

**TRAFFIC ANALYSIS REPORT**

**PROJECT: PAKENHAM EAST PSP**

**PROPOSED INTERSECTIONS ALONG PRINCES  
HIGHWAY AT**

**RYAN ROAD  
CONNECTOR A  
CONNECTOR B  
CONNECTOR C**

**PREPARED BY: TFV / VicRoads**

**Date : 21 AUGUST 2017**

# 1. TABLE OF CONTENTS

INTRODUCTION.....

TRAFFIC VOLUMES.....

TRAFFIC ANALYSIS.....

Intersection analysis at Ryan, Connector A, Connector B & Connector C

CONCLUSIONS.....

ATTACHMENT 1 – SIDRA RESULTS USING PROPOSED LAYOUT BY SMEC

ATTACHMENT 2 – SIDRA RESULTS USING MODIFIED LAYOUTS

## **2. INTRODUCTION**

TFV and VicRoads have been engaged to undertake a traffic analysis using ultimate (2046 year) and interim volume for the proposed intersections along Princes Highway at Pakenham East PSP.

This analysis used the following information:

- 2046 design traffic volumes estimated by Traffic Engineer, Cardinia Shire Council and the traffic distribution assumptions suggested by Council.
- Split phasing is used as recommended by VicRoads

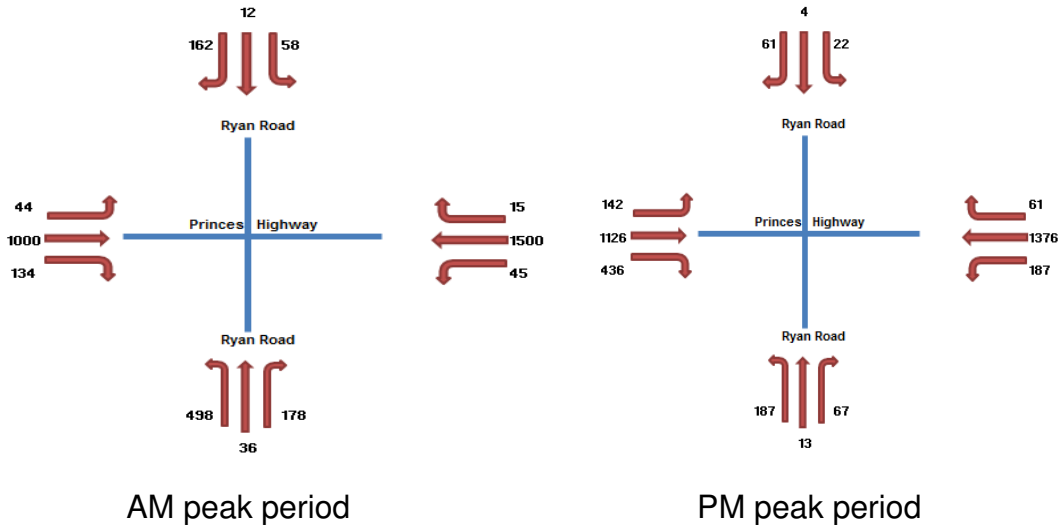
## **3. TRAFFIC VOLUMES**

This report analyses the intersection's operation using predicted traffic volumes for 2046. The traffic volumes estimates undertaken by Cardinia Shire Council were based on the following:

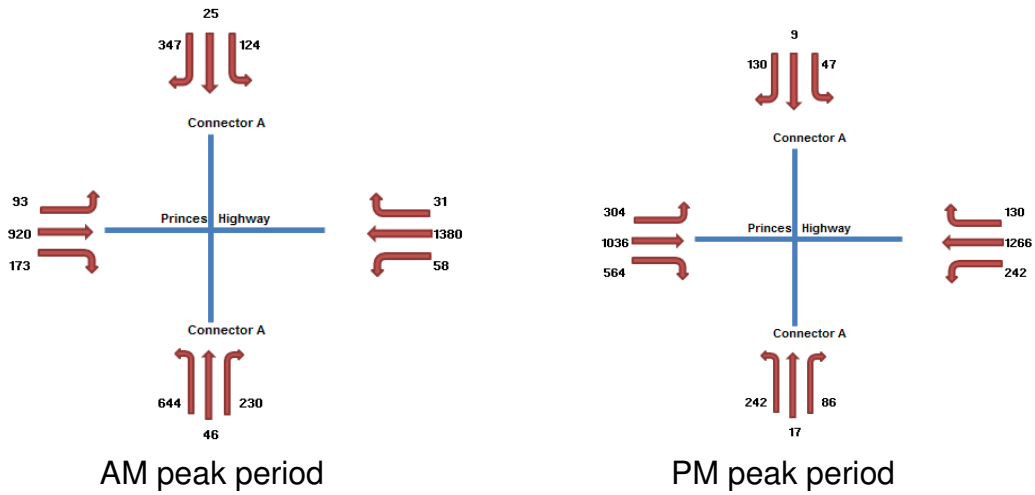
- Standard Density Lots – yield of 15 lots per hectare with a traffic generation rate of 9 trips per lot.
- Medium Density Lots – yield of 25 lots per hectare with a traffic generation rate of 5 trips per lot.
- Low Density Lots – yield of 10 lots per hectare with a traffic generation rate of 9 trips per lot.
- Large Lots – yield of 7 Lots per hectare with a traffic generation rate of 9 trips per lot.
- 2Ha Lots – yield of 0.5 Lot per hectare with a traffic generation rate of 9 trips per lot
- The main shopping centre generates approximately 500 trips to/from arterial road network.

The estimated traffic volumes for four intersections are given below:

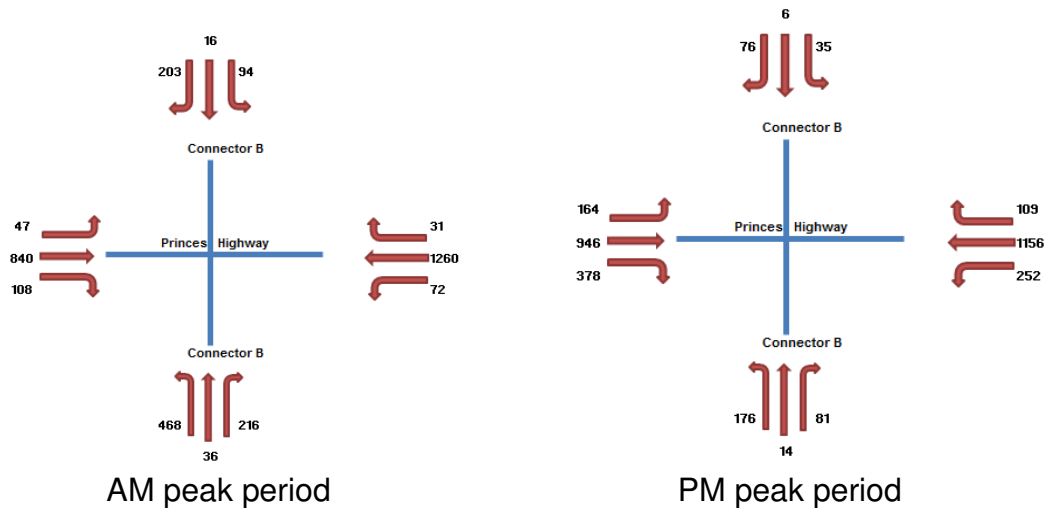
## Princes Highway / Ryan intersection Traffic volumes 2046



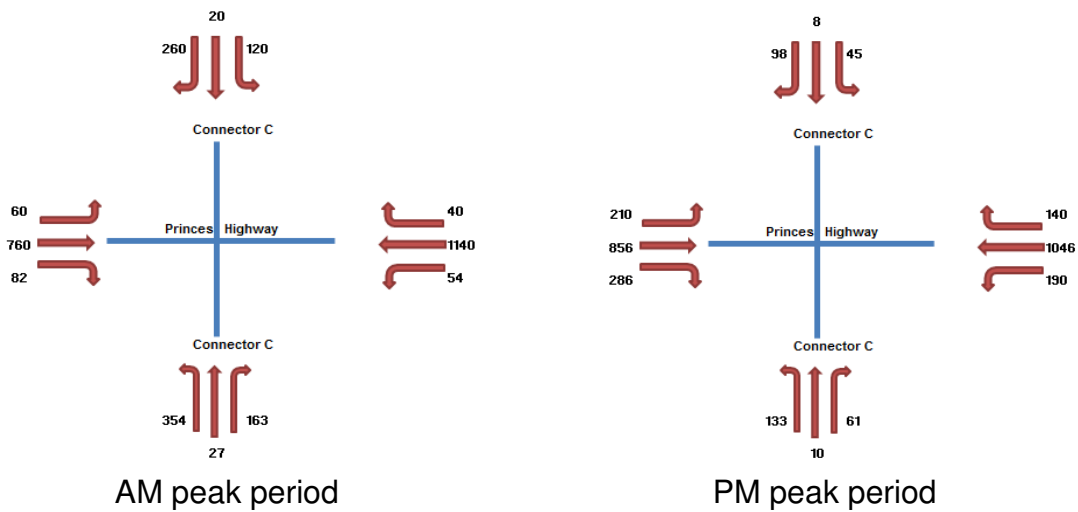
## Princes Highway / Connector A Traffic volumes 2046



## Princes Highway / Connector B Traffic volumes 2046



## Princes Highway / Connector C Traffic volumes 2046



### 4. TRAFFIC ANALYSIS

SIDRA software was utilised to analyse the intersections to determine the anticipated intersection operations for the proposed Pakenham East PSP.

This software provides information on the operation of an intersection. Typically the main characteristic used to assess the operation of the intersection is the Degree of Saturation (DOS) which takes into account the 95<sup>th</sup> percentile queue length and delay.

The DOS below 0.90 for signalised intersections results in acceptable or better operating conditions. Above 0.90, the intersection results in flows starting to breakdown and queues and delays increase rapidly.

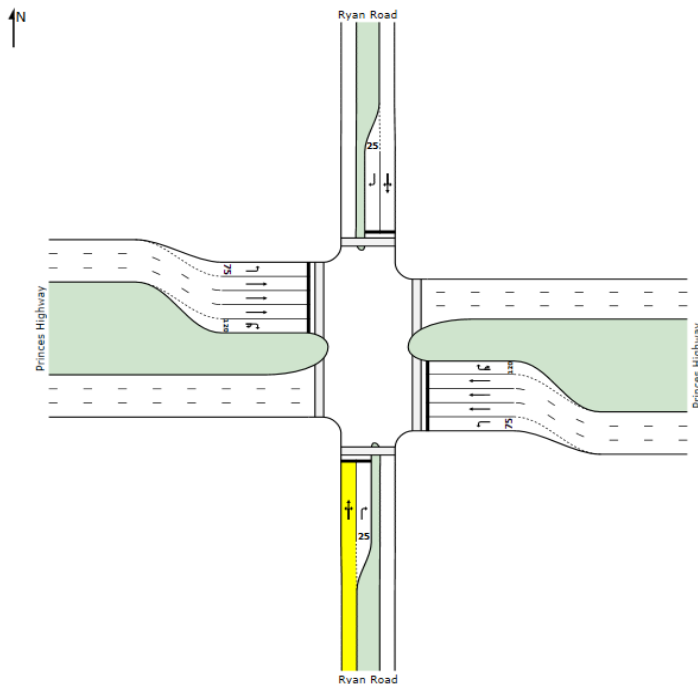
A further explanation of the intersection operating characteristics is shown in Table 1

Degree of Saturation(DOS)	Intersection Operation
Less than 0.60	Excellent operating conditions, minimal delays.
0.60 – 0.70	Very good operating conditions, minimal delays.
0.70 – 0.80	Good operating conditions, delay and queuing increasing.
0.80 – 0.90	Acceptable operating conditions, delays and queues growing.
0.90 - 0.95	Poor operating conditions, flows starting to breakdown and queues and delays increase rapidly.
Above 0.95	Very poor operating conditions with queues and delays increase rapidly.

Table 1: Definitions of intersection operation characteristics

## 5. INTERSECTION ANALYSIS

5.1 SIDRA Version 7 has been used to analyse the operation of the proposed intersection layouts by SMEC using split phasing as recommended by VicRoads. The proposed layout at all four intersections is similar as below;



SIDRA model results as below: T-Through, L- Left-turn, R- Right-turn

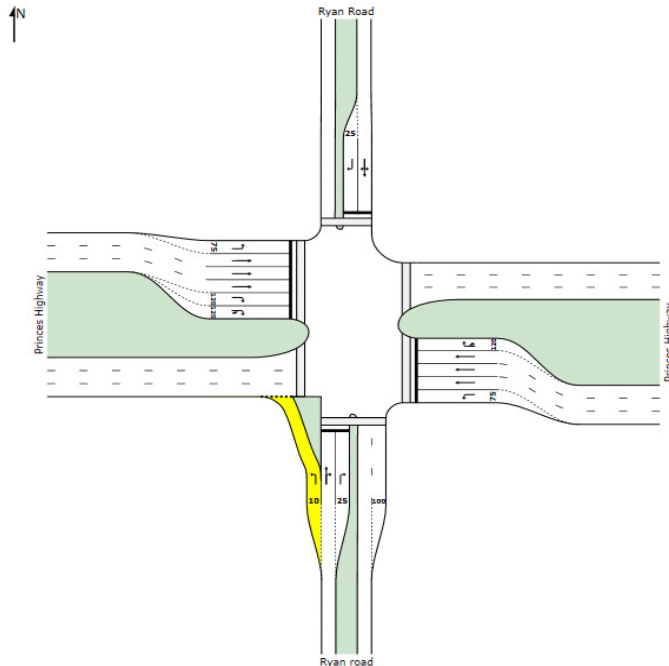
Intersection	Movements at approach	SMEC layout					
		AM			PM		
		DOS	95% Queue (m)	Average Delay (sec)	DOS	95% Queue (m)	Average Delay (sec)
Ryan / Princes Hwy	South	1.05	421.0-L	132.3	0.47	71.8-L	46.7
	East	0.89	261.8-T	52.5	0.91	259.5-T	56.3
	North	0.59	47.1-R	55.3	0.22	17.0-R	48.7
	West	0.75	130.0-T	39.7	0.93	249.4-R	48.6
Connector A / Princes Hwy	South	1.54	1120.9-L	557.3	0.63	96.6-L	48.0
	East	0.89	241.2-T	53.9	0.92	243.9-T	58.0
	North	1.43	504.4-R	344.7	0.76	60.2-R	55.9
	West	0.90	122.0-T	44.0	1.15	582.1-R	96.0

Connector B / Princes Hwy	South	1.02	370.2-L	143.8	0.48	69.2-L	48.8
	East	0.88	211.1-T	51.3	0.78	177.6-T	43.7
	North	0.63	64.9-T&L	52.8	0.28	22.6-R	48.5
	West	0.79	112.1-T	42.9	0.78	170.6-R	42.6
Connector C / Princes Hwy	South	0.78	134.5-L	40.3	0.29	45.5-L	42.8
	East	0.86	176.7-T	49.9	0.68	133.5-T	38.1
	North	0.83	90.6-T	55.9	0.34	26.8-R	43.8
	West	0.57	95.7-T	40.5	0.68	112.4-R	38.6

## 6. Modified Layouts

6.1 The modified layout for Ryan Road and Connector B are similar layout and modifications are as below;

- A slip lane with 10m stand up lane provided at south approach.
- 100m additional entry lane at south approach provided.



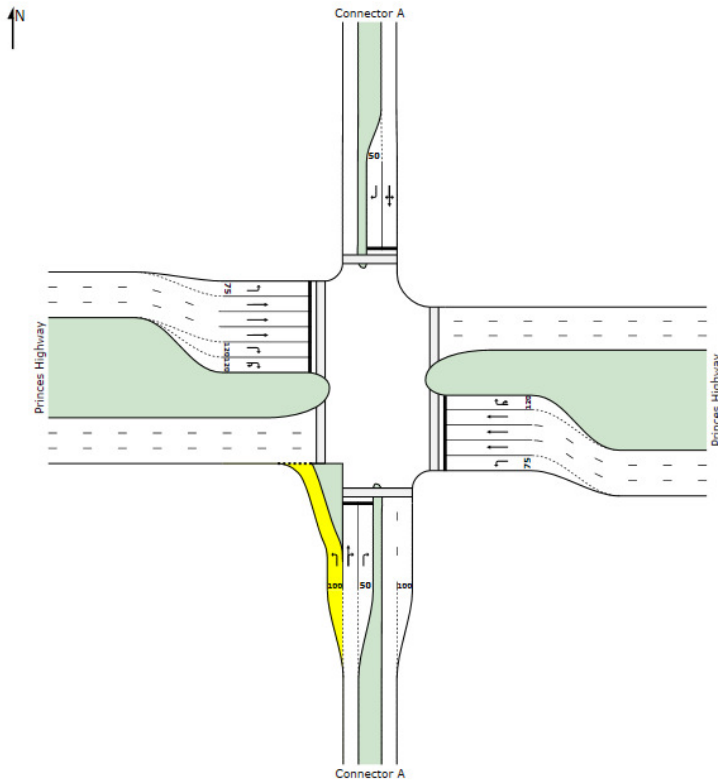
SIDRA model results as below: T-Through, L- Left-turn, R- Right-turn

Intersection	Movements at approach	Modified Layout -Option 1					
		AM			PM		
		DOS	95% Queue (m)	Average Delay (sec)	DOS	95% Queue (m)	Average Delay (sec)
Ryan Road / Princes Hwy	South	0.65	137.2- L	28.5	0.26	30.6-L	27.6
	East	0.75	204.2-T	34.4	0.77	202.7-T	38.2
	North	0.64	47.6- R	56.1	0.25	17.3-R	51.3
	West	0.51	39.0-R	33.8	0.62	114.1-R	37.7
Connector B / Princes Hwy	South	0.57	113.1-L	27.3	0.32	26.6-L	29.1
	East	0.79	189.9-T	43.2	0.85	198.1-T	50.5
	North	0.72	69.0-T	55.8	0.31	22.8-R	49.7
	West	0.52	30.6-R	39.4	0.67	86.8-R	41.7



6.2 The modified layout for Connector A and the modifications are as below;

- A slip lane with 100m stand up lane provided at south approach.
- 100m additional entry lane at south approach provided.
- Right-turn lanes extended to 50m at north and south approaches.

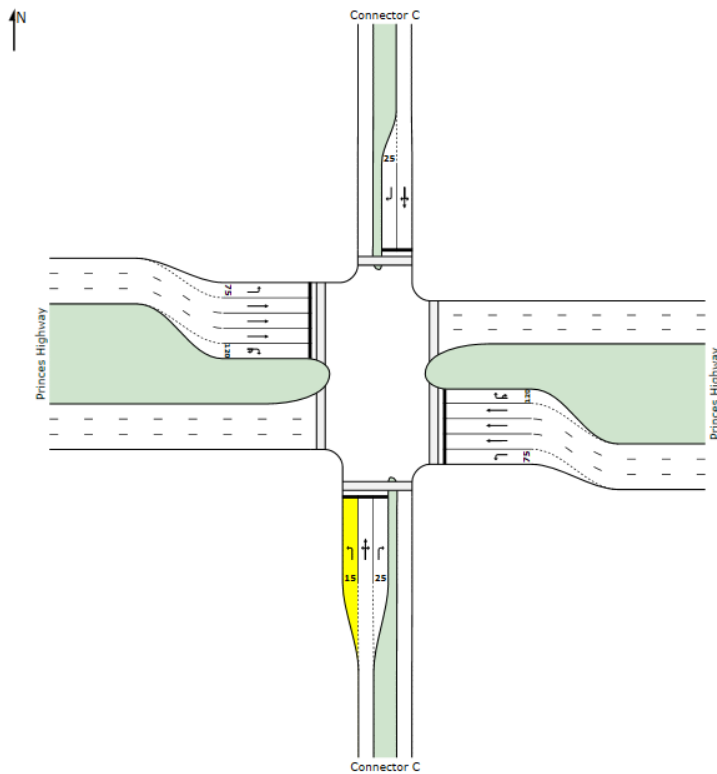


SIDRA model results as below: T-Through, L- Left-turn, R- Right-turn

Intersection	Movements at approach	Modified Layout -Option 1					
		AM			PM		
		DOS	95% Queue (m)	Average Delay (sec)	DOS	95% Queue (m)	Average Delay (sec)
Connector A / Princes Hwy	South	0.84	233.7-L	39.0	0.31	45.4-L	28.5
	East	0.86	230.4-T	49.9	0.89	229.9-T	52.9
	North	0.87	123.8-T	65.1	0.50	38.0-R	51.7
	West	0.66	52.0-R	41.4	0.70	145.5-R	42.7

6.3 The modified layout for Connector C and modification are as below;

- A 15m left-turn lane is provided at south approach



SIDRA model results as below: T-Through, L- Left-turn, R- Right-turn

Intersection	Movements at approach	Modified Layout -Option 1					
		AM			PM		
		DOS	95% Queue (m)	Average Delay (sec)	DOS	95% Queue (m)	Average Delay (sec)
Connector C / Princes Hwy	South	0.46	66.1-L	34.5	0.19	31.4-L	36.4
	East	0.86	176.7-T	49.9	0.68	133.5-T	38.1
	North	0.83	90.6-T	55.9	0.34	26.8-R	43.8
	West	0.57	34.0-R	40.5	0.68	112.4-R	38.6

## CONCLUSIONS

This report reviewed the performance of the proposed four intersections at Ryan, Connector A, Connector B and Connector C along Princes Highway using split phasing as recommended by VicRoads.

Based on the results of the analysis, it is recommended that intersections at Ryan, Connector A and Connector B require modified intersection layout arrangements as shown above to operate at minimum acceptable level.

It should be noted that delays at north leg are not improved as no slip lane is provided.