Lennox Head South, Hutley Drive Traffic Planning issues and Hierarchy Plan

Excerpts; Traffic Studies on small Commercial Developments

Appendix 1
Traffic

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Cardno Eppell Olsen

Lennox Head South, Hutley Drive Traffic Planning Issues

Prepared for
Ballina Shire Council

September 2006

Contents **Page Number**

1.0 INTRODUCTION

1.1 Background

In recent times, Eppell Olsen & Partners and now Cardno Eppell Olsen has been engaged by Council to update the strategic road network modelling for the whole of Shire network as a basis for testing various strategic road network options collectively under consideration by Council and/or the RTA. The outcome of this process will be the identification of future strategic road network requirements in Ballina Shire.

While this work has initially addressed strategic planning issues across the Shire, in the process of testing a range of future network options in liaison with Council and RTA, a number of issues has emerged that are of more immediate concern to Council.

One such issue relates more broadly to the potential for achieving a through traffic route in the Lennox Head South precinct, which is currently accessed by the northern section of North Creek Road. The critical focus however, driven by the need for Council to provide direction for current development proposals in the Lennox Head South precinct, is on Hutley Drive in particular and its potential role in the future road network.

This report explores this issue in some detail and makes recommendations on Hutley Drive to Council.

2.0 LENNOX HEAD SOUTH

2.1 Previous Road Network Planning

Historically, Ballina and Lennox Head were once connected by North Creek Road, which was a low standard two lane rural road.

Some time ago, the 2-lane timber bridge over North Creek was lost and has not been subsequently replaced, thus severing North Creek Road as a through route to this day. Since that time, an alternative high standard arterial route between Ballina and Lennox Head has been developed on Angels Beach Drive and The Coast Road.

The section of North Creek Road west of North Creek currently provides major access to the Ballina Airport, the Waste Management Centre and to the emerging Southern Cross development precinct. The southern section terminates at the Ballina Fishing Park at North Creek.

East of North Creek, the northern section of North Creek Road provides access to an area of emerging development in Lennox Head south, bounded by:

- Skennars Head Road to the south;
- The Coast Road – Byron Bay Road to the east and north;
- the Ballina Nature Reserve and North Creek watercourse to the west.

South of Skennars Head Road, the northern section of North Creek Road provides access to the Ballina Sewage Works and a limited number of rural properties.

2.2 Existing Development in Lennox Head South

Existing development in the Lennox Head South precinct is predominantly distributed as follows:

- the extended area down the eastern side of North Creek Road,
- an area in the northern part west of North Creek Road accessed by Henderson Lane-Silkwood Road-Hutley Drive;
- an area in the southern part west of North Creek Road, accessed by Montwood Drive.

Current Lennox Head planning data identifies that there are nearly 1,000 households with a resident population of 3,000 persons, corresponding to an average household size of 3.12 persons.

2.3 Future Development Projections

As shown in Table 2.1, the Lennox Head South precinct is anticipated to grow to a population of 6,400 by 2016 and 7,200 by 2026, corresponding to 2,000 households by 2016 and 2,300 households by 2026.

Major development proposals in Lennox Head South currently under consideration by Council can be summarised as follows:

- Pacific Pines 571 lots (households); subdivision proposed to be accessed predominantly from extension of existing Hutley Drive, with less than 10% accessed directly from North Creek Road;
- Henderson Farm 203 lots (households); proposed to be accessed directly from existing Hutley Drive, via Henderson Lane west.

Copies of concept plans for these two subdivisions are included at Appendix A for reference.

2.4 Future Role of North Creek Road

As part of previous road network planning for Ballina, the notion of developing a parallel traffic carrying route between Ballina and Lennox Head on an alignment inland from the existing coast road has been explored in some detail in the past.

Options considered were predominantly based on the following road network concepts:

- reinstatement of the North Creek Road bridge and upgrading of overall North Creek Road alignment;
- new Skennars Head Distributor between Angels Beach Road and the northern section of North Creek Road;

The northern section of North Creek Road is currently designated as a Collector in the Ballina Road Hierarchy map, a copy of which is attached at Appendix B. Skennars Head Road is also designated as a Collector into Skennar Head and the area south of Lennox Head.

The future road network concepts tested as above fundamentally assumed that the existing northern section of North Creek Road or alternative route in the area would be able to appropriately provide a higher order traffic carrying role in the local road network.

The benefits of these options were predominantly seen to be the potential for reducing through traffic movements from Ballina and Ballina East and the provision of access for potential future development areas between Ballina and Lennox Head.

Table 2.1 **Lennox Head South – Demographic Projections**

TRAFFIC ZONE	HOUSEHOLDS					POPULATION					growth factor		hhld
	2005	2016	growth 2005-16	2026	growth 2016-26	2005	2016	growth 2005-16	2026	growth 2016-26	2005-2016	2016-2026	size
west of Hutley Drive													
144	17	117	100	143	26	53	369	316	451	82	6.96	1.22	3.16
167	110	162	52	171	9	347	511	164	540	29	1.47	1.06	3.16
168 [1]	0	203	203	254	51	0	641	641	802	161	-	1.25	3.16
sub-total	127	482	355	568	86	400	1521	1121	1793	272	3.80	1.18	3.15
east of Hutley Drive													
169	93	150	57	159	9	293	474	181	502	28	1.62	1.06	3.16
171 [2]	0	422	422	528	106	0	1333	1333	1668	335	-	1.25	3.16
173 [3]	273	307	34	316	9	862	970	108	998	28	1.13	1.03	3.16
sub-total	366	879	513	1003	124	1155	2777	1622	3168	391	2.40	1.14	3.16
North Creek Road													
170	136	213	77	226	13	431	675	244	716	41	1.57	1.06	3.17
172	149	227	78	240	13	472	719	247	760	41	1.52	1.06	3.17
174	179	247	68	261	14	531	733	202	775	42	1.38	1.06	2.97
sub-total	464	687	223	727	40	1434	2127	693	2251	124	1.48	1.06	3.09
total precinct	957	2048	1091	2298	250	2989	6425	3436	7212	787	2.15	1.12	

Notes:

1 Zone 168 = Henderson Farm; loads directly onto Hutley Drive ; assumes approx 80 lots on Council land component

2 Zone 171 = Pacific Pines precinct loading directly onto Hutley Drive

3 Zone 173 growth = Pacific Pines precinct loading directly onto North Creek Road

4 Growth for Pacific Pines and Henderson Farm developments assumed 80% by 2016, 100% by 2026

More recently, the potential for upgrading the northern section of North Creek Road between Skennars Head Road and The Coast Road at Lennox Head has been investigated for Council by Cardno Eppell Olsen. The results of the investigation were reported in a Design Note to Council, a copy of which is included at Appendix C for reference.

Cardno Eppell Olsen has concluded that the northern section of North Creek Road cannot be adequately upgraded as a high standard sub-arterial through the area and should desirably be preserved only as a Major Collector in the future road network.

2.5 Potential for Hutley Drive

Prior to the detailed investigation of North Creek Road by Cardno Eppell Olsen, to address preliminary concerns over the future potential of the northern section of North Creek Road, an alternative traffic carrying corridor notionally west of northern section of North Creek Road was also tested.

Preliminary analysis assumed that an appropriate alternative sub-arterial route might be achieved through the Lennox Head South precinct, utilising the existing Hutley Drive road section.

Reference is made to the Lennox Head Development Control Plan No 1 for Urban Land Map 6, a copy of which is included at Appendix D. It is understood that Council owns the road corridor for Hutley Drive.

Consideration of the potential role of an extended Hutley Drive route needs to address the route as four separate sections as follows:

- the existing section between the western section of Henderson Lane and Silkwood Road;
- a new north-south section as part of the Pacific Pines Estate, south of the western section of Henderson Lane to a point between the water quality pond and the proposed playing fields;
- a new section extending further south and eastwards along the eastern boundary of the Ballina Nature Reserve to connect to North Creek Road near or at Skennars Head Road;
- a new east-west section connecting from Silkwood Road to the intersection at Byron Bay Road/Ballina Street/The Coast Road/North Creek Road through an undeveloped site north of the eastern section of Henderson Lane.

The potential of each of these sections is addressed in the following.

The existing section of Hutley Drive currently operates as a minor collector street, providing access to a small residential precinct, much of it with direct frontage access to Hutley Drive. This existing frontage access effectively compromises the achievement of a traffic carrying through route on Hutley Drive through Lennox Head South, irrespective of what standard can be achieved on the balance of the route.

The section of the Hutley Drive alignment through the Pacific Pines Estate is proposed as a Major Collector with no direct frontage access and incorporates six consolidated access intersections over a length of some 500m, with several intersections spacings as low as 50m.

In Traffic and Access Principles for Urban Areas developed previously by Eppell Olsen & Partners (now Cardno Eppell Olsen), the desirable intersection spacing for a Major Collector is in the range 80m – 100m, with lesser spacing of 40m – 60m deemed more appropriate to a Minor Collector.

Therefore, as proposed by Pacific Pines, the section of Hutley Drive through their site would not be consistent with the operational objectives of a traffic carrying through route through Lennox Head South.

The proposed extension of Hutley Drive further south along the eastern side of Ballina Nature Reserve is currently under planning consideration by Council. A key planning challenge is the achievability of a suitable standard 2-lane road corridor between existing development accessed via Montwood Drive and the nature reserve, while maintaining appropriate buffer separations. Based on discussion with Council planners, it is envisaged that, if a corridor is achievable, it will only be for a minimal 2-lane road, to a standard less than desirable for a traffic carrying through route.

A notional alignment for the southern extension of Hutley Drive is shown on the Preliminary Concept drawing prepared by PMM, a copy of which is included at Appendix E.

Overall, therefore, it can be seen that the potential role of Hutley Drive is constrained by the form of the existing section and anticipated constraints on the section extending south of Pacific Pines to connect around to North Creek Road at/near Skennars Head Road.

It is concluded that both North Creek Road and Hutley Drive should be planned as Major Collectors serving the local community of Lennox Head South, and not intended to carry through traffic as part of a longer traffic carrying route between Ballina and Lennox Head.

The implication of this conclusion is that Council should only consider future network options to provide an alternative traffic carrying route between Ballina and Lennox Head that bypass Lennox Head South precinct.

This means that current notions of reinstating the North Creek Road bridge and/or or opening a new link between Angels Beach Drive and Skennars Head Road will need to search for an alternative route to connect from North Creek Road across to The Coast Road south of Lennox Head. The upgrading of Skennars Head Road is suggested for further consideration in this regard.

2.6 Future Option Testing

By 2016, it is anticipated that base traffic demands for the northern section of North Creek Road as the major traffic collector for Lennox Head South could be in the order of **8,000vpd**.

By 2016, as part of an alternative traffic carrying through route between Ballina and Lennox Head, traffic demands on North Creek Road could increase to **10,000vpd – 12,000vpd**.

The modelling analysis suggests that if Hutley Drive is opened as an alternative route through Lennox Head South, traffic demands would be distributed fairly evenly between the two alignments, i.e. both routes would be carrying traffic volumes significantly less than 10,000vpd.

3.0 CONCLUSIONS

As outlined above, both Hutley Drive and North Creek Road are subject to existing constraints, which predicate against the achievement of an appropriate through traffic route on either alignment.

It is concluded that the existing northern section of North Creek Road between Skennars Head Road and The Coast Road should be appropriately managed as a 2-lane Major Collector in the Lennox Head South precinct. Desirable characteristics for a Major Collector to be pursued as necessary could include the following:

- main local bus route with kerbside bus stops;
- cycle lanes on road;
- sidewalks both side;
- some controlled pedestrian crossing points;
- given the existing road width, could be median divided;
- intersections should be priority controlled or roundabouts.

Similarly, it is concluded that Hutley Drive should be planned as a 2-lane Major Collector in the Lennox Head South precinct. Desirable characteristics to be pursued are similar to those for North Creek Road, although width constraints in the southern section along the boundary of the Ballina Nature Reserve may preclude medians in some places.

Under the current road network layout, progressive development of Pacific Pines and Henderson Farm would lead to unacceptably high traffic volumes on Henderson Lane east. Therefore, the 'missing' key section of Hutley Drive between Silkwood Road and the existing major intersection at North Creek Road/The Coast Road/Byron Bay Road/Ballina Street should be pursued as a priority to facilitate appropriate access to development areas on Henderson Farm and the Pacific Pines Estate.

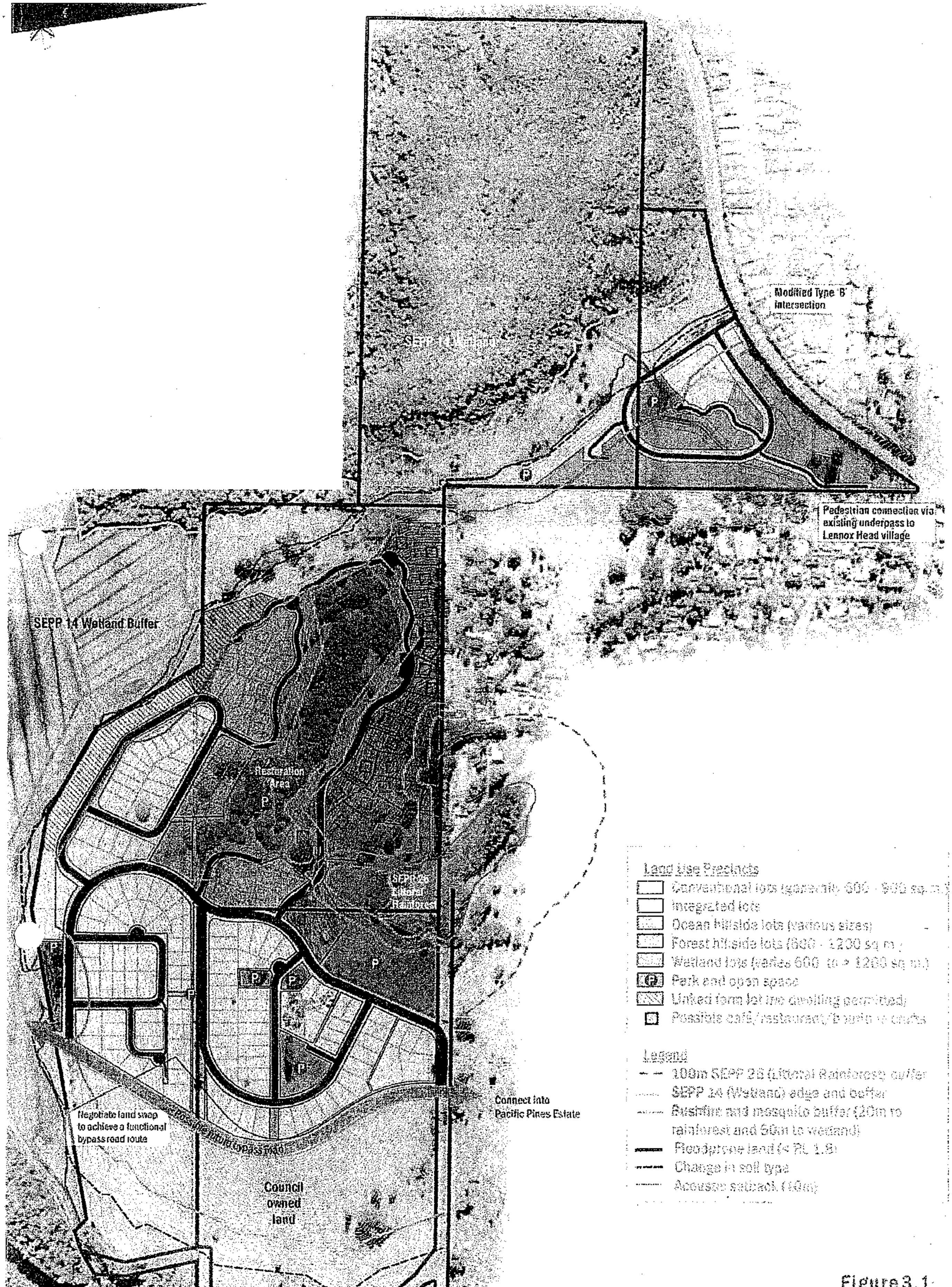
Detailed design consideration will be needed to identify the most appropriate treatment of the confluence of North Creek Road and the 'missing' section of Hutley Drive at The Coast Road.

Current notions of reinstating the North Creek Road bridge and/or or opening a new Skennars Head Distributor link between Angels Beach Drive and Skennars Head Road will need to search for an alternative route to connect from North Creek Road across to The Coast Road south of Lennox Head. The upgrading of Skennars Head Road is suggested for further consideration in this regard.

Furthermore, if a future alternative through route is to be opened between Ballina and Lennox Head using parts of North Creek Road south of the Lennox Head South precinct, traffic management measures should be implemented as necessary on Hutley Drive and the section of North Creek Road north of Skennars Head Road to discourage through traffic from that residential precinct.

Appendix A

Development Concept Plans



1:5000 at A3

Source: Photo and contours by Aspect North
Date: 19 01 06

Figure 3.1

Structure Plan

design team ink

Legend

- ACCESS PLACE 1
- ACCESS PLACE 2
- ACCESS PLACE 3
- LOCAL STREET 1
- LOCAL STREET 2
- COLLECTOR
- MAJOR COLLECTOR
- 50 EXISTING SPEED ZONE

NOTES
1. Lot shapes, sizes and numbers subject to Council approval, engineering design and final survey.
2. Easement locations subject to engineering design and final survey.

[3]02-masplan_Plan3.11a
1 December 2003

Ardill Payne & Partners

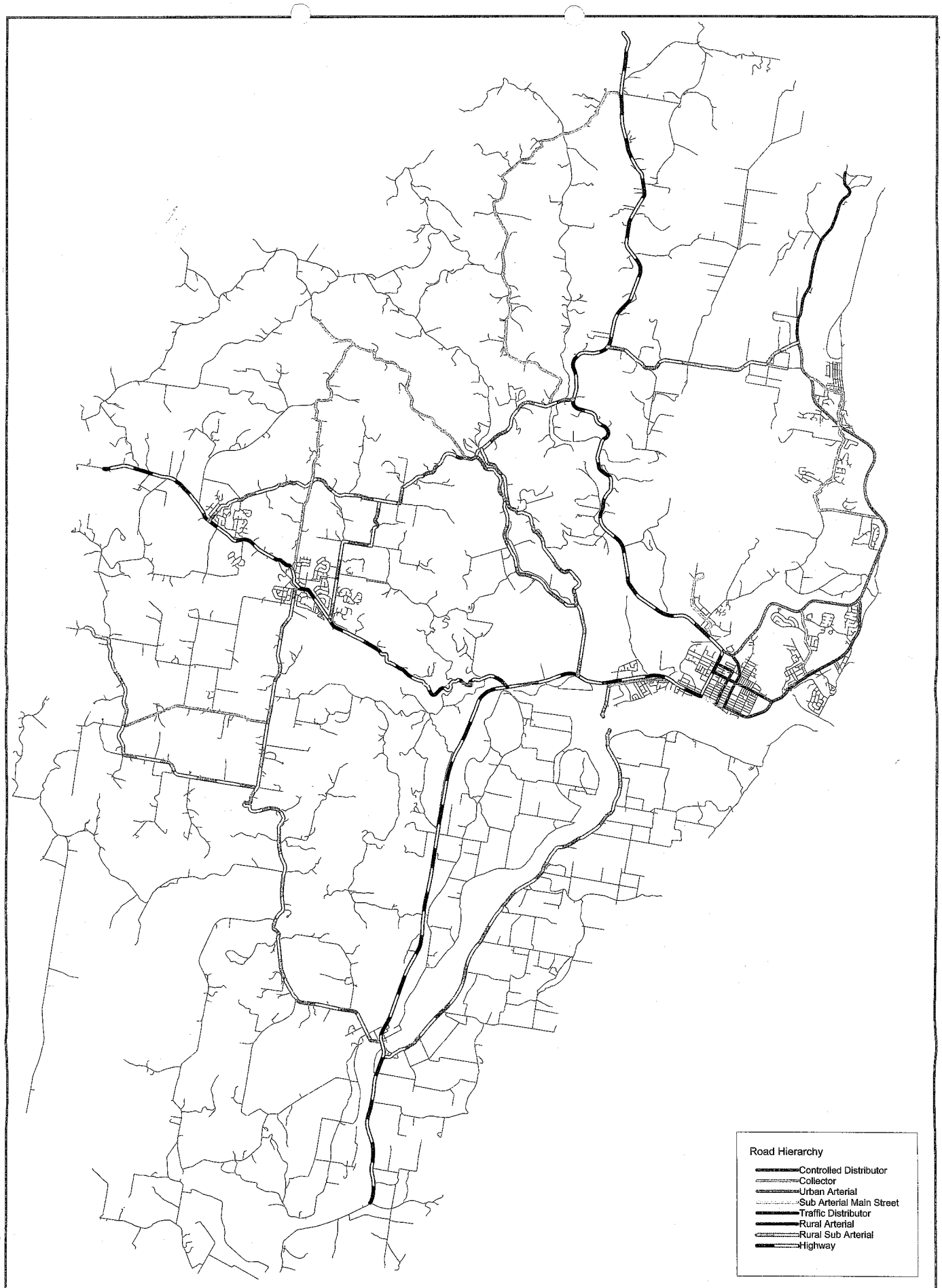
Pacific Pines Estate

0 100 200

Plan 3.10 Road Hierarchy

Appendix B

Road Hierarchy Plan



Cardno Eppell Olsen	Ballina Transport Model Update 20/09/2005	*Road Hierarchy*	FIGURE NO. 1 PROJECT NO. 8238

Appendix C

North Creek Road Upgrading Potential

Cardno Eppell Olsen

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Date: 6 August 2006

DESIGN NOTE

SKENNARS HEAD NORTH CREEK ROAD UPGRADING PRELIMINARY ALIGNMENT DEVELOPMENT

Introduction

Cardno Eppell Olsen has been commissioned by Ballina Shire Council to prepare preliminary road grading plans for the potential upgrading of North Creek Road between the Coast Road and Skennars Head Road. The need for this consideration has been brought about by future transport modelling for the area which describes the need for improved movement opportunities between Lennox Head and the Ballina Central area. A limited number of route alignment options exist which are being evaluated for future transport demands however the geometric constraints to particular routes, including North Creek Road, need to be understood.

This assessment investigates the constraints associated with implementation of two road cross section options for North Creek Road being:

- a four lane cross section (median divided); or
- an upgraded two lane urban road form (undivided).

At this stage, the consideration is limited to the horizontal geometry and the vertical curve geometry, batters and retaining requirements have yet to be evaluated. These aspects would potentially increase the extent of land required.

Four Lane Cross Section

The four lane cross section would enable North Creek Road to be upgraded in its traffic carrying capacity and potentially facilitate the most direct connection route. A constrained four lane divided road form has been considered which incorporates the following design elements:

- 60 kph design speed;
- 4.5m wide verges on both sides of the road alignment;
- 2 x 7 metre width carriageways;
- 1m central median;
- No parking or cycle lane provision
- Total reserve width required – 24 metres.

It is recognised that this cross section reflects the absolute minimum treatment which could be considered for this route and would be feasible in mid block sections only. At intersections, localised

widening would be required to accommodate acceleration, deceleration and turn storage lanes where required.
It is further noted that this cross section does not allow for cycle lanes or parking lanes and the median width is less than that normally desired which would have implications for lighting and other services.

Sketches 1, 2 and 3 attached present the horizontal alignment concept plans for the four lane cross section. The required road resumptions are illustrated in red on these sketch plans. Notably the land resumptions are most significant at the northern end in the vicinity of the Coast Road roundabout where the existing horizontal curve geometry will need to be improved.

Land would be required along the full extent of North Creek Road to accommodate widening to a four lane cross section (constrained). These resumptions would not only be costly to achieve but also difficult time wise considering the number of affected property owners.

In light of the extent of resumptions necessary, even to accommodate the restricted carriageway width, it is not considered feasible to pursue this option.

Upgraded Two Lane Cross Section

An upgraded two lane form on North Creek Road will facilitate improved traffic operations and safety, enabling the potential sharing of traffic demands between this route and a new bypass road located further west. It will be important with the growth in population in this area to properly allow for the upgrading of North Creek Road to at least this standard. Traffic volumes could then theoretically increase to a maximum of 10,000 – 14,000 vehicles per day on this route, with some limitations brought about by fronting development and intersection requirements.

The cross section considered for this exercise comprises the following design elements:

- 60 kph design speed;
- Undivided road profile;
- 2 x 3.5 metre travel lanes;
- 2 x 2.0 metre bicycle/parking lanes;
- 4.5 metre verges on both sides of the alignment;
- Total reserve width required – 20m.

Sketch plans 4, 5 and 6 attached illustrate that this form of corridor can be readily accommodated with some land resumptions required on the horizontal curves. Again the larger land requirements are necessitated at the northern end of the route in proximity to the connection to the Coast Road. Alternate connection options may exist for this section of the route which would preclude the need to upgrade the section between Henderson Place and the Coast Road.

It is considered that the two lane cross section is entirely achievable and reflects the minimum upgrading required for this route to improve traffic capacity and safety.

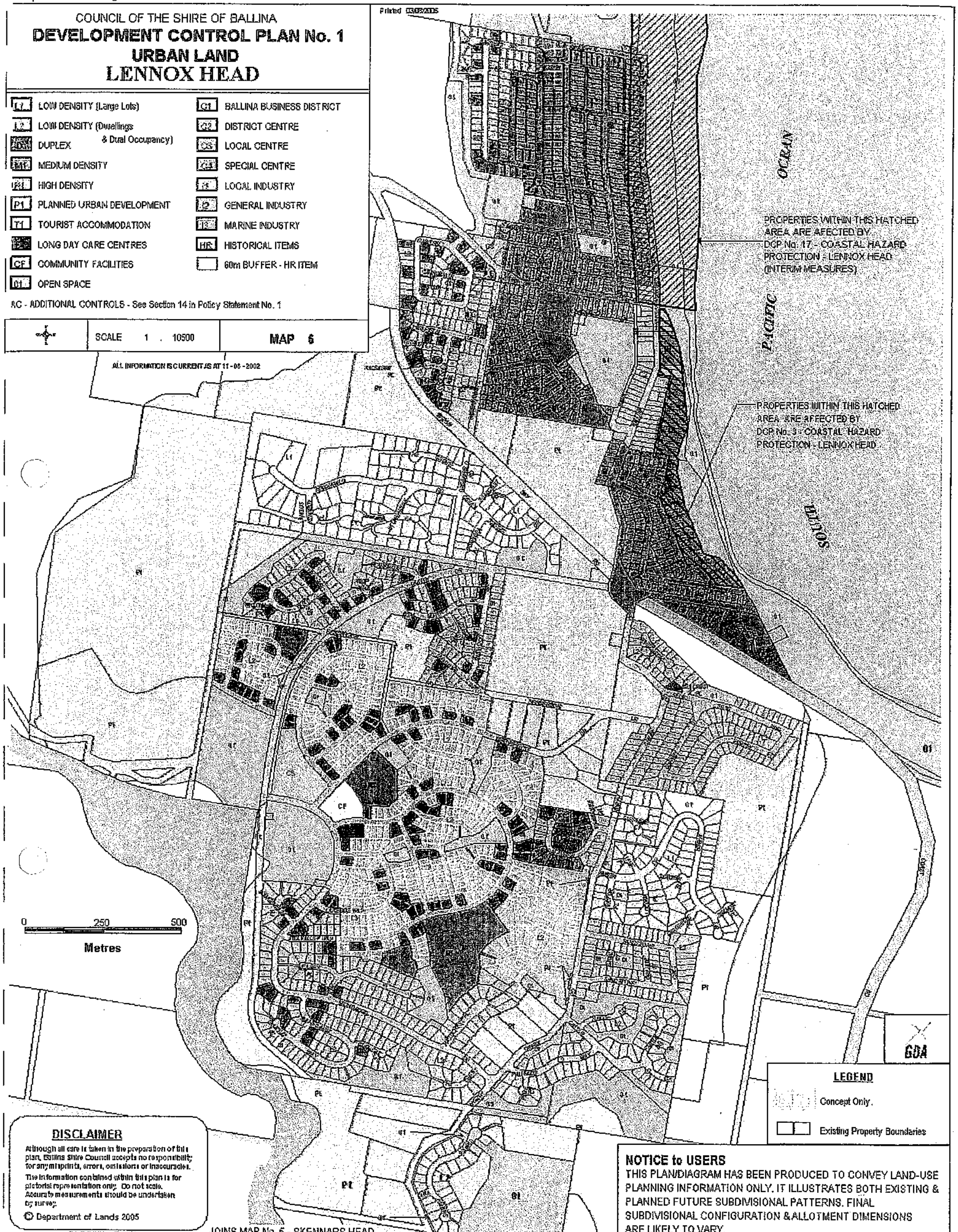
Summary of Findings

This assessment presents a preliminary review of the horizontal alignment geometry of North Creek Road as an input to transport modelling exercises currently being completed for Ballina Shire Council. Following is a summary of findings:

- A four lane cross section will be very expensive to implement along North Creek Road as a result of the extensive property resumptions required even to generate a constrained four lane formation;
- The number of affected properties would make the land acquisition process both time intensive and not provide any certainty for planning purposes regarding the securing of this route;
- A two lane cross section (upgraded) does appear to be achievable and this form would enable the route to function as a sub-arterial route (as envisaged by the road hierarchy plan for the Shire) and increase the traffic carrying potential to around 10,000 – 14,000 vehicles per day.
- To secure the maximum achievable traffic carrying capacity along this route, accesses should be removed or consolidated, and land should be secured when opportunities are provided by way of development applications. Intersection spacing should be no less than 300 metres where feasible;
- Further work will be required at the appropriate time to properly define the priorities and connection to the Coast Road and to resolve the vertical geometries and service requirements along the route. These elements have not been considered in detail within this assessment;
- In light of the constraints existing along North Creek Road, the bypass route should be pursued as the highest priority to enable a sharing of the traffic demands between that route and North Creek Road.

Appendix D

Lennox Head Development Control Plan No 1


COUNCIL OF THE SHIRE OF BALLINA
DEVELOPMENT CONTROL PLAN No. 1
URBAN LAND
LENNOX HEAD
L1 LOW DENSITY (Large Lots)
L2 LOW DENSITY (Dwellings & Dual Occupancy)
DUPLEX
MEDIUM DENSITY
HIGH DENSITY
P1 PLANNED URBAN DEVELOPMENT
T1 TOURIST ACCOMMODATION
LONG DAY CARE CENTRES
CF COMMUNITY FACILITIES
O1 OPEN SPACE
C1 BALLINA BUSINESS DISTRICT
C2 DISTRICT CENTRE
C3 LOCAL CENTRE
C4 SPECIAL CENTRE
LOCAL INDUSTRY
I2 GENERAL INDUSTRY
MARINE INDUSTRY
HR HISTORICAL ITEMS
60m BUFFER - HR ITEM
AC - ADDITIONAL CONTROLS - See Section 14 in Policy Statement No. 1
SCALE 1 : 10500
MAP 6
ALL INFORMATION IS CURRENT AS AT 11-06-2002
PROPERTIES WITHIN THIS HATCHED AREA ARE AFFECTED BY DCP No. 17 - COASTAL HAZARD PROTECTION - LENNOX HEAD (INTERIM MEASURES)
PROPERTIES WITHIN THIS HATCHED AREA ARE AFFECTED BY DCP No. 3 - COASTAL HAZARD PROTECTION - LENNOX HEAD
SOUTH PACIFIC OCEAN
0 250 500
Metres
GDA
LEGEND
Concept Only.
Existing Property Boundaries
DISCLAIMER
Although all care is taken in the preparation of this plan, Ballina Shire Council accepts no responsibility for any misprints, errors, omissions or inaccuracies.
The information contained within this plan is for pictorial representation only. Do not scale. Accurate measurements should be undertaken by survey.
© Department of Lands 2005
JOINS MAP No. 5 - SKENNARS HEAD
NOTICE to USERS
THIS PLAN/DIAGRAM HAS BEEN PRODUCED TO CONVEY LAND-USE PLANNING INFORMATION ONLY. IT ILLUSTRATES BOTH EXISTING & PLANNED FUTURE SUBDIVISIONAL PATTERNS. FINAL SUBDIVISIONAL CONFIGURATION & ALLOTMENT DIMENSIONS ARE LIKELY TO VARY.

Appendix E

Hutley Drive south of Pacific Pines Estate

Preliminary Concept – Option C

PMM

Preliminary Concept - Option C

North Creek Road

LENNOX HEAD

Plan 3.2 Preliminary Master Plan Concept - Option C

Ref: 7225-04 Date: January 2005 Scale 1:1000@A3 1:2000@A2

prdm

3.0 SITE TRAFFIC COUNTS

At Ardill Payne and Partners' request Byron Shire Council undertook automated traffic counts along Rajah Road for the period 8 May 2005. Counts on Yalla-Kool Drive were also taken and are provided in Attachment 1.

Traffic counts indicate that a total of 3794 vehicles used Rajah Road in the monitoring period. Council has subsequently advised that these values are to be taken as 2 way counts [1]. Maximum single lane values are therefore likely to be 60% of this value or 2276 vph. Based on these counts the net traffic into and out of the Shopping centre equates to 1150 trips which is less than to the values calculated from Table 2 above. This outcome supports the lower bound values adopted in Table 1. The increased traffic flow from the proposed development would therefore be 975 + 3794 or 4769 daily average trips.

4.0 ANALYSIS AND DISCUSSION

To aid interpretation on the impacts on traffic flows the RTA Guidelines provide acceptable ranges of peak vehicle flows for various "levels of service" experienced on the road. The intention is to at least maintain the existing "level of service" for the streets adjacent to the site. Mid-block road capacity "levels of service" are defined by the RTA for urban areas are shown in Table 3, with the highest level of service being Level A and service deteriorating to Level E.

Table 3 - RTA Traffic Levels of Service

Level of Service	One Lane (vph)
A	200
B	380
C	600
D	900
E	1400

Peak traffic rates are generally around 10% of average rates. Hence the existing peak rate is approximately 228 vph. Based on the above the Level of Service in Rajah Road is currently rated at the Level B standard. The increase in the peak rate is 119 vph making a combined new peak rate of 347 vph which is still within Level B.

In view of the above, it is assessed that the proposed development will not noticeably lower the existing traffic service. Additional loads imposed on the Level of Service are negligible.

1. Per discussion Peter Barrett and Bill Payne: 18 October 2005

1.0 Introduction

As requested, Ardill Payne and Partners has carried out a traffic and parking assessment at the above site.

The site is approximately 3168m² and is bounded by Tamar Street to the north, Winton Lane to the south and private land to the east and west. The site is currently used as a public car parking area. It is proposed to demolish the existing ground level car park infrastructure and construct a mixed use commercial, retail and multi-level car park structure on the site. Plans of the proposed development are provided as **Attachment 1**.

This report provides details regarding the current traffic generation, the level of service provided by Tamar Street and Winton Lane and the impact the proposed development will have on these streets and the required parking spaces.

2.0 Traffic Assessment

The impact of the development on traffic generation was assessed in accordance with the RTA's "*Guide to Traffic Generating Developments"* (1993) and the American Institute of Traffic Engineers (ITE).

Current traffic generation figures from the site are summarised in Table 1. The RTA Guidelines do not provide specific details on traffic generation for small scale developments such as that proposed. The Guidelines' information is based on large scale development. Although traffic generation amounts are often extrapolated down to the smaller developments such as that proposed, the ITE provides a greater range of studies for large and small developments and is recommended. Average trip generation values provided by ITE are:

- Speciality retail outlets – 41 trips per day (tpd) per 100m^2
- Shopping Centre rates varying from 12.5 to 271 tpd per 100m^2

The RTA guide proposes:

- 121 tpd per 100m^2 for large (up to 10,000m^2) shopping centres
- 23 to 50 tpd per 100m^2 for video shops

The figure adopted in Table 1 is 41 tpd per 100m^2.

2.1 Existing Traffic Generating Behaviour

The current car parking capacity is 66 spaces which are from Tamar St and 9 spaces which are accessed from Winton Lane. Although these spaces are theoretically allocated to existing Wigmore Arcade (1400m^2 retail approx) the facility is perceived as being a public car park.

Table 1. Traffic Generation from Existing Development

Traffic Generation Unit	Traffic component	Unit Quantity Rate	Amount	
Wigmore Arcade	Daily Trips	41/100m² GFA	574	tpd
	Peak rate	4/100m² GFA	56	tph

The existing traffic generation from Wigmore Arcade is equivalent to 574 daily vehicle trips (DVT), with a peak flow of 56 vehicles trips per hour (TPH). The actual use of the car park is probably higher than this due to its perceived public nature. For example the carparking requirement for Wigmore Arcade is only 56 spaces (1400m^2 GFA at 1 space per 25m^2) yet 75 (66+9) are provided. Hence it could be argued that the ADT for the existing development is 574 multiplied by the excess carpark ratio to give a traffic generating capacity of 767 TPD. The peak rate would be similarly calculated at 56 x 66 / 56 off Tamar St or 66 vph.

2.2 Proposed Traffic Generating Behaviour

Traffic generation from the proposed development is summarised in Table 2 below. The proposed commercial gross floor areas (GFA) are estimated approximately as follows:

- Shops to ground floor 1417m² and
- Office to top floor 1053m².

Rates for retail shops and office buildings were sourced from the ITE data discussed above.

Table 2. Traffic Generation from Proposed Development

Traffic Generation Unit	Traffic component	Unit Quantity Rate	Amount	
Retail Shops	Daily Trips	41/100m² GFA	580	TPD
	Peak rate	4/100m² GFA	57	TPH
Office	Daily Trips	10/100m² GFA	105	TPD
	Peak rate	2/100m² GFA	21	TPH
TOTAL	Daily Trips		685	TPD
	Peak rate		78	TPH

To these figures the existing traffic generating potential (574 TPD) of the site must be added as well as the impact of the additional carparking spaces provided.

Section 5.2 Table 7 indicates the car parking requirement off Tamar St for the proposed development and adjoining land uses to be 149 spaces. The car parking provided off Tamar St and Winton Lane amounts to 260 spaces as described in Table 3 below:

Table 3. Proposed car parking provisions

Level	Access	Tamar Carspaces	Winton Carspaces	Total Carspaces
Ground	Winton Lane		8	
Level 2	Tamar Street	84		
Level 3	Tamar Street	84		
Level 4	Tamar Street	84		
Total provided		252	8	260
Total Req'd		149		149

Extra car spaces off Tamar St therefore equal 252 – 149 = 103. Assume additional traffic generated at ratio of car spaces provided to those required. That is allow for extra traffic generated by public carpark nature of development. Traffic load onto Tamar St therefore assumed to be (685+574) x 252 divided by 149, or 2120 TPD. Peak rate is estimated to be (56+57+21) x 252 / 149 or a peak rate of 227 TPH. This is consistent with a conventional TPD:TPH ratio of 10. Actual ratio is 9.4. *The additional peak rate is (57+21) x 252/149 or 132 tph.*

3.0 Site Traffic Counts

3.1 Tamar Street

The following traffic counts were sourced from Ballina Shire Council[1] and are daily vehicle trips in an easterly direction on Tamar Street taken in October 2000. Figures were provided for a traffic count approximately 20m east of the Moon Street intersection on Tamar Street. Data from the traffic count is provided as **Attachment 2**.

*Table 4. **Tamar Street Daily Traffic Counts** (one-way)*

Year	Location	Period	Average (veh/day)	Peak (veh/hour)
2000	20m east of Moon St	Weekdays	2260	32
2000	20m east of Moon St	Weekend	1050	34
2007	As above increased by 2% per annum	Weekdays	2596	36
2007	As above increased by 2% per annum	Weekend	1470	37
Adopted Load		Weekdays	2500	33

[1] *Attached traffic counts from Peter O'Keefe*

To determine the increased load on Tamar Street and hence draw conclusions on the impact on Service Levels created by the development, the existing single lane loads and trip generating potential of the development have to be converted to consistent units.

As the traffic counts are for one direction only, either the return trips generated by the development are to be halved, or the existing Tamar St load doubled, as one return trip is two vehicle movements (lane counts are one directional vehicle movements whilst a return trip is two movements in different lanes).

The RTA describes Service Levels in terms of single lane vehicles per hour. Information in Tables 1 and 2 are for return trips and therefore are to be halved to match the one way lane counts supplied by Council. Hence for comparative purposes, the general case for increased lane load will be half of the peak return trip rate generated by the new development. Hence the peak lane load impact will be 132 divided by 2 or 66 vph. Hence the Tamar Street traffic lane load will increase to 99 vph.

The assumptions adopted in the above, if compared to the existing traffic generating potential of the carpark, means that for a peak rate of 66 tph (see section 2.1) the one way lane contribution into the cark would be 66 divided by 2 or 33 vph. This is almost the peak rate recorded by Council. It is unlikely that the existing carpark creates almost 100% of the traffic on Tamar St. The assumptions adopted above can therefore be considered conservative.

3.2 Winton Lane

Access to Winton Lane remains unchanged from the existing arrangement, being one way from west to east. The current car park exits onto Winton Lane. This will be removed with the proposed development. Car parking off Winton lane reduces from 9 spaces to 8. The difference in numbers being to make provision for an unloading bay and wider pedestrian access along the Winton Lane frontage.

Traffic numbers from Moon St east along Winton Lane should therefore be little affected by the proposed development. Traffic numbers from the development east towards Cherry St will be significantly reduced (theoretically by a peak rate of 33 vph) as the Winton Lane exit for the carpark will be removed.

4.0 Analysis and Discussion

To aid the interpretation of the impacts on traffic flows, the RTA Guidelines provide acceptable ranges of peak vehicle flows for various “levels of service” (LOS) experienced on a road. The intention is to at least maintain the existing “level of service” for the streets adjacent to the site. Mid-block road capacity

"levels of service" are defined by the RTA for urban areas and are shown in Table 5, with the highest level of service being Level A and service deteriorating to Level E.

Table 5. RTA Traffic Levels of Service – Mid Block

Level of Service	One Lane (vph)
A	200
B	380
C	600
D	900
E	1400

4.1 Tamar Street

Based on the above traffic count, the Level of Service (LOS) currently provided by Tamar Street is rated at Level A (<200 veh/hour/lane). The RTA describes this level as follows:

"*Level of Service A – This, the top level is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent."*

This is assumed to describe the current traffic conditions on Tamar Street.

The proposed development would increase the Peak vehicles per hour on Tamar Street from 33 vph to 99 vph (66 + 33). This does not change the Level of Service. Given the lack of impact of the development (Tamar St stays at Level A) there would not seem to be any need at this stage to impose a left turn only.

4.2 Winton Lane

Traffic numbers along Winton Lane will decrease east of the site and should decrease or remain unchanged west of the site as discussed in section 3.2.

4.3 Car park queues

As there is potential conflict from taxi rank traffic across the entry-exit cross-over, it is important that queue lengths are not excessive. The peak rate at which vehicles arrive and leave the carpark is 66 vph or one per minute. Delay times for making turns in a service level A road are generally less than one minute. Hence there should be limited queue lengths in the exit or entrance lanes.