SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

12 September 2014

Ref: 8413/5372_CovLtr

Metromix Pty Ltd
150 Rhondda Road
Teralba NSW 2284

RE: SEPTEMBER 2014 ATTENDED NOISE MONITORING RESULTS – TERALBA QUARRY

Please find attached our report for the recent noise monitoring survey undertaken for the Metromix Teralba Quarry.

Following discussions with Metromix the monitoring was undertaken at the relevant locations over 15 minutes duration in each of the day shoulder, day, evening and night time periods. The monitoring was done on a single day on 8th September, 2014. In Spectrum Acoustics experience such timing and duration is in keeping with what is considered a typical noise monitoring programme for a quarry of the type and size of Teralba quarry.

The majority of receivers in areas potentially impacted by noise from TQ are also in areas subjected to noise from a number of other major sources. There are major roads, a railway line and several large industries either adjacent to receivers or between them and the TQ operations. The acoustic environment of the receiver areas is significantly influenced by noise from these sources.

The EPL (no. 536) for the quarry defines compliance noise levels in dB(A) Leq (15 min) periods. Similarly, the monitoring also fulfils the requirements of the Project Approval for the quarry which states (in part) that the noise management plan; "*must include a noise monitoring programme that:*

- *is capable of regularly evaluating the performance of the project.*"

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Ross Hodge
Acoustical Consultant

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RE: SEPTEMBER 2014 ATTENDED NOISE MONITORING RESULTS – TERALBA QUARRY

This letter report presents the results of attended noise monitoring conducted for the Metromix operated Teralba Quarry (TQ) on Monday 8th September, 2014. Noise monitoring was carried out in accordance with the conditions of the TQ Noise Management Plan (NMP) as shown in extract below (referenced from EPL 0536).

Although the project approval nominates noise criteria at nine locations, Metromix recognises that meaningful monitoring data will be collected from the closest locations to the active operational areas. For periods when operations are confined to areas south of Rhondda Road, noise monitoring will be undertaken at Locations EPL-A, B, C (see note below table), D, E and H. **Table 1** lists the address and coordinates of each noise monitoring location. The locations are shown on the figure in **Appendix I**.

Table 1
Noise Monitoring Locations (from PA 10-0183)

Location in EPL	Address	Easting	Northing
EPL-A	Awaba Street, Teralba	369080	3651470
EPL-B	Rhondda Road, Teralba	369250	6351915
EPL-C	Rhondda Road, Teralba [1]	369205	6352015
EPL-D	Rhondda Road, Teralba	369150	6352135
EPL-E	Victoria Avenue, Teralba [2]	369060	6352620
EPL-F	Victoria Avenue, Teralba [1]	369130	6352945
EPL-H	School Road, Wakefield	366210	6352520

1. Metromix has obtained permission for this monitoring location to be omitted.
2. Monitoring at these locations is only when quarrying activity is being undertaken north of Rhondda Rd.

It is noted that during the period when monitoring is undertaken at Location B, Metromix will ensure a spotter is present to record the number of trucks departing from the Quarry and not the Teralba Business Park.

Condition	Requirement
L4.1	The licensee must ensure that noise generated by the activities within the premises do not exceed the following criteria measured by dB(A) at any residence or privately owned land.

Location	Day Shoulder 6:00am - 7:00am	Day 7:00am - 6:00pm	Evening 6:00pm – 10:00pm	Night 10:00pm – 6:00am
	$L_{Aeq\ (15\ minute)}$	$L_{Aeq\ (15\ minute)}$	$L_{Aeq\ (15\ minute)}$	$L_{Aeq\ (15\ minute)}$ $L_{A1(1min)}$
A-	38	38	37	35 45
B-	42	46	36	35 45
C-	42	42	35	35 45
D,E,G,H,I	35	35	35	35 45
F	37	38	38	35 45

Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above table.

Condition	Requirement
L4.2	The licensee must comply with the operating hours set out in the following table:

Day	Receipt of Concrete or VENM* or ENM**	Loading and Dispatch of Quarry Trucks	Extraction and Processing
Monday - Friday	7:00am to 5:00pm	4:00am Monday to midnight Friday	7:00am to 7:00pm
Saturday	7:00am to 2:00pm	Midnight Friday to 6:00pm Saturday	7:00am to 2:00pm
Sundays and Public Holidays	None	None	none

Note: Maintenance activities may occur at any time provided they are inaudible at privately-owned residence.
*VENM = Virgin Excavated Natural Material
**ENM = Excavated Natural Material

L4.3	The noise limits set out in conditions L4.1 apply under all meteorological conditions except for anyone of the following: a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or b) Stability category F temperature inversion conditions and wind speeds greater the 2 metres/second at 10 metres above ground level; or c) Stability category G temperature inversion conditions.
L4.4	For the purpose of condition L4.3: a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point W1. b) Stability category temperature inversion conditions are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the *NSW industrial Noise Policy (EPA 2000)* Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.
L4.5	For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.
L4.6	To determine compliance: 1. With the $L_{Aeq(15\ min)}$ noise limits in condition L4.1, the licensee must locate noise monitoring equipment; a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more than 30 metres from the property boundary that is closest to the premises; b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable, c) within approximately 50 metres if the boundary of a national park or nature reserve. 2. With the LA1(1 minute) noise limits in condition L4.1, the noise monitoring equipment must be located within 1 metre of a dwelling facade. 3. With the noise limits in condition L4.1, the noise monitoring equipment must be located; a) at the most affected point at a location where there is no dwelling at the location, or b) at the most affected point within an area at a location prescribed by conditions L4.6 1(a) or L4.6 1(b).

NOISE MEASUREMENTS

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 "Sound Level Meters" and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

The noise monitoring was conducted in general accordance with the requirements of Section 9 of the NMP (Noise Monitoring Protocol and Evaluation of Compliance) as follows;

"*Metromix proposes to adopt a noise monitoring protocol that provides feedback on the effectiveness of the noise control measures and demonstrate compliance with the conditions within the Project Approval 10_0183 and Environment Protection Licence 0536.*

The approach to monitoring compliance is based substantially upon Metromix's experience to date which has identified the on-site activities have not been the source of noise complaints or any recorded non-compliance. Hence, it is considered the monitoring program needs to reflect this fact."

A-weighted noise levels were measured over 15 minute monitoring periods with data acquired at 1 second statistical intervals and the meter set to "fast" response. Each 1 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP 'modifying factors'. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

The 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from TQ was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the quarry and other significant noise sources to the overall level. Quarry noise from TQ is shown in the tables in bold type. Where noise from TQ is listed as faintly audible, this means the noise levels from the quarry were at least 10 dB below the ambient level during the measurement and not measurable.

Noise levels were recorded for each of the L10, Leq, Lmax, L1, L90 and Lmin percentiles. All noise levels shown in the tables of results are in dB(A) Leq (15 min). Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request.

Meteorological data used in this report was obtained from the quarry operated weather station at the site.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** to **5**. EPL 536 refers to the various time periods as follows:

a) Day-Shoulder is defined as the period between 6am to 7am Monday to Saturday.

b) Day is defined as:
   (i) the period from 7am to 6pm Monday to Saturday; and

(ii) the period from 8am to 6pm Sundays and Public Holidays.

c) Evening is defined as the period from 6pm to 10pm.

d) Night is defined as:

(i) the period from 10pm to 7am Monday to Saturday; and

(ii) the period from 10pm to 8am Sundays and Public Holidays.

Table 2
Teralba Quarry Noise Monitoring Results – 8 September 2014
Night

Location	Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min)
A	5:30 am	50	35	1.5 m/s 234°	Birds (50), traffic (47), industrial noise (28), train (27), **TQ inaudible**
B	5:05 am	53	35	1.0 m/s 144°	Traffic (53), train (35), frogs (29), **TQ inaudible**[1]
D	5:06 am	47	35	1.0 m/s 144°	Traffic (47), frogs (27), industrial noise (27), train (25), **TQ inaudible**
H	5:35 am	50	35	1.5 m/s 231°	Birds (50), traffic (33), Farm noise (28), **TQ inaudible**

1. No quarry trucks passed, see text

Table 3
Teralba Quarry Noise Monitoring Results – 8 September 2014
Day Shoulder

Location	Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min)
A	6:25 am	50	38	2.8 m/s 293°	Traffic (47), birds (46), **TQ (33)**, industrial noise (30), train (29)
B	6:07 am	59	42	2.0 m/s 275°	Traffic (59), birds (41), train (30), **TQ inaudible**[1]
D	6:07 am	56	35	2.0 m/s 275°	Traffic (54), birds (52), train (29), **TQ (27)**
H	6:31 am	52	35	2.9 m/s 264°	Birds (51), traffic (45), **TQ inaudible**

1. See text

Table 4
Teralba Quarry Noise Monitoring Results – 8 September 2014
Day

Location	Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min)
A	7:30 am	51	38	2.0 m/s 292°	Traffic (51), **TQ (31)**, industrial noise (31), birds (30), train (28)
B	7:05 am	64	46	2.8 m/s 213°	Traffic (64), birds (41), trains (33), other industries (30), **TQ (30)**[2]
D	7:02 am	53	35	2.8 m/s 213°	Traffic (52), birds (46), **TQ (28)**, industrial noise (26), trains (26)
H	7:25 am	49	35	2.1 m/s 292°	Birds (49), **TQ (33)**, traffic (29)

2. Quarry trucks on private road

Table 5 Teralba Quarry Noise Monitoring Results – 8 September 2014 Evening					
Location	**Time**	**Total noise dB(A) Leq**	**Criterion dB(A) Leq**	**Wind speed/ direction**	**Identified Noise Sources (Leq (15 min)**
A	6:25 pm	54	37	4.7 m/s 41°	insects (52), traffic (47), train (45), **TQ inaudible**
B	6:05 pm	57	36	4.5 m/s 39°	Birds & insects (55), traffic (53), train (33), **TQ inaudible (30)**[1]
D	6:23 pm	46	35	4.7 m/s 41°	Traffic (44), frogs (42), train (30), **TQ inaudible**
H	6:02 pm	50	35	4.5 m/s 41°	Birds & frogs (49), traffic (42), **TQ (28)**

1. See text

The results shown in Tables 2 to 5 show that, under the operational and atmospheric conditions at the time of monitoring, noise emissions from TQ did not exceed the relevant criterion at any monitoring location during any part of the survey.

Measurement location B is near the corner of Rhondda Road and Railway Street. This monitoring location is included predominantly to measure quarry noise from emissions from trucks exiting the site along the private section of the access road (through the Teralba Business Park). From the monitoring location it was possible to determine which trucks were associated with the quarry and a dedicated spotter was not required.

The noise level shown in Table 4 for Location B is a calculation of the Leq from the measurement of the noise from two individual trucks travelling along the private road. The levels shown in the other tables for Location B indicate that there were no trucks associated with the quarry that passed the monitoring location during the 15 minute monitoring period.

Data from those times where TQ operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of "modifying factor corrections" in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from TQ must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the quarry. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents, the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, a bedroom window is assumed to be facing the operational noise monitoring location.

As shown in Table 2, during the night time measurement circuit TQ was inaudible and, therefore, the L1 (1 min) noise did not exceed 45 dB(A) at any monitoring location.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

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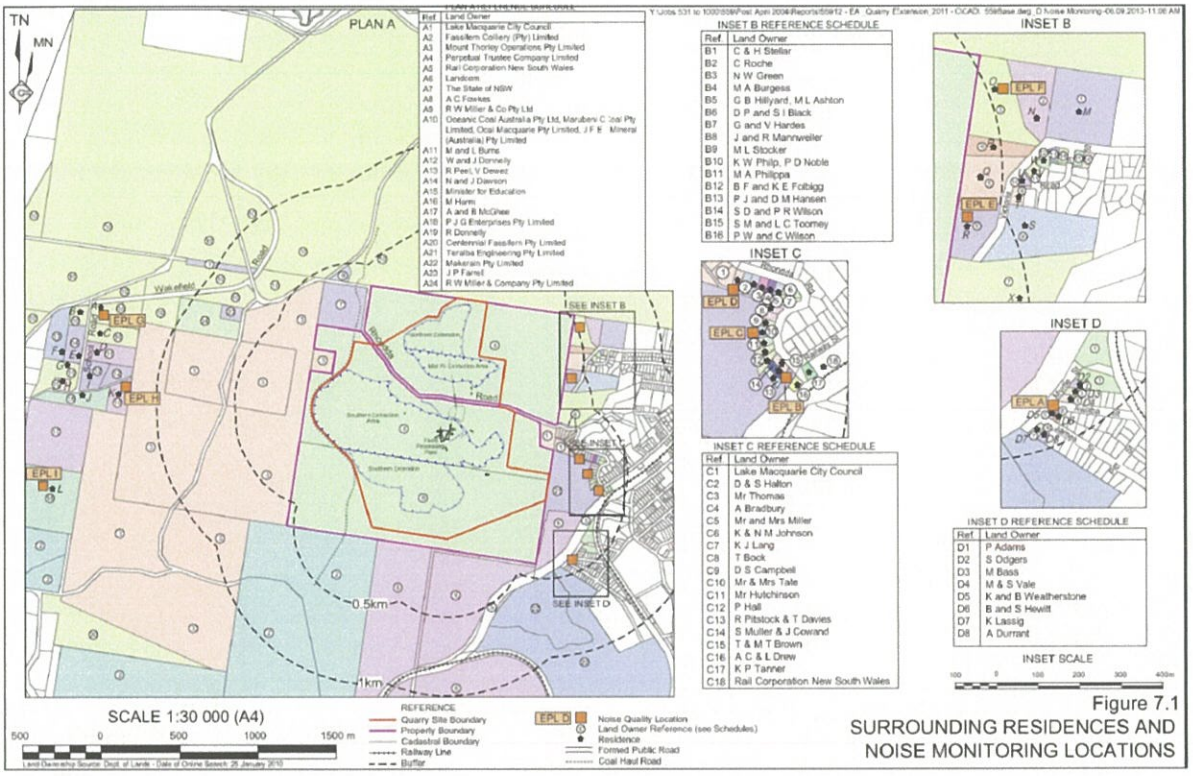

Figure 7.1
SURROUNDING RESIDENCES AND NOISE MONITORING LOCATIONS