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Review of Noise Issues with the Expansion of Champions Quarry Preferred Project 1586 Wyrallah Road Tuckurimba NSW 2480

Prepared by
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Introduction

Ambience Audio Services have been requested by the Tucki Community Against Mega Quarry Inc. (TCAMQ) to provide a review of noise issues with the expansion of Champions Quarry (Preferred Project) at 1586 Wyrallah Road, Tuckurimba NSW. A Noise Impact Assessment (NIA) (Dec 2009) was prepared by Environmental Resources Management Australia (ERM), 33 Saunders Street Pyrmont, NSW and a Noise Summary (09/12/11) prepared by Bridges Acoustics, 78 Woodglen Close, Paterson NSW 2421. Various revisions on noise control bunds have been proposed as well.

The current approved license by Lismore City Council is for a maximum annual production of 29,000 cubic metres (approximately 64,000 tonnes) over 15 years. The proposed expansion is to increase production to 250,000 tonnes per annum over 25 years.

Local residents are concerned that the NIA conducted by ERM does not adequately address the noise impact of the quarry expansion on their residential properties. The current quarry operations are well below the allowed maximum of 29,000 cubic metres per annum. Even with the lower production output, local residents have noticed that noise from the quarry can be intrusive on some of their activities. The local residents have lodged noise complaints with the quarry owner and Lismore City Council when noises from the quarry operations have been intrusive to their activities.

It is noted that blasting has been withdrawn from the current proposal. The location, height and staging of the noise control bunds have been modified in the current proposal. ERM provided a response to issues raised by the public - *Champions Quarry EA Response to Submissions* - ERM Final Report September 2010.

Executive Summary

I have reviewed the above documents that relate to acoustics and note that concerns raised in my previous submissions have not been adequately addressed.

I have conducted noise impact assessments for a wide variety of developments and projects. I have conducted at least 12 noise assessments for local quarries in the Lismore area in the last 6 years.

It is my opinion and I am particularly concerned that the ERM Noise Impact Assessment and Bridges Acoustics Noise Summary do no present a worst case scenario and as a result there will be noise level exceedances at the closest affected receivers for quite a lot of the stages of the proposed development.

Specifically there are 5 main areas where data and assumptions provided in the Noise Impact Assessment and Noise Summary do not truly represent the actual situation.

Background levels too high

Effect of wind not accounted for in any modelling

Effect of reflective surfaces not accounted for in any modelling

Sound power levels of the bulldozer and excavator are too low

Impulsive noise characteristics not included in any noise modelling

The cumulative effect of each of the above points will give results that may be up to 15 decibels below the actual noise level at the receiver.

The proposal to use the Interim Construction Noise Guideline (ICNG) for noise bund construction will increase noise levels at receivers. Page 2 of the ICNG states "*excludes construction associated with quarry and mining – This is assessed under the NSW Industrial Noise Policy (EPA 2000).*"

I have found the changing methods for noise control over various submissions, updates and variations by ERM, particularly bund location, challenging and confusing and will not be appraising these methods.

Garry Hall

Acoustic Consultant
Ambience Audio Services

Review

Details of the specific points raised above will be discussed in a review of the response by ERM to public submissions. The ERM response does not adequately address the issues raised by the public submissions and the documentation that supported those issues.

The darker colour is the summarised issue raised by the public.

The lighter colour is the response from ERM.

My concerns are documented following the ERM response.

The Noise Assessment that accompanied the EA was prepared in accordance with the Department of Environment, Climate Change and Water's (DECCW) Industrial Noise Policy (INP), (EPA 2000). The noise emissions from the quarry sections and operations were quantified using the Environmental Noise Model (ENM) which is widely accepted as a reliable method of predicting noise levels from industrial sources.

In response to these specific points raised in the public submissions:

- used project specific intrusiveness criteria for all receivers 2dB(A) higher than monitoring undertaken by the community;

- noise loggers were placed in incorrect areas closer to Wyrallah Road to increase background noise levels.

- Unattended continuous noise monitoring by means of two ARL EL215 environmental noise loggers was conducted at two representative assessment locations in accordance with the INP.

- Two noise loggers were used, one close to Wyrallah road, the other close to Hazelmount Lane (i.e. away from Wyrallah Road). The logger placed at Wyrallah Road was at an equivalent set-back from the road to the Receiver 1 and 4 façades, so as to be representative of background noise levels for these receivers.

Section 2.1 of the INP – Intrusive Noise Impacts. "*This is to be assessed at the most affected point on or within the residential property boundary – or, if that is more than 30 metres from the residence, at the most-affected point within 30 m of the residence.*"

The Rating Background Level (RBL) by ERM for the receivers appears to be higher than expected. Based on measurements I have conducted in similar environments in the local area, day time RBL can be below 30 dBA even near a main road.

The ERM Noise logger 1 was positioned near receiver 4, 20 - 25 metres from Wyrallah Road. The residential dwelling at this location has the outdoor living areas at the rear of the dwelling (away from the road). This provides a barrier effect to road traffic noise but is in direct line of sight to the proposed quarry expansion. Locating the noise logger near the rear outdoor living area would give lower noise levels from the road traffic. This is the same situation at receiver location 1 where the outdoor living area is partly protected from road traffic noise but exposed to noise from the existing quarry and quarry expansion.

Unattended noise monitoring was conducted by Ambience Audio Services in June 2008 with calibrated noise monitoring equipment at receiver 1 location. The noise logger was positioned 25 m from the residential dwelling in the direction of the quarry to compare with the implied levels of the ERM November 2007 noise levels for that location. A portable weather station (Kestrel 4500) was positioned 10 metres from the noise logger to record wind speed, direction, temperature and humidity every 10 minutes for 5 days of noise monitoring. There were no major operations at the quarry during this monitoring period. The noise logger results were analysed and data that was adversely affected by weather (wind greater than 5m/s and/or rain) was discarded. The calculated RBL for the day time period (7.00am – 6.00pm) was 32 dBA. The ERM RBL for this location was 35 dBA. It would be expected that locations closer to the dwelling would be more protected from road traffic noise and background noises lower than 32dBA.

Unattended noise monitoring was conducted by Ambience Audio Services at receiver 3 location for a 10 day period from the 21st August to the 30th August 2009. The calibrated noise logger was positioned 30 metres from the residential dwelling towards the quarry site. A portable weather station (Kestrel 4500) was positioned 10 metres from the noise logger to record wind speed, direction, temperature and humidity every 10 minutes. There was occasional quarry noise during this monitoring period. The noise logger results were analysed and data that was adversely affected by weather (wind greater than 5m/s and rain) was discarded.

ABL for each day time period was:

21st	22nd	23rd	24th	25th	26th	27th	28th	29th	30th
31.2	29.4	28.1	35.1	36.8	28.1	26.5	26.0	29.6	31.4

The calculated RBL for the day time period (7.00am – 6.00pm) was 29.5 dBA. The ERM RBL for receivers 2 and 3 was 32 dBA.

Section 3.1.2 of the NSW INP - Rating background level (RBL) – states: "Where *the background level is found to be less than 30 dBA, then it is set to 30 dBA."* At this receiver location the RBL would be 30 dBA. This would be a similar situation for receiver 2 and the residential properties near receiver 2.

- used meteorological data unrepresentative of Tucki Tucki;

- Daytime wind roses were created from data obtained from the NSW Bureau of Meteorology's nearest relevant weather station No. 058214 at Lismore Airport in accordance with the INP.

Lismore Airport is 13.5 kilometres from the quarry site. Lismore Airport is further inland on a floodplain and surrounded by hills. The quarry is located closer to the coast that is exposed to coastal weather conditions. As I have noted in previous reports, the weather conditions can be quite different at each location at the same time.

Local residents have noted that even though the quarry has been operating at well below its approved capacity of 29,000 cubic metres per annum, noise from the existing central pit can be quite intrusive when the prevailing wind is from the quarry direction and the excavator is operating.

It is unreasonable to think that there will be no prevailing light breezes increasing machinery noise levels at residential dwellings for the proposed quarry expansion.

Downwind conditions also reduce the effective height of an acoustic screen or bund due to increased diffraction over the screen or bund and small areas of turbulence near the top of the screen or bund.

The 'simple' approach as stated in Section 5.1 of the INP (which assumes that at times wind will be a feature of the area) should be adopted for this project to provide a worst case scenario.

Modelling should include the effect of wind and the effect of downwind conditions on earth bunds.

- did not consider the amplification of noise due to the shape of the site;

- Accurate topographic data (to 2m) was incorporated into the noise assessment model in order to be consistent with the site topography, including the quarry pit form for specific scenarios. As such 'amplification' is accounted for in the modelling;

It is unclear from the ERM NIA or Bridges Acoustics Noise Summary if all reflective surfaces have been included in the noise modelling. A discussion with Mark Bridges indicated that reflective surfaces were not included in modelling.

Local residents have noticed that echoes can be heard from a large stand of trees (approximately 20m high) near their residential dwellings. This reflected sound would add to the direct sound to increase noise levels at some of the receivers. Reflected sound from machinery operating near large working faces will add to the direct sound at distant receivers. The effective height of earth bunds are also reduced as the reflected sound travels a different path.

Modelling must include all significant reflective surfaces for each scenario.

- used incorrect sound power levels for equipment. Similar equipment in the Cotters Dam major project EA had higher noise levels; and

- The sound power level data used for the modelling of quarry equipment for the quarry operations were calculated from measurements obtained either on-site; operating on an existing site, or where particular items were unavailable to be measured, data was obtained from manufacturer's data.

Section 6.2 of the ERM NIA states "*that plant items used in noise modelling scenarios and their associated sound power levels (SWL) are summarised in Table 6.1."* Table 6.1 on page 18 of the ERM NIA refers to Annexe D for spectral data that was used for noise modelling. It appears that some of the sound power levels for the same plant item are different. Table 6.1 and the SWL from Annexe D are presented next to each other below. The items that are different are in **bold**.

Table 6.1 Plant Sound Power Levels

Plant Item	Model	Source	Representative $L_{eq,15minute}$ Sound Power Level (SWL), dB(A)
Mobile Crushing and Screening Plant	Terex Pegson: XA400 primary crusher, 428 Trackpactor tertiary crusher, 2 x Chieftain 2100 Powerscreen.	Measured by ERM at Alstonville Quarry	114
Washing Plant	Terex Finlay Hydrasander 150E or similar	ERM File Data	105
Site Truck (Central Section)	Ford L8000	Measured by ERM on-site	91
Dump Truck (Southern Section)	Caterpillar 35T or similar	ERM File Data	119
Road Truck	Scania 124L Truck and Dog or similar	Measured by ERM on-site	103
Water Truck (Pass-by)	Isuzu	ERM File Data	90
Excavator	Komatsu PC200	Measured by ERM on-site	100
Excavator	Komatsu PC400	ERM File Data	106
Bull Dozer	Caterpillar D8/D9 or similar	ERM File Data	109
Front-End Loader	Komatsu WA320	Measured by ERM on-site	101
Grader	Unknown	ERM File Data	105
Rock Hammer	Typical medium sized Rock Hammer	ERM File Data	121
Rock Saw	Typical medium sized Rock Saw	ERM File Data	113

Notes: 1. Refer to *Annex D* for spectral data used for noise modelling

2. The sound power of the rock hammer was modified to reflect its limited utilisation as the hammer would be used for periods of approximately 5 minute intervals over any 15 minute period.

Annexe D Table D.1

SWL (dBA)	Item
106	6
105	9
90	5
103	4
90	8
109	2
106	1
110	3
105	7
121	10
114	11

It is unclear from the report which data has been used for modelling. It is noted that some of the sound power levels are in the low range of sound power levels compared with other quarry assessments. The correct sound power levels need to be identified and stated and the modelling reflect the correct data.

The Caterpillar D8/D9 bulldozer SWL (dBA) of 109 / 106 (a later assessment indicates 110 dBA) used in the modelling is too low for this type of machine operating in sandstone quarry pits. Measurements I have conducted of D7 type dozers working in sandstone pits near the Lismore area indicate a SWL (dBA) of 112 -115. Ripping in harder layers of sandstone can elevate levels to 117 dBA. There is a lot of banging noise from the blade when not under load (when ripping or reversing). The metal tracks make more noise when reversing (due to no load) and the combined effect of the metal tracks and banging blade produces impulsive noise characteristics. Impulsive noise characteristics are also present when ripping in harder layers of sandstone. I have measured impulsive noise characteristics (L_{AImax} – L_{AFmax}) of generally 3 – 3.5 decibels for dozers in sandstone. 3.5 decibels would be added to the sound power level.

The noise control method of operating the rock hammer for only 5 minutes in every 15 is not a practical solution to noise mitigation.

From Table 4.1 of the INP – Modifying Factors

Impulsive noise	A-weighted fast response and impulse response	If difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB	Apply difference in measured levels as the correction, up to a maximum of 5 dB.	Characterised by a short rise time of 35 milliseconds (ms) and decay time of 1.5 s

Section 4.3 of the ERM NIA discusses modifying factors. No modifying factors were identified in the data analysed by ERM and no modifying factors have been applied to any plant or equipment.

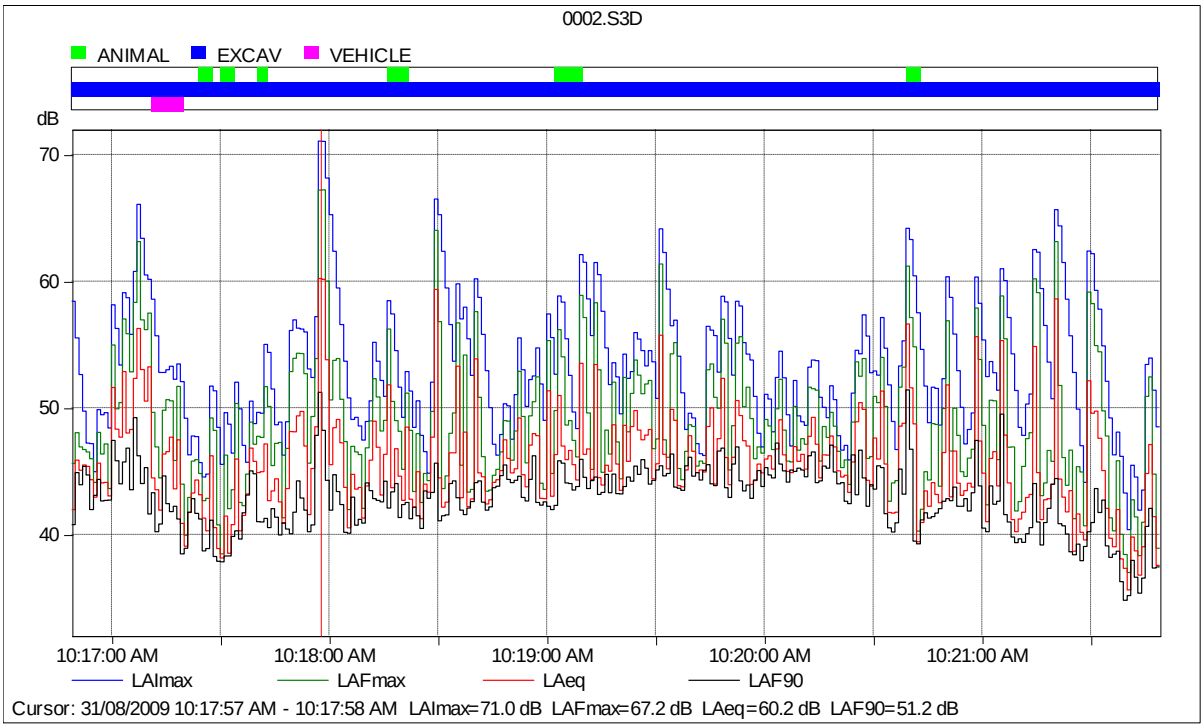
When collecting the noise monitoring equipment on the morning of the 31st of August 2009 from receiver location 3 after the 10 days of background noise monitoring, it was observed that a 1 – 2 m/s WSW wind was carrying noise from an excavator, working near the western boundary of receiver 3 (approximately 350 – 450m away), toward receiver 3. There was a constant low frequency motor noise and loud bangs from the bucket slamming. There was very little audible traffic noise from Wyrallah Road, a small amount of wind in the trees and occasional birds. Temperature was 19 degrees.

A five minute measurement was taken with a Bruel and Kjaer 2260 sound level meter (SLM). The SLM was field calibrated, fitted with a Bruel & Kjaer factory 90mm wind sock and mounted on a 1.4 metre high tripod in an open space

approximately 25 metres from the residential dwelling in the direction of the quarry. Markers were used during the monitoring to identify individual acoustic events for later analysis. The field calibration indicated no system drift. The results were:

Total L_{Aeq} dBA	L_{A10} dBA	L_{A90} dBA	L_{AIMax} dBA	L_{AFMax} dBA	Excavator L_{Aeq} dBA	$L_{AIMax} - L_{AFMax}$ dB
48.1	50.3	40.4	71.0	67.2	48.0	3.8

The logged profile is presented below. The coloured bands at the top of the graph indicate the duration of the marked acoustic events.



The banging of the bucket are the peaks above 60 decibels. It was noted that the difference between the L_{AIMax} and the L_{AFMax} was 3.8 decibels. This is consistent with measurements I have conducted of excavators. This is considered an impulsive noise characteristic and a modifying factor of 3.8 decibels would be added to the L_{Aeq} of the excavator. The noise level of the excavator would then be assessed at 51.8 decibels if it operated for 15 minutes. This level is approximately 15 decibels above the ERM noise goal of 37 dBA at this location.