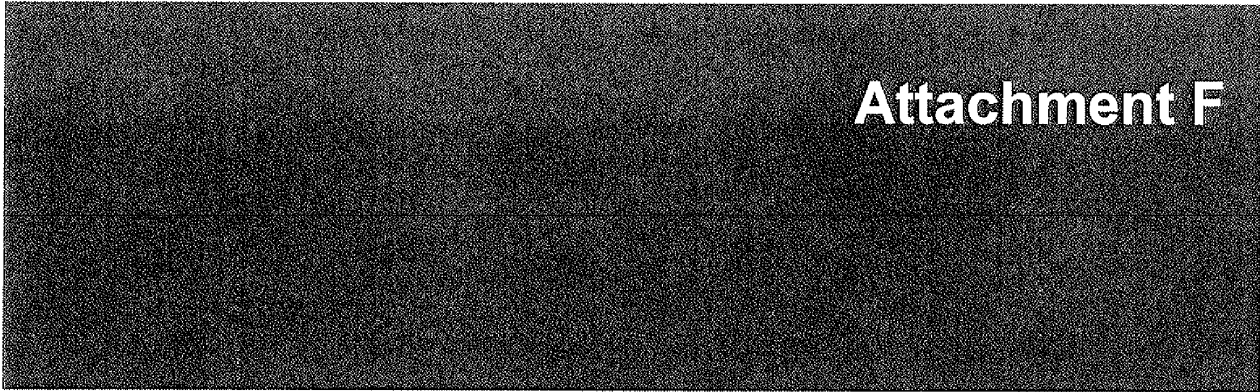
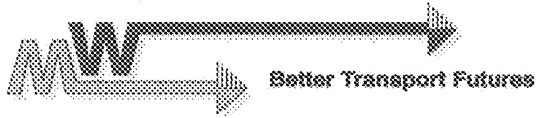

APPENDIX C
Brief Assessment Report

APPENDIX D

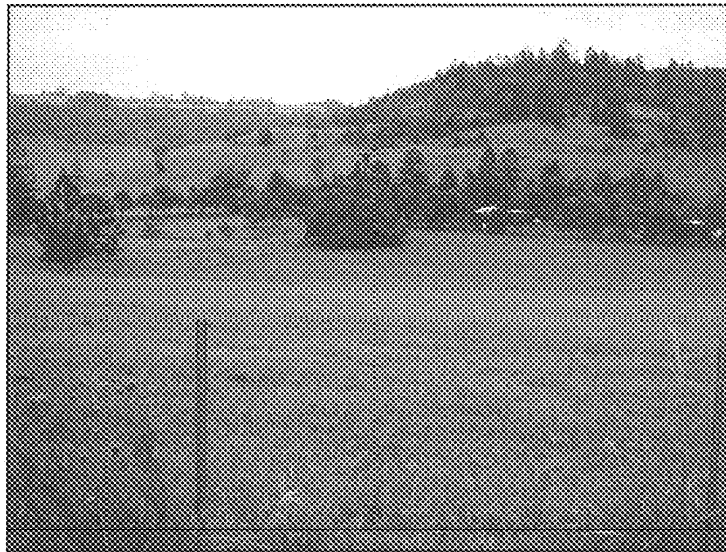
Review of Sewer Capacity, Peer Review





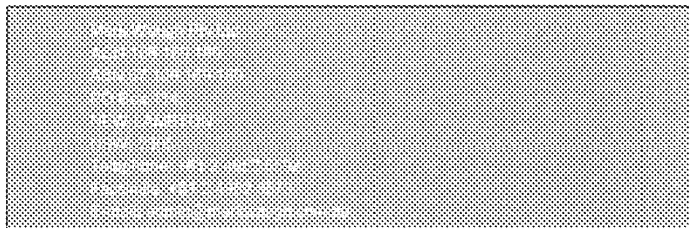
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Proposed Residential Subdivision, North Lismore NSW



Traffic Impact Assessment

February 2011



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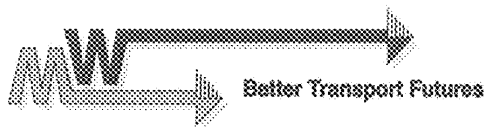
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Document History and Status

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Document Version: Final
Project Number: P0783



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1. Introduction

Background

Better Transport Futures has been commissioned by Project Plan on behalf of the Winten Property Group to prepare a Traffic Impact Assessment for the proposed residential development to the north of Lismore, northern NSW. Due to the size of the development and its location adjacent to Dunoon Road (MR306) the Roads and Traffic Authority for NSW (RTA) will be required to review the proposal prior to formal rezoning once the detail is available for the access arrangements on the arterial road network.

Scope of Report

The scope of this report is to review the traffic and parking implications for the proposed development. The report will also provide advice on access issues, internal car park layout and issues relating to service vehicles.

Issues and Objectives of the study

The issues relevant to the proposal are:

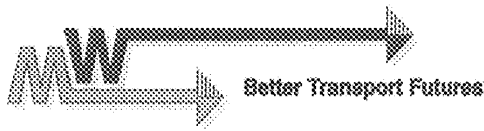
- Assess impact on the arterial and local road network due to the additional traffic flows;
- Assess the capacity of the bridge crossing for access to the Lismore CBD;
- Review the access arrangements for the development; and
- Assess any other transport impacts associated with the development.

The objective of the report is to document the impacts of the proposed development, provide advice on any infrastructure work required as part of the development and to determine the extent of the capacity of the existing road network and in particular the capacity for additional traffic to cross the river to access the Lismore CBD.

Planning Context

As part of the development of this document, the following guides and publications were used:

- RTA Guide to Traffic Generating Developments, Version 2.2 Dated October 2002;
- Australian / New Zealand Standard -- Parking Facilities Part 1 : off-street car parking (AS2890.1:2004);
- Accident Data for the locality by the RTA (Grafton office)
- Lismore City Council DCP Chapter 7 Off Street Parking dated 18/03/09.
- Lismore CBD Traffic and Parking Study, prepared by ttm consultants, final report dated December 2007.



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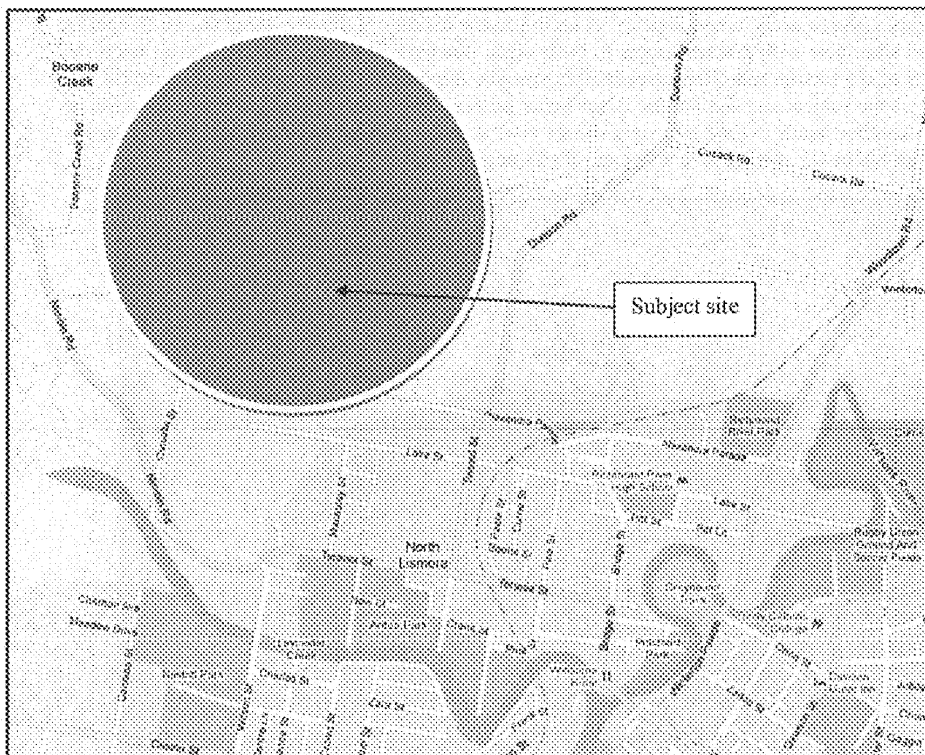
2. Existing Situation

2.1 Site Description and Proposed Activity

2.1.1 Site Location and Access

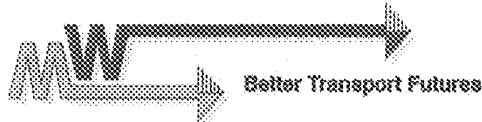
The site is bounded by Dunoon Road and Nimbin Road to the north-west of the Lismore CBD. The site currently has a number of separate access points to individual lots within the subject area. There are a number of residential lots to the immediate south of the site and the Lismore showground is located opposite the site on Dunoon Road.

The location of the site is shown below in **Figure 2.1**.



Source: Google Maps

* **Figure 2.1 - Site Location**



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2.2 Existing Traffic Conditions

2.2.1 Road Hierarchy

Dunoon Road

The major road through the locality is Dunoon Road which is a local Council road providing a road link between Lismore to the south and Dunoon to the north and is a classified main road (MR306) requiring RTA concurrence for any works on or adjacent to the road. To the south of the site it connects with Tweed Street for the connection into Lismore. It also connects with Alexandra Parade for the alternative route into Lismore CBD via Winterton Parade. It provides access for local traffic with limited through traffic movements.

In the locality of the subject site, it provides a single lane of travel in both directions and operates under a posted speed limit of 80 km/h adjacent to the site. On the southern boundary of the site the speed limit reduces to the urban limit of 50 km/h. In the locality of the site, there are no footpaths or sealed shoulders with grassed verges to both sides. Dunoon Road provides an overall width in the order of 6.5 metres and offers a reasonably straight alignment. There are no street lights in the vicinity of the subject site and limited street lights further to the south within Lismore. It connects with Alexandra Parade to the south via a simple give way controlled intersection and then connects to Terania Street via another give way controlled intersection.

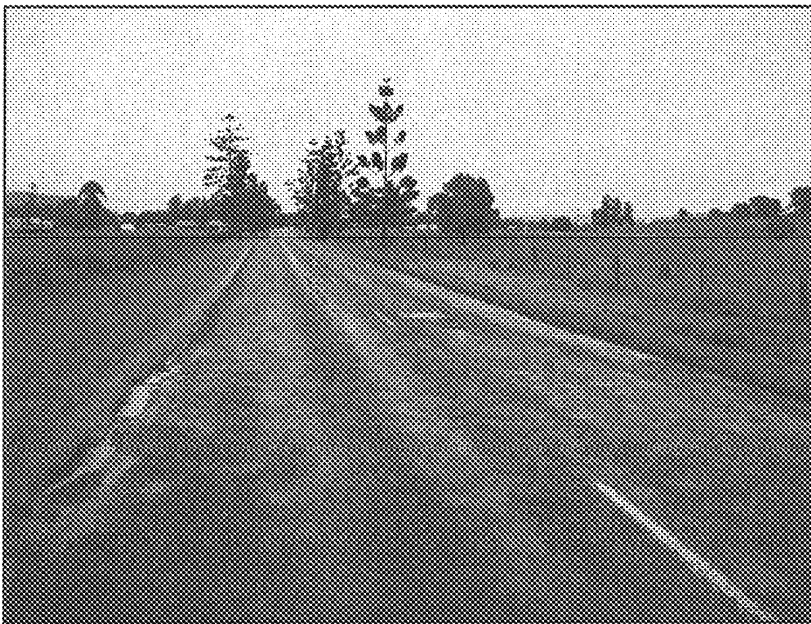
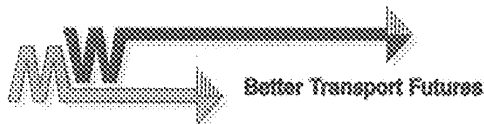


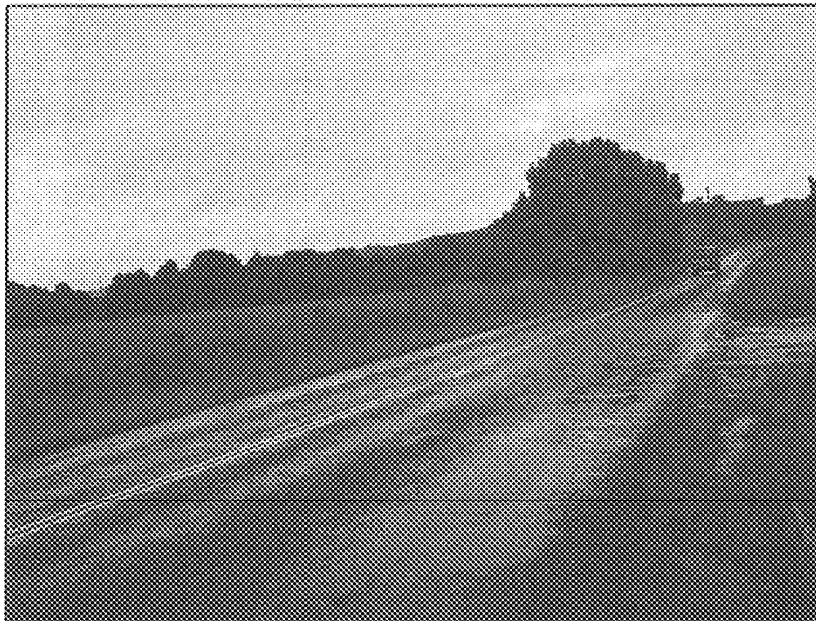
Photo 1 View south along Dunoon Road showing typical cross section. Site is to right of photo



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Nimbin Road

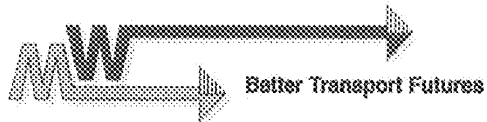
Nimbin Road to the south west of the site is a Council road providing local access to a number of rural lots as well as access through to Nimbin to the north and is a classified main road (MR142). It connects with Terania Street for access to the Lismore CBD. In the vicinity of the subject site it provides an overall width in the order of 6.5 metres with a single lane of travel in both directions. The intersections along its length are simple, give way controlled and the posted speed limit is 50 km/h for the majority of its length along the site frontage. It then increases to 100 km/h. There are no footpaths provided along its length until it connects with Terania Road within the built up area of Lismore.



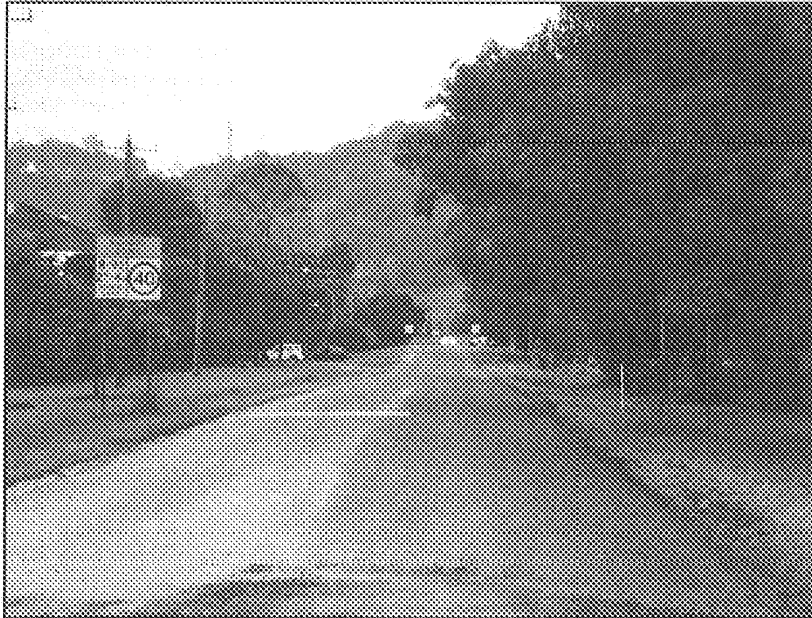
❖ Photo 2 View along Nimbin Road showing typical cross section

Alexandra Parade

Alexandra Parade is a local Council road and provides a connection between the subject site and Winterton Parade for access to the Lismore CBD. It provides a single lane of travel in both directions with an overall width in the order of 6.0 metres. There are no footpaths along its length. Alexandra Parade provides access to a number of individual residential lots and a number of light industrial users as well as at the eastern end of the road the Richmond River High School. Outside of this school zone the posted speed limit is 50 km/h.



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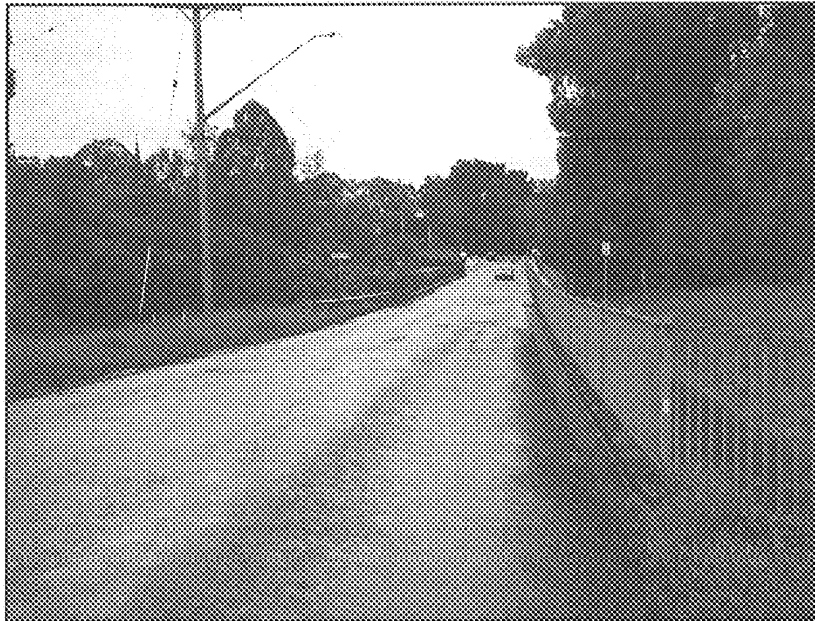
■ **Photo 3** View along Alexandra Parade showing typical cross section.

Winterton Parade

Winterton Parade provides a direct access to the Lismore CBD with a bridge over the river at its southern end. It provides an overall width in the order of 6.5 metres and provides a single lane of travel in both directions. There is a single footpath / cycleway provided along the western side of the road that continues over the river bridge. It provides access to a number of residential lots and operates under a posted speed limit of 50 km/h. It also provides the major access to the Richmond River High School with associated high usage for student drop off and pick up.



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- **Photo 4** View south over the bridge crossing on Winterton Parade. Note footpath to right hand side of photo

2.2.2 Road works

It is understood that other than routine maintenance by the road authorities there are no plans for any major road network changes in the immediate vicinity of the subject site. Given the relatively low traffic flows it can be seen that there is minimal requirements to upgrade the roads in this location.

Currently Council are completing some minor street works along Winterton Parade with resurfacing and rising of the road height being completed as part of the Council flood mitigation works.

2.2.3 Traffic Management Works

It is understood that there are no planned traffic management works in the immediate vicinity of the subject site. A traffic report for the Lismore CBD commissioned by Council has identified a number of intersection upgrades and road upgrades required over the planning of timeframe of 10 years and beyond. It provides a staging for these upgrades of within 5 years, 5-10 years and 10 years and beyond. Council have adopted the recommendations of this study and are looking to complete the road upgrade work over the coming years, dependent upon funding through S94 contributions and State funding opportunities. All of these upgrades have been identified as has the traffic impacts from the proposed development of the subject site.



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2.2.4 Cycling Facilities

There are very limited cycle facilities in the immediate vicinity of the subject site as well as within Lismore despite the Lismore Cycleway Plan (November 2007) identifying the need to develop:

- Linking of existing cycleways with established cycling attractors for commuting cyclists
- Providing loops in the network for recreational cyclists
- Avoiding where possible highly trafficked roads.

There are no published plans of cycleways readily available to promote cycling within the community.

The local roads adjacent to the subject site carry very low traffic volumes and the traffic speeds are low allowing for on-road cycling to occur safely.

2.3 Traffic Flows

The proposed development is for a residential facility providing mixed density development. Access will be provided via connections to Nimbin Road and Dunoon Road. Traffic flows would be typical of residential development, with distinct peaks during the morning and afternoon periods associated with commuting trips, school trips etc.

2.3.1 Daily Traffic Flows

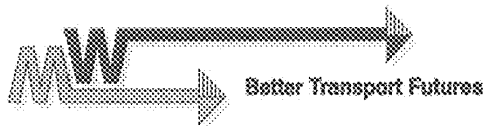
There is limited data available with regard to daily traffic flows in the immediate vicinity of the subject site. However, observations on site indicate that overall the traffic flows adjacent to the subject site are relatively low and well within acceptable limits for these local roads. It can be seen that Dunoon Road does not provide a direct access road to any major centres and as such only provides access for local residential and rural needs.

Peak hour surveys were completed adjacent to the site in a number of locations. Based on peak hour flows representing 10% of the daily flows, the following flows are projected:

- Dunoon Road north of Alexandra Parade -- 3,300 vehicles per day.
- Dunoon Road south of Alexandra Parade -- 2,700 vehicles per day
- Alexandra Parade east of Dunoon Road -- 3,500 vehicles per day

Whilst peak hour flows were completed over the bridge crossing on Winterton Parade, these are not considered representative of daily flows. The Richmond River High School generates significant traffic demands during drop off and pick up times and basing the daily flows on these peak flows would not provide a representative daily value of traffic flows at this location. During the morning peak period, the two-way traffic flow on Winterton Parade over the river bridge was 705 vehicles, with the dominant flow being towards town (525 vehicles). During the afternoon, the flows between 3.15 and 4.00 were similar, although the balance was more even between town bound and out of town bound traffic. However, after 4.00 PM the traffic flows decreased noticeably with the observed flows being in the order of 344 (with the dominant flow being out of town with 210 vehicles or 61% of the flows). This shows that outside of the peak demand created by the schools at this location the flows on Winterton Parade are well within acceptable limits.

The CBD traffic study completed for Council shows slightly lower flows than this but are based on 1996 data. Allowing for background growth in data the current values predicted above would appear representative of the current daily flows.



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2.3.2 Daily Traffic Flow Distribution

Based on the observed traffic movements during both the morning and afternoon peak periods, it can be seen that there is a strong desire for traffic to head towards the Lismore CBD from the outlying areas during the morning peak and then the reverse movement out of Lismore during the PM peak.

It is considered that the subject development site with residential development would show a similar bias with traffic wishing to head towards the Lismore CBD in the morning peak and the reverse outbound trip in the afternoon.

2.3.3 Vehicle Speeds

No vehicle speed measurements have been taken as part of the study work. Observations on site would indicate that the majority of traffic appears to travel within the posted speed limits, with no obvious signs of excessive speed. The road alignment on Dunoon Road adjacent to the site does not encourage high traffic speeds. Similarly, the alignment off Alexandra Parade under the railway line contains vehicle speeds.

Vehicles speeds are also constrained by the school zone on Winterton Parade and Alexandra Parade (40 km/h zone).

2.3.4 Existing Site Flows

The site is currently occupied by a number of rural lots. Existing traffic flows within the overall site area are relatively low.

2.3.5 Heavy Vehicle Flows

Minimal heavy goods vehicles were observed during the site visits. It can be seen that there are only heavy vehicles with a destination to this area with limited through traffic movements overall. It is noted that there are livestock sales yards on the corner of Alexandra Parade and Dunoon Road with the requirement for access by larger vehicles including semi trailers during sales events.

2.3.6 Current Road Network Operation

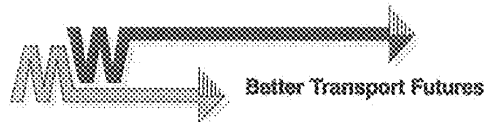
Observations on site indicate the current road network operates well with minimal delays for the majority of traffic movements. The traffic movements associated with the Richmond River High School and Woodlawn College both create high demands along Winterton Parade during the peak periods which can lead to some delays at the intersection of Winterton Parade and Orion Street.

The intersection of Alexandra Parade with Dunoon Road and with Winterton Parade both however operate very well with little if any delay for the majority of road users.

Observations within the Lismore CBD show that there is some congestion, although this was exacerbated by the road works occurring in and around the CBD. The report commissioned by Council has already acknowledged the existing road network constraints and a number of upgrades have been developed and adopted for Council to help reduce the level of congestion and delays within the Lismore CBD.

2.4 Traffic Safety and Accident History

Accident data for the locality is collected by the RTA. Data from the RTA reveals a single accident at the intersection of Winterton Parade and Orion Street and three accidents at the



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intersection of Alexandra Parade and Dunoon Road, over a 5 year history. These are relatively low numbers with just a single injury. Further details are provided in **Appendix B**.

A review of the local road network indicates that the roads are typically well laid out with easy to understand intersections with good visibility splays.

Overall it is considered that the road in this location provides a safe and acceptable layout for existing road users.

2.5 Parking Supply and Demand

2.5.1 On-street Parking Provision

Currently vehicles can park on the verges on the local streets in the general vicinity of the subject site. There are limited parking controls allowing for general use of this parking as required.

2.5.2 Off-Street Parking Provision

Off-street parking in the general locality of the subject site is provided within the residential and light industrial lots. There is car parking within the Richmond River High School for teacher and parent use as required.

2.5.3 Parking Demand and Utilisation

During the site work there was minimal parking demand observed. All of the parking demand was satisfied within the site boundaries of the various lots with very little demand for on-street parking in the locality of the subject site.

It is understood that during functions at the showground there are significant parking demands along both Dunoon Road and Alexandra Parade. This parking demand is restricted by normal parking controls associated with public roads.

2.5.4 Set down or pick up areas

There are no formal set down or pick up areas in the locality of the site. The school bus drop off and pick up is completed off Lake Street with no impact directly on Winterton Parade or Alexandra Parade.

2.6 Public Transport

2.6.1 Rail Station Locations

Lismore Railway Station is closed to rail travel however the station is part of the Countrylink service with rail travel to Sydney and to Brisbane via Casino available and connected to Casino from Lismore via a bus service. There is an AM and PM service to Sydney and an afternoon service to Brisbane.

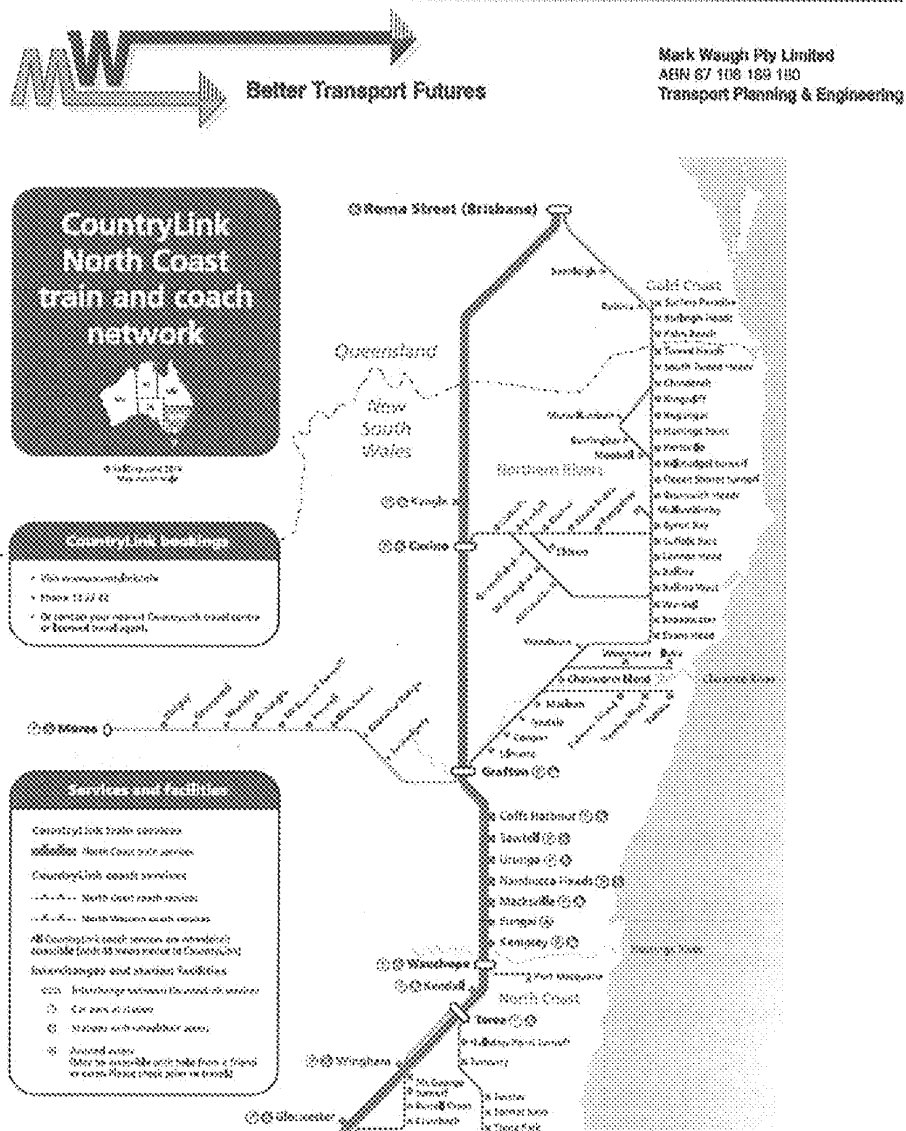


Figure 2-1 Countrylink North Coast Network

2.6.2 Bus Stops and Associated Facilities

Lismore is well supported by a wide range of small bus companies servicing the surrounding townships throughout the region as well as the Countrylink Service connecting Casing to the Gold Coast via Lismore and Byron Bay.

Existing bus services within Lismore are provided by Northern Rivers Buslines however they offer no regular services within the vicinity of the site. The North-South Route 683 services the North Lismore area every two hours during the day and travels along Terania Street however returns towards Lismore at its junction with Nimbin Road. (Figure 2-2).

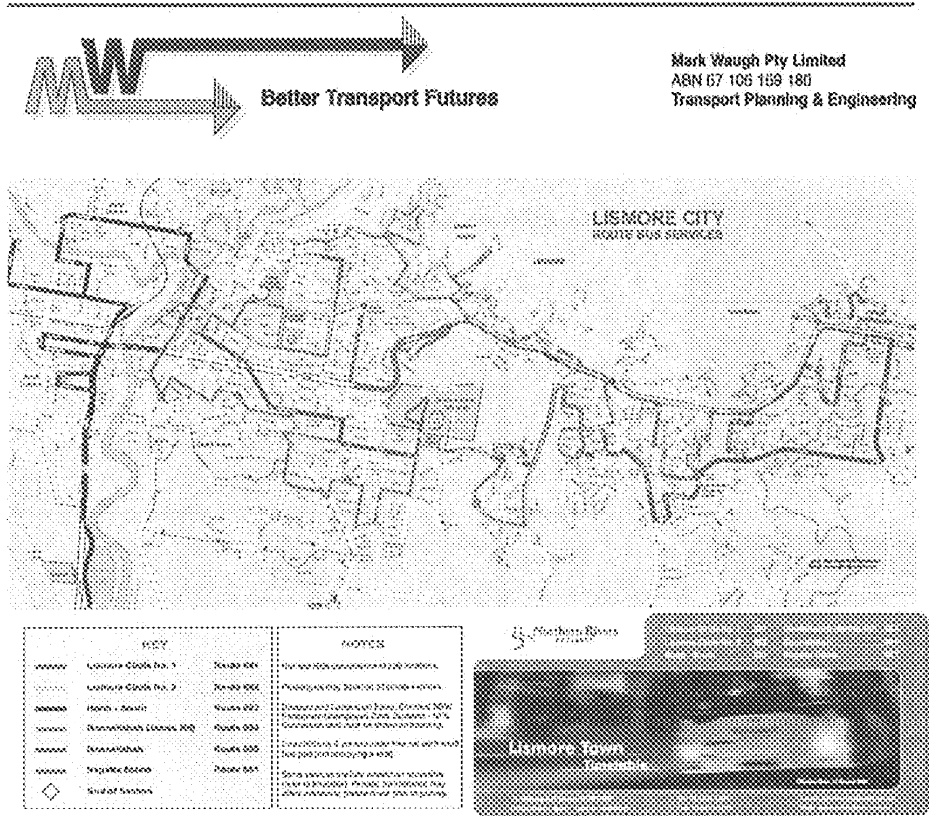
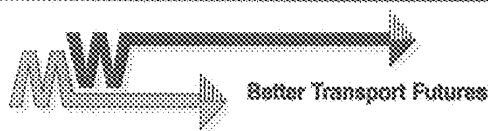


Figure 2-2 Northern Rivers Buslines Lismore Bus Routes

The site work reveals that there are a high number of school buses that service the existing demands for school students for Richmond River High school. These buses provide a service to this school from a number of local towns and centres.

The Dunoon Bus Service offers a Dunoon to Lismore route via Tullera along Dunoon Road on school days only.

Waller's Bus Company runs a number of services daily between Lismore and Nimbin and beyond to Murwillumbah. The services primarily cater for school students although plans are in place, subject to approval by NSW Transport, to offer an additional service for commuters leaving Nimbin in the morning and returning from Lismore at the end of the working day. The route from Nimbin travels along Nimbin Road, along Terania Street and travelling into the CBD via Bridge Street.



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WALLER'S BUS COMPANY
Timetable

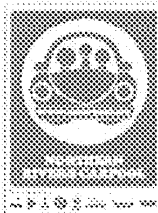
Pickup Points	Nimbin Central	Nimbin Main St	Coffee Camp	Goombunga School	Goombunga Store	Blakebrook Interchange	RRHS	Lismore Transit
Nimbin - Lismore	7:50	7:52	8:03	8:10	8:14	8:20	8:35	8:50
Mon - Fri	8:30	8:09	8:10	8:17	8:18			9:35
	8:22	8:25	8:35	8:40	8:45			9:10
		8:30	8:40	8:45	8:49			9:00
Mon, & Thu Only		12:45	12:55	1:00	1:05	1:15	1:17	
School Holidays		8:00	8:10	8:15	8:16			8:30
		8:25	8:30	8:40	8:48			9:00
Pickup Points	Lismore Transit	RRHS	Blakebrook Interchange	Goombunga Store	Goombunga School	Coffee Camp	Nimbin Main St	Nimbin Central
Lismore - Nimbin	7:00			7:10	7:14	7:25	7:30	7:20
Mon - Fri	8:00			8:10	8:25	8:35	8:45	8:50
	8:35	8:40	8:45	8:48	8:50	9:00	9:10	9:15
	8:20	8:35	8:50	8:55	8:59	9:05	9:15	9:20
Mon, & Thu Only	12:00	12:05	12:10	12:15	12:19	12:25	12:35	
School Holidays	8:35			8:48	8:55	9:00	9:10	
	8:25			8:44	8:50	8:57	9:00	
Pickup Points	Gwynne Road	Mitchell Road	Oakey Creek Interchange	Blakebrook Interchange	RRHS	Trinity Bay 2 Interchange		Lismore Transit
Georgica - Lismore	7:43	7:51	8:03	8:20	8:35	8:40		8:52
School days only								
Pickup Points	Lismore Transit		Trinity Bay 2 Interchange	RRHS	Blakebrook Interchange	Oakey Creek Interchange	Mitchell Road	Gwynne Road
Lismore - Georgica	8:25		8:20	8:35	8:50	9:10	9:15	9:25
School days only								

Town Service - Wheelchair access available upon request, 24 Hour notice required
 School Service - Buses connect in Nimbin - Murwillumbah
 No Public Holiday Services

P.O. Box 8503 SOUTH LISMORE NSW 2480 Phone: (02) 6622-8266 Mob: 0420-255-284 Fax: (02) 6622-6882

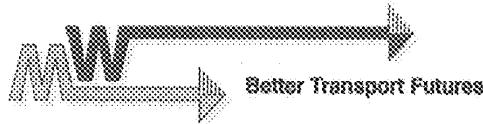
Figure 2-3 Waller's Bus Company Lismore to Nimbin Timetable

2.6.3 Car Pooling

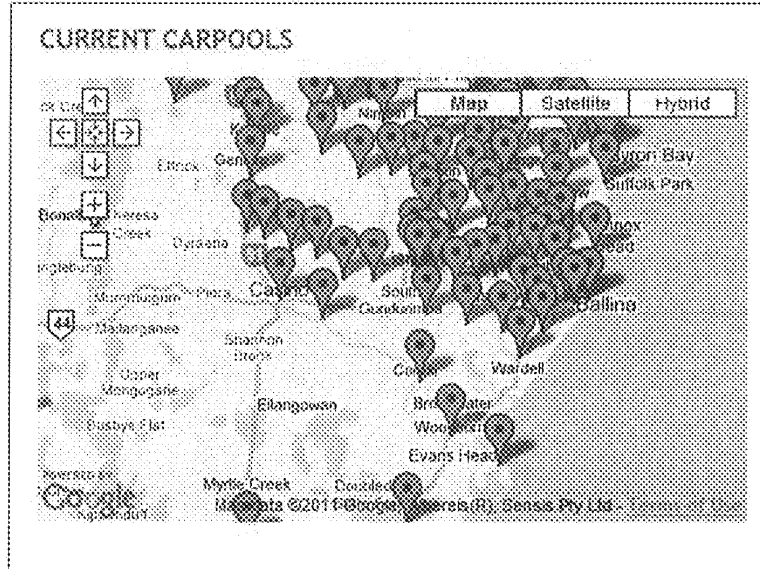


In February 2010 the first regional carpooling network was announced in Lismore. Providing an online registration the program aims to create a network of commuters across the Northern Rivers region (Tweed to Clarence) that have similar travel patterns and are prepared to share their travelling to reduce cost and travel time.

The network is supported by a series of designated roadside pick up points as well as priority parking in specific car parks. It is supported by the local councils, North Coast Institute of TAFE and the North Coast Area Health Service.



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Source: www.nrcarpool.org

■ Figure 2-4 Current Carpooling in the Northern Rivers Carpooling Network

2.6.4 Pedestrians

There are currently no pedestrian facilities in the vicinity of the site reflecting its rural nature. There is a footpath along the western side of Winton Parade providing an important link between the Richmond River High School and the Lismore CBD. This was observed to be used by students accessing the school during the site work.

There is a footpath that connects around the south west of the Richmond River High School as well as a gravel path through Slaters Park connecting back to Alexandra Parade to the east of the railway crossing.

2.7 Other Proposed Developments

To the south of the site, there is a planned development of approximately 8 hectares of industrial land fronting Tweed Street and Terania Street. The land has been rezoned for industrial use and will be proceeding to DA stage shortly.

There are currently no other significant developments proposed in the immediate vicinity of the subject site.



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3. Proposed Development

3.1 The Development

Plans for the proposed residential development have been prepared by RPS and a copy of the overall site layout is provided in **Appendix A** to this report.

3.1.1 Nature of Development

The proposal is for a residential subdivision providing some 1500 residential lots, with a variety of lot sizes. Access to the site will be via three or four potential driveway access points on Dunoon Road and a single access off Nimbin Road.

3.1.2 Access and Circulation Requirements

Access to the site will be via three or four new driveway access points on Dunoon Road. There are three access points to the north of the intersection of Alexandra Parade and Dunoon Road and potentially an access point at this intersection to create a 4-way intersection. These access points will allow for all turning movements as well as dispersment of trips. The development of the land will occur over a number of stages and there will be one or potentially two access points off Dunoon Road at the commencement of the project. As the development progresses, there will be potential for an access off Nimbin Road. There will be an internal network of residential estate roads connecting these separate access points allowing different route options.

The design and construction of these internal roads and access points will be in accordance with Council requirements.

3.2 Access

3.2.1 Driveway Location

The access points will be located in locations to suit the road alignment as well as internal topographical issues. The exact location of these access points will be discussed and agreed with Council during the design phase of the project.

3.2.2 Sight Distances

An important issue with relation to the access points is the provision of adequate sight visibility splays for traffic entering and exiting the site as well as through drivers being able to see the intersection and adjust their vehicle as required. For the posted speed limit of 80 km/h the required visibility splay is 160 metres whilst for junctions within the 50 km/h speed zone the requirement is 69 metres.

The location of the access points will need to take these requirements into consideration at the design stage of the project.



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3.2.3 Service Vehicle Access

The site will allow for access for typical service vehicle requirements associated with residential subdivisions. This will include Council refuse collection vehicles as well as occasional large delivery vehicles. All service vehicles will enter and exit the site in a forward direction and allowing for normal Council requirements it is considered that the internal layout will allow for safe and appropriate access as required for service vehicles.

3.2.4 Queuing at entrance to site

Given the comparatively low traffic flows on the external road network adjacent to the subject site it is considered that there will be minimal queuing at the site entry points. It can be seen that the majority of traffic will have an origin / destination towards Lismore and for the access points on Dunoon Road this will require a left turn in and right turn out, which will mean any queue will be contained within the site. With the potential dispersment of trips due to the 4 or 5 access points it can be seen that the impact at any one access will be reduced and queues will accordingly be negligible. Thus there will be minimal impact upon the traffic movements along the external road links.

3.2.5 Comparison with existing site access

The existing site is currently served by a number of driveways providing access to individual lots. These individual access points will carry much lower flows than the proposed development access points. All redundant existing driveway access points will be removed as part of the development of the site.

3.2.6 Access to Public Transport

There are currently limited options for buses in the vicinity of the site except for school bus runs. It can be seen however that with 1500 lots (and a potential number of residents in the order of 3,750) there will be demand for public transport for access to the centre of Lismore. It is considered that the potential for a bus route to access through the site should be determined at the design stage of the process in consultation with local bus providers so that access can be permitted through the site. This could potentially require the internal access route to have an increased road width to accommodate a bus and for bus stops to be provided along this route accordingly.

This potential route through the site and the associated design requirements will need to be discussed and approved at the design stage with Council and the local bus providers.

3.3 Circulation

3.3.1 Pattern of circulation

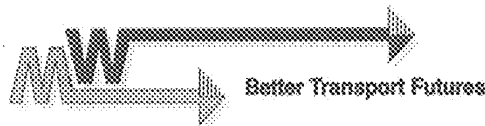
Traffic will enter the site in a forward direction with manoeuvring available within the site on the internal roads to allow for traffic to be able to exit in a forward direction.

3.3.2 Road width

The internal roads will be designed and constructed in accordance with Council Residential Subdivision guidelines. All roads must allow for two-way traffic movements.

3.3.3 Internal Bus Movements

It is considered that there could be potential for an internal bus route through the site to provide access for future residents to access the Lismore CBD. This may require a bus route to access



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through the site and will require discussion with Council and the local bus operators during the design stage of the project.

3.4 Parking

3.4.1 Proposed Supply

All parking for this proposed development will be contained within the site.

3.4.2 Authority Parking Requirements

RTA Parking Requirements

The RTA Guide to Traffic Generating Developments indicates that a single space is required per residential dwelling but that two spaces are preferable.

Lismore City Council DCP Car Parking Requirements

The Lismore City Council Development Control Plan requires two parking spaces per dwelling with one space cover e.g. garage or carport. Parking must also be available for visitors to the site.

Given the size of the development area it is considered that parking provision on site can be accommodated within the site footprint with no impacts upon the external road network. Visitor parking can be accommodated on driveways or within the internal road network with no external impacts.

3.4.3 Parking Layout

The design of the dwellings and the associated parking will be provided in accordance with Council design requirements and will be detailed during the detailed design stage of the development.

3.4.4 Parking Demand

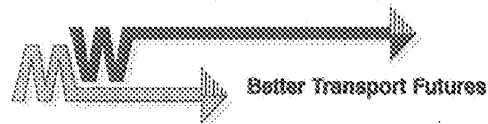
The development will have its peak parking demand over night and the provision of parking in accordance with the Council DCP will ensure the normal peak demand can be accommodated within the development site with no impact upon the external road network.

3.4.5 Service Vehicle Parking

As a residential subdivision there is no requirement or demand for a dedicated service area. The preliminary plans for the development indicate a potential mixed use centre and child care development at the entry point off Dunoon Road which may require some service vehicle access. This will need to be reviewed during the detailed design stage of the development and will need to be in accordance with the Council DCP.

3.4.6 Bicycle Parking

Bicycle parking can be provided within the overall site footprint and will be determined as part of the detailed design of the subdivision. Typically, parking for bicycles can be satisfied within the garages provided for each dwelling.



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4. Impact of Proposed Development

4.1 Traffic Generation

4.1.1 Daily and Seasonal Factors

It is considered that the residential development will have minimal daily and seasonal variation in traffic flows. Weekend flows may be slightly lower than the working week Monday to Friday but overall the flows will be reasonably consistent.

4.1.2 Pedestrian Movements

Pedestrian access and movements to the subject site is an important consideration in the development of the site. It is considered that access will be required internal to the site throughout the development and that off road paths should be provided to cater for the demands of the future residents in and around the subdivision. The use of paths connecting between residential roads or at the end of cul de sacs allows for ease of movement through the site with reduced distance for pedestrians providing a distinct benefit.

The internal design of the development will be in accordance with Council's DCP which includes requirements for pedestrians. The design of the internal roads and paths for pedestrians will be completed during the detailed design stage of the project.

It can also be seen that there will be potential pedestrian (and cyclists) desire lines for movements towards the Richmond River High School and through to the Lismore CBD. The provision of a path from the subject site to connect with Alexandra Parade and through to the existing footpath / cycleway on Winterton Parade is desirable and should be provided as part of the development of the site. This path will provide a benefit to the proposed development as well as the existing residents and development along Alexandra Parade.

The design and provision of this path will be determined during the detailed design stage of the project in consultation with Council.

4.2 Traffic Distribution and Assignments

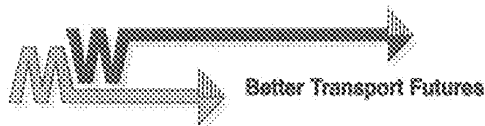
4.2.1 Hourly Distribution of Trips

The level of traffic generated by the proposed development has been assessed in accordance with the RTA Guide to Traffic Generating Developments. This guide indicates that typically residential developments such as this generate some 0.85 trips per dwelling during the peak hours and 9 trips per day. For the proposed development of 1500 lots this gives 1275 trips during the peaks and potentially 13,500 trips per day.

Outside of the peak hours, the flows associated with the residential development would be much lower. Typically flows at night are negligible for residential developments such as this.

4.2.2 Origin / destinations assignment

It is considered that nearly all of the traffic associated with the development will desire access towards the Lismore CBD. There are a number of routes available to the traffic associated with the development but it is considered that the location of the site with primary access off Dunoon Road will have a bias towards using the route via Alexandra Parade and Winterton Parade to access



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Lismore and locations beyond. Traffic may choose to continue south along Tweed Street to connect with Terania Street and Bridge Street to access the CBD but this route is not as attractive as it is slightly longer. It can also be seen from the CBD traffic report completed for Council that the use of this route creates delays for road users with a capacity constraint over the river meaning that traffic to and from the development would find it more desirable to use the route via Winterton Parade.

An important point with regard to the CBD traffic report completed for Council is that the traffic flows associated with the subject development was taken into account with the traffic modelling work completed for the study. However, it would appear that the traffic flows associated with the subject development have been assumed to travel across the two other bridges over the river (as there is no reference to the bridge on Winterton Parade) and thus the model may have overestimated the volume of traffic that will in the future be travelling over the two other bridges to the Lismore CBD. If this is the case, then the requirement to upgrade the bridge over the river as identified within the Council report may not be required in the short term i.e. two years as identified within the report.

4.3 Impact on Road Safety

The additional traffic flows associated with the development of the subject site will have an acceptable impact upon the overall traffic safety in the general vicinity of the subject site. All of the key intersections are well laid out and provide an adequate carriageway width to allow for turning movements. Visibility splays at all of these intersections are good and allow for safe traffic movements.

However, observations on site indicate that the intersection of Winterton Parade with Orion Street currently offers some safety concerns for road users, due to the restricted visibility for drivers exiting Orion Street. The view to the south (left) along Winterton Parade is restricted meaning that drivers pull out of the side road and cause northbound through movements on Winterton Parade to brake to avoid a collision.

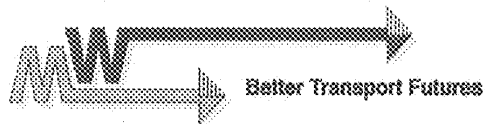
A review of the CBD traffic report completed for Council shows that this intersection has not been considered for any upgrade works.

From the site work, the following options are put forward for consideration for upgrading this intersection to improve safety:

1. Provide a roundabout control at this location to reduce vehicle speeds and reduce visibility requirements. This will also increase the capacity of this intersection to cater for the demands associate with the development of the subject site.
2. Improve the visibility splay available for drivers exiting Orion Street. Whilst this will improve safety it will not improve the capacity of this intersection.

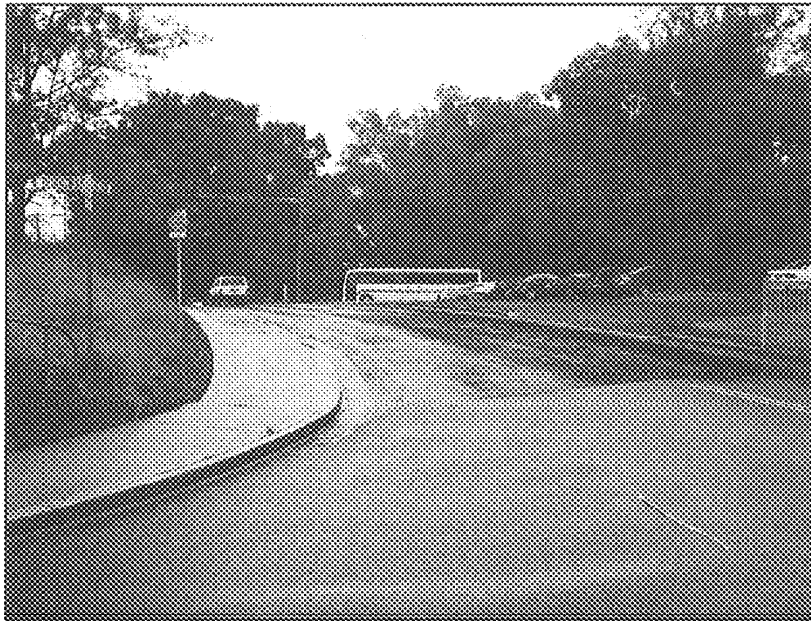
It is important to note that that this intersection also carries a large number of buses associated with the school drop off and pick up requirements at the Richmond River High school as well as movements associated with the Trinity Bus Interchange. Any upgrade would need to take into account the requirements of these larger vehicles and their turning requirements.

Of the two options above, it is considered that the provision of a roundabout at this location would provide the best solution from a road safety and capacity perspective.



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This is an existing issue and is the responsibility of the road authority (Council) to improve this intersection. However, it can be seen that there is potential for increased risks at this intersection due to the increased traffic flows generated by the development and a contribution to the road authority to improve this intersection could be considered as part of this development.



■ **Photo 5 View to left for drivers exiting Orion Street onto Winterton Parade**

Of the remaining intersections used by the development, the layout of these intersections provides a safe and acceptable layout with good visibility on all approaches. The layout of the intersection of Alexandra Parade and Dumoon Road may require an upgrade to roundabout control to accommodate the 4th leg from the development but this will not have any negative impacts upon the road safety at this location.

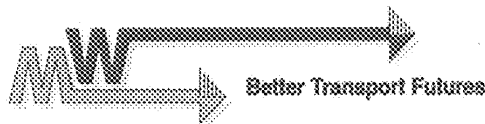
The review of the accident data for the locality indicates that there have been limited accidents in the general vicinity of the subject site.

Overall it is considered that there will be a minimal impact upon road safety in the locality.

4.4 Impact of Generated Traffic

4.4.1 Impact on daily Traffic Flows

The daily level of traffic generated by the proposed development has been assessed in accordance with the RTA Guide to Traffic Generating Developments. Typical peak hour flows would be in the order of 1275 vehicles whilst daily flows will be in the order of 13,500 trips per day (or 6,750 inbound and 6,750 outbound per day).



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The majority of this traffic will use the route along Alexandra Parade and Winterton Parade to access the Lismore CBD. In time, there could be a switch in routes when the additional bridge crossing over the river is provided (as identified within the CBD traffic study completed for Council). The full development 1500 lots will take a number of years to develop and could take near 10 years before the full development is realised.

It can be seen that during the initial stages of the development, the daily traffic flows would be much lower. For example, if the initial stage of the development incorporates 200 lots, the daily traffic flows would be 1800 vehicles per day which would have a minor impact upon the existing road network and could be accommodated along the Alexandra / Winterton Parade route into the Lismore CBD. The impact upon the capacity of Winterton Parade would be negligible with flows spread-out over the full day.

As the development proceeds, it can be seen that the traffic impacts will increase and potentially impact upon the capacity of the route along Alexandra Parade and Winterton Parade. However, there is scope within the existing road network for the development to proceed within the current road network. Traffic dispersment will occur as and when the additional bridge crossing is provided over the river (as identified within the Council report for the CBD).

As a local collector road, Alexandra Parade can carry between 5,000 and 10,000 vehicles per day. With the current AADT being in the order of 3,500 vehicles per day there is scope for up to an additional 6500 vehicles per day to use this road. This represents nearly 50% of the total development of the subject site or 700 lots. Whilst no daily data is available for Winterton Parade, it is considered that a similar value could be accommodated on this road.

For the local roads immediately surrounding the site, it can be seen that there will be increased movements in and out of the site but that the overall flows will be acceptable upon the overall capacity of the road network. The key issue will be the impact at the intersection and the capacity of these intersections.

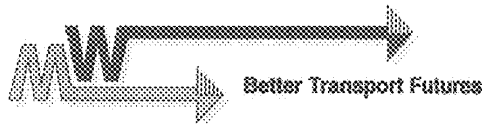
A review of the CBD traffic study indicates that the subject site was taken into account when the future traffic patterns were assessed and therefore no additional work will be required as part of this development within the Lismore CBD.

4.4.2 Peak Hour Impacts on Intersections

One of the critical intersections is that of Alexandra Parade and Dunoon Road. It can be seen that this intersection will carry increased traffic flows and will provide for a 4-way intersection as the development continues. Whilst there will not be a significant capacity constraint, it is considered that a give way controlled 4-way intersection is not desirable at this location and that a 4-way roundabout controlled intersection is preferred. This roundabout upgrade would help with road safety as well as contain traffic speeds. This location marks the entry point for the 50 km/h speed zone associated with Lismore and a roundabout at this location would create a gateway treatment and encourage drivers to slow down to the reduced speed within the urban limits of Lismore.

The design and construction of this upgrade will be in accordance with Council and RTA requirements and will be completed as part of the detailed design work for the project.

Of the remaining intersections potentially impacted upon by the subject development, it is considered that the existing intersections currently have adequate spare capacity to cater for the demands associated with the development. Observations on site during both the morning and afternoon peak period indicated that the intersection of Alexandra Parade and Winterton Parade operates with little if any delay and it is considered that the additional flows associated with the



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development will have a minimal impact upon the operation of this intersection for a number of years into the development.

However, it is considered that as the development extends beyond approximately 500 lots, this intersection will alter in its pattern of traffic movements, with the dominant flows being the left turn into Alexandra Parade and the right turn out. It would therefore be preferable to alter the priority of this intersection to reflect this priority movement, with the northern leg being the minor road.

It can be seen that the development of 500 lots or more could take a number of years and that the extent of road works required at that time needs to be assessed in context of the possible new bridge over the river to the Lismore CBD. Whilst the route via Winterton Parade has some considerable spare capacity, upgrading of the road network elsewhere may make it more desirable for drivers to choose another route.

4.4.3 Impact of Construction Traffic

The majority of the construction work will be located on site and as such will have a minimal impact upon the adjacent road network. The works on site will require some specialist machinery e.g. cranes, as well as construction workers to access the site. Typically site construction work occurs between 7.00 AM and 4.00 AM and thus will have little impact upon the traditional peak periods.

During the construction of the new site access driveways, there will be a need to work adjacent to a traffic lane. This will require protection for workers and would involve a reduced speed zone for the duration of these works.

All works on site will be governed by the relevant EP&A rules and as stipulated within any development consent granted by Lismore City Council. This will include hours of work. As part of the development approval process, a Traffic Control Plan (TCP) will be required.

4.4.4 Other Developments

The proposed industrial development to the south of the site will not impact upon this proposed development.

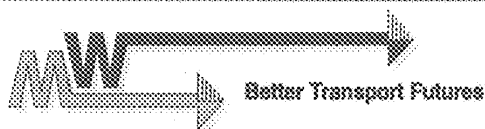
4.4.5 Assessment of Traffic Noise

An assessment of traffic noise is beyond the scope of work and expertise of Better Transport Futures.

4.5 Public Transport

4.5.1 Options for improving services

It is considered that the proposed development could generate increased demands for access to the Lismore CBD via improved bus services. A regular bus service between the subject site and the Lismore CBD would provide a benefit to non car owning residents as well as reduce the dependence upon private motor vehicle use for access to the Lismore CBD. The potential for a bus route to service the site and potentially travel through the site should be discussed with Council and the local bus providers during the design stage of the project.



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4.5.2 Pedestrian Access to Bus Stops

All of the internal residential roads will allow for pedestrian access in accordance with Council's residential subdivision guide. This will allow for pedestrian access to any bus stops within the site or along Dunoon Road once a new route is determined.

4.6 Recommended Works

4.6.1 Improvements to Access and Circulation

It is considered that the proposed site access and circulation will provide a safe and appropriate access arrangement for the proposal, as all access points and internal roads will be designed and constructed in accordance with Council's Residential Subdivision guidelines. Due to the low speed environment within the site, internal movements will be able to operate in a safe and appropriate manner.

4.6.2 Improvements to External Road Network

As discussed above, a number of external road upgrades will be required as part of the development. These will include:

- Upgrade the intersection of Winterton Parade and Orion Street to provide a roundabout controlled intersection. A contribution towards this upgrade is considered appropriate as this is an existing issue and the upgrade will solve the existing safety concerns at this intersection;
- Provide a 4-way roundabout controlled intersection at Alexandra Parade with Dunoon Road as part of the access to the subject site;
- Upgrade the intersection of Alexandra Parade and Winterton Parade to alter the priority to reflect the dominant flows that will occur as the development of the subject site proceeds

4.6.3 Improvements to Pedestrian Facilities

It is considered that a footpath / cycleway should be provided along Alexandra Parade to connect to the existing footpath / cycleway on Winterton Parade for access between the subject site and the Lismore CBD

4.6.4 Effect of Recommended Works on Adjacent Developments

There will be no effect on adjacent developments.

4.6.5 Effect of Recommended Works on Public Transport Services

There will be no effect on public transport services.

4.6.6 Provision of LATM Measures

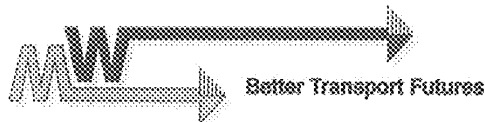
There are no other LATM measures required as part of this development.

4.6.7 Funding

All works identified above will be reviewed as part of the subject development with potential for some of the works to be negotiated as part of a Voluntary Planning Agreement (VPA) as well as funding through S94 contributions.

4.6.8 Noise Attenuation

Any noise attenuation measures will be assessed by others.



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5. Conclusions

The following conclusions are drawn from the investigations into the proposed residential development to the north of Lismore off Dunoon Road, NSW:

1. The proposed development is for a residential subdivision providing in the order of 1500 lots. Access will be provided via a number of access points off Dunoon Road and Nimbin Road and all parking can be contained on site.
2. The site is currently occupied by a number of rural holdings.
3. The major road through the locality providing access to the subject site is Dunoon Road. It generally provides a single lane of travel in each direction and suffers from minimal delays and congestion in the general locality of the site due to it not providing any direct through route for traffic.
4. The remaining roads in the locality of the subject site are all local Council roads providing access to the local residents. These operate under the 50 km/h speed limit within the urban limit of Lismore and generally provide a wide pavement width with no footpaths.
5. As part of the study, traffic data was collected at the key intersections that could be impacted upon by the development and the road network operations observed at these locations. The on-site observations show that the current traffic flows are low in the vicinity of the site and there is minimal delay for existing road users.
6. The observations on site showed that there is a large amount of traffic using Winton Parade to cross the river, but the majority of this traffic is associated with school drop off and pick up. Outside of these periods the flows are very low on this section of the road network.
7. Based on advice from the RTA Guide to Traffic Generating Developments, the proposed development of 1500 lots could generate some 1275 vehicle movements during the peak periods and 13500 throughout the day. It is considered that the major attraction would be towards the Lismore CBD and that access via Alexandra Parade and Winton Parade would be desirable for future residents of the subject site.
8. A review of the traffic report that was completed for Council for the Lismore CBD shows that the proposed development of the subject site was taken into account when the traffic modelling was completed for this project. Whilst this report indicated that there would be capacity constraints in the road network, the report and modelling did not take into account the capacity along the route via Winton Parade.
9. The existing road network in the general vicinity of the subject site currently operates with minimal delays and congestion for the existing road users. There are minimal delays for the existing road users and it is considered that the additional traffic flow associated with development of the subject site will have a minimal impact upon the overall operation of the road network.
10. A review of the accident data provided by the RTA indicates that there have been few accidents in the general vicinity of the subject site over the last 5 years. Given the good road layout in the locality it is not considered that this will alter considerably due to the proposed development. However, observations on site show that the intersection of Winton Parade and Orion Street suffers from some delays but also creates some safety concerns due to limited visibility at this location. The provision of a roundabout at this location will aid the safe operation of this intersection.
11. One of the main access points for the development will be a 4-way intersection of Alexandra Parade and Dunoon Road. It is considered that this intersection should be upgraded to a 4-way roundabout control, for ease of traffic movements and to act as a gate way treatment for traffic entering the urban speed limit of 50 km/h within Lismore.

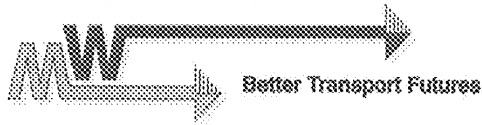


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12. As the development expands in stages, it is considered that the intersection of Alexandra Parade and Winterton Parade should be altered to reflect the change in priority for the dominant traffic movements.
13. It can be seen that beyond the development of approximately 500 lots, the continual use of the route via Alexandra Parade and Winterton Parade could change with the provision of the additional bridge crossing proposal supported by Council. Once this is constructed the traffic movements between the subject site and the Lismore CBD could alter considerably and should be reviewed at that stage.

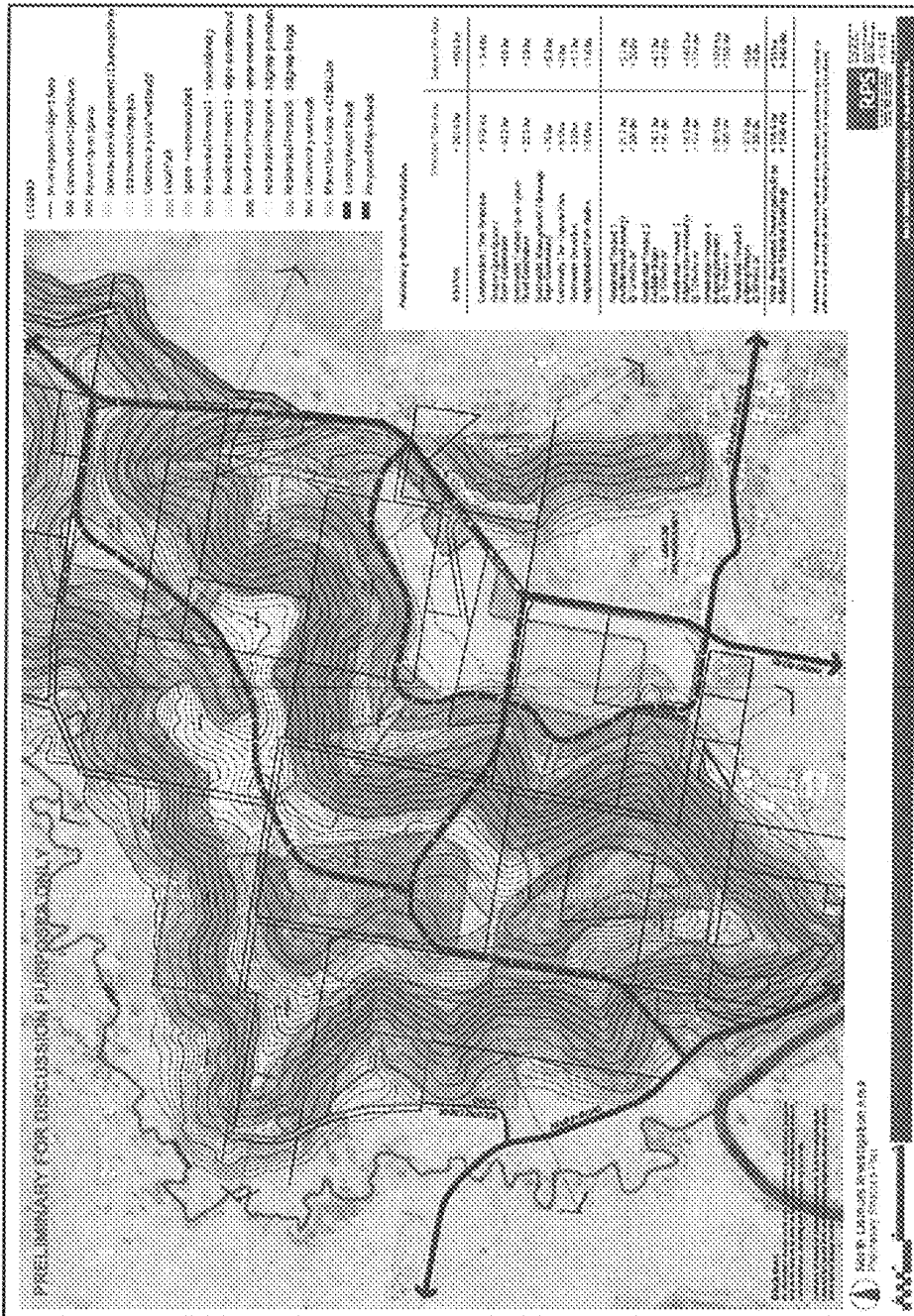
The overall conclusion from the investigations is that traffic and parking arrangements for the development proposal are satisfactory and that there is no traffic or parking impediments to the development. Access between the subject site and the Lismore CBD can be gained via the route along Alexandra Parade and Winterton Parade, subject to the following works being implemented:

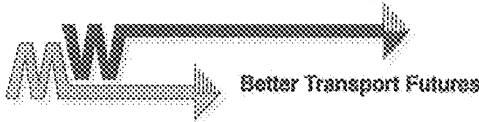
- Upgrade the intersection of Winterton Parade and Orion Street to provide a roundabout controlled intersection. This will solve the existing safety concerns at this intersection;
- Provide a 4-way roundabout controlled intersection at Alexandra Parade with Dunoon Road as part of the access to the subject site;
- Provide a footpath / cycleway along Alexandra Parade to connect to the existing footpath / cycleway on Winterton Parade for access between the subject site and the Lismore CBD;
- Upgrade the intersection of Alexandra Parade and Winterton Parade to alter the priority to reflect the dominant flows that will occur as the development of the subject site proceeds; and
- Review access options beyond 500 lots to reflect the road changes that will have occurred at that time, including the potential provision of another bridge crossing to the Lismore CBD.



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Appendix A Site Plans





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Summary Crash Report

Table with columns for Crash Type, Contributing Factors, Crash Movement, Crash Description, Crashes, and Casualties. Includes detailed data for various crash types like 'Truck Crash' and 'Moped Crash'.

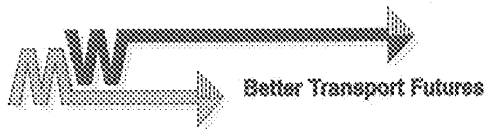
Consultants: Convey, Woodruff, Duncan, Linnors
Date: 20/05/2010

Percentage are percentages of all crashes. Unknown values for each category are not shown in this report.

Report: RTA/01

Page 1 of 1

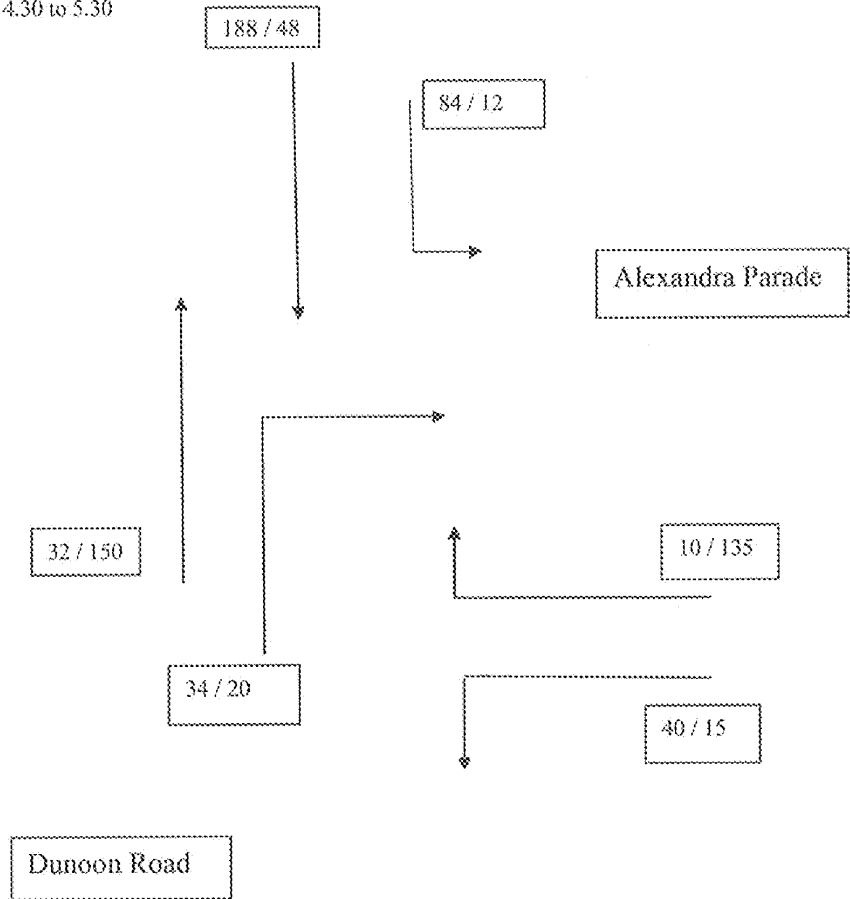
Document: 100976711.docx

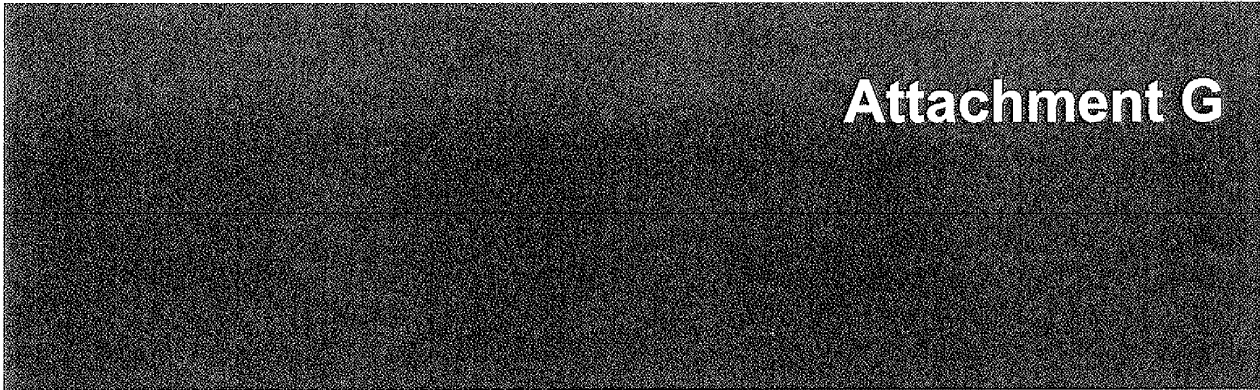


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Appendix C Traffic Survey Results

Alexandra Parade and Dunoon Road
AM peak -- 7.30 to 8.30
PM peak -- 4.30 to 5.30





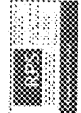
14/02/2010

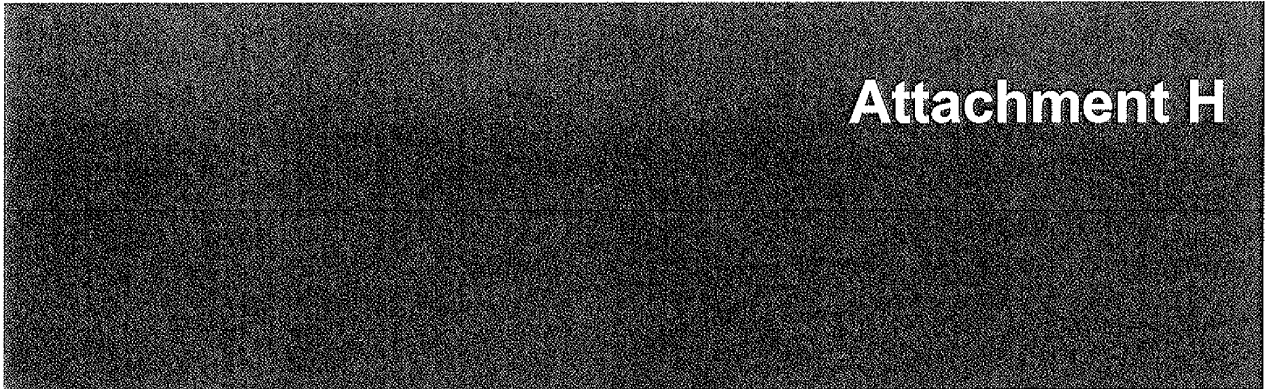
Investigation Subject Area, 3rd, 2010
MCCS Boundary by Department of Planning - 15/02/2010
North Lismore Plateau 4125 Locality - 1/28/2010



Investigation Subject Area, 3rd, 2010
MCCS Boundary by Department of Planning - 15/02/2010
North Lismore Plateau 4125 Locality - 1/28/2010

North Lismore Investigation Area
Response Urban Boundary and Urban Lismore - 1/28/2010





Appendix H Consistency with SEPP's

State Environmental Planning Policy	Consistency
SEPP No. 1 -- Development Standards	N/A
SEPP No. 4 -- Development Without Consent and Miscellaneous Exempt and Complying Development	N/A
SEPP No. 6 -- Number of Storeys in a Building	N/A
SEPP No. 10 -- Retention of Low Cost Rental Accommodation	N/A
SEPP No. 14 -- Coastal Wetlands	N/A
SEPP No. 15 -- Rural Landsharing Communities	N/A
SEPP No. 19 -- Bushland in Urban Areas	N/A
SEPP No. 21 -- Caravan Parks	Consistent
SEPP No. 22 -- Shops and Commercial Premises	Consistent
SEPP No. 26 -- Littoral Rainforests	N/A
SEPP No. 29 -- Western Sydney Recreation Area	N/A
SEPP No. 30 -- Intensive Agriculture	N/A
SEPP No. 32 -- Urban Consolidation (Redevelopment of Urban Land)	N/A
SEPP No. 33 -- Hazardous and Offensive Development	N/A
SEPP No. 36 -- Manufactured Home Estates	Consistent
SEPP No. 39 -- Spit Island Bird Habitat	N/A
SEPP No. 41 -- Casino Entertainment Complex	N/A
SEPP No. 44 -- Koala Habitat Protection	Consistent. E. teriticornis (Forest Red Gum) is known to occur on the site and this community should be included in an environment protection zone.
SEPP No. 47 -- Moore Park Showground	N/A
SEPP No. 50 -- Canal Estate Development	N/A
SEPP No. 52 -- Farm Dams and Other Works in Land and Water Management Plan Areas	N/A
SEPP No. 53 -- Metropolitan Residential Development	N/A
SEPP No. 55 -- Remediation of Land	Consistent. Potential contamination and remediation issues will be addressed in compliance with this SEPP.
SEPP No. 59 -- Central Western Sydney Regional Open Space and Residential	N/A

State Environmental Planning Policy	Consistency
SEPP No. 60 – Exempt and Complying Development	N/A
SEPP No. 62 – Sustainable Aquaculture	N/A
SEPP No. 64 – Advertising and Signage	Consistent
SEPP No. 65 – Design Quality of Residential Flat Development	Consistent
SEPP No 70 – Affordable Housing (Revised Schemes)	N/A
SEPP No. 71 – Coastal Protection	N/A
SEPP (Affordable Rental Housing) 2009	Consistent
SEPP (Building Sustainability Index: BASIX) 2004	Consistent
SEPP (Exempt and Complying Development Codes) 2008	Consistent
SEPP (Housing for Seniors or People with a Disability) 2004	Consistent
SEPP (Infrastructure) 2007	Consistent
SEPP (Kosciuszko National Park – Alpine Resorts) 2007	N/A
SEPP (Major Development) 2005	N/A
SEPP (Mining, petroleum Production and Extractive Industries) 2007	N/A
SEPP (Rural Lands) 2008	Consistent
SEPP (Sydney Region Growth Centres) 2006	N/A
SEPP (Temporary Structures) 2007	N/A
SEPP (Western Sydney Employment Area) 2009	N/A
SEPP (Western Sydney Parklands) 2009	N/A

