



CONSULTING CIVIL & TRAFFIC ENGINEERS, RISK MANAGERS.



Project: Allawuna Landfill Development

Great Southern Highway

Traffic Impact Statement

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GLOSSARY OF TERMS

Abbreviations

AADT	Annual Average Daily Traffic
AUR	Auxiliary Right Turn Treatment
BAL	Basic Left Turn Treatment
BAR	Basic Right Turn Treatment
CHL	Channelised Left Turn Treatment
GEH	Great Eastern Highway
GSH	Great Southern Highway
HV	Heavy Vehicle
Km	Kilometre
Km/h	Kilometres per Hour
MRWA	Main Roads Western Australia
PCE	Passenger Car Equivalent
RAV	Restricted Access Vehicle
SLK	Straight Line Kilometre
Vpd	Vehicles per Day

EXECUTIVE SUMMARY

This report presents the results of the Traffic Impact Statement associated with the proposed development of a landfill site off Great Southern Highway (GSH), located at SLK 26.3 in St Ronans, in the Shire of York. One of the major issues considered in the context of the assessment was to identify the potential impacts of the proposed landfill operation on the intersection of GSH/site access road, and on the local road network in the vicinity of the site.

The results of the assessment indicate that the proposed development will increase the vehicular traffic on GSH in the order of 74 vehicle movements per day. The following summary outlines the details associated, with respect to these anticipated impacts on the road network:

- The traffic generated by the proposed landfill development can be safely accommodated into the existing and future capacity of the road network;
- The predicted daily traffic volumes converted to Passenger Car Equivalents, warrants the need for an acceleration lane for a left turn onto GSH. In accordance with Austroads *Guide to Road Design Part 4A - Unsignalised and Signalised Intersections*, the length of the acceleration lane should be 910m for a fully loaded truck, however the length is recommended from the site access intersection to approximately 100m before the tangent point of the first curve westbound (approximately 450m), as trucks will be leaving the site unloaded;
- The predicted peak hour volumes on GSH and the site access road warrant the provision of a Basic Right Turn treatment (BAR) from GSH. Notwithstanding, an Auxiliary Right Turn (AUR) treatment on GSH, due to the high number of heavy vehicles (20%), is recommended;
- The predicted peak hour volumes on GSH and the site access road warrant the provision of a Basic Left Turn treatment (BAL) from the site access road. Notwithstanding, a Channelised Left Turn (CHL) and free flow slip island for a left-turn onto GSH, in addition to the acceleration lane, is recommended;
- The predicted peak hour volumes on GSH and the site access road warrant the provision of a BAL from GSH. Therefore a localised widening of the shoulder on this approach is recommended;



- The existing trees at the point of intersection currently prevent the required sight distances in both directions when approaching GSH from the minor road, and should be trimmed or removed accordingly;
- The Level of Service on GSH (as shown in Appendix E) will not be impacted due to the addition of site-generated traffic. This section of GSH currently operates at a satisfactory Level of Service and Degree of Saturation and will continue to do so beyond the expected operational lifetime of the landfill development; and
- In relation to localised road improvements, the site access road approach should be sealed to a minimum of 100m from its intersection to GSH. The intersection should be designed to allow for the lane correct movement of pocket road trains.

1.0 INTRODUCTION

1.1. SITA's Proposed Development

SITA Australia Pty Ltd (SITA) is proposing to develop a Class II putrescibles landfill at the Allawuna site (Lots 9926, 26934, 4869 and 5931), Great Southern Highway in St Ronans, in the Shire of York. The proposed life of the landfill site is 40 years.

Proposed access to the site is to be located at SLK 26.3 on the Great Southern Highway (GSH), approximately 20km west of York. The location of the proposed landfill site is shown in its regional context in **Figure 1** below. The proposed access is located approximately 430m west of Wambyn Road as shown in **Figure 2** overleaf.



Figure 1 - Location of Proposed Landfill Site



Figure 2 - Location of Proposed Access

1.2. Purpose

The purpose of this Access Assessment is to assess the traffic impacts of the proposed development on the GSH at this location and recommend any improvements.

1.3. Methodology

The proposed access will be assessed in the following guidelines:

- *MRWA Guidelines for Assessing the Suitability of Routes for Restricted Access Vehicles* (MRWA Guideline)
- *Austroads Guide to Road Design Part 4A - Unsignalised and Signalised Intersections* (Austroads Part 4A)

2.0 EXISTING ROADS

2.1. Traffic Volumes

The Average Weekly Traffic (AWT) volumes were sourced from the MRWA website (attached as Appendix A) and summarised in **Table 1** below.

Site No	Road	Location	AWT	% HV	Data Date
51175	GSH	West of Ashworth Road	1,406	20.1%	07/06/12

Table 1 - Great Southern Highway Traffic Count Data

2.2. Existing Roads

The GSH in the vicinity of the proposed Allawuna access road is an undivided single carriageway consisting of the following cross-section:

- 7.0m wide seal;
- 0.5 metre wide sealed shoulders; and
- 1.0m unsealed shoulder.

The posted speed limit is 110km/h.

The existing access to the proposed landfill site is as an unsealed driveway approximately 5m wide as shown in **Figure 3** below.



Figure 3 - Existing Driveway Looking South



2.3. Crash History

Crash data sourced from MRWA website in the vicinity of the intersection in the five years indicated no crashes have been recorded at this location.

2.4. RAV Network Status

- The GSH is a network 4 Restricted Access Vehicle (RAV) approved route.

3.0 TRANSPORT METRICS AND PROPOSED ROUTES

3.1. Transport Metrics

The proposed transport operations will operate 6 days per week (Monday to Saturday) between 0600 hours and 1800 hours and will be transported by 27.5m Pocket Road Trains (RAV Category 3) as shown in **Figure 4** below.



Figure 4 - Pocket Road Train Configuration (27.5m)

The estimated annual tonnage of waste to be transported to the site is between 150,000 and 250,000 tonnes, which equates to 8 road trains undertaking 3 return trips each day. Up to three trucks per hour will enter the proposed landfill site.

The site will also be accessed by thirteen light vehicles per day (vpd), including one visitor vpd. It is assumed 5 vehicles will be from Perth and 8 from York and will occur during the morning and evening peaks.

The total site-generated traffic is summarised in **Table 2** below.

Vehicle Class	Number of Vehicles	Daily Movements
Pocket Road Train	24	48
Light Vehicle	13	26
TOTAL	37	74

Table 2 - Generated Allawuna Development Traffic



3.2. Route Description

The truck fleet will be leaving from one of SITA's base sites located at either:

- 116 Kurnall Road, Welshpool; or
- 15 Atwell Street, Landsdale.

For every four trucks which leave from Welshpool, one truck will leave from Landsdale. From Welshpool, the route onto GSH will be Orrong Road, Roe Highway and Great Eastern Highway (GEH) and from Landsdale, the route will be Gnangara Road, Beachboro Road North, Reid Highway, Roe Highway and GEH. The truck fleet will end the day parked at either the landfill site or at a depot in Peth, dependent on where their last run finishes. Refer to **Appendix C** for the RAV route layouts.

4.0 WARRANTS FOR IMPROVEMENTS

4.1. Turning Treatments

The warrants for left and right turning improvements will be assessed in accordance with Figure 4.9(a) of Austroads *Guide to Road Design Part 4A – Unsignalised and Signalised Intersections*. This document provides guidelines on the requirements of turning treatments on the major road intersections based on the peak hourly major road traffic volumes and the minor road turning volumes.

4.2. Acceleration Lanes

The warrants for overtaking lanes will be assessed in accordance with the MRWA *Guidelines for Assessing the Suitability of Routes for Restricted Access Vehicles* which provides the following warrants for acceleration lanes onto a RAV network highway:

- The speed limit is at least 80km/h;
- The AADT is greater than 1,000 Passenger Car Equivalent (PCE); and
- There is no overtaking lane on the RAV road at or near the point of entry from a side road.

5.0 TRAFFIC IMPACT STATEMENT

5.1. Traffic Volumes

The proposed development will add 74 vehicles to the GSH each day, increasing the AWT from 1,406 vpd to 1,480 vpd.

The peak hour traffic volumes were sourced from MRWA website (attached as **Appendix B**) and summarised in **Table 3** below.

Site No	Road	Location	AM		PM	
			Westbound	Eastbound	Westbound	Eastbound
51175	GSH	West of Ashworth Road	64	45	56	81

Table 3 - Great Southern Highway Peak Hour Data

5.2. Sight Distance

The proposed site access has also been assessed in accordance with Austroads Part 4A.

From Table 3.2 of Austroads Part 4A, minimum requirements for the approach sight distance and safe intersection sight distance for 120 km/h, have been documented in **Table 4** below.

		Sight Distance (m)
Safe Intersection Sight Distance	Minimum Required	285
	Measured (East)	450
	Measured (West)	580

Table 4 - Safe Intersection Sight Distance

The observed sight distances from the proposed access are shown in **Photograph 1** and **Photograph 2** overleaf.



Photograph 1 - Sight Distance Looking West



Photograph 2 - Sight Distance Looking East

The available sight distance is excellent in both directions and exceeds the minimum required distances for the intersection, taking into consideration that trimming of existing overhanging trees either side of the intersection is required.

The existing track intersects with GSH at an angle of approximately 90 degrees and therefore is acceptable. The Approach Sight Distance (ASD) for trucks should be provided at intersections to ensure that trucks approaching the intersection, at the 85th percentile operating speed of trucks, are able to stop safely. ASD for trucks on intersection approaches should be measured from truck driver eye height (2.4 m) to pavement level at the stop or holding line (0.0 m).

5.3. Acceleration Lane

The existing AWT on GSH now and into the future has been converted using the PCE factors shown in **Appendix D**, and is shown in **Table 5** below.

	AWT (vpd)	PCE (vpd)
Pre Development	1,406	2,349
Post Development	1,480	2,638

Table 5 - PCE Volumes

The pre development and post development PCE, in accordance with Austroads 4A, exceeds 1,000, and therefore a left turn acceleration lane is required.

From Table 8 of the RAV Guidelines, the acceleration lane length should be 910m for a 1% downhill grade, however this table considers only loaded trucks. The truck leaving the site will be empty and therefore the length required to accelerate up to 70% of the posted speed limit will be less than 910m. It is desirable to merge the trucks before the curve located 580m west of the proposed access, therefore it is recommended that the merge be completed 100m prior to the tangent point of the curve. This should allow adequate distance for the empty trucks to accelerate and merge.

5.4. Turning Treatments

The warrants for the left and right turn improvements will be assessed using Figure 4.9 of Austroads Part 4A. The through, left and right turn volumes, as shown in **Figure 5** overleaf, to be applied to Figure 4.9 are shown in Table 6 also overleaf.

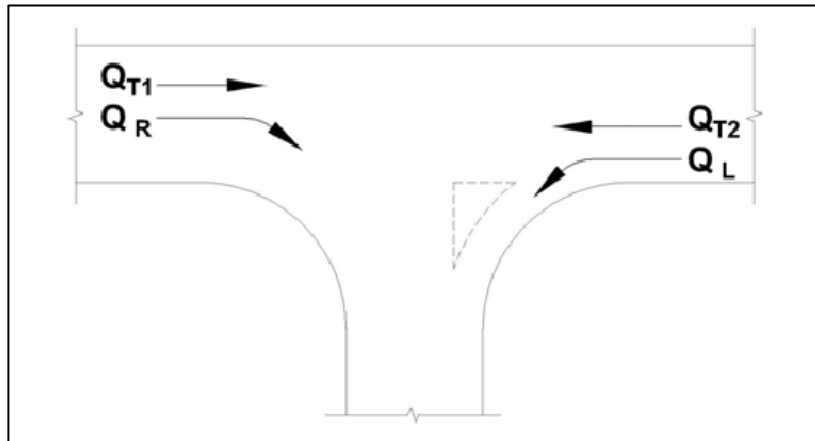


Figure 5 - Calculation of the Major Road Traffic Volume Parameter Q_m

Turn Type	Q_{T1}	Q_{T2}	Q_R	Q_L	Q_M
Right (AM)	45	64	3 HV + 5 LV	8 LV	117
Right (PM)	81	56	3 HV	0	137
Left (AM)		64		8 LV	56
Left (PM)		56		0	56

Table 6 - Major Road Turning and Through Volumes

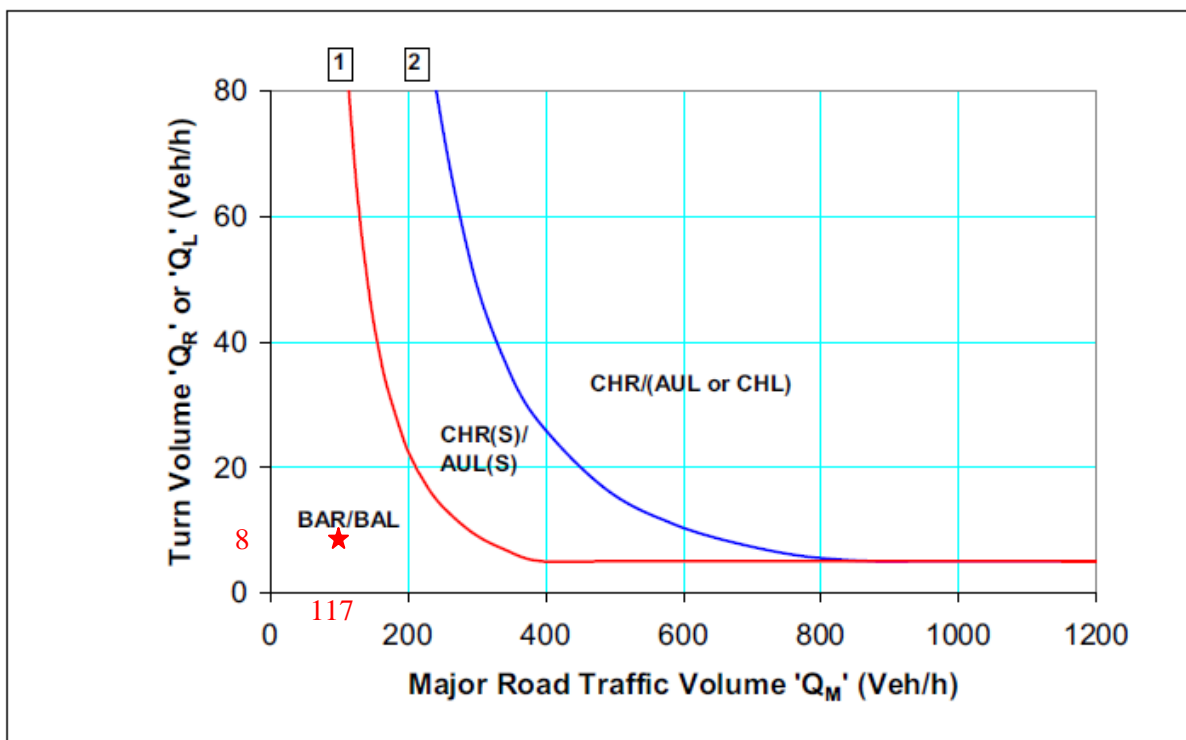


Figure 6 - AM Peak Right Turning Warrants

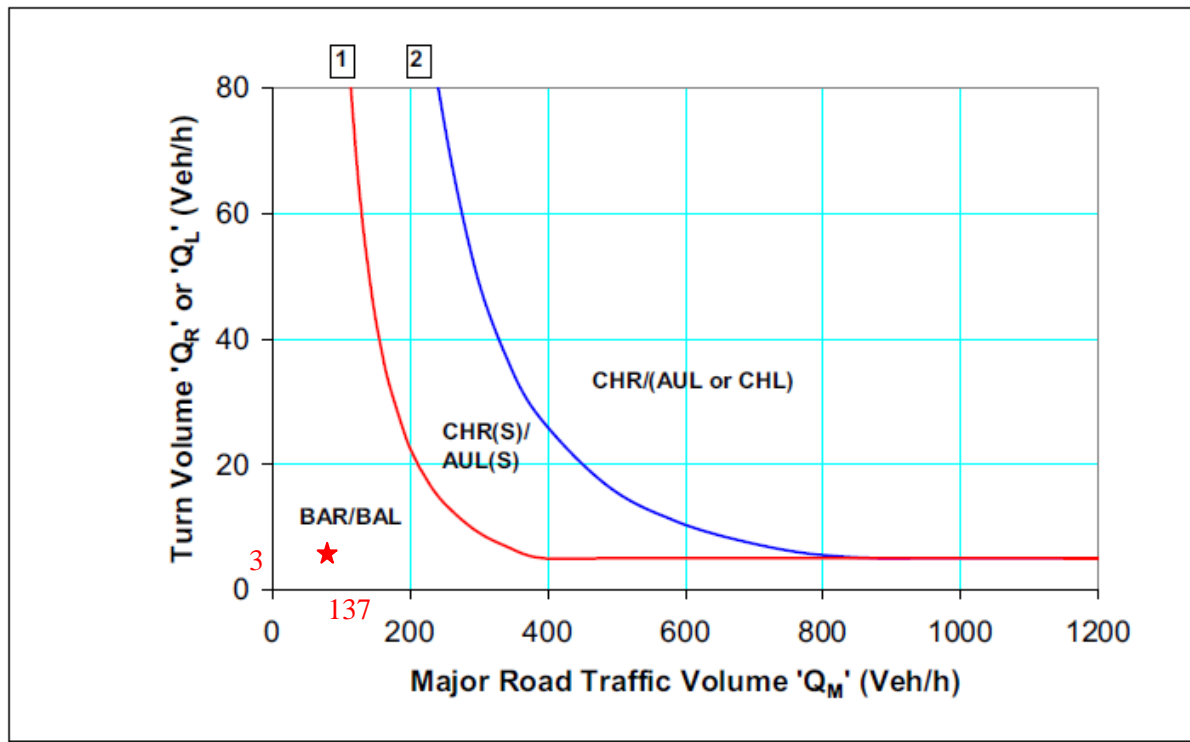


Figure 7 - PM Peak Right Turning Warrants

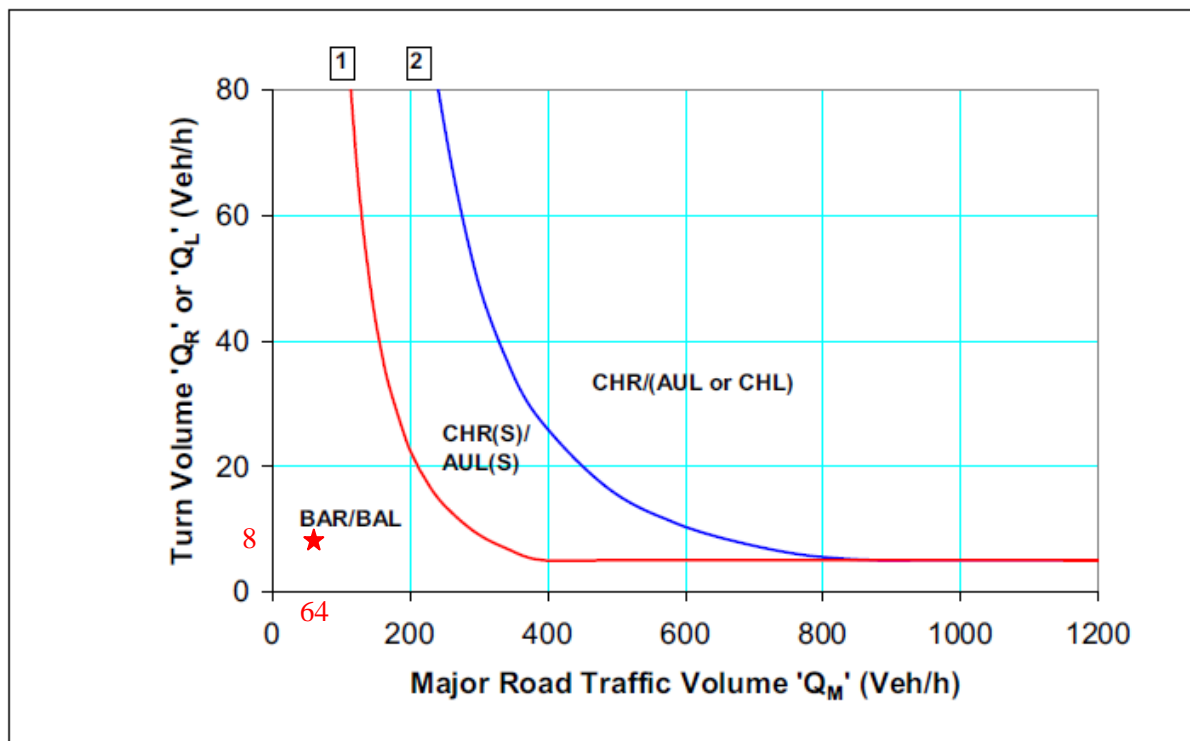


Figure 8 - AM Peak Left Turning Warrants

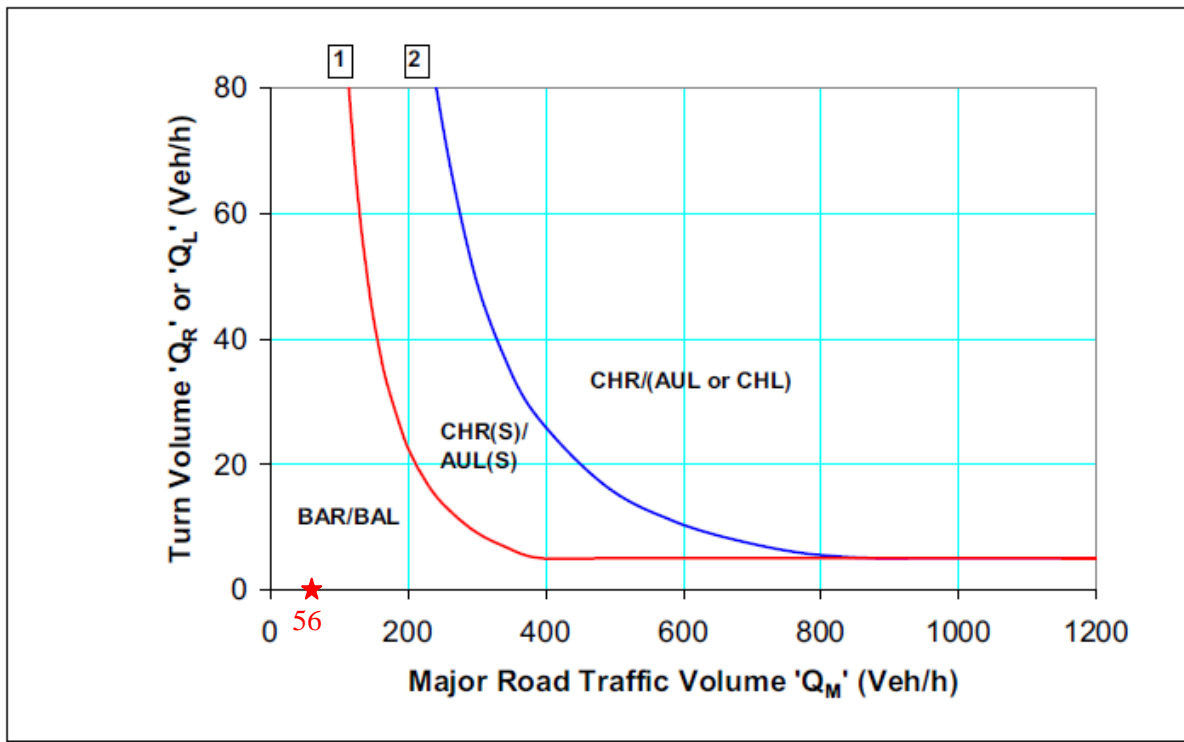


Figure 9 - PM Peak Left Turning Warrants

In conclusion the warranted right and left turn treatments for the proposed access are BAL for the left turn and a BAR for the right turn as shown in **Figure 10** below.

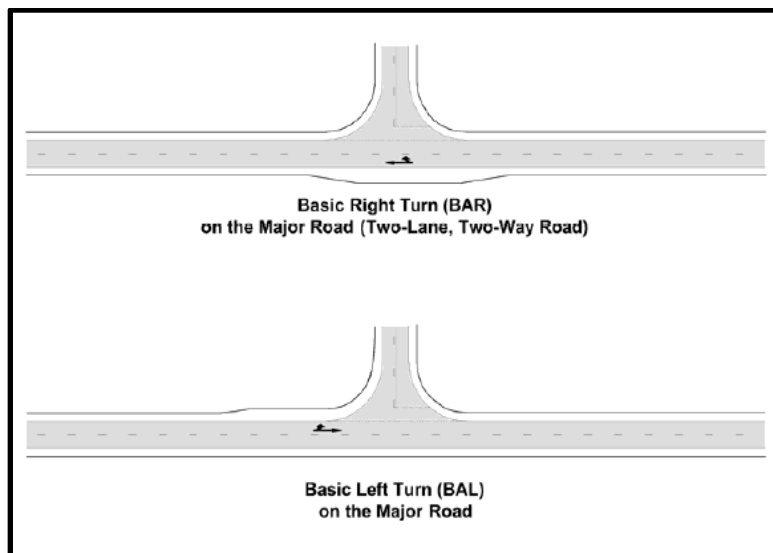


Figure 10 - Typical Rural Basic Turn Treatments for Unsignalised Intersections

Notwithstanding that a BAR on the major road is warranted, it is recommended that an AUR, as shown in **Figure 11** overleaf, be provided due to the high number of heavy vehicles (20%) on this section of road.

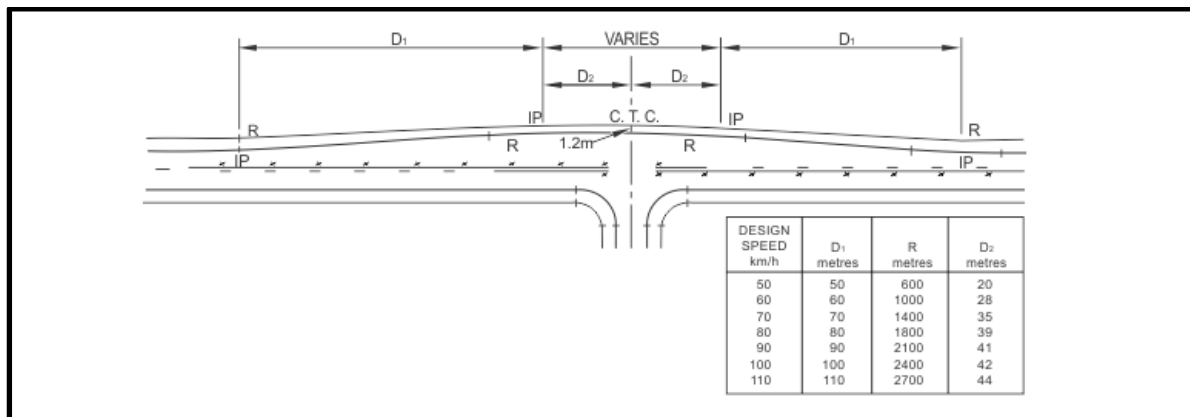


Figure 11 - Typical Main Roads Type AUR Treatment

With the inclusion of a left-turn acceleration lane, it is recommended that a free flow slip lane, as shown in **Figure 12** below, be provided for the left turn on the minor road.

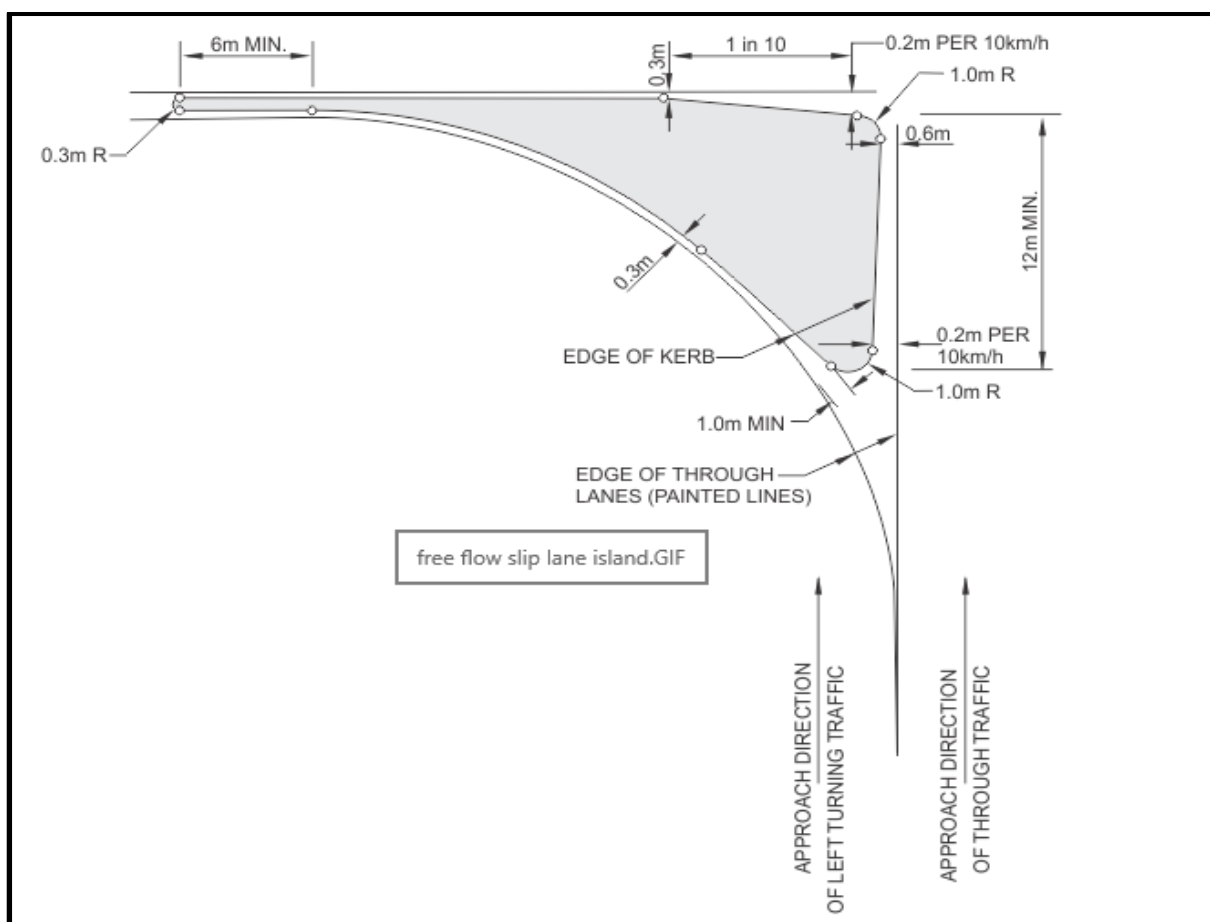


Figure 12 - Typical Main Roads Free Slip Island

In addition to the left turn free flow slip lane, it is recommended that a CHL treatment, as shown in **Figure 13** below, be provided for the minor road. This will enable the trucks to negotiate the left turn unimpeded and accelerate up to the desired speed before merging with the GSH through traffic.

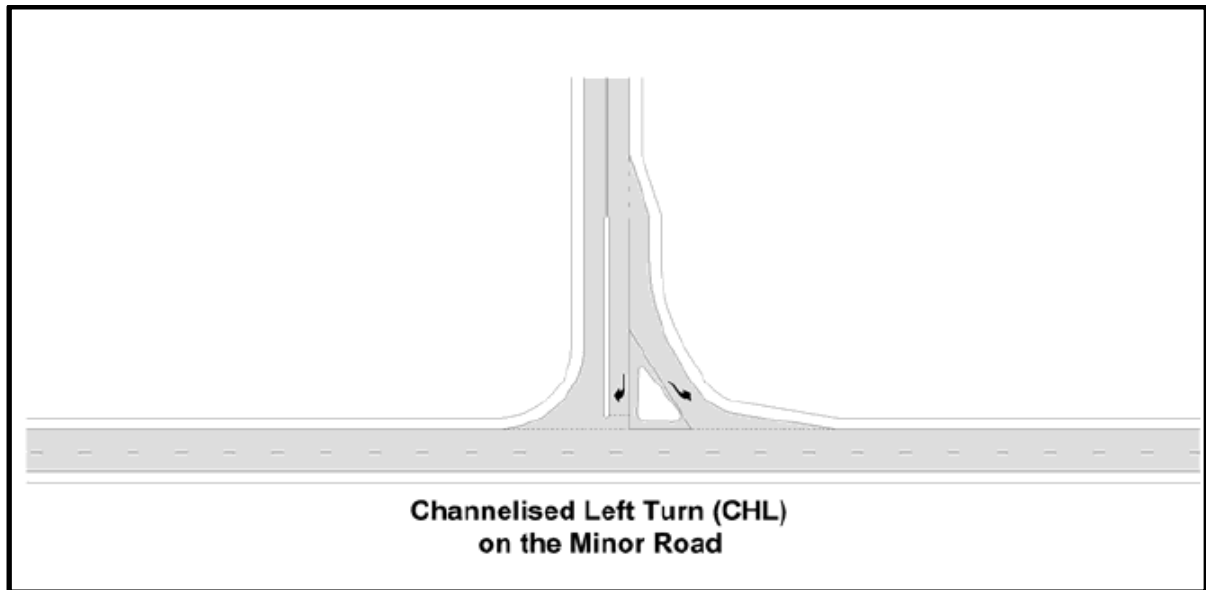


Figure 13 - Typical Channelised Turn Treatments for Unsignalised Intersections

6.0 CONCLUSION AND RECOMMENDATIONS

The overall increase in traffic associated with the development of the landfill at Allawuna is in the order of 24 triple road trains and 13 light vehicles (both inbound and outbound). The development is expected to have a negligible operational impact on both the Great Southern Highway (GSH)/Allawuna site access road intersection, and on the local road network in the vicinity of the proposed operation.

The projected peak hour through and turning movements warrant the provision of Basic Left Turn (BAL) treatments and a Basic Right Turn (BAR) treatment on GSH and on the site access road.

To allow for the right turning RAVs into the site to move off the carriageway to allow for through traffic, an Auxiliary Right Turn (AUR) treatment is recommended instead of a BAR. This is due to the high number of heavy vehicles (20%).

To allow for the left turn of RAV's into the site, a BAL treatment in the form of a widened shoulder is recommended.

To allow for the left turn of RAV's onto GSH, a Channelised Left Turn (CHL) treatment instead of a BAL is recommended. Additionally, existing and future projected traffic volumes on GSH warrant the provision of an acceleration lane for vehicles turning left onto GSH from the site access road. An acceleration lane westbound is therefore recommended.

It is also recommended that the approach on the site access road to GSH is sealed with a minimum length of 100m with centre line marking and a holding line. The intersection layout should be designed to ensure the safe turning movement of the RAV in and out of the access road.

Based upon a review and assessment of the existing and future traffic scenario at the GSH/Allawuna site access road intersection, no major changes to the road network are recommended.



APPENDIX A – MRWA TRAFFIC DATA

Short Term Count Summary by Road

Region : Wheatbelt North

Count : Combined

Road Name : Chidlow York

Average : Monday - Friday (AWT)

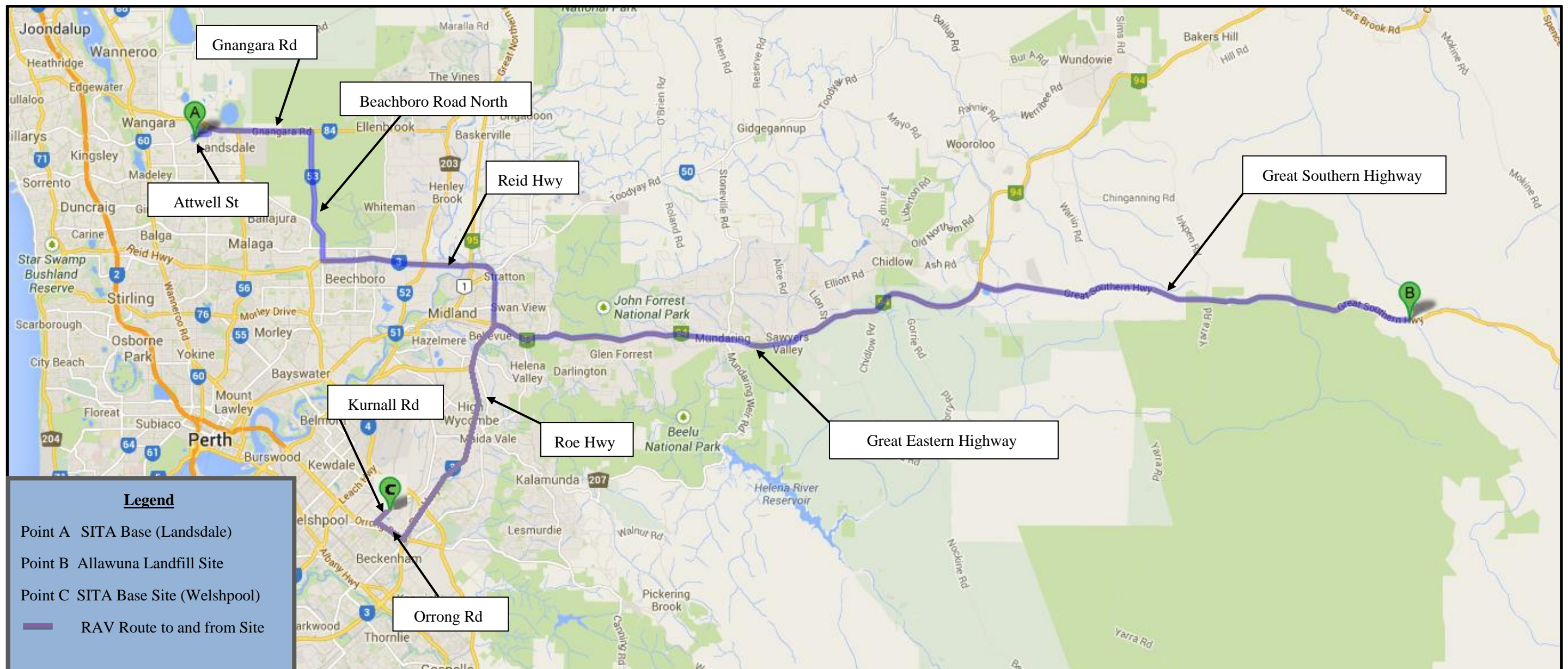
	Vehicle Volumes by Classification (Ausroads94)														Peak Statistics							
	1	2	3	4	5	6	7	8	9	10	11	12	% Heavy	Vehicles	AM				PM			
															1/4hr		1hr		1/4hr		1hr	
															Hour	Vol	Hour	Vol	Hour	Vol	Hour	Vol
Chidlow York - W of Inkpen Rd (16775)																						
03/04/2008	1261	75	94	22	3	3	9	5	37	33	58	0		1600	0845	35	0845	123	1700	38	1630	145
%	78.8	4.7	5.9	1.4	0.2	0.2	0.6	0.3	2.3	2.1	3.6	0.0	16.5									
Chidlow York - E of Inkpen Rd (16774)																						
03/04/2008	1464	85	119	25	2	4	6	7	19	35	47	0		1813	0945	50	0900	150	1730	51	1645	183
%	80.8	4.7	6.6	1.4	0.1	0.2	0.3	0.4	1.0	1.9	2.6	0.0	14.6									
27/09/2007	1445	111	75	24	1	4	8	6	29	17	21	0		1742	0915	34	0900	128	1545	41	1500	151
%	83.0	6.4	4.3	1.4	0.1	0.2	0.5	0.3	1.7	1.0	1.2	0.0	10.6									
Chidlow York - E of Berry Brow Rd (19171)																						
03/02/2005	1356	71	86	30	3	2	8	11	18	12	28	1		1625	0815	36	0745	133	1715	40	1645	141
%	83.4	4.4	5.3	1.8	0.2	0.1	0.5	0.7	1.1	0.7	1.7	0.1	12.2									
Chidlow York - W of Ashworth Rd (51175)																						
07/06/2012	1082	44	184	17	1	6	13	6	31	10	14	0		1406	0715	29	0845	103	1715	32	1630	123
%	77.0	3.1	13.1	1.2	0.1	0.4	0.9	0.4	2.2	0.7	1.0	0.0	20.1									
Chidlow York - S of Morris Edwards Dr (16720)																						
14/11/2012	1075	55	125	16	1	4	9	7	36	14	17	0		1359	0815	29	0815	109	1600	29	1600	107
%	79.1	4.0	9.2	1.2	0.1	0.3	0.7	0.5	2.6	1.0	1.3	0.0	16.9									
02/10/2007	1358	85	96	23	2	7	9	10	37	18	28	0		1670	0915	34	0915	130	1600	39	1530	137
%	81.3	5.1	5.7	1.4	0.1	0.4	0.5	0.6	2.2	1.1	1.7	0.0	13.8									
Chidlow York - E of Morris Edwards Dr (51174)																						
23/05/2012	1021	73	116	13	2	5	10	7	36	8	17	0		1302	0930	29	0915	104	1700	29	1615	103
%	78.4	5.6	8.9	1.0	0.2	0.4	0.8	0.5	2.8	0.6	1.3	0.0	16.4									



APPENDIX B – MRWA PEAK HOUR TRAFFIC DATA

Peak Statistics																			
		Mon		Tue		Wed		Thu		Fri		Sat		Sun		Mon - Fri		Mon - Sun	
		E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E	W
AM	1/4 Hour	1100	0715	1130	0900	0945	0830	1145	0715	1030	0915	1145	1000	1030	1145	1030	0715	1145	1000
	1/4 Hr Vol	17	19	14	21	15	22	13	22	17	20	26	25	28	25	12	19	16	17
	1/2 Hour	1045	0715	1130	0715	0930	0830	0845	0700	1030	0900	1130	0945	1145	1145	1030	0715	1145	1000
	1/2 Hr Vol	32	33	25	36	26	40	22	36	31	38	51	46	56	51	24	33	32	33
	1 Hour	1015	0800	1115	0815	1145	0800	0845	0845	1130	0845	1130	0945	1115	1115	1145	0815	1130	0930
	1 Hr Vol	56	58	42	68	47	67	43	64	56	75	103	84	111	93	45	64	63	62
	1 Hr Fact	.84	.9667	.7778	.8095	.94	.7614	.9485	.9412	.84	.9534	.9421	.8289	.8495	.9058	.9256	.9674	.9591	.9006
	2 Hour	1030	0715	1030	0715	0915	0715	1145	0815	1030	0745	1130	0930	1030	1145	1130	0715	1030	0830
	2 Hr Vol	98	113	78	125	89	122	89	122	110	140	189	156	217	180	90	123	123	123
PM	1/4 Hour	1600	1245	1700	1515	1645	1445	1715	1345	1715	1430	1215	1500	1200	1515	1715	1445	1715	1500
	1/4 Hr Vol	19	14	23	15	20	19	26	18	31	19	27	29	33	37	23	15	21	19
	1/2 Hour	1700	1415	1700	1515	1630	1430	1700	1445	1700	1415	1200	1500	1200	1500	1700	1430	1700	1500
	1/2 Hr Vol	36	26	43	26	39	34	45	31	62	38	52	51	58	73	43	29	41	38
	1 Hour	1700	1230	1630	1445	1600	1530	1700	1430	1645	1415	1200	1500	1200	1500	1630	1430	1630	1445
	1 Hr Vol	70	50	76	46	70	59	80	60	114	74	97	93	99	145	81	56	78	74
	1 Hr Fact	.9722	.8721	.8444	.7667	.875	.8939	.7692	.8491	.9194	.9569	.8872	.811	.7577	.971	.8924	.9529	.9332	.9526
	2 Hour	1600	1245	1600	1330	1600	1430	1600	1345	1645	1345	1200	1400	1200	1430	1600	1345	1600	1400
	2 Hr Vol	135	97	140	87	127	115	148	114	208	136	174	166	170	266	151	108	147	141
Peak	12 Hour	0700	0515	0715	0500	0730	0600	0730	0530	0800	0630	0715	0700	0800	0730	0730	0530	0715	0600
	12 Hr Vol	583	572	497	535	547	583	581	629	779	694	823	758	772	934	605	607	665	677

APPENDIX C – PROPOSED HAULAGE ROUTES





APPENDIX D – PASSENGER CAR EQUIVALENTS

AUSTROADS Vehicle Class	Description	Flat Terrain	Rolling Terrain	Mountainous Terrain
1	Car	1.0	1.0	1.0
2	Car Towing	1.0	1.3	2.0
3	Two Axle Truck/Bus	1.2	1.7	3.0
4	Three Axle Truck/Bus	1.7	3.5	6.0
5	Four Axle Truck	2.0	5.0	8.0
6	Three Axle Articulated Truck/Bus	2.5	5.0	10.0
7	Four Axle Articulated Truck	2.5	5.0	10.0
8	Five Axle Articulated Truck	2.5	5.0	10.0
9	Six Axle Articulated Truck	4.0	10.0	16.0
10	B Double	4.0	10.0	16.0
11	Double Road Train	9.0	22.0	35.0
12	Triple and Quad Road Trains	9.0	22.0	35.0



APPENDIX E – ROAD CAPACITY ASSESSMENT

	Year	% No Passing Zones	AADT	PCE	No. of Overtaking Lanes	Direction	Total Length of Overtaking Lanes (km)	LoS
Section 1	2013	61%	2,264	6,500	1	Westbound	1.00	B
	2014		2,519	7,526				B
Section 2	2013	56%	1,357	2,349	3	2 Westbound 1 Eastbound	3.61	B
	2014		1,541	3,043				B