Noise and Sound Services

Noise Compliance Report

At:-

Tomingley Gold Project
Tomingley, NSW 2869.

October 2014

Report No. nss22126 – Final

Prepared at the request of:-

Tomingley Gold Operations Pty Ltd
(A wholly owned subsidiary of Alkine Resources Ltd)
Tomingley West Road, Tomingley, NSW 2869

Prepared by:-

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C O N T E N T S

SUMMARY

A compliance noise survey, in line with the evening and night time NSW Environment Protection Authority (EPA) licence conditions has been carried out during the operational phase for the Tomingley Gold Project, in Tomingley, NSW 2869. The purpose of the survey is to carry out an independent and accurate assessment of the noise levels external to neighbouring residential dwellings and compare these to the EPA noise limits.

The residential areas have been assigned into 'Noise Assessment Groups' in the SLR Consulting Australia Pty Ltd Noise Report dated September 2011 (Report Number 10-791R1D10 Draft 10). The EPA day time noise limits ($L_{Aeq,\ 15\ minutes}$) as given in the Environment Protection Licence are between 36 dBA and 49 dBA.

To provide a good cross section of the Noise Assessment Groups, attended noise measurements were carried out at seven locations neighbouring the mine site over a three day period.

Naturally occurring environmental sound, such as dogs, cicadas, frogs and road traffic noise, particularly B-double trucks using the Newell Highway, was a major sound source in the area. This resulted in the measured sound pressure level ($L_{Aeq,\ 15\ minutes}$) exceeding the EPA noise limit for almost all of the evening and night time samples and all of the night time samples. The mine noise levels were below the EPA noise limits, with the exception of the following: 40 Myall Street during the evening and night time period.

At the measurement site **40 Myall Street,** Tomingley (Group C - R3) the energy average noise level is dominated by close road traffic using the Newell Highway. However on two of the three days of sample measurements the mine noise was clearly audible during road traffic lulls and was measured at 40 dBA to 51 dBA. These noise levels occurred regularly and often in any 15 minute period. However it was not possible to directly measure the 15 minute mine noise due to the frequent on-road truck movements using the Newell Highway (giving 59 dBA to 68 dBA). It has been established that mine noise exceeded the EPA noise limit at this location and hence mitigations are recommended. .

1. INTRODUCTION

Noise and Sound Services was requested by Tomingley Gold Operations Pty Ltd (a wholly owned subsidiary of Alkine Resources Ltd) of Tomingley West Road, Tomingley, NSW 2869 to carry out a compliance noise survey. The noise survey is in line with the NSW Environment Protection Authority (EPA) licence conditions during the operational phase for the Tomingley Gold Project.

The purpose of the survey is to carry out an independent and accurate assessment of mine noise levels external to neighbouring residential dwellings and compare these to the EPA noise limits.

2. SITE AND DEVELOPMENT DESCRIPTION

The Tomingley Gold Mine site is located in the central west slopes of NSW, immediately south of Tomingley Township, approximately 15 km north of the town of Peak Hill and approximately 53 km southwest of the town of Dubbo.

3. NOISE LIMITS

The residential areas have been previously grouped in the SLR Consulting Australia Pty Ltd Noise Report dated September 2011 (Report Number 10-791R1D10 Draft 10). These Noise Assessment Groups are:-

A. Ambient noise influenced by both local roads and the Newel Highway;
B. Rural setting noise with minimal traffic noise influence;
C. Ambient noise highly elevated due to the Newell Highway; and
D. Ambient noise elevated due to the Newell Highway.

The EPA noise limits are given in the Environment Protection Licence number 20169. The full noise limits are given in Appendix A below and relevant to the current measurements, are as shown Table 1 below:-

TABLE 1 - EPA NOISE LIMITS.

Noise Assessment Group	Day $L_{Aeq,\ 15\ minute}$ (dB)	Evening $L_{Aeq,\ 15\ minute}$ (dB)	Night $L_{Aeq,\ 15\ minute}$ (dB)	Night $L_{AF1,\ 1\ minute}$ (dB)
A (R6)	36	36	36	45
A (R5)	37	37	37	45
B	36	36	36	45
C (R3)	49	38	38	45
C (R29)	48	37	37	45
D	43	38	38	46

For the purpose of determining the noise generated at the neighbouring residential premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied to the noise level measured by the noise monitoring equipment.

4. NOISE MEASUREMENTS

To determine compliance with the EPA noise limits, attended noise measurements were carried out at the following seven locations:

- Group A - R5 – *"Rosewood'* off the Newell Highway past McNivens Lane - stud farm and residential home of Graham and Lynne Hando;
- Group A - R6 – *"Dunoon"* McNivens Lane, Tomingley – agricultural farm and residential home of Anne and Max McNiven;
- Group B - R2 – *"Lilyvale"* Tomingley West Road, Tomingley – sheep farm and residential home of Sally and Wes Bourchier;
- Group B – *"Ellerslie"* Thornycroft Road, Tomingley residential home of Gai Strahorn;
- Group C - R3 – 40 Myall Street, Tomingley - residential home of Christine Sonter;
- Group C - R29 – *"Budgerie"* Genangie Street Tomingley - residential home of Nigel and Brenda Harper; and
- Group D –7 Burrill Street Tomingley- residential home of Ben Rees.

4.1 Instrumentation

The instrumentation used during the noise source survey consisted of three Brüel and Kjær sound level meters model 2250 (serial numbers 2446904, 2449942 and 2685757). These meters conforms to Australian Standard AS IEC 61672.1-2004 : '*Electroacoustics - Sound level meters – Specifications*' as class 1 precision sound level meters and have accuracies suitable for both field and laboratory use. The calibration of the meters was checked before and after each of the measurement periods with three Brüel and Kjær acoustic calibrators model number 4231 (serial numbers 2385023, 2445349 and 268864). No significant system drift occurred over the measurement periods.

The sound level meters and calibrators were checked, adjusted and aligned to conform to the Brüel and Kjær factory specifications and issued with conformance certificates within the last 24 months as required by the regulations. The internal test equipment used is traceable to the National Measurement Laboratory at C.S.I.R.O., Lindfield, NSW, Australia.

4.2 Measurement Procedure

The acoustical measurements were carried out in accordance with the NSW Industrial Noise Policy (2000) and the Australian Standards AS 1055 '*Acoustics – Description and Measurement of Environmental Noise'*, (1997).

The evening and night time measurements are normally required to compare to the EPA noise limits. Sample noise measurements were carried out at each site. Where practicable these were for one hour in the evening time within the period from 6:00pm to 10:00pm and one hour in the night time from within the period 10:00pm to 01:00am. In some cases, adverse weather or extraneous noise prevented the full hour being measured.

The attended measurements were carried out from Monday 22 September 2014 to Wednesday 24 September 2014. The 'A' frequency weighting and 'fast' time weighting were used for each measurement.

The weather conditions were mostly clear sky (with occasional light cloud) cool to mild, 22°C at 6:00 pm to 12°C just after midnight. No rain was recorded for the first two days but rain prevented continuous measurements on Wednesday 24 September 2014. Mostly negligible winds (very still to 1.2 m/s) in the evening but easterly winds increased in the night time particularly in the elevated out-of-town areas (up to 4.0 m/s on occasions).

4.3 Measurement Results

This section gives the measured sound pressure level results in each area type as shown in Tables 2 to 6 below. The average noise energy level ($L_{Aeq,\ 15\ minute}$) represents the base descriptor and measurement period and is used for the EPA noise limit. This level is also often referred to as the 'ambient' noise level. The naturally occurring ambient noise level in any area is omnipresent and, in some cases, well above the mine noise limit set by the EPA. It is often difficult to distinguish between mine noise and naturally occurring ambient noise levels particularly where the mine noise is at a low level.

Environmental noise levels can naturally vary considerably with time; therefore it is not adequate to use a single number to fully describe the acoustic environment. The preferred, and now generally accepted, method of recording and presenting noise measurements is based upon a statistical approach. For example, the L_{AF10} noise level is the level exceeded for 10% of the time, and is approximately the average maximum noise level. The L_{AF50} noise level is the level exceeded for 50% of the time and is the numerical average of the decibels. The L_{AF90} level is the level that is exceeded for 90% of the time, and is considered to be approximately the average of the minimum noise level recorded. This level is

often referred to as the 'background' noise level. To set noise goals the 'background' noise level is measured without the source noise in operation.

TABLE 2 - MEASUREMENT RESULTS GROUP A - R5 *"Rosewood'*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
22/9/14	18:30 – 18:45	46	54	51	41	31
	18:45 – 19:00	43	52	47	39	31
	19:00 – 19:15	42	52	47	35	27
	19:15 – 19:30	43	53	47	37	26
22/9/14	22:00 – 22:15	49	58	54	45	34
	22:15 – 22:30	46	56	50	31	28
	22:30 – 22:45	45	53	49	41	36
	22:45 – 23:00	41	52	45	37	34
23/9/14	18:45 – 19:00	48	60	50	43	35
	19:00 – 19:15	46	55	51	40	33
	19:15 – 19:30	46	55	47	41	30
	19:30 – 19:45	43	54	37	35	28
23/9/14	22:00 – 22:15	44	54	48	37	30
	22:15 – 22:30	43	53	48	39	35
	22:30 – 22:45	45	55	49	42	37
	22:45 – 23:00	46	52	49	45	41
24/9/14	18:45 – 19:00	47	56	52	44	38
	Measurements stopped due to rain					
	19:35 – 19:50	46	55	51	41	36
	19:50 – 20:10	46	54	50	43	35
24/9/14	21:45 – 22:00	46	55	50	40	33
	22:00 – 22:15	45	56	49	39	34
	Rain					
	22:30 – 22:45	50	60	55	40	34
	22:45 – 23:00	48	58	52	41	36
	Measurements stopped due to rain					

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 3 - MEASUREMENT RESULTS GROUP A - R2 – *"Dunoon"*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
22/9/14	19:45 – 20:00	33	41	35	32	29
	20:00 – 20:15	34	39	36	33	30
	20:15 – 20:30	32	40	35	31	28
	20:30 – 20:15	34	38	36	33	31
22/9/14	23:00 – 23:15	37	42	39	37	34
	23:15 – 23:30	37	42	39	37	35
	23:30 – 23:45	37	41	39	35	34
	23:45 – 24:00	38	42	39	37	36
23/9/14	22:00 – 22:15	31	40	37	34	32
	22:15 – 22:30	31	38	36	34	32
	22:30 – 22:45	31	39	37	35	32
	22:45 – 23:00	31	42	38	35	33
23/9/14	23:00 – 23:15	38	42	40	38	36
	23:15 – 23:30	38	41	39	38	36
	23:30 – 23:45	38	42	40	38	36
	23:45 – 24:00	39	43	40	38	37
24/9/14	20:15 – 20:30	36	40	38	36	34
	20:30 – 20:45	38	41	39	37	36
	20:45 – 21:00	37	42	39	37	35
	21:00 – 21:15	37	41	39	37	35
24/9/14	Measurements stopped due to rain					

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 4 - MEASUREMENT RESULTS GROUP B - R2 – *"Lilyvale"*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
22/9/14	19:40 – 19:55	36	49	38	28	25
	Measurements stopped due to the arrival of the farmer truck, unloading sheep, dogs barking, etc					
22/9/14	23:00 – 23:15	35	43	37	32	30
	23:15 – 23:30	37	47	38	32	30
	23:30 – 23:45	36	40	34	31	28
	23:45 – 24:00	34	43	34	29	28
23/9/14	18:40 – 18:55	31	39	30	28	27
	18:55 – 19:10	33	42	30	28	26
	19:10 – 19:25	30	37	29	26	25
	19:25 – 19:40	33	45	31	27	25
23/9/14	23:00 – 23:15	38	51	36	31	29
	23:15 – 23:30	35	43	37	33	30
	23:30 – 23:45	33	40	35	31	30
	23:45 – 24:00	34	42	36	32	31
24/9/14	18:10 – 18:25	39	49	42	35	33
	Measurements stopped due to rain					
24/9/14	21:10 – 21:25	31	41	32	28	25
	21:25 – 21:50	32	43	33	27	25
	21:50 – 22:05	31	42	33	29	26
	Measurements stopped due to rain					

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 5 - MEASUREMENT RESULTS GROUP B – *"Ellerslie"*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
22/9/14	18:45 – 19:00	32	43	30	22	21
	19:00 – 19:15	25	33	26	21	19
22/9/14	21:45 – 22:00	30	40	30	26	23
	22:00 – 22:15	46	58	50	31	23
	22:15 – 22:30	36	43	38	31	27
23/9/14	20:00 – 20:15	23	36	25	22	21
	20:15 – 20:30	23	36	25	22	21
	20:30 – 20:45	22	37	24	21	20
	20:45 – 21:00	23	37	25	21	20
23/9/14	23:15 – 23:30	37	46	40	37	36
	Measurements stopped due to high wind					
24/9/14	19:30 – 19:45	39	49	35	33	32
	Measurements stopped due to rain					
24/9/14	22:10 – 22:25	33	41	35	32	30
	Measurements stopped due to rain					

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 6 - MEASUREMENT RESULTS GROUP C - R3 – 40 Myall Street

Date	Time (approximate)	Sound Pressure Level, 15 minutes (except when noted) (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
		Excluding On-Road Traffic				
22/9/14	20:10 – 20:25	46	51	49	46	44
	20:25 – 20:40	44	51	47	43	41
		Including On-Road Traffic				
	20:40 – 20:55	63	78	60	48	43
	20:55 – 22:10	62	77	60	52	48
		Excluding On-Road Traffic				
23/9/14	00:00 – 00:15	48	55	51	45	42
23/9/14	Short term samples of mine noise only from 21:00 to 21:50	Excluding On-Road Traffic				
		51	57	55	53	49
		48	50	49	48	46
		49	52	51	48	46
		50	55	52	50	47
		51	58	54	50	45
		Including On-Road Traffic				
23/9/14	23:30 – 23:45	62	76	56	43	37
	23:45 – 24:00	59	72	56	40	36
24/9/14	00:00 – 00:15	59	71	49	42	38
	00:15 – 00:40	61	71	53	40	36
		Excluding On-Road Traffic				
	00:40 – 00:55	40	48	44	38	34
		Including On-Road Traffic				
24/9/14	20:07 – 20:23	68	81	65	48	40
	20:23 – 20:37	62	77	56	38	29
	20:37 – 20:52	66	81	63	47	37
	20:52 – 21:09	67	81	65	48	41
		Including On-Road Traffic				
24/9/14	22:00 – 22:15	63	79	58	42	36
	22:15 – 22:30	65	79	61	37	29
	22:30 – 22:45	65	79	56	41	32
		Measurements stopped due to rain				

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **49 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **38 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **38 dBA**
Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 7 - MEASUREMENT RESULTS GROUP C - R29 – *"Budgerie*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
22/9/14	19:45 – 20:00	49	58	53	47	41
	20:00 – 20:15	43	50	47	41	37
	20:15 – 20:30	41	49	46	38	35
	20:30 – 20:45	46	53	50	44	38
22/9/14	23:15 – 23:30	44	49	47	43	39
	23:30 – 23:45	41	48	44	40	37
23/9/14	23:45 – 00:00	42	51	45	40	36
	00:00 – 00:15	45	54	46	41	36
23/9/14	20:10 – 20:25	45	51	48	44	40
	20:25 – 20:50	47	54	49	46	40
	20:50 – 21:05	46	52	49	45	42
	21:05 – 21:20	47	53	49	46	41
23/9/14	23:19 – 23:35	41	50	43	38	34
	23:35 – 23:50	40	49	44	36	33
24/9/14	23:50 – 00:15	41	51	45	36	33
	00:15 – 00:30	38	47	41	35	32
24/9/14	20:30 – 20:45	43	52	47	40	32
	20:45 – 21:00	45	54	49	43	34
	21:00 – 21:15	45	55	48	39	32
	21:15 – 21:30	45	52	49	42	29

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **48 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 8 - MEASUREMENT RESULTS GROUP D – 7 Burrill Street

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
22/9/14	18:45 – 19:00	45	53	48	44	40
	19:00 – 19:15	47	56	49	45	41
	19:15 – 19:30	44	51	47	43	40
22/9/14	22:00 – 22:15	50	57	53	48	45
	22:15 – 22:30	48	54	51	48	45
	22:30 – 22:45	50	56	53	48	45
	22:45 – 23:00	48	55	50	46	43
23/9/14	18:45 – 19:00	45	51	48	44	42
	19:00 – 19:15	45	51	48	44	39
	19:15 – 19:30	45	52	48	44	41
	19:30– 19:45	47	55	50	46	44
23/9/14	22:00 – 22:15	46	53	48	44	41
	22:15 – 22:30	46	53	49	44	41
	22:30 – 22:45	48	55	52	46	42
	22:45 – 23:00	46	55	49	44	39
24/9/14	19:30– 19:45	45	52	49	43	34
	19:50– 20:05	46	53	49	45	40
	20:05 – 20:23	66	81	63	45	36
		Measurements stopped due to barking dog and then rain				

Day time Noise Limit $L_{Aeq, 15\ minutes}$ **43 dBA**
Evening time Noise Limit $L_{Aeq, 15\ minutes}$ **38 dBA**
Night time Noise Limit $L_{Aeq, 15\ minutes}$ **38 dBA**
Night time Noise Limit $L_{AF1, 1\ minute}$ **46 dBA**

5. DISCUSSION

It can be seen that many of the measured sound pressure levels ($L_{Aeq, 15\ minutes}$) exceeded the EPA noise limits. However this was mainly due to naturally occurring ambient noise (environmental sound), predominantly trucks using the Newell Highway in areas close to the Highway and wind in the trees plus fauna noise in areas away from the Highway. Nevertheless there were areas where the EPA noise limits were exceeded due to mine noise alone. Each of the sample sites are considered in detail below. Adverse wind conditions and temperature inversions could increase the mine noise levels at residences but these conditions did not occur during this survey.

- At the measurement site Group A - R5 ***"Rosewood'*** off the Newell Highway past McNivens Lane - stud farm and residential home of Graham and Lynne Hando (Group A - R5), mine noise was audible during Newell Highway traffic lulls and low wind conditions. Traffic lulls and low wind conditions did not last for 15 minutes on any occasion; therefore it was not possible to directly measure the 15 minute energy average ($L_{Aeq, 15\ minute}$). However the mine noise was measured in short term energy averages ($L_{Aeq, short\ term}$). These did not exceed 35 dBA. Hence it is concluded that the noise due to the Tomingley Gold Mine project did not exceed the EPA noise limit at any time during the monitoring at this location.

- At the measurement site Group B - R6 ***"Dunoon"*** McNivens Lane, Tomingley – agricultural farm and residential home of Anne and Max McNiven, mine noise was just audible on a few occasions. The sound pressure level was generated by wind in the trees, and distant road traffic. Traffic lulls and low wind conditions did last for 15 minutes on occasions and the mine noise did not exceed 34 dBA as shown in Table 3 above. Hence the noise due to the Tomingley Gold Mine project did not exceed the EPA noise limit at any time during the monitoring at this location.

- At the measurement site Group B - R2 **"Lilyvale"** Tomingley West Road**,** Tomingley – sheep farm and residential home of Sally and Wes Bourchier mine noise was audible and it was possible, on occasions, to directly measure the 15 minute energy average ($L_{Aeq, 15\ minute}$) mine noise. This was between 30 dBA and 35 dBA as shown in Table 4 above. Where noise levels exceeding 35 dBA were measured it was due to extraneous noise and not mine noise. Hence the noise due to the Tomingley Gold Mine project did not exceed the EPA noise limit at any time during the monitoring at this location.

- At the measurement site Group C - R3 **40 Myall Street,** Tomingley - residential home of Christine Sonter, the noise level is dominated by close road traffic using the Newell Highway (approximately 12 metres from the boundary of the house to the kerb). The lights from the mine plant were partly visible through the trees at this location and the closest point of mine activity was estimated to be at 400 metres. Mine noise was audible and measurable during road traffic lulls on the evening and night-time of 22 September 2014 and early night time of 24 September 2014, clearly audible and measurable during road traffic lulls on the evening and night time of 23 September 2014 and inaudible on the evening time of 24 September 2014.

The mine alone noise levels ($L_{Aeq,\ 15\ minute}$) including the metal to metal impacts of the drill rigs and mine trucks were 44 dBA to 46 dBA on the 22 September 2014 and ($L_{Aeq,\ sample}$) 48 dBA to 51 dBA on the 23 September 2014. This exceeds the EPA noise limit of 38 dBA by at least 6 dB.

- The measurement site Group C - R29 ***"Budgerie"*** Genangie Street**,** Tomingley - residential home of Nigel and Brenda Harper is close to road traffic noise using the Newell Highway and a truck stop is approximately 100 metres to the west of the property boundary. The lights from the mine plant were clearly visible and estimated to be working at 800 metres from the property. The sound pressure level was mainly generated by road traffic using the Newell Highway, trucks with reversing alarms using the truck stop, occasional dog barking and fauna. However the mine noise was audible on occasions. The noise was possibly the metal to metal impacts of the drill rigs and mine trucks. Here the estimated mine noise was 34 to 36 dBA just below the EPA noise limit of 37 dBA.

- At the measurement site Group D **7 Burrill Street,** Tomingley- residential home of Ben Rees, the mine plant is not visible. The mine plant noise was audible during road traffic lulls and the estimated mine noise was 34 to 36 dBA, just below the EPA noise limit of 38 dBA. The measured sound pressure level was generated mainly by road traffic using the Newell Highway, a pump at a residential premise, dog barking and fauna.

6. CONCLUSIONS

The noise from plant and equipment operating during the three day measurement period of 22nd to 24th September 2014 did not exceed the EPA noise limits as given in the Environment Protection Licence at six of the seven monitoring locations.

The exception is at **40 Myall Street,** Tomingley (Group C - R3), where the mine noise was considerably below the noise from on road trucks using the Newell Highway but could be measured during traffic lulls. The mine noise evening and night time exceeded the EPA noise limit of 38 dBA by at least 6 dB.

Adverse wind conditions and temperature inversions could increase the mine noise levels at residences but these conditions did not occur during this survey.

Status	Date	Prepared by:
Draft	5th October 2014	Ken Scannell MSc MAAS MIOA.
Status	**Date**	**Checked by:**
Draft	7th October 2014	Shaun Luttrell B.Com.
Status	**Date**	Issued By
Final	9th October 2014	Ken Scannell MSc MAAS MIOA.

Important Note. *All products and materials suggested by 'Noise and Sound Services' are selected for their acoustical properties only. All other properties such as airflow, aesthetics, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, grout or tile cracking, loading, shrinkage, ventilation, etc are outside of 'Noise and Sound Services' field of expertise and* ***must be*** *checked with the supplier or suitably qualified specialist before purchase.*

APPENDIX A – EPA NOISE LIMITS

Limit conditions: Noise generated at the premises must not exceed the noise limits in the table below. The location groups referred to in the tables below are indicated by Table 4 of *'Tomingley Gold Project – Noise and Blasting Assessment'* (NBA) prepared by SLR Consulting dated September 2011 (Report Number 10-7910R1D10 Draft 10).

TABLE A1 - EPA NOISE LIMITS.

Noise Assessment Group	Day $L_{Aeq, 15\ minute}$ (dB)	Evening $L_{Aeq, 15\ minute}$ (dB)	Night $L_{Aeq, 15\ minute}$ (dB)	Night $L_{AF1, 1\ minute}$ (dB)
A (R6)	36	36	36	45
A (R5)	37	37	37	45
A (all other receivers)	35	35	35	45
B (all receivers)	36	36	36	45
C (R3)	49	38	38	45
C (R29)	48	37	37	45
C (all other receivers)	46	37	37	45
D (all receivers)	43	38	38	46
All other residential receivers	35	35	35	45

APPENDIX B – GLOSSARY OF TECHNICAL TERMS

'A' Frequency Weighting – The most widely used sound level frequency filter is the A scale, which roughly corresponds to the inverse of the 40 dB (at 1 kHz) equal-loudness curve. Using this filter, the sound level meter is less sensitive to very high and, in particular, very low frequencies. Sound pressure level measurements made with this filter are commonly expressed as **dBA.**

Ambient Sound – The all-encompassing sound associated with that environment being a composite of sounds from many sources, near and far.

Decibel (dB) – The logarithmic ratio of any two quantities and relates to the flow of energy (power). Scale used for acoustic measurement related to power, pressure and intensity. Expressed in dB, relative to standard reference levels.

Energy Average Levels ($L_{Aeq, T}$). The L_{Aeq} level represents the average noise energy during the measurement period (T). This level is used to describe the source noise and when the source noise is not present it is used to describe the 'ambient' noise level.

'Fast' Time Weighting – The root-mean-squared energy averaging of the sound pressure with time. 'Fast' time weighting is 125 milliseconds.

Percentile Levels (L_{AF1}, L_{AF10}, L_{AF90}) - Environmental noise levels can vary considerably with time; therefore it is not adequate to use a single number to fully describe the acoustic environment. The preferred, and now generally accepted, method of recording and presenting noise measurements is based upon a statistical approach. For example, the L_{AF1} noise level is the 'A' frequency weighted and 'fast' time weighted level exceeded for 1% of the measurement time, and is approximately the maximum noise level. The L_{AF10} noise level is the 'A' frequency weighted and 'fast' time weighted level exceeded for 10% of the time, and is approximately the average maximum noise level. The L_{AF90} level is the level that is exceeded for 90% of the time, and is considered to be approximately the average of the minimum noise level recorded. This level is often referred to as the 'background' noise level.

Sound Power - Sound power is the energy rate - the energy of sound per unit of time (J/s, Watts in SI-units) from a sound source.

Sound Power Level (L_W) – Sound power level is a logarithmic measure of the sound power in comparison to a specified reference level (10^{-12} Watts). The unit less decibel term is a measure of the sound emission of a source independent of distance. When 'A' frequency weighted the symbol becomes **L_{WA}.**

Sound Pressure - Sound Pressure is the force (N) of sound on a surface area (m^2) perpendicular to the direction of the sound. The SI-units for the Sound Pressure are N/m^2 or Pa.

Sound Pressure Level (L_p) - Sound pressure level is a logarithmic measure of the square of the sound pressure in comparison to a specified reference level (20 μPa). The unit less decibel term is a measure of the sound immission of a source at a specified distance. When 'A' frequency weighted the symbol becomes $\mathbf{L_{PA}}$.