



26 December 2018

Ref: 8413/8185

Metromix Pty Ltd
 150 Rhondda Road
 Teralba NSW 2284

NOVEMBER 2018 NOISE MONITORING RESULTS – TERALBA QUARRY

This letter report presents the results of attended noise monitoring conducted for the Metromix operated Teralba Quarry (TQ) commencing on Tuesday 20th and finishing on Thursday 23rd of November, 2018. Noise monitoring was carried out in accordance with the conditions of the TQ Noise Management Plan (NMP) as shown in extract on page 2 (referenced from EPL 536).

Although the project approval nominates noise criteria at nine locations, Metromix recognises that meaningful monitoring data will continue to be collected from the closest locations to the active operational areas. As a result of this, and as outlined within the approved NMP, for periods when operations are confined to areas south of Rhondda Road, noise monitoring will be undertaken at Locations EPL-A, B, D, E and H.

Further to this, location EPL-C and EPL-F have been omitted from the noise monitoring programme given they are not required as other monitoring locations are nearby and closer to quarry related noise sources. This has been recognised by the EPA by the removal of these locations from the monitoring locations detailed in EPL 536. **Table 1** lists the address and coordinates of each noise monitoring location, with the relevant monitoring locations that were monitored during the November 2018 period highlighted in **bold**. 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-B¹	Rhondda Road, Teralba	369250	6351915
EPL-C	Rhondda Road, Teralba ²	369205	6352015
EPL-D	Rhondda Road, Teralba	369150	6352135
EPL-E	Victoria Avenue, Teralba	369060	6352620
EPL-F	Victoria Avenue, Teralba ²	369130	6352945
EPL-H	School Road, Wakefield	366210	6352520

1. See text in relation to changes to monitoring location
2. Metromix has obtained permission for this monitoring location to be omitted.

It is noted that during the period when monitoring is undertaken at Location B, Metromix is required to provide a spotter to record the number of trucks departing from the Quarry and not the Teralba Business Park. Spectrum Acoustics personnel undertook identification of quarry trucks as part of the noise monitoring procedure.

As part of pre monitoring protocols Spectrum Acoustics notified, by letterbox drop, all landowners in the close vicinity of each site of the impending monitoring. The resident at Location B has previously told Metromix that he doesn't want monitoring to be done near his residence so monitoring was undertaken at a point approximately 30m south (as shown in Appendix I).

The following presents noise related conditions of EPL 536 relevant to the compliance noise monitoring programme.

Condition	Requirement																																													
L5.2	<p>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.</p> <table border="1" data-bbox="316 842 1431 1238"> <thead> <tr> <th data-bbox="316 842 475 875">Location</th> <th data-bbox="475 842 794 920">Day Shoulder 6:00am - 7:00am</th> <th data-bbox="794 842 1034 920">Day 7:00am - 6:00pm</th> <th data-bbox="1034 842 1273 920">Evening 6:00pm – 10:00pm</th> <th data-bbox="1273 842 1431 920">Night 10:00pm – 6:00am</th> </tr> <tr> <td></td> <td data-bbox="475 920 794 954">L_{Aeq} (15 minute)</td> <td data-bbox="794 920 1034 954">L_{Aeq} (15 minute)</td> <td data-bbox="1034 920 1273 954">L_{Aeq} (15 minute)</td> <td data-bbox="1273 920 1431 954">L_{Aeq} (15 minute)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td data-bbox="1273 954 1431 987">L_{A1}(1min)</td> </tr> </thead> <tbody> <tr> <td data-bbox="316 976 475 1010">EPL-A</td> <td data-bbox="475 976 794 1010">38</td> <td data-bbox="794 976 1034 1010">38</td> <td data-bbox="1034 976 1273 1010">37</td> <td data-bbox="1273 976 1431 1010">35</td> </tr> <tr> <td data-bbox="316 1021 475 1055">EPL-B</td> <td data-bbox="475 1021 794 1055">42</td> <td data-bbox="794 1021 1034 1055">46</td> <td data-bbox="1034 1021 1273 1055">36</td> <td data-bbox="1273 1021 1431 1055">45</td> </tr> <tr> <td data-bbox="316 1066 475 1099">EPL-C</td> <td data-bbox="475 1066 794 1099">42</td> <td data-bbox="794 1066 1034 1099">42</td> <td data-bbox="1034 1066 1273 1099">35</td> <td data-bbox="1273 1066 1431 1099">35</td> </tr> <tr> <td data-bbox="316 1111 475 1144">EPL-D, EPL-E, EPL-H</td> <td data-bbox="475 1111 794 1144">35</td> <td data-bbox="794 1111 1034 1144">35</td> <td data-bbox="1034 1111 1273 1144">35</td> <td data-bbox="1273 1111 1431 1144">45</td> </tr> <tr> <td data-bbox="316 1155 475 1189">EPL-F</td> <td data-bbox="475 1155 794 1189">37</td> <td data-bbox="794 1155 1034 1189">38</td> <td data-bbox="1034 1155 1273 1189">38</td> <td data-bbox="1273 1155 1431 1189">35</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td data-bbox="1273 1200 1431 1234">45</td> </tr> </tbody> </table> <p data-bbox="331 1238 1431 1312">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.</p>	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)	EPL-A	38	38	37	35	EPL-B	42	46	36	45	EPL-C	42	42	35	35	EPL-D, EPL-E, EPL-H	35	35	35	45	EPL-F	37	38	38	35					45
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L5.3	<p>For the purposes of Condition L5.2:</p> <ul style="list-style-type: none"> a) Day-Shoulder is defined as the period between 6am to 7am Monday to Saturday. b) Day is defined as: <ul style="list-style-type: none"> a. the period from 7am to 6pm Monday to Saturday; and b. 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: <ul style="list-style-type: none"> a. the period from 10pm to 7am Monday to Saturday; and b. the period from 10pm to 8am Sundays and Public Holidays. 																																													
L5.4	<p>The contributed noise level from the premises must not exceed the noise limits specified within EPL 536 at the most noise-affected point on or within the boundary of any residential premises to the north and/or south of the premises, except as expressly provided by this licence, or by the EPA in writing.</p>																																													
L5.5	<p>The noise limits set out in conditions L5.2 apply under all meteorological conditions except for anyone of the following:</p> <ul style="list-style-type: none"> 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. 																																													
L5.6	<p>For the purpose of condition L5.5:</p>																																													

	<p>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.</p> <p>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 <i>NSW industrial Noise Policy (EPA 2000)</i></p> <p>Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.</p>																
L5.7	<p>To determine compliance:</p> <ol style="list-style-type: none"> With the $L_{Aeq(15\text{ min})}$ noise limits in condition L5.2, the licensee must locate noise monitoring equipment; <ol style="list-style-type: none"> approximately on the boundary, where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises; or, 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; or where applicable within approximately 50 metres if the boundary of a national park or nature reserve. With the $LA1(1\text{ minute})$ noise limits in condition L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade. With the noise limits in condition L5.2, the noise monitoring equipment must be located; <ol style="list-style-type: none"> at the most affected point at a location where there is no dwelling at the location, or at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b). 																
L5.8	<p>A non-compliance will still occur where noise generated from the premises in excess of the appropriate noise limit is measured:</p> <ol style="list-style-type: none"> at a location other than an area prescribed by the conditions of this licence, and /or at a point other than the most affected point at a location. 																
L5.9	<p>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.</p>																
L5.10	<p>For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.</p>																
L7.1	<p>The licensee must comply with the operating hours specified in Column 2, Column 3, and Column 4 of the table below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Day</th> <th style="text-align: center;">Loading and Dispatch of Quarry Trucks</th> <th style="text-align: center;">Extraction and Processing</th> <th style="text-align: center;">Receipt of Concrete</th> </tr> </thead> <tbody> <tr> <td>Monday - Friday</td> <td>4:00am Monday to midnight Friday</td> <td>7:00am to 7:00pm</td> <td>7:00am to 5:00pm</td> </tr> <tr> <td>Saturday</td> <td>Midnight Friday to 6:00pm Saturday</td> <td>7:00am to 2:00pm</td> <td>7:00am to 2:00pm</td> </tr> <tr> <td>Sundays and Public Holidays</td> <td>None</td> <td>none</td> <td>none</td> </tr> </tbody> </table> <p>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</p>	Day	Loading and Dispatch of Quarry Trucks	Extraction and Processing	Receipt of Concrete	Monday - Friday	4:00am Monday to midnight Friday	7:00am to 7:00pm	7:00am to 5:00pm	Saturday	Midnight Friday to 6:00pm Saturday	7:00am to 2:00pm	7:00am to 2:00pm	Sundays and Public Holidays	None	none	none
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Sundays and Public Holidays	None	none	none														

NOISE MEASUREMENTS

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration of each instrument was 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 worst case 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. Wind speed is presented in metres per second units. Winds speeds less than 0.5 m/s are noted as “calm”.

Noise Compliance Assessment

The results of the noise measurements undertaken throughout the various time periods are provided in **Tables 2 to 16**. 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 – 20 November 2018 Night					
Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	5:36 am	46	35	Calm	Traffic (43), birds (42), TQ inaudible
B	4:31 am	49	35	Calm	Birds (47), traffic (43), TQ inaudible
D	4:30 am	47	35	Calm	Birds (43), Traffic (43), TQ inaudible
E	5:31 am	51	35	Calm	Birds (51), traffic (41), TQ inaudible
H	5:02 am	48	35	Calm	Birds (48), Traffic (36), TQ inaudible

Table 3 Teralba Quarry Noise Monitoring Results – 20 November 2018 Day Shoulder					
Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	6:37 am	46	38	0.7 / 287	Birds (44), traffic (39), TQ inaudible
B	6:22 am	52	42	Calm	Industrial noise (50), traffic (46), TQ (32) ¹
D	6:44 am	50	35	0.7 / 287	Traffic (48), birds (43), TQ inaudible
E	6:32 am	52	35	Calm	Birds (50), traffic (45), TQ inaudible
H	6:02 am	51	35	Calm	Birds (50), Traffic (41), TQ inaudible

Note: 1 See text description and analysis

Table 4 Teralba Quarry Noise Monitoring Results – 20 November 2018 Day					
Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	7:04 am	47	38	Calm	Traffic (42), industry (42), trains (40), TQ inaudible
B	4:32 pm	60	46	1.7 / 65	Trucks (60), industry (40), wind (40), TQ inaudible
D	4:29 pm	52	35	1.7 / 65	Traffic (52), birds (41), TQ inaudible
E	7:46 am	51	35	Calm	Dogs (50), traffic (42), TQ inaudible
H	8:37 am	52	35	1.0 / 19	Birds (51), Traffic (42), TQ inaudible

Note: 1 See text description and analysis

Table 5
Teralba Quarry Noise Monitoring Results – 20 November 2018
Evening

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	6:30 pm	49	37	1.8 / 52	Dogs (47), trains (41), TQ inaudible
B	6:01 pm	59	36	1.7 / 63	Traffic (59), trains (44), industry (40), TQ inaudible
D	6:02 pm	48	35	1.7 / 63	Traffic (48), birds (34), TQ inaudible
E	7:00 pm	51	35	1.5 / 56	Traffic (49), birds (44), TQ inaudible
H	7:43 pm	52	35	1.2 / 63	Birds (48), mowing (47), insects (41), TQ inaudible

Table 6
Teralba Quarry Noise Monitoring Results – 21 November 2018
Night

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	5:36 am	50	35	1.0 / 339	Trains (46), birds (46), traffic (40), TQ inaudible
B	4:32 am	49	35	1.0 / 358	Train (47), traffic (42), insects (34), TQ inaudible
D	4:30 am	41	35	1.0 / 358	Birds (38), traffic (37), TQ inaudible
E	5:30 am	45	35	1.0 / 339	Birds (43), traffic (37), TQ inaudible
H	5:02 am	50	35	2.0 / 357	Birds (45), dogs (44), traffic (42), TQ inaudible

Table 7
Teralba Quarry Noise Monitoring Results – 21 November 2018
Day Shoulder

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	6:32 am	52	38	2.8 / 4	Birds (50), traffic (45), TQ inaudible
B	6:23 am	50	42	2.8 / 4	Industrial noise (47), Traffic (47), TQ (33) ¹
D	6:44 am	45	35	2.4 / 14	Traffic (43), birds (38), TQ inaudible
E	6:45 am	55	35	2.4 / 14	Motorbike (53), birds (48), traffic (41), TQ inaudible
H	6:03 am	51	35	1.7 / 16	Birds (50), traffic (41), TQ inaudible

Note: 1 See text description and analysis

Table 8
Teralba Quarry Noise Monitoring Results – 21 November 2018
Day

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	3:54 pm	48	38	2.5 / 345	Wind (46), industrial noise (42), traffic (34), TQ inaudible
B	9:36 am	54	46	2.2 / 349	Traffic (52), trains (48), TQ (28) ¹
D	8:03 am	55	35	2.2 / 13	Traffic (52), birds (50), TQ (<30)
E	7:44 am	55	35	1.9 / 355	Birds (55), traffic (42), TQ inaudible
H	9:41 am	51	35	2.2 / 349	Wind (48), birds (47), TQ inaudible

Note: 1 See text description and analysis

Table 9
Teralba Quarry Noise Monitoring Results – 21 November 2018
Evening

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	8:28 pm	54	37	2.0 / 332	Insects (53), train (43), TQ barely audible
B	6:01 pm	55	36	2.9 / 350	Traffic (54), traffic, (43), train (41), TQ inaudible
D	7:20 pm	49	35	2.8 / 351	Car (47), traffic (42), TQ inaudible
E	7:50 pm	49	35	2.2 / 349	Crickets (48), traffic (40), TQ inaudible
H	6:12 pm	59	35	2.9 / 350	Birds (54), wind (53), car (52), TQ inaudible

Table 10
Teralba Quarry Noise Monitoring Results – 22 November 2018
Night

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	5:37 am	44	35	2.0 / 341	Birds (42), traffic (38), TQ inaudible
B	4:34 am	58	35	1.9 / 40	Trains (54), motorcycle (52), traffic (50), TQ inaudible
D	4:30 am	45	35	1.9 / 40	Traffic (45), TQ inaudible
E	5:32 am	49	35	2.0 / 341	Wind (47), traffic (42), TQ inaudible
H	5:01 am	45	35	1.1 / 19	Birds (42), traffic (38), wind (35), TQ inaudible

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	6:31 am	46	38	1.8 / 329	Traffic (42), birds (41), wind (37), TQ inaudible
B	6:23 am	48	42	1.8 / 329	Train (44), industrial noise (42), traffic (42), TQ inaudible
D	6:41 am	46	35	1.9 / 337	Traffic (43), wind (42), TQ inaudible
E	6:33 am	52	35	1.8 / 329	Cars (50), birds (44), wind (40), TQ inaudible
H	6:02 am	49	35	2.6 / 330	Birds (47), traffic (43), TQ inaudible

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	7:05 am	49	38	2.5 / 321	Dog (46), traffic (42), wind (41), trains (40), TQ inaudible
B	4:32 pm	57	36	3.1 / 258	Birds (55), traffic (48), wind (46), TQ inaudible
D	7:40 am	53	35	3.3 / 344	Traffic (52), birds (43), TQ inaudible
E	8:02 am	59	35	2.7 / 3232	Insects (57), traffic (48), wind (46), TQ inaudible
H	9:45 am	56	35	3.7 / 319	Birds (55), wind (45), TQ inaudible

Note: 1 See text description and analysis

Location	Start Time	Total noise dB(A) Leq	Criterion dB(A) Leq	Wind speed/ direction	Identified Noise Sources (Leq (15 min))
A	6:00 pm	44	37	2.6 / 264	Wind (41), traffic (39), TQ inaudible
B	6:01 pm	55	36	2.6 / 264	Traffic (51), wind (50), train (45), TQ inaudible
D	7:05 pm	54	35	2.1 / 272	Wind (52), traffic (48), TQ inaudible
E	6:36 pm	55	35	2.6 / 261	Traffic (54), domestic (42), TQ inaudible
H	7:41 pm	49	35	1.8 / 271	Birds (46), wind (45), TQ inaudible

The results shown in Tables 2 to 13 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.

Monitoring location EPL-B is situated close to 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 during this monitoring period.

When measuring noise at the EPL-B location, the noise emissions from the exiting quarry trucks (whilst on the private section of the access road) was measured and the worst case 15 minute Leq noise level calculated based on the time each truck was on the private road. The worst case calculated Leq level for the trucks is that shown for Location B in Tables 2 to 13.

At location EPL-D the acoustic environment is significantly influenced by noise from traffic on Rhondda Rd, trains and other industries within the vicinity. Noise emissions from the batching plant which is located adjacent to TQ contributed to the received noise during some monitoring periods.

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)** within the night-time period i.e. between the hours of 10 pm and 7 am, in accordance with *Condition L4.1* of EPL 536. 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.

The results of the sleep disturbance measurements are shown in **Tables 14 to 16**.

Location	Time	dB(A), L ₁ (1minute)	Wind speed/ direction	L _{A1} source	Identified Quarry Sources (L ₁ (1 min))
A	5:36 am	67	Calm	Birds	n/a
B	4:31 am	70	Calm	Traffic	n/a
D	4:30 am	68	Calm	Traffic	n/a
E	5:31 am	61	Calm	Birds	n/a
H	5:02 am	57	Calm	Birds	n/a

Table 15 Teralba Quarry (L1 (1min)) Noise Monitoring Results – 21 November 2018 (Night)					
Location	Time	dB(A), L1(1minute)	Wind speed/ direction	L _{A1} source	Identified Quarry Sources (L ₁ (1 min))
A	5:36 am	70	1.0 / 339	Birds	n/a
B	4:32 am	72	1.0 / 358	Traffic	n/a
D	4:30 am	60	1.0 / 358	Birds	n/a
E	5:30 am	58	1.0 / 339	Birds	n/a
H	5:02 am	61	2.0 / 357	Birds	n/a

Table 16 Teralba Quarry (L1 (1min)) Noise Monitoring Results – 22 November 2018 (Night)					
Location	Time	dB(A), L1(1minute)	Wind speed/ direction	L _{A1} source	Identified Quarry Sources (L ₁ (1 min))
A	5:37 am	68	2.0 / 341	Traffic	n/a
B	4:34 am	74	1.9 / 40	Traffic	n/a
D	4:30 am	58	1.9 / 40	Birds	n/a
E	5:32 am	55	2.0 / 341	Birds	n/a
H	5:01 am	64	1.1 / 19	Birds	n/a

As shown in Tables 14 to 16, during the night time measurement circuits the L1 (1 min) noise from TQ did not exceed 45 dB(A) at any monitoring location.

In summary the results of the noise monitoring programme have shown that the Teralba Quarry continues to operate within approved noise limits. No actions are recommended with respect to noise management at Teralba Quarry.

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.

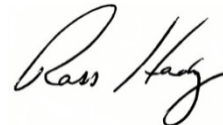
Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Author:

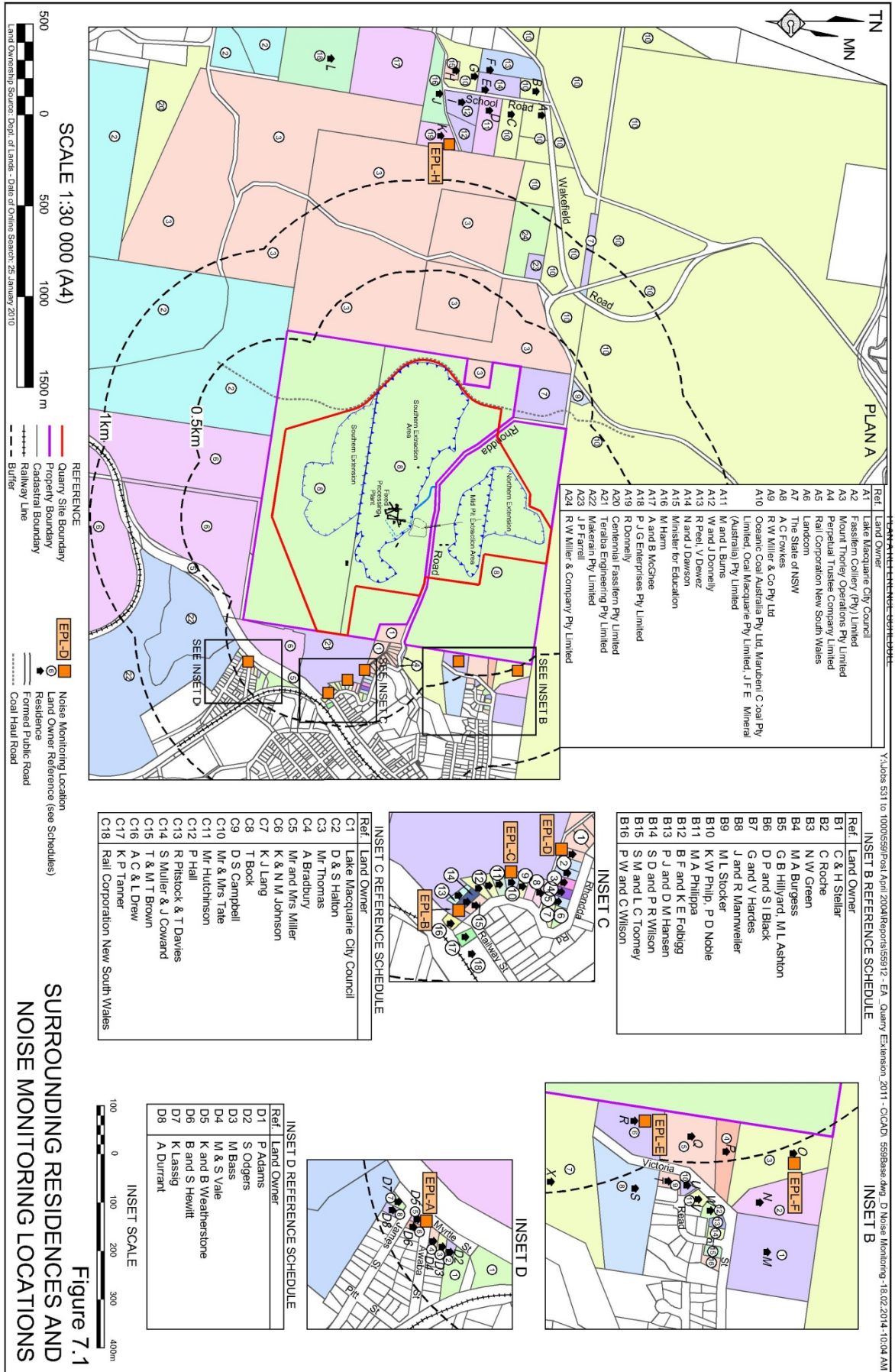


Neil Pennington MAIP, MAAS, MASA
Acoustical Consultant

Review:



Ross Hodge MAAS
Acoustical Consultant





Location EPL – B Modified noise monitoring location