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Memorandum

То	Transport for New South Wales	Page	1
СС	Kate Denney, Nicholas Lennon		
Subject	Edmondson Park MOD 5 - Response to Submissi South Wales	ions from Trans	sport for New
From	Martin Mallia		
File/Ref No.	60560899	Date	07-Jul-2021

1.0 Introduction

Edmondson Park is a major land release area in the south west growth region of Sydney. The Edmondson Park South Concept Plan forms the southern sub-precinct of the Edmondson Park Release Area and comprises an area of approximately 413 hectares. The Edmondson Park Town Centre North relates to an area located in the northern portion of the approved Concept Plan.

In March 2010, the Edmondson Park South Concept Plan (MP10_0118) was lodged by Landcom and established the overall planning framework for Edmondson Park South. This comprised residential developments, the development of Edmondson Park Town Centre as well as conservation lands and the upgrade of Campbelltown Road. On 18 August 2011, the Concept Plan (MP10_0118) was approved by the Planning Assessment Commission and has since been modified on several occasions. Landcom's proposal is Modification 5 to the Concept Plan.

Concept Plan MOD 5 proposes modifications to Edmondson Park Town Centre North, including revision to the Concept Plan boundary to include land owned by OSL and other modifications relating to the school zone, road layout, dwelling yield and mix, building height and bushfire asset protection zones. A Traffic Management and Accessibility Plan (TMAP) was prepared by AECOM for Landcom, dated 4 June 2020, to support the Concept Plan MOD 5 for the site.

When on public exhibition, several submissions were made from various stakeholder groups including Transport for New South Wales (TfNSW). One of the requests was for additional modelling to be undertaken for the intersection of Camden Valley Way / Bernera Road / Croatia Avenue. The purpose of this memo is to provide the modelling methodology, outputs and mitigation strategy (where required) for the performance of this intersection.

2.0 Traffic modelling methodology

As agreed with TfNSW officers in a meeting on 10 February 2021, a stand-alone SIDRA intersection model has been prepared to evaluate the performance of the intersection of Camden Valley Way / Bernera Road / Croatia Avenue under existing and future conditions. Therefore, using the intersection geometry as measured on site and using mapping software, and peak hour traffic counts, the performance of the key intersections was evaluated using SIDRA Intersection 8.0, a computer-based modelling package designed for calculating isolated intersection performance. The performance indicators for SIDRA 8.0 include:

- Degree of Saturation (DoS) measure of the ratio between traffic volumes and capacity of the intersection is
 used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and
 delays increase rapidly.
- Average Delay duration, in seconds, of the average vehicle waiting at an intersection,
- Level of Service (LoS) measure of the overall performance of the intersection (refer to Table 1).

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Level of Service	Average Delay (sec/veh)	Traffic Signals and Roundabouts	Give Way and Stop Signs
А	Less than 14	Good Operation	Good Operation
В	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
С	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Table 1 Level of Service criteria for intersections.

Source: Guide to Traffic Generating Developments, RTA, 2002

The intersection geometry used to assess the existing and future model scenarios is illustrated in Figure 1.

Figure 1 SIDRA intersection layout





3.0 2019 base year traffic model

The base year traffic model was prepared using Intersection turning counts undertaken by TTM Group on Wednesday 18th September 2019 during the morning (07:00 to 10:00) and afternoon (15:00 to 18:00) peak hours. The turning count surveys are presented in **Appendix A**.

The traffic surveys identified the network peak hours at being between 08:00 - 09:00 and 15:00 - 16:00. A VISSIM Microsimulation model was prepared for the Edmondson Park Town Centre precinct, which identified the future network peak periods upon full development of the precinct as being between 07:00 - 08:00 and 17:00 - 18:00. Therefore, the peak hours considered for this assessment will be 07:00 - 08:00 and 17:00 - 18:00 accordingly to be in line with the forecast 2026 network peak hours.

SCATS data was provided by TfNSW to calibrate the signal phasing and timing as illustrated in **Figure 2**. As such, a 140 second cycle time was used for both the AM and PM models. The user given cycle time parameter was selected in SIDRA, which results in SIDRA determining the base phase times, which are presented in **Table 2**. All other default SIDRA parameters were used.



Figure 2 SCATS output for Camden Valley Way / Bernera Road / Croatia Avenue

Source: TfSNW, 2021

Table 2	AM and	PM p	bhase	times
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	АМ			PM						
Phase	Α	С	D	E	G	Α	С	D	E	G
Phase Change Time (sec)	0	72	88	103	127	0	55	79	102	123
Green Time (sec)	66	10	9	18	10	49	18	17	15	11
Phase Time (sec)	72	16	15	21	16	55	24	23	21	17
Phase Split	51%	11%	11%	15%	11%	39%	17%	16%	15%	12%

The base year traffic model intersection performance summary is presented in **Table 3**. The intersection performs satisfactorily and like observed site conditions.

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Intersection	Demand flow (veh/h)	Degree of Saturation	Level of Service	Avg. Delay	95% Back of Queue (m)
AM Peak		-			
South – Croatia Avenue	492	0.664	E	58.0	56.8
East – Camden Valley Way	729	0.577	В	19.1	58.6
North – Bernera Road	549	0.369	С	39.3	65.2
West – Camden Valley Way	1,383	0.709	С	30.2	219.1
All Vehicles	3,154	0.709	С	33.6	219.1
PM Peak					
South – Croatia Avenue	460	0.597	D	53.3	58.7
East – Camden Valley Way	1,412	0.584	В	24.2	189.9
North – Bernera Road	677	0.628	D	48.6	66.7
West – Camden Valley Way	729	0.457	С	35.9	114.6
All Vehicles	3,278	0.628	С	35.9	186.9

Table 3 2019 base year intersection performance

4.0 2026 do nothing traffic model

The 2026 Do Nothing traffic model assesses the forecast intersection performance at this intersection without the project. A background traffic growth factor of 1.1 per cent has been identified for the area based on tracking historic AADT from permanent traffic counters in the vicinity of the site.

The 2026 Do Nothing traffic model therefore applies a compound growth factor to the surveyed 2019 traffic volumes of 1.1 per cent to 2026. All modelling parameters were retained from the Base Year Traffic Model, including the traffic signal phasing and timing as per instruction from TfNSW. The 2026 Do Nothing traffic model intersection performance summary is presented in **Table 4.** The intersection is forecast to perform satisfactorily.

Table 4 2026 Do Nothing intersection performance

Intersection	Demand flow (veh/h)	Degree of Saturation	Level of Service	Avg. Delay	95% Back of Queue (m)
AM Peak					
South – Croatia Avenue	531	0.717	E	58.5	61.4
East – Camden Valley Way	789	0.592	В	19.3	64.3
North – Bernera Road	594	0.568	С	40.9	79.1
West – Camden Valley Way	1,494	0.772	С	31.2	248.8
All Vehicles	3,407	0.772	С	34.4	248.8
PM Peak					
South – Croatia Avenue	495	0.535	D	52.1	61.4
East – Camden Valley Way	1,524	0.691	В	25.0	218.4
North – Bernera Road	732	0.677	D	48.3	72.9
West – Camden Valley Way	786	0.493	С	36.3	125.5
All Vehicles	3,537	0.691	С	36.1	218.4



5.0 2026 do something traffic model

The 2026 Do Something traffic model assesses the forecast intersection performance with the project and all associated traffic demand on the network. The 2026 Do Nothing AM and PM models have been used as the basis for additional development trips to be added, which captures background growth in the area. Furthermore, the traffic signal phasing as presented in Table 2 has been retained as per instruction from TfNSW. All assumptions have been documented and applied in a spreadsheet model named EPTC North (6ha school) – Concept Plan Network_2026 Update MOD _200304, which has been submitted as to TfNSW along with the SIDRA model files as part of this study. The following chapter summarises the assumptions used and provides the modelling summary.

5.1 Trip generation

Based on the proposed development yields and presented in the most recent TMAP prepared in June 2020, **Table 5** presents the forecast trip generation volumes as a result of the development.

Land Use	AM Peak	PM Peak
Residential	4,193	4,193
Town Centre	851	1,585
School	1,500	0
Total	6,544	5,778

Table 5 Edmondson Park MOD 5 trip generation

5.2 Trip distribution

5.2.1 Residential

Trip distributions for residential land uses are based on employment forecasts and centres 2026¹. The distribution percentages are presented in **Table 6**. Furthermore, assumption is that 40% of all trips are internal trips, and 60% are external trips. External trips will have a 10/90 split for in / out trips in the AM peak and 90/10 for PM peak.

Table 6 Residential trip distribution

Direction	Percentage Split
North (Camden Valley Way)	27%
East (Campbelltown Road)	59%
South (Macdonald Road)	9%
West (Campbelltown Road)	5%

5.2.2 Town Centre

Trip distributions are based on the forecast retail catchment prepared by Frasers Property². The distribution percentages are presented in **Table 7**. Furthermore, 50% of town centre trips to / from residential zones within 400m of the town centre will be walking trips, 100% of town centre trips to / from high density residential land uses in the vicinity of the town centre will also be walking trips³. External trips will have a 60/40 split for in / out in the AM peak and 50/50 split in the PM peak. The agreed trip rates include a 20% reduction in the PM peak hour for linked trips.

¹ Table 7-7, Edmondson Park South Part 3A – Concept Plan Application TMAP, AECOM, 2010

² Table 3, Edmondson Park Town Centre S75W, AECOM, 2017

³ Section 7.3.2, Edmondson Park South Part 3A – Concept Plan Application TMAP, AECOM, 2010



Table 7 Town Centre trip distribution

Direction	Percentage Split
North (Camden Valley Way)	67%
East (Campbelltown Road)	5%
South (Macdonald Road)	7%
West (Campbelltown Road)	21%

5.2.3 School

Trip distributions for school land uses are based on 2026 population forecasts. The distribution percentages are presented in Table 8. Furthermore, assumption is that 50% of all school trips will be walking trips, which has been accounted for in the trip rate. External trips will have a 50/50 split for in / out trips in the AM peak. There will be no school trips in the PM peak as it occurs outside of the network modelled peak.

Table 8 School trip distribution

Direction	2026 Population	Percentage Split
North (Camden Valley Way)	9,628	25%
East (Campbelltown Road)	1,353	4%
South (Macdonald Road)	6,407	17%
North West (Jardine Drive)	20,543	54%

5.3 **Trip summary**

Based on the trip distribution assumptions presented in Section 5.2, Table 9 and Table 10 presents the traffic volumes that are forecast to use the intersection of Camden Valley Way / Bernera Road / Croatia Avenue in 2026.

750

60

2,262

3,072

188 611

40

839

AM Peak trip summary External School 1,500 0 1,500 750 Residential 4,193 1,680 2,513 251 700 **Town Centre** 851 151 91 Total 6,544 1,092 **Camden Valley Way Distribution** School 25% 188 Residential 27% 68 **Town Centre** 67% 61 Total 316

Table 9



Table 10PM peak trip summary

				Extern	al
PM Peak	Total	Internal	External	In	Out
School	0	0	0	0	0
Residential	4,193	1,660	2,513	2,263	251
Town Centre	1,585	1,179	406	203	203
Total	5,778			2,466	454
	Ca	mden Valley Way D	istribution		
School	25%			0	0
Residential	27%			611	68
Town Centre	67%			136	136
Total				747	204

5.4 Camden Valley Way / Bernera Road / Croatia Avenue trip distribution

The development trips that are forecast to use the Camden Valley Way / Bernera Road / Croatia Avenue intersection will be distributed using the same traffic distribution that was observed during the 2019 traffic surveys. **Table 11 - Table 14** presents the distribution percentages for development traffic at this intersection.

Table 11	AM Camden Valley	y Way / Bernera Road /	Croatia Avenue trip d	istribution – light vehicles
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07:00 - 08:00	Bernera Road (N)	Camden Valley Way (E)	Croatia Avenue (S)	Camden Valley Way (W)
Bernera Road (N)			55.42%	
Camden Valley Way (E)			21.99%	
Bernera Road (S)	50.32%	32.12%		17.56%
Camden Valley Way (W)			22.59%	

Table 12 AM Camden Valley Way / Bernera Road / Croatia Avenue trip distribution – heavy vehicles

07:00 - 08:00	Bernera Road (N)	Camden Valley Way (E)	Croatia Avenue (S)	Camden Valley Way (W)
Bernera Road (N)			50.00%	
Camden Valley Way (E)			30.00%	
Bernera Road (S)	37.50%	12.50%	0.00%	50.00%
Camden Valley Way (W)			20.00%	

 Table 13
 PM Camden Valley Way / Bernera Road / Croatia Avenue trip distribution – light vehicles

17:00 - 18:00	Bernera Road (N)	Camden Valley Way (E)	Croatia Avenue (S)	Camden Valley Way (W)
Bernera Road (N)			57.88%	
Camden Valley Way (E)			31.51%	
Bernera Road (S)	53.78%	21.74%		24.49%
Camden Valley Way (W)			10.62%	

17:00 - 18:00	Bernera Road (N)	Camden Valley Way (E)	Croatia Avenue (S)	Camden Valley Way (W)
Bernera Road (N)			0.00%	
Camden Valley Way (E)			100.00%	
Bernera Road (S)	66.67%	0.00%		33.33%
Camden Valley Way (W)			0.00%	

Table 14 PM Camden Valley Way / Bernera Road / Croatia Avenue trip distribution – heavy vehicles

5.5 Modelling summary

The 2026 Do Something traffic model intersection performance summary is presented in Table 15.

Intersection	Demand flow (veh/h)	Degree of Saturation	Level of Service	Avg. Delay	95% Back of Queue (m)
AM Peak		-			•
South – Croatia Avenue	1,414	1.884	F	540.1	594.2
East – Camden Valley Way	864	0.592	В	19.0	64.3
North – Bernera Road	777	1.210	F	148.5	320.1
West – Camden Valley Way	1,568	1.234	D	55.5	239.3
All Vehicles	4,623	1.884	F	212.5	594.2
PM Peak					
South – Croatia Avenue	708	0.794	D	55.8	99.1
East – Camden Valley Way	1,799	0.772	В	23.4	225.7
North – Bernera Road	1,164	1.654	F	366.3	687.0
West – Camden Valley Way	865	0.779	С	40.8	125.5
All Vehicles	4,537	1.654	F	119.8	687.0

Table 15 2026 do something intersection performance

The intersection performance for the 2026 Do Something scenario is expected to operate at LoS F in both the AM and PM peak hours if the existing intersection parameters and layout is retained.

Performance on Camden Valley Way is expected to remain acceptable with minimal delay in both the AM and PM peak hours. However, during the AM peak hour, it is forecast that queues in the right turn lane on the western leg of Camden Valley Way would extend to about 180 metres, where the right turn lane is only 100 metres in length. There are opportunities to extend the length of this right turn lane by 80 metres to accommodate the full right turning queue resultant from the Project.

However, significant delays and queues are forecast on the north and south legs of the intersection. The queues on the northern leg of Bernera Road are forecast to extend 687 metres in the PM peak hour, which would impact the upstream signalised intersection of Bernera Road / Bombaderry Drive / Wroxham Street. The queues on the southern leg of Croatia Avenue are forecast to extend 594 metres in the AM peak hour, which would not block the upstream signalised intersection of Croatia Avenue / Dalmatia Avenue. There would however be significant delays in the region of 15 minutes for vehicles travelling straight onto Bernera Road or turning right onto Camden Valley Way. These delays are attributed to the fact that the increase in trips generated by Edmondson Park Town Centre has not been accounted for appropriately in the intersection operation, as priority is given to the state-controlled road of Camden Valley Way.



It should be noted that vehicles travelling on Croatia Avenue in the AM peak hour would likely find alternative routes onto Camden Valley Way to avoid queuing. There are alternative routes available via Ardennes Avenue to the east, and Gellibrand Road and Rynan Avenue to the west, which will be known by local drivers. This assessment assumes a worst-case scenario. The microsimulation model does not extend to these intersections, so it is difficult to quantify the percentage of vehicles that would reroute to these intersections, however it is a likely event considering the forecast delays.

5.6 Mitigation strategy

Mitigation measures have been considered to improve the forecast intersection performance. There are limited opportunities to provide infrastructure upgrades along Bernera Road and Croatia Avenue due to the existing private property boundaries being so close to the carriageway and footway. There are potential opportunities to introduce a third right turn lane / short through lane within the existing median on Croatia Avenue, however the benefit of this would be insignificant in terms of travel time savings. Due to the signal timing implemented by TfNSW, the north and south legs of this intersection get minimal green time, and therefore infrastructure upgrades would be limited in their benefit without sufficient green time for vehicles to pass through the intersection.

However, there are opportunities to optimise the signal timing and phasing to achieve a more acceptable intersection performance. The east and west legs of Camden Valley Way are forecast to operate with spare capacity, so by reallocating green time to the north and south legs, a more balanced intersection performance could be achieved.

5.6.1 AM peak hour

Model testing has been undertaken for the AM peak hour by amended the signal phasing and optimising the cycle and phase times. The proposed signal phasing changes involve making changes to the 'C' phase, which typically gives priority to vehicles on the eastern leg of Camden Valley Way travelling northbound and westbound. The traffic demand for these movements in the AM peak hour are lower that on the western leg of Camden Valley Way due to the tidal nature of traffic in the area, and therefore there are opportunities to reallocate green time to the southern leg to release traffic from Croatia Avenue in the AM peak whilst maintaining acceptable operation on Camden Valley Way. The proposed signal phasing is illustrated in **Figure 3**, and the proposed signal cycle and phase times are presented in **Table 16**, which results in an optimal cycle time of 115 seconds.

Phase	Α	С	D	E	G
Phase Change Time (sec)	0	50	63	75	99
Green Time (sec)	44	7	6	18	10
Phase Time (sec)	50	13	12	24	16
Phase Split	43%	11%	10%	21%	14%

Table 16 AM phase times

AECOM

Figure 3 Proposed changes to 'C' phase



Based on the proposed changes to the signal phasing, cycle time and phase time phase times, the intersection can achieve LoS D. The intersection performance summary is presented in **Table 17**

Intersection	Demand flow (veh/h)	Degree of Saturation	Level of Service	Avg. Delay	95% Back of Queue (m)
South – Croatia Avenue	708	0.847	D	44.5	119.5
East – Camden Valley Way	1,799	0.972	С	36.2	81.0
North – Bernera Road	1,164	0.978	Е	60.9	160.5
West – Camden Valley Way	865	1.014	E	64.6	327.8
All Vehicles	4,537	1.014	D	52.5	327.8

Table 17 2026 AM do something – optimised signals intersection performance

5.6.2 PM peak hour

Model testing has been undertaken for the PM peak hour by optimising the signal phase times whilst maintaining a cycle time of 140 seconds. The proposed signal phase times for the PM peak hour are presented in **Table 18**

Phase	Α	С	D	E	G
Phase Change Time (sec)	0	47	66	84	125
Green Time (sec)	41	13	12	35	9
Phase Time (sec)	47	19	18	41	15
Phase Split	34%	14%	13%	29%	11%

Table 18 PM phase times

Based on the proposed changes to the phase times, the intersection can achieve LoS D. The intersection performance summary is presented in **Table 19**

Intersection	Demand flow (veh/h)	Degree of Saturation	Level of Service	Avg. Delay	95% Back of Queue (m)
South – Croatia Avenue	708	0.476	D	46.4	77.9
East – Camden Valley Way	1,799	0.943	D	51.3	372.4
North – Bernera Road	1,164	0.959	F	71.5	237.7
West – Camden Valley Way	865	0.952	D	48.8	137.6
All Vehicles	4,537	0.959	D	55.3	372.4

Table 19 2026 PM do something – optimised signals intersection performance

6.0 Conclusion

In conclusion, it is forecast that the intersection performance of Camden Valley Way / Bernera Road / Croatia Avenue would likely operate unsatisfactorily in 2026 with the Project based on the existing intersection geometry, signal phasing and timing. The northern and southern legs are forecast to operate with significant queueing and delays, whilst Camden Valley Way would operate with spare capacity.

If the existing signal phasing and timing is retained, infrastructure upgrades at this intersection would likely be ineffective due to the minimal green time available on these legs to release queued traffic. However, there are opportunities to extend the length of the right turn lane on the western leg of Camden Valley Way by 80 metres to a total of 180 metres to accommodate the full forecast queue for right turning traffic in the AM peak hour. This would likely improve performance on the western leg of Camden Valley Way.

There are opportunities to amend the signal phasing and timing in the AM and PM peak periods to alleviate the queueing and delay, to bring overall intersection performance within and acceptable LoS D in 2026 as demonstrated through SIDRA modelling. Furthermore, it should be noted that this is a worst-case assessment, and it is likely that drivers would choose alternative routes onto Camden Valley Way via Ardennes Avenue to the east, and Gellibrand Road and Rynan Avenue to the west which would help alleviate queueing and delay on Croatia Avenue.



Appendix A – Traffic Surveys

TTM Data

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time start 7:00

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763 23 4

PM Peak 299 8 2 309 175 3 2 180 279 9 2 290 0 779 0 71 1 0 72 167 2 0 169 104 0 1 105 1

TTM Reference:	19SYD0154

Location: Camden Valley Way & Bernera Rd

Suburb: Edmondson Park Date: Tuesday, 17 September 2019

Survey Duration: 0700-1000 & 1500-1800 AM Peak: 0800-0900 Weather: Light showers PM Peak: 1500-1600

Notes:

ttm

TTM Reference: 19SYD0154 Location: Camden Valley Way & Bernera Rd Suburb: Edmondson Park Date: Tuesday, 17 September 2019 Survey Duration: 0700-1000 & 1500-1800 Weather: Light showers Notes:

AM Peak: 0800-0900 PM Peak: 1500-1600

291 3 1 295 3188 110 12 3310 530 23 0 553 3 4161 0

347 0 PM Peak 103 1 0 104 1095 41 5 1141 171 12 0 183 0 1428 0

271 11 4 286

Northern Approach: Bernera Rd Southern Approach: Croatia Ave Time Eastern Approach: Camden Valley Way Western Approach: Camden Valley Way
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