



ALBION PARK, BASS POINT & DUNMORE QUARRIES

Cumulative Traffic Impact Assessment

Prepared for:

Cleary Bros (Bombo) Pty Ltd
Hanson Construction Materials Pty Ltd
Boral Resources (NSW) Pty Ltd

14/04/2016

The Transport Planning Partnership Pty Ltd

ACN: 607 079 005

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Version: 04

14/04/2016

TTPP Reference: 15003

Quality record

Report name	Date	Version	Approved by	Signature
15003r02	27/11/15	V01	Jason Rudd	
15003r02	30/11/15	V02	Jason Rudd	
15003r02	28/02/16	V03	Jason Rudd	
15003r02	14/04/16	V04	Jason Rudd	

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A. RMS TRAFFIC VOLUME DATA

1 INTRODUCTION

Cleary Bros, Hanson and Boral each operate a hard rock quarry in the Illawarra Region, south of Wollongong. The relevant quarries are:

- Albion Park Quarry (Cleary Bros)
- Bass Point Quarry (Hanson)
- Dunmore Quarry (Boral)

Each of the three quarries has recently received conditional approval to increase their annual quarry production limits.

A condition of consent for each of the quarries requires that a jointly funded “Cumulative Traffic Impact” study be prepared to:

- assess the current and future projected cumulative impacts of the three quarries on the classified road network; and
- identify (if necessary to address adverse cumulative traffic impacts) reasonable and feasible measures that can be implemented to minimise the traffic and road safety impacts of quarry trucks on Mount Ousley Road.

An extract of Condition 47A and 47B as it appears in the Albion Park Quarry Consent (No. 10639 of 2005) is reproduced below.

Cumulative Traffic Impact Study

- 47A. The Applicant shall, in conjunction with the operators of the Bass Point Quarry and the Dunmore Quarry, cause to be prepared an independent Cumulative Traffic Impact Study. The study must:
- a) be undertaken by a suitably qualified traffic consultant, whose appointment has been approved by the Secretary;
 - b) be commissioned by 31 August 2015, and completed by 30 November 2015, or as otherwise agreed in writing by the Secretary;
 - c) be co-funded by the operators of the Albion Park, Dunmore and Bass Point quarries, proportionate to the quarries' respective quarry product road transport limits, as approved at 31 August 2015;
 - d) include a comprehensive assessment of current and future projected cumulative traffic impacts of the three quarries on the classified road network, undertaken in consultation with the RMS; and
 - e) identify any reasonable and feasible measures that can be implemented to minimise the traffic and road safety impacts of quarry trucks on Mount Ousley Road, and the likely cost of implementing these measures.
- 47B. The Applicant shall, in conjunction with the operators of the Bass Point Quarry and the Dunmore Quarry, prepare and implement a program to implement any reasonable and feasible measures identified in the Cumulative Traffic Impact Study not already undertaken by the Applicant, in an equitable manner with the two other quarry operators, to the satisfaction of the Secretary. The program must be submitted to the Secretary for approval by 31 December 2015, or as otherwise agreed in writing by the Secretary.

It is noted that the condition is identical in the consents for the Dunmore Quarry and Bass Point Quarry with the exception of the dates for report commissioning and preparation.

The Transport Planning Partnership (TTPP) Pty Ltd have been engaged by Boral, Cleary Bros and Hanson and approved by the Department of Planning and Environment (DoPE) to prepare the Cumulative Traffic Impact study.

TTPP considers that the objectives of the cumulative assessment are as follows:

- Identify the combined (cumulative) traffic generation potential of the 3 approved quarries (Albion Park, Bass Point and Dunmore);
- Identify the growth of traffic on the classified road network associated with the combined potential increase in quarries production levels;
- Assess the implications of the cumulative quarry traffic generation; and
- Identify mitigation or improvements measures (if required) to address the identified implications.

These study objectives were discussed and agreed with the RMS as required by the condition of consent. Details of the consultation with RMS are provided in Section 3 of this report.

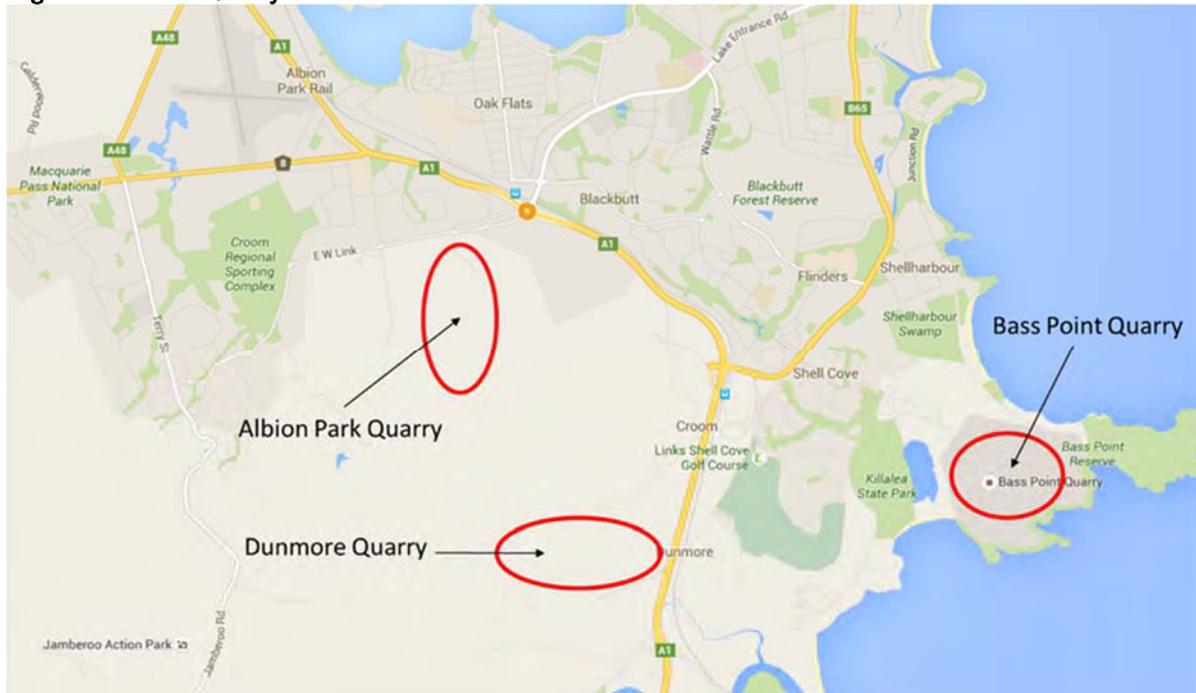
It is noted that this report and the assessment provided herein has been updated to incorporate and address comments provided by the DoPE in their correspondence dated 7 December 2015.

2 BACKGROUND

2.1 Site Location

The locations of the three quarries within the context of the Illawarra Region that are to be considered as part of the Cumulative Traffic Impact Assessment presented in this report are shown in Figure 1.

Figure 1 Quarry Locations



Source: Google Maps

2.2 Access to the Classified Road Network

The Albion Park Quarry is conditioned to be accessed via the East West Link linking to the Princes Highway. The new access to the East West Link has been constructed and the Quarry is operating product haulage movements via this access in accordance with the consent condition. Both the East - West Link and Princes Highway are classified regional roads.

The Bass Point Quarry is accessed via a private Haul Road linking to Dunmore Road / Shellharbour Road and the Princes Highway. Shellharbour Road is a classified regional road. It is noted that only Bass Point Quarry utilises local roads to distribute quarry product. Levies for local road use paid by Hanson to Shellharbour Council are conditioned separately.

The Dunmore Quarry has a direct access to the Princes Highway via a grade separated interchange.

Once on the Princes Highway, each Quarry has access to the regional (classified) road network, including the F6 link to Sydney.

2.3 Approved Quarry Production Levels

Table 1 provides a summary of the pre and post approval production levels for each of the quarries that can be transported by road as detailed in the consents for each Quarry.

Table 1 Approved Annual Production Levels MTPA (Material Transported Via Road)

	Albion Park	Bass Point	Dunmore	Total
Pre Modification Approved Production Level (million tonnes per annum)	0.6	1.5 ¹	1.0	3.1
Post Modification Approved Production Level (million tonnes per annum)	0.9	3.0	1.5	5.4
Net Potential Increase of Approved Production Transported via Road	0.3	1.5	0.5	2.3

Notes: 1. Bass Point Pre Modification is actual production via road rather than approved.
2. Bass Point proposes to also transports additional product via ship.
3. Dunmore Quarry also transports additional product via rail

It is noted that both Dunmore Quarry and Bass Point have additional production levels that can be transported via non road haulage namely rail and ship.

Through TTPP's discussions with representatives of each Quarry operator, it is interesting to note the approved production levels for each Quarry is somewhat of a theoretical maximum in that each Quarry will to a large degree be competing for the same customers. For example each of the three quarries bid to supply materials for the Berry Bypass project.

It is considered unlikely that all three quarries will operate to their maximum consented production levels in the same year. Thus any traffic assessment based on all three quarries operating simultaneously at full production levels for a one year period is conservative and assessing what is considered by TTPP to be an unrealistic worst case.

Notwithstanding the above, the assessment presented in this report is based on the conservative "worst case" scenario.

2.4 Hours of Operation

The hours of operation for each quarry vary to some degree and this has the potential to influence the amount of product transported from each quarry at any one time.

The Albion Park Quarry has no restrictions with regard to the haulage of product from the quarry other than the annual limit of 900,000 tonnes per year.

The Bass Point Quarry can haul product from the quarry 24 hours per day, 7 days a week with the following maximum limits for the dispatch of laden trucks from the quarry:

- 7am - 10pm: 40 in any one hour
- 10pm - 7am: 23 in any one hour
- 24 hour period: 500 max

The Dunmore Quarry has approval to undertake road haulage as follows:

- Monday to Saturday: 24 hours per day
- Sunday: 8am to 6pm for 15 Sundays a year

2.5 Combined Quarries Average Annual Road Haulage Volumes

Based on the approved production increases for each quarry as described in **Table 1** annual average haulage volumes have been estimated by TTPP. These estimates are then compared with the estimated volumes documented in the development applications.

It is assumed that an average truck load of product will be 33 tonnes per truck. This average truck load is based on the majority of the quarry fleets being a combination of semi trailers and truck and dog vehicles.

The annual average truck movements associated with maximum allowable annual production of the quarries is summarised in **Table 2**.

Table 2 Average Annual Haulage Volumes - No. of Laden Trucks Leaving Quarries

	Albion Park	Bass Point	Dunmore	Total
Pre Modification Approved Production Level (Trucks per annum)	18,180	45,450	30,300	93,930
Post Modification Approved Production Level (trucks per annum)	27,270	90,910	45,450	163,630
Net Potential Increase of Trucks Haulage Volumes	9,090	45,460	15,150	69,700

Notes: 1. The number in this table are to be doubled in order to estimate the total number of truck movements, namely laden leaving the quarry and returning empty.

For the purpose of this assessment it is assumed that there are 275 effective work days per year once quarry shut down, public holidays and limited if any haulage on Sundays and half day Saturdays have been accounted for.

Using these assumptions the average daily increase in truck haulage volumes for each have been estimated as follows:

- Albion Park Quarry: 33 laden trucks per weekday
- Bass Point Quarry: 165 laden trucks per weekday
- Dunmore Quarry : 55 laden trucks per weekday
- Cumulative (Total): 253 laden trucks per weekday

It is understood that the volume of haulage trucks entering and leaving the quarries varies on a day to day basis.

It is noted that the nature of the limit on annual production levels for each quarry means that days where above average truck volumes are undertaken there will be similarly days where truck volumes are lower than the average.

2.6 Estimated Maximum Additional Peak Hour Road Haulage

The various traffic reports submitted with the Development Applications for each quarry have been reviewed with regard to the future increases in the peak period road haulage volumes expected to occur with the quarries production level increases.

The hourly road haulage of each quarry varies significantly from day to day and hour to hour. The number of peak hour loads for each of the three quarries is more aligned with client demands than a particular time of day and as such it is not practical to identify existing or predict future patterns of product haulage for each quarry.

Actual existing haulage data for each of the three quarries was included in the various traffic assessments for the individual quarries or the project application material. It is upon such data that the additional traffic (existing versus future) associated with each approved production level increase has been estimated and documented in the quarry traffic assessments and reproduced in this cumulative assessment.

Notwithstanding the above, the approved future operating conditions for each of the three quarries will determine the additional cumulative impact of quarry product haulage. Each of the environmental assessments for the quarries included an estimate of the additional product haulage vehicle movements that would be expected within a typical peak one hour period.

Should each of the quarries additional peak hour haulage occurs simultaneously, then this would be considered to be the worst case scenario for the cumulative impact of the approved production level increases.

A summary of the estimated additional peak period haulage volumes is presented in **Table 3**.

From Table 3 it is noted that Bass Point and Albion Park quarries typically generate peak haulage movements at different times of the day.

Furthermore, as set out in the environmental assessment documents, the Albion Park Quarry does not expect to increase its current level of peak haulage activities but rather that there will be more days per year where peak haulage levels will be undertaken. This reflects the quarry's production and vehicle loading capacity.

As shown in Table 3, should all three quarries simultaneously operate with typical peak period generation, then the net increase in peak period haulage vehicles for three quarries is estimated to be **17 laden vehicles per hour**.

**Table 3 Additional Quarry Peak Period Additional Truck Haulage Volumes
(No. of Laden Trucks Leaving the Quarries per Hour)**

	Albion Park	Bass Point	Dunmore
No. of Existing Peak Haulage Trucks Leaving the Quarry (Trucks per Hour)	20	13	10
No. of Future Peak Haulage Trucks Leaving the Quarry (Trucks per Hour)	20	25	15
No. of Additional Haulage Trucks Leaving the Quarry (Trucks per Hour)	0	12	5
Peak period for Quarry Haulage	9am - 12noon	12 noon - 3pm	Varies
Approved Hourly Limit of Haulage Trucks Leaving the Quarry	n/a	40 per hour (7am-10pm)	n/a

2.7 Cumulative Truck Distributions

Discussions have been undertaken by TTPP with each of the quarry operators regarding the potential future markets for the additional annual levels of quarry product. These discussions have been used to formulate an expected distribution of haulage vehicle movements on the classified road network.

Cleary Bros (Bombo) Pty Ltd indicated that they expect strong demand from local markets in the foreseeable future. Notwithstanding this, a conservative estimate has been used whereby it is expected that some 80% of haulage movements will be to the southern Sydney Region via Mount Ousley Road.

Hanson Construction Materials Pty Ltd indicated that a significant proportion of current haulage volumes were 'ex bin' (ie sold directly from the site to external customers, as opposed to being transported by Hanson's vehicles to other sites. These details were considered to be confidential.

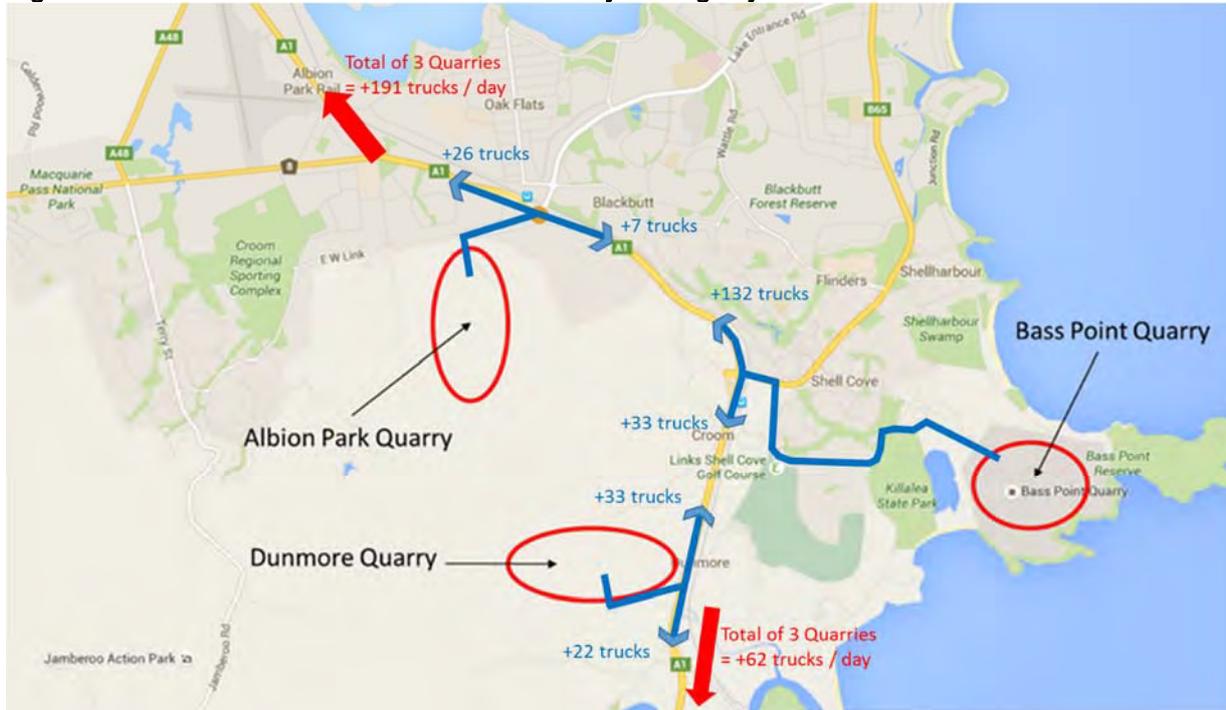
Notwithstanding the above, it is estimated that some 80% of haulage movements from Bass Point Quarry may use Mount Ousley Road. This estimate is likely to be conservatively high as no allowance has been made for trucks travelling to Port Kembla.

Boral Resources Pty Ltd indicated that they expected a strong local market for its additional product noting that the impending closure of Boral's Burrier Quarry, near Nowra. It is estimated that some 60% of haulage trucks will travel to destinations north of the Dunmore Quarry while some 40% will travel south.

The proportional distributions have been applied to the estimated additional average daily haulage volumes described in Section 2.5 above.

The distribution of the additional daily haulage volumes is summarised in **Figure 2**.

Figure 2 Distribution of Additional Ave. Daily Haulage by Laden Trucks



Source: Google Maps

Figure 2 indicates that the average additional truck haulage volumes heading to Mount Ousley Road associated with the approved production levels of the three quarries would be 191 trucks per weekday. This represents an additional 382 truck movements (191 laden northbound + 191 unladen southbound) along Mount Ousley Road per day.

Furthermore, Figure 2 indicates that approximately 75% of the combined additional product from the 3 quarries is anticipated to travel north along Mount Ousley Road.

Of the additional 191 trucks per weekday on Mount Ousley Road the following proportions are assigned to each of the 3 quarries:

- Albion Park Quarry: 14%
- Bass Point Quarry: 69%
- Dunmore Quarry: 17%

The same distributions have been applied to the maximum additional peak hour haulage associated with simultaneous peak haulage of all three quarries (ie. 17 haulage movements). The results are that some additional 13 laden haulage movements per hour are expected to travel north and some 4 laden movements per hour to the south should each quarry operate at its future peak levels.

3 CONSULTATION WITH RMS

A meeting was held between RMS representatives and TTPP in October 2015 to discuss the cumulative impact assessment as required by the consents for each quarry.

The objectives of the meeting were established to be:

- To provide the RMS with the background to the cumulative assessment, including its need to address conditions of consent.
- Establish RMS' expectations as to the definition of the classified road network as it relates to the impact assessment of the 3 quarries and the extent to which the study shall focus on Mount Ousley Road.
- Obtain RMS comments as to the existing operational performance of the classified road network (specifically Mount Ousley Road). I.e. are there any existing capacity pinch points?
- Identify planned and potential improvements planned for the classified network.
- Determine to what extent does the RMS consider the quarries additional traffic may impact on network operation and if so are there specific items / works that could be implemented to address such impacts.
- Obtain any recent traffic flow data for the classified roads in the study area to assist in the assessment of the cumulative impacts of the three quarries.

The key items of the discussion with regard to the assessment were:

- With regard to funding for classified roads, the RMS stated that there is no current mechanism or policy which enables the RMS to collect a levy for classified road use by heavy vehicles. Funding for classified road is via State government funding or works specifically required to address / mitigate impacts of a particular development.
- As stated within the RMS submissions to DoPE for each quarry, the RMS reiterated that they had no objections to the proposed increase of production levels of each quarry individually. This statement was on the basis that in isolation each quarry's production increase would not in its self adversely impact on the operation of the classified road network.
- With regard to the cumulative impacts of the three quarries increasing production, the RMS noted that the combined additional haulage volumes was unlikely to have a measureable impact on the operation of the classified road network, even along Mount Ousley Road however there had been no cumulative assessment demonstrating the extent of impact.
- The RMS suspected that the combined additional haulage volumes of the three quarries would represent a small percentage of total traffic flows along Mt Ousley Road however the assessments to date have not presented such information to confirm or counter this suspicion.
- Mount Ousley Road was identified as the key pinch point in the classified road network surrounding the quarries.

- With regard to capacity and safety improvements along Mount Ousley Road, the RMS has a number of projects being carried out to improve safety for road users in this area including:
 - Safety upgrade for northbound traffic entering the M1 from Picton Road (complete)
 - Interchange at the intersection of M1 and Old Mount Ousley Road.

Each of these projects has been developed with a view to accommodating future traffic growth in the corridor.

- The RMS noted the significant capacity improvements that would be offered by the planned Albion Park Rail bypass.
- It was discussed that major local projects such as the Berry Bypass and Albion Park Rail bypass would require significant volumes of quarried material and the presence of 3 local and competing quarries would be advantageous for the project with regard to haulage distances. This reinforces the expected distribution of additional quarry material to be more focused on local markets rather than the traditional northbound haulage of material to the Sydney region.
- It was discussed that the implications of the combined additional haulage of the three quarries should consider the cumulative implications to the classified road network closer to the quarry sites rather than focus on Mount Ousley Road where the potential for realistic additional capacity improvements are limited.
- It was agreed that any measures to mitigate the cumulative implications of the quarries (if required) should also to consider what each quarry has committed to undertaken as part of their Traffic Management Plans, noting that a key factor in reducing vehicle accidents is driver behaviour.

4 CUMMULATIVE TRAFFIC IMPACT ASSESSMENT

4.1 Background Traffic Volumes on the Classified Road Network

The RMS has provided TTPP with recent traffic volume data for the classified road network for use as part of this cumulative traffic impact assessment.

A summary of the traffic volume data is provided in **Table 4**. Full details are reproduced in Appendix A.

Table 4 Surveyed Daily Traffic Volumes on Classified Road Network

Road	Location	Average Daily Traffic Volume (ADT)	Year	% Heavy Vehicles	Annual Growth Rate
Southern Freeway (F6) 7.104	Gwynneville at Gipps Road Overbridge	77,996	2012	-	2.2%
Southern Freeway (F6) 7.594	Unanderra north of Northcliffe Drive	61,465	2013	9.1%	1.6%
Princes Highway (SH1) RD001	At Shellharbour Road (MR522)	30,311	2014	10.9%	4.0%
Princes Highway (SH1) 7.804	Kiama at Bombo Railway Station	34,367	2014	9.3%	2.3%

Source: RMS (2015)

It is noted that the surveyed traffic volumes presented in Table 4 above, include vehicle movements associated with the existing haulage operations of the Albion Park, Bass Point and Dunmore Quarries.

The surveyed traffic volumes and the associated historical growth rates over the past 5-7 years have been used to estimate traffic volumes for the year 2015 and 2030.

Table 5 Estimated 2015 and 2030 Daily Traffic Volumes on Classified Road Network

Road	Location	Average Daily Traffic Volume (2015)	Average Daily Traffic Volume (2030)
Southern Freeway (F6) 7.104	Gwynneville at Gipps Road Overbridge	83,258	115,395
Southern Freeway (F6) 7.594	Unanderra north of Northcliffe Drive	63,448	80,505
Princes Highway (SH1) RD001	At Shellharbour Road (MR522)	31,523	56,772
Princes Highway (SH1) 7.804	Kiama at Bombo Railway Station	35,157	49,448

Source: RMS (2015)

4.2 Road Network Daily Traffic Volumes with Cumulative Quarry Haulage

The additional road haulage movements associated with the annual production level increase of the three quarries as described above in Section 2 have been added to the estimated road network flows as presented in Section 4.1.

The results are summarised in **Table 6**.

Table 6 Estimated 2015 Daily Traffic Volumes on Classified Road Network

Road	Location	Average Daily Traffic Volume (2015)	With Additional Movements of 3 Quarries	% Increase Associated with 3 Quarries
Southern Freeway (F6) 7.104	Gwynneville at Gipps Road Overbridge	83,258	83,640	0.46%
Southern Freeway (F6) 7.594	Unanderra north of Northcliffe Drive	63,448	63,830	0.60%
Princes Highway (SH1) RD001	At Shellharbour Road (MR522)	31,523	31,919	0.55%
Princes Highway (SH1) 7.804	Kiama at Bombo Railway Station	35,157	35,281	0.35%

The results shown in **Table 6** indicate that the cumulative traffic volume impact of the Albion Park, Bass Point and Dunmore Quarries on Mount Ousley would in 2015 represent an increase of less than ½ a percent (0.46%).

It is considered that such an increase is an insignificant implication to the operational capacity of the classified road network and specifically Mount Ousley Road. The proportion of the additional quarry related traffic will further decrease over future years as background traffic flows increase.

Furthermore, the proportion of the additional quarry related traffic on the classified road network within close proximity to the quarries' locations is also considered to be insignificant being less than 1% of total existing traffic flows.

The analysis presented in **Table 6** confirms the RMS's suspicion that the additional quarry related traffic would represent a very small proportion of the total traffic along Mount Ousley Road.

4.3 Road Network Peak Hour Traffic Volumes with Cumulative Quarry Haulage

The RMS was consultant to obtain traffic flow information for Mount Ousley Road and in particular hourly flows and percentage of heavy vehicles.

However traffic flow data for Mount Ousley Road was not available.

Notwithstanding the above, a RMS count station on the Southern Freeway at Unanderra (07.594) which is along the 3 quarries haulage route towards the north indicated that peak period flows in February 2015 were in the order of :

- AM Peak Hour (8-9am)
 - Northbound: 3,539 vehicles / hour
 - Southbound: 1,639 vehicles / hour
 - Total: 5,178 vehicles / hour
- PM Peak Hour (5-6pm)
 - Northbound: 2,215 vehicles / hour
 - Southbound: 3,023 vehicles / hour
 - Total: 5,237 vehicles / hour

Assuming, based on 2012 RMS daily traffic data, that the proportion of heavy vehicles in the peak hour flows is similar at 9.1% then the peak hour heavy vehicle flows are estimated to be:

- AM Peak Hour: 471 heavy vehicles per hour
- PM Peak Hour: 477 heavy vehicles per hour

The addition of 26 two way truck movements per hour (13 laden quarry trucks) would represent an increase of heavy vehicle movements of 5-6% at this point on the F3 Freeway.

4.4 Warrants for Capacity Improvements on Mount Ousley Road (F6)

The analysis presented in Section 4.2 above indicates that road capacity improvements along Mount Ousley Road are not warranted to accommodate the additional truck haulage movements associated with the approved increases to annual production at the Albion Park, Bass Point and Dunmore Quarries.

Furthermore, discussions with the RMS have indicated that while Mount Ousley Road is considered to be a pinch point in the classified road network, significant capacity improvements are not at this stage considered practical, feasible or warranted.

It is noted that there is no current arrangement under which the RMS could seek or obtain a contribution or levy for improvement works associated with the approved development of the three quarries or other developments in the Illawarra whereby the development itself does not trigger the need for such capacity improvements.

4.5 Warrants for Capacity Improvements on Other Sections of Classified Network

The analysis presented in Section 4.2 above also indicates that road capacity improvements of the Princes Highway closer to the three quarry sites are not warranted to accommodate the additional truck haulage movements associated with the approved increases to annual production at the Albion Park, Bass Point and Dunmore Quarries.

The various intersection operation analysis presented in the traffic assessments submitted with the quarries' development applications clearly indicate that there is significant spare capacity within the network, even when accounting for the cumulative implications of increased production of the three quarries.

4.6 Warrants for Safety Improvements

TTPP undertake discussions with each of the 3 quarry operators with the view to obtaining an operators perspective on road safety issues facing quarry truck drivers.

The operators each highlighted that the key factor in safety was the driver behaviour of their truck drivers and that of other general road users. The geometry of the roads and the site access were generally stated to be of a satisfactory standard with regard to safety.

In addition to the discussions, site inspections were undertaken at each of the Quarries access routes to and from the classified road network. The access arrangements were determined to be satisfactory and in accordance with RMS (and Australian Standard) sight distance requirements.

Therefore, it is considered that safety improvements associated with the three Quarries should be focused on driver behaviour. Each of the three quarries is required to develop and implement a Traffic Management Plan (TMP) for quarry traffic. This TMP is required to include a '*Driver Code of Conduct*'.

The TMP and Drivers Code of Conduct shall include details regarding:

- vehicle operating speeds;
- fatigue management;
- haulage routes;
- communications; and
- legal restrictions relating to driving under the influence of drugs and alcohol.

It is also noted that the RMS has recently completed an upgrade for northbound traffic entering the Mount Ousley Road from Picton Road.

The objectives of the upgrade were to:

- Reduce the frequency of crashes resulting from vehicles overtaking slow vehicles.
- Improve road safety by allowing vehicles entering from Picton Road to accelerate to a suitable speed for merging with the Princes Motorway traffic.
- Improve the safety and efficiency of the Princes Motorway, especially in wet and peak periods.
- Reduce potential environmental impacts.

The REF for the upgrade identified that for the 5 year period between 2008 and 2012 that there were 9 reported crashes in the vicinity of the Princes Motorway / Picton Road intersection with 78% involving rear end or lane change crashes.

The upgrade removes the need for vehicles to stop by removing the T-junction and providing a new road alignment (acceleration lane) where Picton Road meets Princes Motorway. Discussions with RMS have indicated that they consider the upgrade to be a success.

5 CONCLUSIONS

The assessment presented in this report has considered the potential traffic implications to the classified road network associated with the cumulative additional traffic generation of the Albion Park, Bass Point and Dunmore quarries approved increases in allowable annual production levels.

The analysis has determined that the combined average additional daily traffic generation of the three quarries if operating at fully approved production levels would be in the order of 253 additional laden haulage trucks per day leaving the quarries.

The analysis has determined that the generation of 253 additional haulage trucks (or 506 truck movements) would represent an insignificant increase to total traffic volumes on the classified road network including both Mount Ousley Road and the Princes Highway closer to the quarry sites.

Furthermore, the peak hour cumulative additional haulage truck movements has been estimated to be 13 laden trucks (26 truck movements) to the north of the quarries and 4 laden trucks to the south. These represent an insignificant proportion of the total traffic and heavy vehicle flows along the quarries haulage routes.

Based on the insignificant level of traffic volume increases, it is concluded that warrants for capacity improvements to the classified road network are not warranted in order to accommodate the combined increased production of the Albion Park, Bass Point and Dunmore quarries.

Notwithstanding the above, it is considered that maintaining and improving road safety is to be established as a key requirement for the operation of truck haulage of quarry product. In this regard the development and maintenance of a Traffic Management Plan and Driver Code of Conduct is required for each quarry. The above recommendations would be considered reasonable and feasible measures that can be readily implemented by the three quarry operators.

Furthermore, the findings and conclusions of this cumulative traffic impact assessment does not removal the need for Quarry operators to comply with other traffic related conditions within each individual consent for the Albion Park, Bass Point and Dunmore quarries.

APPENDIX A

RMS Traffic Volume Data

Site	Perman	Road Num	Road Name	Location	Permanent ADT	Permanent Year	Sample Count ADT	%HV
7.104	Y	F6006	SOUTHERN FWY,F6	GWYNNEVILLE-AT GIPPS RD OVBR	77996	2012		
7.104	Y	F6006	SOUTHERN FWY,F6	GWYNNEVILLE-AT GIPPS RD OVBR	76528	2011		
7.104	Y	F6006	SOUTHERN FWY,F6	GWYNNEVILLE-AT GIPPS RD OVBR	75653	2010		
7.104	Y	F6006	SOUTHERN FWY,F6	GWYNNEVILLE-AT GIPPS RD OVBR	73803	2009		
7.104	Y	F6006	SOUTHERN FWY,F6	GWYNNEVILLE-AT GIPPS RD OVBR	71643	2008		
7.104	Y	F6006	SOUTHERN FWY, F6	GWYNNEVILLE-AT GIPPS RD OVBR	69771	2007		
7.594	N	F6006	Southern F'way	Unanderra			55723	9.10%
7.594	Y	F6006	SOUTHERN FWY	UNANDERRA-N NORTHCLIFFE DR INTERCH'G	61465	2013		
7.594	Y	F6006	SOUTHERN FWY,F6	UNANDERRA-N NORTHCLIFFE DR INTERCH'G	58948	2012		
7.594	Y	F6006	SOUTHERN FWY,F6	UNANDERRA-N NORTHCLIFFE DR INTERCH'G	59000	2011		
7.594	Y	F6006	SOUTHERN FWY,F6	UNANDERRA-N NORTHCLIFFE DR INTERCH'G	57887	2010		
7.594	Y	F6006	SOUTHERN FWY,F6	UNANDERRA-N NORTHCLIFFE DR INTERCH'G	56561	2009		
7.594	Y	F6006	SOUTHERN FWY,F6	UNANDERRA-N NORTHCLIFFE DR INTERCH'G	55493	2008		
7.594	Y	F6006	SOUTHERN FWY, F6	UNANDERRA-N NORTHCLIFFE DR INTERCH'G	55950	2007		
RD001	Y	HW1	SH1 Princes Hwy	At MR522	30311	2014	26450	10.90%
RD001	Y	HW1	Princes Hwy	At Shellharbour Rd	29717	2013		
RD001	Y	HW1	PRINCES HWY, HW1	AT MR522	28243	2012		
RD001	Y	HW1	PRINCES HWY, HW1	AT MR522	27068	2011		
RD001	Y	HW1	PRINCES HWY, HW1	AT MR522	25928	2010		
7.804	N	HW1	Princes Hwy Kiama	At Bombo			35743	9.30%
7.804	Y	HW1	PRINCES HWY	KIAMA-AT BOMBO RLY STN	34367	2014		
7.804	Y	HW1	PRINCES HWY	KIAMA-AT BOMBO RLY STN	33810	2013		
7.804	Y	HW1	PRINCES HWY,SH1	KIAMA-AT BOMBO RLY STN	32588	2012		
7.804	Y	HW1	PRINCES HWY,SH1	KIAMA-AT BOMBO RLY STN	31925	2011		
7.804	Y	HW1	PRINCES HWY,SH1	KIAMA-AT BOMBO RLY STN	31406	2010		
7.804	Y	HW1	PRINCES HWY,SH1	KIAMA-AT BOMBO RLY STN	30443	2009		
7.804	Y	HW1	PRINCES HWY,SH1	KIAMA-AT BOMBO RLY STN	29143	2008		
7.804	Y	HW1	PRINCES HWY, SH1	KIAMA-AT BOMBO RLY STN	29407	2007		