Technical Note

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Subject	Pagewood – Development Density Increases		

1 Introduction

Arup were commissioned by Meriton to undertake additional modelling in line with the recent density increases that were documented in Arup's previous assessment dated 7 April 2017. The Pagewood developments floor space ratios (FSR) were increased from 2.35:1 to 2.5:1. This led to an increased yield of 172 units, 2,240 now in total across the development. In addition, 5,000 sqm of retail gross floor area (GFA) has been added to the assessment.

2 Demand Development

The revised traffic demands have been estimated using the same methodology that was implemented during previous modelling exercises for the rezoning application. This includes a 75% discount to retail trips, accounting for trip containment of retail within the development, given the large amount of residential within the masterplan and the retail adjacent to the development site. This is consistent with other traffic impact assessments previously undertaken for the court approved Stage 1 Masterplan. Table 1 indicates the total two hour volumes for the two scenarios with Table 2 highlighting the change in development traffic from the previous analysis.

Table 1 Total two hour traffic volumes

Peak	2031 Future Base	Total 2031 Demand
AM	17,852	19,765
PM	21,646	23,520
WE	23,443	25,290

Table 2 Change in development traffic

Peak	Previous Development Traffic	Current Development Traffic	% Change
AM	1888	1913	1.3%
PM	1566	1874	19.7%
WE	1532	1847	20.6%

The PM and Weekend peak period traffic volumes increased more than the AM peak period due to the re-introduction of retail to the development site. The relative increase in traffic from residential trips is minor and depending on the level of trip containment, it is likely that the retail trips will not generate significant increases in trips given the available adjacent retail at Westfield Eastgardens.

3 Road network improvements

The main changes that were implemented in order to improve the efficiency of the 2031 models are outlined below:

- Page Street / Wentworth Avenue intersection was re-configured;
- Heffron Road and Banks Avenue phasing configuration was updated; and
- Wentworth/Banks/Corish and Wentworth/Denison intersections had signal operation improvements.

The modelling also captures the reconfiguration of the Bunnerong / Heffron / Maroubra; Heffron / Banks and Page / Wentworth intersections which have been fully funded by Meriton as part of the approved Stage 1 Masterplan to manage development traffic flows.

There were no physical works required at Heffron Road and Banks Avenue as the intersection is already committed by Meriton under the approved Stage 1 Masterplan development. However, the intersection phasing was re-configured to run the more flexible double-diamond phasing. Although with no physical works, the signal lanterns will need to be capable of running the double diamond phasing. Pavement markings will also need to reflect the right turn movements.

To allow for a more efficient double diamond signal phasing the following changes were made at Page Street / Wentworth Avenue (see Figure 1):

- Removal of the lane 2, shared through-right lane from the Page Street north western approach. The traffic lane is suggested to be re-configured as a right turn only lane.
- Removal of the lane 2, shared through-right lane from the Page Street south eastern approach. The traffic lane is suggested to be re-configured as a through lane only.

  (The above two changes should be sufficient in providing adequate room within the existing intersection to allow the Page Street right hand turns to run together.)

- The Page Street south east approach turning bays were then re-configured to provide the right turn with additional storage/access when the through movement queue builds up. This was

achieved by reducing the two lane segment on the departure side keeping within the existing kerb to kerb arrangement.

This phasing arrangement takes advantage of the relative volumes of the right turns and allows for more flexible phasing arrangements. Meriton has committed to the funding of this intersection upgrade through the VPA associated with the approved Masterplan.

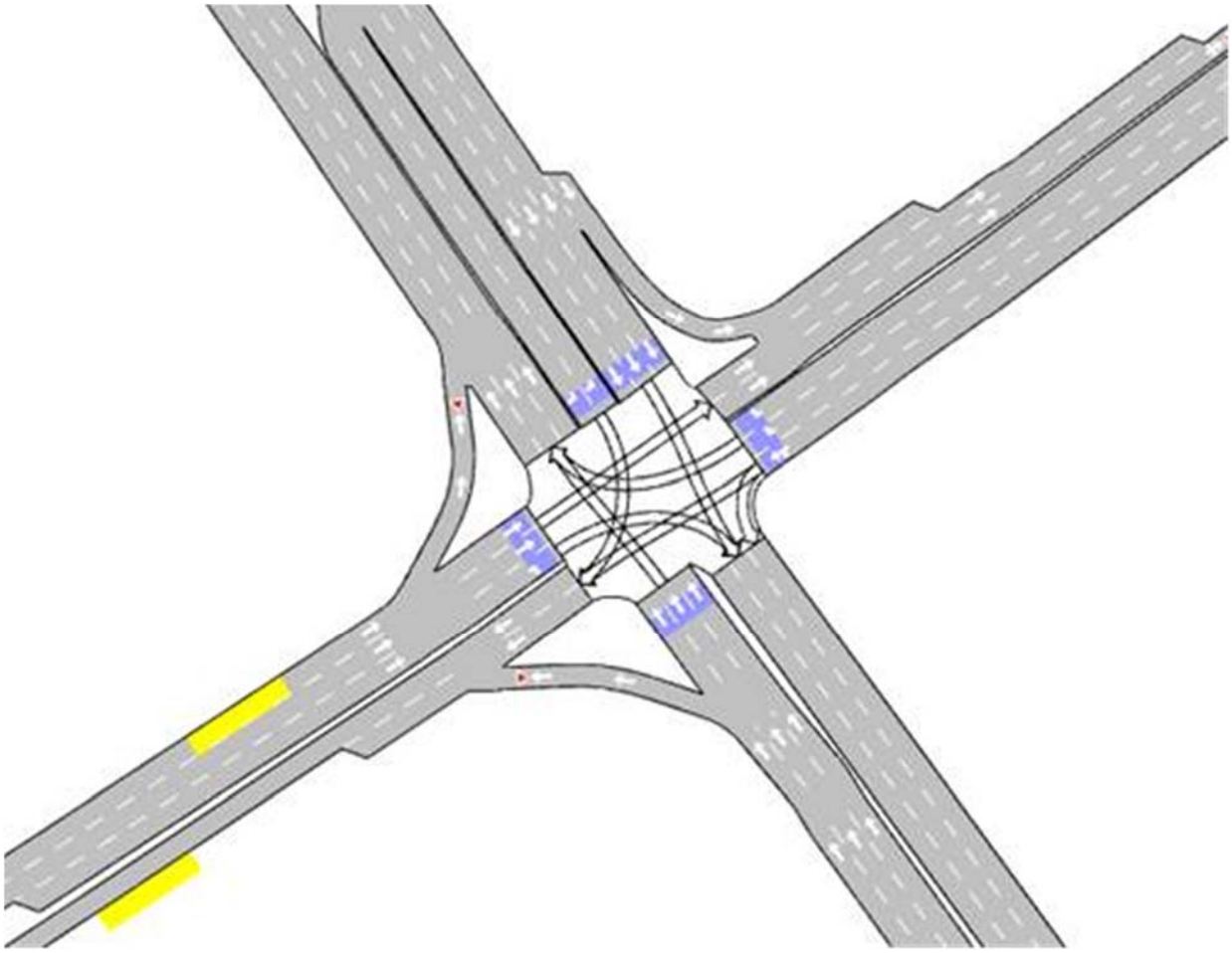

Figure 1 Page St Wentworth Ave intersection re-configuration

Additionally, there were signal operation improvements at Wentworth/Banks/Corish and Wentworth/Denison. The operational change involved streamlining the operation between the two intersections, removing adaptable timings in favour of better signal offsets. The co-ordination of these two signalised intersections contributes to reduced intersection capacity, which is increasingly under pressure as a result of future Westfield background traffic growth. Signals that include a stagger movement are known to reduce the capacity of a section of road. Authorities could consider upgrading Corish Circuit and downgrading Denison Street, which would remove the stager movement out of Banks Avenue and into Denison Street could potentially lead to greater network throughput.

It should be noted that Bunnerong / Heffron / Maroubra and the Banks / Heffron signalised intersection upgrades have commenced and modelling has assumed no further physical changes given the spare capacity available as a result of the upgrades.

4 Modelling Results

Despite the development traffic, the network capacity in 2031 was able to be improved over and above the existing future base scenario. Indicating that there is currently spare capacity on the network that is only restricted by the operation of a number of key intersections.

Table 3 Network Statistics

Peak Period	Average Speeds (Km/hr)		Average Delay (Seconds)		Travel Time (seconds)	
	Future Base	Development	Future Base	Development	Future Base	Development
AM	31	30	87	83	144	141
PM	25	30	160	84	218	142
WE	24	25	127	116	184	174

As the AM peak period model is relatively uncongested there is little change in the intersection level of service (LoS) as indicated in Table 4. Where the changes make the most difference is in the PM peak period (see Table 5). The double diamond phasing allows the intersections to effectively deal with the tidal peak demands competing with retail trips around the Westfield Eastgardens site. In the Weekend peak period, two of the intersections start to come under pressure again however overall there is still a network improvement even with the increased demand.

Table 4 AM Peak Period Intersection Level of Service

Intersection	Base		Future Base		Development	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Heffron/Maroubra/Bunnerong	40	C	41	C	44	D
Bunnerong/Wentworth	20	B	23	B	26	B
Wentworth/Denison	20	B	43	D	32	C
Wentworth/Banks/Corish	22	B	48	D	32	C
Banks/Westfield entrance	5	A	7	A	5	A
Banks/Heffron	14	A	23	B	26	B
Wentworth/Page	65	E	60	E	68	E

Table 5 PM Peak Period Intersection Level of Service

Intersection	Base		Future Base		Development	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Heffron/Maroubra/Bunnerong	43	D	45	D	44	D
Bunnerong/Wentworth	18	B	34	C	26	B
Wentworth/Denison	20	B	154	F	32	C
Wentworth/Banks/Corish	33	C	137	F	33	C
Banks/Westfield entrance	6	A	25	B	5	A
Banks/Heffron	16	B	45	D	25	B
Wentworth/Page	40	C	74	F	70	E

Table 6 Weekend Peak Period Intersection Level of Service

Intersection	Base		Future Base		Development	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Heffron/Maroubra/Bunnerong	51	D	55	D	47	D
Bunnerong/Wentworth	26	B	33	C	41	C
Wentworth/Denison	20	B	47	D	42	C
Wentworth/Banks/Corish	38	C	114	F	67	E
Banks/Westfield entrance	9	A	16	B	15	B
Banks/Heffron	16	B	70	E	30	C
Wentworth/Page	40	C	53	D	64	E

5 Summary and Conclusion

The revised FSR and retail GFA resulted in an increase in development trips of 1.3%, 19.7% and 20.6% for the AM, PM and Weekend peak periods respectively. This accounted for an increase of 0.1%, 1.3% and 1.3% to overall network demands in the 2031 scenario with development traffic now accounting for 11%, 9% and 8% of total network traffic in the AM, PM and Weekend peak periods respectively.

As demonstrated by Table 6, it was found with some minor network adjustments and despite the development traffic, the overall network capacity in 2031 was able to be improved over and above the existing future base scenario. This is also facilitated by the substantial traffic upgrades already funded by Meriton. This indicates that there is currently spare capacity on the road network that is only restricted by the operation of a number of key intersections.

DOCUMENT CHECKING (not mandatory for File Note)

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