Noise and Sound Services

Construction Noise Compliance Report

At:-

Tomingley Gold Project
Tomingley, NSW 2869.

September 2013

Report No. nss21987 – Final

Prepared at the request of:-

Tomingley Gold Operations Pty Ltd
(A wholly owned subsidiary of Alkine Resources Ltd)
Level 2, 21 Church Street
Dubbo NSW 2830

Prepared by:-

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SUMMARY

A compliance noise survey, in line with the NSW Environment Protection Authority (EPA) licence conditions has been carried out during the construction 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 construction 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 six locations neighbouring the construction site over a three day period.

Naturally occurring environmental sound, such as bird song 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 day time samples and all of the night time samples. The construction noise levels were below the EPA noise limits, with the exception of the following: 40 Myall Street during the day and night time period and Ben Rees house during the day and night time period. These exceedences were due to revering alarms.

At the measurement site **40 Myall Street,** Tomingley (Group C - R3) the noise level is dominated by close road traffic using the Newell Highway and the construction plant tonal reversing alarms were clearly audible only during road traffic lulls and were measured at 45 dBA. These noise levels occur regularly and often in any 15 minute period. However it is not possible to directly measure the 15 minute construction noise due to the frequent truck movements (giving circa 68 dBA). Applying the 5 dB modification factor for tonality the modified noise level is 50 dBA. It is estimated that the construction plant reversing alarms exceed the EPA noise limit and hence modifications are recommended.

Although all plant and machinery must be used in a safe manner, tonal reversing alarms should not be used due to the long distances the sound travels. Therefore alternative systems of work, for reversing which are safe for employees and fully comply with NSW Work Health and Safety Act 2011, should be found.

1. INTRODUCTION

Noise and Sound Services was requested by Tomingley Gold Operations Pty Ltd (a wholly owned subsidiary of Alkine Resources Ltd) of Level 2, 21 Church Street, Dubbo NSW 2830 to carry out a compliance noise survey. The noise survey is in line with the NSW Environment Protection Authority (EPA) licence conditions during the construction phase for the Tomingley Gold Project in the region of Tomingley NSW 2869.

The purpose of the survey is to carry out an independent and accurate assessment of construction 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 Newel Highway; and
D. Ambient noise elevated due to the Newel Highway.

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

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).

Day, evening and night time measurements are normally required to compare to the EPA noise limits. However for this survey the construction works were only in operation from approximately 6:00 am to 6:00 pm. Hence sample noise measurements at each site were carried out for 1.5 hours in the day time and 30 minutes from 6:00 am to 7:00 am (defined as night time).

The attended measurements were carried out on from 11:30 am on Monday 2 September 2013 to 7:00 am on Thursday 5 September 2013. The 'A' frequency weighting and 'fast' time weighting were used for each measurement. The 1/3 octave band frequency analysis was also stored in the meter memory for each measurement.

The weather conditions were mostly clear sky (with occasional light cloud) cool to warm 8°C at 6: 00 pm to 27°C just after midday. No rain at any time. Mostly negligible winds (up to 1.2 m/s) apart from a light occasional breeze up to 3.8 m/s on Tuesday 3rd September and Wednesday 4th September which were southerly up to 4.5 m/s.

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 L_{Aeq} level represents the average noise energy during the measurement period and is the base descriptor for the EPA noise limit. This level is also often referred to as the 'ambient' noise level**. None of the 15 minute sound pressure levels given in Tables 2 to 6 below where significantly (greater than 0.5 dB) influence by the Tomingley Gold Mine project.**

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_{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

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
2/9/13	13:10 – 13:25	50	62	51	43	35
	13:25 – 13:40	48	60	50	41	34
	13:40 – 13:55	47	60	48	40	34
	13:55 – 14:10	46	56	47	41	34
	14:10 – 14:25	49	61	51	43	36
	14:25 – 14:40	49	61	52	44	38
3/9/13	07:45 – 08:00	49	61	51	42	36
	08:00 – 08:15	49	60	49	42	37
	08:15 – 08:30	50	62	53	41	37
	08:30 – 08:45	48	61	50	44	39
	08:45 – 09:00	51	63	55	43	38
	09:00 – 09:15	50	61	54	45	35
4/9/13	07:25 – 07:35	50	59	51	45	41
	07:35 – 07:50	50	59	52	47	43
	07:50 – 08:05	51	63	53	46	42
	08:05 – 08:20	51	59	54	48	43
	08:20 – 08:35	51	61	54	48	43
	08:35– 08:50	50	59	53	48	43
5/9/13	06:00 – 06:15	55	67	57	48	37
	06:15 – 06:30	53	63	55	48	38
	06:30 – 06:45	53	64	55	49	39
	06:45 – 07:00	54	63	57	51	43

Day 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 3 - MEASUREMENT RESULTS GROUP B – R2

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
2/9/13	11:30 – 11:45	36	46	39	33	28
	11:45 – 12:00	36	48	39	31	27
	12:00 – 12:15	42	54	42	32	27
	12:15 – 12:30	36	46	38	30	25
	12:30 – 12:45	32	45	33	26	23
	12:45 – 13:00	42	54	37	26	22
3/9/13	07:45 – 08:00	43	52	44	40	38
	08:00 – 08:15	43	51	43	39	37
	08:15 – 08:30	41	49	43	38	36
	08:30 – 08:45	44	57	45	38	36
	08:45 – 09:00	45	51	48	44	38
	09:00 – 09:15	47	56	50	43	38
4/9/13	09:00 – 09:15	45	56	47	42	38
	09:15 – 09:30	43	50	46	41	37
	09:30 – 09:45	42	49	45	41	37
	09:45 – 10:00	43	52	45	41	37
	10:00 – 10:15	44	56	46	38	36
	10:15 – 10:30	42	49	44	39	35
5/9/13	06:00 – 06:15	42	54	46	36	30
	06:15 – 06:30	40	51	41	32	28
	06:30 – 06:45	43	53	44	34	28
	06:45 – 07:00	47	60	47	36	31

Day 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 – R6

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
2/9/13	11:30 – 11:45	37	47	40	30	26
	11:45 – 12:00	35	46	38	30	25
	12:00 – 12:15	43	54	39	29	24
	12:15 – 12:30	32	41	35	28	23
	12:30 – 12:45	32	43	35	27	23
	12:45 – 13:00	34	43	37	30	24
3/9/13	09:30 – 09:45	41	48	44	40	37
	09:45 – 10:00	41	51	41	38	35
	10:00 – 10:15	43	47	45	42	40
	10:15 – 10:30	45	51	48	45	42
	10:30 – 10:45	43	52	46	41	38
	10:45 – 11:00	43	52	45	41	39
4/9/13	09:00 – 09:15	43	49	46	42	40
	09:15 – 09:30	44	52	45	42	40
	09:30 – 09:45	44	53	45	42	38
	09:45 – 10:00	50	56	45	41	39
	10:00 – 10:15	40	46	41	40	38
	10:15 – 10:30	40	46	42	39	35
3/9/13	06:00 – 06:15	42	54	44	40	35
	06:15 – 06:30	43	52	44	39	35
	06:30 – 06:45	41	51	43	38	35
	06:45 – 07:00	45	55	45	37	34

Day 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 C – R3

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
2/9/13	11:00 – 11:15	67	79	72	56	47
	11:15 – 11:30	66	78	70	56	47
	11:30 – 11:45	66	78	70	54	44
	11:45 – 12:00	66	78	70	54	44
	12:00 – 12:15	66	78	70	52	42
	12:15 – 12:30	68	80	71	52	41
3/9/13	11:15 – 11:30	66	78	70	53	46
	11:30 – 11:45	67	79	71	52	45
	11:45 – 12:00	66	78	70	53	47
	12:00 – 12:15	65	77	70	54	45
	12:15 – 12:30	66	78	69	54	46
	12:30 – 12:45	67	78	71	55	48
4/9/13	11:00 – 11:15	67	79	72	56	47
	11:15 – 11:30	66	78	70	56	47
	11:30 – 11:45	66	78	70	54	44
	11:45 – 12:00	66	78	70	54	44
	12:00 – 12:15	66	78	70	52	42
	12:15 – 12:30	68	80	71	52	41
4/9/13	06:00 – 06:15	66	80	67	52	44
	06:15 – 06:30	63	77	65	51	43
	06:30 – 06:45	64	77	67	53	42
	06:45 – 07:00	64	77	67	54	47

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

TABLE 6 - MEASUREMENT RESULTS GROUP C - R29

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
2/9/13	13:15 – 13:30	45	55	49	41	36
	13:30 – 13:45	45	54	49	42	35
	13:45 – 14:00	44	55	46	40	35
	14:00 – 14:15	44	52	47	41	36
	14:15 – 14:30	44	54	46	42	39
	14:30 – 14:45	46	54	48	44	40
3/9/13	11:15 – 11:30	46	55	49	42	38
	11:30 – 11:45	45	57	47	42	36
	11:45 – 12:00	45	53	48	42	38
	12:00 – 12:15	46	55	48	43	39
	12:15 – 12:30	46	56	49	44	40
	12:30 – 12:45	48	59	50	45	41
4/9/13	10:45 – 11:00	57	57	51	46	43
	11:00 – 11:15	52	60	54	50	48
	11:15 – 11:30	51	59	53	47	44
	11:30 – 11:45	51	61	52	47	45
	11:45 – 12:00	49	58	51	47	44
	12:00 – 12:15	49	57	521	47	44
4/9/13	06:00 – 06:15	51	64	52	45	40
	06:15 – 06:30	48	58	52	45	40
	06:30 – 06:45	51	61	55	45	37
	06:45 – 07:00	51	61	54	47	43

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

TABLE 7 - 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}
2/9/13	14:55 – 15:10	42	49	45	40	35
	15:10 – 15:25	40	48	42	38	35
	15:25 – 15:40	45	55	46	41	39
	15:40 – 15:55	41	50	44	38	35
	15:55 – 16:10	42	53	44	39	36
	16:10 – 16:25	43	49	45	41	38
3/9/13	11:15 – 11:30	51	56	53	50	48
	11:30 – 11:45	50	55	52	49	46
	11:45 – 12:00	49	55	52	48	45
	12:00 – 12:15	49	55	51	47	45
	12:15 – 12:30	47	55	51	48	45
	12:30 – 12:45	48	52	49	46	43
4/9/13	07:15 – 07:30	48	55	51	47	45
	07:30 – 07:45	48	54	51	47	45
	07:45 – 08:00	47	54	49	46	44
	08:00 – 08:15	52	63	54	47	43
	08:15 – 08:30	48	57	50	47	44
	08:30 – 09:00	49	54	51	48	45
4/9/13	06:00 – 06:15	48	57	51	46	43
	06:15 – 06:30	49	57	52	46	42
	06:30 – 06:45	49	56	51	48	45
	06:45 – 07:00	50	57	52	49	46

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **43 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 the measured sound pressure levels ($L_{Aeq,\ 15\ minutes}$) exceeded the EPA noise limits for almost all of the day time samples and all of the night time samples. However this was mainly due to naturally occurring environmental sound, predominantly bird song, which is prolific in all measurement areas (which typically reach 70 dBA in short bursts). This was so plentiful it was not possible to totally isolate bird sound from the measurement results. Noise from trucks using the Newell Highway was also a major sound source.

At the measurement site ***"Rosewood'*** off the Newell Highway past McNivens Lane - stud farm and residential home of Graham and Lynne Hando (Group A -

R5), no construction noise was audible on any occasion. The sound pressure levels were generated by bird song, wind in the trees and distant road traffic using the Newell Highway. Hence the noise due to the Tomingley Gold Mine project did not exceeded the EPA noise limit at any time during the monitoring at this location.

At the measurement **site "Lilyvale" Tomingley West Road,** Tomingley – sheep farm and residential home of Sally and Wes Bourchier (Group B - R2) no construction noise was audible on any occasion. The sound pressure level was generated by bird song, sheep, wind in the trees and very occasional road traffic using Tomingley West Road. The entrance road to the mine is visible at approximately 1.6 km to the east of the site and light vehicles were seen to be using the road but they were inaudible. Hence the noise due to the Tomingley Gold Mine project did not exceeded the EPA noise limit at any time during the monitoring at this location.

At the measurement site ***"Dunoon"*** **McNivens Lane**, Tomingley – agricultural farm and residential home of Anne and Max McNiven (Group B - R6), no construction noise was audible on any occasion. The sound pressure level was generated by bird song, wind in the trees, and very occasional farm road traffic using McNivens Lane. Hence the noise due to the Tomingley Gold Mine project did not exceeded the EPA noise limit at any time during the monitoring at this location.

At the measurement site **40 Myall Street,** Tomingley - residential home of Christine Sonter (Group C - R3), 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). A night time (06:00 to 07:00 hours) road traffic count was carried out giving 104 vehicles passing the house with 38% heavy traffic (mainly B-Doubles). On average one truck passed the house every minute. The construction plant is partly visible through the trees at this location and estimated to be at 150 metres.

Occasional short-term construction noise was audible and measurable during road traffic lulls. These were 41 dBA to 42 dBA. These noise levels only occur for a short time in any 15 minute period. If they occur for (say) 5 minutes in any 15 minute period, they would meet the day and night time (38 dBA) noise limit (from $38 = 42 - 10 \log_{10} (15/5)$ dBA). The construction plant tonal (1.25 kHz) reversing alarms were clearly audible during road traffic lulls and were measured at 45 dBA. These noise levels occur regularly and often in any 15 minute period. However it is not possible to directly measure the 15 minute construction noise due to the frequent truck movements. Applying the 5 dB modification factor for tonality as given in Section 4 of the NSW Industrial Noise Policy, the modified noise level is 50 dBA. It is estimated that the construction plant reversing alarms exceed the EPA night time noise limit (and marginally the day time limit) and hence

modifications are recommended. Although all plant and machinery must be used in a safe manner, tonal reversing alarms should not be used due to the long distances the sound travels. Therefore alternative systems of work, for reversing which are safe for employees and fully comply with NSW Work Health and Safety Act 2011, should be found.

The measurement site ***"Budgerie"*** **Genangie Street,** Tomingley - residential home of Nigel and Brenda Harper (Group C - R29) 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 construction plant is clearly visible and estimated to be working at 350 metres from the property. No construction plant noise was audible except for reversing alarms which were only just audible during road traffic lulls but not measureable. The sound pressure level was generated by road traffic using the Newell Highway, trucks with reversing alarms using the truck stop and bird song. Hence the noise due to the Tomingley Gold Mine project did not exceeded the EPA noise limit at any time during the monitoring at this location.

At the measurement site **7 Burrill Street** Tomingley- residential home of Ben Rees (Group D), the construction plant is not visible but estimated to be at 450 metres from the property. No construction plant noise was audible except for reversing alarms which were only audible during road traffic lulls but not measureable. The sound pressure level was generated by road traffic using the Newell Highway, power tools and radio from the neighbouring kitchen manufacturing facility dog barking and bird song. Reversing alarms were clearly audible during road traffic and bird song lulls and were measured at 42 dBA. These noise levels occur regularly and often in any 15 minute period. However it is not possible to directly measure the 15 minute construction noise due to the frequent truck movements. In addition, reversing alarms were also clearly audible (and generally louder and similar tone) from the truck parks situated on the Newell Highway at approximately 200 metres and 280 metres from the boundary of 7 Burrill Street. Therefore it is not conclusive that the reversing alarms from the construction at Tomingley Gold Mine site alone exceed to EPA licence noise limits. However as modifications are already recommended for the Tomingley Gold Mine site construction reversing alarms at the 40 Myall Street site any possible exceedences will be eliminated at 7 Burrill Street.

6. CONCLUSIONS

The noise from construction plant operating during the three day measurement period of 2nd to 5th September 2013 did not exceed the EPA noise limits as given in the Environment Protection Licence.

The exception is for construction plant tonal reversing alarms at the close residential dwelling to the construction site (estimated to be at 150 metres). At this site, **40 Myall Street,** Tomingley (Group C - R3), the construction plant noise was considerably below the noise from trucks and could only be briefly measured during traffic lulls. Based on calculated noise levels the tonal reversing alarms did exceed the EPA noise limit for night time and marginally at day time.

Status	Date	Prepared by:
Draft	13th September 2013	Ken Scannell MSc MAAS MIOA.
Final	18th September 2013	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 refer 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 $\mathbf{L_{PA}}$.