# Traffic Solutions Pty Ltd

ABN 63 074 165 263

P.O Box 9161
Bathurst NSW 2795

Phone / Fax
(02) 6331 0467

E-mail
trafficsolutions@ozemail.com.au


6-Feb-12
Ref. 09.10.070 & 11.12.056

The General Manager
Blacktown City Council
P.O Box 63
Blacktown NSW 2148

Dear Sir

**Proposed Lot yield increase Bunya residential Estate, Doonside Road, Doonside – Traffic Impact Assessment**

Traffic Solutions Pty Ltd has been engaged by APP Corporation Pty Ltd (on behalf of Landcom) to provide Council with an assessment of the traffic implications of a proposal to increase the total Bunya Residential Estate lot yield from the approved 730 lots to 820 lots.

The approval of 730 lots was over the whole 6 Precincts of the site. As Council would be aware Precincts 1 and 2 have been developed with a slight increase in density compared to the original Concept Plan. Precincts 3, 4 and 5 have recently been approved with a slight increase in lots compared to the original Concept Plan. Precinct 6 will contain approximately 20-30 more lots than originally planned. Therefore, Landcom wish to apply for approval to increase the total Bunya Estate by 90 dwellings.

A Transport Management and Accessibility Plan (TMAP) dated August 2007, prepared by Maunsell Aecom for Landcom as part of the application for the project to the Minister for Planning. This document assessed the traffic implications of the proposal with 730 lots with 3 improved intersections providing vehicle access to the estate.

Maunsell Aecom undertook a review in February 2009 of the potential impacts of an increase in dwelling from 730 to 790 in the Bungarribee Precinct (a copy of this report is attached for reference). The following tables have been extracted from this report which provides a comparison of the operation of the 3 intersections providing vehicle access to/from the precinct between the 730 and 790 dwellings as forecast by Maunsell Aecom.

Table: 2.1: AM and PM Peak Hour Intersection Performance with 730 dwellings

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 3,607 | 0.8 | 28.5 | C |
| Doonside Rd / Bungarribee Rd | 3,598 | 0.9 | 46.6 | D |
| Doonside Rd / Douglas Rd | 2,616 | 0.9 | 25.1 | B |
| **PM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 4,353 | 0.9 | 34.8 | C |
| Doonside Rd / Bungarribee Rd | 3,863 | 0.9 | 43.3 | D |
| Doonside Rd / Douglas Rd | 2,953 | 0.6 | 9.5 | A |

Source: Maunsell, January 2009

Table 2.2: AM and PM Peak Hour Intersection Performance with 790 dwellings

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 3,614 | 0.9 | 35.3 | C |
| Doonside Rd / Bungarribee Rd | 3,616 | 0.9 | 48.3 | D |
| Doonside Rd / Douglas Rd | 2,633 | 0.9 | 27.2 | C |
| **PM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 4,370 | 0.9 | 33.0 | C |
| Doonside Rd / Bungarribee Rd | 3,800 | 0.9 | 43.6 | D |
| Doonside Rd / Douglas Rd | 2,976 | 0.6 | 10.1 | A |

Source: Maunsell, January 2009

The traffic generation rate calculated by Maunsell Aecom was 0.68 vehicle trips/dwelling/lot in the peak hours. Utilising this rate the increase in vehicle trips from 730 – 790 dwellings would be 41 additional vehicle trips (without a mode shift away from car transport).

As tabulated in the reproduced Tables 2.1 and 2.2 from the Maunsell Aecom report this additional 41 vehicle trips did not cause any of the 3 intersections to fail and only marginally increased the Average Delays per vehicle. The intersection of Doonside Road and Bungarribee Road is forecast to operate close to capacity with a Level of Service 'D' under both dwelling yield scenarios. Level of Service 'D' is triggered when the average delay exceeds 43 seconds per vehicle and the maximum increase from the additional dwelling yield at the intersection of Doonside Road and Bungarribee Road was 46.6 – 48.3 seconds. This intersection would be deemed to operate unsatisfactorily (i.e. oversaturated) if it was to go to Level of Service 'E' which is not triggered until the average delay exceeds 56 seconds.

The current proposal to increase the yield to 820 dwellings is only an additional of 30 dwellings over the 790 dwellings which were modelled in table 2.2. Utilising the same traffic generation rate the addition dwellings would generate a further 20 vehicle trips in the peak hours.

Considering that 41 additional vehicle trips increased the average vehicle delays only marginally it is my opinion that a further 20 additional vehicle trips will not increase the average delays to cause any of the 3 intersections serving the estate to be oversaturated.

The Maunsell TMAP also adopted a traffic volume split of 85% of traffic generated in the morning peak departing the estate (therefore 15% approaching) and the reverse in the evening peak hour.

Utilising the same proportions the increased yield from 790 – 820 dwellings (i.e. 20 vehicle trips) would have a split of 17 departing and 3 approaching the estate in the morning peak hour and the reverse in the evening peak hour.

The TMAP distributed the traffic generated by the estate with 55% approaching/departing the area in the morning peak hour via the Douglas Road intersection, 27% approaching/departing via Bungarribee Road and 20% approaching/departing via Eastern Road intersection. This would result in approximately 9 vehicles exiting the area and 2 approaching at the Doonside Road intersection in the morning peak hour (with the reverse in the evening peak hour). The Bungarribee Road intersection would have an additional 5 vehicles exiting the area and 1 approaching in the morning peak hours with the reverse in the evening peak hour. The Eastern Road intersection would have approximately 3 vehicles departing the area and none approaching.

An alternative distribution could be based upon the number of lots/dwellings which the most direct access to each of the controlled intersections. APP Corporation has provided Traffic Solutions Pty Ltd with the number of lots now proposed for each stage. Utilising this alternative the distribution would be 30% via Doonside Road, 41% via Bungarribee Road and 29% via Eastern Road intersection. This would result in approximately 5 vehicles exiting the area and 1 approaching at the Doonside and Eastern Road intersections in the morning peak hour (with the reverse in the evening peak hour). The Bungarribee Road would therefore have an additional 7 vehicles exiting the area and 1 approaching in the morning peak hours with the reverse in the evening peak hour.

In both alternative distributions the forecast additional volume of vehicles is very low. It is the opinion of this practice that this minor increase in peak hour traffic volumes will not cause the 3 controlled intersections (which have been previously been forecast modelled as operating at a satisfactory level of service under 730 and 790 dwellings) to operate at an unsatisfactory level of service.

In conclusion, it is considered that further intersection modelling is not required and it is suggested that on traffic grounds the proposal to increase the lot yield in the Bunya Estate by 90 dwellings is supportable.

Should you require any additional information or clarification of the contents of this letter please contact me on the telephone numbers provided.

Yours sincerely

Craig Hazell
Director

**Maunsell Australia Pty Ltd**
Level 11, 44 Market Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8295 3600 F +61 2 9262 5060 www.maunsell.com
ABN 20 093 846 925

Ref: 60012281

Carlos Lopez
PO Box 1573
North Sydney
NSW 2059

3 February 2009

Dear Carlos

**Bungarribee Precinct - Additional traffic analysis to Doonside Transport Management and Accessibility Plan**

## 1.0 Background and Introduction

In August 2007, Maunsell was commissioned by Landcom to prepare a Transport Management and Accessibility Plan for the Doonside site adjacent to the Bungarribee Precinct within the Western Sydney Parklands. The purpose of the report was to support a Part 3a application to the Department of Planning for rezoning of the site for residential uses.

Based on this report and by request from the RTA, additional analysis regarding the proposed accesses was undertaken to establish the optimal access arrangements to the site based on traffic volumes, accessibility and safe pedestrian crossing opportunities. This analysis was summarised in the Bungarribee Precinct Sydney Regional Development Advisory Committee Response report (Maunsell, January 2008).

In response to a request from APP Corporation, Maunsell has undertaken additional analysis which involves the following tasks:

- Potential traffic impacts on the surrounding key intersections based on a revised (increased) number of dwellings;
- Analysis of the number of trips that will trigger the need for implementation of a second access point;
- Advice regarding an alternative location for an access point from Doonside Road and regarding pedestrian crossing opportunities; and
- A conclusion which summarises the findings of the analysis.

The analysis of these tasks is presented in the following sections of this letter.

## 2.0 Potential Traffic Impacts

The traffic impact assessment of the development presented in the Doonside Transport Management and Accessibility Plan (Maunsell, August 2007) was based on a total number of 730 dwellings. Due to a revised layout plan, the total number of dwellings has now been increased to approximately 790 dwellings which would increase the number of trips to and from the site.

An analysis of the impact on the three surrounding key intersections was undertaken to compare the difference in impact between the two scenarios, being 730 and 790 dwellings respectively. The analysis was carried out for AM and PM Peak Hour and is shown in **Table 2.1** and **2.2** respectively. No changes to the layouts presented in Maunsell's report 2007 have been done.

**Table: 2.1: AM and PM Peak Hour Intersection Performance with 730 dwellings**

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 3,607 | 0.8 | 28.5 | C |
| Doonside Rd / Bungarribee Rd | 3,598 | 0.9 | 46.6 | D |
| Doonside Rd / Douglas Rd | 2,616 | 0.9 | 25.1 | B |
| **PM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 4,353 | 0.9 | 34.8 | C |
| Doonside Rd / Bungarribee Rd | 3,863 | 0.9 | 43.3 | D |
| Doonside Rd / Douglas Rd | 2,953 | 0.6 | 9.5 | A |

Source: Maunsell, January 2009

**Table 2.2: AM and PM Peak Hour Intersection Performance with 790 dwellings**

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 3,614 | 0.9 | 35.3 | C |
| Doonside Rd / Bungarribee Rd | 3,616 | 0.9 | 48.3 | D |
| Doonside Rd / Douglas Rd | 2,633 | 0.9 | 27.2 | C |
| **PM Peak 2016** | | | | |
| Doonside Rd / Eastern Rd | 4,370 | 0.9 | 33.0 | C |
| Doonside Rd / Bungarribee Rd | 3,800 | 0.9 | 43.6 | D |
| Doonside Rd / Douglas Rd | 2,976 | 0.6 | 10.1 | A |

Source: Maunsell, January 2009

The comparison between the two scenarios shows that there will not be any significant difference in impact on the analysed intersections between the two scenarios of 730 and 790 dwellings respectively.

## 3.0 Trigger for Implementation of Access Points

To provide an initial access point to the development it was proposed that an additional arm would be added to the Douglas Road / Doonside Road signalised intersection (Maunsell, 2007). To establish when a second access point would need to be implemented to the development, an iterative approach was used to determine the volume of traffic generated by the development that would cause the Douglas Road / Doonside Road intersection to perform poorly in the AM and PM Peak Hour respectively.

The analysis found that up to 300 vehicles can be accommodated by the Douglas Road / Doonside Road intersection before it operates at capacity and the degree of saturation become unsatisfactory. The trip rates used in the previous analysis suggests that one dwelling generates approximately 0.68 trips and 300 vehicles would therefore be generated by approximately 440 dwellings. The intersection performance for the Douglas Road / Doonside Road intersection for AM and PM Peak Hour respectively can be seen in **Table 3.1**.

**Table 3.1: Doonside Road / Douglas Road intersection performance with 300 vehicles to and from site**

| Peak Hour | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| AM Peak | 2,812 | 0.9 | 22.5 | C |
| PM Peak | 3,020 | 0.7 | 8.8 | A |

Source: Maunsell, January 2009

As seen in **Table 3.1**, the intersection is performing satisfactory with approximately 300 vehicles travelling to and from the site. However, exceeding this number would result in an unsatisfactory Degree of Saturation in the AM Peak Hour.

It is not good practice to use a single point of access for a large residential area because of concerns regarding evacuation safety, the risk of accidents at the access limiting ingress or egress, and the limitations that a single point of access places on circulation.

## 4.0 Alternative location to access point from Doonside Road

As an outcome of the Bungarribee Precinct Sydney Regional Development Advisory Committee Response (Maunsell, January 2008), the recommended optimal scenario for access points to the development are the following:

- New arm to Doonside Road / Bungarribee Road upgraded to a signalised intersection;
- New Arm to Doonside Road / Eastern Road upgraded to a signalised intersection; and
- New Arm to the currently signalised Doonside Road / Douglas Road intersection.

This section analyses two types of alternative access point options, being a left in / left out access or a signalised access respectively, located between Douglas Road / Doonside Road and the Doonside Road / Bungarribee Road intersection. The design criteria for Intersection Spacing (The Road Design Guide, August 1991) recommend that the distance between two intersections should be approximately 500 m.

The potential access point is located approximately 400 m north of the Doonside Road / Douglas Road intersection. However, the modelling undertaken in 2007 at the two intersections north and south of the proposed access point shows that the queue lengths of the two intersections are short and therefore unlikely to interfere with the proposed access point.

The two alternative access options were analysed in four scenarios, being with and without the additional access arm to the Doonside Road / Bungarribee Road roundabout as follows:

*Left in / Left out access:*

- Scenario 1: Without additional arm to the Bungarribee Road / Doonside Road roundabout;
- Scenario 2: With additional arm to the Bungarribee Road / Doonside Road roundabout;

*Signalised access:*

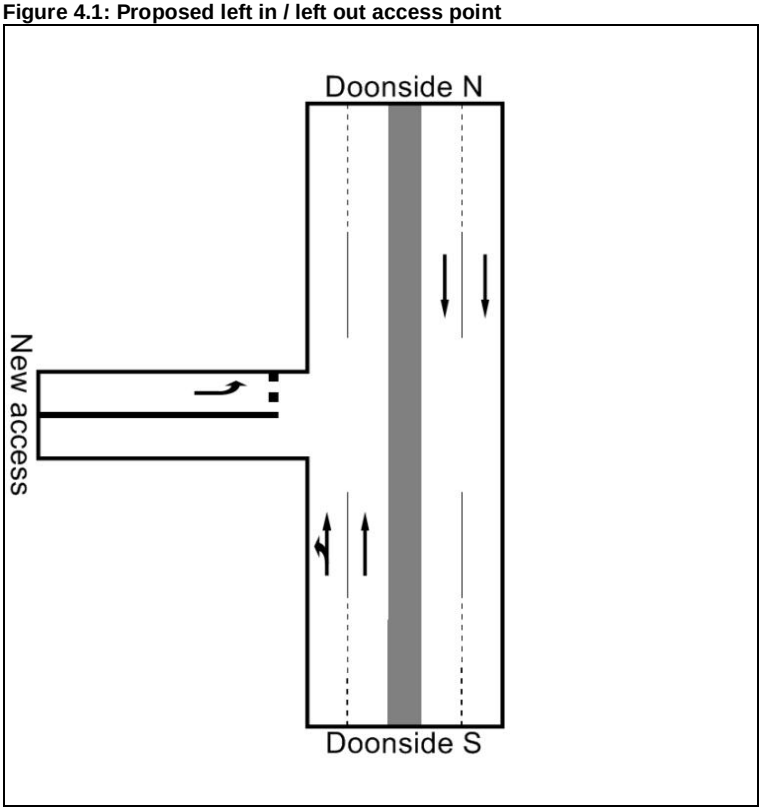
- Scenario 3: Without additional arm to the Bungarribee Road / Doonside Road roundabout; and
- Scenario 4: With additional arm to the Bungarribee Road / Doonside Road roundabout.

The results of this analysis are presented in the following sections. When assessing the presented options, the analysis takes surrounding intersection performance, safety and pedestrian connectivity to shops and station into consideration.

## 4.1 Left in / Left out access option

A potential layout of the left in / left out access option is shown in **Figure 4.1**.

**Figure 4.1: Proposed left in / left out access point**




Source: Maunsell, January 2009

The same trip distribution, that is the same number of vehicles turning north and south respectively used in the Maunsell report 2007 was applied to the left in / left out access option for consistency. The intersection performance results of the surrounding intersections with the additional left in / left out access option can be seen in **Table 4.1** and **4.2** for Scenario 1 and Scenario 2 respectively. No overall Level of Service results are given for the left in / left out option; therefore the Level of Service for this intersection has been given for both the major and the minor approach.

**Table 4.1: Intersection Performance for Scenario 1**

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016 Without Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 3,631 | 0.8 | 6.5 | A |
| Doonside Rd / Bungarribee Rd | 3,527 | 1.2 | 85.5 | F |
| Doonside Rd / Douglas Rd | 2,653 | 1.0 | 28.9 | C |
| Left in / left out access | 2,266 | 0.4 | 0.3 | A (major approach)<br>B (minor approach) |
| **PM Peak 2016 Without Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 4,398 | 0.9 | 9.4 | A |
| Doonside Rd / Bungarribee Rd | 3,800 | 0.8 | 12.3 | B |
| Doonside Rd / Douglas Rd | 3,000 | 0.6 | 10.2 | B |
| Left in / left out access | 2,472 | 0.5 | 0.2 | A (major approach)<br>F (minor approach) |

Source: Maunsell, January 2009

**Table 4.2: Intersection Performance for Scenario 2**

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016 With Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 3,612 | 0.812 | 6.4 | A |
| Doonside Rd / Bungarribee Rd | 3,612 | 0.923 | 16.2 | B |
| Doonside Rd / Douglas Rd | 2,633 | 0.962 | 27.2 | C |
| Left in / left out access | 2,134 | 0.4 | 0.3 | A (major approach)<br>B (minor approach) |
| **PM Peak 2016 With Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 4,360 | 0.833 | 7.6 | A |
| Doonside Rd / Bungarribee Rd | 3,890 | 1.250 | 207.3 | F |
| Doonside Rd / Douglas Rd | 2,996 | 0.626 | 10.1 | B |
| Left in / left out access | 2,454 | 0.5 | 0.2 | A (major approach)<br>F (minor approach) |

Source: Maunsell, January 2009

As seen in **Table 4.1**, the Doonside Road / Bungarribee Road roundabout will perform poorly without the additional arm in the AM Peak Hour. However, the poor performance of this roundabout is appearing in 2016 without the development traffic and is therefore caused by the large number of background traffic, as presented in the 2007 Maunsell report.

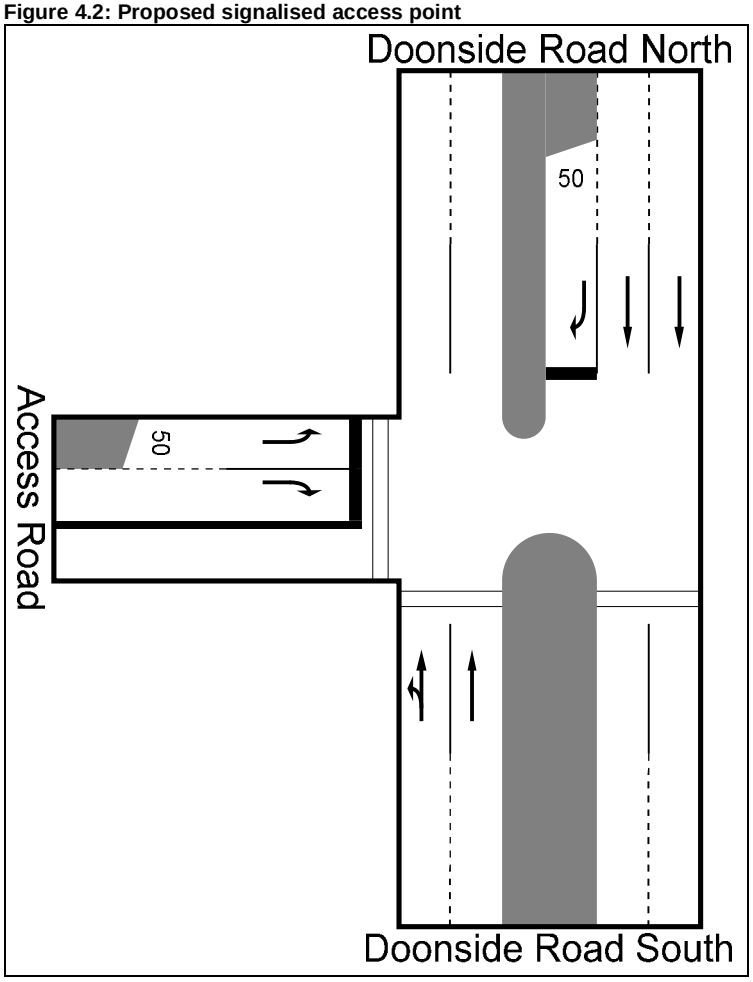
As seen in **Table 4.2**, the Doonside Road / Bungarribee Road roundabout will perform poorly with the additional arm in the PM Peak Hour. This is due to the large number of through traffic in the PM Peak Hour. An additional arm to the roundabout would result in the removal of the slip lane for the northbound vehicles which would cause the roundabout to perform poorly in the PM Peak Hour.

Due to the heavy vehicle movement in the northbound direction on Doonside Road, vehicles on the Access Road are required to wait for sufficient gaps within the northbound traffic in order to merge. Therefore this arm registers a Level of Service F, however this is considered acceptable as the degree of saturation for this arm is below 0.5 and only a low number of vehicles are affected in the PM Peak Hour. The Level of Service for the major approaches of the intersection is an A both in the AM and PM Peak Hour and the overall Degree of Saturation and Average Delay for the intersection are both satisfactory.

## 4.2 Signalised access option

A potential layout of the signalised access option is shown in **Figure 4.2**.

**Figure 4.2: Proposed signalised access point**




Source: Maunsell, January 2009

The same trip distribution, that is the same number of vehicles turning north and south respectively used in the Maunsell report 2007 was applied to the signalised access option. The intersection performance results of the surrounding intersections with the additional signalised access option can be seen in **Table 4.3** and **4.4** for Scenario 3 and Scenario 4 respectively.

**Table 4.3: Intersection Performance for Scenario 3**

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016 Without Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 3,690 | 0.8 | 6.7 | A |
| Doonside Rd / Bungarribee Rd | 3,527 | 1.2 | 85.5 | F |
| Doonside Rd / Douglas Rd | 2,652 | 0.9 | 27.0 | C |
| Signalised access | 2,166 | 0.5 | 2.5 | A |
| **PM Peak 2016 Without Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 4,258 | 0.8 | 6.5 | A |
| Doonside Rd / Bungarribee Rd | 3,783 | 0.8 | 12.3 | B |
| Doonside Rd / Douglas Rd | 3,000 | 0.6 | 10.2 | B |
| Signalised access | 2,513 | 0.6 | 2.2 | A |

Source: Maunsell, January 2009

**Table 4.4: Intersection Performance for Scenario 4**

| Intersection | Vehicles (veh / hour) | Degree of Saturation | Average Delay (sec / veh) | Level of Service |
|---|---|---|---|---|
| **AM Peak 2016 With Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 3,431 | 0.8 | 6.2 | A |
| Doonside Rd / Bungarribee Rd | 3,596 | 0.9 | 15.6 | B |
| Doonside Rd / Douglas Rd | 2,633 | 0.9 | 27.2 | C |
| Signalised access | 2,143 | 0.5 | 2.5 | A |
| **PM Peak 2016 With Additional Arm Doonside Rd / Bungarribee Rd** | | | | |
| Doonside Rd / Eastern Rd (Roundabout) | 4,360 | 0.8 | 7.6 | A |
| Doonside Rd / Bungarribee Rd | 3,855 | 1.3 | 183.3 | F |
| Doonside Rd / Douglas Rd | 2,996 | 0.6 | 10.1 | B |
| Signalised access | 2,487 | 0.6 | 2.0 | A |

Source: Maunsell, January 2009

As seen in **Table 4.3**, the same results as for the left in / left out option for the Doonside Road / Bungarribee Road roundabout will remain without the additional arm in the AM Peak Hour due to the large number of background traffic as presented in the 2007 Maunsell report. However, as mentioned previously, this is not caused by the development traffic.

As seen in **Table 4.4**, the Doonside Road / Bungarribee Road roundabout will perform poorly with the additional arm in the PM Peak Hour, as for the left in / left out option. This is due to the large number of through traffic in the PM Peak Hour. An additional arm to the roundabout would result in the removal of the slip lane for the northbound vehicles which will cause the roundabout to perform poorly in the PM Peak Hour.

Implementation of the signalised access option would provide a safe crossing opportunity for pedestrians.

### 4.3 Summary

This analysis indicates that from a traffic efficiency perspective, the provision of a left-in / left-out or a signalised intersection to the north of the Doonside Road/Douglas Road signalised intersection would alleviate the need to provide a fourth arm into the Doonside Road / Bungaribee Road intersection. However, this configuration would have three major issues:

- Doonside Road / Bungaribee Road roundabout currently operates poorly during the peak periods and would continue to do so;
- A left-in / left-out access would provide very poor pedestrian amenity across Doonside Road on key desire lines to the station and local shops from much of the Doonside residential development; and
- Due to the proximity of the surrounding intersections, implementation of this access point might increase accident risks caused by the creation of a new conflict point and increased delay. Whether this option would be considered acceptable or not would therefore require further discussion with the NSW Roads and Traffic Authority.

Therefore, the intersection arrangements proposed in the Bungarribee Precinct Sydney Regional Development Advisory Committee Response (Maunsell, January 2008) continue to be the best solution for the development in terms of traffic efficiency and subject to a balanced review of other issues such as cost, constructability and urban design, should remain the preferred option.

## 5.0 Conclusions and Recommendations

The analysis shows that the increased number of dwellings (790 dwellings compared to 750 dwellings) based on the revised layout would not impact significantly on the surrounding road network compared to the lower number of dwellings.

Based on the performance of the Doonside Road / Douglas Road intersection, it would be possible to feed approximately 300 development trips (generated by 440 dwellings) through one point of access (being the Doonside Road / Douglas Road intersection) before it would be necessary to implement a second access point to the development. At this stage, the second point of access would also be necessary for safety concerns and to assure circulation within the site.

Four access option alternatives to the ones presented in the Bungarribee Precinct Sydney Regional Development Advisory Committee Response (Maunsell, January 2008) were analysed in terms of surrounding intersection performance, safety and pedestrian accessibility, being a left in / left out option and a signalised option. Both access options were analysed with and without an additional arm to the Doonside Road / Bungarribee Road roundabout.

The Doonside Road / Bungarribee Road roundabout perform poorly in the PM Peak Hour when implementing the additional arm due to removal of the northbound slip lane on the current layout. If an additional arm is provided to the Doonside Road / Bungarribee intersection, it needs to be upgraded to a signalised intersection to work efficiently.

The left in / left out option and the signalised access option, without implementation of the additional arm to the Doonside Road / Bungarribee Road roundabout, overall both perform satisfactory in the AM and PM Peak Hour. However, the signalised access option would provide a better opportunity for a safe pedestrian crossing on Doonside Road, but due to the proximity to the surrounding intersections, implementation of this option would require further discussion with the NSW Roads and Traffic Authority.

Therefore, the access option presented in the Bungarribee Precinct Sydney Regional Development Advisory Committee Response (Maunsell, January 2008) is still the recommended option for the development in terms of traffic efficiency and subject to a balanced review of other issues such as cost, constructability and urban design. This option involves:

- A new arm to Doonside Road / Bungarribee Road upgraded to a signalised intersection;
- a new arm to Doonside Road / Eastern Road upgraded to a signalised intersection; and
- a new arm to the currently signalised Doonside Road / Douglas Road intersection.

These access arrangements would assure satisfactory surrounding intersection performances and safe crossing opportunities for pedestrians.

Kind regards

Anneli Karlsson
Transport Planner
anneli.karlsson@maunsell.com

Direct Dial: +61 2 8295 5738
Direct Fax: +61 2 9262 5060