

## SOUTHERN HIGHLANDS REGIONAL SHOOTING COMPLEX

HILL TOP, NSW

NOISE COMPLIANCE REPORT JUNE 2023

RWDI # 2204102

21 July 2023

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# DOCUMENT CONTROL

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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.

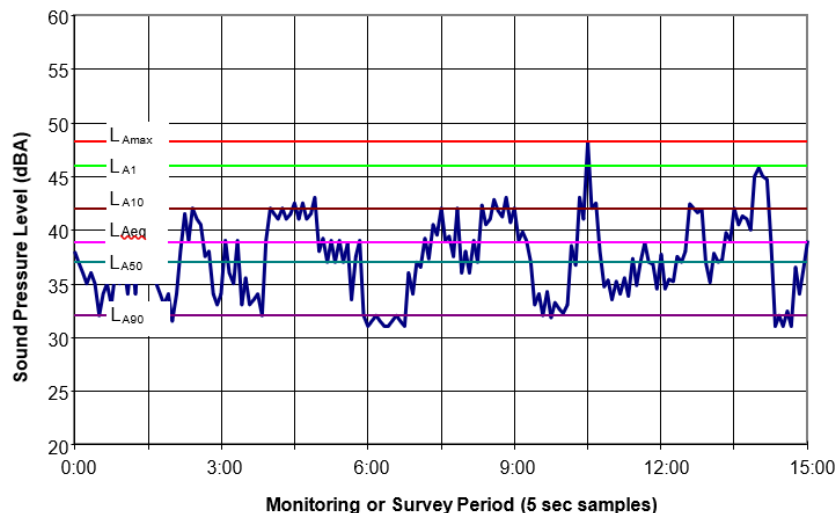
**$L_{A90}$**  – The  $L_{A90}$  level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the  $L_{A90}$  level for 10% of the time. This measure is commonly referred to as the background noise level.

**$L_{Aeq}$**  – 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





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## 1 INTRODUCTION

This report summarises the results of the attended compliance noise monitoring of the Southern Highlands Regional Shooting Complex (SHRSC), completed on 17 June 2023 between 10.40am and 1.30pm.

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 and annually thereafter. This report has been prepared for 2023 annual compliance monitoring session of the 50 m, 500 m, and 800 m ranges.

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 75 dB 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).*

## 2 PROJECT 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 50 m range, a 500 m range, and an 800 m range. The range currently operates on Fridays between 10.00am and 2.00pm and on weekends between 10.00am and 5.00pm.

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

Figure 2-1 below presents the location of the three ranges relative to the nearest residential receivers.

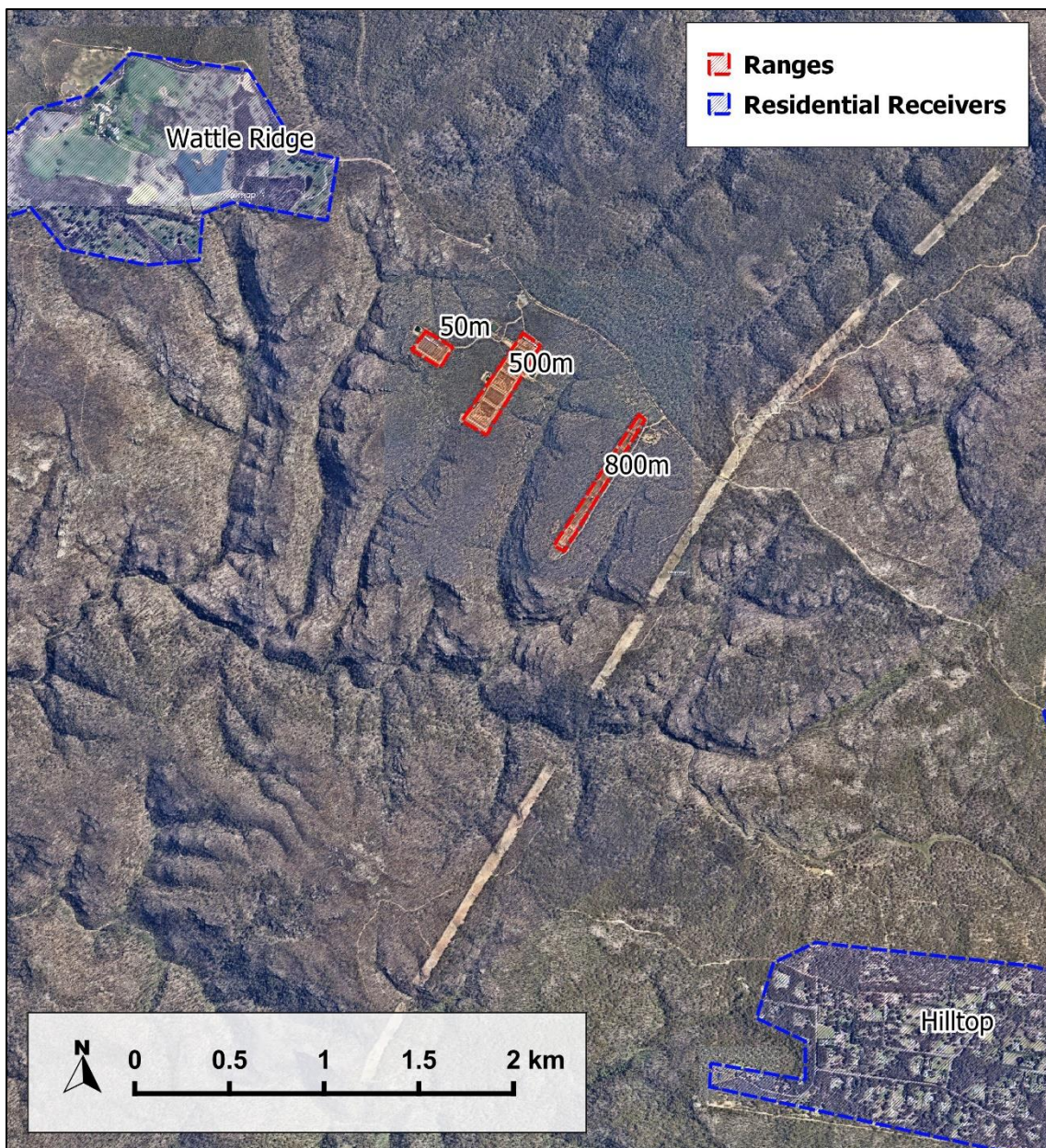


Figure 2-1: Site Overview and Nearest Receivers

## 3 NOISE ASSESSMENT

### 3.1 Methodology

Attended monitoring was completed on 17 June 2023 between 10.40am and 1.30pm. On the day of monitoring all three ranges were scheduled for use. **Appendix A** provides information relating to the calibre and number of rounds used on the day of monitoring (10.00am – 5.00pm). This information was collected by and provided by the Office of Sport.

Monitoring was conducted over two sessions, 10.40am to 11.40am at Location L2 and 12.00pm to 1.30pm at Location L1.

Measurements were conducted using an NTI XL2 sound level meter. This meter conforms 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 meter was checked before and after the measurements with a Brüel & Kjær Type 4231 sound level calibrator and no significant drift was noted.

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

The sound level meter was set to measure LzPeak levels in accordance with EPA's Application. Noise compliance was determined by the manual method described in the Application note. The sound level meter is capable of logging noise level at 100 millisecond increments with audio in case further post processing is required.

Noise monitoring locations were selected to be consistent with Condition A9 of the Consent Conditions. ARL NGARA's were also installed at the rear of the three ranges to allow for confirmation of the timing and number of shots fired from each range during the monitoring period.

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

**Table 3-1 Summary of Monitoring Setup**

Location No.	Location	Equipment	Serial No.
L1	Wattle Ridge Farm	NTI XL2	A2A-16735-E0
L2	Rocky Waterhole	NTI XL2	A2A-16735-E0
L3	50m	ARL NGARA	8780F2
L4	500m	ARL NGARA	8780FA
L5	800m	ARL NGARA	87807C

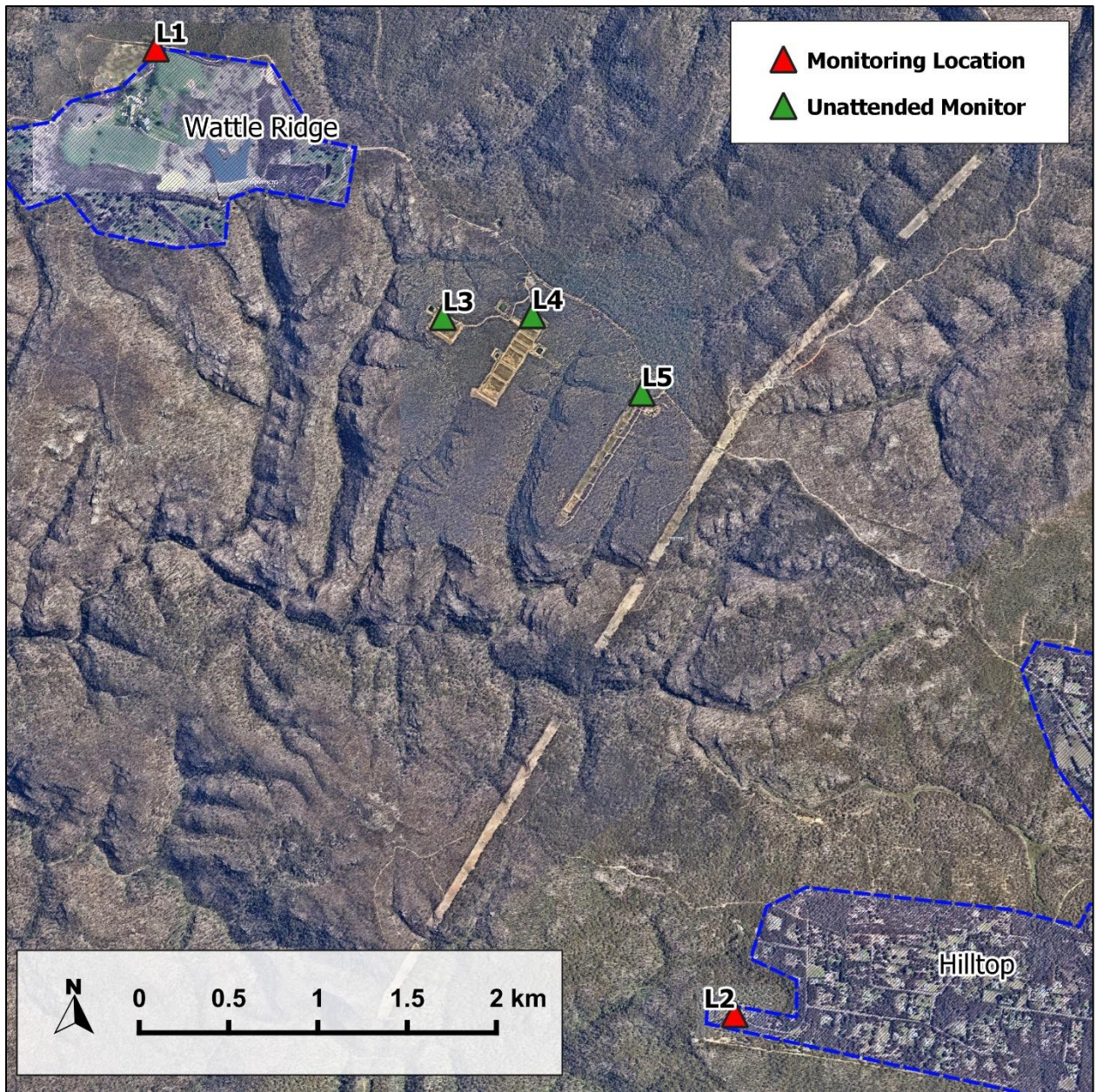


Figure 3-1: Noise Monitoring Locations

### 3.2 Noise Monitoring Results and Discussion

**Table 3-2** summarises monitoring results from both monitoring sessions. **Table 3-3** summarises the number of shots fired on range during the monitoring period, these were estimated by reviewing the data from the noise loggers installed on each of the ranges. It is noted that due to equipment malfunction no shots were recorded from the noise monitor at location L5. However, the shots at the 800 m range would be audible and would be recorded by the noise monitor at location L4.

The recorded noise levels at the assessment locations are presented in **Appendix B**.





**Table 3-2: Receiver Noise Monitoring Results - LzPeak dB**

Location	No. of Shots Measured	Category		Final Noise Level dBZ
		A	B	
L1 Wattle Ridge	Not Audible	-	-	-
L2 Rocky Waterhole	54	26	28	64

Note: Final Noise Level determined as per the EPA Application Note, where:  
 if there are greater than 50 Category A shots, the final noise level is the arithmetic average of Category A shots.  
 if there are less than 50 Category A shots, the final noise level is the arithmetic average of all Category A and B shots.

**Table 3-3: Estimated Number of Shots on Range**

Session	Range	Number of Shots
10.40am-11.40pm	50m	327
	500m	37
	800m	178 <sup>1</sup>
12.00pm-1.30pm	50m	563
	500m	49
	800m	270 <sup>1</sup>

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

Note 1: Due to equipment malfunction no shots were recorded by the on-range noise monitor, numbers are estimated based on recorded levels from the 500 m range noise monitor.

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. Noise from nearby residents were intermittent throughout the monitoring period. Recorded shots were measured in periods where there was no extraneous noise from wind or nearby residents. It is to be noted that where shots were audible but not measurable due to extraneous noise, the LzPeak level did not rise above the ambient level nor the 75 dBZ criteria. The arithmetic average of the received shot levels is below the LzPeak 75 dBZ criteria when measured at Rocky Waterhole.

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. Shots were not audible at this location throughout the entire monitoring period of 12.00pm to 1.30pm. Review of noise levels from the on-range monitors confirmed that more than 30 shots were fired during the monitoring period. As there were at least 30 shots fired on range within an hour and weather conditions were suitable for measurements, but no shots were audible, then compliance has been demonstrated.

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 CONCLUSIONS AND RECOMMENDATIONS

RWDI has conducted noise monitoring of the operation of 50m, 500m, and 800m ranges at the Southern Highlands Regional Shooting Complex. Monitoring was conducted on 17 June 2023 between 10.40am and 1.30pm. The results of the noise monitoring determined that the operation of the three ranges complies with relevant criteria when assessed at residential receivers and satisfies all conditions of consent relating to noise.



## 5 STATEMENT OF LIMITATIONS

This report entitled Southern Highlands Regional Shooting Complex - Noise Compliance Report July 2023 was prepared by RWDI Australia Pty Ltd (“RWDI”) for NSW Office of Sport (“Client”). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein (“Project”). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.



## APPENDIX A: FIREARM CALIBRE RECORDS

Calibre	No of Shots
<b>50 m</b>	
9mm	1440
0.22	100
.38 spc	100
undeclared	400
<b>500 m</b>	
0.22	30
9mm	48
<b>800 m</b>	
223	190
308	200
270	60
260	0
6.5	48



# APPENDIX B: NOISE MEASUREMENT RESULTS

## Rocky Waterhole Noise Monitoring Data

No.	Pre-Shot L <sub>zPeak</sub>	Shot L <sub>zPeak</sub>	Difference	Category
1	55	56	1	B
2	55	57	2	B
3	53	58	5	A
4	52	56	4	A
5	55	56	1	B
6	54	58	4	A
7	60	65	5	A
8	64	68	4	A
9	57	58	1	B
10	56	59	3	B
11	66	69	3	B
12	59	61	2	B
13	70	71	1	B
14	60	63	3	B
15	61	65	4	A
16	63	64	1	B
17	58	61	3	B
18	65	69	4	A
19	58	72	14	A
20	62	65	3	B
21	58	61	3	B
22	63	65	2	B
23	60	63	3	B
24	59	64	5	A
25	63	74	11	A
26	63	68	5	A
27	63	70	7	A
28	65	69	4	A
29	55	58	3	B
30	59	60	1	B
31	70	74	4	A
32	71	72	1	B
33	61	67	6	A

SOUTHERN HIGHLANDS REGIONAL SHOOTING COMPLEX

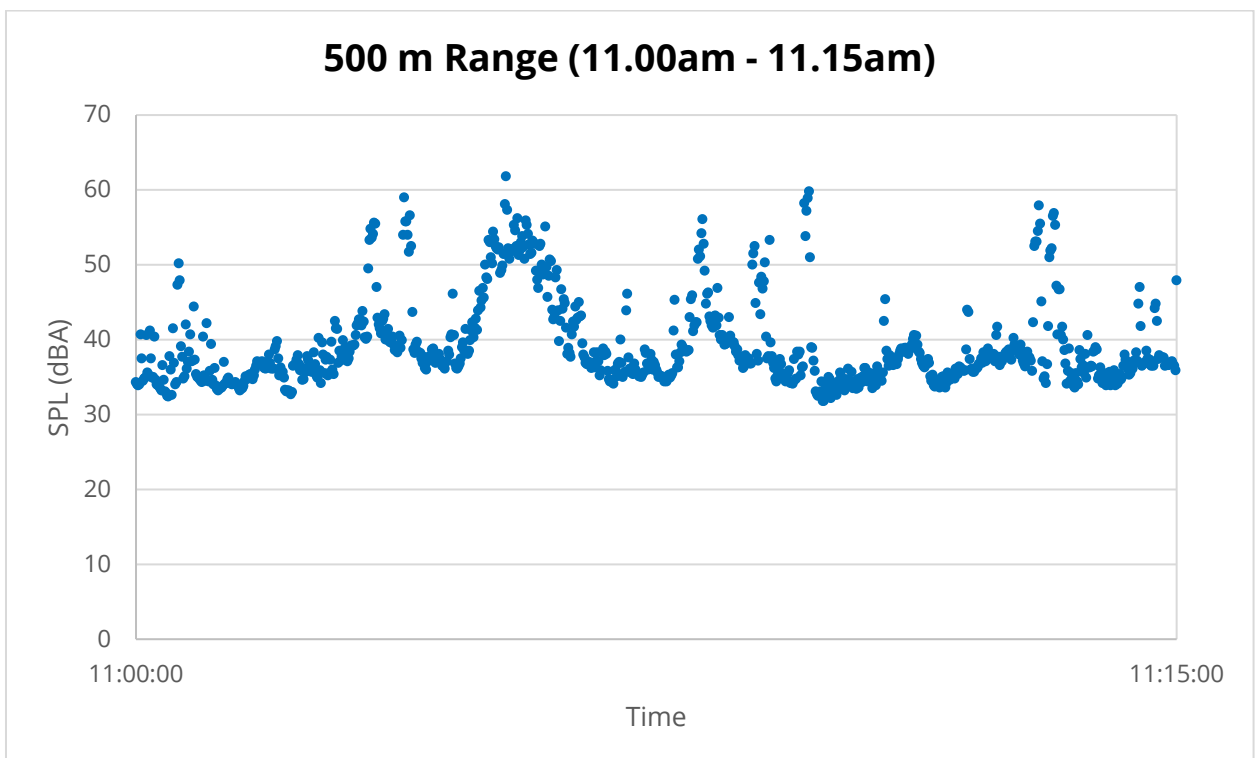
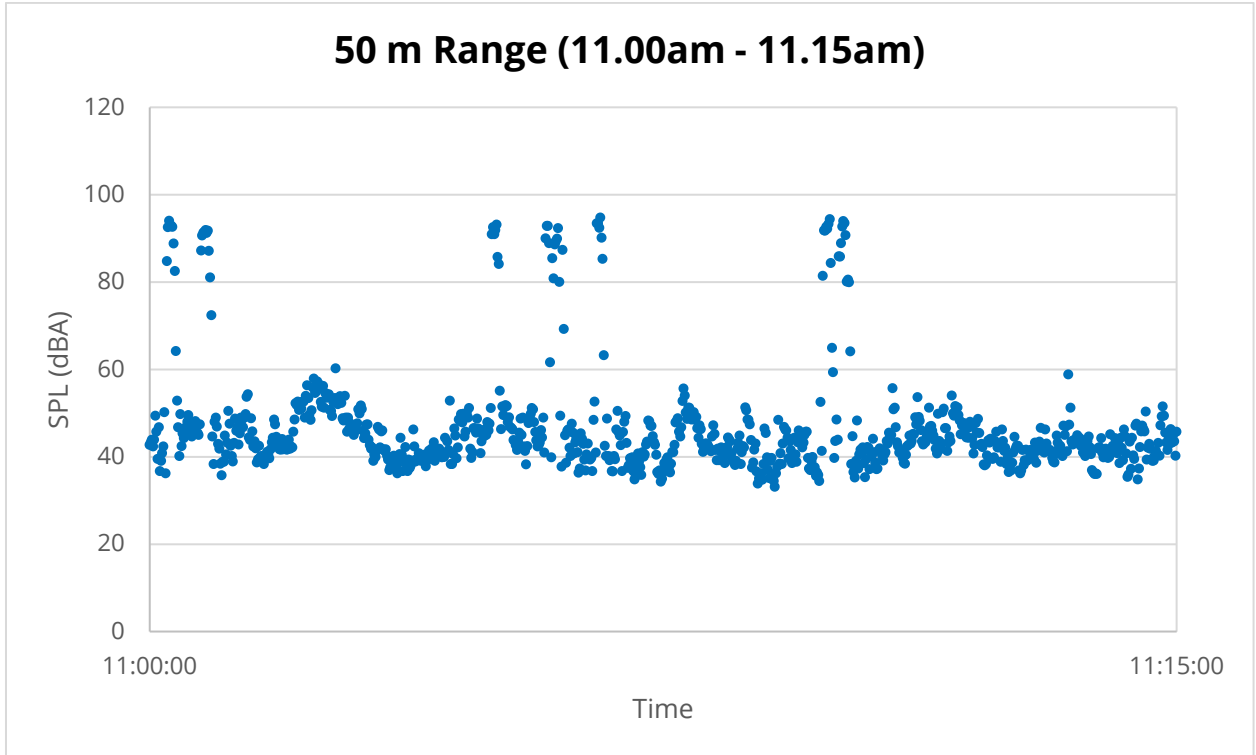
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No.	Pre-Shot L <sub>zPeak</sub>	Shot L <sub>zPeak</sub>	Difference	Category
34	63	68	5	A
35	58	62	4	A
36	62	64	2	B
37	58	61	3	B
38	61	63	2	B
39	59	61	2	B
40	60	65	5	A
41	59	63	4	A
42	53	56	3	B
43	56	57	1	B
44	60	61	1	B
45	55	62	7	A
46	58	61	3	B
47	54	57	3	B
48	62	68	6	A
49	58	65	7	A
50	58	69	11	A
51	68	73	5	A
52	61	63	2	B
53	65	71	6	A
54	63	74	11	A
<b>Total no. of Category A Shots</b>				<b>26</b>
<b>Total no. of Category B Shots</b>				<b>28</b>
<b>Average of Category A Shots</b>				<b>67 dBZ</b>
<b>Average of Category A Shots and Category B Shots</b>				<b>62 dBZ</b>
<b>Final Noise Level</b>				<b>64 dBZ</b>



# APPENDIX C: SAMPLE ON-RANGE NOISE PROFILES



## APPENDIX D: NOISE MONITORING SETUP

### Wattle Ridge Noise Monitoring Setup





## Rocky Waterhole Noise Monitoring Setup



## 50 m On-range



## 500 m On-range



## 800 m On-range

