Bulgers Pit, Gunnedah

Traffic Impact Assessment

No. 809 Oakey Creek Road, Piallaway NSW 2342

for

Outline Planning

On Behalf of Gunnedah Shire Council

March 2023

Traffic Impact Assessment Details

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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

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1. INTRODUCTION

StreetWise Road Safety & Traffic Services Pty Ltd (StreetWise) have been engaged by Outline Planning Consultants Pty Ltd, on of behalf of Gunnedah Shire Council, to prepare a traffic assessment for continuation of the existing activities at 'Bolgers Pit', an existing hard rock quarry located 25kms south-east of Gunnedah at No. 809 Oakey Creek Road, Piallaway. The site is identified as Lots 139 DP 751012 & Lot B DP 432415.

'Bolgers Pit' is one of Council's larger borrow pits, located in the south-east portion of the Gunnedah Shire. The Council now wishes to regularise the use of this quarry and to laterally expand the active quarry pit through the development approval process. The existing disturbed quarry has an area of approximately 2.7ha. A lateral expansion is proposed, with a rate of extraction of up to 40,000 tonnes per annum. The total quarry resource is estimated to be 306,000 cubic metres (equivalent to about 734,000 tonnes).

This report presents the findings of the traffic assessment and includes the following;

- An outline of the existing road network in the vicinity of the site.
- Assessment of the capacity of the local road network to cater for the continued haulage of quarry materials from the site, including Werris Creek Road, Gap Road and Kamilaroi Highway.
- An assessment of the impacts of the existing and future activities including the predicted traffic generation and its impact on existing road and intersection capacities.
- Review traffic impacts, in accordance with Council and the NSW Roads and Maritime Services (RMS) standards and requirements.
- Presentation of conclusions and recommendations

2. SITE LOCATION

The existing Bolgers Pit quarry has been operated by Gunnedah Shire Council for a number of years. The quarry is located approximately 25kms south-east of the Gunnedah township, and is accessed off Oakey Creek Road and Piallaway Road from Werris Creek Road.

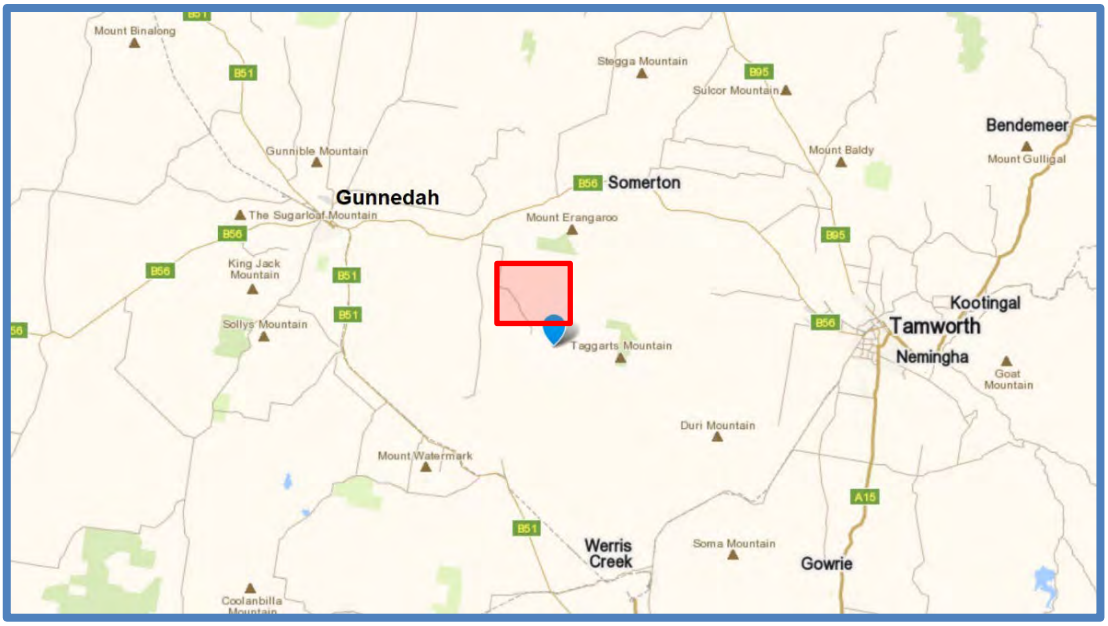

Figure 1 – Locality Plan

Figure 2 – Site Plan showing Bolgers Pit

3. EXISTING ROAD NETWORK

The existing Bolgers Pit is located in a rural area, mid-way between Tamworth and Gunnedah. The roads in the immediate vicinity of the quarry are low-volume, rural roads owned and maintained by the local council. A number of the local roads are designated B-double routes approved by Transport for NSW, or haulage roads previously approved by council. The majority of Piallaway Road, to the east, is within the Liverpool Plains council area.

3.1 Oakey Creek Road

3.1.1 Description

Oakey Creek Road is a low-volume, unsealed rural road, which connects Clifton Road in the west to Piallaway Road in the south-east. The road is generally 7m wide, and was in reasonable condition at the time of inspection (Monday 28 November 2022, apart from some damage caused by recent flooding. Oakey Creek Road provides access to Bolgers Pit, and advice from Gunnedah Council indicates Oakey Creek is an approved haul road.

Figure 3.1a: *Typical view of Oakey Creek Road, just west of Bolgers Pit quarry*

As can be seen from Figure 1b below, the existing alignment of Oakey Creek Road includes a number of 90º bends and basic intersections with minor local roads, which require drivers to reduce speeds and drive to the existing conditions.

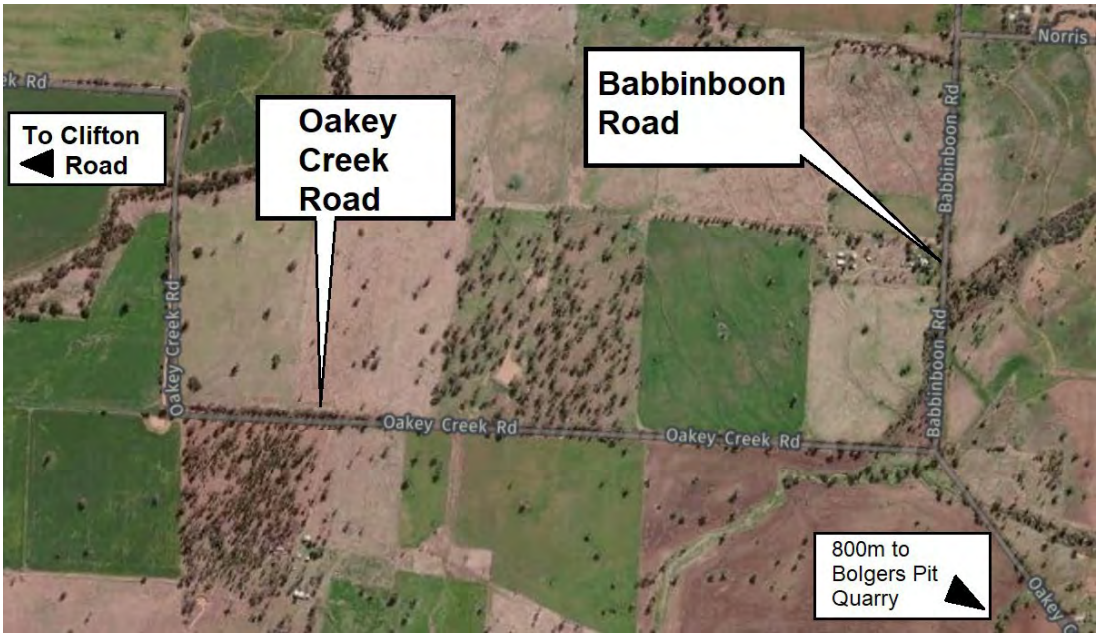

Figure 3.1b: *Aerial view of Oakey Creek Road, west of Bolgers Pit quarry*

Gunnedah Shire Council regularly grade and maintain this road, and have provided appropriate signage, as shown in Figures 3.1a and 3.1C.

Figure 3.1c: *Looking east on Oakey Creek Road, near the intersection with Babbinboon Road.*

3.2 Clifton Road (south)

3.2.1 Description

Clifton Road is a rural road, which connects the township of Breeza in the south to Carroll in the north. The section of road between the Kamillaroi Highway and Oakey Creek Road is 7 – 8m wide and generally in good condition, apart from a number of floodways, which currently exhibit damage after recent flooding. Advice from Gunnedah Council indicates Clifton Road is an approved quarry haul route, suitable for heavy vehicles including laden truck & dogs.

Figure 3.2: Typical view of Clifton Road, looking north at floodway

3.3 Clifton Road (north)

3.3.1 Description

Clifton Road is a rural road, which connects the township of Breeza in the south to Carroll in the north. The section of Clifton Road between Oakey Creek Road and the Oxley Highway at Carroll is generally sealed, and approximately 7m wide. However, a few sections of the road are unsealed. Clifton Road (north) is generally in good condition, apart from a number of floodways, which currently exhibit damage after recent flooding. Advice from Gunnedah Council indicates Clifton Road is an approved quarry haul route, suitable for heavy vehicles including laden truck & dogs. It should be noted that the condition of the unsealed sections is dependent on regular grading and maintenance.

3.4 Piallaway Road

3.4.1 Description

Piallaway Road is a rural road, approximately 25 kms in length, which connects the township of Currabubula in the east to Clifton Road in the west. The western section of Piallaway Road (located within the Gunnedah Shire Council area) is unsealed, while the eastern section (Liverpool Plains Council) is sealed. The unsealed section is generally 7 – 8m wide, and in reasonable condition, apart from those sections damaged by recent flooding. The eastern section is sealed, and generally 6 – 7m wide.

Figure 3.3: Typical view of Piallaway Road, looking east

3.5 Kamillaroi Highway

3.5.1 Description

The Kamillaroi Highway is a major rural road which connects the New England Highway in the south to Gunnedah, Narrabri and towns in the north-west on New South Wales. The Kamillaroi Highway is an approved heavy vehicle route, with the section between Werris Creek and Gunnedah generally

suitable for B-doubles (conditional to weather and road conditions). The Kamillaroi Highway is currently a TfNSW approved heavy vehicle route suitable for 25m B-doubles.

Figure 3.4: Typical view of Kamillaroi Hwy, looking north from Werris Creek Rd

3.6 Werris Creek Road

3.6.1 Description

Werris Creek Road is a major rural road which connects Tamworth with Currabubula, Werris Creek and Quirindi to the south. The sealed road provides 2 lanes and sealed shoulder in both directions, and a painted median generally provides 1m separation between carriageways along the majority of its length. The section of Werris Creek Road between Tamworth and Werris Creek is an approved B-double route (with conditions relating to wet weather and road conditions).

Figure 3.5: Typical view of Werris Creek Rd, looking north at current roadworks

3.7 Existing Intersections

3.7.1 Kamillaroi Highway & Clifton Road, Breeza

The existing intersection of Kamillaroi Highway and Clifton Road is a T-intersection. Clifton Road actually merges with Hogarth St approximately 120m from the intersection. The roadway then

crosses a railway line about 70m from the intersection with the highway, with signals and boom gate controlling traffic movements. As can be seen in Figure 3.5 below, the existing intersection layout includes:

- Give Way signs giving priority to the highway over the side road
- Approximately 8m of seal width, including shoulders, on the highway to allow light vehicles to pass any vehicle slowing to turn right into Hogarth St.
- Large radius of seal to allow large vehicles to turn in and out of side road
- 80kmh speedzone through the Breeza township, which increases to 110kmh east of the subject intersection.
- Flat longitudinal grade on each approach (0.5 to 5.0%)

Safe Intersection Sight Distance (SISD) for an 80kmh speedzone is shown below (from Austroads)

	SISD		
Speed (kmh)	Austroads	Actual	
		West	*East*
80	181m	200+m	165m

Figure 3.5: *At Hogarth St, looking east (L) and west (R) at Kamillaroi Hwy*

As can be seen from the photos above, the sight distance to the west (towards Gunnedah) meets the desired Safe Intersection Sight Distance, as shown in Austroads (Guide to Road Design Part 4A: Unsignalised and Signalised Intersections), for a 2.0 second reaction time. The sight distance to the east (towards Werris Creek) is approximately 15 – 20m short of the required distance. However, the existing sight distance exceeds the minimum Approach Stopping Sight Distance (114m). Consideration should be given to trimming existing vegetation along the Kamillaroi Highway and installing additional signage at the westbound approach to the intersection, warning drivers of potential vehicle turning or queuing at Hogarth Street. No correction for gradient required.

3.7.2 Werris Creek Road & Piallaway Road, Currabubula

The existing intersection of Werris Creek Road and Piallaway Road is a T-intersection. As can be seen in Figure 3.6 below, the existing intersection layout includes:

- Give Way signs giving priority to the highway over the side road

- Approximately 8m of seal width, including wide shoulders on the northbound lane.
- A minimal width shoulder and guardfence on the southbound side does not provide adequate width to avoid any vehicle slowing, queueing or turning in the side road.
- Large radius of seal to allow large vehicles to turn in and out of side road
- 50kmh speedzone through the Currabubula township, which increases to 100kmh at the subject intersection.

Safe Intersection Sight Distance (SISD) for an 50kmh speedzone is shown below (from Austroads)

Speed (kmh)	SISD		
	Austroads	Actual	
		North	*South*
50	97m	200+m	183m
100	181m	200+m	183m

Figure 3.6: At Piallaway Road, looking north (L) and south (R) at Werris Creek Road

As can be seen from the photos above, the sight distance in both directions meets the desired Safe Intersection Sight Distance, as shown in Austroads (Guide to Road Design Part 4A: Unsignalised and Signalised Intersections), for a 2.0 second reaction time. However, the sight distance to the north (towards Tamworth) is obstructed by signage, vegetation and bridge. No correction for gradient required.

3.7.3 Oxley Highway (B56) & Clifton Road, Carroll

The existing intersection of the Oxley Highway and Clifton Road is a T-intersection. Clifton Road actually merges with Howe St just south of the intersection. As can be seen in Figure 3.7 below, the existing intersection layout includes:

- Give Way signs giving priority to the highway over the side road
- Linemarked median and separation between carriageways through the intersection
- A dedicated right turn lane into the side road from the Oxley Highway.
- Large radius of seal to allow large vehicles to turn in and out of side road
- 70kmh speedzone through the Carroll township, which increases to 100kmh outside of the township.

Safe Intersection Sight Distance (SISD) for an 70kmh speedzone is shown below (from Austroads)

Speed (kmh)	SISD		
	Austroads	Actual	
		West	*East*
70	151m	200+m	200+m

Figure 3.7: *At Howe St (Clifton Rd), looking east (L) and west (R) at Oxley Hwy*

As can be seen from the photos above, the sight distance to the west (towards Gunnedah) meets the desired Safe Intersection Sight Distance, as shown in Austroads (Guide to Road Design Part 4A: Unsignalised and Signalised Intersections), for a 2.0 second reaction time. No correction for gradient required.

3.7.4 Access to Bolgers Pit off Oakey Creek Road

The existing access to the Bolgers Pit quarry is off the western side of Oakey Creek Road, near Piallaway. The driveway forms a T-intersection with the unsealed local road. As can be seen in Figures 3.8 – 3.10 below, the existing intersection layout includes:

- An unsealed surface on the quarry access road, with lockable gate & cattle grid approximately 30m from Oakey Creek Road.
- Oakey Creek Road is generally 7m wide. Condition of road is relatively good, but subject to regular grading and maintenance.
- 80kmh speedzone on Oakey Creek Road
- Large radius to allow large vehicles to turn in and out of quarry access
- Low traffic volumes on Oakey Creek Road

Figure 3.8: *Looking east at quarry access from Oakey Creek Road*

Safe Intersection Sight Distance (SISD) for an 80kmh speedzone is shown below (from Austroads)

	SISD		
Speed (kmh)	Austroads	Actual	
		North	*South*
80	181m	185m	200+m

Figure 3.9: At quarry access, looking north (L) and south(R) on Oakey Creek Road

As can be seen from the photos above, the sight distance to the north (towards Gunnedah) and south (towards Piallaway Rd) meets the desired Safe Intersection Sight Distance, as shown in Austroads (Guide to Road Design Part 4A: Unsignalised and Signalised Intersections), for a 2.0 second reaction time. No correction for gradient required.

3.8 Current Haul Roads

Advice from Gunnedah Shire Council indicates there are currently 3 haulage routes to access the 'Bolgers Pit' quarry, and have been utilised regularly for a number of years. The 3 routes include:

- Access to and from the Kamillaroi Highway at Breeza via Clifton Road (south) and Oakey Creek Road
- Access to and from the Oxley Highway at Carroll via Clifton Road (north) and Oakey Creek Road
- Access to and from Werris Creek Road at Currabubula via Oakey Creek Road and Piallaway Road

Figure 3.10: Existing 'Bolgers Pit' haul roads

Figure 3.10 above, shows the currently utilised haul routes which provide access to and from the Bolgers Pit quarry. It should be noted that the quarry is located on the eastern boundary of Gunnedah Shire Council area, and that Currabubula and other locations immediately to the east are located in Liverpool Plains Council. Therefore, the haulage trips to the east via Piallaway Road are rare, and the majority of laden, quarry-generated trips are via Breeza to the west and Carroll to the north-west of the quarry via Clifton Road.

The quarry trucks can then travel further afield via either the Kamillaroi Highways or Oxley Highway.

Further advice from Gunnedah Shire Council notes that the vehicles commonly used by council for haulage are truck & dog combinations, which are General Access vehicles under NHVR arrangements, so no special approval is needed.

4. EXISTING TRAFFIC GENERATION

4.1 Manual Traffic Counts

4.1.1 Kamillaroi Highway & Clifton Road, Breeza

StreetWise recently conducted an on-site manual traffic count at the intersection of Clifton Road/Hogarth St & Kamillaroi Highway, Breeza.

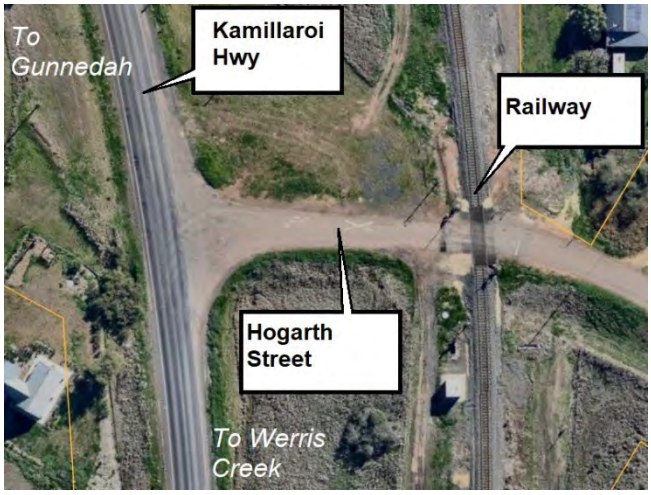

Figure 4.1: Aerial photo of Kamillaroi Hwy & Hogarth St intersection (2015)

The traffic count of Hogarth Road and Kamillaroi Highway was undertaken during the morning peak period (Monday 28 November 2022). The results of the traffic count are tabulated below, in Figure 4.2 and 4.3. A full traffic count can be found in Appendix A at the rear of this report.

		1			2			3			4			5			6				
Time		Kimallaroi Hwy (to Quirindi)			Left Into Hogarth			Left out Hogarth			Right out of Hogarth			Right into Hogarth			Kimallaroi Hwy (to			15 Min Total	60 min Total
		Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total		
7:30 AM	7:45 AM	12	3	15	2	0	2	5	0	5	2	0	2	0	0	0	16	6	22	77	
7:45 AM	8:00 AM	15	0	15	1	0	1	1	0	1	1	0	1	0	0	0	5	4	9	39	
8:00 AM	8:15 AM	12	1	13	1	0	1	0	0	0	2	0	2	1	0	1	6	4	10	41	
8:15 AM	8:30 AM	8	2	10	1	0	1	3	0	3	2	2	4	2	1	3	14	5	19	70	227
	Total	47	6	53	5	0	5	9	0	9	7	2	9	3	1	4	41	19	60	227	

AM Traffic Volumes – Monday 28-11-22

Figure 4.2: Result of Manual Traffic Count – Intersection of Kamillaroi Hwy & Hogarth St

The StreetWise traffic count results indicate a total of 227 vehicles in the AM peak period hour. These numbers are relatively low, and the results indicate:

- 28 heavy vehicle movements (or 12.3%), of which 19 were eastbound on the highway
- Approximately 12% of all movements turned in or out of the side road

- Based on the morning peak volumes, an AADT of 1240 vehicles can be expected on the Kamillaroi Highway through Breeza each day.
- Observed morning peak hour is 7:30 – 8:30am

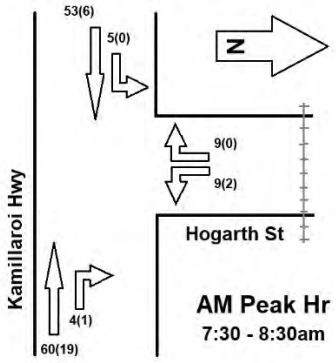

Figure 4.3: *AM Peak Hour Movements at Intersection of Kamillaroi Hwy & Hogarth Street*

4.1.2 Piallaway Road & Werris Creek Road, Currabubula

StreetWise recently conducted an on-site manual traffic count at the intersection of Piallaway Road and Werris Creek Road, Currabubula.

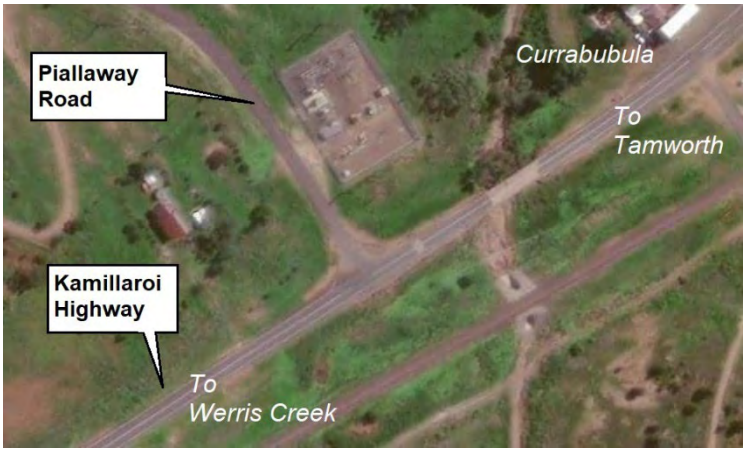

Figure 4.4: *Aerial photo of the intersection of Werris Creek Road and Piallaway Road*

The traffic count of Hogarth Road and Kamillaroi Highway was undertaken during the afternoon peak period (Monday 28 November 2022). The results of the traffic count are tabulated below, in Figure 4.5 and 4.6. A full traffic count can be found in Appendix A at the rear of this report.

		1			2			3			4			5			6				
Time		Werris Crk Rd (to Quirindi)			Left into Piallaway			Left out Piallaway			Right out of Piallaway			Right into Piallaway			Werris Creek Rd (to Quirindi)			15 Min Total	60 min Total
		Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total	Light	HV	Total		
2:30 PM	2:45 PM	16	3	19	2	0	2	3	0	3	1	0	1	0	0	0	20	2	22	75	
2:45 PM	3:00 PM	19	1	20	1	1	2	2	0	2	1	0	1	0	0	0	16	1	17	64	
3:00 PM	3:15 PM	19	1	20	0	0	0	2	0	2	0	0	0	0	0	0	23	5	28	80	
3:15 PM	3:30 PM	26	2	28	0	0	0	5	0	5	0	0	0	0	0	0	18	4	22	82	301
	Total	80	7	87	3	1	4	12	0	12	2	0	2	0	0	0	77	12	89	301	

PM Traffic Volumes – Monday 28-11-22

Figure 4.5: *Result of Manual Traffic Count – Intersection of Werris Creek Road and Piallaway Road*

The StreetWise traffic count results indicate a total of 301 vehicle movements through the intersection in the PM peak hour. These numbers are relatively low, and the results indicate:

- 20 heavy vehicle movements (or 6.6%), of which 12 were southbound Werris Creek Rd
- Approximately 6% of all movements turned in or out of the side road

- Based on the afternoon peak volumes, an AADT of 1920 vehicles can be expected on Werris Creek Road through Currabubula.
- Observed afternoon peak hour is 2:30 – 3:30pm

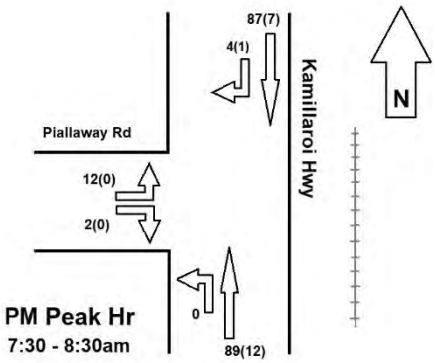

Figure 4.6: *Peak Hour Movements at Intersection of Werris Creek Rd & Piallaway Road*

4.1.3 Clifton Road & Oxley Highway, Carroll

A manual traffic count at the intersection of the Oxley Highway and Clifton Road at Carroll was not completed, as StreetWise have previously prepared a Traffic Impact Assessment for another quarry at Carroll, and have utilised traffic data from that report. The Oxley Highway volumes shown below were collected by TfNSW counters in 2016 on the highway east of Carroll (i.e. between Carroll and Tamworth), and an annual increase of 1% p.a. has been applied.

Figure 4.7 below shows average hourly traffic volumes in both directions on a typical weekday. As can be seen from the table and graph, the traffic volume include:

- The total volume increases steadily from 3am to 11am
- Remains steady between 10am and 4pm
- reduces quickly after 4pm, and remains low overnight (between 8pm and 5am)
- the Eastbound volumes (towards Tamworth) are higher in the morning
- the westbound volumes (towards Gunnedah) are higher in the afternoon.
- Heavy vehicle content is 11 %

Time	Eastbnd	Westbnd	Total
12 AM	5	4	9
1 AM	4	4	8
2 AM	3	4	7
3 AM	4	5	9
4 AM	4	8	12
5 AM	11	15	26
6 AM	23	30	53
7 AM	38	61	99
8 AM	54	88	142
9 AM	71	104	175
10 AM	87	110	197
11 AM	100	113	213
12 PM	99	101	200
1 PM	101	99	200
2 PM	108	99	207
3 PM	107	100	207
4 PM	107	91	198
5 PM	93	71	164
6 PM	64	46	110
7 PM	42	23	65
8 PM	25	15	40
9 PM	18	10	28
10 PM	12	6	18
11 PM	8	4	12
	1188	1211	2399

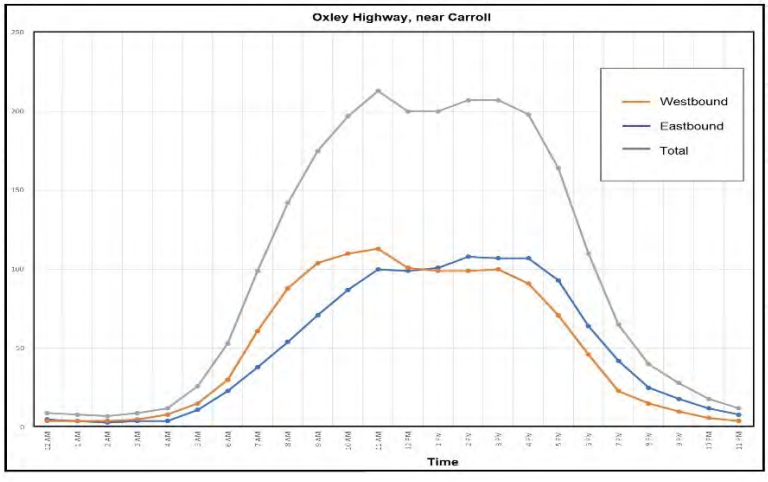

Figure 4.7: *Hourly traffic volumes (2022) on the Oxley Highway east of Carroll (estimated)*

As can be seen from the table above, traffic volumes are relatively low, with the peak hour volumes of around 200 vehicles per hour. Traffic volumes on the side road (Clifton Road) are also estimated to be very low (less than 20 movements per hour), due to the small number of rural properties serviced by Clifton Road.

5. QUARRY GENERATED MOVEMENTS

5.1 Existing Quarry Operations

A geological assessment of the extent and quality of the quarry resource undertaken indicates the site contains a hard rock suitable for the production of road base. The material won from the quarry is, however, not suited to higher specification applications, such as sealing aggregate or DGB 20. The existing operations involve extraction from the north-eastern part of the quarry pit, with processing of quarry products in the processing area and stockpiling of quarry products prior to dispatch by road via Oakey Creek Road.

Operating hours for the existing Bolgers Pit are 7:00am – 6:00pm, (11 hrs) Monday to Friday and 7:00am – 1:00pm (6 hrs) on Saturdays. Blasting at the quarry is currently only permitted between 9:00am and 3:00pm on weekdays.

Given that the quarry is utilised for civil projects by Gunnedah Shire Council, it is assumed that the majority of laden haulage movements will be undertaken in the morning and early afternoon on weekdays, with minimal laden trips generated after (say) 3:00pm. It is also unlikely that laden haulage trips will be generated on Saturdays.

5.2 Existing Traffic Movements

Gunnedah Shire Council currently utilise the material from Bolgers Pit quarry for a range of civil projects throughout the council area. However, haulage from the quarry is not regular, and quarry-generated vehicle movements can be sporadic, dependent on the location, size and type of project council are servicing. Gunnedah Shire Council have access to a number of quarries throughout the Gunnedah area, so Bolgers Pit is generally used for projects in the south-east section of the council district. Also, the material is not suitable for all road projects. Therefore, activity at the quarry is likely to occur for a week, then be un-used for 2 or 3 weeks.

Recent discussions with Gunnedah Shire Council also indicate the following:

- haulage vehicles used are generally ‘truck & dog trailers’, but other vehicle types may be used, depending on availability.
- Haulage roads are suitable for heavy vehicles up to 25m B-double combinations. However, the haulage distances are generally fairly short, and do not justify larger (B-double) vehicles.
- Gunnedah Shire Council may occasionally utilise drivers & vehicles from outside council on a contract basis
- Haulage movements to the east via Piallaway Road are rare, with most haulage trips to the north-west via Clifton Road and Oxley Highway, or south west via Clifton Road and Kamillaroi Highway
- The majority of haulage movements occur in the first half of the day, and are generally completed by 3pm.
- Quarry activities and haulage movements generally only occur on weekdays
- There are currently no restrictions on operating hours for the quarry, number of haulage movements or daily quantity of material hauled.

5.2.1 Average Number of Trips

Gunnedah Shire Council indicates the amount of material extracted annually varies depending on demand and location of projects. In recent years, quarry production at Bolgers Pit has ranged between 18,355 tonnes (2018) and 556 tonnes (2017).

Council also indicated that the annual requirement from Bolgers Pit is unlikely to exceed 40,000 tonnes. If we use this volume for assessment purposes, and adopt the standard haulage vehicle as a truck & dog trailer combination (32 tonne), we can estimate the average number of quarry-generated vehicle movements:

No. of working weeks:	48
No. of working days:	5 per week
No. of working hours:	8 (7am – 3pm)
Total yearly quantity:	40,000 tonnes (max)
Truck & dog capacity:	32 tonnes
Total no. haulage trips:	1,250 laden trips per year (max)
Av. No. of weekly trips:	26 laden trips
Av. No. of daily trips:	5.2 laden trips
Av. No. of hourly trips:	less than 1 per hour

5.2.2 Peak Number of Trips

Gunnedah Shire Council state that the quarry is not used on a regular basis, and the average numbers shown above are unlikely to reflect normal usage. It is more likely that the quarry is used a few times a year when quarry material is required for projects in the south-east of the council area. In this case, up to (say) 40 laden trips per day may be generated, which would result in the following:

Max no. haulage trips:	1,250 laden trips per year
Max. No. of weekly trips:	200 laden trips (400 total trips)
Max. No. of daily trips:	40 laden trips (80 total trips)
Av. Hourly trips (@8hrs):	5 laden trips (or 10 total trips)
No. of working weeks:	6.25 per year

5.2.3 Annual Trips – based on recent years

As discussed above, the maximum volume extracted from Bolgers Pit in recent years is 18,355 tonnes in 2018. If we round this volume up to 20,000 tonnes, it is 50% of the maximum volume assessed above. This will result in a significantly less trips than shown in 5.2.1 & 5.2.2 above, but is likely to be closer to the actual volumes, as shown below:

Total yearly quantity:	20,000 tonnes
Truck & dog capacity:	32 tonnes
Total no. haulage trips:	625 laden trips per year
Av. No. of weekly trips:	13 laden trips
Av. No. of daily trips:	2.6 laden trips
Av. No. of hourly trips:	less than 1 laden trips per hour

As shown above, material from Bolgers Pit may be utilised 5 – 10 times a year, for periods of up to a week at a time, with up to 40 laden trips by truck & dogs per day.

The quarry will also require a number of staff onsite to undertake quarry activities, including blasting, processing of the quarry material and loading of haulage trucks. It is likely that 2 or 3 staff will be required for a full day, and will generally access the site around 7am and leave after 3pm in the afternoon. Also, a number of service vehicles may access the quarry during the week (say 2 per day)

Therefore, when operating at peak capacity, the quarry will generate the following:

6:30am – 7:00am	Staff arrive	3 light vehicles in
7:00am – 3:00pm	Haulage movements	Truck & dogs (5 in & 5 out per hr)
9:00am – 2:00pm	Service vehicles	2 light vehicles in & 2 out
3:00pm – 3:30pm	Staff leave	3 light vehicles out

Based on the estimates above, the quarry activities are likely to generate a maximum of 6 trips per hour, which includes 2 light vehicle, 5 empty truck & dog and 5 laden truck and dog movements. It is therefore likely that up to 5 laden heavy vehicle movements (10 total trips) per hour will be generated during peak times within the local road network.

It should be noted that the above estimate is the MAXIMUM number of trips that is likely generated by Bolgers Pit, and the actual number of quarry-generated trips (based on recent usage) is expected to be significantly less.

5.3 Distribution of Traffic Movements

The destination for laden heavy vehicle movements generated by the Bolgers Pit quarry will be determined by the location of civil projects managed by Gunnedah Shire Council. It can be assumed that the projects sites will generally be within (say) 40 – 50kms of the quarry, given that council can utilise a number of other quarries for projects elsewhere in the council district.

Projects around the township of Breeza, or accessed the Kamillaroi Highway, will require haulage vehicles to utilise Clifton Road (south) while projects around Carroll or accessed off the Oxley Highway will utilise Clifton Road (north). Advice from Council indicates very few projects would be located east of the quarry, as only a short section of Piallaway Road is located in the Gunnedah shire and most projects east of the quarry would be located in Liverpool Plains Council area.

For the purposes of this assessment, we will adopt a 50:50 split i.e. 50% of projects each year will be located south-west, and 50% will be located north-west of the quarry. Given that Bolgers Pit is generally only used occasionally (i.e. 5 – 10 times per year), we can assume that every 2 months, for a period of 5 days, a maximum of 40 laden trucks per day, will utilise either:

- Oxley Highway via Clifton Road (north) or
- Kamillaroi Highway via Clifton Road (south)

The estimated maximum number of quarry-generated movements per day is approximately 50, including 40 laden truck & dog trips. However, the actual number of trips per annum is likely to be significantly less.

5.4 Future Traffic Movements

To date, the quarry has produced a maximum of 18,355 tonnes in any one year. With a proposed annual maximum extraction volume of 40,000 tonnes being utilised, the future quarry-generated vehicle movements will increase by slightly more than twice the current maximum number of trips currently being generated i.e. from 625 laden trips per year (or an average of 13 laden trips per week) to a maximum of 1250 laden trips per year (or 26 laden trips per week). However, in the unlikely scenario of the proposed annual maximum extraction volume of 40,000 tonnes being utilised, the future quarry-generated vehicle movements will increase by approximately 2 x the current number of trips i.e. from 625 laden trips per year (or an average of 13 laden trips per week) to a maximum of 1250 laden trips per year (or 26 laden trips per week).

6. ROAD CAPACITY

6.1 Road Capacities

6.1.1 Local Roads

Austroads guidelines indicate that a 2-way, high standard road (such as Clifton Road) can safely & efficiently cater for up to 1700 vehicles per hour per lane, or a total of 3200 vph in both directions (see Fig 6.1 below).

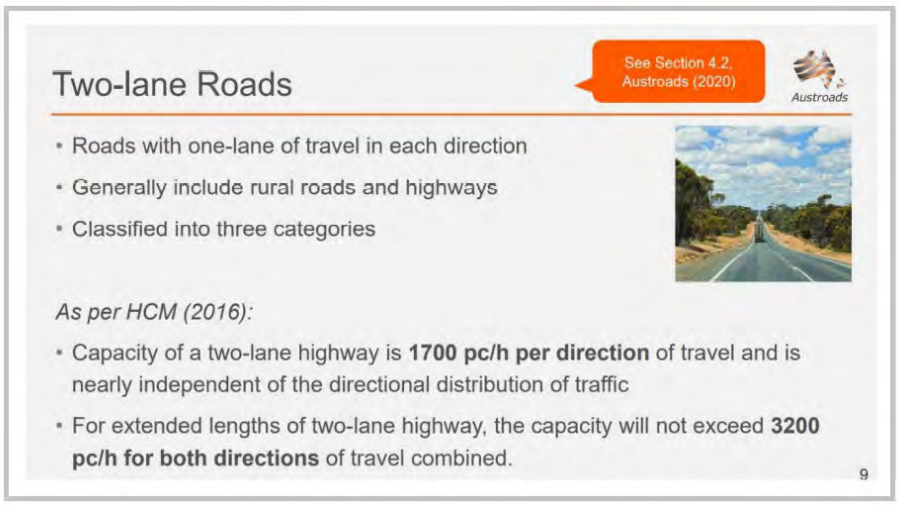

Figure 6.1: Austroads Lane Capacity – rural roads

AustRoads guidelines (see below) indicate that a single lane in a rural location can cater for up to 900 vehicles per hour, while still maintaining an efficient flow of traffic. Given the current volumes on Clifton Road and Oakey Creek Road are estimated to be less than 200 vehicles a day in one direction, the Austroads table indicates the road has adequate capacity to cater for existing volumes and any future increases due to quarry activities.

Type of lane	One-way mid-block capacity (pc/hr)
Median or inner lane	
• Divided road	1000
• Undivided road	900
Middle lane (of a 3-lane carriageway)	
• Divided road	900
• Undivided road	1000
Kerb lane	
• Adjacent to parking lane	900
• Occasional parked vehicles	800
• Clearway conditions	900

Source: Table 5.1 of Austroads Guide to Traffic Management Part 3

Figure 6.2: Austroads Lane Capacity – rural roads

Additionally, the graph below (from '*Austroads Traffic Management - Part 3 – Traffic Studies & Analysis')* shows the capacity of a lane based on posted speeds and traffic volumes. Given the speedzones of the Clifton Road, Oakey Creek Road and Piallaway Roads are between 80 - 100kmh, and an hourly volume of less than 200 vehicles in any one direction, the roads will operate at a Level of Service (LoS) of 'A' where 'A' is *a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to*

manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.

If we adopt 200 vehicles per hour as the maximum volume in any one direction, the chart below indicates a minimum Level of Service of 'B'. However, it is likely that the volumes on the local roads in the vicinity of the Bolgers Pit quarry are significantly less than 200 per hour.

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 6.3: *Capacity and Level of Service (TfNSW – Guide to Traffic Generating Developments)*

As can be seen from Figure 6.3 above, both Clifton Road, Oakey Creek Road and Piallaway Road have adequate capacity to cater for the existing and future traffic volumes, including quarry-generated movements, with minimal impact on existing traffic patterns or road safety.

6.1.2 Major Roads

Section 6.1.1 discusses the capacity of Clifton Road, Oakey Creek Road and Piallaway Road. These local roads connect Bolgers Pit quarry with major roads i.e. Oxley Highway, Kamillaroi Highway and Werris Creek Road, all of which are TfNSW classified roads. As discussed in Section 4 above, these 3 major roads all have AADTs of less than 2500 vpd, and currently operate at a Level of Service of 'A', according to Figure 6.3 above. Therefore, all 3 major roads have adequate capacity to cater for the existing and future traffic volumes, including quarry-generated movements, with minimal impact on traffic patterns or road safety.

7. ALTERNATE TRANSPORT MODES

There is no public transport (bus) service to the area that is within convenient walking distance to the quarry site. However, a school bus service utilises the local roads in the morning and afternoon.

The quarry is located in a rural area, where there are no constructed footpaths or other facilities for pedestrians. Any pedestrians walking along the local road network would be required to use the unformed verges or utilise the road shoulder where necessary.

Similarly, there are no designated on or off-road cycle ways in the area therefore cyclists using the road network would either need to use the formed road shoulders or share the traffic lanes where necessary.

In regard to the haulage of extracted material from the site there are currently no alternatives to the use of road haulage to and from the site.

8. TRAFFIC IMPACTS OF PROPOSED DEVELOPMENT

The main traffic impacts of the proposed quarry development lie in the areas of traffic efficiency, amenity, road safety, road pavements and alternate transport modes. Within these areas the main issues usually relate to the levels of service (LoS) experienced on the road network particularly at intersections, the impacts of road noise and dust, the geometric standards of the haulage routes, the construction standard of the haulage routes and the availability and accessibility to alternate transport modes.

8.1 Traffic Efficiency

From the assessment of existing traffic volumes as well as road and intersection capacity, it can be seen that the local road network around the site is currently operating at the highest levels of efficiency. The combination of low traffic volumes and a good standard of road construction mean that motorists on the local road network experience a high level of service with little or no delays. This occurs including the current operation of the quarry.

Based on current activities, the quarry has produced up to a maximum of 18,355 tonnes of gravel in any one year, which generates an average of 13 laden truck movements per week. However, it should be noted that the quarry is only utilised a few times each year, and generates a maximum of 100 laden haulage trips per week when in use, or about 40 heavy vehicle movements (20 laden) per day.

Gunnedah Shire Council propose a maximum annual extraction of 40,000 tonnes per year, which would generate an average of 13 laden truck movements per week, or a maximum of (say) 40 laden trips per day.

The proposed annual extraction limit of 40,000 tonnes, is approximately double the current volume of material extracted annually from Bolgers pit quarry to date, and if achieved, will increase the number of quarry-generated vehicle movements accordingly. However, in the unlikely event of the maximum 40,000 tonnes being met, it is considered, given the good standard of the existing haul roads, and the current low volumes on the local road network, that the existing Level of Service of 'A' currently experienced by motorists on the road network will not be reduced.

Similarly, in regard to the existing intersections at Oxley Highway, Kamillaroi Highway and Werris Creek Road, and the maximum increase in quarry-generated traffic (20 laden trips per day or 2.5 per hour), the layouts all meet (or exceed) the required AustRoads guidelines and currently operate with minimal interruptions to flow conditions. The proposal to set an annual limit of 40,000 tonnes per year from Bolgers Pit quarry will not result in any significant increase to the daily or peak hourly traffic volumes within the local road network, and it is reasonable to conclude the proposal will have no significant impact on the current operation of the intersections, and no nexus would exist for any road upgrading works.

8.2 Amenity

Amenity issues for adjoining residents in regard to the traffic generated by a development usually relate to traffic noise and dust generation. In regard to dust generation, the majority of existing haulage routes are sealed, which results in minimal dust generation from the haulage traffic, provided all loads are covered as required by law in NSW (and in the conditions of the current DA approval).

In terms of road noise, the operation of large haulage trucks can generate significant noise particularly when returning to the quarry empty. Similarly, the internal operations of the quarry can also generate noise issues for adjoining residents. It should be noted that the quarry is located in a rural area, with minimal residences close to the quarry or adjacent to the haul roads. Also, traffic volumes on the local road network are currently less than 200 vpd for local roads, and is also relatively low on the major roads. It is considered that any dust or noise generated by the quarry activities will have no significant impact on residences, schools or other community activities.

8.3 Road Safety

In terms of road safety, the main issues that need to be considered are type of traffic, road geometry and intersection safety. Any increase in traffic volumes increases the risk of traffic accidents and thus impacts on the standard of road geometry required for the road. However, the proposal does not include an increase in haulage movements from the quarry, and therefore any existing impacts are likely to continue. The road geometry impacts on the safe travelling speed in a number of ways including horizontal alignment, vertical alignment and lane widths. Intersections represent the major traffic conflict points on a road network and thus are a location of most crash incidents. However, the proposal does not include an increase in quarry-generated movements, and therefore does result any increase in risk at these locations.

Existing pavement construction standards have been discussed previously in this report, and it has been found that the haulage route to the site is generally sealed with a minimum road width of 7.0 metres. Traffic volumes on the local road network are all less than 200 vpd and thus with a minimum sealed width of 7 metres would satisfy the design requirements for road widths contained within the Austroads Guide to Road Design (2009). It should also be noted that all of the local routes associated with the existing haul routes currently operate at a Level of Service of 'A' – "*a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream.*"

Assessment of the existing road alignment both horizontal and vertical is a much more difficult task without the need to carry out extensive survey works. By visual assessment however it is generally considered that the current road alignment of the existing local roads are suitable for the speed zoning currently regulated. However, further assessment of some un-signposted curves may be required.

It is the area of intersection safety that is of most relevance for this proposal. Intersection safety is generally dependant on the amount of traffic passing through and turning at the intersection as well as the availability of sight distance and intersection geometry. In this case the main intersections on the proposed haulage route are:

- Clifton Road & Oxley Highway
- Clifton Road/Hogarth Road & Kamillaroi Hwy
- Piallaway Road & Werris Creek Road

These intersections are discussed in Section 4 above, but by observation the layouts all have suitable road geometry, and the available sight distance generally exceeds Austroads requirements (as specified in Guide to Road Design Part 4A: Unsignalised and Signalised Intersections).

It should be noted that the current haul routes have previously been utilised by Gunnedah Shire Council for a number of years, while the major roads are currently approved by TfNSW for use by 25m B-Double vehicles.

The intersection of Babbinboon Road and Oakey Creek Road was also assessed as a part of the traffic impact assessment. It should be noted that Babbinboon Road is not one of the primary quarry haul routes identified by Council for the transport of its quarry products. Despite the small radius curve through the intersection, road users would drive to suit conditions. Moreover, traffic volumes on this road would be low and sight distances are good. It is therefore considered that this intersection does not present any traffic safety concerns. Council's gravel road network contains numerous other examples of such 'tight' intersections.

In summary, it is concluded that the local road network currently impacted by quarry traffic is suitably safe for use by quarry traffic, while the major roads are approved for B-doubles and therefore suitable for haulage of quarry material.

8.4 Pavement Condition

The existing haulage routes are currently utilised by Gunnedah Shire Council, and therefore considered to be suitable for use by heavy vehicles. Clifton Road is sealed and 7m wide, and a visual assessment of the road pavement along the proposed haulage route indicates that the road is in

relatively good condition, apart from some damage caused by recent flooding. Similarly, Piallaway Road is a sealed road with 6 - 7m width. Oakey Creek Road is unsealed, but currently in good condition. However, it's condition is likely to vary, dependent on regular grading and maintenance.

Council generally use truck & dog combinations to haul quarry materials. As discussed previously, the number of annual heavy vehicle movements is relatively low, and with a maximum of (say) 40 laden movements per day during peak operating times". However, it is estimated that the quarry may only be utilised by Gunnedah Shire Council 5 – 10 times per year.

In summary, Council propose to continue operating the Bolgers Pit quarry with a maximum extraction volume of 40,000 tonnes, which equates to 1250 laden truck & dog trips per year, and an average of 26 trips per week – a potential increase of 100% from the current average of 13 trips per week.

8.5 Alternative Transport Modes

As previously discussed in this report accessibility to alternate transport modes for the existing quarry site is considered minimal. No specific bicycle or pedestrian infrastructure is provided to the site and the public transport service to the site is also non-existent. The proposal will not increase demand for alternate transport modes therefore it is considered that no new alternative transport mode infrastructure will be required by the proposal.

9. CONCLUSION

This traffic impact assessment for the ongoing quarry activities at 'Bolgers Pit' has determined the following:

- The proposal seeks to continue the current quarrying activities and haulage of quarry materials, and setting an extraction limit of 40,000 tonnes p.a.
- It is proposed to continue to utilise Clifton Road and Oakey Creek Road as a haulage route for the efficient haulage of quarry materials to locations north, south and west of the quarry, and also use Piallaway Road (if required) to deliver quarry material to the east of the quarry. There will be no construction required as part of this proposal, given that there are no proposed changes to the existing quarry activities.
- The proposal seeks to set a limit of 40,000 tonnes per annum of quarry material extracted from the Bolgers Pit quarry.
- The proposed annual extraction limit of 40,000 tonnes, is approximately double the maximum volume of material extracted annually from Bolgers pit quarry to date, and if achieved, will increase the number of quarry-generated vehicle movements accordingly. This equates to an average of:
    - An average of 1250 laden trips per year
    - An average of 26 laden truck movements per week
    - An average of 5.2 laden truck movements per day (5.5 days a week for 48 weeks),
    - A maximum of approximately 40 laden truck movements per day (5 days a week for approximately 5 - 10 weeks p.a.).
- The quarry currently operates intermittently throughout the year (approximately 5 – 10 times) to service a few civil projects in the south-east of the council area, and will likely continue to operate as it has for the past few years. It is considered that in the 'worst case' the quarry will generate up to an additional 20 laden trucks per day for short periods, but overall, there will be no significant additional impacts on the local road network.
- Current traffic volumes on Clifton Road (north & south), Oakey Creek Road and Piallaway Road are relatively low (i.e. less than 200 a day or 20 an hour at peak times). The additional heavy vehicle movements generated by the proposed quarry development will result in no significant additional impacts on the local road network

- The existing intersections on the existing haul routes (at Kamillaroi Hwy, Oxley Hwy and Werris Creek Rd) operate a Level of Service of 'A', and have adequate capacity to cater for the existing and future heavy vehicle movements to & from Bolgers Pit Quarry.
- There is currently adequate capacity in the local road network and the efficiency will not be significantly impacted on by the proposal. Uninterrupted flow conditions will continue to exist on local roads and intersections for the expected remaining life of the quarry.
- The local road network servicing the site is in satisfactory condition and is considered suitable in terms of road geometry, speed zoning and pavement construction for use by traffic generated by the quarry. No further works are thus required in order to accommodate the additional truck traffic generated by the quarry. It should be noted that existing road damage noted during the site inspections was likely caused by recent flooding, and is scheduled to be repaired in the near future.
- The Kamillaroi Hwy, Oxley Hwy and Werris Creek Road are currently an TfNSW-approved B-double routes, while Clifton Road and Oakey Creek Road have been utilised for laden heavy vehicle movements for many years. It is considered that Piallaway Road is satisfactory to cater for the relatively small number of laden quarry vehicles generated by the quarry, if required .
- Alternative transport modes available to the site are non-existent and would not provide any benefit to the proposal. Therefore, no nexus exists for additional infrastructure requirements in regard to alternative transport modes.

10. RECOMMENDATION

This traffic impact assessment relates to continuation of the ongoing quarry activities at Bolgers Pit Quarry, and the haulage of quarry materials on existing haul routes. The operators (Gunnedah Shire Council) are proposing to limit annual extraction to 40,000 tonnes of quarry material to service infrastructure projects in the south-east of the Gunnedah Shire area.

It is proposed to continue to utilise Oakey Creek Road and Clifton Road to access the Oxley Highway and Kamillaroi Highway as haulage roads for efficient haulage of quarry materials to project locations north, south and west of the quarry. If required, Piallaway Road is also suitable for haulage vehicles to access Werris Creek Road to the east.

The current layout, condition and capacity of the existing approved haul roads can easily cater for the existing low volumes on these roads, with adequate capacity available to safely cater for the ongoing heavy vehicle movements generated by Bolgers Pit quarry.

In summary, the proposal to extract up to 40,000 tonnes of quarry material a year may result in minor increases to the existing average daily haulage volumes. However, the existing haulage routes are good quality and have the capacity to safely cater for the haulage truck movements generated by the Bolgers Pit quarry, with minimal impact on the efficiency or safety of the local road network.

A J Davis

BTech (Civil Engineering)

Level 3 Road Safety Auditor

Director StreetWise Road Safety & Traffic Services

Appendix A

Full Result of Manual Traffic Counts

Time		1			2			3			4			5			6			15 Min Total	60 min Total
		Kamillaroi Hwy (to Quirindi)			Left Into Hogarth			Left out Hogarth			Right out of Hogarth			Right into Hogarth			Kamillaroi Hwy (to				
		Light	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*		
7:00 AM	7:15 AM																				
7:15 AM	7:30 AM	3	0	3	0	0	0	0	0	0	0	0	0	0	3	3	15	3	18	45	
7:30 AM	7:45 AM	12	3	15	2	0	2	5	0	5	2	0	2	0	0	0	16	6	22	77	
7:45 AM	8:00 AM	15	0	15	1	0	1	1	0	1	1	0	1	0	0	0	5	4	9	39	
8:00 AM	8:15 AM	12	1	13	1	0	1	0	0	0	2	0	2	1	0	1	6	4	10	41	***202***
8:15 AM	8:30 AM	8	2	10	1	0	1	3	0	3	2	2	4	2	1	3	14	5	19	70	***227***
8:30 AM	8:45 AM	8	2	10	1	0	1	3	0	3	1	0	1	1	0	1	11	4	15	52	***202***
8:45 AM	9:00 AM	9	3	12	0	0	0	0	0	0	0	1	1	0	1	1	5	3	8	32	***195***
9:00 AM	9:15 AM																				
	Total	67	11	78	6	0	6	12	0	12	8	3	11	4	5	9	72	29	101	**356**	

Time		1			2			3			4			5			6			15 Min Total	60 min Total
		Werris Crk Rd (to Quirindi)			Left Into Hogarth			Left out Hogarth			Right out of Hogarth			Right into Hogarth			Kimallaroi Hwy (to				
		Light	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*	*Light*	*HV*	*Total*		
2:00 PM	2:15 PM	19	3	22	1	0	1	0	0	0	0	0	0	0	1	1	16	1	17	60	
2:15 PM	2:30 PM	19	3	22	0	0	0	0	1	1	0	0	0	0	0	0	17	3	20	64	
2:30 PM	2:45 PM	16	3	19	2	0	2	3	0	3	1	0	1	0	0	0	20	2	22	75	
2:45 PM	3:00 PM	19	1	20	1	1	2	2	0	2	1	0	1	0	0	0	16	1	17	64	***263***
3:00 PM	3:15 PM	19	1	20	0	0	0	2	0	2	0	0	0	0	0	0	23	5	28	80	***283***
3:15 PM	3:30 PM	26	2	28	0	0	0	5	0	5	0	0	0	0	0	0	18	4	22	82	***301***
3:30 PM	3:45 PM	22	2	24	3	0	3	2	0	2	0	0	0	1	0	1	17	2	19	74	***300***
3:45 PM	4:00 AM	18	3	21	1	0	1	1	0	1	0	0	0	0	0	0	17	3	20	65	***301***
4:00 PM	4:15 AM																				
	Total	158	18	176	8	1	9	15	1	16	2	0	2	1	1	2	128	20	148	**564**	