

SOUTHERN HIGHLANDS REGIONAL SHOOTING
COMPLEX
COMPLIANCE NOISE MONITORING FEBRUARY 2020

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

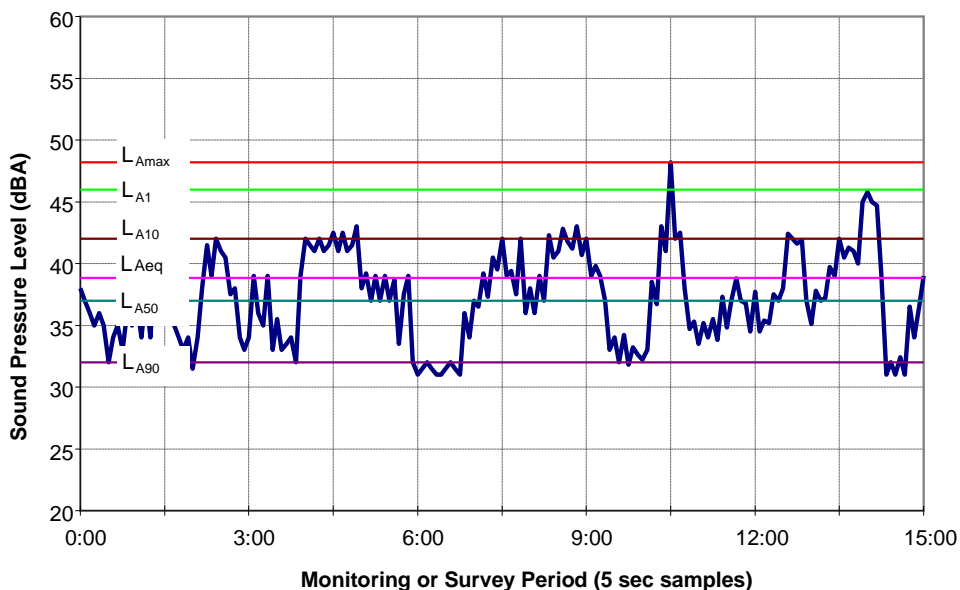
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

This report summarises the results of the attended compliance noise monitoring of the Southern Highlands Regional Shooting Complex (SHRSC), completed on 23 February 2020.

As part of its Conditions of Approval (MP 06_0232 MOD 5), the SHRSC must complete attended noise monitoring quarterly in the first 12 months of operation of annually thereafter. This report has been prepared for the fourth quarterly compliance monitoring session of the 50m and 500m ranges. Due to fire damage from recent bushfires, the 800m range was closed and was not in operation on the day of monitoring.

Noise compliance was determined based on the methodology outlined in the NSW EPA document "*Target Shooting Ranges: Application Note for Assessing Noise Compliance*" (EPA Application Note).

Condition A9 also stipulates the Firearm Noise Limits and states the following:

The noise from firearms or use of the site must not exceed LZpeak 75dB at the following locations:

- a) At the south-western end of Rocky Waterholes Road, Hill Top (representing residences at 1, 2 and 4 Rocky Waterholes Road); and*
- b) At Nattai Road, Hill Top, adjacent to the western entrance to the Wattle Ridge Farm (representing the existing residence).*

The assessment of noise compliance from the Southern Highlands Regional Complex shall be undertaken in accordance with the EPA's Target Shooting Ranges: Application Note for Assessing Noise Compliance (2015).

NSW Planning & Environment has reviewed previous compliance reports and has requested additional detail be included in the reports moving forward. Details which are to be included are as follows:

- Details of the types of firearms used on the ranges;
- Measurements of wind speed and direction on the ranges;
- Placement of a logger near the back of the firing range to record the number and time of shots; and
- The preparation of an improved project specific proforma report.

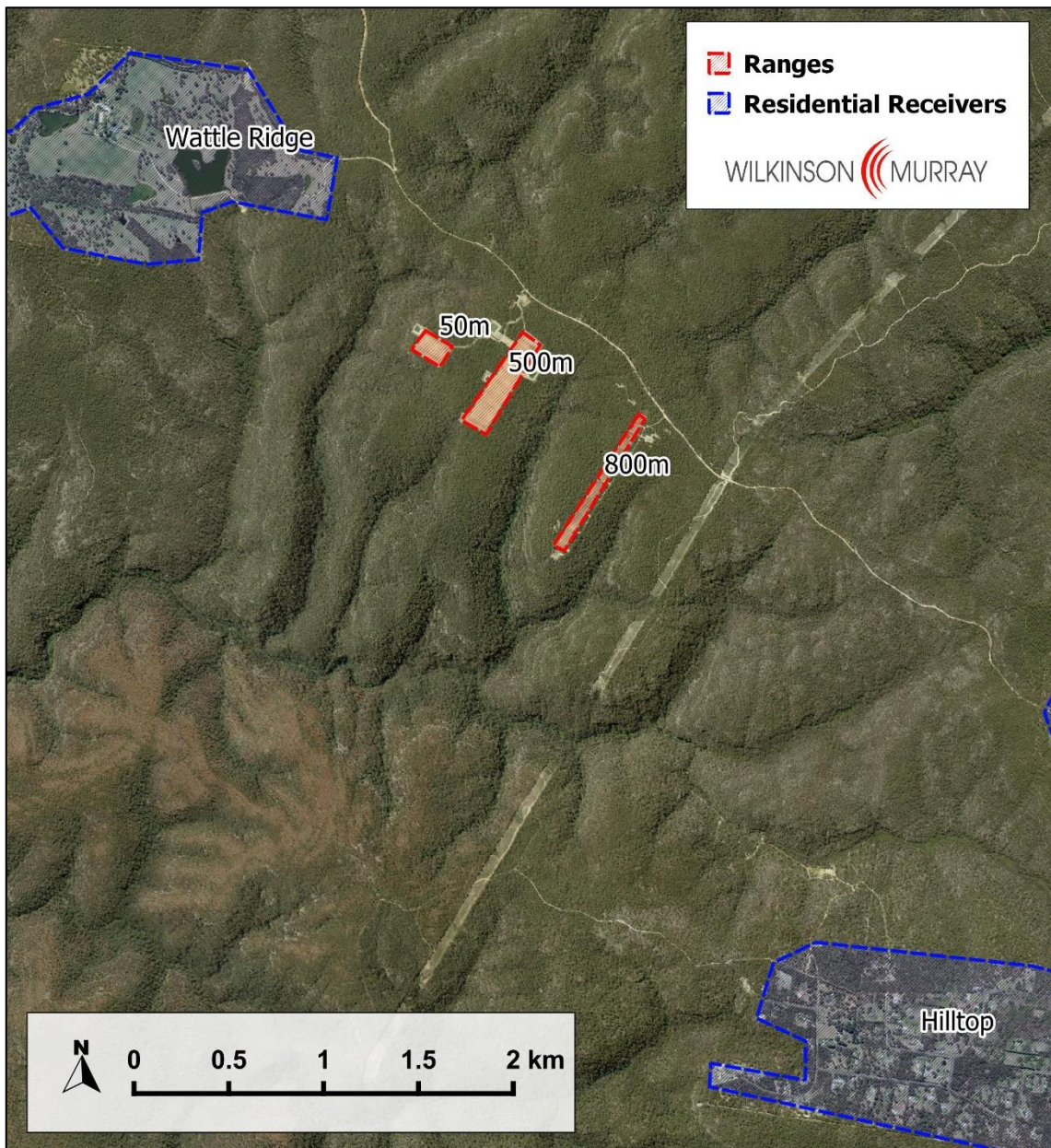
These items have been addressed in the report

2 SITE DESCRIPTION

The SHRSC is located on Wattle Ridge Road, Hilltop, NSW. The complex is situated within the Nattai National Park. The complex currently consists of a 50m range, a 500m range, and an 800m range. The range currently only operates on weekends between 10.00am and 5.00pm.

The nearest residential receivers include Wattle Ridge Farm, located approximately 2.5km to the north-west, and Hilltop township located approximately 3km to the south-east. No notable topographical shielding is present between the range and receivers.

Figure 2-1 Site Overview and Nearest Receivers



3 NOISE ASSESSMENT

3.1 Methodology

Attended monitoring was completed on 23 February 2020. On the day of monitoring, the 50m and 500m were scheduled for use. **Table 3-1** summarises the monitoring periods and active ranges for each period. **Table 3-1** also provides information relating to the firing distance and calibre of ammunition used on each of the ranges. This information was collected by and provided by the Office of Sport.

Table 3-1 Monitoring Periods and Range Use

Time	500m	50m
10.40am – 11.40am	Big Game Shoot .17 HMR, .22, .308, 7.65mm, .357	Service Pistol/SSAA BR30 0.32-9mm/.22LR

Measurements were conducted using a Brüel & Kjær 2250 and an NTI XL2 sound level meter. Both meters conform to Australian Standard 1259 *Acoustics – Sound Level Meters* as a Type 1 Precision Sound Level Meter which has an accuracy suitable for field and laboratory use. The calibration of the meters was checked before and after the measurements with a Brüel & Kjær Type 4231 sound level calibrator and no significant drift was noted. An ARL NGARA sound level meter was also set up for logging at the two assessment locations. These loggers were set up approximately 15m from the operator attended location to minimise extraneous noise.

All equipment has been laboratory calibrated within the previous two years in accordance with our in-house Quality Assurance Procedures.

Both meters were set to measure L_{zPeak} levels in accordance with EPA’s Application. Noise compliance was determined by the manual method described in the Application note. Unattended noise monitors were also installed near the attended noise monitoring locations to record shots in case further post processing is required.

Noise monitoring locations were selected to be consistent with Condition A9 of the Consent Conditions. ARL Ngaras were also installed at the rear of the two ranges to allow confirmation of the timing and number of shots fired from each range.

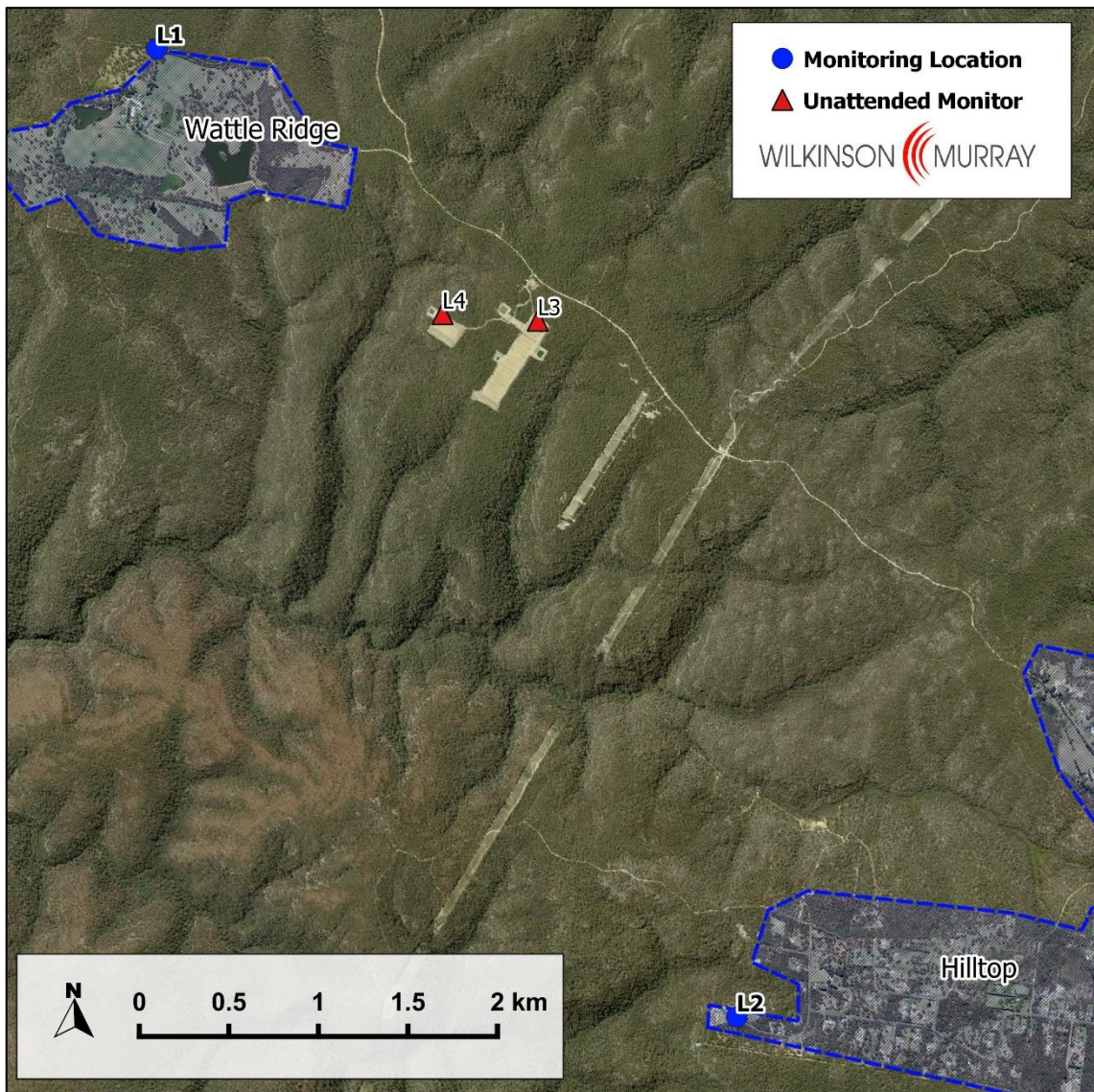
A Davis Vantage Pro2 weather station was installed on the 50m range (L4). Regular attended wind measurements were also conducted at both monitoring locations with handheld anemometers.

Figure 3-1 presents monitoring locations relative to the site and receivers and **Table 3-2** summarises the attended monitoring information. Photos of the monitoring set up are shown in **Appendix B**.

Table 3-2 Summary of Monitoring Setup

Location No.	Location	Equipment	SN
L1	Wattle Ridge Farm	ARL Ngara	8780F9
		Brüel & Kjær 2250	3008381
		Windmate WM-200	10783
L2	Rocky Waterhole	ARL Ngara	8780FA
		NTI XL2	A2A-16735-E0
		Digitech QM1642	08068830
L3	500m Range	ARL Ngara	8780F2
L4	50m Range	ARL Ngara	8780FC

Figure 3-1 Noise Monitoring Locations



3.2 Noise Monitoring Results and Discussion

Table 3-3 summarises monitoring results from both monitoring sessions and **Table 3-4** summarises the number of shots measured on range during the monitoring period. The recorded noise levels at the assessment location are presented in **Appendix A**

Table 3-3 Receiver Noise Monitoring Results – L_{zPeak} dB

Location	No. of Shots Measured	Category		Arithmetic Average
		A	B	
L1 Wattle Ridge	51	28	23	67
L2 Rocky Waterhole	30	16	14	65

Table 3-4 Number of Shots on Range (Range Noise Monitoring)

Range	Number of Shots
500m Range	224
50m Range	316

Note: **Appendix C** presents time splices for each of the on-range noise monitors.

The on-range weather station recorded average wind speeds of 0.5 – 2m/s in a north easterly direction. Additionally, wind measurements at both monitoring locations ranged between 0 – 2m/s with peaks of 3m/s in a north easterly direction. On this basis, wind conditions on the day were suitable for noise monitoring as wind speeds at microphone height was less than 5m/s, as recommended in the NSW EPA's *Noise Policy for Industry*.

At the Rocky Waterhole monitoring location, the general noise environment consisted of noise from rustling of nearby trees from occasional gusts with some intermittent noise from birds, insects, nearby vehicles, and aircraft. For a brief period at the start of the monitoring session, music was audible from one of the nearby residences.

At the Wattle Ridge monitoring location, the ambient noise environment generally consisted of noise from rustling of nearby trees from occasional gusts with some intermittent noise from birds, insects, and aircraft.

At both monitoring locations, shots from SHRSC were audible and measurable however a significant number of shots were audible and below the ambient noise level or affected by extraneous noise and therefore not measurable. Recorded shots were measured in periods where there was no extraneous noise from wind or nearby residents. It is to be noted that for both monitoring locations, where shots were audible but not measurable due to extraneous noise, the L_{zPeak} level did not rise above the ambient level and seldom above 75dBZ.

The arithmetic average of the received shot levels is below the L_{zPeak} 75dBZ criteria when measured at both monitoring locations. On this basis, noise from firearms from the SHRSC complies with relevant noise limits when assessed at locations stipulated in Condition A9 of the consent conditions.

4 CONCLUSION

Wilkinson Murray has conducted noise monitoring of the operation of 50m and 500m ranges at the Southern Highlands Regional Shooting Complex. Monitoring was conducted on 23 February 2020 between 10.40am and 11.40am. The results of the noise monitoring determined that the operation of the two ranges complies with relevant criteria when assessed at residential receivers and satisfies all conditions of consent relating to noise.

APPENDIX A

NOISE MEASUREMENT RESULTS

L1 – Wattle Ridge Farm Noise Monitoring Data

No.	Pre-Shot L _{zPeak}	Shot L _{zPeak}	Difference	Category
1	77	81	4	A
2	64	66	2	B
3	67	68	1	B
4	58	62	4	A
5	53	55	2	B
6	64	66	2	B
7	63	65	2	B
8	55	76	21	A
9	55	57	2	B
10	54	62	8	A
11	56	63	7	A
12	59	65	6	A
13	64	65	1	B
14	59	64	5	A
15	56	67	11	A
16	58	63	5	A
17	71	74	3	B
18	63	64	1	B
19	61	65	4	A
20	56	58	2	B
21	64	69	5	A
22	62	66	4	A
23	60	65	5	A
24	62	65	3	B
25	71	79	8	A
26	65	67	2	B
27	78	80	2	B
28	63	68	5	A
29	63	69	6	A
30	61	66	5	A
Total no. of Category A Shots				17
Total no. of Category B Shots				13
Final Noise Level				67

L2 – Rocky Waterhole Noise Monitoring Data

No.	Pre-Shot L _{zPeak}	Shot L _{zPeak}	Difference	Category
1	60	64	4	A
2	61	62	1	B
3	62	67	5	A
4	57	61	4	A
5	54	64	10	A
6	62	65	3	B
7	61	64	3	B
8	63	68	5	A
9	63	67	4	A
10	64	67	3	B
11	61	68	7	A
12	60	65	5	A
13	56	67	11	A
14	60	64	4	A
15	62	65	3	B
16	64	66	2	B
17	52	58	6	A
18	54	56	2	B
19	53	57	4	A
20	54	59	5	A
21	57	64	7	A
22	60	63	3	B
23	61	65	4	A
24	57	63	6	A
25	58	62	4	A
26	60	64	4	A
27	54	62	8	A
28	60	63	3	B
29	56	63	7	A
30	58	68	10	A
31	64	70	6	A
32	62	67	5	A
33	64	68	4	A
34	61	64	3	B
35	57	61	4	A
36	60	66	6	A
37	61	64	3	B
38	59	72	13	A
39	64	71	7	A
40	70	71	1	B
41	61	64	3	B
42	73	75	2	B

No.	Pre-Shot L_{zPeak}	Shot L_{zPeak}	Difference	Category
43	65	66	1	B
44	66	67	1	B
45	59	61	2	B
46	60	61	1	B
47	59	62	3	B
48	61	63	2	B
49	61	64	3	B
50	67	68	1	B
51	72	73	1	B
Total no. of Category A Shots				28
Total no. of Category B Shots				23
Final Noise Level				65

APPENDIX B

TYPICAL NOISE MONITORING SETUP

Typical Noise Monitoring Setup – Wattle Ridge



Note: This is an image from a previous monitoring session and is to present a typical monitoring setup at Wattle Ridge

Weather Station on 50m Range



APPENDIX C
ON RANGE NOISE PROFILES

