Proposed Quarry

Traffic Impact Assessment

Lot 542 DP 531809 at 465 Shallow Bay Road, Shallow Bay, NSW

For

Ironhide Enterprises Pty Ltd

March 2024

Traffic Impact Assessment Details

Edition / Revision No.	1	2	3
Document Status	Internal Review	DRAFT Report Issued for Client Review	FINAL Report Issued for Client Review
Prepared By	Andy Davis Director 	Andy Davis Director 	Andy Davis Director 
Reviewed By	Craig Nethery Director 	Craig Nethery Director 	Craig Nethery Director 
Date	31 March 2025	1 April 2025	3 April 2025
Issued To		Sam Elbourne Client	Sam Elbourne Client

StreetWise Road Safety & traffic Services Pty Ltd
PO BOX 1395
Port Macquarie
NSW 2444

Mob:- 0412 009 558 (Craig Nethery)
Email:- craig@streetwisersa.com.au

Mob:- 0422 011 353 (Andy Davis)
Email:- andy@streetwisersa.com.au

www.streetwisersa.com.au

CONTENTS

APPENDICES

1. BACKGROUND

1.1 Introduction

StreetWise Road Safety & Traffic Services have been engaged by Ironhide Enterprises Pty Ltd to prepare a Traffic Impact Assessment (TIA) in regard to a proposed quarry operation at 465 Shallow Bay Road (Lot 542 DP 531809), Shallow Bay to the south west of the township of Forster. Lot 542 DP 531809 has an area of approximately 192ha.

1.2 Quarry Location

The proposed quarry site is located on the western side of Wallis Lake within the MidCoast Council local government area. The site is south-west of the Forster-Tuncurry township, and approximately 40km by road via The Lakes Way and Coomba Road.

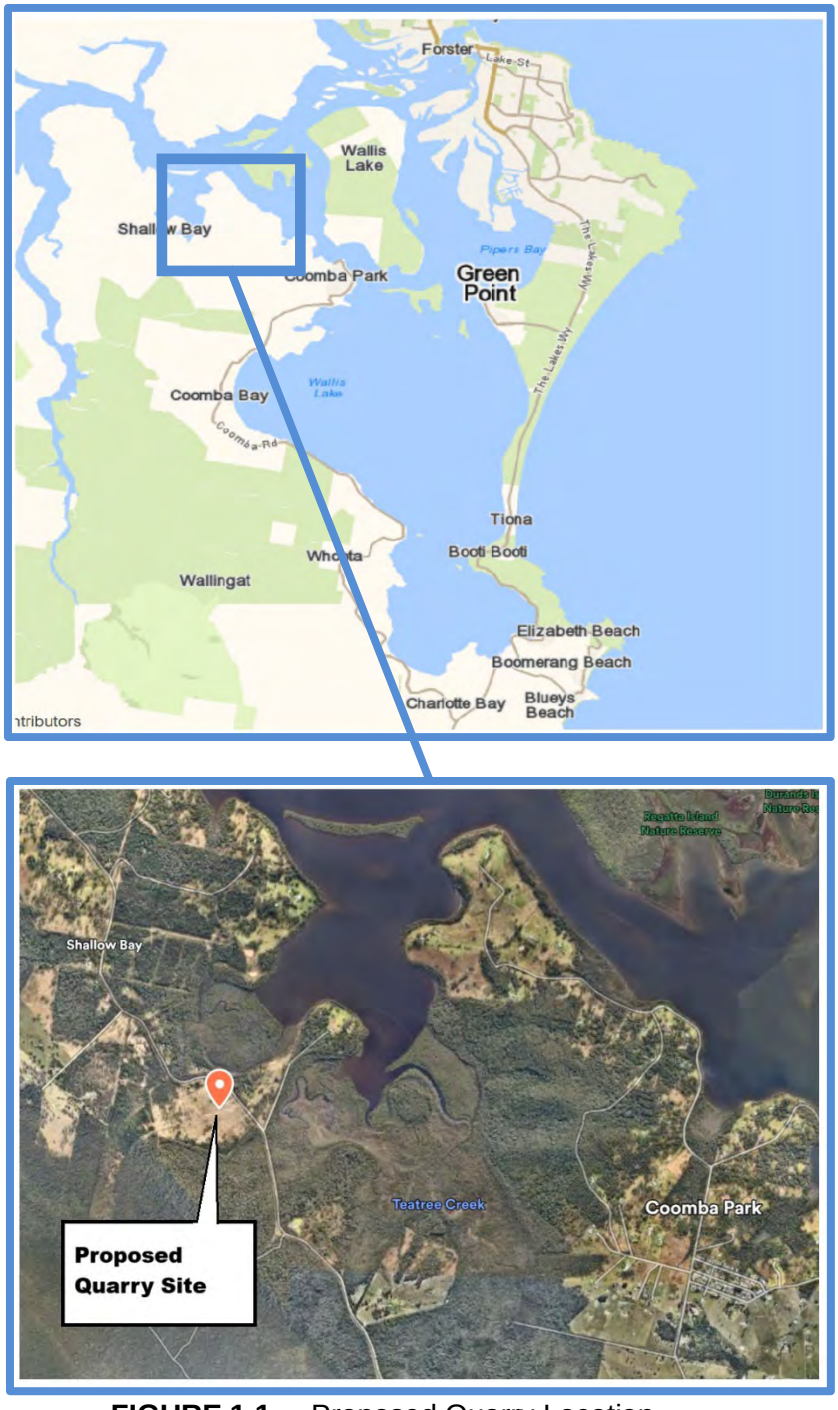

FIGURE 1.1 Proposed Quarry Location

1.3 The Proposal

Ironhide Enterprises Pty Ltd propose to establish a hard rock quarry on the site and extract up to 30,000 tonnes per annum of hard rock material from a resource of approximately 756,000 tonnes over approximately 25 years.

The project comprises a hard rock quarry with a maximum:

- Annual extraction rate of 30,000 tonnes.
- Quarry disturbance area of 1.99 hectares.
- Maximum depth below existing ground level of 28.6 metres.

The primary purpose of the project is to supply hard rock material for use as fill, as well as for road construction and maintenance. Primary project activities include site establishment, pre-stripping and stockpiling soil. Quarry operations, including excavating rock, crushing and screening, then transport of quarry products from site to customers.

Extraction rates are expected to vary in response to demand, with an expected average of 20,000 tonnes and maximum of 30,000 tonnes of material per annum.

For the estimated resource of about 756,000 tonnes, the ultimate project life depends upon the actual demand for quarry products, whilst the quarry is operating.

Operating hours are proposed between 7:00am – 6:00pm on weekdays only. No work is proposed on weekends or public holidays.

The rock being quarried is comparatively strong and needs to be blasted and fractured with explosives placed in drill holes to enable its excavation with earth moving equipment. The maximum expected blasting frequency is once per year, if peak production levels are reached. Blast drilling will take place for approximately a week prior to each blast.

It is planned to engage contractors to crush and screen the excavated rock using a mobile impact crusher located close to the extraction area. Adjustments may be made to the impact crusher and screens periodically to produce various sizes and types of quarry products in response to customer demand.

The proposed peak production level of 30,000 tonnes per year will involve the crushing and screening of quarry product on a sporadic campaign basis with an expected maximum daily throughput of 150 tonnes. Items used will vary depend on the various factors, including the required end product, rock hardness and contractor availability.

Quarry products will be stockpiled within designated areas within the quarry site. The stockpiles will be segregated for quality control purposes, to avoid mixing and contamination of product sizes and blends.

It is planned to employ local staff in a mixture of full time and part time positions, depending on demand, with the initial operational workforce expected to include a

quarry manager and 2 to 3 plant operators. Truck drivers will comprise a variable mix of employees, contractors and customers.

Various items of plant and equipment will be used for project establishment and initial operations. The type and number of items will change in response to operational requirements such as required production levels and product types.

A single tracked mobile crusher with recirculating screens and two output conveyors will be used during the initial stages of the project. Mobile processing equipment provides flexibility in plant location and also facilitates the replacement or adjustment of elements of the processing system.

Infrastructure required for the quarry operation external to the site typically will be truck and dog vehicles. A mix of truck and dog combination (32 tonnes+), with larger and smaller trucks used where road weight limits allow.

In summary, the quarry operations will comprise the following:

- Ripping of weathered quarry resource
- Blasting of unweathered (hard) meta-sediment rock.
- Loose rock is then transported from the worked quarry face to the (in-pit) quarry processing plant
- Rock is then crushed and screened,
- Transported off-site via Shallow Bay Road and Coomba Road.

2. ROAD NETWORK

2.1 Local Road Network

The proposed Shallow Bay Quarry is located approximately 10km to the south-west of Forster CBD, and 20.5km north-east of The Lakes Way. The main haul route will be via Shallow Bay Road (4.6km), then turn either:

- Left onto Coomba Road towards the township of Coomba Park, or:
- Right onto Coomba Road for 15.8km towards the intersection with The Lakes Way.

FIGURE 2.1 Proposed Haul Routes from quarry

2.1.1 The Lakes Way (MR111)

The Lakes Way connects the Pacific Motorway at Bulahdelah in the south to the Pacific Motorway at Failford in the north, via Forster & Tuncurry. The road is listed as a Tourist Road (No.6) and is approximately 85km in length.

In the vicinity of Coomba Road, the travel lanes are generally 3.5m wide in each direction with minimal width shoulders. The roadway widens in a number of locations including intersections and bus bays. Figure 2.2 below shows a photograph of The Lakes Way, looking south towards the intersection with Coomba Road. The road widens to add a right turn lane into Coomba Road. A bus bay can also be seen on the left hand side of the roadway. Note the lack of road shoulders in this section of The Lakes way.

The posted speed limit on The Lakes Way in the vicinity of Coomba Road is 100km/h. The southern section of The Lakes Way (i.e. south of Forster township) is not an approved B Double route for heavy vehicles.

FIGURE 2.2 The Lakes Way, looking south at Coomba Road intersection

FIGURE 2.3 Heavy Vehicle route on northern section of The Lakes Way

2.1.2 Coomba Road

Coomba Road is a local rural access road providing access to the township of Coomba Park and rural properties in the Coomba Park and Shallow Bay precincts on the south-western side of Wallis Lake. Coomba Road is approximately 20km in length, and connecting the township of Coomba Park in the north to The Lakes Way in the south.

The sealed formation width of Coomba Road varies in width between 5.5 and 6.5m, with unsealed shoulders on both sides. The posted speed limit of Coomba Road is generally 80kmh.

FIGURE 2.4 Typical views of Coomba Road

2.1.3 Shallow Bay Road

Shallow Bay Road is a local rural access road providing access to rural properties in the Shallow Bay precinct, to the west of Coomba Park. Shallow Bay Road intersects with Coomba Road approximately 4km south of Coomba Bay (or 16km north-east of The Lakes way).
Shallow Bay Road is unsealed and variable width - generally a minimum of 5m wide. The condition of Shallow Bay Road is considered variable i.e. dependent of weather conditions and Council maintenance.

Shallow Bay Road caters for approximately 50 rural properties with residences. If occupied, the residences would generate around 350 trips per day, or up to 35 trips during peak hours.

As can be seen from Figure 2.5 below, some sections of Shallow Bay Road include a gravel shoulder and/or informal tabledrain.

FIGURE 2.5 Typical views of Shallow Bay Road

2.1.4 Intersection of The Lakes Way (A15) & Coomba Road

The intersection of The Lakes Way Coramba Road is a T-intersection, which has been widened on the southbound side allow for right turning vehicles accessing Coomba Road with the ability for through traffic to slip past turning vehicles. The intersection is not controlled by any STOP or GIVE WAY signage. A sealed bus bay with shelter is located on the southbound side of The Lakes Way, while an unsealed bus bay is located on the northbound side (just south of the intersection).

Sight distance for vehicles entering and exiting Coomba Road is over 200m in both directions of The Lakes Way, which meets the Austroads minimum (ASD) requirements for a 100kmh speedzone. The intersection also includes streetlighting.

FIGURE 2.6 Existing Intersection of The Lakes Way & Coomba Road

2.1.5 Intersection of Coomba Road & Shallow Bay Road

The current intersection of Coomba Road is a T-intersection, with some widening of Coomba Road. The intersection is sealed, but becomes unsealed approximately 50m west on Shallow Bay Road. The existing layout is not lit, and does not include any controls on the side road (i.e. STOP or GIVE WAY signs). There is no linemarking or delineation on either road.

Sight distance for vehicles entering and exiting Shallow Bay Road is over 200m in both directions of Coomba Road, which exceeds the Austroads requirements for an 80kmh speedzone. The intersection does not currently include streetlighting.

Coomba Road is widened just north of the intersection to cater for a bus stop on the southbound side. However, the intersection layout does not appear to have adequate widening on the southbound side to meet the requirements of an Austroads BAR/BAL intersection (see Figure 2.7 below).

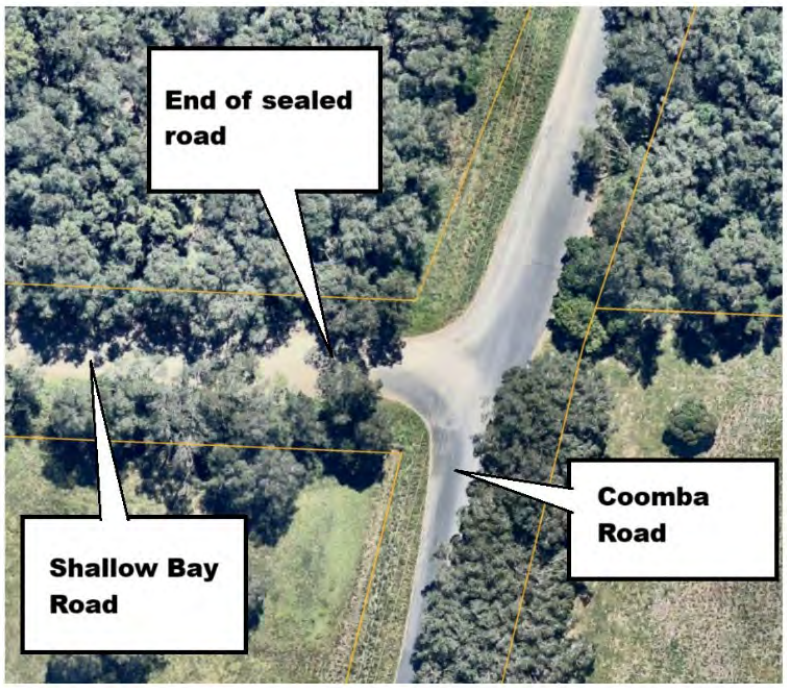

FIGURE 2.7 Existing Intersection of Coomba Road and Shallow Bay Road

FIGURE 2.8 Looking south at intersection of Coomba Road and Shallow Bay Road

2.1.6 Crash History on The Lakes Way near Coomba Road

The New South Wales Centre for Road Safety website indicates there have been 4 recorded crashes in the vicinity of the intersection of The Lakes Way and Coomba Road in the past 5 years. All 4 crashes involved single vehicles losing control and running off the roadway. One resulted in serious injury; another was a moderate injury and the other 2 were minor.

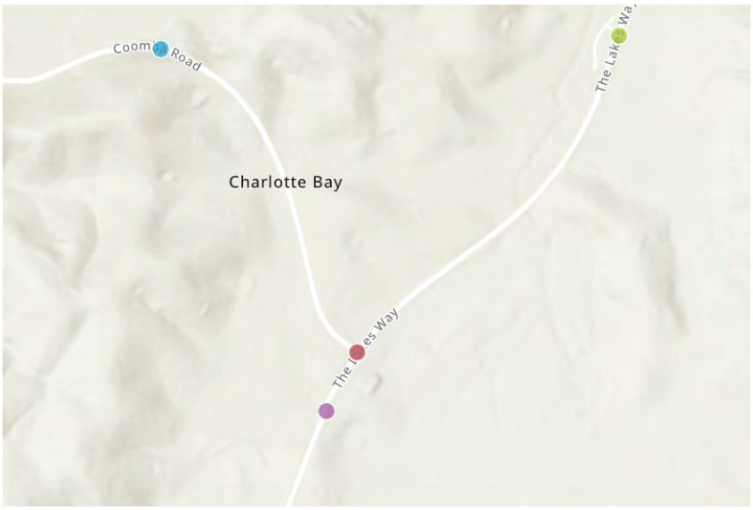

FIGURE 2.9 Recent crashes near The Lakes Way & Coomba Road intersection

3. EXISTING TRAFFIC VOLUMES

3.1 The Lakes Way

StreetWise undertook a manual traffic count data at the intersection of The Lakes Way and Coomba Road on Wednesday 5 and Thursday 6 of March 2025. Figure 3.1 below shows the results of the AM and PM peak hour traffic counts, while the full traffic counts results are in Appendix A at the rear of this report.

		1			2			3			4			5			6			15 Min Total	60 min Total
Time		The Lakes Way (Northbound)			Left into Coomba Rd			Right out of Coomba Rd			Left out of Coomba Rd			Right into Coomba Rd			The Lakes Way (Southbound)				
		Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total		
8:00 AM	8:15 AM	55	2	57	8	0	8	3	0	3	16	0	16	3	0	3	20	0	20	107	
8:15 AM	8:30 AM	51	0	51	4	0	4	5	0	5	18	1	19	3	0	3	28	1	29	111	
8:30 AM	8:45 AM	51	4	55	8	0	8	6	0	6	21	3	24	8	0	8	21	0	21	122	
8:45 AM	9:00 AM	53	3	56	4	0	4	8	0	8	23	0	23	7	1	8	34	1	35	134	474
	Total	210	9	219	24	0	24	22	0	22	78	4	82	21	1	22	103	2	105	474	

		1			2			3			4			5			6			15 Min Total	60 min Total
Time		The Lakes Way (Northbound)			Left into Coomba Rd			Right out of Coomba Rd			Left out of Coomba Rd			Right into Coomba Rd			The Lakes Way (Southbound)				
		Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total		
2:30 PM	2:45 PM	49	1	50	3	0	3	4	0	4	14	2	16	19	0	19	49	0	49	141	
2:45 PM	3:00 PM	47	1	48	5	0	5	4	0	4	11	0	11	16	0	16	40	0	40	124	
3:00 PM	3:15 PM	30	0	30	3	0	3	2	0	2	12	0	12	11	0	11	48	1	49	107	
3:15 PM	3:30 PM	31	0	31	1	0	1	9	0	9	13	0	13	16	1	17	50	1	51	122	494
	Total	157	2	159	12	0	12	19	0	19	50	2	52	62	1	63	138	2	140	494	

FIGURE 3.1 Peak hour volumes through the intersection of The Lakes Way & Coomba Rd

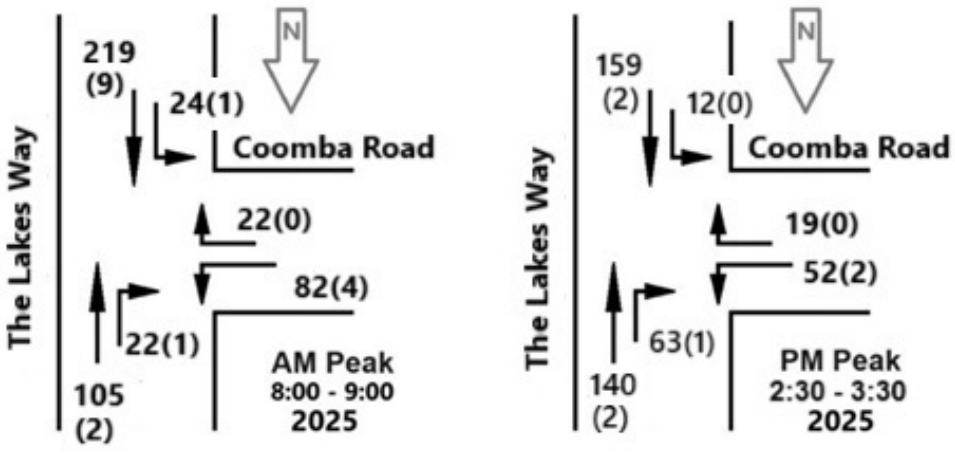

FIGURE 3.2 Diagram showing peak hour traffic volumes at Coomba Road intersection

StreetWise also obtained the following traffic data from MidCoast Council:

- AADT 4660 (April 2024) at The Lakes Way (just south of Coomba Road)
- AADT 857 (May 2016) at Coomba Road (adjusted to current 928 at 1% p.a.)

The traffic volumes recently collected and shown in Figure 3.2 above generally comply with the AADT figures provided by Midcoast Council.

3.2 Coomba Road & Shallow Bay Road

As discussed above, StreetWise undertook a manual traffic count data at the intersection of The Lakes Way and Coomba Road on Wednesday 5 and Thursday 6 of March 2025. StreetWise also estimated the peak hour volumes on Shallow Bay Road, based on 7 trips per day being generated by 50 existing properties in the Shallow Bay precinct. The diagram below is an estimate of existing movements through the intersection of Shallow Bay Road & Coomba Road, based on the above traffic count, and the following:

- An AADT of 350 trips on Shallow Bay Road or 35 peak hour trips
- Similar peak hours to the intersection at The Lakes Way
- 70:30 split on Shallow Bay Road i.e. 70% out and 30% in during AM peak
- The majority of movements out of Shallow Bay Road towards The Lakes Way (say 60:40

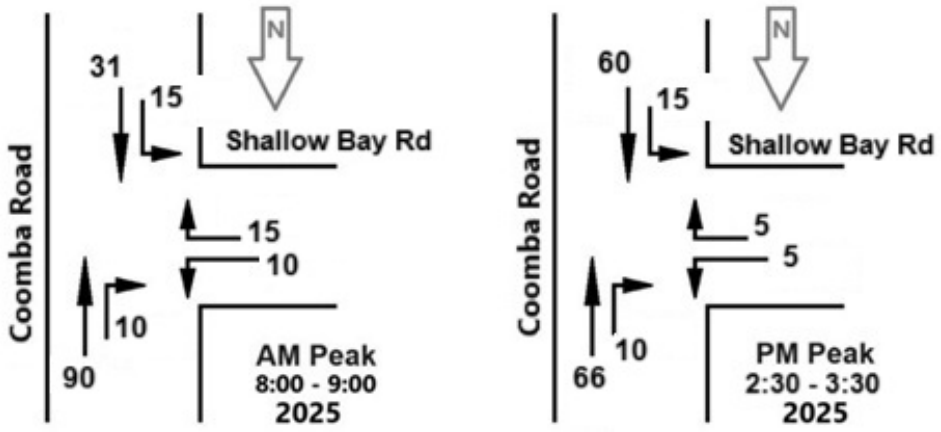

FIGURE 3.3 Diagram showing peak hour traffic volumes at Shallow Bay Road intersection

3.3 Existing Roadway Capacity

3.3.1 Road Category

- ***Class I*** *– These are two-lane highways on which motorists expect to travel at relatively high speeds. Two-lane highways that are major intercity routes, primary arterials connecting major traffic generators, daily commuter routes, or primary links in state or national highway networks generally are assigned to Class I. Class I facilities most often serve long-distance trips or provide connecting links between facilities that serve long-distance trips.*
- ***Class II*** *– These are two-lane highways on which motorists do not necessarily expect to travel at high speeds. Two-lane highways that function as access routes to Class I facilities, serve as scenic or recreational routes that are not primary arterials, or pass through rugged terrain generally are assigned to Class II. Class II facilities most often serve relatively short trips,*

the beginning and ending portions of longer trips, or trips for which sightseeing plays a significant role.

- ***Class III*** *– These are two-lane highways serving moderately developed areas. They may be portions of a Class I or Class II highway that pass through small towns or developed recreational areas. On such segments, local traffic often mixes with through traffic, and the density of unsignalised roadside access points is noticeably higher than in a purely rural area. Class III highways may also be longer segments passing through more spread-out recreational areas, also with increased roadside densities. Such segments are often accompanied by reduced speed limits that reflect the higher activity level.*

For the purposes of this assessment The Lakes Way will be referred to as a Class 1 category.

3.3.2 Level of Service

The Austroads Guide to Traffic Management prescribes the following definitions for Level of Service (LoS) with the various levels of service as follows:

- ***LOS A*** describes primarily free-flow operation. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at the boundary intersections is minimal. The travel speed exceeds 80% of the base free-flow speed (BFFS).

- ***LOS B*** describes reasonably unimpeded operation. The ability to manoeuvre within the traffic stream is only slightly restricted and control delay at the boundary intersections is not significant. The travel speed is between 67% and 85% of the BFFS.

- ***LOS C*** describes stable operation. The ability to manoeuvre and change lanes at mid- segment locations may be more restricted than at LOS B. Longer queues at the boundary intersections may contribute to lower travel speeds. The travel speed is between 50% and 67% of the BFFS.

- ***LOS D*** indicates a less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed. This operation may be due to adverse signal progression, high volume, or inappropriate signal timing at the boundary intersections. The travel speed is between 40% and 50% of the BFFS.

- ***LOS E*** is characterised by unstable operation and significant delay. Such operations may be due to some combination of adverse progression, high volume, and inappropriate signal timing at the boundary intersections. The travel speed is between 30% and 40% of the BFFS.

- ***LOS F*** is characterised by flow at extremely low speed. Congestion is likely occurring at the boundary intersections, as indicated by high delay and extensive queuing. The travel speed is 30% or less of the BFFS. LOS F is assigned to the subject direction of travel if the through movement at one or more boundary intersections has a VCR ratio greater than 1.0.

In summary, roads generally operate safely and efficiently at a Level of Service of 'C' or better. When the Level of Service deteriorates to 'D' or worse, the roads become congested and inefficient, measures need to be considered to improve the roadway including widening or other upgrades.

3.3.3 Road Capacity

The Lakes Way

Austroads Guide to Traffic Management includes a table for determining Level of Service for 2-lane rural roads (see Figure 3.4 below), based on total hourly volumes and the terrain-type. As can be seen from Figure 3.4, The Lakes Way, with total peak hour volumes of around 400vph, and relatively low percentage of heavy vehicles, currently has a Level of Service of 'B'.

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

FIGURE 3.4 Level of Service for The Lake Way

Figure 3.5 below is an excerpt from Austroads guidelines showing the capacity of a 2-lane rural highway, indicating that a single lane can cater for up to 1700 vph.

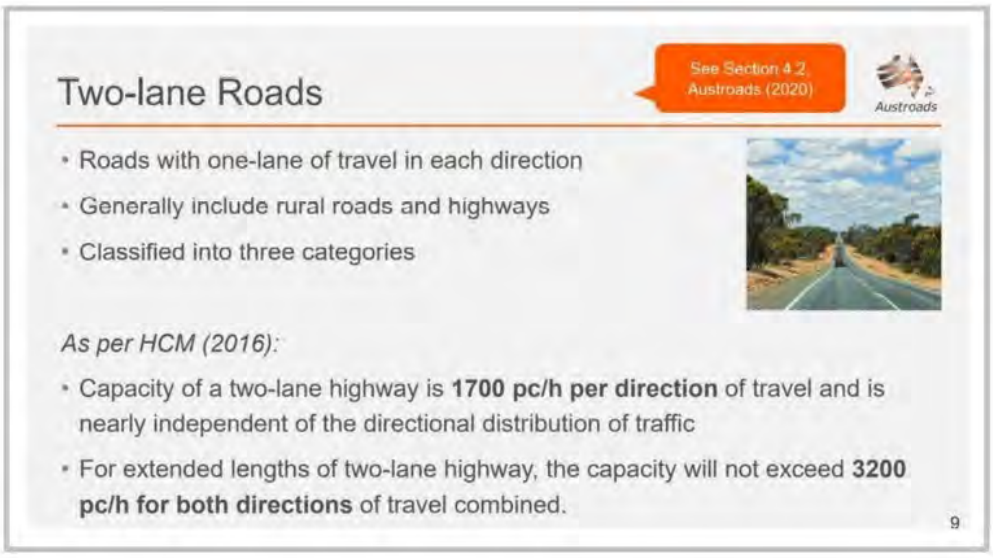

Figure 3.5 Rural highway capacity (Austroads)

Coomba Road

Figure 3.5 below shows the peak hour volumes on Coomba Road, as determined from the manual traffic count undertaken by StreetWise. The volumes indicate Coomba Road caters for a total of 150 vehicles (both directions) in the morning peak hour, and 146 vehicles during the afternoon peak. This equates to approximately 1500 vehicles per day currently utilising Coomba Road.

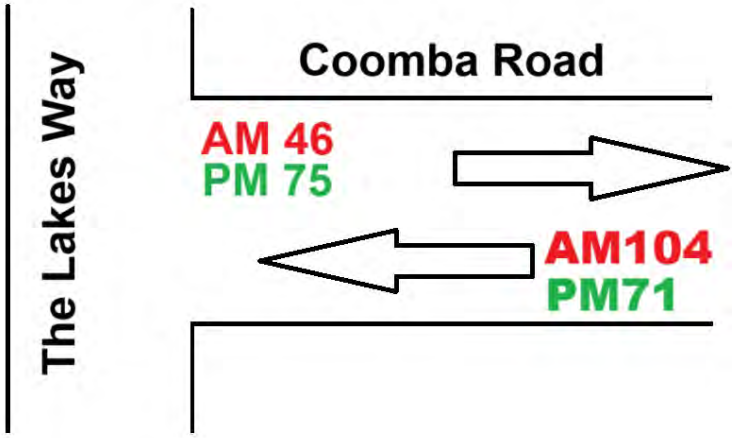

FIGURE 3.5 Peak hour volumes on Coomba Road (near The Lakes Way)

The following table is from TfNSW 'Guide to Traffic Generating Developments' (see Figure 3.5 below), which determines a Level of Service based on daily traffic volumes, percentage of heavy vehicles, posted speedzone and type of terrain. Coomba Road runs along the southern edge of Wallis Lake, and is generally flat, with some small rolling hills. If we adopt a total hourly volume of 150 vehicles, a flat alignment and a heavy vehicle content of 5%, the TfNSW chart indicates a Level of Service of better than 'B', and adequate capacity to safely and efficiently cater for approximately 10x Coomba Road's current hourly volumes.

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

FIGURE 3.5 Level of Service for Coomba Road (TfNSW)

Shallow Bay Road

Shallow Bay Road is an unsealed rural road, with a general width of approximately 5m. Some sections include an unsealed shoulder and/or gravelled tabledrain. Shallow Bay Road intersects with Coomba Road in the south, and extends north almost 10kms to the southern bank of the Coolongalook River. The existing driveway to the future quarry site is approximately 4.8kms from Coomba Road.

StreetWise estimate Shallow Bay Road has an AADT of 350 vehicles, based on 7 trips a day generated by the 50 rural lots in the Shallow Bay precinct. This equates to approximately 35 trips an hour during peak times.

Unsealed roads generally have a lower capacity than sealed roads, and their capacity can be reduced if the road is not maintained regularly, or is damaged by weather or vehicle movements. However, given that existing volumes on Shallow Bay Road are very low, and the estimated traffic volumes to be generated by the future quarry are minimal, it is considered that Shallow Bay Road has adequate capacity to cater for future traffic volumes with minimal reduction in the current safety or efficiency of the road.

4. FUTURE TRAFFIC ASSESSMENT

4.1 Future volumes through The Lake Road intersection

StreetWise have undertaken a manual traffic count at the intersection of The Lakes Way and Coomba Road, as discussed in Section 3.1 above. Annual growth has been adopted as 2% p.a., as per recent population growth (from Australian Bureau of Statistics). A 10-year event horizon has been adopted for this assessment i.e. future traffic volumes have been estimated for 2035.

4.2 Proposed Quarry Traffic Generation

It is intended that the quarry material won from the proposed Shallow Bay quarry will be used for a range of purposes, primarily as a roadbase or select fill servicing local and regional infrastructure projects.

The quarry operators plan to utilise a 32 tonne truck & dog combination to haul the quarry material. It is estimated that the future proposed quarry will generate an average of 13 laden trips per week, and up to 20 laden quarry trucks per week at maximum output (See Table 4.1 below).

This equates to a maximum of 4 laden truck & dog movements per day, or 8 return trips.

Hard Rock Quarry - Proposed Activity	*Average Output*	*Maximum Output*
Annual Output (Tonnes)	20,000	30,000
Vehicle capacity (Truck & dog (tonnes)	32	32
Average no. of laden trucks per year	625	937.5
Available working weeks per year	48	48
Maximum working hours per week	55	55
Average no. of laden trucks per week	13.0	19.5
Average no. of laden trucks per weekday	2.6	3.9
Average no. of laden trucks per hour	0.24	0.36

Table 4.1 Estimated Laden Truck Movements to be generated by quarry

The above table is based on the following:
Notes:-

1. Hours of Operation
   - 7.00am to 6.00pm (Monday to Friday)
   - No weekend work

2. It is likely that the majority of laden trips can be expected in the first half of the daily shift

The proposed quarry will employ up to 4 staff working on site plus occasional contractors such as blasting contractors, machinery servicing and refuellers. This will generate approximately 15 daily trips or an average of 1.5 trips per hour to and from the quarry. It is likely that commuter trips by staff will be into the site before 7:00am and exit around mid to late afternoon. The quarry may also generate occasional heavy vehicle movements such as floating of earthmoving equipment or mobile crusher etc.

4.3 Summary Traffic Generation

Table 4.2 provides a summary of the predicted traffic generation to be generated by the proposed quarry operation which will be used in future assessments in this report moving forward.

	Normal Operation			Peak Capacity		
	Truck & Dog		Light Vehicles	Truck & Dog		Light Vehicles
	Out (Laden)	Total (Out laden + In empty)		Out (Laden)	Total (Out laden + In empty)	
Daily	2.6	5.2	15	3.9	7.8	15
Hourly	0.24	0.72	1.5	0.36	0.72	1.5
AM Peak	1	2	2	1	2	2

TABLE 4.2 Summary of Peak Hour Heavy Vehicle Trip Generation

Note that the trip numbers shown in Table 4.2 above have been rounded up for the purposes of this assessment. As can be seen from the table, the average daily number of trips to be generated are low, with a maximum of 1 return laden truck and dog movement per hour.

As discussed previously, the quarry will generate a small number of light vehicle movements each day. However, staff commuter movements are likely outside of peak hours, while the low number of service vehicle movements will likely be spread throughout a working day.

The proposed maximum annual output (30,000 tonnes) is also relatively low. If the quarry operates at maximum capacity (i.e. to supply a major project) and generates a higher than average daily rate of laden truck movements, the 30,000 annual limits will be exhausted quickly, and may result in a number of weeks/months of no crushed gravel production (or truck movements).

4.4 Traffic Growth

Based on the population growth between the 2016 and 2021 Census in the Coomba Bay area, StreetWise have adopted an annual growth factor of 2.0% for the purposes of this assessment.

4.5 Traffic Distribution

The quarry operator has indicated that the majority of future haulage movements will be within the Coomba Bay area.

For the purposes of this assessment the following traffic distribution has been assumed:

- It is likely that the majority of laden truck movements will occur in the morning, with less movements in the afternoon
- The majority of laden truck movements will turn right onto Shallow Bay Road
- A Coomba Road, the majority of truck movements will turn left and head north towards the Coomba Park precinct (say 70%). The remaining 30% may turn right towards The Lakes Way.
- The majority of light vehicle movements (i.e. staff, service vehicles, deliveries etc) will be to & from the local area or the Forster-Tuncurry precinct.

4.6 Summary of Predicted Traffic Generation, Distribution & Assignment

As discussed above, the estimated traffic volumes to be generated by the proposed quarry in Shallow Bay Road are relatively low, with an average of around 4 laden truck & dog movements per day (or 8 return trips) and approximately 15 light vehicle trips. This equates to less than 1 laden trip and 2 light vehicle trips per hour at peak times (see Figure 4.3 below).

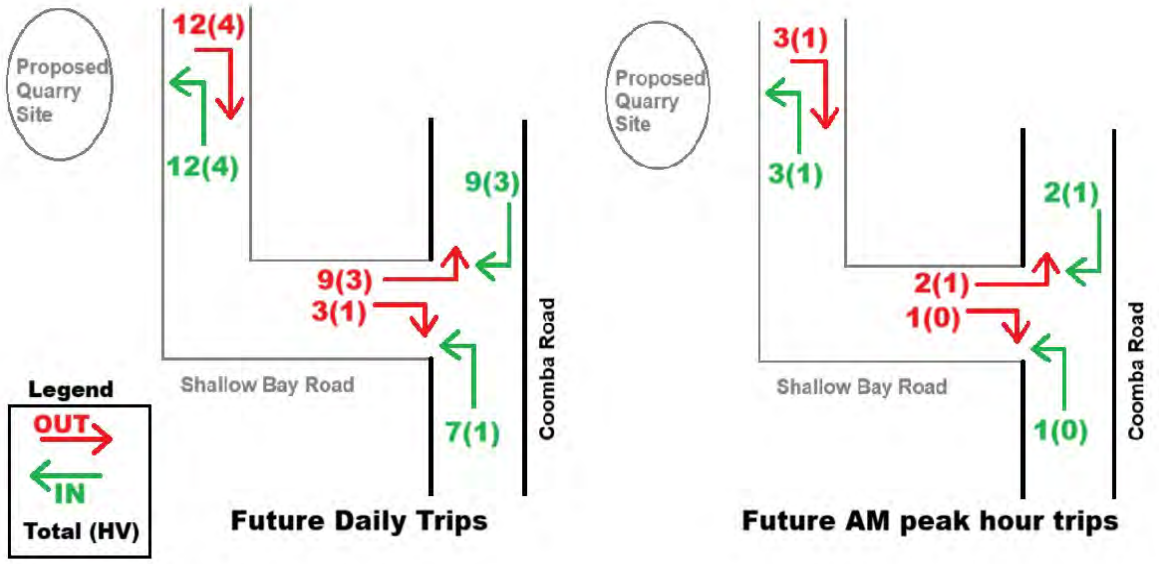

Figure 4.3 Future total peak-hour movements (2035) through Coomba Road & Shallow Bay Road intersection (Heavy Vehicles shown in brackets)

4.7 Intersection Requirements

4.7.1 Intersection of Coomba Road and The Lakes Way

Based on Figure 3.25a of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings the following intersection warrant assessment is provided for the intersection of The Lakes Way and Coomba Road. Figure 4.7 is based on current (2025) peak hour traffic volumes. The second diagram below (Figure 4.8) is based on estimated future (2035) volumes, which includes an annual growth rate of 1% and including trips to be generated by the proposed quarry.

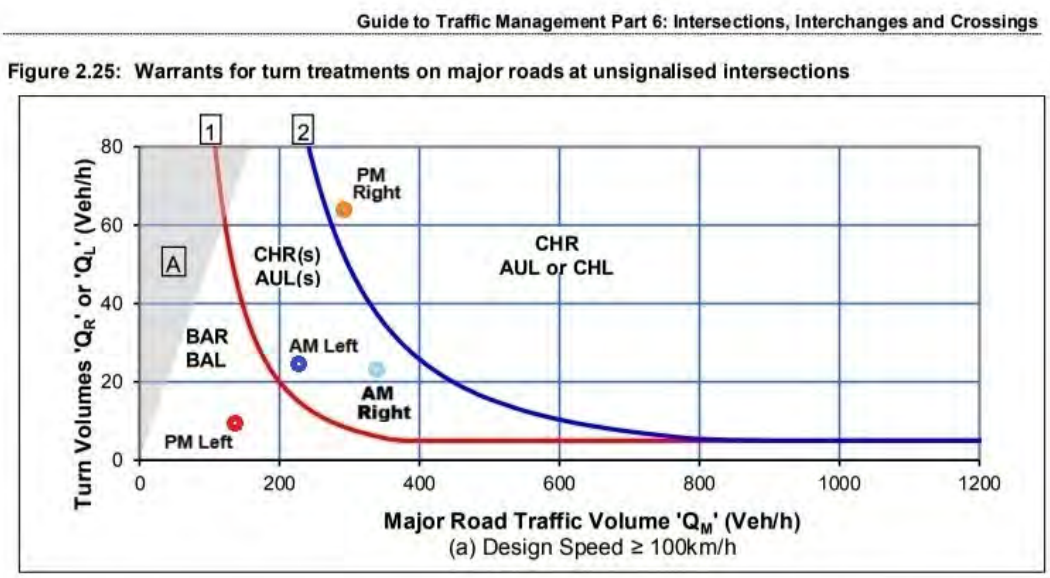

Figure 4.7 Intersection Warrant for The Lakes Way & Coomba Road (2025)

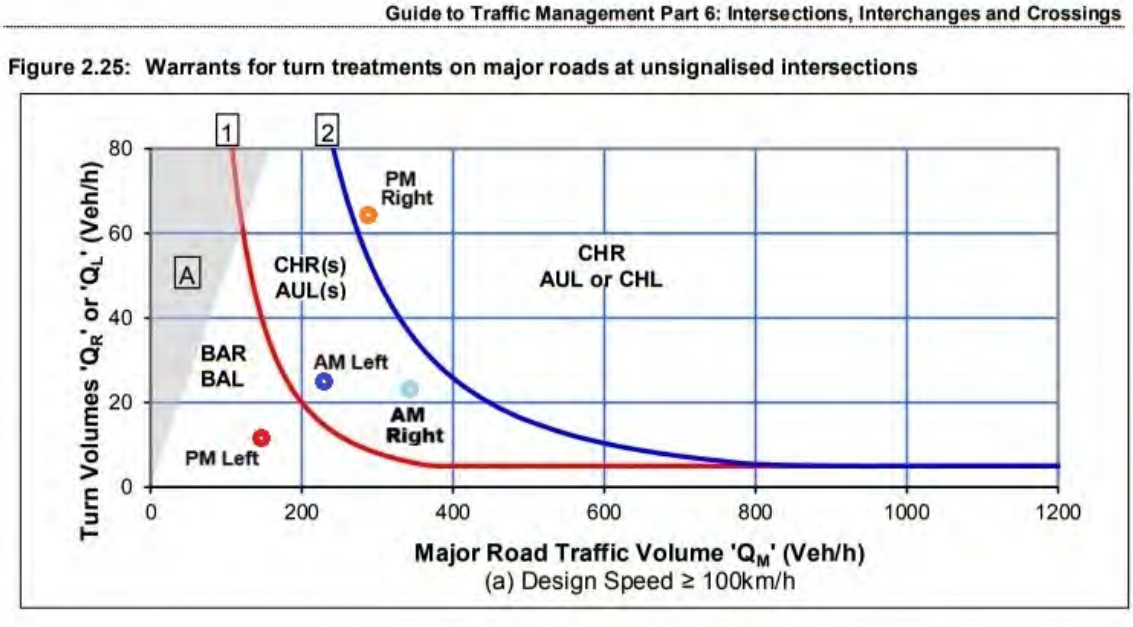

Figure 4.8 Intersection Warrant for The Lakes Way & Coomba Road (2035)

As can be seen when comparing the 2 diagrams above, there is only a minor increase in traffic volumes and turn movements estimated over the next 10 years, with minimal changes between the 2 diagrams. The Austroads warrant recommends an upgrade to channelised intersection to cater for existing volumes.

In summary, the existing intersection with the added development traffic trips indicates the intersection will need to be upgraded. However, as the existing intersection operation warrant assessment shows above, the required intersection upgrade is not a result of the proposed development but required as a result of existing traffic flows around the intersection.

This assessment has shown that the number of daily trips estimated to be generated by proposed development will be relatively low. It is also likely that the majority of laden truck & dog movements will be confined to the Coomba Park area, with only a small number of haulage trips planned to utilise The Lakes Way via the above intersection. The assessment has also shown that the intersection of Coomba Road and The Lakes Way should be upgraded to a Channelised Intersection, based on current volumes. However, this assessment **does not** consider that any upgrades to this intersection will be triggered as a result of the development proposal.

4.7.2 Intersection of Coomba Road & Shallow Bay Road

Based on Figure 3.25a of the Austroads Guide to Traffic Management, Part 6 – Intersections, Interchanges and Crossings the following intersection warrant assessment is provided for the intersection of Coomba Road and Shallow Bay Road, as per the traffic movements shown in Figure 3.3. with a speedzone of 80kmh.

Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings

Figure 2.25: Warrants for turn treatments on major roads at unsignalised intersections

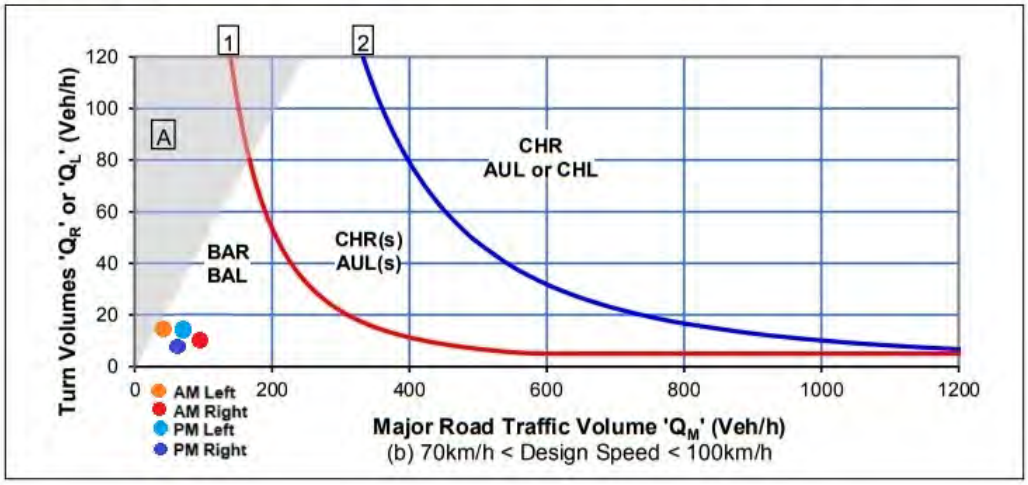

FIGURE 4.6: Intersection Warrant for Shallow Bay Rd & Coomba Rd intersection

As can be seen by the assessment above, a BASIC intersection layout will cater for existing traffic volumes, and also have adequate capacity to cater for future (2035) movements, including the minimal additional volumes to be generated by the proposed development.

5. SITE ACCESS

The access to the future quarry is proposed via the existing driveway off Shallow Bay Road (see photographs below). As can be seen from Figure 5.1 and 5.2, the unsealed layout has adequate width to cater for the turn movements of large vehicles.

As discussed earlier in this report, the existing traffic volumes on Shallow Bay Road are relatively low with around 350 movements per day. This equates to around 35 vehicles and hour at peak times, or an average of 3 minutes gap between vehicles in each direction. Given that the quarry will generate an average of 4 haulage movements a day, the likelihood of conflict with local vehicle movements at the quarry entry is very low.

Also, the majority of future haulage movements will turn right out of the quarry and head towards Coomba Road. This means the likelihood of any haulage vehicles turning right into the site from Shallow Bay Road is low, and the likelihood of any conflict with local traffic and a truck & dog slowing, queuing or turning right into the quarry site is minimal.

Based on the above information, StreetWise consider a BAL (Basic Left Turn) intersection layout (from Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections) is suitable for the proposed development.

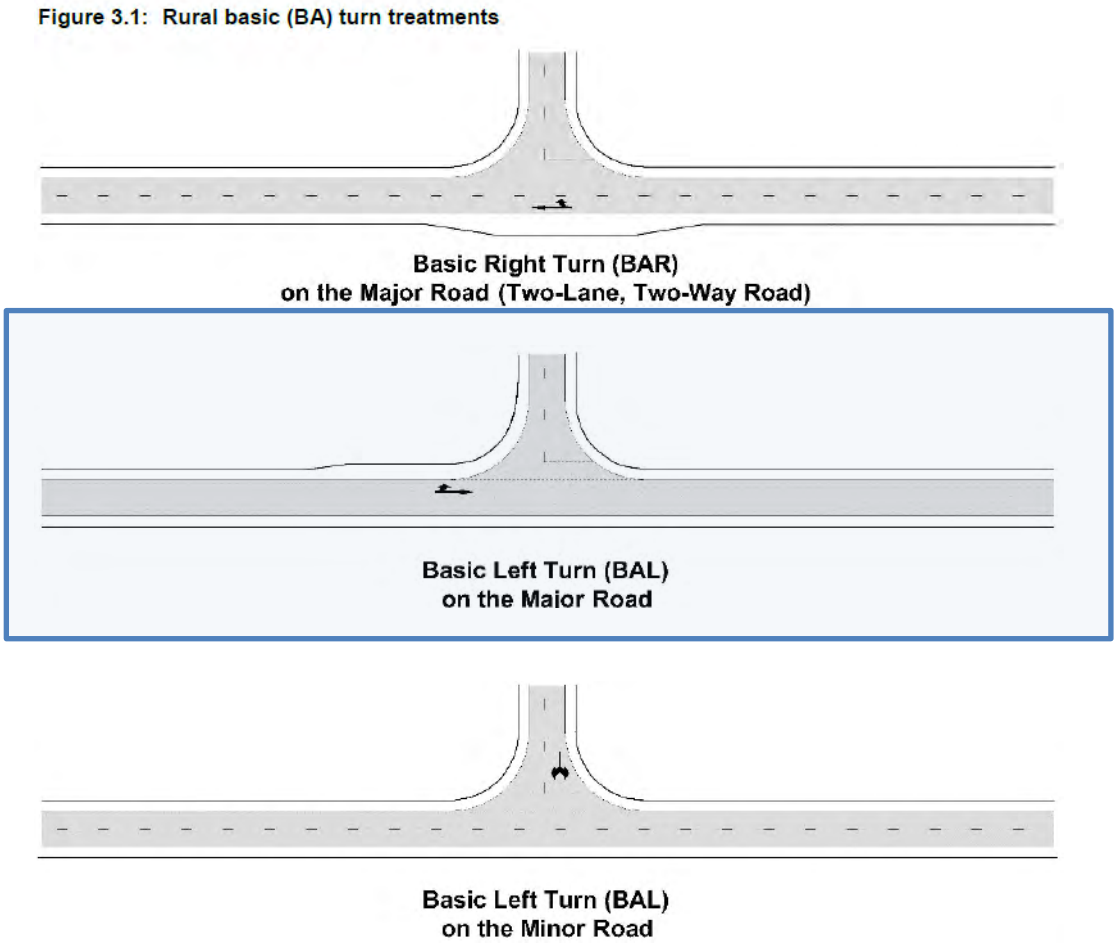

Figure 5.1 BASIC rural intersection layouts (Austroads)

Figure 5.2 Existing driveway into subject site

Figure 5.3 Aerial photograph of existing driveway (2023)

6. ROAD SAFETY

As part of assessing the future intersection requirements for the proposed operation of the quarry road safety for all road users will need to be considered given the traffic mix. Therefore, the following assessment will be completed with regard to road safety around the access intersection:-

- Safe Intersection Sight Distance (SISD).
- Crash History, and
- Road Conditions

6.1 Safe Intersection Sight Distance

The existing Shallow Bay Road is unsealed and signage at the eastern end warns drivers to Drive Carefully. StreetWise have assumed a speed limited of 60kmh for the purposes of this assessment, although travel speeds on Shallow Bay Road may vary due to the changing condition of the road surface. Similarly, sight distance requirements may also vary due to the surface condition. StreetWise measured the sight distances currently available from the existing driveway using a laser measurer. The existing distances were:

- To left 105m
- To right 180+m

The above distances are considered satisfactory for an unsealed surface and local traffic driving to the conditions.

Figure 6.1 Sight distance from existing driveway looking south (L) and north (R)

In order to make drivers more aware of heavy vehicles in the area and to improve road safety around the quarry access it is recommended W5 – 22 (B size) signs be erected at 150m on approach to each side of the quarry access.

FIGURE 6.2 Typical W5-22 sign face (TfNSW)

6.2 Crash History

Section 2.1.6 of this report discusses the recent crash history in the vicinity of the intersection of The Lakes Way and Coomba Road. The New South Wales Centre for Road Safety website also includes crash data for Coomba Road and also Shallow Bay Road.

6.2.1 Coomba Road

According to the TfNSW website, there have been 9 crashes recorded on Coomba Road in the past 5 years. After reviewing the crash data, StreetWise make the following comments:

- Only 2 of the 9 crashes resulted in serious injuries
- 6 of the 9 crashes involve vehicles leaving the sealed road surface
- 5 of 9 crashes occurred after dark
- 7 of 9 crashes were single vehicle incidents

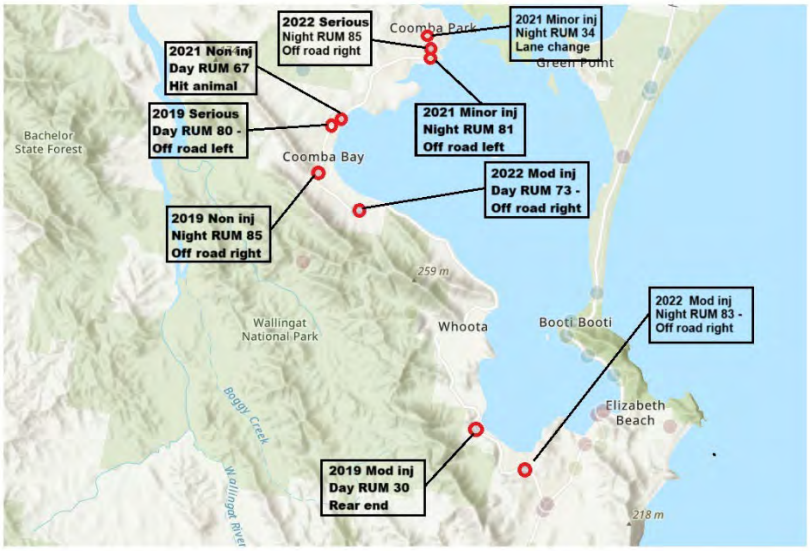

FIGURE 6.3 Typical W5-22 sign face (TfNSW)

6.2.2 Shallow Bay Road

The TfNSW website also indicated there has been 1 crash recorded on Shallow Bay Road in the past 5 years. The crash occurred in daytime conditions in 2020 on a bend to the south of the proposed quarry site i.e. between the subject site and the intersection of Shallow Bay Road and Coomba Road.

FIGURE 6.4 Shallow Bay Road crash map (TfNSW)

6.3 Bus Routes

Rhino Bus Company operates a school bus service serving the Shallow Bay and Coomba Park areas, taking school students to & from Forster Schools via Forster Heights (S361). The route includes a number of bus stops along Coomba Road, but the route does not utilise Shallow Bay Road (see Figure 6.5). The nearest bus stop to the proposed development site is located at the intersection of Shallow Bay Road and Coomba Road.

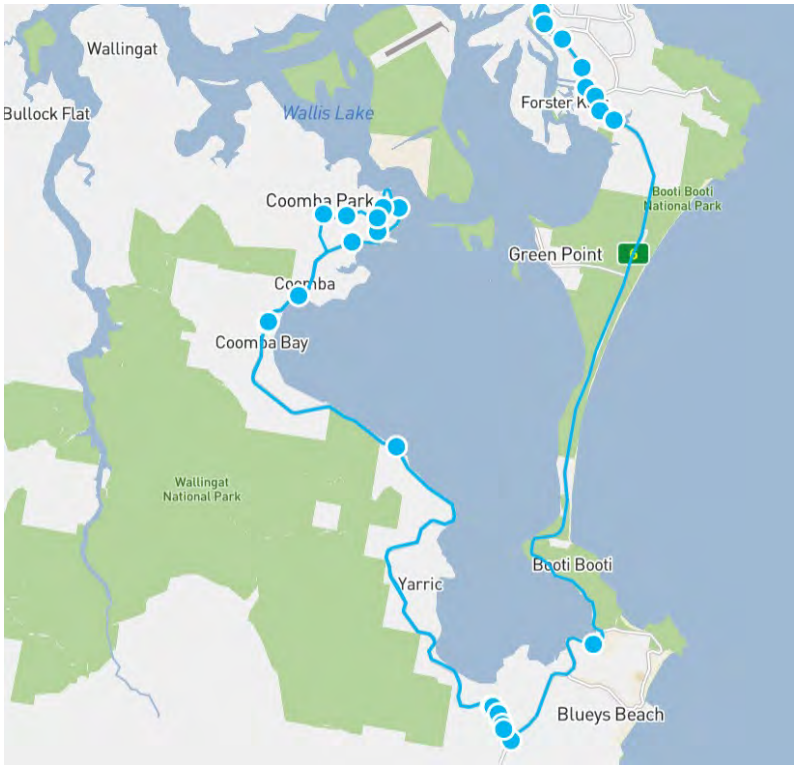

FIGURE 6.5 Bus route and bus stop locations in Coomba Park area

6.4 Haulage Route

As previously indicated in this report, the proposed haulage route will utilise Shallow Bay Road to the intersection with Coomba Road, then either head north towards Coomba Park or south towards The Lakes Way.

The following table is from Austroads *'Guide to Road Design Part 3: Geometric Design*' and indicates the recommended sealed width for rural roads catering for various daily traffic volumes.

Table 4.5: Single carriageway rural road widths (m)

Element	Design AADT				
	1–150	150–500	500–1000	1000–3000	> 3000
Traffic lanes(1)	3.7 (1 x 3.7)	6.2 (2 x 3.1)	6.2–7.0 (2 x 3.1/3.5)	7.0 (2 x 3.5)	7.0 (2 x 3.5)
Total shoulder	2.5	1.5	1.5	2.0	2.5
Minimum shoulder seal (2),(3),(4),(5),(6)	0	0.5	0.5	1.0	1.5
Total carriageway	8.7	9.2	9.2–10.0	11.0	12.0

1 *Traffic lane widths include centrelines but are exclusive of edge-lines.*
2 *Where significant numbers of cyclists use the roadway, consideration should be given to fully sealing the shoulders. Suggest use of a maximum size 10 mm seal within a 20 km radius of towns.*
3 *Wider shoulder seals may be appropriate depending on requirements for maintenance costs, soil and climatic conditions or to accommodate the tracked width requirements for Large Combination Vehicles.*
4 *Short lengths of wider shoulder seal or lay-bys to be provided at suitable locations to provide for discretionary stops.*
5 *Full width shoulder seals may be appropriate adjacent to safety barriers and on the high side of superelevation.*
6 *A minimum 7.0 m seal should be provided on designated heavy vehicle routes (or where the AADT contains more than 15% heavy vehicles).*

FIGURE 6.6 Single carriageway rural road widths (Austroads)

The following desktop assessment of the haulage route is provided.

6.4.1 Shallow Bay Road

Shallow Bay Road is an unsealed rural road currently providing access to approximately 50 properties in the Shallow Bay precinct. The formation generally provides for a single travel lane in each direction.

In the vicinity of the proposed quarry the unsealed road width is generally 5 - 6 wide with some sections of unsealed shoulders and tabledrains. This section of the haulage route is not speed posted, with warning signs recommending users 'Drive to the Conditions'.

The road was dry and in reasonable condition at the time of inspection, but the condition will vary, depending on the regularity of council grading and maintenance.

6.4.2 Coomba Road

Coomba Road is a local rural road providing access to and from The Lakes Way for residents in the Coomba Park and Shallow Bay precincts. The road is sealed and approximately 21 kms in length.

The sealed formation width of Coomba Road varies in width between 5.5 and 6.5m, with unsealed shoulders on both sides. The posted speed limit of Coomba Road is generally 80kmh.

As discussed previously, current traffic volumes on Coomba Road are estimated at 150 vph at peak times (total of both directions), or a total of 1500 vehicles per day. The table from Austroads design guide, shown in Figure 6.6 above, indicates that Coomba Road does not currently meet the recommended sealed road width of 7.0m for an AADT of 1500 vehicles. Consideration should be given to the following:

- Widening the existing sealed roadway to 7.0m
- Providing a sealed/unsealed shoulder

In the meantime, it is recommended that signage be placed at a number of locations along Coomba Road to warn drivers of potential heavy vehicle movements. It should be noted that the proposed quarry will generate a maximum of 4 laden truck & dog movements per day, or 8 return trips.

Coomba Road generally follows the south-western shore of Wallis Lake. The vertical alignment is generally flat, with a small number of small rolling hills. However, the vertical alignment includes a large number of curves in the 21km length. The Austroads *'Guide to Road Design Part 3: Geometric Design*' indicates the minimum radius for a curve on a rural radius in an 80kmh speedzone (with minimal crossfall) is 450m. StreetWise noted during the inspection a number of curves which require a reduction in speed from the 80kmh speedzone.

A check of existing curves on Coomba Road using aerial photographs (NearMap) indicates many of the existing curves have radii significantly LESS than the recommended 450m, with some as low as 100m. Figures 6.7 and 6.8 below are examples of some of the small-radii curves on Coomba Road.

FIGURE 6.7 Coomba Road, north of Woota, showing existing curve radii

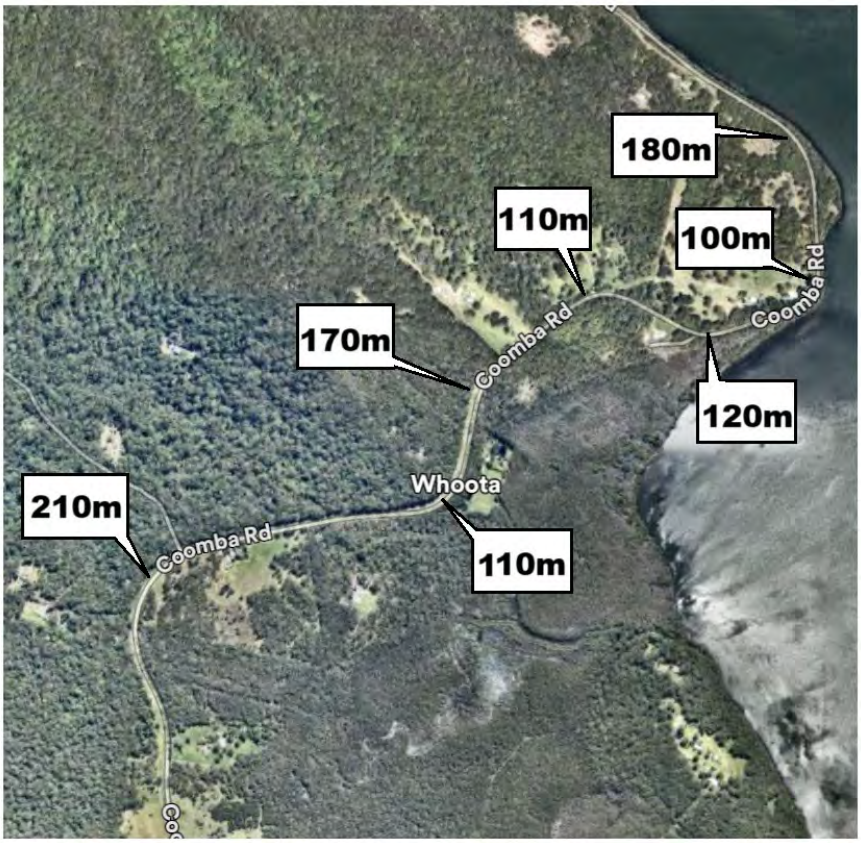

FIGURE 6.8 Coomba Road, at Woota, showing existing curve radii

It should be noted that StreetWise did not observe any CAMs (Curve Advisory Markers) with recommended reduced speeds during the inspection of Coomba Road. However, a few curves included arrows showing the direction of the curve (see below).

FIGURE 6.9 Existing curve signage on Coomba Road

StreetWise recommend a review of the existing Coomba Road, with a view to either reducing the current 80kmh speedzone, or installing additional curve warning signage (including recommended reduced speeds). It should be noted that the above is recommended based on existing conditions and current traffic volumes. The relatively low number of traffic movements to be generated by the proposed development will not have any significant impacts on the safety or efficiency of the existing local road network.

6.5 Transportation and Storage of Dangerous Goods

All explosives will be transported by experienced blasting contractors in accordance with AS 2187.2-2006 "Explosives - Storage, Transport and Use".
On site traffic management will likely provide speed limits for all vehicles travelling around the quarry site to ensure slow vehicle speeds and maximise safety.

Minimal hazardous materials will be stored at the quarry. Any fuel storage will be self-bunded and in full conformance to the Australian Standard AS1940-2017.

7. SITE SERVICING

7.1 Site Access

The proposed quarry site is located within Lot 542 in DP 531809, approximately 350 metres to the west of Shallow Bay Road, and is currently accessed via an existing gravel road. The unsealed driveway at Shallow Bay Road is suitable to cater for the turning movements of heavy vehicles (Section 5).

7.2 On Site Amenities

It is proposed to establish on site amenities once the quarry pit of is sufficient size, including a small demountable site office with staff amenities. Initially, front-end loaders with calibrated scales will be used for loading and weighing of the hard rock resource won from the site into road trucks. It is anticipated that once production significantly increases a weighbridge will be installed.

Any fuels stored on site will be contained within self-bunded fuel tanks. Chemical storage may include a bunded lockable container for oils and lubricants for minor servicing.

7.3 Driver Safety

A driver code of conduct outlines the expected standards of behaviour and rules for drivers, emphasizing safety, compliance with traffic laws, and responsible driving practices, including maintaining a valid license and adhering to speed limits. It is proposed to prepare a Driver Code of Conduct for the use of all drivers accessing the quarry site. The document may also include:

- Licensing
- Speed Limits
- Road Conditions
- Safe Driving Practices
- Load Security
- Fatigue Management
- Substance Use
- Courtesy and Respect
- Reporting Incidents
- Following Routes
- Noise and Dust Minimisation
- Litter Prevention
- Company Policies

Consideration should also be given to reducing speed and maximising safety when driving near bus stops during peak school periods.

All drivers will be in communication with the quarry and other drivers via 2-way radio.

8. SUMMARY

StreetWise Road Safety & Traffic Services have been engaged by Ironhide Enterprises Pty Ltd to prepare a Traffic Impact Assessment (TIA) in regard to a proposed quarry operation at 465 Shallow Bay Road.

Ironhide Enterprises Pty Ltd propose to establish a hard rock quarry on the site and extract up to 30,000 tonnes per annum of quarry material from a resource of approximately 756,000 tonnes. The primary purpose of the project is to supply quarry products for use as fill, as well as for road construction and maintenance.

The proposed Shallow Bay Quarry operation is located approximately 10km to the south-west of Forster CBD, and 20.5km north-east of The Lakes Way. The quarry operators propose to service the Coomba Park & Coomba Bay area, but quarry material may also be utilised for projects in the wider Forster area. The main haul route (road) will be Shallow Bay Road (4.6km), then either turn left onto Coomba Road towards Coomba Park (5km) or turn right and head south for 15.8km towards The Lakes Way.

Coomba Road is a local rural access road providing access to rural properties in the Coomba Park and Shallow Bay precincts on the south-western side of Wallis Lake. Coomba Road is approximately 20km in length, and connecting the township of Coomba Park in the north to The Lakes Way in the south. The sealed formation width of Coomba Road varies in width between 5.5 and 6.5m, with unsealed shoulders on both sides. The posted speed limit of Coomba Road is generally 80kmh. The speedzone reduces to 50kmh near Burraneer Road, at the approach to Coomba Park township.

The Lakes Way connects the Pacific Motorway at Bulahdelah in the south to the Pacific Motorway at Failford in the north, via Forster & Tuncurry. The road is listed as a Tourist Road (No.6) and is approximately 85km in length. The posted speed limit on The Lakes Way in the vicinity of Coomba Road is 100km/h. The southern section of The Lakes Way (i.e. south of Forster township) is not an approved B Double route for heavy vehicles.

In the vicinity of Coomba Road, the travel lanes on The Lakes Way are generally 3.5m wide in each direction with minimal width shoulders. The roadway widens in a number of locations including intersections and bus bays. The road widens to add a right turn lane into Coomba Road.

Shallow Bay Road is a local rural access road providing access to rural properties in the Shallow Bay precinct, to the west of Coomba Bay. Shallow Bay Road intersects with Coomba Road approximately 4km south of Coomba Bay (or 16km north-east of The Lakes way). Shallow Bay Road is unsealed and variable width - generally a minimum of 5m wide. The condition of Shallow Bay Road is considered variable i.e. dependent of weather conditions and Council maintenance.

Shallow Bay Road caters for approximately 50 rural properties with residences. If occupied, the residences would generate around 350 trips per day, or 35 trips during peak hours.

The intersection of The Lakes Way Coramba Road is a T-intersection, which has been widened on the southbound side to create a dedicated right turn lane for vehicles accessing Coomba Road.

The current intersection of Coomba Road is a T-intersection, with some widening of Coomba Road. The intersection is sealed, but becomes unsealed approximately 50m west on Shallow Bay Road.

The New South Wales Centre for Road Safety website indicates there have been 4 recorded crashes in the vicinity of the intersection of The Lakes Way and Coomba Road in the past 5 years. The website also indicates 9 crashes have occurred recently on Coomba Road, while 1 has been recorded on Shallow Bay Road. The majority of the crashes have been single vehicle incidents, with most involving the vehicle losing control and crashing off the sealed roadway.

StreetWise undertook a manual traffic count data at the intersection of The Lakes Way and Coomba Road. The data indicates a total of around 100 vehicles an hour on Coomba Road at peak times, and 370 an hour on The Lakes Way. StreetWise also estimated approximately 350 vehicles a day hour use Shallow Bay Road, based on 7 trips an hour generated by the 50 properties in the area.

StreetWise consider that all existing roads proposed to be used to haul material from the future quarry currently have a Level of Service of ‘A’ or ‘B’, and have adequate capacity to cater for the additional traffic to be generated by the quarry with minimal impacts on safety or efficiency.

It is intended that the quarry material won from the proposed Shallow Bay quarry will be used for a range of purposes, primarily as a roadbase or select fill servicing local and regional infrastructure projects. The quarry operators plan to

utilise a 32 tonne truck & dog combination to haul the quarry material. It is estimated that the future proposed quarry will generate an average of 13 laden trips per week, and up to 20 laden quarry trucks per week at maximum output. This equates to a maximum of 4 laden truck & dog movements per day, or 8 return trips.

The proposed quarry will employ up to 4 staff working on site plus occasional contractors such as blasting contractors, machinery servicing and refuellers. This will generate approximately 15 daily trips or an average of 1.5 trips per hour to and from the quarry. It is likely that commuter trips by staff will be into the site before 7:00am and exit around mid to late afternoon.

	Normal Operation			Peak Capacity		
	Truck & Dog		Light Vehicles	Truck & Dog		Light Vehicles
	Out (Laden)	Total (Out laden + In empty)		Out (Laden)	Total (Out laden + In empty)	
Daily	2.6	5.2	15	3.9	7.8	15
Hourly	0.24	0.72	1.5	0.36	0.72	1.5
AM Peak	1	2	2	1	2	2

The quarry operator has indicated that the majority of future haulage movements will be within the Coomba Bay area. For the purposes of this assessment the following traffic distribution has been assumed:

- It is likely that the majority of laden truck movements will occur in the morning, with less movements in the afternoon
- The majority of laden truck movements will turn right onto Shallow Bay Road
- A Coomba Road, the majority of truck movements will turn left and head north towards the Coomba Park precinct (say 70%). The remaining 30% may turn right towards The Lakes Way.
- The majority of light vehicle movements (i.e. staff, service vehicles, deliveries etc) will be to & from the local area or the Forster-Tuncurry precinct.

The current intersection of The Lakes Way and Coomba Road is a BAR/BAL layout, with adequate widening on the eastern side of The Lakes Way to allow southbound traffic to pass any vehicles turning right into Coomba Road. An intersection assessment indicates the current peak hour volumes through the intersection would trigger an upgrade to a CHR layout.

The existing intersection of Coomba Road and Shallow Bay Road currently caters for low traffic volumes. An intersection assessment indicates a BAR/BAL intersection is required. The existing layout would require widening on the southbound side to meet the minimum requirements of a BASIC intersection.

The access to the future quarry is proposed via the existing driveway off Shallow Bay Road. The unsealed layout has adequate width to cater for the turn movements of large vehicles. Shallow bay Road currently caters for approx. 350 vehicles per day, or an average of 3 minutes gap between vehicles in each direction. Given that the quarry will generate an average of 4 haulage movements

a day, the likelihood of conflict with local vehicle movements at the quarry entry is very low.

Also, the majority of future haulage movements will turn left out of the quarry and head towards Coomba Road. This means the likelihood of any haulage vehicles turning right into the site from Shallow Bay Road is low, and the likelihood of any conflict with local traffic and a truck & dog slowing, queuing or turning right into the quarry site is minimal.

StreetWise measured the sight distances currently available at the existing intersections, and found them to be adequate for the designated speedzones.

- To left 105m
- To right 180+m

The above distances are considered satisfactory for an unsealed surface and local traffic driving to the conditions.

In order to make drivers more aware of heavy vehicles in the area and to improve road safety around the quarry access it is recommended W5 – 22 (B size) signs be erected at 150m on approach to each side of the quarry access.

Rhino Bus Company operates a school bus service serving the Shallow Bay and Coomba Park areas, taking school students to & from Forster Schools via Forster Heights (S361). The route includes a number of bus stops along Coomba Road, but the route does not utilise Shallow Bay Road.

StreetWise undertook a desktop assessment of the haulage route, which indicated:

- The Lakes Way is a classified road which is suitable for use as a haulage road, and has adequate capacity to cater for the small number of laden truck & dog movements to be generated by the proposed quarry.
- Shallow Bay Road is an unsealed rural road, with a road width of generally 5 – 6m. This section of the haulage route is not speed posted, with warning signs recommending users ‘Drive to the Conditions’. The road condition will vary, depending on the regularity of council grading and maintenance.
- The existing sealed road width of Coomba Road is generally 5.0 – 6.0m metres , with minimal shoulder width. The existing sealed width does not meet the Austroads recommended requirements for a rural road catering for 1500 vehicles per day.
- A check of existing curves indicates many have radii significantly LESS than the Austroads recommended 450m, with some as low as 100m.
- StreetWise did not observe any CAMs (Curve Advisory Markers) with recommended reduced speeds during the inspection of Coomba Road. However, a few curves included arrows showing the direction of the curve.

It is proposed to prepare a Driver Code of Conduct for the use of all drivers accessing the quarry site.

9. RECOMMENDATIONS

In summary, StreetWise Road Safety and Traffic Services recommend that the proposed development as being a suitable development based on the predicted traffic impacts. The additional vehicle trips to be generated by the development will not have a significant impact on the efficiency or safety of the local road network, and that the local roads and intersections have the capacity to cater for the additional trips generated by the development, with minimal upgrades required.

Consideration should be given to the following:

- Upgrade the intersection of Shallow Bay Road and Coomba Road to an Austroads Type BAR / BAL layout to ensure there is adequate width to allow southbound traffic on Coomba Road to pass any vehicles slowing, queuing or turning right into Shallow Bay Road. This is a pre-existing condition and there are no upgrades required as a result of this development proposal.
- Undertaking an assessment of the full length of Coomba Road with a view to reducing the existing 80kmh speedzone or installing Curve Advisory Markers (CAMs) with recommended speed reductions where required. This is a pre-existing condition and there are no upgrades required as a result of this development proposal.
- Install W5-22 Advanced Warning signage along the proposed haulage routes to ensure drivers are aware of increased heavy vehicles movements thus improving road safety.
- The existing traffic volumes through the intersection of The Lakes Way and Coomba Road currently exceed the existing BASIC intersection layout. Consideration should be given to upgrading this intersection to a Channelised intersection (as per Austroads Guidelines). This is a pre-existing condition and there are no upgrades required as a result of this development proposal.

Appendix A
Manual Traffic Count Results

Intersection of Coomba Road & The Lakes Road

Time		1			2			3			4			5			6			15 Min Total	60 min Total
		The Lakes Way (Northbound)			Left into Coomba Rd			Right out of Coomba Rd			Left out of Coomba Rd			Right into Coomba Rd			The Lakes Way (Southbound)				
		Light	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*		
8:00 AM	8:15 AM	55	2	57	8	0	8	3	0	3	16	0	16	3	0	3	20	0	20	107	
8:15 AM	8:30 AM	51	0	51	4	0	4	5	0	5	18	1	19	3	0	3	28	1	29	111	
8:30 AM	8:45 AM	51	4	55	8	0	8	6	0	6	21	3	24	8	0	8	21	0	21	122	
8:45 AM	9:00 AM	53	3	56	4	0	4	8	0	8	23	0	23	7	1	8	34	1	35	134	**474**
	Total	210	9	219	24	0	24	22	0	22	78	4	82	21	1	22	103	2	105	**474**	

Time		1			2			3			4			5			6			15 Min Total	60 min Total
		The Lakes Way (Northbound)			Left into Coomba Rd			Right out of Coomba Rd			Left out of Coomba Rd			Right into Coomba Rd			The Lakes Way (Southbound)				
		Light	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*		
2:30 PM	2:45 PM	49	1	50	3	0	3	4	0	4	14	2	16	19	0	19	49	0	49	141	
2:45 PM	3:00 PM	47	1	48	5	0	5	4	0	4	11	0	11	16	0	16	40	0	40	124	
3:00 PM	3:15 PM	30	0	30	3	0	3	2	0	2	12	0	12	11	0	11	48	1	49	107	
3:15 PM	3:30 PM	31	0	31	1	0	1	9	0	9	13	0	13	16	1	17	50	1	51	122	**494**
	Total	157	2	159	12	0	12	19	0	19	50	2	52	62	1	63	138	2	140	**494**	

Appendix B
Consultation

Appendix C
Quarry Operational Traffic Management Plan (TMP)

Appendix D
Quarry Driver's Code of Conduct (DCC)