



**Traffic & Transport
Assessment**

Proposed Extension of Ardglen Quarry, north of Murrurundi NSW

Daracon Quarries



Traffic Impact Assessment

September 2006

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1. Introduction

Mark Waugh Pty Ltd was commissioned by Daracon Quarries to prepare a Traffic Impact and Access Assessment for the proposed extension of the Ardglen Quarry, NSW. The work is required to support an application under Part 3A of the Environmental Planning and Assessment Act 1979, seeking approval by the Minister for the proposed quarry extension.

This report presents the findings of the traffic investigations and assessment of the proposal. It is structured as follows:

- **Chapter 2** outlines the existing situation in the vicinity of the subject site, including discussion on the planned development growth within the vicinity and road network changes to support it.
- **Chapter 3** describes the traffic and parking features of the proposal, access arrangements and how these meet Council's and road authority guidelines.
- **Chapter 4** details the assessment of traffic operations related to the proposal as well as review the on-going safety implications of the quarry works.
- **Chapter 5** summarises the findings of this investigation, outlining conclusions and recommendations for the traffic operations of the site to support the project application.

2. Existing Situation

2.1 Background and Site Location

The subject site is located 8 kilometres north-west of Murrurundi in the general locality of Ardglen, NSW. It is located on the western edge of the main northern railway line and road access is via Quarry Road to the New England Highway. It is proposed to continue to provide access via this existing road.

The site is located approximately 80 kms south of Tamworth and 73 kms north of Muswellbrook.

The locality of the site in the context of the greater road network is illustrated in **Figure 2.1** below:

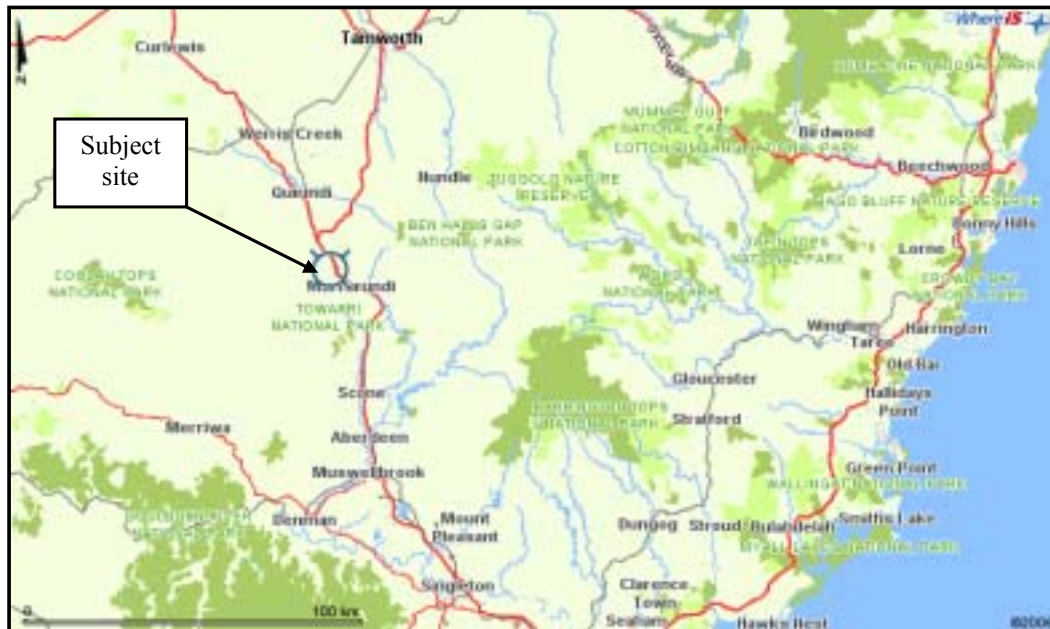


Figure 2.1 – Site Location

2.2 Local Road System

2.2.1 Road Characteristics

The New England Highway is the main road through the locality and it provides the major connection between Newcastle, the Hunter Valley through to Tamworth and Queensland. The New England Highway forms part of the National Highway system and is controlled by the Roads and Traffic Authority of NSW (RTA). It is classified as State Highway number 9.

The New England Highway in the vicinity of the access to the site via Quarry Road provides two lanes of travel in both directions. The road provides a sealed shoulder in both directions, for use by either broken down vehicles or cyclists. It has a general posted speed limit of 100 km/h along its length. The road alignment is generally good with good forward visibility provided along its length.



Photo 1 - View south along the New England Highway adjacent to the intersection with Quarry Road. Note sealed shoulder to both sides.

There are limited access points along this length of the road due to the relatively rural nature of the road in the vicinity of the site. There are a number of minor driveways to rural lots as well as farm holdings.

The road provides an overall width in the order of 11 metres on both sides of the highway, inclusive of a 2.0 m wide sealed shoulder to both sides. There is a combination of concrete jersey barriers and wire safety fence provided along the majority of the central reservation, to maximise safety between the opposing traffic streams. There are no street lights or footpaths in the vicinity of the site.

Quarry Road is a simple two lane rural road with a single lane of travel in both directions. It provides access to the village of Ardglen as well as access to the subject quarry site.

2.3 Traffic Volumes

2.3.1 Traffic Surveys

Traffic volume data for the project has been obtained from the RTA published data. The RTA data provides annual daily traffic flows (AADT) to the north of Murrurundi, at 1.5 km north of the town boundary as well as at Willow Tree, some 15 km north of Murrurundi. Data is also provided 3 km south of Murrundi. With the limited population and development in the general vicinity of the subject site it is considered that these count stations provide adequate data for this project.

The count station 15 km north of Murrundi also provides a breakdown in weekly and hourly data, allowing for an accurate picture of the traffic flows along this length of the New England Highway.

2.3.2 RTA Traffic Data

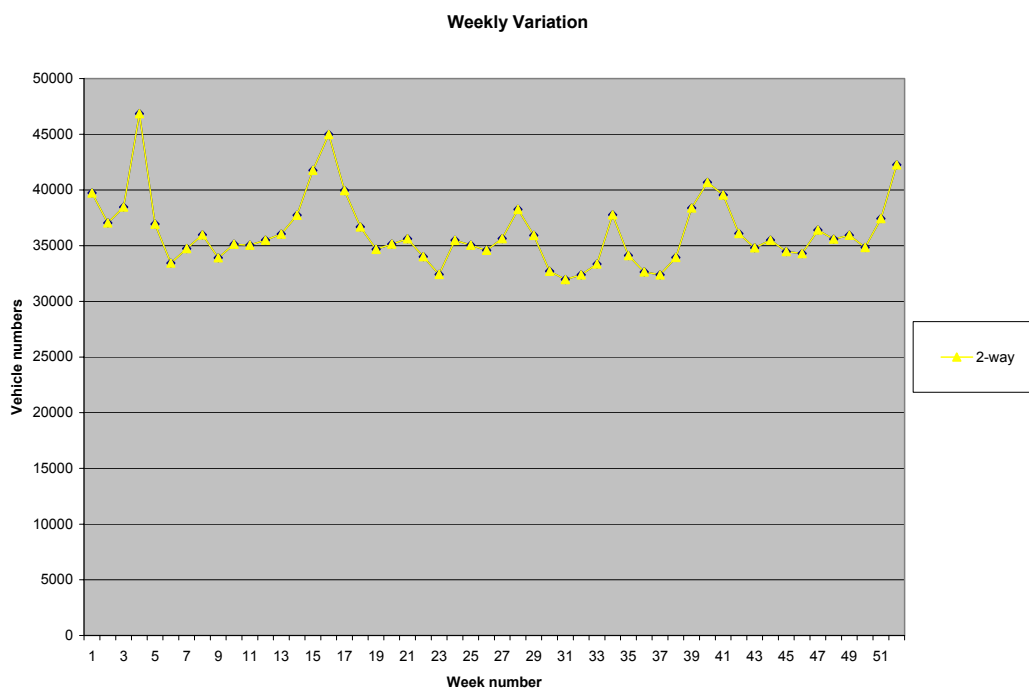
The relevant traffic data provided by the RTA is for the station number 92.102 at Willow Tree. This station has been used because of the wide range of data provided, including weekly variation in flows along the New England Highway as well as hourly variation in flows, for both southbound and northbound flows. This is not available at other stations in the vicinity of the site.

This data is reproduced in **Appendix A**.

2.3.3 Weekly variation in traffic flows along the New England Highway

The weekly variation in traffic data for traffic flows along the New England Highway is presented in the Graph 1 below.

Graph 1 – Weekly Variation on Traffic Flows

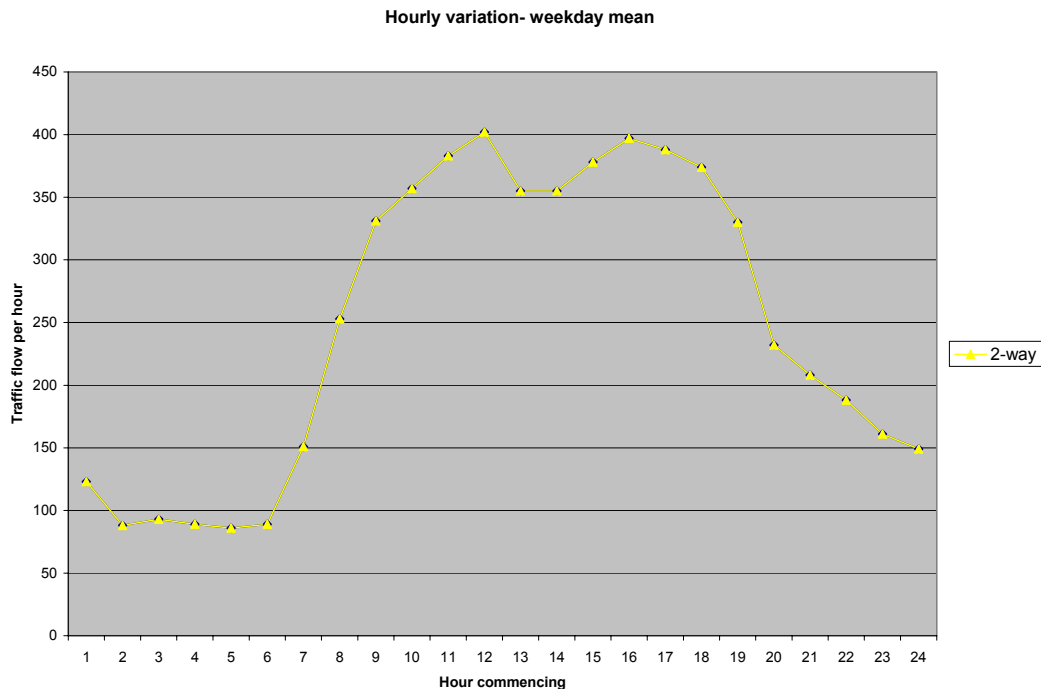


From the graph above, it can be seen that the weekly variation in traffic flows along the New England Highway is reasonably low. During the peak week in 2004 (week number 4, commencing 19/1/04) the weekly flow along the New England Highway was 46,845 two-way. This compares with the average of 36,254 vehicles per week, representing an increase of 29% greater than the annual average. The 85th percentile weekly flow is 38,842, showing the peak weekly flow is 20% greater than the 85th percentile weekly flow.

2.3.4 Hourly Variation in Traffic Flows

Data from the same RTA station also provides details on the hourly variation in traffic flows. The results of the hourly variation in traffic flows are presented in Graph 2 below:

Graph 2 – Hourly Variation on Traffic Flows



The above graph demonstrates that the peak period along this length of the New England Highway is around the 11.00 to 12 noon. This is due to the road being a popular through road for regional traffic movements. The peak two-way flow is in the order of 402 vehicles per hour from this traffic count station.

2.3.5 Historic Traffic Growth

The traffic data from the RTA automatic counter also provides historic data, providing background traffic growth in traffic volumes along the New England Highway. These are presented in **Table 2.1** below:

Table 2.1 – Historic Traffic Flows along the New England Highway

Year	1992	1995	1998	2001	2004
AADT (southern boundary of Murrurundi)	6,101	5,773	5,889	5,989	5,783
Growth		-5%	2%	1.6%	-3.5%
Per year		-1.7%	0.66%	0.53%	-1.16%
AADT (at Willow Tree, 15 kms north of Murrundi)	5,582	5,695	5,639	5,685	5,179
Growth		2%	-1%	0.1%	-9%
Per year		0.7%	-0.3	0.03%	-3%

The table above shows that the rate of growth in traffic flows along The New England Highway is relatively low, with some years showing negative growth. The average over the last 10 years shows that the rate of annual growth is near zero overall.

2.4 Intersection Controls

As discussed above, there are minimal intersections in the general vicinity of the site. The major intersection is the intersection of the New England Highway and Quarry Road, as used by the subject site.

This intersection is well laid out, with a sheltered right turn lane for southbound traffic on the New England Highway turning right into the side road. There are no left turn deceleration or acceleration lanes but given the low traffic volumes on the New England Highway and side road flows it is considered that these lanes are not required. In addition it is noted that there is no acceleration lane for traffic turning right out of the side road, again due to the low traffic volume turning right out of the side road at this location.

2.5 Road Network Improvements

It is understood there are no major road network improvements planned in the vicinity of the subject site, apart from normal road maintenance performed by Council and the RTA.

2.6 Public Transport, Pedestrians and Cyclists

There is no regular public transport in the vicinity.

Cyclists are able to utilise the shoulders of the roadways in the vicinity of the site. Observations on site indicate that there is limited use of the New England Highway in this location by cyclists.

Pedestrians can use the existing sealed shoulders. Again, during the site observations there were no pedestrian movements observed.

2.7 Existing Quarry Truck Operations

Existing truck movement numbers associated with the current use of the site have been obtained from the quarry management. The data provided indicates that the typical daily number of truck movements is in the order of 25 out and 25 in. In addition, there are generally 8 people working full time on site, generating some 8 inbound movements in the morning and 8 outbound movements in the afternoon.

The vehicles involved with removing this material are truck and dog combinations.

The information provided indicates that the truck movements associated with removal of material from the quarry can be greater when the demand is increased, and similarly can be less when the demand decreases. The material is transported to locations both north and south of the site with the majority of the material heading south from the site.

3. Proposed Development

3.1 Development and Parking Arrangements

The proposed development will allow for the extension of the extraction area to the west of the existing operations. The proposal will continue to produce up to 500,000 tonnes of material per annum, with up to 250,000 tonnes transported by rail and the balance by road.

It is important to note that the proposed extraction rate will remain as per the existing facility, meaning that the number of truck movements per annum will not alter as a result of this development.

3.2 Traffic Generation

The level of traffic generation from the development has been provided by the client and is based upon the existing operations. The current quarry transports on average 250,000 tonnes per annum by road, which gives an average number of 25 truck movements per day outbound laden (and corresponding unladen truck movements inbound). This number will not alter as a result of the proposed development.

All machinery required for the work is currently located on site. No additional machinery or access will be required as part of this development. Existing maintenance and service vehicles will remain as per existing levels.

3.3 Traffic Distribution

Trucks delivering material from the quarry could head either north or south of the site. The majority currently head south from the quarry, requiring a right turn out from Quarry Road and left turn into Quarry Road for the return trip.

3.4 Site Operations and Access Arrangements

The site plans for the proposal are presented in **Appendix C** to this report. The overall layout and operation will be similar to the existing quarry and caters for all vehicle movements. Vehicles enter and exit the site in a forward direction.

3.5 Parking Requirements

Parking for the current operations is contained on site. The extension will not generate any major increase in parking requirements and it is considered that all parking can be provided on site.

4. Assessment of Transport Operations

4.1 Site Access Operations

It can be seen that the volume of traffic associated with the quarry, together with the current flows on the New England Highway, will have a minimal impact upon the level of service for all road users. The level of traffic turning in and out of Quarry Road is very low, which combined with the relatively low traffic flows along the New England Highway mean that delays for the through traffic movements will be small.

From Table 4.1 of Austroads Part 5 – Intersections at Grade (reproduced below), it can be seen that the warrants for delays to traffic movements are not met during the peak period, as the two-way traffic flow on the New England Highway is less than 600 vehicles per hour. Combined with the side road flows of less than 100 vehicles per hour it can be seen that no intersection analysis is required as there is minimal delay for all road users.

Table 4.1 — Intersection Capacity - Uninterrupted Flow Conditions

Major Road Type ¹	Major Road Flow (vph) ²	Minor Road Flow (vph) ³
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Notes:

1. Major road is through road (i.e. has priority).
2. Major road design volumes include through and turning movements.
3. Minor road design volumes include through and turning volumes.

4.2 Road Network Performance

Traffic data presented in **Section 2.3** indicates that the current hourly traffic flows along the New England Highway in the vicinity of the site operate at a good level of service. From the data provided by the RTA, it can be seen that the current peak hourly flows along the New England Highway are in the order of 400 maximum per hour two-way. From Table 4.5 of the RTA Guide to Traffic Generating Developments (reproduced below) it can be seen that the level of service for the current flows is B.

Table 4.2 – Peak Hour Flows on Rural two-lane roads

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

It is important to note that this development will not increase the traffic movements in and out of the site. Therefore this existing level of service will be maintained.

4.3 Intersection Safety Review

From the above, it can be seen that there will be little if any increase in traffic flows associated with the proposed extension of the quarry. The traffic volume data also indicates that there is not a capacity issue associated with the intersection of the New England Highway and Quarry Road.

It is considered that the safety implications of the continual use of this intersection need to be reviewed, to ensure that road safety at this intersection for all road users is acceptable and maintained at the existing levels.

An audit has been completed of the existing intersection layout together with speed surveys for trucks turning right from the quarry, as well as for general truck movements along the New England Highway.

4.3.1 Sight Distance for Exiting Traffic

The intersection is located on the outside of a bend on the New England Highway and as such increases the visibility available to road users. The layout of the intersection provides a sheltered central lane that allows vehicles to turn right out of the side road in two stages. However, observations on site show that large vehicles do not use this central area of the road, but complete the right turn movement in one movement. It can be seen that this can be done due to the low traffic flows in both directions along the New England Highway.

For traffic on the side road, the visibility available is good. The visibility distance has been measured on site and it exceeds 300 metres. With reference to Table 4.7.1 of the RTA Road Design Guide (reproduced below) it can be seen that for the posted speed limit of 100 km/h the safe intersection sight distance should be 255 metres. Allowing for the correction due to the down

grade (in the order of 5-8%) this distance should be increase by 25 metres, giving a minimum sight distance of 280 metres. It can therefore be seen that the available visibility for trucks exiting the site road exceeds the requirements of the RTA Road Design Guide.

Table 4.3 – Intersection Sight Distance for Level Pavement

Design speed (major road) (km/h)	Deceleration (g) ⁽¹⁾	ESD - entering sight distance (1.05m to 1.05m) (m)	ASD - Approach sight distance (1.05m to 0.0m)				SISD - Safe intersection sight distance (1.05m to 1.05m)			
			Absolute minimum 2.0 secs		Desirable 2.5 secs		Absolute minimum 2.0 secs		Desirable 2.5 secs	
			m ⁽²⁾	min K ⁽⁴⁾	m ⁽²⁾	min K ⁽⁴⁾	m ⁽²⁾	min K ⁽⁴⁾	m ⁽²⁾	min K ⁽⁴⁾
40	0.56	100	33	5	39	8	66	5	72	6
50	0.52	125	47	11	54	14	89	9	96	11
60	0.48	160	63	19	71	25	113	15	121	17
70	0.45	220	82	32	91	40	140	23	149	27
80	0.43	305	103	51	114	63	170	34	181	39
90	0.41	400	128	78	140	94	203	49	215	55
100	0.39	500 ⁽³⁾	157	117	170	139	240	69	253	76
110	0.37	500 ⁽³⁾	190	172	205	200	282	94	297	105
120	0.35	500 ⁽³⁾	229	250	245	286	329	129	345	142

Table 4.4 – Grade Corrections to ASD and SISD

Design speed (major road) (km/h)	Correction (m)							
	Upgrade				Downgrade			
	2%	4%	6%	8%	2%	4%	6%	8%
40	-	-	-1	-1	-	-	1	2
50	-	-1	-2	-3	-	2	3	4
60	-1	-2	-3	-4	1	3	4	6
70	-2	-4	-5	-7	2	4	7	9
80	-3	-5	-7	-9	3	6	10	13
90	-4	-7	-10	-13	4	8	13	19
100	-5	-9	-14	-17	6	12	18	26
110	-7	-13	-18	-23	7	16	25	36
120	-9	-17	-24	-30	10	21	34	48



Photo 2 – View to right for drivers exiting Quarry Road.



Photo 3 – View to left for drivers exiting Quarry Road.

4.3.2 Forward Visibility, southbound on New England Highway

The straight alignment of the New England Highway in this location on the approach to the intersection offers good forward visibility for vehicles approaching the intersection from the north. The visibility has been measured on site and exceeds 500 metres. This again exceeds the requirements of the RTA Road Design Guide.

4.3.3 Forward Visibility, northbound on New England Highway

The straight alignment of the New England Highway in this location offers good forward visibility for vehicles approaching the intersection from the south. The visibility has been measured on site and exceeds 300 metres. This again exceeds the requirements of the RTA Road Design Guide.

4.4 Intersection Layout

The layout of the intersection provides a central right turn lane for traffic entering the side road. Advice from the client indicates that trucks associated with the quarry can depart/arrive from both the north and south of the site. For trucks from the north, the drivers can pull into this central right turn lane to ensure they do not block the through traffic movements. From this central turn lane, the drivers have good visibility along the New England Highway allowing the drivers to safely judge a suitable gap for turning across the northbound lane to enter the side road. This is also backed up with the adequate safe intersection sight distance for the northbound traffic on the New England Highway. This ensures that northbound traffic on the New England Highway can brake to avoid a collision with a right turning vehicle.



Photo 4 – Drivers view for right turn into side road from New England Highway southbound

Whilst no left turn deceleration or acceleration lane is provided, it is considered that the low traffic volumes together with the two lanes of travel do not create any safety issues at this intersection. For the left turn out, the gradient of the road helps the trucks to accelerate up to speed. For the left turn in, the nearside kerb effectively operates as a deceleration lane, with through traffic movements able to pass the slowing vehicle with little hindrance. With the low traffic volumes this does not create any capacity issues.

For traffic turning right out, there is no right turn acceleration lane. With the good visibility together with the low traffic speeds, it can be seen that this does not create an issue, as the drivers can safely judge a suitable gap in the traffic flows from both directions and enter the New England Highway.

Whilst a right turn acceleration lane could be provided at this location, it is considered that this is not feasible, due to the steep gradient for vehicles (and heavy trucks in particular) turning to head south from the side road. The trucks in particular cannot accelerate up to the posted speed limit of 100 km/h before the summit of the hill. A normal merge allows vehicles to accelerate to a similar speed to the through traffic movements so a merge can occur, as opposed to a give way situation. It is therefore considered a right turn acceleration lane with merge cannot be provided at this location.

It is noted that there is an existing road sign just to the south of this intersection, which tells drivers that “Heavy Vehicles Must Use Left Lane”, thereby ensuring that all trucks exiting the side road cross across the full width of the road to head south in the nearside traffic lane.

4.4.1 Traffic Speeds

As part of the site audit work, the vehicle speeds along the New England Highway were monitored. The speed of a typical laden B-double travelling through the intersection on the New England Highway was monitored for 3 separate vehicles. It was noted that to the north of the intersection the gradient is relatively shallow and that the trucks could maintain a speed of 90 km/h, upto the intersection with Quarry Road. However, as the gradient of the New England Highway increases to the south of this intersection, the vehicle speeds decreased considerably. The speed of the B-doubles reduced to a speed in the order of 60-65 km/h.

A speed survey was also completed for the current laden trucks from the quarry exiting the side road. The survey was again completed for 3 separate trucks and all of the trucks accelerated to a maximum speed in the order of 38-39 km/h. This speed only increased once the trucks had passed over the summit of the hill.

The above observations demonstrate that all heavy goods vehicles on the hill travel at a much lower speed than the posted speed limit of 100 km/h. For the drivers of light vehicles, it is important that they have adequate visibility to observe these slower moving vehicles, so that they can slow down to avoid a collision or to allow them to move into the outside traffic lane.

The forward visibility envelope for drivers travelling south on the New England Highway is good and for the length along this steep up gradient exceeds 500 metres, as the curves are generous and the bank to the left hand side is cut back from the edge of the road, to maximise forward visibility for all vehicles.

5. Conclusions

The following conclusions are drawn from the investigations into the proposed expansion of the Ardglan Quarry, north of Murrurundi NSW:

1. The development proposal is to extend the existing extraction area. The extension will allow the quarry to continue operating in the same manner as the existing operations. The proposal will allow for the same annual volume of material to be excavated from the site with no increase in the number of truck movements associated with the operations.
2. Access to the site is proposed via the existing access route along Quarry Road, off the New England Highway. Existing truck numbers associated with the quarry operations are typically 25 laden trucks per day, spread over the working day. These trucks can head north or south from the quarry but generally head south from the site.
3. Existing road network operations adjacent to the site are well within technical capacity limits and operational levels of service are very good at B. The historical traffic data indicates there is little if any traffic growth along this length of the New England Highway.
4. The amount of traffic associated with the proposed extension will be similar to the existing operations. One extra employee will work at the site, whilst the truck movements in and out will remain as per the existing situation. This level of traffic is very low and will not have any impact upon the operation of the New England Highway or impact upon the operation of the intersection of the New England Highway and Quarry Road.
5. The existing intersection of the New England Highway and Quarry Road has been reviewed against the standards within the RTA Road Design Guide to review the impact upon the road safety for all users on the New England Highway as well as traffic associated with the on-going use of this intersection by quarry trucks. The side road of the intersection is located on the outside of a curve and accordingly offers good visibility for the drivers exiting the side road. The visibility has been measured on site and exceeds the requirements of the RTA Road Design Guide.
6. An audit has been completed on existing traffic speeds through this intersection. The audit shows that existing B-double trucks travelling southbound on the New England Highway pass through the intersection at a speed in the order of 90 km/h but then the speed of the trucks decreases significantly down to around 60-65 km/h. This is due to the uphill gradient of the New England Highway in this location. The alignment of the road, together with the low traffic speeds means that southbound traffic can pull out into the outside lane or brake to avoid a collision with these slow moving vehicles.
7. A speed audit was also completed of the existing trucks from the quarry. The speed audit shows that these trucks accelerate to a maximum speed in the order of 38-39 km/h and do not reach the posted speed limit until they have passed over the summit of the hill.
8. It is considered that an acceleration lane for the trucks turning right out of the side road is not warranted on capacity or safety grounds, due to the low traffic volumes on the New England Highway combined with the good visibility along this length of the road.

In conclusion, it is considered that there will be no impact created by the extension of the quarry and that the existing road safety for all road users is acceptable at the intersection of the New England Highway and Quarry Road.

Appendix A Traffic Data From RTA

STATE HIGHWAY NO. 9 - NEW ENGLAND HIGHWAY (Continued)

STATION	LOCATION	MAP	Rm	1990		1992		1994		1996		1988		1990		1992		1995		1998		2001		2004	
				AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm	AADT	Rm
MUSWELLBROOK LGA																									
*05.244	MUSWELLBROOK-AT STEPS TOWN EBY	29	108.0	6480	---	9040	---	12480	---	13154	---	15181	---	16294	---	18018	---	18567	---	15191	---	16971	---	16253	---
05.245	MUSWELLBROOK-S OF M9209, STINNEY ST	TOWN	110.0	9990	---	12480	---	16250	---	18157	---	18157	---	---	---	---	---	---	---	---	---	---	---	---	---
05.246	MUSWELLBROOK-E OF MALLARD ST	TOWN	110.2	14980	---	16250	---	18157	---	18157	---	18157	---	---	---	---	---	---	---	---	---	---	---	---	---
05.039	0.502M N OF LIZBELL EY	38	85.3	5840	---	7920	---	8190	---	8190	---	8190	---	---	---	---	---	---	---	---	---	---	---	---	---
05.040	S OF MUSCLE CK BR	38	105.2	5900	---	8190	---	8190	---	8190	---	8190	---	---	---	---	---	---	---	---	---	---	---	---	---
05.247	MUSWELLBROOK-S OF HILL ST	TOWN	110.8	12320	---	14540	---	14540	---	14265	---	14265	---	---	---	---	---	---	---	---	---	---	---	---	---
05.063	0.202M S OF SANDY CK BR	29	113.6	7260	---	8030	---	8030	---	8284	---	8284	---	---	---	---	---	---	---	---	---	---	---	---	---
UPPER HUNTER LGA																									
STATION LOCATION MAP Rm 1990 AADT Rm 1992 AADT Rm 1994 AADT Rm 1996 AADT Rm 1988 AADT Rm 1990 AADT Rm 1992 AADT Rm 1995 AADT Rm 1998 AADT Rm 2001 AADT Rm 2004 AADT																									
92.331	AREFIELD-AT MUSWELLBROOK SIDGE EBY	29	121.9	6130	---	7740	---	8641	---	8641	---	8641	---	---	---	---	---	---	---	---	---	---	---	---	---
92.674	AREFIELD-AT BRIDGE OVER HUNTER RIVER	29	124.5	6200	---	6870	---	8747	---	8747	---	8747	---	---	---	---	---	---	---	---	---	---	---	---	---
92.038	SCOME-TOWN S OF M9154, GUNDEY RD	29	134.4	5220	---	6300	---	6057	---	6057	---	6057	---	---	---	---	---	---	---	---	---	---	---	---	---
92.486	SCOME-S OF M9105A, GUNDEY RD	TOWN	136.0	5320	---	6450	---	6450	---	6450	---	6450	---	---	---	---	---	---	---	---	---	---	---	---	---
92.485	SCOME-N OF TOWN ST	TOWN	136.2	6440	---	7200	---	8377	---	8377	---	8377	---	---	---	---	---	---	---	---	---	---	---	---	---
92.483	SCOME-N OF M962, LIVERPOOL ST	TOWN	137.0	6990	---	10263	---	10263	---	10263	---	10263	---	---	---	---	---	---	---	---	---	---	---	---	---
92.113	SCOME-AT ELY KING	TOWN	137.5	6790	---	6620	---	7665	---	7665	---	7665	---	---	---	---	---	---	---	---	---	---	---	---	---
92.115	SCOME-1.5KM N OF M942, LIVERPOOL ST	TOWN	138.5	4420	---	4380	---	4380	---	4380	---	4380	---	---	---	---	---	---	---	---	---	---	---	---	---
92.039	SCOME-1.9KM N OF M942, LIVERPOOL ST	29	139.7	3520	---	4810	---	4810	---	4810	---	4810	---	---	---	---	---	---	---	---	---	---	---	---	---
*92.330	BLAIRFORD-1.02M S OF BLAIRFORD	29	159.2	3440	---	3930	---	3930	---	3930	---	3930	---	---	---	---	---	---	---	---	---	---	---	---	---
92.031	5M S OF MERRIBONE	29	173.9	3190	---	4040	---	4040	---	4040	---	4040	---	---	---	---	---	---	---	---	---	---	---	---	---
92.030	1.50M N OF MERRIBONE	29	176.7	3590	---	3570	---	3570	---	3570	---	3570	---	---	---	---	---	---	---	---	---	---	---	---	---
LIVERPOOL PLAINS LGA																									
STATION LOCATION MAP Rm 1990 AADT Rm 1992 AADT Rm 1994 AADT Rm 1996 AADT Rm 1988 AADT Rm 1990 AADT Rm 1992 AADT Rm 1995 AADT Rm 1998 AADT Rm 2001 AADT Rm 2004 AADT																									
*92.102	WILLOW TREE-1.50M N OF MERRIBONE	29	187.1	3170	---	3400	---	3400	---	3400	---	3400	---	---	---	---	---	---	---	---	---	---	---	---	---
92.029	WILLOW TREE-S OF M9259, MERRIBONE RD	29	196.1	2490	---	3440	---	3440	---	3440	---	3440	---	---	---	---	---	---	---	---	---	---	---	---	---
92.028	WILLOW TREE-N OF M9259, MERRIBONE RD	29	196.3	3130	---	4270	---	4270	---	4270	---	4270	---	---	---	---	---	---	---	---	---	---	---	---	---
92.043	N OF M919, KAMILLAROE HWY	29	197.5	2040	---	2750	---	2750	---	2750	---	2750	---	---	---	---	---	---	---	---	---	---	---	---	---
92.326	N OF M912, GUNDEY RD, N-MALLABUM RD	29	215.6	2120	---	2270	---	2270	---	2270	---	2270	---	---	---	---	---	---	---	---	---	---	---	---	---
*92.325	1KM N OF TUSKERTH REGIONAL EBY	29	227.8	2020	---	2440	---	2440	---	2440	---	2440	---	---	---	---	---	---	---	---	---	---	---	---	---



Mark Waugh Pty Limited
 ABN 67 106 169 180
 Transport Planning & Engineering

DAILY TRAFFIC VOLUMES Year 2004
 NEW ENGLAND HWY, SH9 WILLOW TREE-15KM N OF MURRURUNDI Station No. 92.102.C

Week	Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total	Percent
1	29/12/03	6272	6910	5116	4498p	6193	5622	5719	39730	2.1075
2	5/01/04	5233	5461	5366	5486	5981	4504	5006	37037	1.9646
3	12/01/04	5147	5437	5195	5646	6713	5090	5245	38463	2.0403
4	19/01/04	5628	5909	6244	6963	8680	6775	6646	46845	2.4849
5	26/01/04	7338p	5738	5250	5126	5427	3738	4319	36936	1.9593
6	2/02/04	4630	4652	4950	5024	5720	3706	4546	33428	1.7732
7	9/02/04	4943	4884	4876	5429	5765	4004	4843	34744	1.8430
8	16/02/04	4875	5104	4950	5336	6393	4048	5266	35972	1.9081
9	23/02/04	4911	4768	4896	5004	5716	3932	4689	33916	1.7991
10	1/03/04	4929	5164	4709	5217	6243	4103	4769	35134	1.8637
11	8/03/04	5073	5076	4882	5297	5719	3998	5007	35042	1.8558
12	15/03/04	4834	4907	4751	5506	6243	4134	5122	35497	1.8829
13	22/03/04	5152	5309	5362	5540	6065	3794	4913	36035	1.9115
14	29/03/04	5102	5350	5485	5705	6282	4610	5199	37733	2.0015
15	5/04/04	5379	5934	6227	6627	7775p	3575	4253	41770	2.2157
16	12/04/04	7969p	6997	6202	6396	6709	5128	5589	44990	2.3865
17	19/04/04	5722	5782	5915	6358	7114	5108	3962	39961	2.1197
18	26/04/04	5861p	5247	5735	5331	5861	3914	4742	36691	1.9463
19	3/05/04	4706	4485	4863	5455	5949	4236	4979	34673	1.8392
20	10/05/04	5204	5040	4956	5379	5843	4012	4717	35151	1.8646
21	17/05/04	5222	5168	4959	5443	6001	4152	4670	35615	1.8892
22	24/05/04	5467	5181	5046	5295	5486	3396	4146	34007	1.8039
23	31/05/04	4458	4716	4973	5248	5172	3453	4399	32419	1.7197
24	7/06/04	4873	4914	5006	5345	7670	4533	3148	35489	1.8825
25	14/06/04	6928p	5490	5049	4977	5184	3690	3729	35037	1.8585
26	21/06/04	4703	4963	5029	5647	5887	3998	4377	34594	1.8350
27	28/06/04	4547	4907	4978	5363	6007	4816	5013	35631	1.8900
28	5/07/04	5459	5493	5397	5502	6503	4704	5200	38258	2.0294
29	12/07/04	5449	5008	5135	5539	5856	4100	4842	35929	1.9059
30	19/07/04	4573	4840	4764	5351	5977	3558	4252	32715	1.7354
31	26/07/04	4484	4848	4602	4803	5281	3498	4440	31956	1.6951
32	2/08/04	4711	5023	4793	4953	5232	3284	4382	32378	1.7175
33	9/08/04	4569	4799	4669	4810	5684	4142	4678	33351	1.7691
34	16/08/04	5658	5565	5968	6538	6073	3579	4395	37776	2.0038
35	23/08/04	4809	4821	5069	5271	5707	3806	4631	34114	1.8096
36	30/08/04	4889	4823	4490	5167	5430	3531	4303	32633	1.7310
37	6/09/04	4671	5025	4717	4658	5418	3824	4064	32377	1.7174
38	13/09/04	4605	4728	4958	5168	5921	3893	4682	33945	1.8006
39	20/09/04	5115	5082	5139	6014	6802	4908	5317	38377	2.0357
40	27/09/04	5820	5871	5979	6553	7427	5160	3979	40689	2.1583
41	4/10/04	6784p	6009	5638	5764	6149	4309	4395	39548	2.0978
42	11/10/04	5273	5218	5317	5426	6171	4176	4521	36102	1.9150
43	18/10/04	4630	5066	4963	5790	5843	3842	4680	34814	1.8467
44	25/10/04	5120	5284	5294	5417	5702	3954	4737	35508	1.8835
45	1/11/04	5023	4993	5126	5461	5603	3675	4589	34470	1.8285
46	8/11/04	4967	5070	5036	5416	5595	3442	4769	34295	1.8192
47	15/11/04	5106	5036	5133	5665	6147	4296	5024	36407	1.9312
48	22/11/04	5105	5418	5056	5392	5816	3994	4809	35590	1.8879
49	29/11/04	4997	5218	5197	5823	6121	4054	4532	35942	1.9065
50	6/12/04	5281	5289	5166	5466	5565	3749	4329	34845	1.8484
51	13/12/04	5115	5316	5513	5806	5949	4618	5112	37429	1.9854
52	20/12/04	5581	6294	6872	8031	5231	6774	3478	42261	2.2417
53	27/12/04	5863p	4956p	5628	6499	5367	3607	5279	37199	1.9732
Annual Averages:		5064	5254	5219	5624	6000	4198	4693	36254	
								AAWT	AAWE	AAFH
								5179	5439	6441

p indicates Public Holiday



Mark Waugh Pty Limited
 ABN 67 106 169 180
 Transport Planning & Engineering

HOURLY TRAFFIC VOLUMES for Week commencing MON 16/08/04

Station No. 92.102.C

NEW ENGLAND HWY, SH9 WILLOW TREE-15KM N OF MURRUMUNDI

HOUR comm.	WEEKDAYS							WEEKEND (+HOLIDAYS)			WHOLE WEEK					
	MON 16/08	TUE 17/08	WED 18/08	THU 19/08	FRI 20/08	SAT 21/08	SUN 22/08	TOTAL	MEAN	%	TOTAL	MEAN	%	TOTAL	MEAN	%
0	47	173	107	146	143	73	52	616	123	2.07	125	63	1.57	741	106	1.96
1	44	89	100	102	107	77	24	442	88	1.48	101	51	1.27	543	78	1.44
2	46	111	109	105	92	72	25	463	93	1.55	97	49	1.22	560	80	1.48
3	60	109	89	112	74	96	13	444	89	1.49	109	55	1.37	553	79	1.46
4	57	71	112	96	93	66	26	429	86	1.44	92	46	1.15	521	74	1.38
5	56	122	74	87	108	46	16	447	89	1.50	62	31	0.78	509	73	1.35
6	127	155	172	186	114	70	29	754	151	2.53	99	50	1.24	853	122	2.26
7	162	237	313	396	156	113	33	1264	253	4.24	146	73	1.83	1410	201	3.73
8	248	320	401	432	256	184	94	1657	331	5.56	278	139	3.49	1935	276	5.12
9	356	301	392	325	408	234	182	1783	357	5.98	416	208	5.22	2199	314	5.82
10	429	358	312	337	481	299	228	1917	383	6.43	527	264	6.61	2444	349	6.47
11	447	330	374	407	452	305	304	2010	402	6.74	609	305	7.64	2619	374	6.93
12	445	287	272	327	444	325	304	1775	355	5.96	629	315	7.89	2404	343	6.36
13	406	301	331	295	444	245	340	1777	355	5.96	585	293	7.34	2362	337	6.25
14	424	307	364	373	421	254	385	1889	378	6.34	639	320	8.01	2528	361	6.59
15	437	345	380	426	395	239	413	1983	397	6.65	652	326	8.18	2635	376	6.98
16	343	305	416	487	390	211	415	1941	388	6.51	626	313	7.85	2567	367	6.80
17	327	397	339	440	367	181	371	1870	374	6.27	552	276	6.92	2422	346	6.41
18	262	350	358	382	300	156	320	1652	330	5.54	476	238	5.97	2128	304	5.63
19	170	232	211	292	253	91	277	1158	232	3.89	368	184	4.61	1526	218	4.04
20	198	161	241	263	178	84	206	1041	208	3.49	290	145	3.64	1331	190	3.52
21	182	179	206	206	169	58	174	941	188	3.16	232	116	2.91	1173	168	3.11
22	212	164	148	157	125	58	100	806	161	2.70	158	79	1.98	964	138	2.55
23	173	162	147	158	103	42	64	743	149	2.49	106	53	1.33	849	121	2.25
DAY TOT	5658	5565	5968	6538	6073	3579	4395	29802	5960	100.00	7974	3987	100.00	37776	5397	100.00
MAX	447	397	416	487	481	325	415	AMT = 5960			AWE = 3987			ADT = 5397		

HOURLY TRAFFIC VOLUMES for Week commencing MON 16/08/04

Station No. 92.187.C

MR63 N OF RD TO LAKE KEEPIT, JUNCTION

HOUR comm.	WEEKDAYS							WEEKEND (+HOLIDAYS)			WHOLE WEEK					
	MON 16/08	TUE 17/08	WED 18/08	THU 19/08	FRI 20/08	SAT 21/08	SUN 22/08	TOTAL	MEAN	%	TOTAL	MEAN	%	TOTAL	MEAN	%
0	0	3	0	8	3	1	4	14	3	0.24	5	3	0.32	19	3	0.26
1	3	4	11	3	3	8	3	24	5	0.41	11	6	0.69	35	5	0.47
2	2	1	1	1	2	3	2	7	1	0.12	5	3	0.32	12	2	0.16
3	3	7	17	3	3	0	0	33	7	0.57	0	0	0.00	33	5	0.45
4	3	10	1	3	10	2	0	27	5	0.46	2	1	0.13	29	4	0.39
5	9	17	7	22	15	3	4	70	14	1.20	7	4	0.44	77	11	1.04
6	33	24	34	28	22	8	5	141	28	2.42	13	7	0.82	154	22	2.08
7	57	59	69	75	67	28	33	327	65	5.61	61	31	3.85	388	55	5.24
8	136	96	120	97	93	52	44	542	108	9.30	96	48	6.06	638	91	6.61
9	127	113	113	103	84	80	51	540	108	9.27	131	66	8.27	671	96	9.06
10	107	92	81	87	84	86	60	451	90	7.74	146	73	9.22	597	85	8.06
11	92	57	57	69	75	49	83	350	70	6.01	132	66	8.33	482	69	6.51
12	82	69	47	55	70	51	46	323	65	5.55	97	49	6.12	420	60	5.67
13	71	63	52	56	80	79	66	322	64	5.53	145	73	9.15	467	67	6.30
14	97	65	67	76	71	89	68	376	75	6.45	157	79	9.91	533	76	7.19
15	112	86	85	89	111	53	74	483	97	8.29	127	64	8.02	610	87	8.23
16	107	116	99	119	106	52	88	547	109	9.39	140	70	8.84	687	98	9.27
17	53	98	96	114	78	58	61	439	88	7.54	119	60	7.51	558	80	7.53
18	46	48	47	59	63	42	35	294	59	5.05	77	39	4.86	371	53	5.01
19	38	48	47	56	37	16	20	226	45	3.88	36	18	2.27	262	37	3.54
20	21	29	19	30	27	19	16	126	25	2.16	35	18	2.21	161	23	2.17
21	15	15	6	9	13	13	13	58	12	1.00	26	13	1.64	84	12	1.13
22	18	17	16	19	6	6	0	76	15	1.30	6	3	0.38	82	12	1.11
23	8	7	4	3	7	4	6	29	6	0.50	10	5	0.63	39	6	0.53
DAY TOT	1240	1144	1127	1184	1130	802	782	5825	1165	100.00	1584	792	100.00	7409	1056	100.00
MAX	136	116	120	119	111	89	88	AMT = 1165			AWE = 792			ADT = 1056		