.6	LOS D	21.4	149.9	1.00	0.97	25.4
Approach		1612	0.0	0.858	31.7	LOS C	21.4	149.9	0.75	0.86	32.1
West: Manning River Drive											
10	L	589	0.0	0.317	7.6	X	X	X	X	0.60	49.7
11	T	301	0.0	0.316	30.3	LOS C	5.5	38.4	0.86	0.70	31.3
Approach		891	0.0	0.317	15.3	LOS B	5.5	38.4	0.29	0.64	41.5
All Vehicles		4279	0.0	0.858	24.7	LOS B	21.4	149.9	0.65	0.74	35.3

MOVEMENT SUMMARY

Site: 2042 PM - Full Development and Recommended Upgrades

Lansdowne Rd and Manning River Drive Signalised Intersection
Full recommended upgrades to intersection by Stage 4
Signals - Fixed Time Cycle Time = 90 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Manning River Dr											
5	T	331	0.0	0.144	8.8	LOS A	3.2	22.4	0.48	0.40	46.6
6	R	594	0.0	0.625	38.5	LOS C	12.6	88.0	0.92	0.83	29.2
Approach		924	0.0	0.625	27.9	LOS B	12.6	88.0	0.76	0.68	33.7
North: Lansdowne Rd											
7	L	671	0.0	0.703	12.8	LOS A	10.1	71.0	0.50	0.78	44.6
9	R	716	0.0	0.694	40.2	LOS C	14.4	101.1	0.95	0.86	28.5
Approach		1386	0.0	0.703	26.9	LOS B	14.4	101.1	0.73	0.82	34.6
West: Manning River Drive											
10	L	549	0.0	0.296	7.6	X	X	X	X	0.60	49.7
11	T	586	0.0	0.615	33.1	LOS C	11.7	81.6	0.94	0.80	30.0
Approach		1136	0.0	0.615	20.8	LOS B	11.7	81.6	0.49	0.70	37.2
All Vehicles		3446	0.0	0.703	25.2	LOS B	14.4	101.1	0.66	0.74	35.1

Northern Link (North) / Brimbin Internal Access Road

MOVEMENT SUMMARY

Site: 2042 AM - Full Development & Recommended Upgrades – Adjusted Signal Timings

Northern Link Rd and Brimbin Access Road Signalised Intersection
Full recommended upgrades to intersection by Stage 4
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Brimbin Access Road SE											
21	L	115	0.0	0.706	50.6	LOS D	4.8	33.6	1.00	0.85	25.0
23	R	119	0.0	0.732	50.5	LOS D	5.0	35.2	1.00	0.87	25.0
Approach		234	0.0	0.732	50.6	LOS D	5.0	35.2	1.00	0.86	25.0
North: Brimbin Access Road N											
7	L	68	0.0	0.062	10.1	LOS A	0.6	4.3	0.25	0.69	46.9
9	R	966	0.0	0.850	26.7	LOS B	35.0	245.2	0.88	0.93	34.5
Approach		1035	0.0	0.850	25.6	LOS B	35.0	245.2	0.83	0.91	35.1
South West: Northern Link Road											
30	L	546	0.0	0.386	11.2	LOS A	7.1	49.6	0.36	0.75	45.7
32	R	31	0.0	0.219	48.3	LOS D	1.2	8.4	0.97	0.72	25.7
Approach		577	0.0	0.386	13.2	LOS A	7.1	49.6	0.39	0.75	43.9
All Vehicles		1845	0.0	0.850	24.9	LOS B	35.0	245.2	0.72	0.85	35.5

MOVEMENT SUMMARY

Site: 2042 PM - Full Development & Recommended Upgrades – Adjusted Signal Timings

Northern Link Rd and Brimbin Access Road Signalised Intersection
Full recommended upgrades to intersection by Stage 4
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South East: Brimbin Access Road SE											
21	L	11	0.0	0.047	30.3	LOS C	0.2	1.7	0.91	0.67	32.7
23	R	93	0.0	0.416	31.4	LOS C	2.3	15.9	0.97	0.76	32.1
Approach		103	0.0	0.416	31.3	LOS C	2.3	15.9	0.96	0.76	32.1
North: Brimbin Access Road N											
7	L	26	0.0	0.024	11.3	LOS A	0.2	1.6	0.38	0.69	45.6
9	R	525	0.0	0.707	22.6	LOS B	11.5	80.8	0.89	0.88	36.9
Approach		552	0.0	0.707	22.0	LOS B	11.5	80.8	0.87	0.87	37.3
South West: Northern Link Road											
30	L	805	0.0	0.678	14.1	LOS A	12.7	88.6	0.69	0.83	43.1
32	R	62	0.0	0.279	31.6	LOS C	1.5	10.4	0.95	0.75	32.0
Approach		867	0.0	0.678	15.3	LOS B	12.7	88.6	0.70	0.82	42.1
All Vehicles		1522	0.0	0.707	18.8	LOS B	12.7	88.6	0.78	0.83	39.4

Appendix F

Cundletown Bypass Alignment