

7 June 2007

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Dear Bryan

**North Cooranbong Development
Technical Review of Recommended Traffic Treatments - Joint Statement**

We enclose the joint statement prepared by Mark Waugh and Adrian Bateman to review the application of traffic planning and engineering principles to the provision of external road and intersection works as part of the North Cooranbong Development.

The review has considered the 'Addendum 2 - 2022 Full Development Scenario for 2,500 Dwellings' report dated June 2007 relating to the assessment of external road and intersection works and the application of relevant standards and guidelines in force in NSW.

Should you have any queries about the information contained in this statement please contact the undersigned.

Yours faithfully



Adrian Bateman
Senior Transportation Consultant
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North Cooranbong Development

JOINT STATEMENT of

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7 June 2007

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1 Introduction

This technical review has been prepared on behalf of Johnson Property Group relating to external road and intersection works proposed to support the North Cooranbong Development.

1.1 Statement of Issues

The issues relate to the technical assumptions applied in determining the forecast traffic operating conditions on the external road network associated with the Development. They are the result of application of various data sources and also from discussions with the road authorities, RTA and Lake Macquarie City Council. The issues involved are nominated as:

- » Assumed level of development potential for the subject site
- » Traffic generation rates applied for the development
- » Trip distribution assumptions
- » Road capacity assumptions
- » Internal layout and relationship to site access
- » Resultant impacts on external road and intersection treatments

1.2 Qualifications and Experience

The following parties have undertaken this review and are both specialist in traffic and transport planning.

- » Mark Waugh is a civil engineer with 25 years experience in transport engineering, traffic and transport planning, civil engineering site investigations and design. He has a BE (Civil) from the University of Sydney and a MEngSc majoring in Transport Engineering from the University of NSW. Mark's experience has included work in local government and the private sector in a variety of roles, from civil engineering design, geotechnical engineering and site investigations to traffic and transport modelling, urban masterplanning, road safety auditing, traffic impact statements for development and as contributions to major road infrastructure environmental impact statements. He has been involved in the development approvals process on a wide variety of projects, from rezoning, development application through to appearing as an expert witness in Land & Environment Court hearings and at commissions of inquiry. Mark remains active in the continuing development of the transport profession through his roles with Engineers Australia (Newcastle Division Transport Forum) and the Chartered Institute of Logistics and Transport(National Vice Chairman)
- » Adrian Bateman is a civil engineer with eleven years work experience gained in England and Australia as a transport planning and traffic engineering consultant. He has a BEng (Hons) in Civil Engineering and Construction Management from the University of Leeds in England. Adrian's experience has included work in both the private sector and for local government, through public-private partnerships. Adrian's experience includes site feasibility studies, transport modelling, transport corridor studies, site masterplanning, land use/transportation studies, traffic engineering preliminary and detailed design, traffic impact assessment and road safety and road user audits.

1.3 Site Inspections

Site inspections and a review of technical reports and drawings have been undertaken as part of this technical review.

1.4 Review Documentation Used

Information reviewed as part of this technical review includes the following:

- » North Cooranbong Rezoning – Traffic Implications – Stage 2 Final Report, GHD, February 2005
- » North Cooranbong Additional Transport Information, GHD, November 2006
- » Local Environmental Study North Cooranbong, URS, December 2006

The following technical documents have been used in preparing this report:

- » The RTA Guide to Traffic Generating Developments, October 2002;
- » Austroads, Urban Road Design – Guide to the Geometric Design of Major Urban Roads (2002);
- » Austroads, Guide to Traffic Engineering Practice, Part 2 –Roadway Capacity (1988);
- » Austroads, Guide to Traffic Engineering Practice, Part 5 -Intersections at Grade (2005);

2 Development Levels

Previous technical analyses have been undertaken on the basis of total development yields varying between 2,500 dwellings and 3,000 dwellings.

JPG have now advised that calculation based upon a revised masterplan for the development indicates that a total development yield of 2,500 is likely, Therefore, it is this figure adopted for use in this technical analysis that underpins this joint statement review.

3 Traffic Generation

The GHD November 2006 traffic report used traffic Generation rates derived from journey to work data obtained from the NSW Transport and Population data centre and applied to the North Cooranbong development with some underlying assumptions.

The resultant calculated trip rates were considered to provide a robust appraisal of the traffic generation potential of residential land development based on locational factors. However, this approach is based upon the forward extrapolation of historical trends.

Upon review, this approach could be considered to be overly conservative with the potential changes in future travel patterns that would occur with more local jobs and activities containing movements to the Morisset area, and within the proposed mixture of land uses, rather than to the nearest centres of Toronto and south to Warnervale/Wyong.

For this joint review it is considered that the use of a standard RTA traffic generation rate based may provide a more reasonable basis for assessment.

The RTA guide to traffic generating developments states that the weekday peak hour vehicle trip generation rate for dwelling house is 0.85 per dwelling.

The RTA guidelines also states that for residential sub-division about 25% of these trips could be internal to the subdivision area representing local shopping, school and social trips. The proposed masterplan provides a mixture of land uses, including commercial and a school, which would assist in the containment of trips within the subject development. It is therefore considered appropriate that this trip generation discount is applied.

The applicable discounted weekday peak hour traffic generation rate for use in the assessment is therefore calculated to be 0.64 trips per dwelling.

The application of this traffic generation rate to the anticipated development yield of 2,500 dwellings and assuming a 90%/10% outbound/inbound split during the morning peak hour (reversed during the evening peak hour) provides the following estimate of vehicle movements:

- » AM peak hour: 1,440 outbound 160 inbound
- » PM peak hour: 160 outbound 1,440 inbound

As a comparison it is noted that Lake Macquarie City Council DCP No1 states a trip generation rate of 8.0 trips per dwelling for residential dwellings. Which is lower again than the RTA rate. Applying this rate for the subject development, and using a similar proportion of peak hour trips to that of the RTA (9.0/0.85) would give a peak trip generation of 0.75 trips. Applying the same internal trip containment factor of 25% would give external trips of 1406 two-way vehicle trips. This is then potentially over 12 % less than the rate applied within the analysis.

For a development of the size and scale planned at North Cooranbong the level and variety of activities available on site will result in a significant level of trip containment. This will include trips to facilities such as local shops, education facilities, recreation activities and some locally based employment opportunities. The net result of this mix of land use is to achieve a trip containment level that would be consistent with the levels applied in the RTA's Guide to Traffic Generating Developments. It is therefore recommended that the 25% discount to traffic generation rates be applied for the purposes of assessing the development's external traffic impacts.

In many cases this level of traffic generation will still be conservative, depending on the level of support provided for generating local trips, and also for alternate transport opportunities that shift travel away from the traditional car based approach that underpins the generation rates applied in the RTA guide.

4 Trip Distribution and assignment

The GHD November 2006 traffic report identified a likely distribution of traffic based upon the data available from Journey to work data available from the NSW Transport and Population data centre.

The joint review concluded that the application of this historic data may be questionable is in terms of the assignment of trips to local destinations within the Lake Macquarie LGA (which is quite disparate), and the various routes available, in view of the changing role of the region.

A key factor in the route choice for drivers will be the comparable travel times available. For example any trips to the northern areas of Lake Macquarie such as Glendale, Cardiff, Charlestown, and further north to Newcastle or Maitland and the Hunter Valley would be able to use Freemans Drive North and Awaba Road to access the F3 Freeway at the Awaba Interchange. This route is about 10 km shorter than the alternate route via the F3 Morisset Interchange, and from recorded travel times about 50% faster in elapsed travel time.

Each of these factors could lead to a reduction in forecast flows as shown on the critical Freemans Drive link back to Morisset.

The use of historic data to forecast future trip generations and distributions is a common practice, and is often the only available source of creditable information on which to base future performance. However, in an area such as Morisset which is highlighted in the recently adopted Hunter Regional Strategy as a major growth centre, both in terms of population but also as one of 6 important regional centres across the region. This factor alone is likely to result in a shift in travel patterns, with more local jobs and activities containing movements to the Morisset area, rather than further a field. For example, travel to the nearest centres of Toronto and south to Warnervale Wyong will most probably be replaced by more local alternatives.

There is also likely to be a shift in travel patterns, both car based and public transport based as a result of this shift in development patterns in the lower Hunter Region.

The revised traffic distribution is shown in Figure 1.

The recently adopted Lower Hunter Regional Strategy sets the framework for development over the next 25 years. The Strategy identifies a series of key centres across the region, including the regional centre of Newcastle, and a series of sub-regional centres in locations such as Glendale, Maitland, Cessnock, Raymond Terrace and Morisset. Growth in these centres, coupled with the continuing growth of centres such as Wyong and Warnervale on the Central Coast will alter the distribution of travel across the region, from current (historic) trends.

Centres that are likely to develop stronger attractions for the North Cooranbong area include Morisset, Glendale and Warnervale. The role of Morisset is planned to change significantly, along with Glendale, and is most likely to see a shift in travel patterns to these growing centres away from traditional centres such as Toronto.

The net effect of this planned growth therefore will be to see a stronger connection to the closest centre of Morisset, but also a stronger attraction to the centres to the north (Glendale and beyond) via Freemans Drive and the F3 Freeway, rather than the current trend which focuses on Toronto.

The above factors have led to a revision of the trends in trip distribution and assignment, with a stronger connection to Morisset, and also for travel north than was originally assumed (based on the historic journey to work data for the Cooranbong area.)

Another factor considered in this review focuses on the State Government Transport strategy, Action for Transport 2010 and its objective of achieving moderation in traffic growth, coupled with encouragement of alternate travel to the private car. The strategy also highlights the need to get the most out of our existing transport systems, to achieve better efficiencies.

Consequently the assignment of trips to the local road network has considered alternate routes that are both underutilised and also attractive from a travel time/distance perspective. This includes the use of Deaves Road to access the F3 south of the subject site. This route is actually shorter and can be consistently faster than the alternative via Freemans Drive because of the lower levels of intersection delay and priority afforded by using junctions from this approach. Short of closing the route it will be an attractive alternative that will most likely be more heavily utilised than the conservative 15% assumption applied here.

The same assessment has been made in relation to the use of Newport Road rather than Freemans Drive to access the Morisset town centre. These two routes are similar in terms of distance to the extent that likely levels of congestion along the Freemans Drive / Mandalong Road route will see a split in terms of route choice. Another factor influencing this route choice is the nature of the planned main site access and its link through to Newport Road.

The resultant effects in terms of a revised distribution, and then assignment of the above issues is illustrated on the figures overleaf. Note it is still likely that more traffic may choose to utilise the Newport Road connection to Morisset rather than Freemans Drive, such that the levels of service would become more balanced. (This thesis can be tested more thoroughly with network modelling techniques, but essentially it is an application of Wardrop's Equilibrium Theory which balances travel distance and travel time such that alternate route choices are balance based on the levels of service provided.

The net effect of this approach to network planning is a more efficient use of existing assets, rather than provision of unnecessary infrastructure that continues to reinforce the car based travel choice. (The principle does include however retaining acceptable service levels and may still require some investment in infrastructure (road and intersection) upgrades to retain satisfactory performance.

5 Roadway Capacities

A review was undertaken of applicable road capacity assumptions has been undertaken based on the available standards and guidelines.

The GHD November 2006 work assumed a general road capacity for urban conditions of 1,400 vehicles per hour per lane. This is consistent with the mid-block capacities quoted in Austroads 'Guide to Traffic Engineering Practice: Part 5'.

There is a historic precedent to support the use of this traffic lane capacity in similar traffic studies in the region. For example the major residential release areas at Thornton and North Lakes in the Lower Hunter Region.

Examples of where this higher level of capacity is being successfully applied by the RTA in the Lower Hunter Region include the Tourle Street Bridge and Cormorant Road route on Koorangang Island, George Booth Drive at Cameron Park, sections of Toronto Road and The Esplanade. Each of these roads continues to function under two lane two way operations and in the case of the Tourle Street bridge which the RTA is about to replace with another two lane river crossing, the peak flows are in the vicinity of 1500 vehicles per hour per lane in the peak direction.

This is considered not only acceptable but consistent with the NSW Government's broader transport objectives as outlined in Action for Transport 2010.

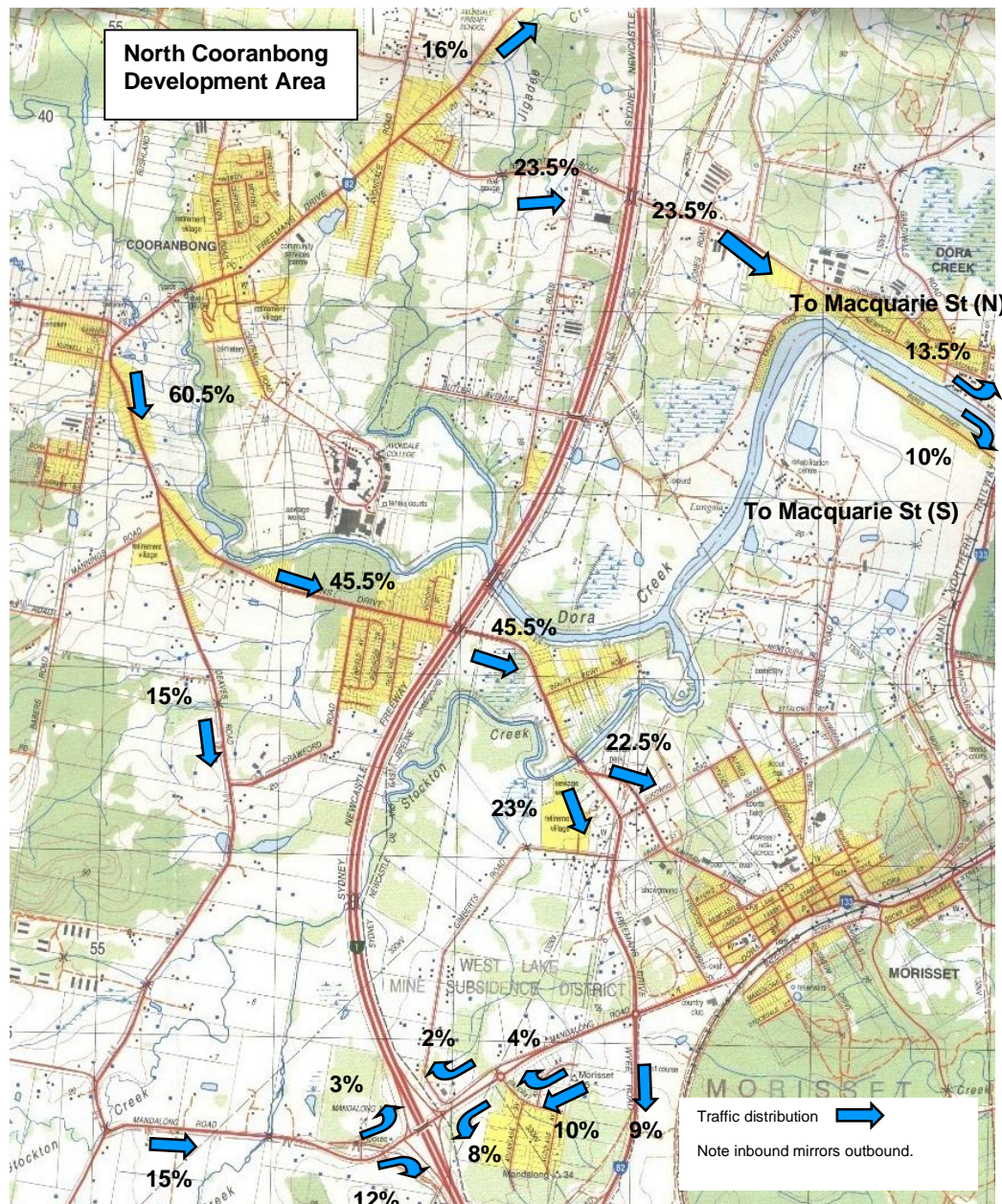


Figure 1 – Traffic Distribution

6 Forecast Mid Block Road Performance

Based upon a reanalysis of the above underlying study assumption the forecast levels of mid block performance have been recalculated and the results are presented in Table 1.

Table 1 2022 Study Area Midblock Performance (One way flows)

Road Link	Peak	'Without' Development		'With' Development	
		Volume	V/C (%)	Volume	V/C (%)
Freemans Dr – Newport - Alton	AM	546	39.0%	1096	78.29%
	PM	509	36.4%	1249	89.2%
Freemans Dr – Alton - Deaves	AM	510	36.4%	1303	93.1%
	PM	558	39.9%	1341	95.8%
Freemans Dr – Deaves - Stockton	AM	512	36.6%	1167	83.4%
	PM	531	37.9%	1160	82.9%
Freemans Dr – Stockton – Mandalong	AM	319	22.8%	570	40.7%
	PM	252	18.0%	538	38.4%
Mandalong Rd - Gimberts - Freemans	AM	1387	99.1%	1588	113.4%
	PM	1322	94.4%	1523	108.8%
Mandalong Rd Gimberts - F3	AM	1308	93.4%	1452	103.7%
	PM	1406	100.4%	1442	103.0%
Mandalong Rd West	AM	124	8.9%	340	24.3%
	PM	147	10.5%	363	25.9%
Deaves Rd	AM	107	7.6%	323	23.1%
	PM	108	7.7%	324	23.1%
Newport Rd West	AM	213	15.2%	552	39.4%
	PM	213	15.2%	431	30.8%
Newport Rd East	AM	447	31.9%	793	56.6%
	PM	455	32.5%	882	63.0%
Macquarie St	AM	1001	71.5%	1064	76.0%
	PM	748	53.4%	1106	79.0%
Alton Rd	AM	146	10.4%	203	14.5%
	PM	250	17.9%	307	21.9%
Avondale Rd	AM	185	13.2%	666	47.6%
	PM	185	13.2%	379	27.1%

Application of the traffic lane capacity of 1,400 vehicle per hour can establish under which development scenario duplication would be required to accommodate the traffic demands exceeding this capacity.

The midblock assessment indicates the following:

- » Mandalong Road between Gimberts Road and the F3 freeway will require duplication by 2022 under the '*without*' development of North Cooranbong scenario; and,
- » Mandalong Road between Gimberts Road and the Freemans Drive will require duplication by 2022 under the '*with*' development of North Cooranbong scenario only. It is of note however that the section of road would be operating at its theoretical capacity under the '*without*' development of North Cooranbong scenario.

The basis for funding of the above road upgrades will need to be established. Particularly in relation to the section of Mandalong Road which would require upgrade to accommodate the future traffic demand '*without*' the development at North Cooranbong.

7 Internal Site Layout Issues

The proposed Masterplan differs from that assessed in the GHD November 2006 report. The revised masterplan for 2,500 dwellings is shown in Figure 2.

The access arrangements are briefly described as follows:

- » Link A - Alton Road will provide a local street connection into the southwest corner of the subject development. The internal road network is oriented to downplay the function of this link and make it less attractive as a route due to the longer travel distance between the development cells and Freemans Road via alternative links. This should reinforce the local road function. The retention of the existing intersection layout of Freemans Drive/Alton Road stopline controlled arrangement should not encourage excessive levels of vehicular usage through this intersection. This approach is considered more suitable to balance traffic demands across the alternative access points rather than build in potentially unpopular and high maintenance traffic control devices into new development.
- » Link B –New Access (Middle) will function at the lower category of local road within the internal road network. Frontage residential properties will have direct access and as such this will limit through traffic flows and reducing the relative attractiveness of this link in comparison to the higher order alternatives. The orientation of the masterplan and the internal road network will assist in controlling traffic demands on this link to levels sufficient for its function. Again, the role of this route is reinforced through a suitable intersection treatment with Freemans Drive and the provision of sufficient capacity commensurate with the desired demand will help achieve the desired balance of flows across the
- » Link C – This connection would utilise a realigned Avondale Road to connect the subject development site to Freemans Drive and Newport Road. This link would constitute one of two main access points to the subject development site and would provide the higher order collector road function. The orientation of the masterplan and the internal road network would ensure that this link is one of the main corridors of movement between the subject development and Freemans Drive and Newport Road. The intersection layout of the realigned Avondale Road with Freemans Drive and Newport Road will provide sufficient capacity to provide minimal delays to reinforce the main role of this link.
- » Link D – A potential new connection to the north of Newport Road will provide the second main access point to the development. The orientation of the road network will reinforce the use of this link particularly for traffic movements to and from the north.

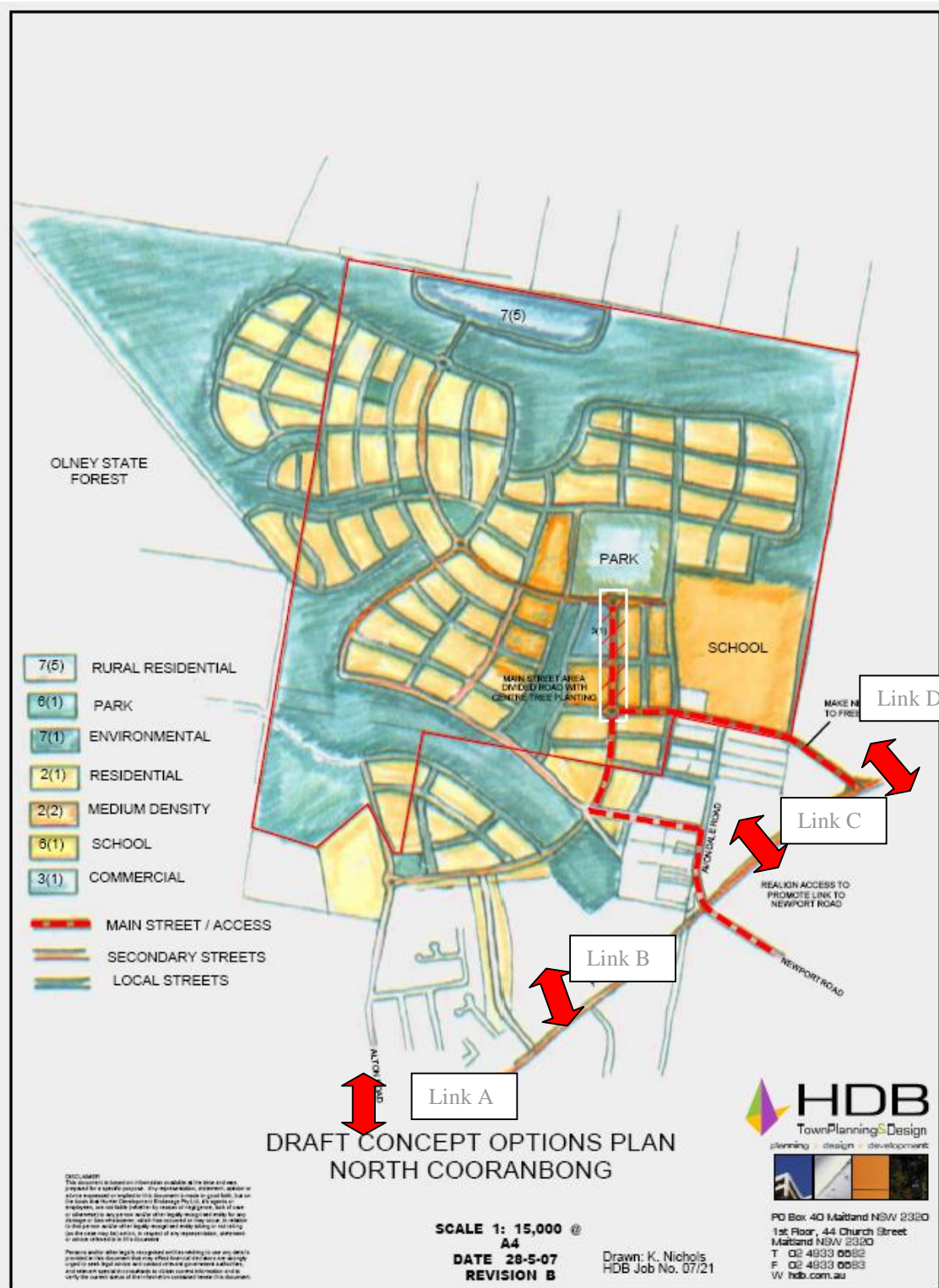
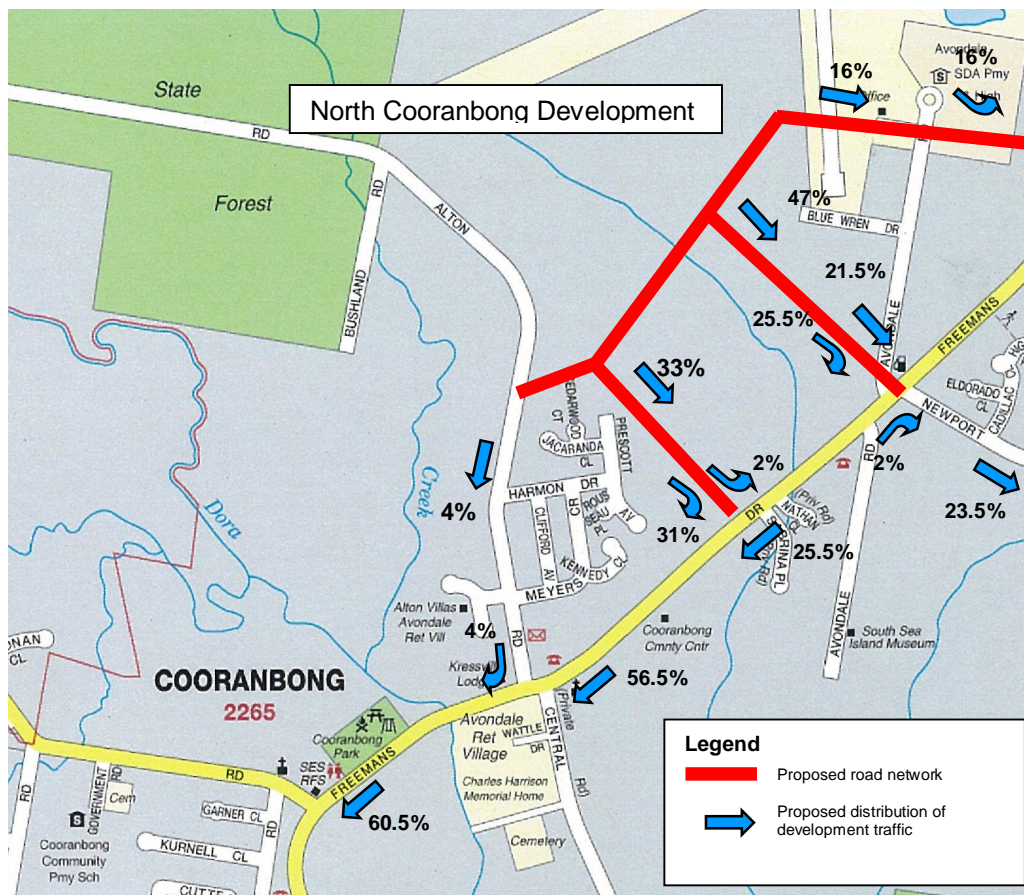


Figure 2 Proposed Masterplan and External Road Network Connections

A local traffic distribution to identify the allocation of traffic between the different access points was calculated based upon the most direct route and consideration of the function of the route. The local traffic distribution is shown in Figure 3

Figure 3 - Assumed Local Traffic Distribution for North Cooranbong



8 Impact on Road Upgrades

The revisions to the study base parameters (traffic generation and distribution) and the reduced level of development yield, produced a revised set of 2022 'with' and 'without' development weekday morning and evening peak hour traffic flows.

The existing Intersections previously assessed in the GHD November 2006 report, and supplemented by those additionally requested by RTA/Council, were as follows:

- » F3 SB Ramps / Mandalong Road
- » F3 NB Ramps / Mandalong Road
- » Mandalong Road / Gimberts Road
- » Freemans Drive / Mandalong Road
- » Freemans Drive / Stockton Street
- » Mandalong Road / Deaves Road
- » Freemans Drive / Deaves Road
- » Macquarie Street / Dora Creek
- » Freemans Drive / Alton Road
- » Freemans Drive / Newport Road / Avondale Road

The operational performance of the above identified intersections were reanalysed using the revised 2022 'without' and 'with' development scenario weekday morning and evening peak hour flows. A comparison of the results is presented in Table 2.

Table 2 is summarised as follows:

- » Intersection upgrade would be required at the Macquarie Street and Dora Street intersection by 2022 under the "without" and "with" development scenario.
- » Intersection upgrades would required at the following intersections by 2022 under the "with" development scenario:
 - Freemans Drive and Deaves Road
 - Freemans Drive and Stockton Street
 - Freemans Drive and Mandalong Road

Table 2 Comparison of Key Intersection Operational Performance (2022)

Intersection	Peak Period	‘Without’ Development		‘With’ Development	
		Average Delay (s)	Level of Service	Average Delay (s)	Level of Service
Freemans Dr with Avondale Rd & Newport Rd (PC)	AM	15.9	B	Existing layout would require upgrade to realign Avondale Road	
	PM	15.7	B		
Freemans Dr & Alton Rd (PC)	AM	14.0	A	19.2	B
	PM	12.9	A	35.3	C
Freemans Dr & Deaves Rd (PC)	AM	25.6	B	401.7	F
	PM	32.8	C	640.7	F
Freemans Dr with Stockton Street (PC)	AM	35.9	C	5037	F
	PM	52.3	D	6156	F
Freemans Dr & Mandalong Rd (RD)	AM	40.8	C	299.1	F
	PM	45.6	D	1230	F
Mandalong Rd & Gimberts Drive (RD)	AM	16.2	B	17.1	B
	PM	20.2	B	22.9	B
F3 NB on Ramp & Mandalong Rd (PC)	AM	9.9	A	9.9	A
	PM	9.4	A	9.3	A
F3 NB off Ramp & Mandalong Rd (PC)	AM	11.5	A	14.6	B
	PM	10.1	A	10.2	A
F3 SB on Ramp & Mandalong Rd (PC)	AM	13.0	A	13.6	A
	PM	12.1	A	12.2	A
F3 SB off Ramp & Mandalong Rd (PC)	AM	9.2	A	9.2	A
	PM	9.0	A	9.0	A
Mandalong Rd & Deaves Rd (PC)	AM	12.7	A	12.7	A
	PM	12.8	A	13.2	A
Macquarie St & Dora St (PC)	AM	510	F	3116	F
	PM	268	F	268	F

Note: PC represents priority control, RD represents roundabout, TS represents traffic signal.

Concept designs for the existing intersections requiring upgrade, and for the intersections required to facilitate access to the subject development, were prepared. The target level of intersection operation was LoS D for the weekday peak hour periods which is consistent with RTA requirements

The results of the operational analysis of the proposed layouts is shown in Table 3.

Table 3 2022 Intersection Performance – Proposed Layout ‘With’ Development Scenario

Intersection	Peak Period	AD (Secs)	LOS	DoS	QL (m)
Freemans Dr with Avondale Rd & Newport Rd (TS)	AM	34.0	C	0.782	121
	PM	43.6	D	0.908	164
Freemans Dr & Deaves Rd (TS)	AM	10.7	A	0.728	177
	PM	12.6	A	0.788	225
Freemans Dr & New Access (middle) (TS)	AM	27.5	B	0.828	199
	PM	10.7	A	0.598	157
Freemans Dr & New Access (northern) (PC)	AM	10.1	A	0.269	11
	PM	11.3	A	0.240	9
Freemans Dr with Stockton Street (RD)	AM	16.1	B	0.310	20
	PM	30.5	C	0.853	137
Freemans Dr & Mandalong Rd (TS)	AM	40.4	C	0.853	165
	PM	47.3	D	0.922	281
Macquarie St & Dora St (RD)	AM	19.8	B	0.672	69
	PM	16.3	B	0.700	73

Notes: AD represents Average Delay, LoS represents Level of Service and DoS represents Degree of Saturation, QL Queue Length, PC represents priority control, RD represents roundabout, TS represents traffic signal.

- The average delay for sign controlled intersections is selected from the movement with the highest average delay. The average delay for roundabouts is selected from the movement on the approach with the highest average delay. The average delay per vehicle in seconds for traffic signals is selected as the average delay over all movements at the intersection.
- The level of service for sign controlled intersections is based on the highest average delay per vehicle for the most critical movement during peak conditions. The level of service for roundabouts is based on the highest average delay per vehicle for the most critical movement. The level of service for traffic signals is based on the average delay over all movements.
- The Degree of Saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.
- The queue length for sign controlled intersections and roundabouts are selected from the movement with the highest queue length at the intersection. The queue length for traffic signals is based on the queue length over all movements.

Table 3 shows that the proposed intersection concept layouts would all provide a satisfactory level of operation during both of the peak hour periods in 2022 with the inclusion of the traffic associated with the subject development.

The basis for funding of the identified intersection upgrades will need to be established. Particularly in relation to existing intersections which would require upgrade to accommodate the future traffic demand ‘without’ the development at North Cooranbong.

9 CONCLUSIONS

A review was undertaken of the traffic planning and engineering investigations completed as part of the North Cooranbong Development. The review has considered assumptions made relating to base trip generation, distribution and assignment criteria, and how these can potentially have a significant bearing on the levels of road and intersection investment for the project.

The conclusions from the joint technical review are as follows:

- » The overall approach to the traffic assessment is sound, with appropriate levels of traffic capacity and allowance for background growth being made.
- » The assumed level of development potential for the subject site has been confirmed as 2,500 dwellings.
- » Traffic generation rates from the RTA 'Guide to Traffic Generating Developments' were used in the assessment with discounting for the likely trip containment within the subject development due to the internal provision of a range of land uses.
- » The traffic distribution used in the GHD November 2006 traffic report was further reviewed in light of the Lower Hunter Regional Strategy and the likely potential changes to existing travel patterns that are likely to occur.
- » The basis of 1,400 vph per lane traffic capacity was confirmed as having precedent for application in the traffic assessments.
- » A revised masterplan was developed which included four external connections to Freemans Road.
- » The layout of the master plan and orientation of the internal road network is considered sufficient to reinforce the intended role of each of the four access points in terms of their functional classification within the masterplan area, and to minimise the amenity impacts on surrounding residential properties to satisfactory levels.
- » Operational assessment was undertaken of key intersections within the agreed traffic study area for weekday peak hour periods in 2022 for both "*without*" and "*with*" development scenarios.
- » Intersection upgrade would be required at the Macquarie Street and Dora Street intersection by 2022 under the "*without*" and "*with*" development scenario.
- » Intersection upgrades would required at the following intersections by 2022 under the "*with*" development scenario:
 - Freemans Drive and Deaves Road
 - Freemans Drive and Stockton Street
 - Freemans Drive and Mandalong Road
- » The basis for funding of the identified intersection upgrades will need to be established. Particularly in relation to the existing intersection that would require upgrade to accommodate the future traffic demand '*without*' the development at North Cooranbong.
- » Assessment of the mid block traffic capacity of the road links comprising the study area was undertaken. The results of the assessment are summarised below:
 - Mandalong Road between Gimberts Road and the F3 freeway will require duplication by 2022 under the '*without*' development of North Cooranbong scenario; and,

- Mandalong Road between Gimberts Road and the Freemans Drive will require duplication by 2022 under the '*with*' development of North Cooranbong scenario only. It is of note however that the section of road would be operating at its theoretical capacity under the '*without*' development of North Cooranbong scenario.
- » The basis for funding of the identified road upgrades will need to be established. Particularly in relation to the section of Mandalong Road which would require upgrade to accommodate the future traffic demand '*without*' the development at North Cooranbong.

It is concluded that the base assumptions used in the technical analysis to identify the road infrastructure requirements to accommodate future traffic demand '*without*' and '*with*' development of the subject site are considered to be satisfactory for the development.

Signatures



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