APPENDIX F | TRAFFIC STUDIES

Technical Memorandum

To	BJ Panizza Family Trust	**Project No**	CW1200522/304900887
Project Name	Lot 124, Lot 125 & Lot 9001 South Coast Highway, Marbellup	**Status**	A
Date	05/12/2022	**Discipline**	Traffic & Transport
Author	Lovely Lal		
Reviewer	Desmond Ho	**Office**	Perth

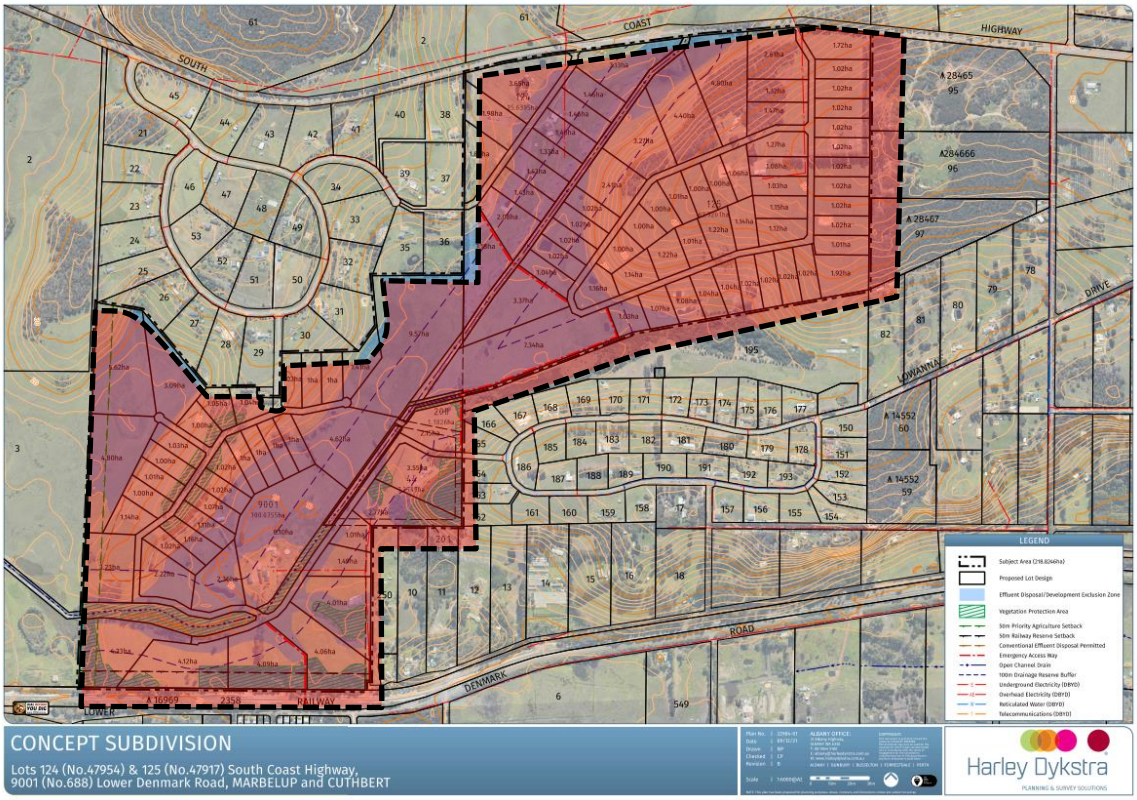
1 Introduction

Cardno now Stantec has been commissioned by BJ Panizza Family Trust to undertake a Turn Warrant Assessment for the proposed new accesses for the rural residential subdivision located on Lots 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road, Marbelup and Cuthbert , within the City of Albany.

2 Site Context

The subject Site is currently vacant spanning 208.5 hectares in extent and is located on Lot 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road, within the City of Albany as shown in **Figure 2-1.**

Figure 2-1 Aerial image of site



Source: Harley Dykstra

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2.2 Existing Road Network

The layout and classification of the roads under the *Main Roads WA Road Hierarchy* surrounding the Site is summarised in **Table 2-1** and illustrated in **Figure 2-2.**

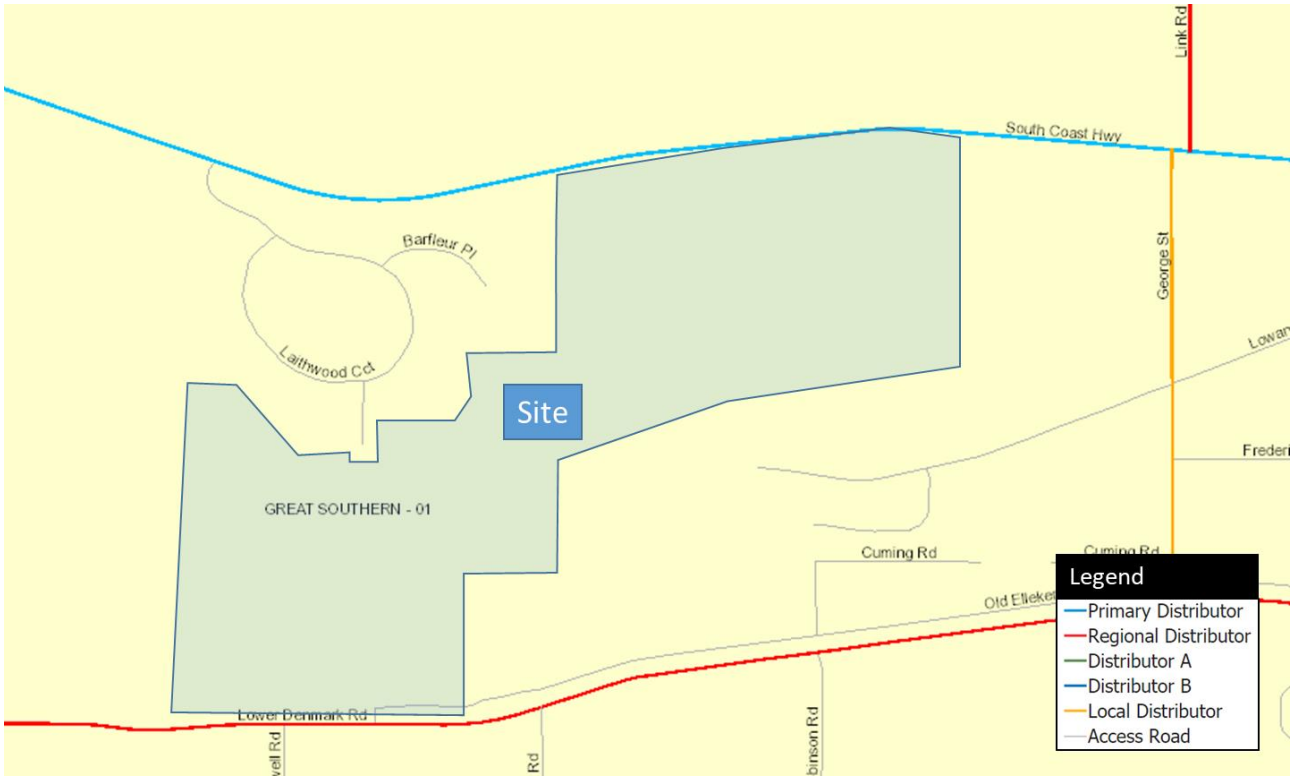
Table 2-1 Road Network Classification

Street Names	Road Hierarchy		Road Network			
	Road Hierarchy	Jurisdiction	No. of Lanes	No. of Footpaths	Width (m)	Posted Speed (km/h)
South Coast Highway	Primary Distributor	Main Roads	2	0	7.0	110
Lower Denmark Road	Regional Distributor	Local Government	2	0	7.0	90*

**A portion of Lower Denmark Road between Prescottvale Rd &Trebor Rd has a speed limit of 70km/h*

Source: Main Roads Information Mapping Centre

Figure 2-2 Road Network Classification



Source: Road Mapping and Information System

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3 Proposed Development

The proposed subdivision is proposed on multiple lots with a combined area of approximately 208.5 hectares. The Site is divided into three lots: Lots 124 & Lot 125 South Coast Highway and Lot 90001 Lower Denmark Road.

- Lot 124 is approximately 25.6 hectares in extent and is proposed to be subdivided into 10 rural residential lots;
- Lot 125 is approximately 82.9 hectares in extent and proposed to be subdivided into 51 rural residential lots with lot sizes ranging from 1.02 hectares to 7.34 hectares; and
- Lot 9001 is proposed to be subdivided into 34 rural residential lots with lot sizes ranging from 1.0 hectare to 8.50 hectares.

The layout of the proposed Site is shown in **Figure 3-1.**

Figure 3-1 Subdivision Plan

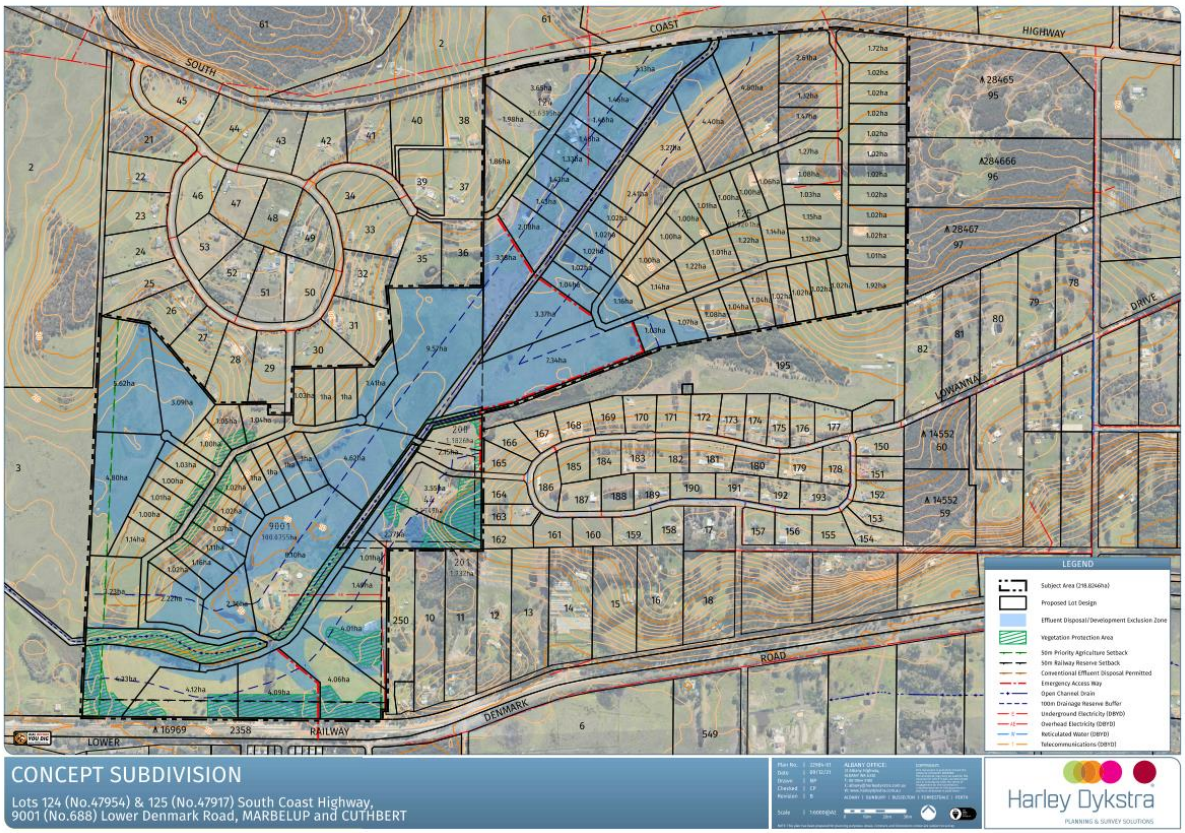

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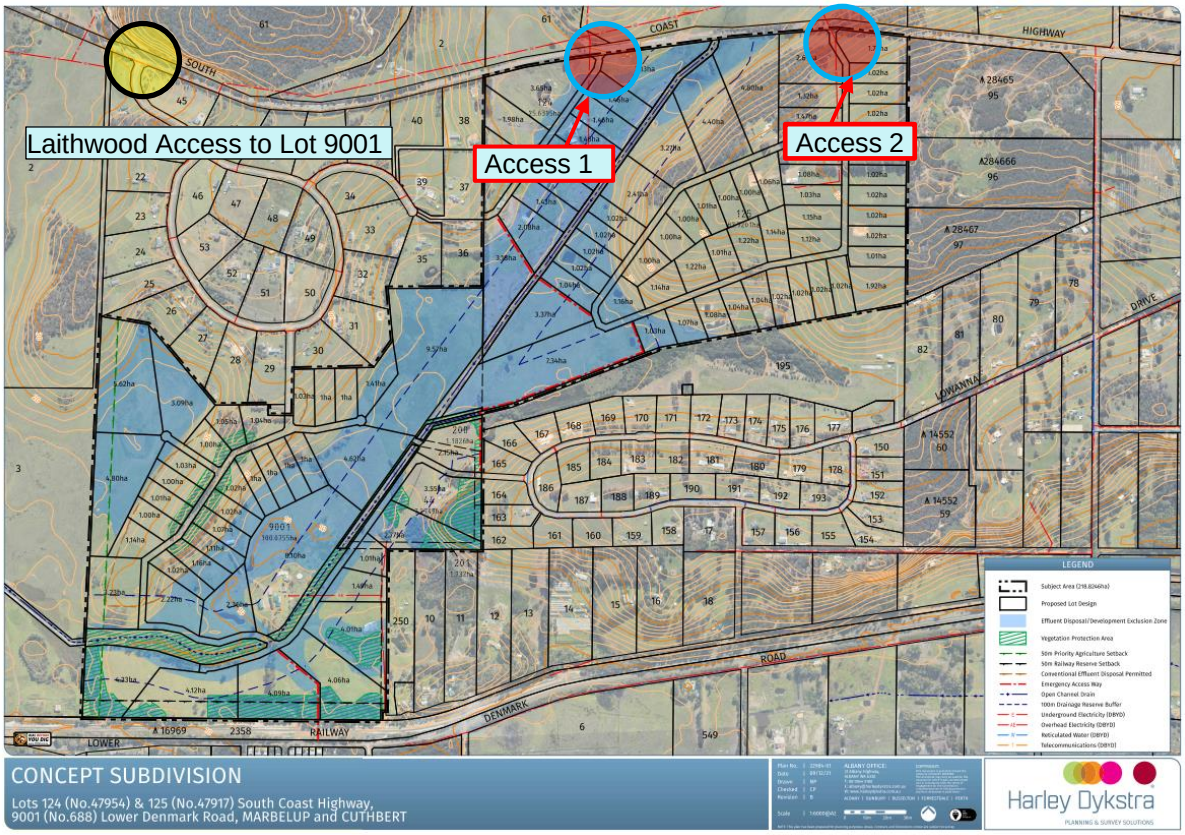
Figure 3-2 Access Arrangements



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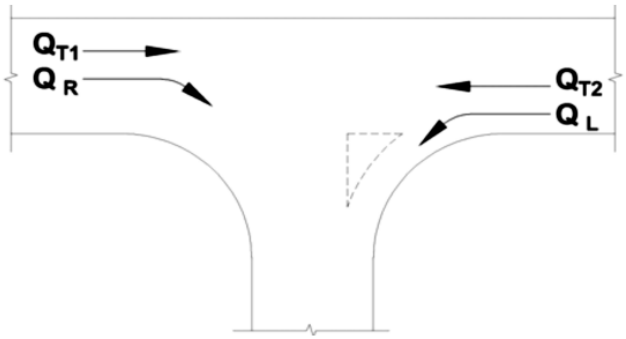
4 Turn Warrant Assessment Parameters

Main Roads Western Australia supplement to Austroads *Guide to Road Design Part 4A -A.8* which provides a warrant for the preferred minimum turn treatments on major roads (i.e. the road that has traffic priority over another at an intersection).

The preferred turn treatments are determined by the following parameters:

- **QL or QR**: development peak hour entry turning movement volume.
- **QM**: traffic volume on the major road, see **Figure 4-1** for the calculation of QM for a two-way two-lane road; and
- **design speed** – *120km*/h design speed is adopted with the acknowledgement that South Coast Highway would have 110km/h posted speed limit in the medium to long term.
- **Traffic volume** – Existing SWCH traffic volumes sourced from Main Roads Trafficmap in 2021/22 and the turning movements based on the Site traffic generation will be used for this assessment.

Figure 4-1 Calculation of QM



Road type	Turn type	Splitter island	Q_M (veh/h)
Two-lane two-way	Right	No	= $Q_{T1} + Q_{T2} + Q_L$
		Yes	= $Q_{T1} + Q_{T2}$
	Left	Yes or no	= Q_{T2}
Four-lane two-way	Right	No	= 50% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 50% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 50% x Q_{T2}
Six-lane two-way	Right	No	= 33% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 33% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 33% x Q_{T2}

Source: TMR (2016a).

As per Main Roads Western Australia supplement to Austroads *Guide to Road Design Part 4A -A.8,* it is important to note that these warrants focus on safety performance outcomes and not operational performance. Additionally, it is developed for intersections on new roads and is not intended for direct application to accesses and driveways.

The warrants have been analysed for the opening year (2024) and the future year (2034).

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4.1 Traffic Generation

Trip generation has been calculated for the proposed development utilising trip generation rates from the *Institute of Transportation Engineers (ITE) "Trip Generation" 10th Ed.* **Table 4-1** provides the trip generation rates for the AM and PM peak hour periods. **Table 4-2** outlines the directional distribution and **Table 4-3** summarises the total trips expected to be generated by the proposed development. **Figure 4-2** shows development traffic volumes.

Table 4-1 Trip Generation Rate – Peak Hour Generator

Land Use	ITE Code	AM Peak Rate	PM Peak Rate	Daily Rate
Residential	ITE 210	0.76 trips per dwellings	1 trip per dwellings	9.44 trips per dwellings

Table 4-2 Directional Distribution

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Residential	26%	74%	64%	36%	50%	50%

Table 4-3 Total Trip Generation

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Lot 9001 (Residential)	8	23	26	15	194	194
Lot 124 (Residential)	3	7	8	4	57	57
Lot 125 (Residential)	10	29	33	19	245	245
Sub-Total	21	59	67	38	496	496
Total	**80**		**105**		**992**	

4.2 Traffic Volumes & Trip Distribution

The existing traffic volumes were derived from Main Roads Traffic Map as shown in **Figure 4-2**. The available traffic counts along South Coast Highway does not show any incremental increase in traffic historically and for the purpose of a robust assessment, a 1% annual background traffic growth rate was assumed for this study. This has been applied to the background traffic for the opening year (2024) and future design year (2034) for this assessment. **Figure 4-2** shows development traffic volumes and **Figure 4-3** shows the estimated volumes for the 2024 and 2034 design years with the proposed development traffic.

The trip distribution for the Site was derived from the 2016 ABS Census place of work and residential census within the City of Albany and the surrounding suburbs. It is assumed that 75% of the residents will be attracted to the East, as this is where the Albany CBD is located and other popular commercial and office industries. The remaining 25% will be attracted to other destinations such as the Town of Denmark and other locations within the Albany region to the west of the subject Site.

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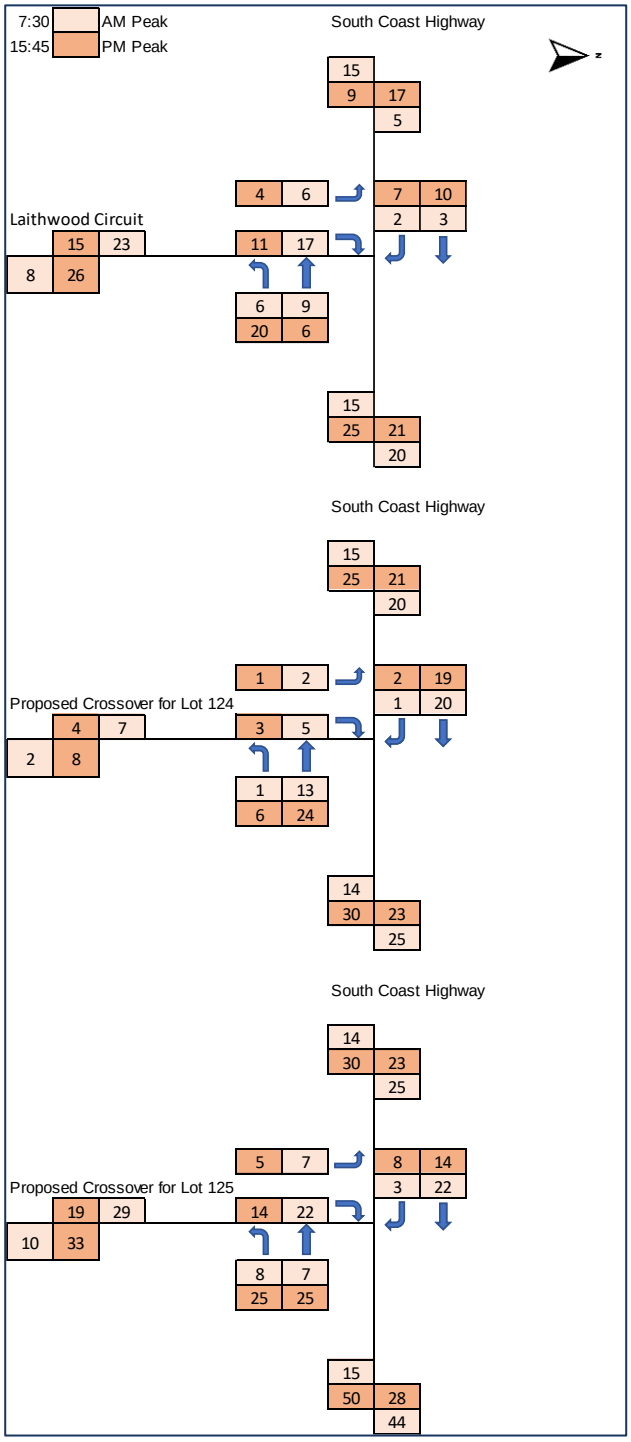
Figure 4-2 Development Traffic & 2022 Traffic Volumes

Dev Traffic



2022 Traffic

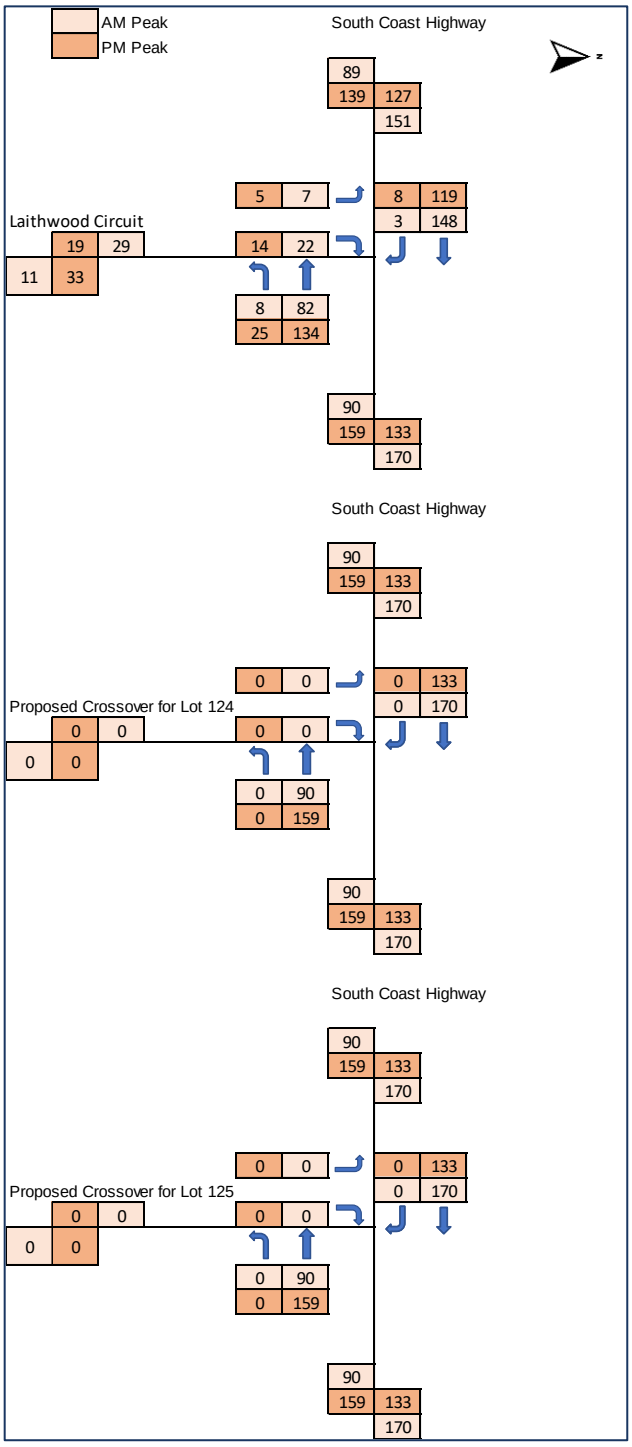


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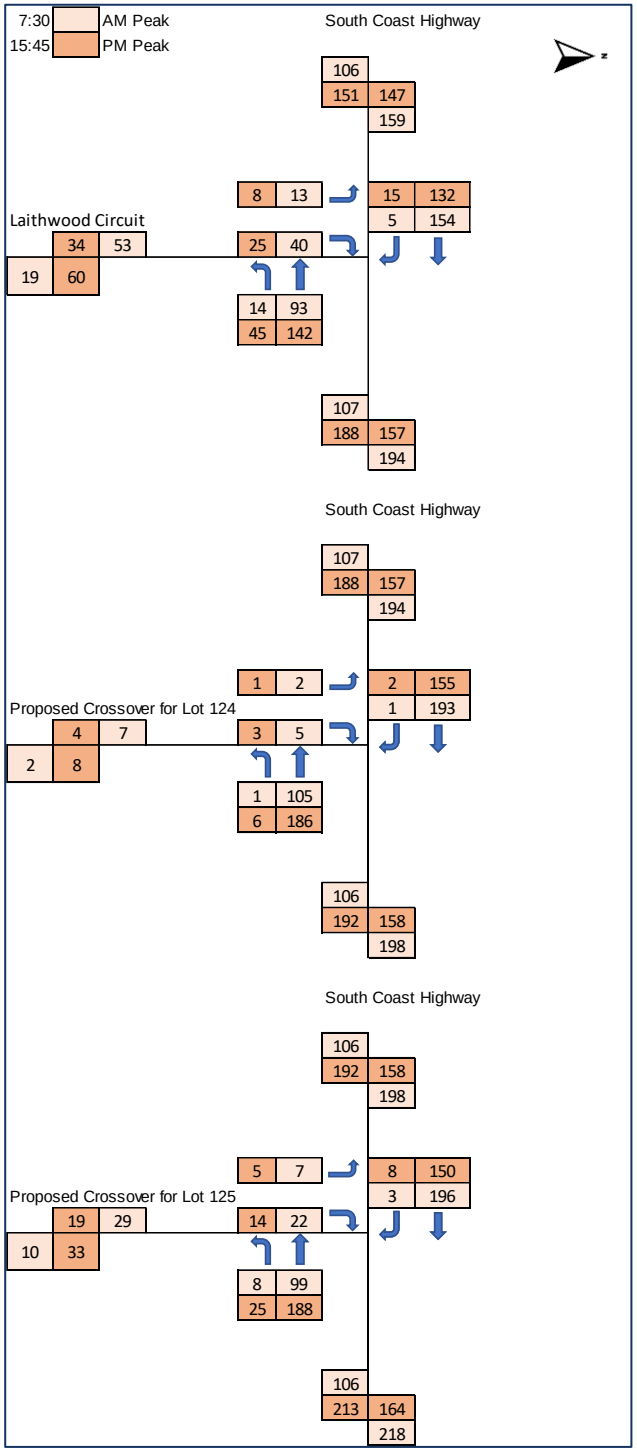
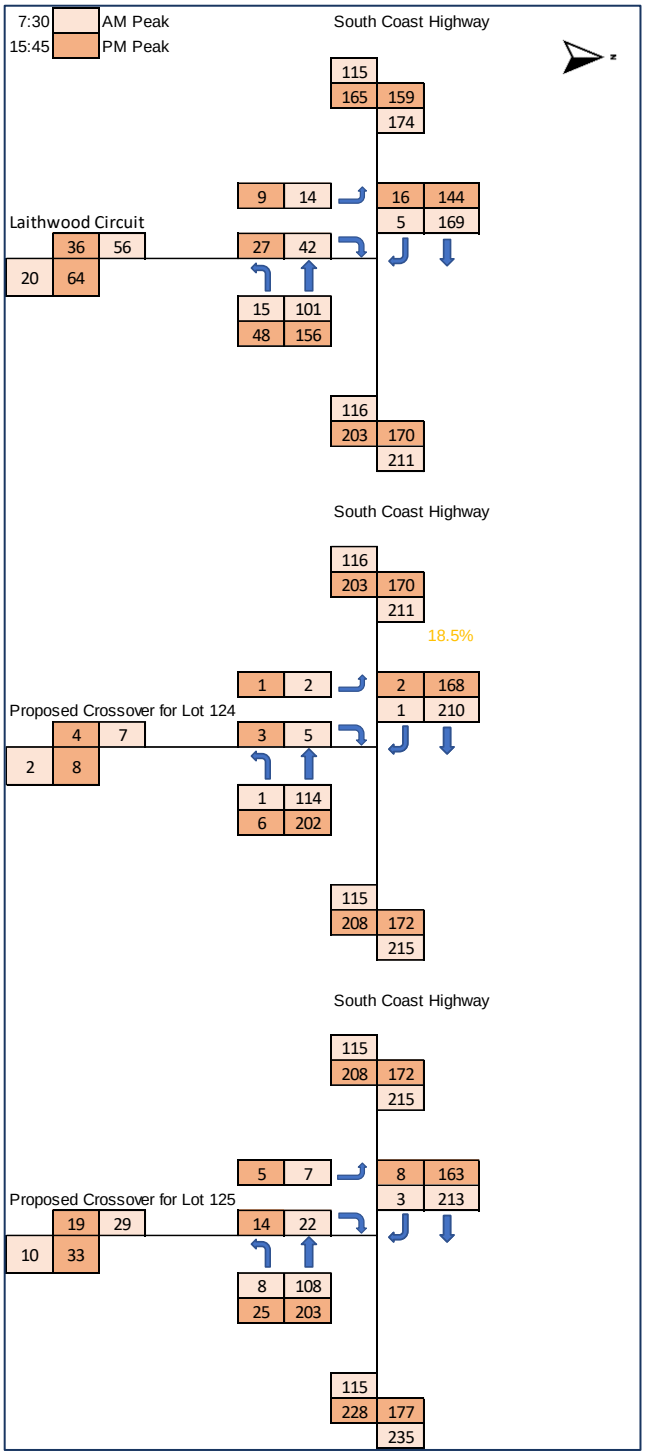
Figure 4-3 2024 & 2034 Traffic With Development

2024 + Dev Traffic



2034 + Dev Traffic



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4.3 Turn Warrant Assessment

The key intersections analysed are:

> South Coast Highway/ Lot 124 Access (Access 1); and

> South Coast Highway/ Lot 125 Access (Access 2).

4.3.1 South Coast Highway/Lot 124 (Access 1) Assessment

Table 4-4 summarises the turn warrant assessment for the AM and PM peak hour periods respectively for the opening year (2024) and future 10 years after opening (2034).

Table 4-4 Access 1 – South Coast Highway/Access 1

Two lane Two way				
South Coast Highway / Lot 124(Access 1)				
	2024 With Development		2034 With Development	
	AM	PM	AM	PM
Q_{T1}	193	155	210	168
HV (%) – Q_{T1}	12.2	18.5	12.2	18.5
Q_R	1	2	1	2
HV (%) - Q_R	0	0	0	0
Q_{T2}	105	186	114	202
HV (%) - Q_{T2}	24.4	6	24.4	6
Q_L	2	6	2	6
HV (%) - Q_L	0	0	0	0
Left Turn Treatment	**BAL**	**BAL**	**BAL**	**BAL**
Right Turn Treatment	**BAR**	**BAR**	**BAR**	**BAR**

Based on the assessment above for both peak hours, basic right turn (BAR) and basic left turn (BAL) treatments are recommended for 2024 and 2034 scenarios.

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4.3.2 South Coast Highway/Lot 125 (Access 2) Assessment

Table 4-5 summarises the turn warrant assessment for AM and PM peak hour periods respectively for the opening year (2024) and future 10 years after opening (2034).

Table 4-5 Access 2 – South Coast Highway/Access 2

Two lane Two way				
South Coast Highway / Lot 125(Access 2)				
	2024 With Development		2034 With Development	
	AM	PM	AM	PM
Q_{T1}	196	150	213	163
HV (%) – Q_{T1}	12.2	18.5	12.2	18.5
Q_R	3	8	3	8
HV (%) - Q_R	0	0	0	0
Q_{T2}	99	188	108	203
HV (%) - Q_{T2}	24.4	6	24.4	6
Q_L	8	25	8	25
HV (%) - Q_L	0	0	0	0
Left Turn Treatment	**BAL**	**BAL**	**BAL**	**AUL(S)**
Right Turn Treatment	**BAR**	**AUR**	**BAR**	**AUR**

Based on the assessment above for both peak hours, an AUR turn treatment is warranted in 2024 and AUR and AUL(S) is warranted in 2034.

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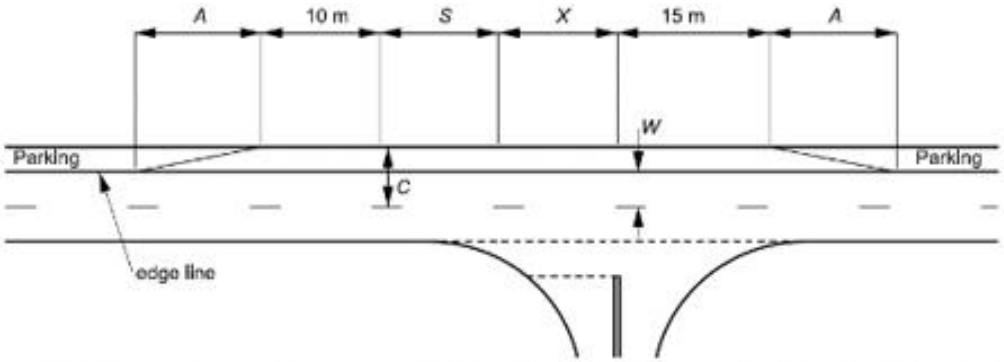
4.3.3 Turn Treatment Types

4.3.3.1 Basic Right Turn Treatment (BAR)

The BAR turn treatment is applicable to intersections of two-lane urban roads and minor local roads where traffic volumes do not warrant a higher-order treatment. It should provide sufficient pavement width for the design through vehicle to pass a vehicle waiting to turn right. **Figure 4-4** illustrates a typical layout for BAR treatment.

Figure 4-4 Typical BAR Treatment



Notes: This diagram does not show any specific bicycle facilities. Where required bicycle facilities should be provided in accordance with this Part.

The dimensions of the treatment are defined thus:

W = Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.

C = On straights – 6.0 m minimum
– 6.5 m minimum for 19 m semi-trailers and B-doubles
– 7.0 m minimum for Type 1 and Type 2 road trains
On curves – widths as above + curve widening (based on widening for the design turning vehicle plus – widening for the design through vehicle).

$$A = \frac{0.5V(C-W)}{3.6}$$

Increase length A on tighter curves (e.g. where side friction demand is greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer, the minimum speed used to calculate A is 80 km/h.

V = Design speed of major road approach (km/h).

S = Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m).

X = Distance based on design vehicle turning path, refer to Design Vehicles and Turning Path Templates (Austroads 2013f).

Source: Department of Main Roads (2006)[30].

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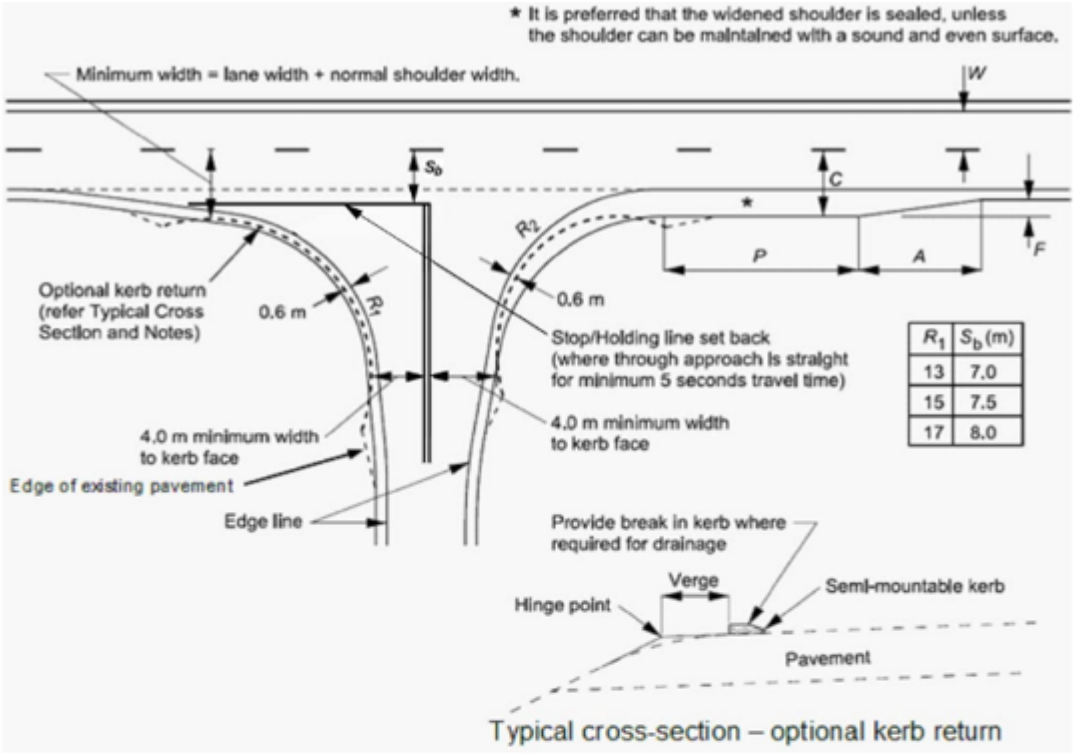
4.3.3.2 *Basic Left Turn Treatment (BAL)*

Figure 4-5 shows a minimum treatment for use in a rural situation which provides tapers leading into and out of the left turn treatment.

Figure 4-5 Typical BAL Treatment



R_1	S_b (m)
13	7.0
15	7.5
17	8.0

Notes:

- *R_1 and R_2 are determined by the swept path of the design vehicle.*
- *The dimensions of the treatment are defined thus:*

  W = *Nominal through lane width (m) (including widening for curves).*

  C = *On straights – 6.0 m minimum.*
  On curves – 6.0 m plus curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).

  $A = \frac{0.5VF}{3.6}$

  V = *Design speed of major road approach (km/h).*

  F = *Formation/carriageway widening (m).*

  P = *Minimum length of parallel widened shoulder (Table 8.1).*

  S_b = *Setback distance between the centre of the major road and the give way or stop line in the minor road.*

Source: Department of Main Roads (2006)[35].

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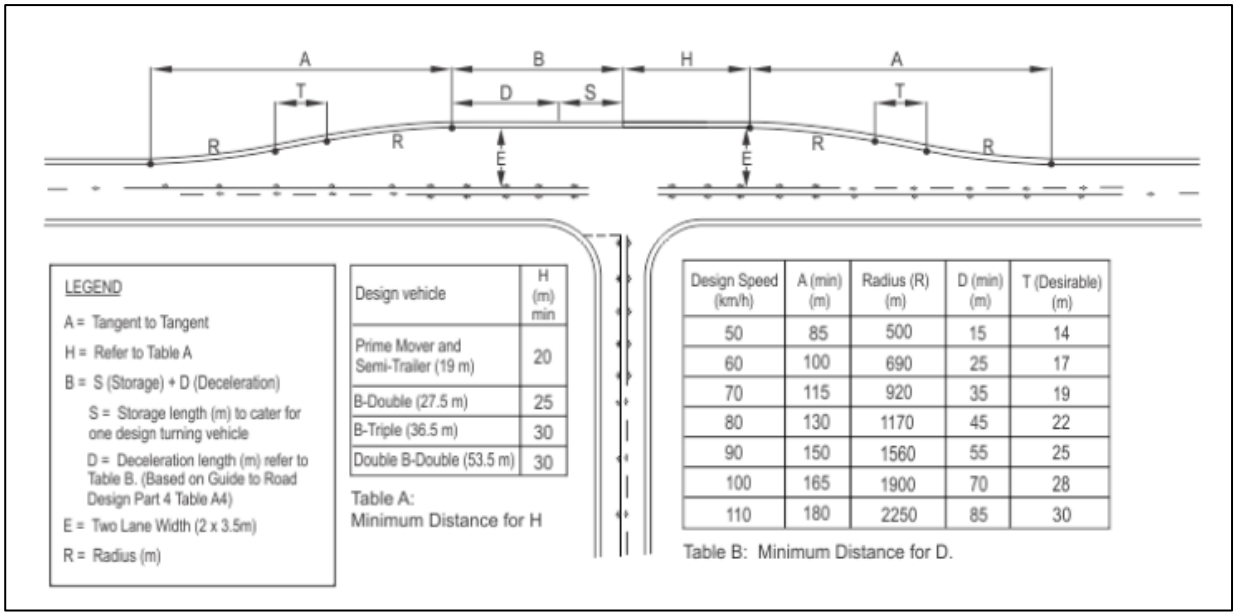
4.3.3.3 AUR Treatment

AUR treatment is a right turn treatment that involves the creation of an additional short lane on the major road to allow through traffic to bypass a right turning vehicle. This treatment does not involve channelisation of the additional lane. **Figure 4-6** illustrates a typical layout for AUR treatment.

Figure 4-6 Typical Main Roads Type AUR treatment



Source: MRWA Supplement to Austroads Guide to Road Design – Part 4 Appendix A

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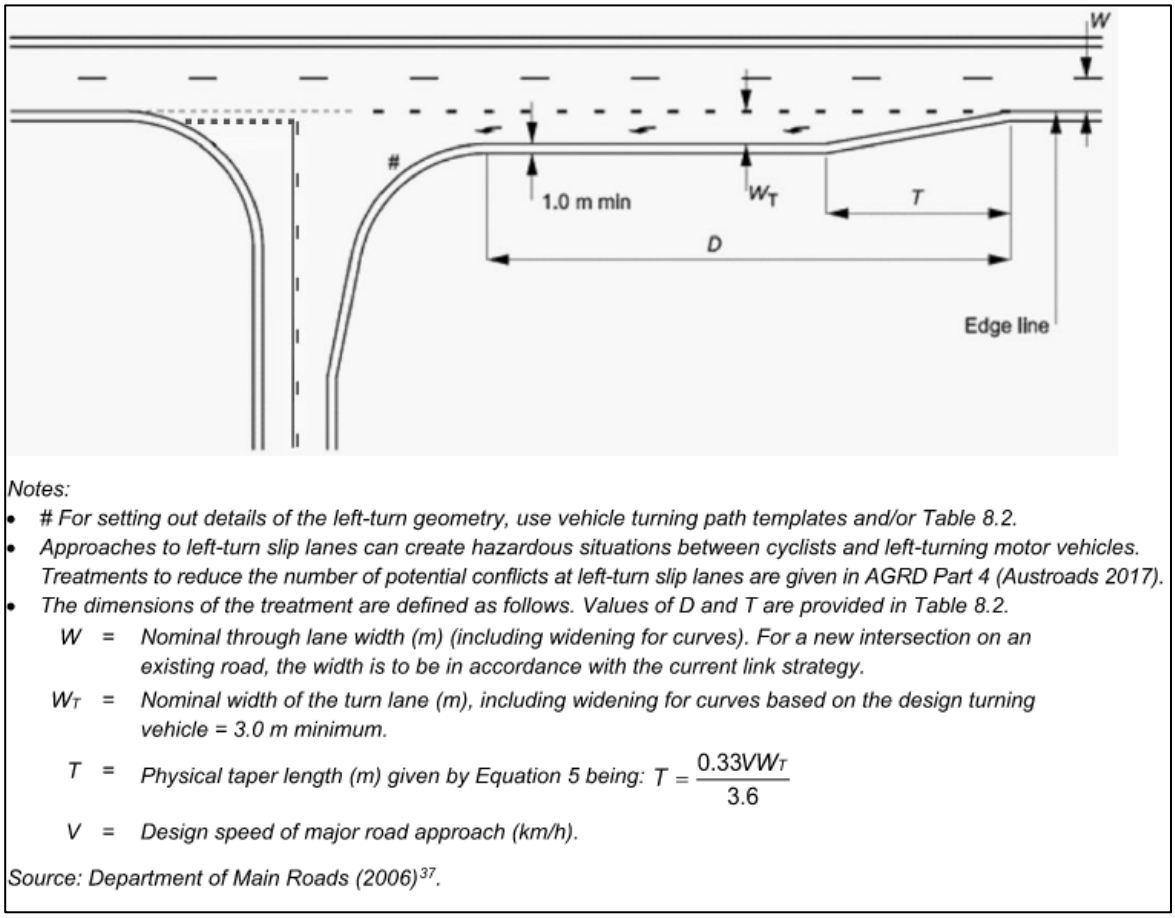
4.3.3.4 AUL(S) Treatment

AUL(S) is a left turn treatment provided on the major road, by providing an idented lane, separated from the through lanes. **Figure 4-7** below shows a typical layout for AUL(S).

Figure 4-7 Rural AUL(S) treatment with a short left-turn lane



Notes:

- *# For setting out details of the left-turn geometry, use vehicle turning path templates and/or Table 8.2.*
- *Approaches to left-turn slip lanes can create hazardous situations between cyclists and left-turning motor vehicles. Treatments to reduce the number of potential conflicts at left-turn slip lanes are given in AGRD Part 4 (Austroads 2017).*
- *The dimensions of the treatment are defined as follows. Values of D and T are provided in Table 8.2.*

W = Nominal through lane width (m) (including widening for curves). For a new intersection on an existing road, the width is to be in accordance with the current link strategy.

W_T = Nominal width of the turn lane (m), including widening for curves based on the design turning vehicle = 3.0 m minimum.

T = Physical taper length (m) given by Equation 5 being: $T = \frac{0.33VW_T}{3.6}$

V = Design speed of major road approach (km/h).

Source: Department of Main Roads (2006)[37].

Source: Austroads Guide to Road Design Part 4A

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5 Conclusions and Recommendations

The Turn treatment warrant assessment has been undertaken for the proposed access on South Coast Highway. It is important to note that these warrants are developed for intersections on new roads and is not intended for direct application to accesses and driveways.

The key intersections analysed are:

> South Coast Highway/ Lot 124 Access (Access 1); and

> South Coast Highway/ Lot 125 Access (Access 2).

Based on the assessment for both peak hours, auxiliary lanes are not required for Access 1. For Access 2, an AUR turn treatment is warranted in 2024 and 2034 turning movements and AUL(S) is warranted in 2034 from a safety perspective taking into consideration the posted speed on South Coast Highway is 110km/hr.

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Technical Memorandum

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Project Name	Lot 124, Lot 125 & Lot 9001 South Coast Highway, Marbellup	**Status**	A
Date	05/12/2022	**Discipline**	Traffic & Transport
Author	Lovely Lal		
Reviewer	Desmond Ho	**Office**	Perth

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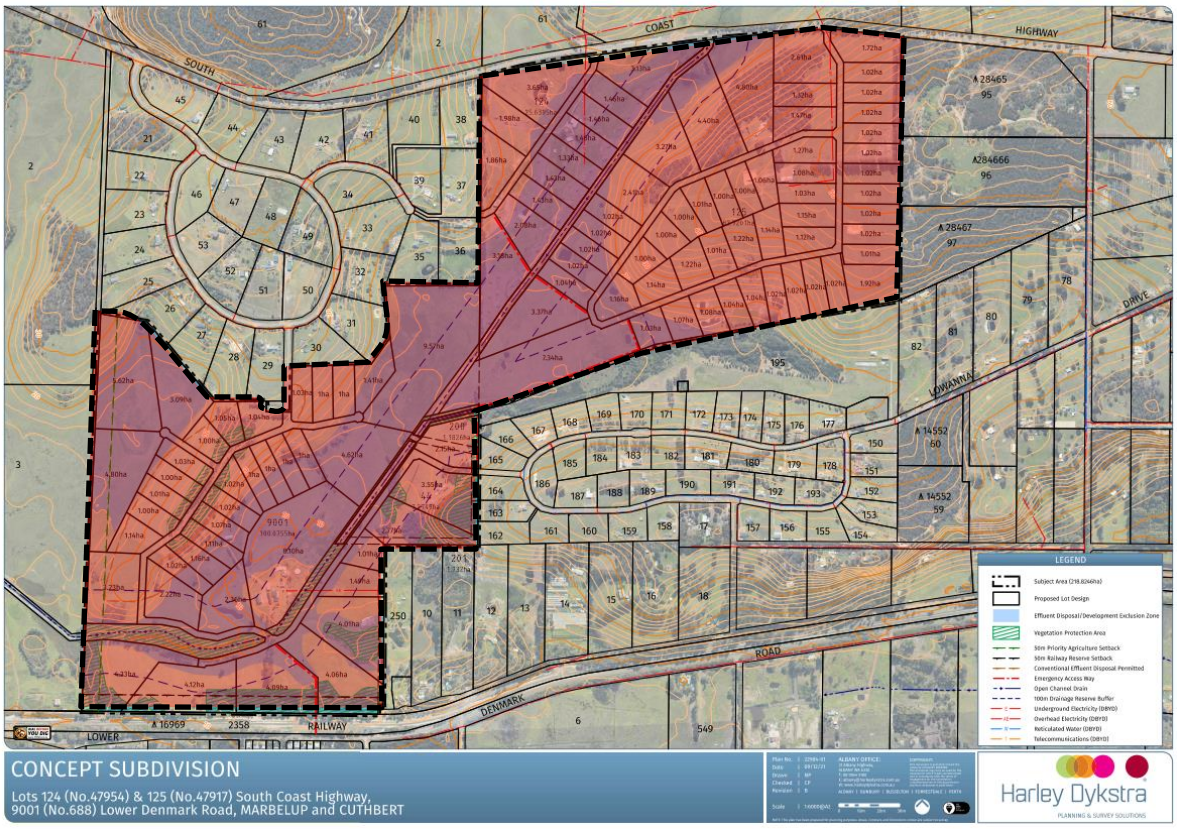

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The layout of the proposed Site is shown in **Figure 3-1.**

Figure 3-1 Subdivision Plan

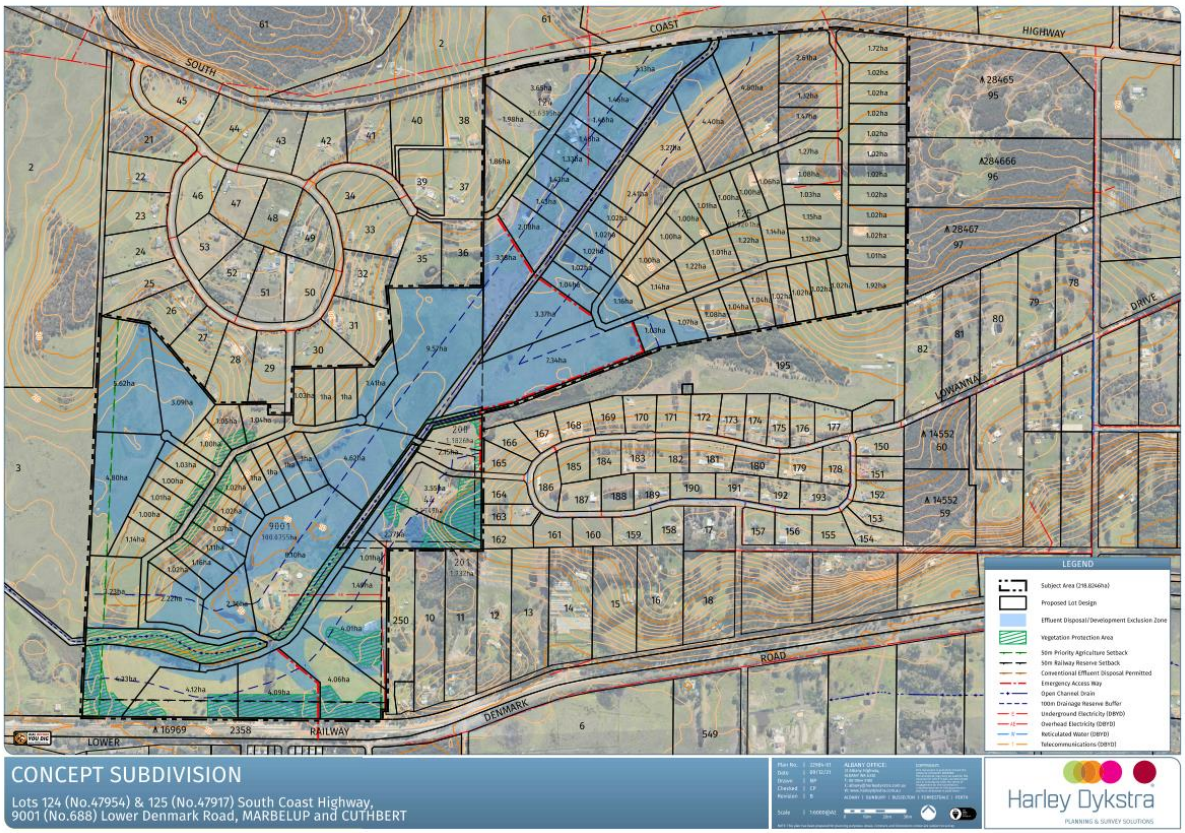

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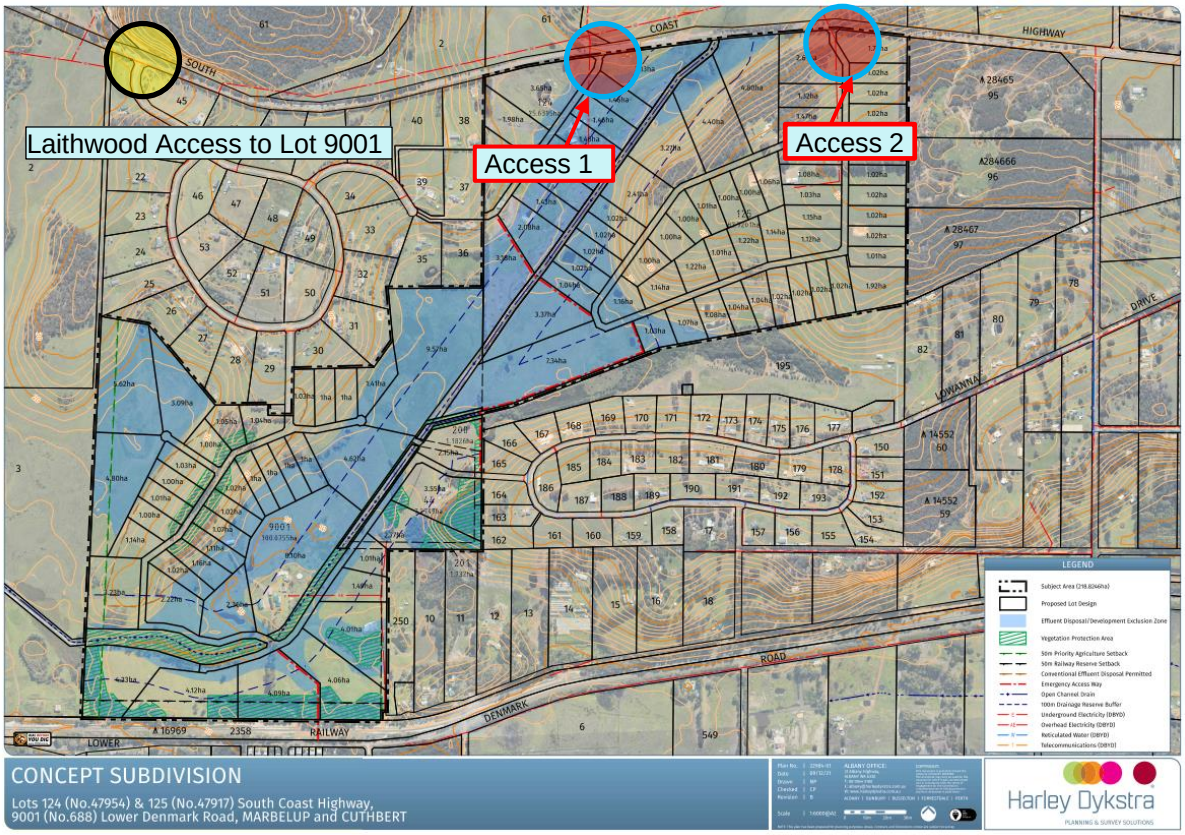
Figure 3-2 Access Arrangements



Source: Harley Dykstra

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Lot 125 (Residential)	10	29	33	19	245	245
Sub-Total	21	59	67	38	496	496
Total	**80**		**105**		**992**	

The proposed development is expected to generate approximately 80 vehicles during the AM peak hour and 105 vehicles during the PM peak hour respectively.

3.4 Traffic Volumes & Trip Distribution

The existing traffic volumes were derived from Main Roads Traffic Map as shown in **Figure 3-3.** The available traffic counts along South Coast Highway does not show any incremental increase in traffic historically and for the purpose of a robust assessment, a 1% annual background traffic growth rate was assumed for this study. This has been applied to the background traffic for the opening year (2024) and future design year (2034) for this assessment. **Figure 3-3** shows development traffic volumes and **Figure 3-4** shows the estimated volumes for the 2024 and 2034 design years with the proposed development traffic.

The trip distribution for the Site was derived from the 2016 ABS Census place of work and residential census within the City of Albany and the surrounding suburbs. It is assumed that 75% of the residents will be attracted to the East, as this is where the Albany CBD is located and other popular commercial and office industries. The remaining 25% will be attracted to other destinations such as the Town of Denmark and other locations within the Albany region to the west of the subject Site.

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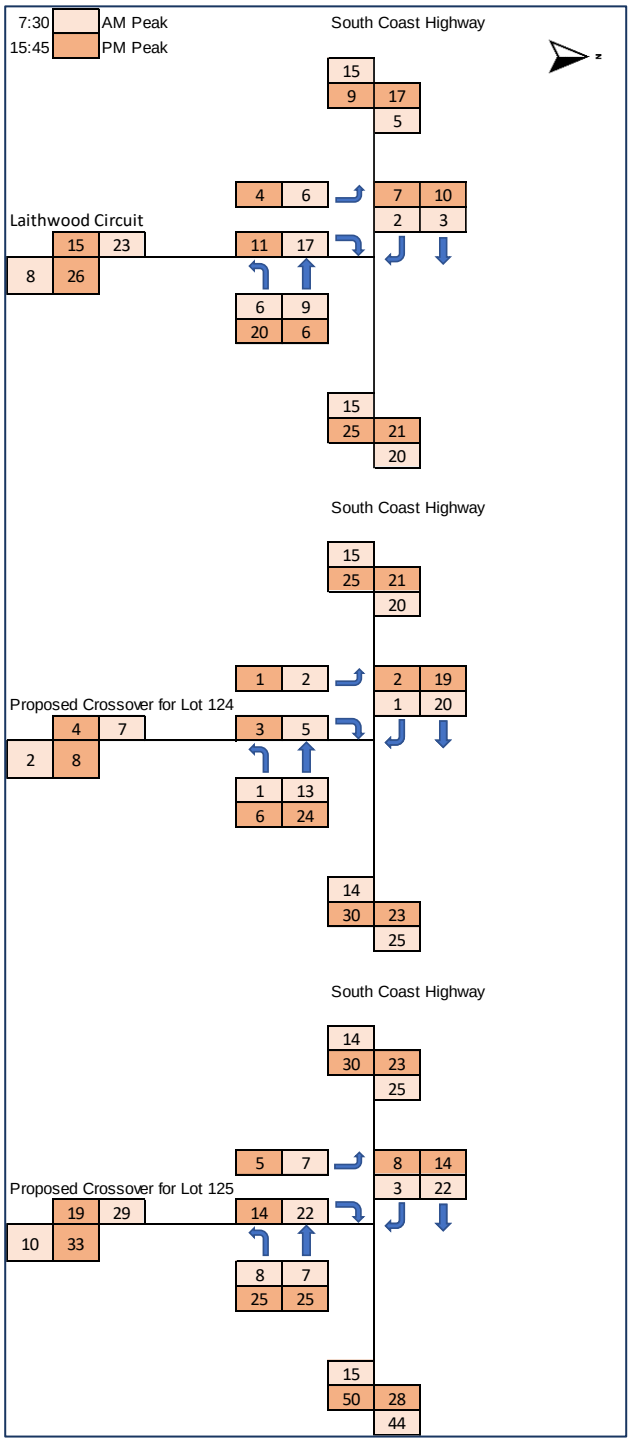
Figure 3-3 Development Traffic & 2022 Traffic Volumes

Dev Traffic



2022 Traffic

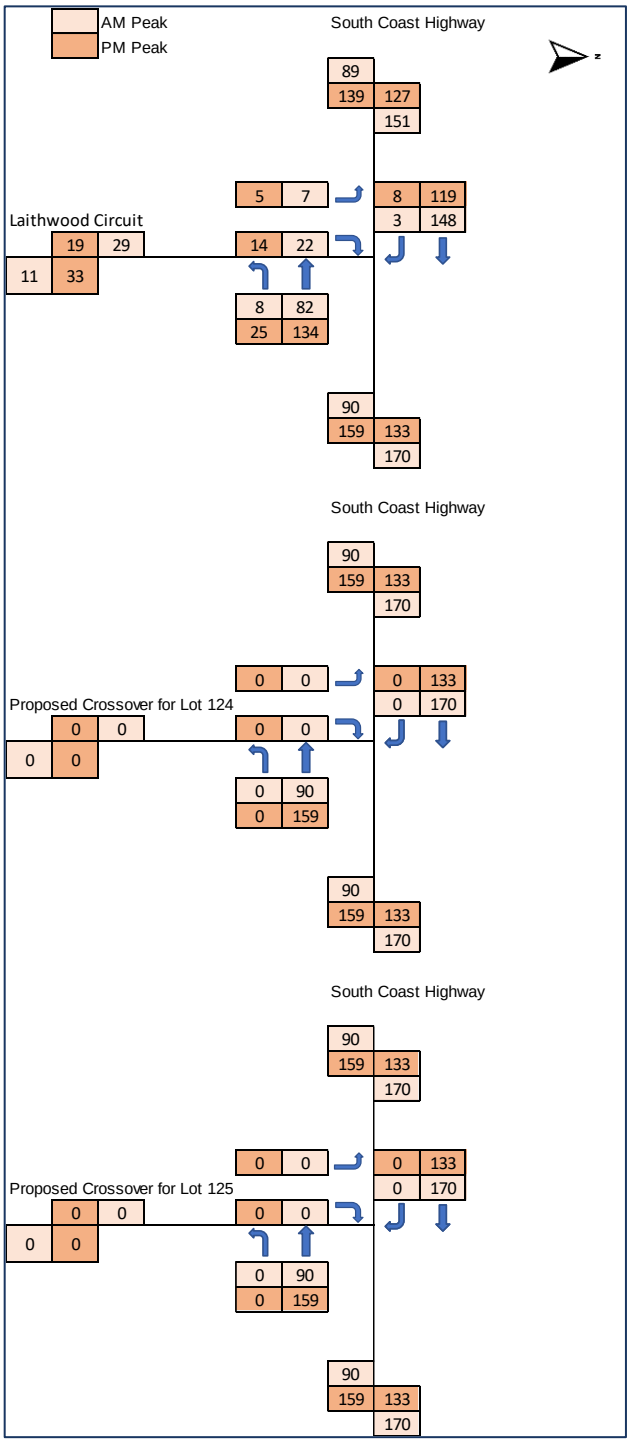


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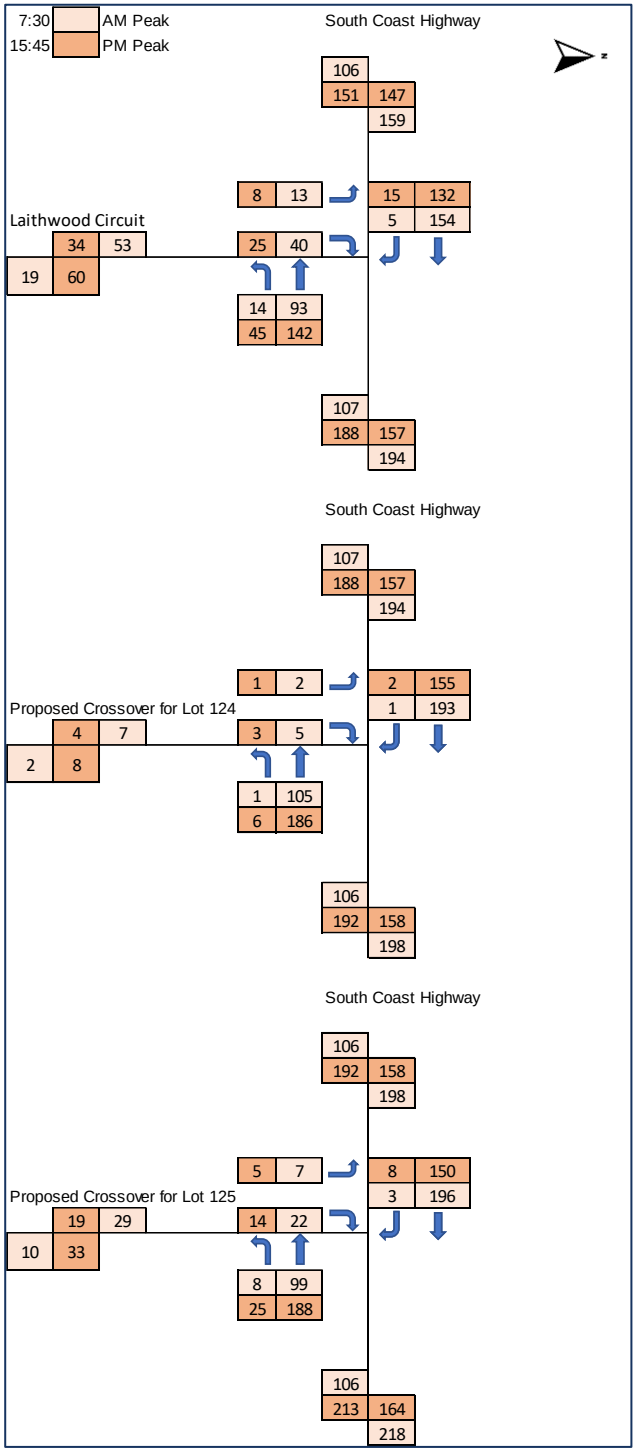
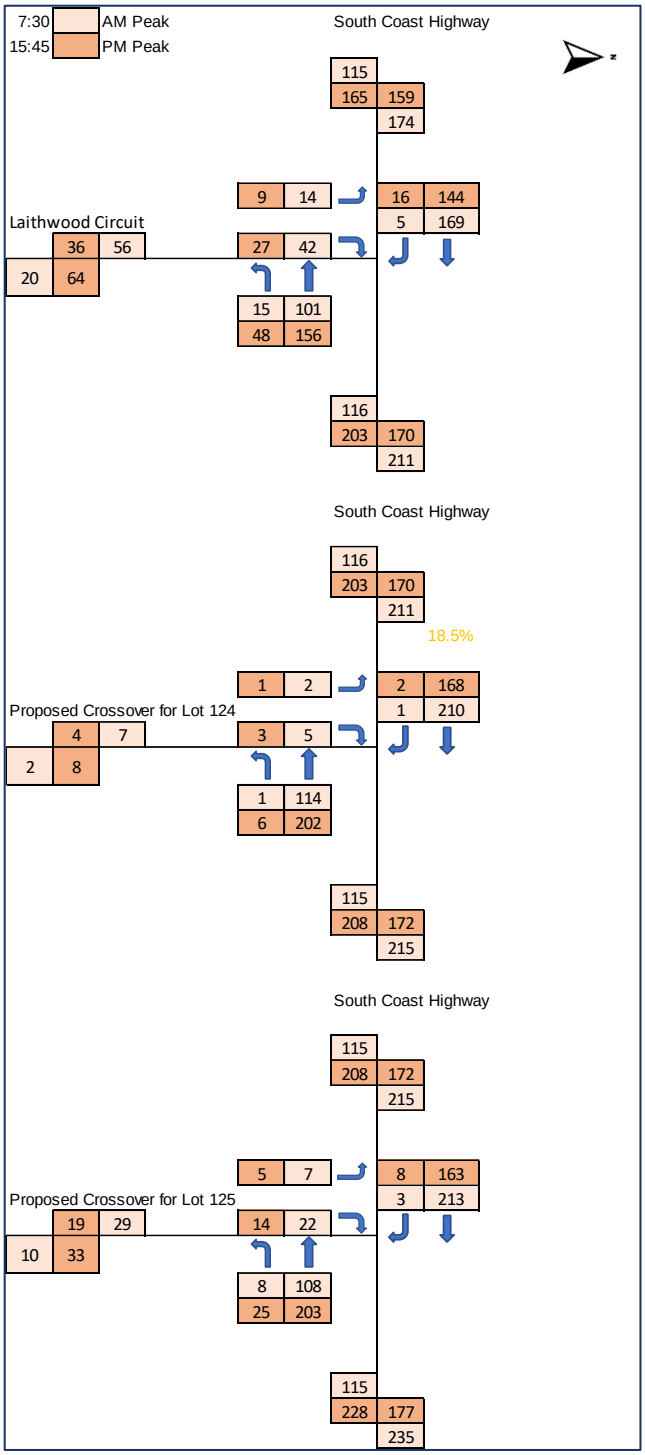
Figure 3-4 2024 & 2034 Traffic With Development

2024 + Dev Traffic



2034 + Dev Traffic



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4 SIDRA Modelling

4.1 Intersection Performance

Analysis of the traffic impacts of the proposed development has been undertaken for the following intersections:

- South Coast Highway/Proposed Access Road (Lot 124)
- South Coast Highway/Proposed Access Road (Lot 125)

The identified intersections have been analysed using the SIDRA analysis program. This program calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output SIDRA provides values for the Degree of Saturation (DOS), queue lengths, delays, level of service, and 95th Percentile Queue. These parameters are defined as follows:

- Degree of Saturation (DOS): is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The theoretical intersection capacity is exceeded for an un-signalized intersection where DOS > 0.80;
- 95% Queue: is the statistical estimate of the queue length up to or below which 95% of all observed queues would be expected;
- Average Delay: is the average of all travel time delays for vehicles through the intersection. An unsignalised intersection can be considered to be operating at capacity where the average delay exceeds 40 seconds for any movement; and
- Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in **Table 4-1.**

Table 4-1 Level of Service (LoS) Performance Criteria

LOS	Description	Signalised Intersection	Unsignalised Intersection
A	Free-flow operations (best condition)	≤10 sec	≤10 sec
B	Reasonable free-flow operations	10-20 sec	10-15 sec
C	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	25-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

A LOS exceeding these values indicates that the road section is exceeding its practical capacity. Above these values, users of the intersection are likely to experience unsatisfactory queueing and delays during the peak hour periods.

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4.1 SIDRA Analysis Results

The following scenarios were considered for analysis:

- Opening Year Background Traffic (with growth) + Full development (2024)
- 10-Year Horizon Background traffic (with growth) + Full development (2034)

4.1.1 South Coast Highway/Proposed Access Road (Lot 124)

The proposed intersection layout has been modelled in SIDRA as shown in **Figure 4-1**. **Table 4-2** and **Table 4-3** summarise the results for 2024 and 2034 with development.

Figure 4-1 Proposed Intersection Layout of South Coast Highway / Lot 124 Access

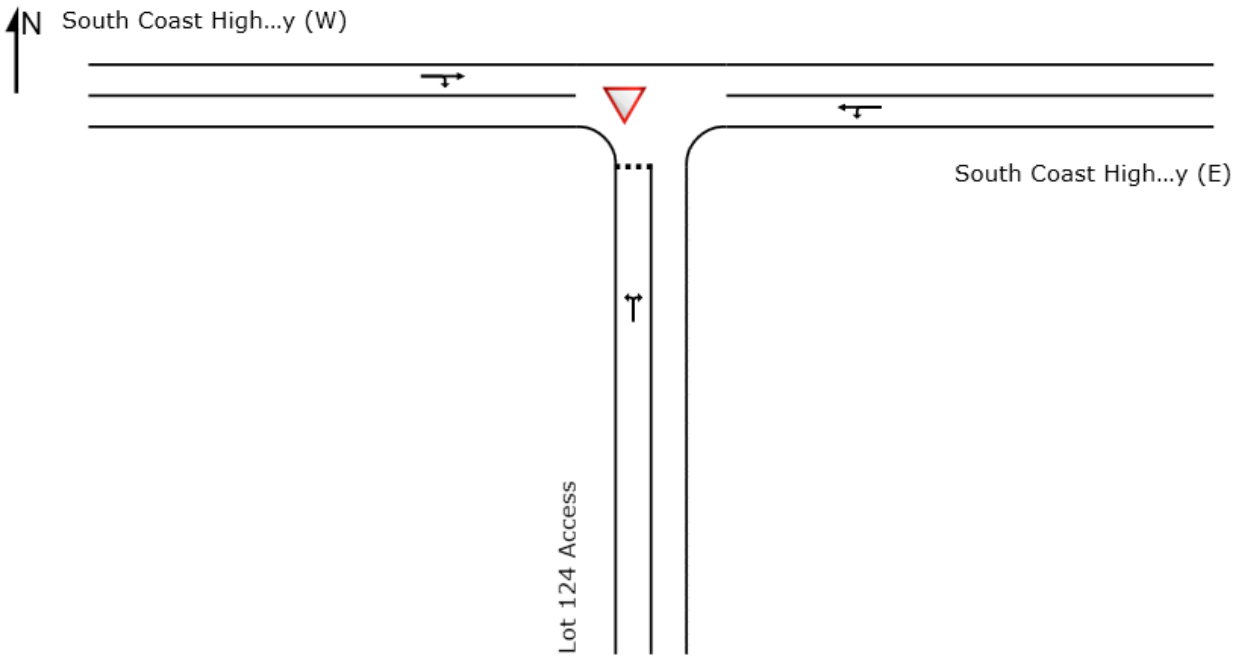

Table 4-2 South Coast Highway-Lot 124 Access Road – 2024 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 124 Access	L	0.007	4.9	A	0.2	0.004	5.1	A	0.1
	R	0.007	5.8	A	0.2	0.004	6.0	A	0.1
East: South Coast Highway (E)	L	0.071	8.2	A	0.0	0.109	8.2	A	0.0
	T	0.071	0	A	0.0	0.109	0.0	A	0.0
West: South Coast Highway (W)	T	0.116	0	A	0.1	0.099	0.0	A	0.1
	R	0.116	8.2	A	0.1	0.099	8.5	A	0.1
All Vehicles		0.116	0.2	NA	0.2	0.109	0.3	A	0.1

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Table 4-3 South Coast Highway-Lot 124 Access Road– 2034 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 124 Access	L	0.007	4.9	A	0.2	0.004	5.2	A	0.1
	R	0.007	5.9	A	0.2	0.004	6.1	A	0.1
East: South Coast Highway (E)	L	0.077	8.2	A	0.0	0.118	8.2	A	0.0
	T	0.077	0.0	A	0.0	0.118	0.0	A	0.0
West: South Coast Highway (W)	T	0.127	0.0	A	0.1	0.108	0.0	A	0.1
	R	0.127	8.3	A	0.1	0.108	8.6	A	0.1
All Vehicles		0.127	0.2	NA	0.2	0.118	0.2	A	0.1

4.1.2 South Coast Highway/Proposed Access Road (Lot 125)

The proposed intersection layout has been modelled in SIDRA as shown in **Figure 4-1**. **Table 4-2** and **Table 4-3** summarise the results for 2024 and 2034 with development.

Figure 4-2 Proposed Intersection Layout of South Coast Highway / Lot 125 Access Road

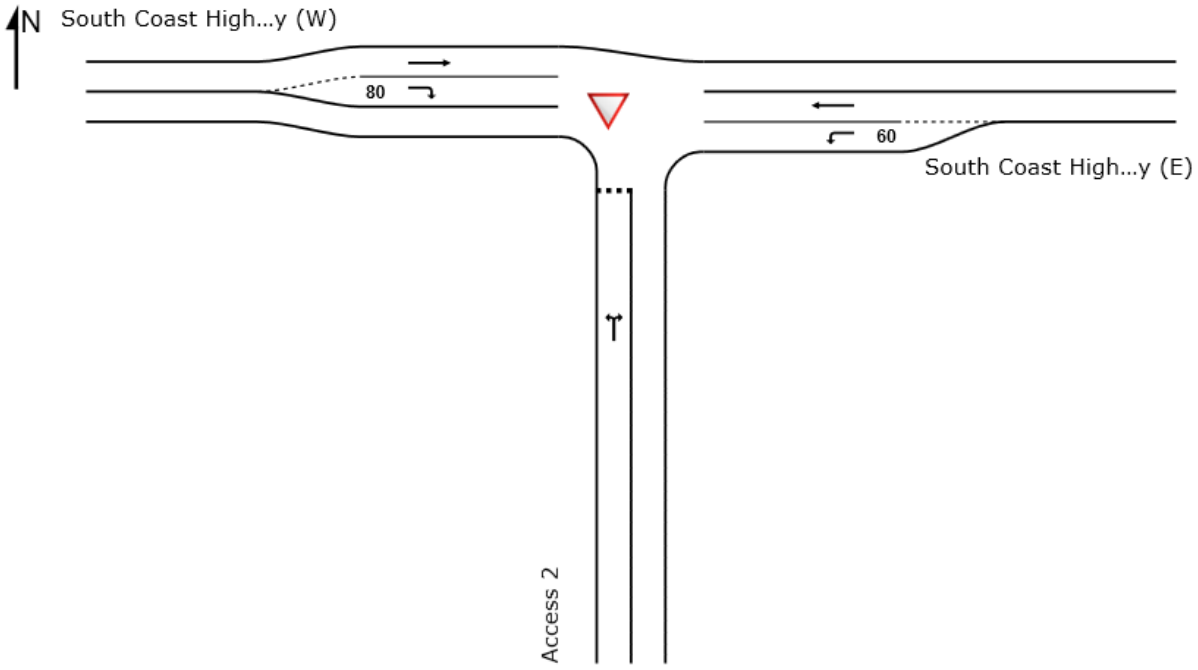

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Table 4-4 South Coast Highway-Lot 125 Access Road – 2024 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 125 Access	L	0.039	5.0	A	1.1	0.027	5.3	A	0.7
	R	0.039	7.0	A	1.1	0.027	7.5	A	0.7
East: South Coast Highway (E)	L	0.004	8.2	A	0.0	0.014	8.2	A	0.0
	T	0.066	0.0	A	0.0	0.106	0.0	A	0.0
West: South Coast Highway (W)	T	0.117	0.0	A	0.0	0.095	0.0	A	0.0
	R	0.002	8.3	A	0.1	0.007	8.7	A	0.2
All Vehicles		0.117	0.8	NA	1.1	0.106	1.0	NA	0.7

Table 4-5 South Coast Highway-Lot 125 Access Road – 2034 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 125 Access	L	0.040	5.0	A	1.1	0.028	5.4	A	0.8
	R	0.040	7.3	A	1.1	0.028	7.8	A	0.8
East: South Coast Highway (E)	L	0.004	8.2	A	0.0	0.014	8.2	A	0.0
	T	0.072	0.0	A	0.0	0.115	0.0	A	0.0
West: South Coast Highway (W)	T	0.128	0.0	A	0.0	0.103	0.0	A	0.0
	R	0.002	8.3	A	0.1	0.007	8.8	A	0.2
All Vehicles		0.128	0.8	NA	1.1	0.115	1.0	NA	0.8

The SIDRA network analysis shows that both intersections will perform satisfactorily during the opening year and 10 years after opening.

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5 High Level Cost Estimate

A high level cost estimate has been prepared for the proposed Access 1 and Access 2 based on the turn warrant treatment recommendations detailed in a separate Technical Note dated 5 December 2022.

The estimated cost for construction of the proposed intersections is summarised as follows:

i) Access 1 - $ 245,010.19 + GST

ii) Access 2 - $1,408,867.50 +GST

A cost estimate schedule has been included in **Appendix A**.

The following exclusions and assumptions apply.

- High level costing based on SIDRA information provided
- Services taken from DBYD only
- 40% continency added
- Geotech and feature survey estimated costs included
- We have only allowed for minimal service relocations

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6 Conclusion

The following is concluded:

- The proposed subdivision consists of 105 rural residential lots spread across Lots 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road
- The subject Site is anticipated to generated 80 vehicle trips in the AM peak and 105 vehicle trips in the PM peak.
- All of the intersections are anticipated to operate at good levels of service, average delays and capacity during both the AM and PM Peak hour periods for the opening year and future 2034 horizon.
- Based on the SIDRA traffic modelling analysis, the proposed development is expected not to have any material or significant impact on the surrounding road network.
- The high level cost estimate for providing Access 1 and Access 2 is $ 245,010.19 +GST and $1,408,867.50 +GST respectively.

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APPENDIX A

COST ESTIMATE

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	South Coast Highway / Lot 124 Access (Access 1)				Revision	A
	OPC				Date:	30/11/2022
No.	Description	Unit	Qty	Rate		Amount
1	**Preliminaries**					
	Geotechnical Investigation & Report	item	1	$ 8,000.00	$	8,000.00
	Feature Survey of the Site	item	1	$ 10,000.00	$	10,000.00
	Contractor's preliminaries and site overheads	item	20%	-	$	16,167.88
	Traffic Management	week	6	$ 10,000.00	$	60,000.00
	TOTAL PRELIMINARIES				$	94,167.88
2	**Builder's Works**					
	Summary of works					
2.1	**Earthwork and Demolition**					
	Site Clearing, heavy	m^2	1060	$ 2.00	$	2,120.00
	Existing feature removal and disposal	m	100	$ 50.00	$	5,000.00
	Median island removal	m^2	0	$ 75.00	$	-
	Removal and disposal of Pavement (300 thick)	m^2	0	$ 3.85	$	-
	Removal and disposal of Seal	m^2	0	$ 0.38	$	-
	Removal and disposal of Kerb	m	0	$ 10.55	$	-
	Compact and trim pavement subgrade	m^2	475	$ 4.00	$	1,900.00
	Tree removal	No	10	$ 1,000.00	$	10,000.00
	Removal of existing line marking	m	0	$ 2.25	$	-
	Removal of existing ramp	m^2	0	$ 3.85	$	-
	Removal of Existing Concrete Footpath	m^2	0	$ 16.94	$	-
2.2	**Roadworks**					
	Construct pavement as specified					
	200mm crushed rock basecourse	m^2	475	$ 20.00	$	9,500.00
	200mm crushed limestone subbase	m^2	475	$ 12.00	$	5,700.00
	Construct pavement seal as specified					
	30 thick open graded black asphalt	m^2	475	$ 15.12	$	7,182.00
	Prime coat	m^2	475	$ 1.40	$	665.00
	Supply and lay extruded concrete kerbing as shown					
	Semi-mountable (SMK)	m	0	$ 29.55	$	-
	Construct footpaths as specified					
	Compact and trim footpath subgrade (min 450mm depth)	m^2	0	$ 10.00	$	-
	Concrete footpath	m^2	0	$ 103.81	$	-
	Construct traversable median					
	Brick paving including 30 thick sand bedding	m^2	0	$ 67.20	$	-
	Concrete treatment end	m^2	0	$ 60.87	$	-
	Concrete infill	m^2	0	$ 60.87	$	-
	Crossover extension					
	Concrete infill	m^2	0	$ 60.87	$	-
	150mm crushed rock basecourse	m^2	0	$ 15.50	$	-
	Flush pedestrian crossing	m^2	0	$ 20.16	$	-
	Ramp installation	No	0	$ 3,000.00	$	-
2.4	**Signage and Linemarking**					
	Linemarking - Continuity Line	m	66	$ 0.56	$	36.40
	Linemarking - Broken - Giveway	m	20	$ 0.56	$	11.20
	Signage - Single	No.	2	$ 336.00	$	672.00
	Guide post	No.	10	$ 44.80	$	448.00
	Linemarking - Direction Arrow	No.	3	$ 201.60	$	604.80
2.6	**Stormwater Drainage (Provisional Rates)**					
	Proposed Road Side Swale	m	100	$ 70.00	$	7,000.00
	Culvert Crossing Upgrade	No.	1	$ 10,000.00	$	10,000.00
2.7	**Lighting and Power (Provisional Rates)**					
	Relocation of Existing Services	No.	2	$ 10,000.00	$	20,000.00
	TOTAL BUILDER'S WORKS				$	80,839.40
	SUBTOTAL				$	**175,007.28**
3	**Contingencies**					
	Contingency allowance items	item	40%	$ 175,007.28	$	70,002.91
	TOTAL CONTINGENCIES				$	70,002.91
	GRAND TOTAL				$	**245,010.19**

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	South Coast Highway / Lot 124 Access (Access 2)				Revision	A
	OPC				Date:	24/11/2022
No.	Description	Unit	Qty	Rate		Amount
1	**Preliminaries**					
	Geotechnical Investigation & Report	item	1	$ 10,000.00	$	10,000.00
	Feature Survey of the Site	item	1	$ 15,000.00	$	15,000.00
	Contractor's preliminaries and site overheads	item	20%	-	$	136,888.99
	Traffic Management	week	16	$ 10,000.00	$	160,000.00
	TOTAL PRELIMINARIES				$	321,888.99
2	**Builder's Works**					
	Summary of works					
2.1	**Earthwork and Demolition**					
	Site Clearing, heavy	m^2	4550	$ 2.00	$	9,100.00
	Existing feature removal and disposal	m	1000	$ 50.00	$	50,000.00
	Median island removal	m^2	0	$ 75.00	$	-
	Removal and disposal of Pavement (300 thick)	m^2	4774	$ 3.85	$	18,379.90
	Removal and disposal of Seal	m^2	0	$ 0.38	$	-
	Removal and disposal of Kerb	m	0	$ 10.55	$	-
	Compact and trim pavement subgrade	m^2	7174	$ 4.00	$	28,696.00
	Tree removal	No	20	$ 1,000.00	$	20,000.00
	Removal of existing line marking	m	0	$ 2.25	$	-
	Removal of existing ramp	m^2	0	$ 3.85	$	-
	Removal of Existing Concrete Footpath	m^2	0	$ 16.94	$	-
2.2	**Roadworks**					
	Construct pavement as specified					
	200mm crushed rock basecourse	m^2	7174	$ 20.00	$	143,480.00
	200mm crushed limestone subbase	m^2	7174	$ 12.00	$	86,088.00
	Construct pavement seal as specified					
	40 thick intersection mix	m^2	7174	$ 30.00	$	215,220.00
	Prime coat	m^2	7174	$ 1.40	$	10,043.60
	Supply and lay extruded concrete kerbing as shown					
	Semi-mountable (SMK)	m	0	$ 29.55	$	-
	Construct footpaths as specified					
	Compact and trim footpath subgrade (min 450mm depth)	m^2	0	$ 10.00	$	-
	Concrete footpath	m^2	0	$ 103.81	$	-
	Construct traversable median					
	Brick paving including 30 thick sand bedding	m^2	0	$ 67.20	$	-
	Concrete treatment end	m^2	0	$ 60.87	$	-
	Concrete infill	m^2	0	$ 60.87	$	-
	Crossover extension					
	Concrete infill	m^2	0	$ 60.87	$	-
	150mm crushed rock basecourse	m^2	0	$ 15.50	$	-
	Flush pedestrian crossing	m^2	4	$ 20.16	$	80.64
	Ramp installation	No	4	$ 3,000.00	$	12,000.00
2.4	**Signage and Linemarking**					
	Linemarking - Continuity Line	m	1000	$ 0.56	$	560.00
	Linemarking - Broken - Giveway	m	500	$ 0.56	$	280.00
	Signage - Single	No.	6	$ 336.00	$	2,016.00
	Guide post	No.	20	$ 44.80	$	896.00
	Linemarking - Direction Arrow	No.	3	$ 201.60	$	604.80
2.6	**Stormwater Drainage (Provisional Rates)**					
	Proposed Road Side Swale	m	1100	$ 70.00	$	77,000.00
	Culvert Crossing Upgrade	No.	1	$ 10,000.00	$	10,000.00
2.7	**Lighting and Power (Provisional Rates)**					
	Relocation of Existing Services	No.	0	$ 5,000.00	$	-
	TOTAL BUILDER'S WORKS				$	684,444.94
	SUBTOTAL				$	**1,006,333.93**
3	**Contingencies**					
	Contingency allowance items	item	40%	$ 1,006,333.93	$	402,533.57
	TOTAL CONTINGENCIES				$	402,533.57
	GRAND TOTAL				$	**1,408,867.50**

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