



Traffic Impact Statement

Project: Gairdner 2021 Emergency OBH Expansion
Client: CBH
Author: James Bridge
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CONSULTING CIVIL AND TRAFFIC ENGINEERS
1 ST. FLOOR, 908 ALBANY HIGHWAY, EAST VICTORIA PARK WA 6101.
PHONE|+61 8 9355 1300
FACSIMILE| +61 8 9355 1922
EMAIL| admin@shawmac.com.au





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Version	Prepared By	Reviewed By	Approved By	Date
A	J. Bridge	I. Broadley	J. Bridge	29/06/21

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1. Introduction

1.1. Background

CBH are proposing to construct an emergency Open Bulkhead (OBH) at their existing Gairdner site in anticipation of excess storage demand from the 2021/2022 harvest.

CBH propose to construct an additional 39,300 of storage with two new emergency OBH's (TBH 01 & 02) which will increase the site storage from 305,390t to 344,690t. Refer to **Appendix A – CBH Concept Plan** for details of the proposed emergency expansion.

The emergency storage is anticipated to be in place for one year only.

Shawmac has been engaged by CBH to prepare a Traffic Impact Statement assessing the proposed emergency expansion.

Access to the emergency bulkheads will be through the existing Gairdner OBH site, which is accessed by the South Coast Highway.

Refer to **Figure 1** and **Figure 2** for the project location and proposed emergency bulkhead location, respectively.



Figure 1: Project Location



Figure 2: Aerial View – Proposed Emergency Bulkhead

1.2. Previous Studies

At this time there is no known previous studies related to traffic impact assessments for the site provided to Shawmac for assessment/background support.

2. Existing Situation

2.1. Road Network

The layout and hierarchy of the existing local road network according to the Main Roads WA Road Information Mapping System is shown in **Figure 3**.



Figure 3: Adjacent Road Network

2.2. Carriageway Width and Cross Section

The configuration of the relevant roads is summarised in **Table 1**.

Table 1: Road Configuration

Road and Location	Road Type	Cross Section	Sealed Pavement Width (Approx.)
South Coast Highway	Primary Distributor	2 lane single carriageway - 9m Formation	8.0-9.0

2.3. Traffic Volumes

The available traffic count data for the surrounding roads were sourced from MRWA Traffic Map.

The traffic counts sourced for South Coast Highway (North of Gairdner South Rd SLK 145.50) was recorded in 2018/19. Two other traffic count locations, closest to the site, demonstrated that from 2016/17 to 2018/19 and 19/20 there was a reduction in overall traffic volumes. Therefore, for what is considered a conservative

assumption, it is assumed that the 2018/19 traffic volumes for the closest traffic count on South Coast Highway are a representative of the expected 2021/22 volumes, although it is likely that actual traffic volumes would be less.

Detailed traffic count data is attached in **Appendix B – Traffic Count**. They are also summarised in **Table 2** and **Table 3**.

Table 2: Daily Traffic Volumes

Road / Direction	Location	Daily Volume	Estimated Daily (2021/22)	Data Source
South Coast Highway	North of Gairdner South Rd	363	363	MRWA (2018/19)

Table 3: Peak Hour Traffic Volumes

Road / Direction	Location	Existing		Estimated 2021/22	
		AM Peak	PM Peak	AM Peak	PM Peak (worst-case)
South Coast Highway /NORTH	North of Gairdner South Rd	18	17	18	17
Wubin-Mullewa Road / SOUTH	North of Gairdner South Rd	13	21	13	21

2.4. RAV Status

As per MRWA HVS network mapping tool:

- South Coast Highway is categorised under Tandem Drive RAV 7.3 / Tri Drive 4.3 network with no condition(s).

Figure 4 shows the RAV network for the road network in the vicinity of the site.

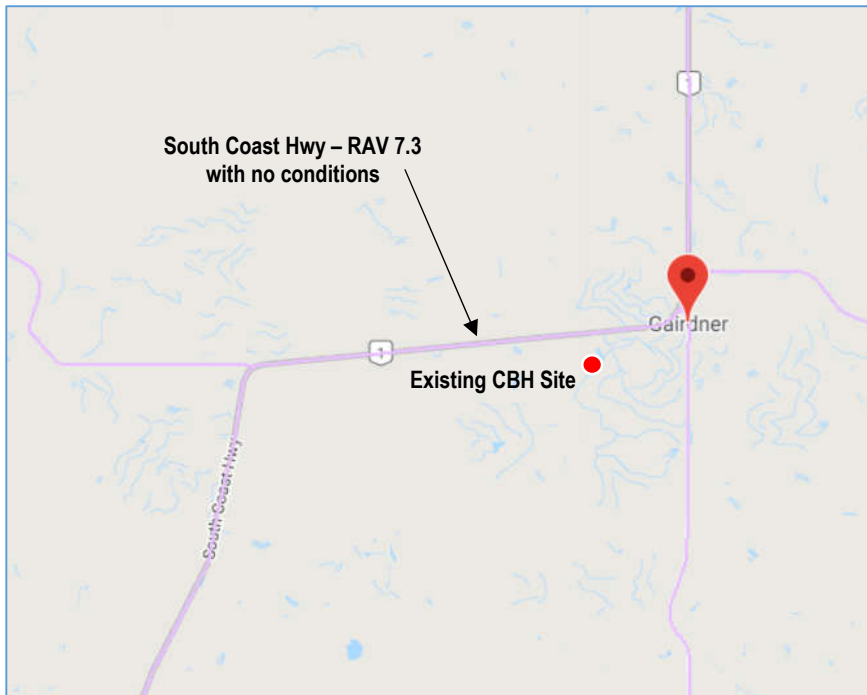


Figure 4: Tandem Drive RAV Network

2.5. Speed Limit

As per MRWA Road Information Mapping System, South Coast Highway is operating under 110 km/hr speed limit.

It is understood that the CBH Access Road operates under a 20km/hr speed limit.

The speed limit of the adjacent road network is shown below in **Figure 5**.

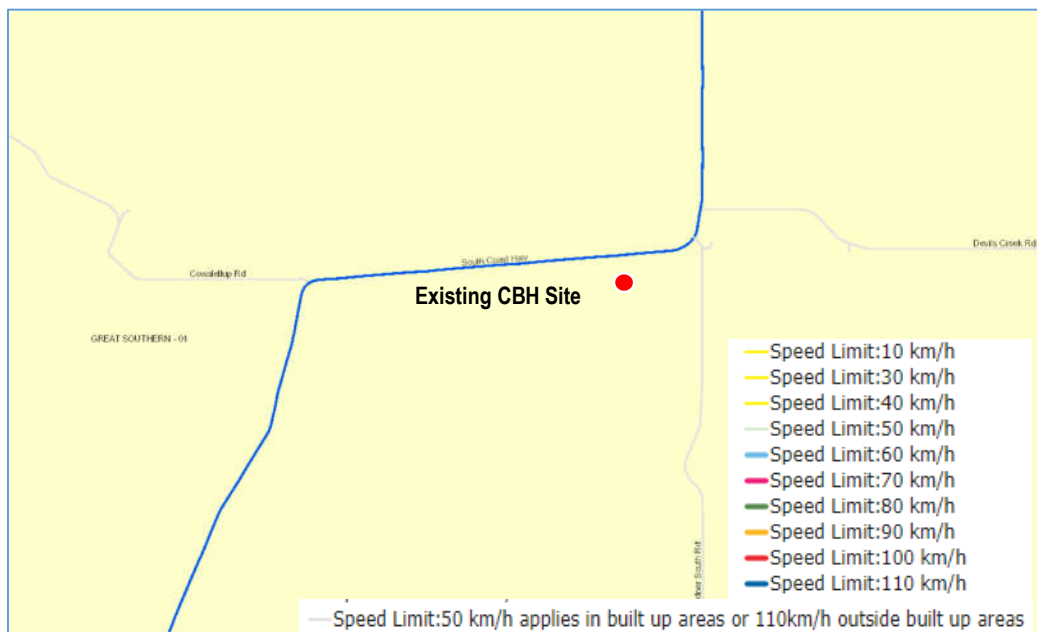


Figure 5: Speed Zoning



2.6. Crash History

Crash data for the relevant roads in close proximity to the intersection were sourced from MRWA Crash Analysis Reporting System (CARS) for the 5-year period ending 31/12/2020. The report is summarised in **Table 4**.

Table 4: Crash History

Location	Number of Crashes	MR Nature and Location	Severity
South Coast Highway	0	N/A	N/A

As shown, there have been no crashes recorded.

2.7. Changes to Surrounding Transport Networks

There are no known changes to the adjacent network that have the potential to affect the assessment.

3. Transport Logistics

3.1. Proposed Development

The existing CBH facility has 305,390 tonnes of storage capacity. The proposed emergency bulkhead involves construction of two emergency bulkheads with a total of 39,300 tonnes additional storage capacity.

CBH have advised that the nameplate capacity is seldom able to be achieved. This is because of “loss by division/loss by commodity” where multiple grain types are required to be stored/tarped within the same OBH, resulting in less efficient storage. CBH have advised that maximum effective storage capacity is generally around 85% of nameplate i.e., there is 15% lost due to loss by division/loss by commodity inefficiency. The effective capacities are therefore 259,583t at present and 33,405t (292,987t total) after the emergency OBH expansion.

3.2. Proposed Haulage Vehicle

It is proposed to use RAV 7 trucks up to 36.5m long for haulage of grains. Refer **Figure 6** for typical configurations of the RAV 7 vehicles.

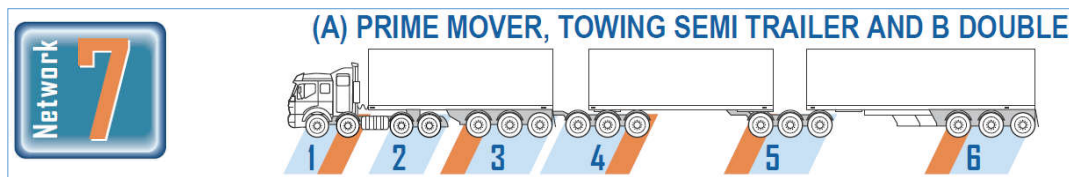


Figure 6: Typical Tandem Drive RAV 7 Trucks

3.3. Operating Hours and Receival Period

The campaign period for receival of grains will start mid-October and last 2-3 months. It is noted that the amount of daily receival varies depending on the supply.

CBH propose to operate the site 12 hours a day (6 AM to 6 PM) and Monday to Sunday with minor variations of start and finish times.

3.4. 5-year Average Traffic Data

CBH have provided the past 5-year average traffic data associated with the Gairdner Site as follows:

- Average receivals per year – 103,376t.
- Maximum receivals per year – 144,272 (2018/19).
- Average truck payload – 41t
- Origin direction split – 73.4% north, 8.4% south, 11.6% east, 6.6% west.

The 5-year average traffic data indicates that the site is currently not being loaded to full capacity. However, CBH is anticipating increases in received tonnes to the site.



Therefore, CBH are proposing to construct the emergency OBH to increase site capacity so that more grain can be stored through the harvest and inefficient out loading movements within the harvest period are avoided.

3.5. Predicted Traffic without Emergency OBH

CBH are proposing to construct the emergency OBH to increase site capacity so that more grain can be stored through the harvest and inefficient out loading movements within the harvest period are avoided. During the harvest, once site capacity is reached, out loading movements may be required to restore capacity and allow grain to continue to be received from the nearby farms. This will involve shifting the grain from Gairdner to the next available site with storage capacity, with movement occurring towards the export port. In this case, movements would be northwest (in the direction of Kwinana Port), likely to CBH's next primary receival site; Borden. This double-handling of grain is inefficient in terms of cost and adds additional traffic to the surrounding road network.

For comparative purposes it is useful to assess what would occur if the proposed emergency bulkheads are not constructed.

CBH expect that the 2021/2022 harvest will exceed the existing effective site capacity by approximately the planned volume of the effective emergency storage. This would result in receivals of approximately 344,690t (292,987t x 85% efficiency) which is greater than any of the previous 5-years and 33,405t greater than the existing effective site capacity. Based on the average truck payload of 41, this would result in an additional 815 truck movements within the harvest period for out loading (1,630 additional trucks when considering both in and out movements). If the emergency OBH is constructed, then the 815 truck out loading movements (1,630 including both in and out movements) still need to occur to move the grain for export, but this would occur outside the harvest period, when there are considerably less trucks on the road network.

3.6. Predicted Traffic with Emergency OBH

As discussed previously, CBH expect that the 2021/2022 harvest will result in approximately 292,987t of grain being transported to the Gairdner Site. Based on the average payload of 41t, **Table 5** provides an estimate of the 21/22 harvest period truck movements, with and without the proposed emergency OBH and with comparison to the previous 5-year average and maximum volumes and movements.

Table 5: Harvest Truck Movement Comparison

Item	5-year Average	5-year Maximum	21/22 Without Emergency OBH	21/22 With Emergency OBH
Tonnes Received	103,376	144,272	292,987	292,987
Effective Site Capacity	259,582	259,582	259,582	292,987
Truck Payload (tonnes)	41	41	41	41
Total Harvest Receival Movements	2,521	3,519	7,146	7,146
Total Harvest Out loading Movements	0	0	815	0
Total Harvest Movements	2,521	3,519	7,961	7,146
Total Movements (In & Out) During Harvest Period	5,043	7,038	15,922	14,292

As shown, the movements for 2021/2022 are expected to exceed the 5-year average/maximum, but the construction of the emergency OBH allows movements to be reduced in comparison to the expected existing full capacity scenario where the emergency OBH is not installed for the 2021/2022 harvest.

3.7. Haulage Route

CBH have provided an estimation of the proportion of deliveries coming from paddocks either north, south, west or east of the existing site (refer **Table 6**).

Table 6: Receival Delivery Proportions

Location/Direction	Percentage of Product
Trucks delivering from NORTH of site	73.4%
Trucks delivering from SOUTH of site	8.4%
Trucks delivering from EAST of site	11.6%
Trucks delivering from WEST of site	6.6%

From interpretation of the existing RAV network (refer **Figure 7**), it is expected that the 80% of the north, 70% of the south and 100% of the east deliveries will come from the south of the existing site via South Coast Highway, Gairdner South Road and Devils Creek Road, respectively. It is anticipated that the rest of the deliveries will come from the west of the site via South Coast Highway. Refer **Figure 8** for east and west delivery proportions for the South Coast Highway and CBH Entry.

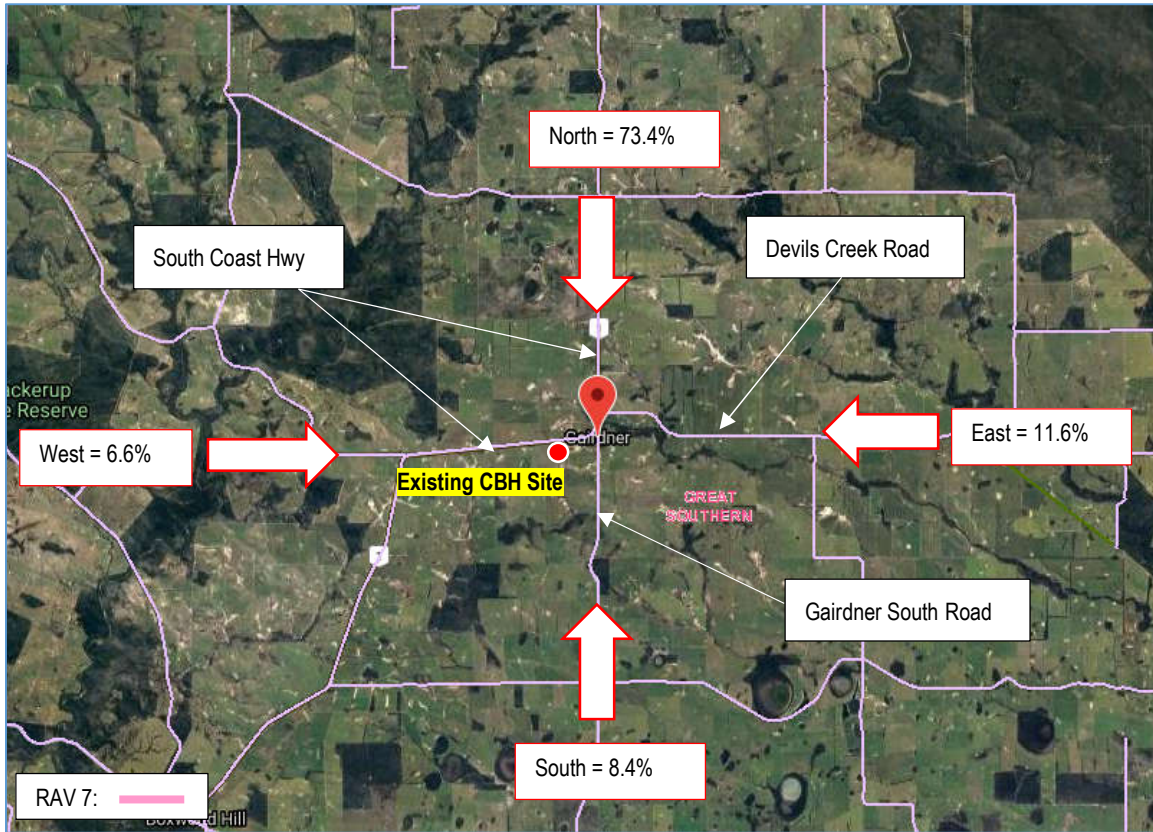


Figure 7: Receival Delivery Proportions

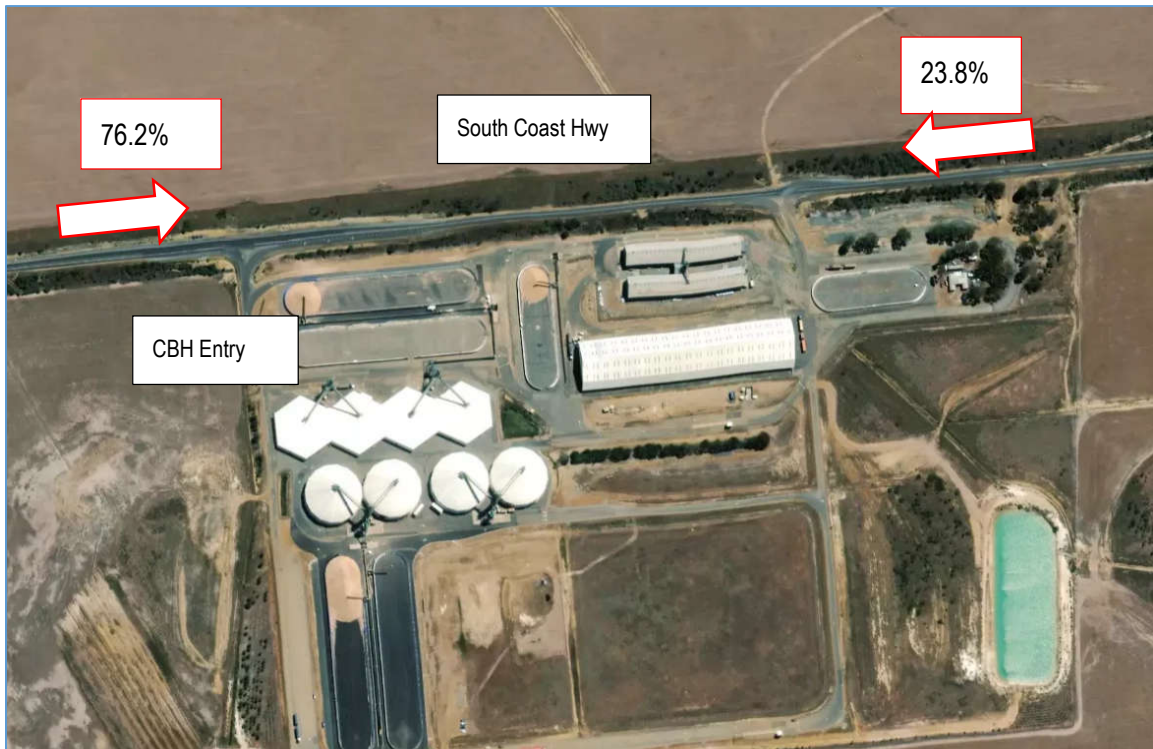


Figure 8: Receival Delivery Proportions - Intersection

Outloading traffic distribution has been assumed to be the same considering the road connectivity.

Table 7: Harvest Truck Movement Direction Split

Location	% Split	Number of Trucks During Harvest (IN ONLY)		
		Existing	Emergency	Total ¹
Trucks delivering from NORTH of site	73.4%	4,647	598	5245
Trucks delivering from SOUTH of site	8.4%	532	68	600
Trucks delivering from EAST of site	11.6%	734	95	829
Trucks delivering from WEST of site	6.6%	418	54	472
SUBTOTAL	100.0%	6,331	815	7,146
Trucks delivering from East of site	76.2%	4,824	621	5,445
Trucks delivering from West site	23.8%	1,507	194	1,701
SUBTOTAL	100.0%	6,331	815	7,146

¹ Figures may not sum due to rounding

Figure 9 shows the predicted harvest period traffic distribution to the surrounding road network.



Figure 9: Harvest Period Movement Volumes

3.8. Peak Period Assessment

Although the harvest period is expected to occur over 2-3 months, it is known that there is a peak within this period. Specific data for Gairdner was not available to define this peak period, but data from other CBH sites indicate that generally 80-85% of grain is received within 28 days.

For the purposes of assessing the peak period impacts, the following assumptions have been made:

- 85% of total grain tonnes are received within, and evenly distributed over 28 days.
- Truck deliveries occur over a 12-hour period, and 10% of all daily volumes are received within a peak hour.

Based on these assumptions:

- 6,074 truck movements will occur during the 28-day peak.
- 217 movements will occur each day of the 28-day peak.
- 22 movements will occur each day during a peak hour.



Figure 10 shows the predicted harvest peak daily and peak hour traffic distribution.



Figure 10: Peak Daily / Hour Volumes

This volume of traffic is considered to be low and can be readily accommodated within the existing capacity of the road network.

4. Traffic Impact Assessment

4.1. Assessment Years

The development is assessed based on current network condition (2021).

The following assessment is based on the emergency bulkhead being installed.

4.2. Impact on Roads

4.3. Road Minimum Widths

The sealed widths of the surrounding roads were checked against the Rural Road Minimum Width in accordance with Appendix A of the MRWA RAV assessment guideline. The comparison is shown below in **Table 8**.

Table 8: Rural Road Minimum Width

Road	Location	Existing AADT (No CBH traffic)	Proposed AADT (Peak)	Speed (km/hr)	RAV Status	Required Minimum Seal (m)	Existing Width* (m)
South Coast Highway	West of Site	185	237	110	RAV 7	6.0	8.0-9.0
South Coast Highway	East of Site	178	363	110	RAV 7	6.0	8.0-9.0

Notes: *Sealed width or Carriageway width if it is unsealed.

As per the above, the existing road sealed widths comply with the minimum requirements.

4.4. Road Safety

The crash history of the adjacent road network (as previously outlined in **Section 2.6**) does not suggest any particular safety issues (there have been no crashes recorded) in the existing road network. The additional traffic movements generated by the emergency bulkhead is not considered to increase the likelihood of crashes to unacceptable levels. Further, relative to the scenario where the emergency bulkhead is not installed, it is expected that the construction of the emergency bulkhead results in a positive impact to road safety as it reduces out loading movements during the busy harvest period.

4.5. Intersections

4.6. Safe Intersection Sight Distance

The Safe Intersection Sight Distance (SISD) is the minimum distance which should be provided on the major road at any intersection. SISD provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation (e.g. in the worst case, stalling across the traffic lanes) and to decelerate to a stop before reaching the collision point.

The SISD is assessed based on the following parameters:

- An observation time of 3 seconds as per Austroads Part 3;
- A reaction time of 2.5 seconds;
- Deceleration coefficients for the purpose of SISD calculations are 0.36 for light vehicles and 0.28 for heavy vehicles; and
- Driver eye height is 2.4m for trucks and 1.1m for cars.

The results are summarised in **Table 9**. The line of sight photos at the CBH site exit are shown from **Figure 11** and **Figure 12**. The measurement of the SISD is shown in **Figure 13**.



Figure 11: South Coast Hwy / CBH Exit Looking West



Figure 12: South Coast Hwy / CBH Exit Looking East



Figure 13: Sight Distance Measurement – Intersections

Table 9: SISD at Existing Intersections

Location	Vehicle Type	Design Speed (km/h) (West / East)	Coefficient of Deceleration	Decision Time (s)	Longitudinal Grade (West / East) *	Required SISD for West / East Traffic (m)	Available SISD (m)	
							West	East
South Coast Hwy	Trucks	100 / 100	0.28	3.0+2.5	-0.5% / +0.5%	296 / 291	+500	+500
	Cars	110 / 110	0.36	3.0+2.5	-0.5% / +0.5	302 / 299	+500	+500

*Positive for through traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on survey provided.

Therefore, as shown, the SISD are sufficient to achieve minimum requirements in accordance with the Austroads Guide to Road Design Part 4A.

4.7. Entering Sight Distance

The Entering Sight Distance (ESD) is the minimum distance for driver of a RAV, entering a through road, having appropriate sight distance to see a sufficient gap in oncoming traffic that will allow a RAV, with greater length and lower acceleration capacity, to clear the intersection safely.

The ESD is assessed based on the following parameters:

- A reaction time of 4 seconds, and
- Deceleration coefficients of 0.29 (up to 90km/hr), 0.28 (at 100km/hr).

The Entering Sight Distance (ESD) for existing and proposed access locations has been assessed in accordance with RAV Route Assessment Guideline (updated November 2019). A comparison of available and required ESD for RAV vehicles are summarised in **Table 10**.

Table 10: RAV Vehicle Entering Sight Distance

Location	Design Speed (km/h) (West / East)	Coefficient of Deceleration	Reaction Time (s)	Longitudinal Grade (West / East) *	Required ESD for West / East Traffic (m)	Available ESD (m)	
						West	East
South Coast Hwy	100 / 100	0.28	4	-0.5% / +0.5%	255 / 249	+500	+500

*Positive for through traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on survey provided.

As shown, the ESD are sufficient to achieve minimum requirements in accordance with the MRWA RAV Assessment Guideline.

4.8. Approach Sight Distances

The Approach Sight Distance (ASD) is required to ensure that drivers of trucks and light vehicles approaching the intersection/CBH Exit from inside the Minor Road at the 85th percentile operating speed are able to see the intersection and stop at the holding line.

The ASD is assessed based on the following parameters:

- A reaction time of 2.5 seconds for light vehicles and 4.0 seconds for heavy vehicles;
- Deceleration coefficients for the purpose of SISD calculations are 0.36 for light vehicles and 0.28 for heavy vehicles;
- Driver eye height is 2.4m for trucks and 1.1m for cars; and
- It is understood that the CBH Access Road operates under a 20km/hr speed limit. Therefore, a design speed of 30km/hr has been adopted for both trucks and cars.

The approach sight lines from the intersections are as shown in **Figure 14**. The required and available ASD at the intersection has been determined from Austroads Part 4A Equation 2 are summarised in **Table 11**.

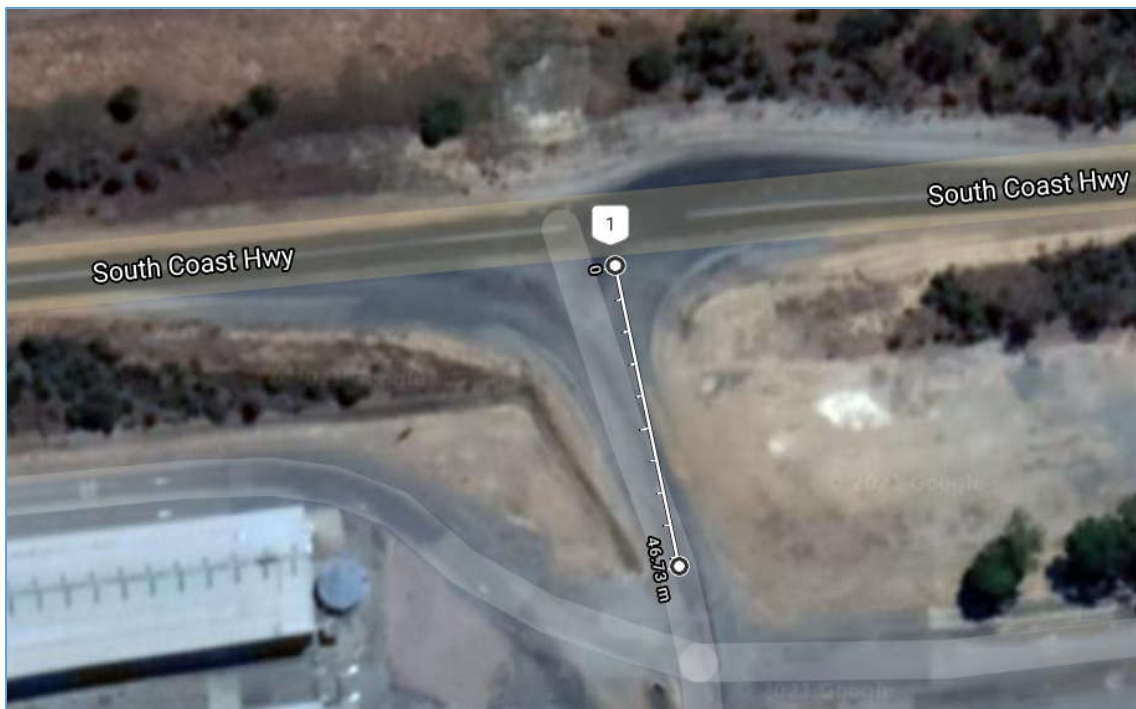


Figure 14: Approach Sight Lines

Table 11: Approach Sight Distance

Location	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration	Reaction Time (s)	Longitudinal Grade*	Required ASD (m)	Available ASD (m)
South Coast Hwy	Trucks	30	0.28	4.0	0%	46	+46
	Cars	30	0.362	2.5	0%	31	+46

*Positive for traffic travelling uphill and negative for through traffic travelling downhill.

The assessment indicates the ASD are above the requirements.

4.9. Intersection Volumes

For the purpose of Auxiliary Lane assessment, the existing traffic volumes and CBH volumes previously estimated in, have been combined for the peak hour (worst-case scenario) as shown in **Figure 15**.



Figure 15: Peak Hour Intersection Volumes

4.10. Auxiliary Lanes

The requirement for turning treatments was calculated using the Intersection Warrants calculator provided in Main Roads WA Supplement to Austroads Guide to Road Design - Part 4 A.8. The results of the assessment are shown in **Figure 16**.

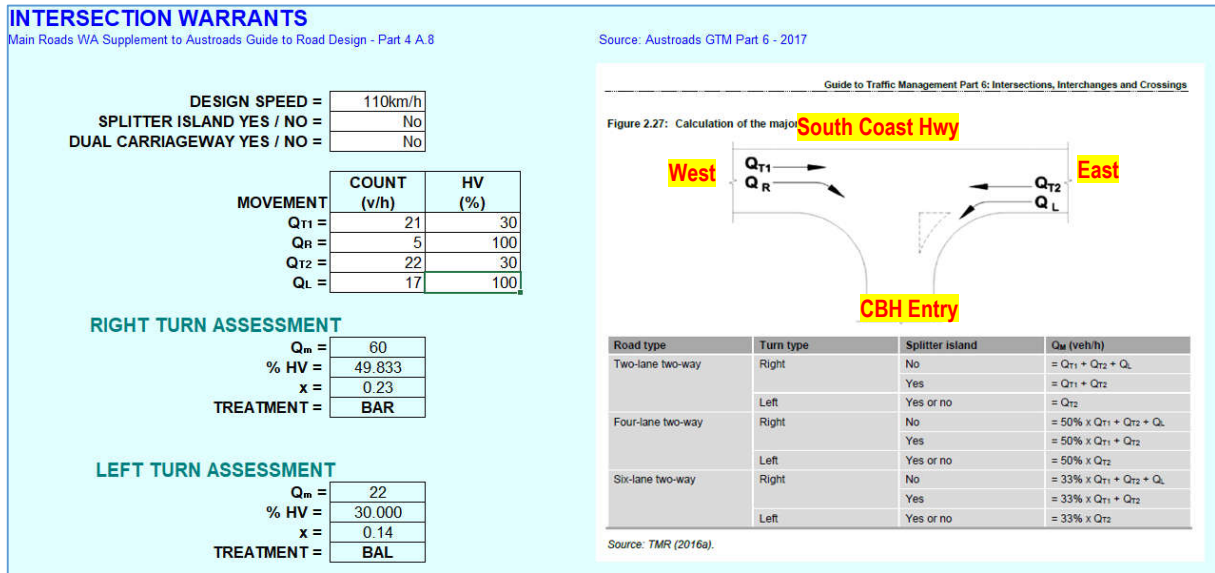


Figure 16: Warrants for Turn Treatments on Major Roads at Unsignalised Intersections

As shown, the required left-turn and right turn treatments at all assessment intersections are Basic Left Turn (BAL) and Basic Right Turn (BAR) treatment. BAR and BAL turn treatments both feature a widened shoulder on the major road. The BAR turn treatment allows through vehicles, having slowed, to pass to the left of turning vehicles. A BAL turn treatment allows turning vehicles to move further off the through carriageway making it easier for vehicles to pass.

South Coast Highway intersection already comprises of an auxiliary right turn and a left turn auxiliary/deceleration lane and therefore, no further widening or intersection is required.

4.11. Swept Path Assessment

A swept path analysis on aerial photos (or survey where available) for a 36.5m MRWA RAV 5-7 vehicle template (20m turning radius) was completed to determine if the existing intersections geometry are sufficient to accommodate the proposed RAV vehicle movement.

The swept path diagrams are shown in **Figure 17** and **Figure 18**.

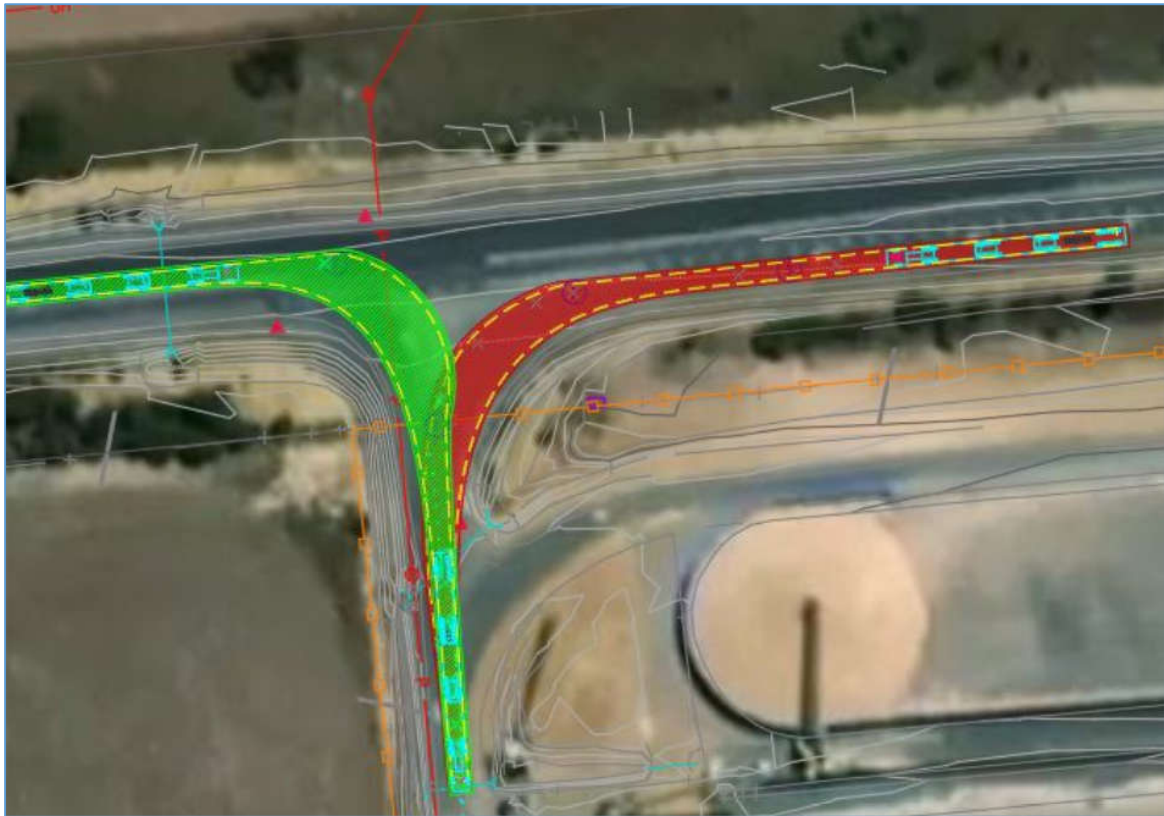


Figure 17: RAV 7 Manoeuvring at South Coast Highway Intersection – Entry

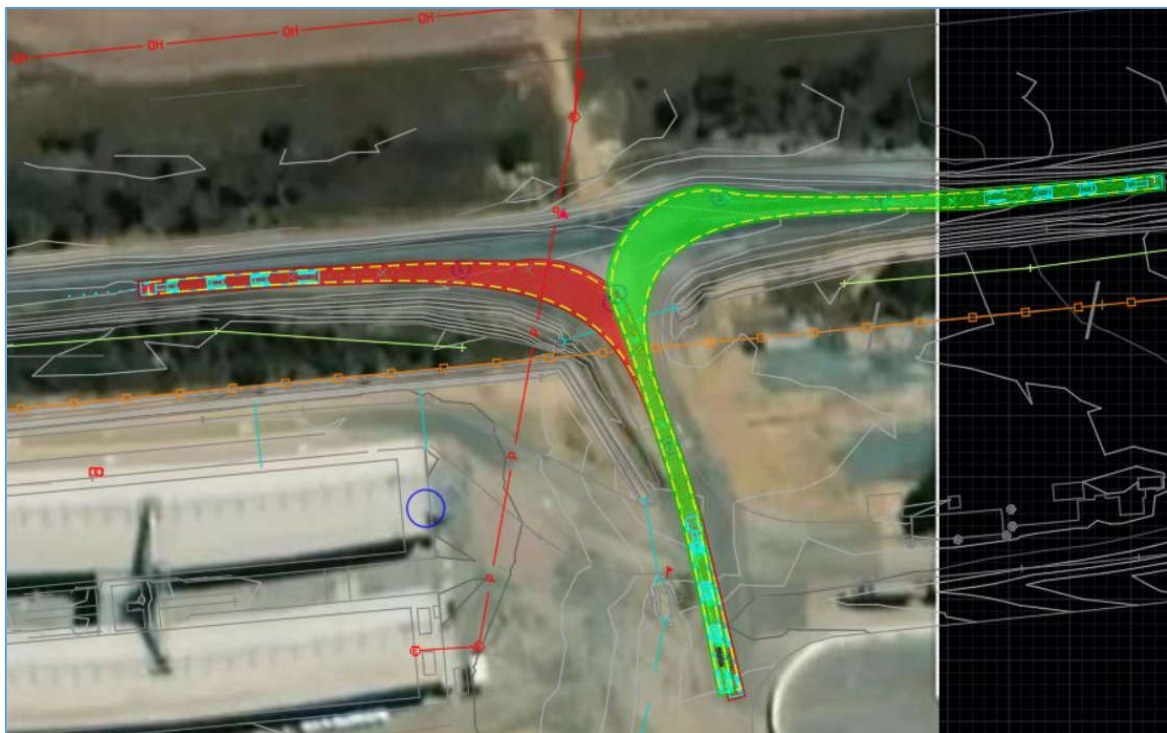


Figure 18: RAV 7 Manoeuvring at South Coast Highway Intersection – Exit



The analysis indicates the designated movements using RAV 7 vehicles can be completed with adequate clearance to the edges of seal and kerbing.



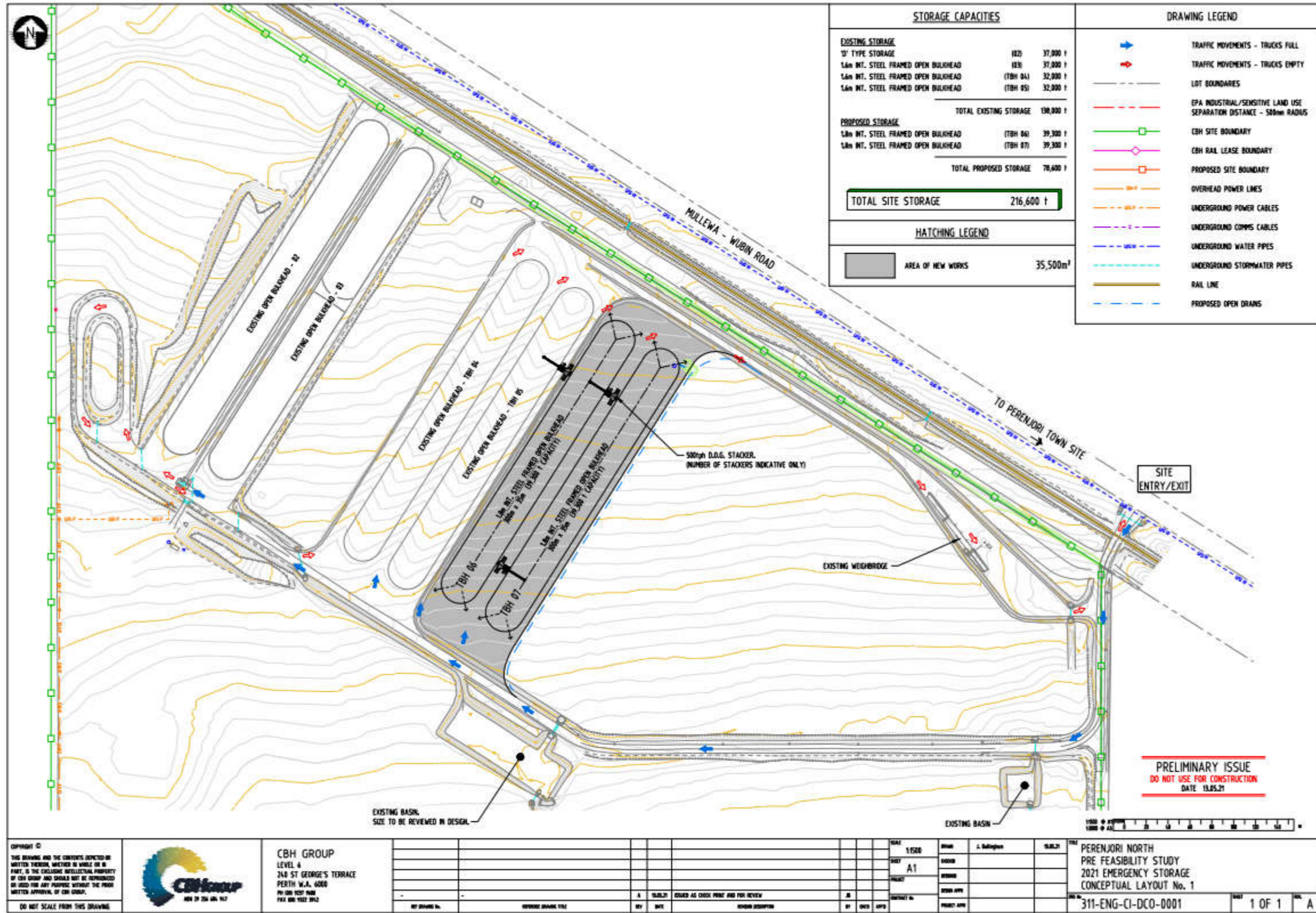
5. Conclusions

This Transport Impact Assessment has been prepared for the proposed emergency OBH located within the existing Gairdner Site and has concluded the following:

- The estimated traffic generation can be accommodated within the capacity of the adjacent road network.
- The additional traffic generated by the site is not considered to increase the likelihood of crashes to unacceptable levels.
- The sealed widths of the surrounding road are equal to or above the minimum road width for their relative RAV categories.
- Existing sight distances at the intersections are deemed satisfactory.
- The estimated traffic volumes do not warrant the installation of additional auxiliary lanes.
- Existing intersection geometry is adequate and no further widening required.



Appendix A – CBH Concept Plan



PRELIMINARY ISSUE
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1 OF 1



Appendix B – Traffic Count

Hourly Volume

Mullewa Wubin Rd (M039)

2020/21
Monday to Friday

South of Old Mullewa Rd (SLK 92.27)

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	0	0	0	0	0	0	0.0
01:00	0	0	0	0	0	0	0.0
02:00	0	1	1	0	1	1	100.0
03:00	0	0	0	0	0	0	0.0
04:00	0	0	0	0	0	0	0.0
05:00	2	0	2	1	0	1	50.0
06:00	3	3	6	0	0	0	0.0
07:00	11	6	17	4	1	5	29.4
08:00	8	7	15	3	1	4	26.7
09:00	9	6	15	4	0	4	26.7
10:00	11	12	23	3	4	7	30.4
11:00	8	9	17	2	1	3	17.6
12:00	9	9	18	3	3	6	33.3
13:00	9	11	20	3	4	7	35.0
14:00	11	11	22	3	3	6	27.3
15:00	6	8	14	1	1	2	14.3
16:00	7	7	14	3	1	4	28.6
17:00	3	8	11	1	1	2	18.2
18:00	2	3	5	0	1	1	20.0
19:00	1	1	2	0	0	0	0.0
20:00	2	0	2	1	0	1	50.0
21:00	0	0	0	0	0	0	0.0
22:00	0	0	0	0	0	0	0.0
23:00	0	0	0	0	0	0	0.0
TOTAL	102	102	204	32	22	54	26.5



Peak Statistics

AM	TIME	07:00	10:00	10:00	08:30	09:45	11:45
	VOL	11	12	23	6	4	9
PM	TIME	14:15	13:30	13:30	12:15	13:30	13:30
	VOL	12	16	25	5	6	9

