

## SOUTHERN HIGHLANDS REGIONAL SHOOTING COMPLEX

HILL TOP, NSW

NOISE COMPLIANCE REPORT JUNE 2024

RWDI # 2204102

9 July 2024

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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.

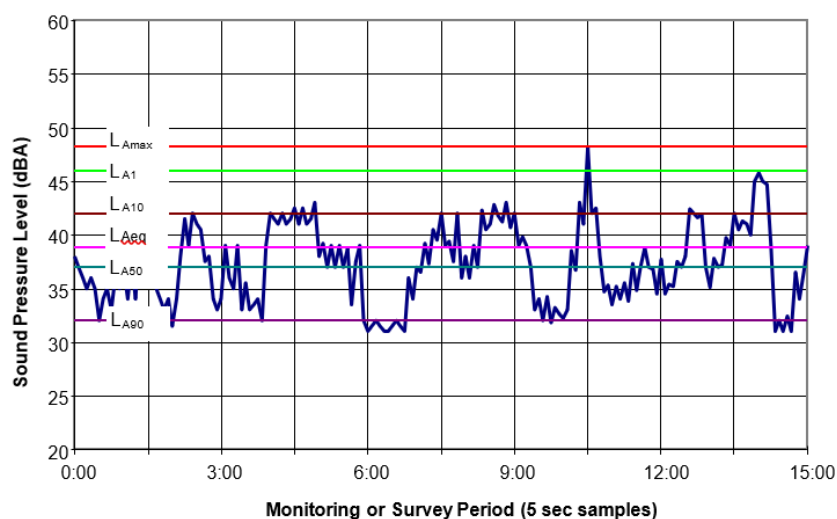
**$L_{A90}$**  – The  $L_{A90}$  level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the  $L_{A90}$  level for 10% of the time. This measure is commonly referred to as the background noise level.

**$L_{Aeq}$**  – 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





# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>5</b>
<b>2</b>	<b>PROJECT DESCRIPTION.....</b>	<b>6</b>
<b>3</b>	<b>NOISE ASSESSMENT.....</b>	<b>7</b>
<b>3.1</b>	<b>Methodology .....</b>	<b>7</b>
<b>3.2</b>	<b>Noise Monitoring Results and Discussion.....</b>	<b>8</b>
<b>4</b>	<b>CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>10</b>
<b>5</b>	<b>STATEMENT OF LIMITATIONS .....</b>	<b>11</b>
	<b>APPENDIX A: FIREARM CALIBRE RECORDS .....</b>	<b>12</b>
	<b>APPENDIX B: NOISE MEASUREMENT RESULTS.....</b>	<b>13</b>
	<b>APPENDIX C: SAMPLE ON-RANGE NOISE PROFILES .....</b>	<b>20</b>
	<b>APPENDIX D: NOISE MONITORING SETUP .....</b>	<b>22</b>



## 1 INTRODUCTION

This report summarises the results of the attended compliance noise monitoring of the Southern Highlands Regional Shooting Complex (SHRSC), completed on 1 June 2024 between 10.30am and 1.00pm.

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 2024 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 4.30pm.

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.

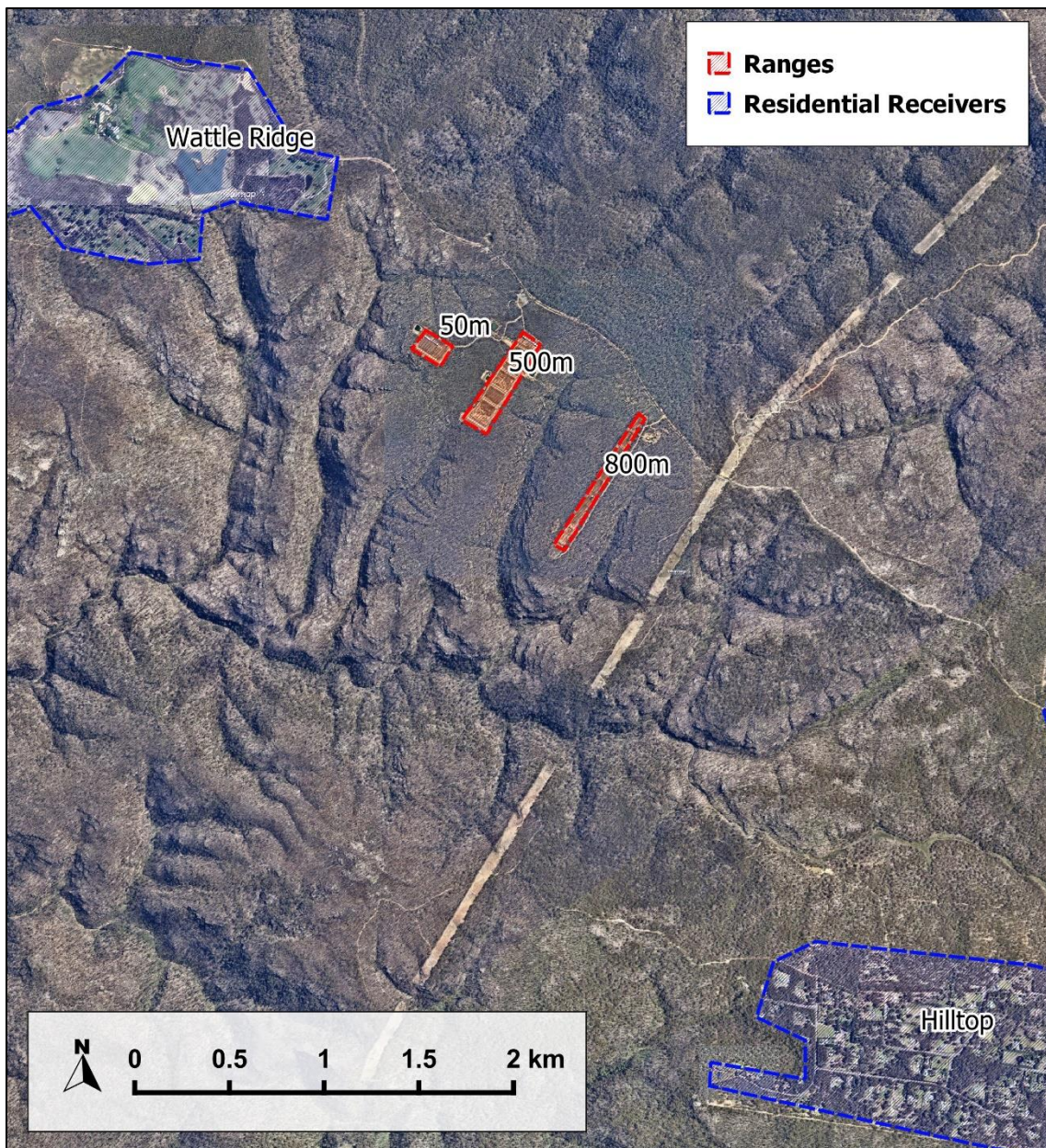


Figure 2-1: Site Overview and Nearest Receivers

## 3 NOISE ASSESSMENT

### 3.1 Methodology

Attended monitoring was completed on 1 June 2023 between 10.30am and 1.00pm. 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 – 4.30pm). This information was collected by and provided by the Office of Sport.

Monitoring was conducted over two sessions, 10.30am to 11.30am at Location L2 and 12.00pm to 1.00pm 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-15945-E0
L2	Rocky Waterhole	NTI XL2	A2A-15945-E0
L3	50m range	NTI XL2	A2A-08006-E0
L4	500m range	ARL NGARA	NA
L5	800m range <sup>1</sup>	NTI XL2	A2A-16735-E0

Note 1: Monitor was installed at the 200m distance mark of this range, as this was where shooting was occurring the morning of testing



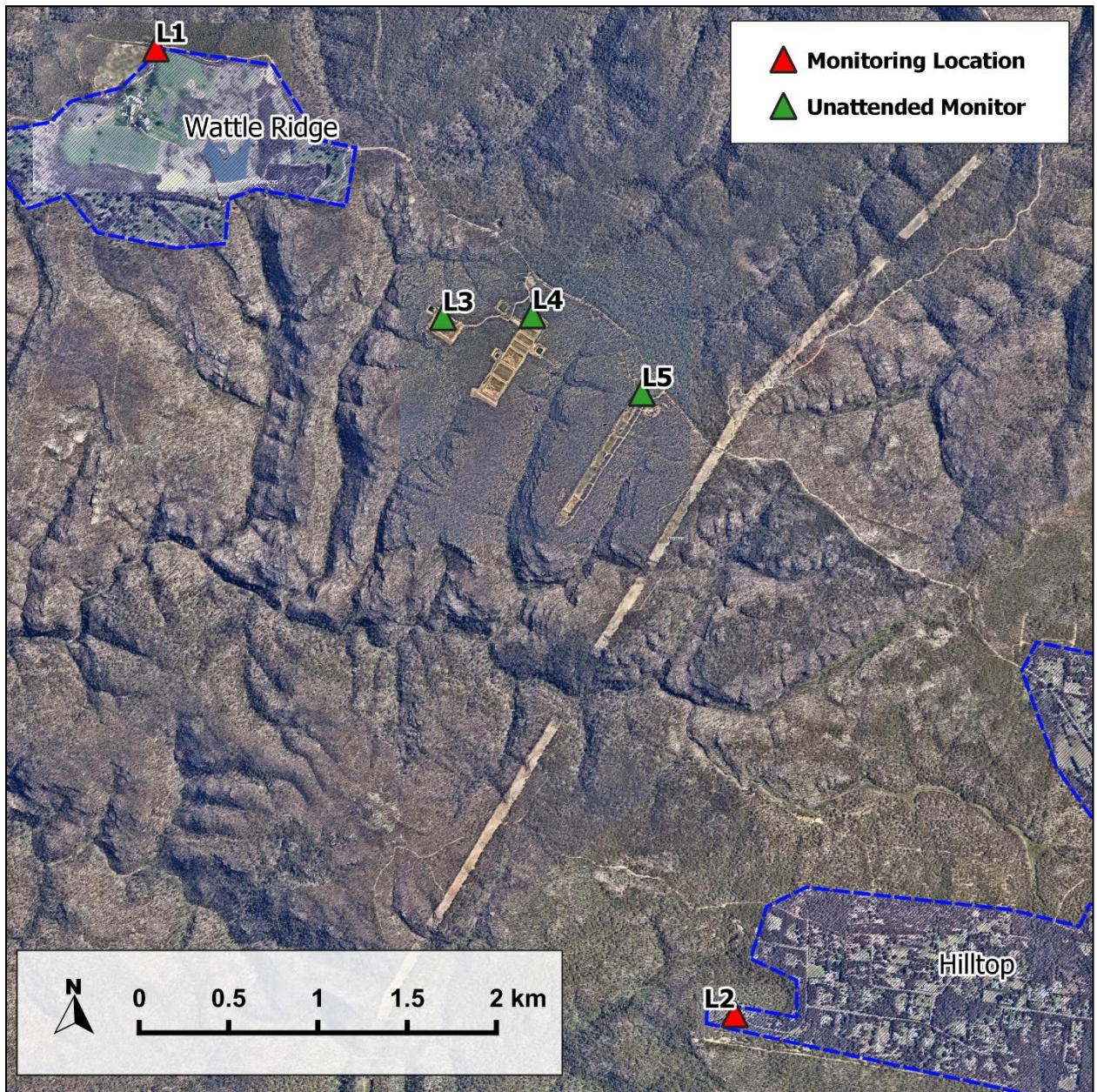


Figure 3-1: Noise Monitoring Locations

### 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 L4. However, the shots at the 500 m range were clearly audible and would be recorded by the noise monitor at location L3, as well as at L5, if corroboration was required.

The recorded noise levels at the assessment locations are presented in **Appendix B**. Time slices for each of the on-range noise monitors are presented in **Appendix C**.





**Table 3-2: Receiver Noise Monitoring Results - L<sub>zPeak</sub> dB**

Location	No. of Shots Measured	Category		Final Noise Level dBZ
		A	B	
L1 Wattle Ridge	160	112	48	68
L2 Rocky Waterhole	87	6	38	58

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
10.30am-11.30pm	50m	0
	500m	≥75 <sup>1</sup>
	800m	46
12.00pm-1.00pm	50m	0
	500m	≥56 <sup>1</sup>
	800m	11

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 50 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 L<sub>zPeak</sub> level did not rise above the ambient level nor the 75 dBZ criteria. The arithmetic average of the received shot levels is below the L<sub>zPeak</sub> 75 dBZ criteria when measured at Rocky Waterhole.

At the Hill Top monitoring location, the general noise environment consisted of noise from rustling of nearby trees from occasional gusts with some intermittent noise from birds, insects, and aircraft. Light rain occurred for approximately 5 minutes of the measurement time. Recorded shots were measured in periods where there was no extraneous noise from wind or rain. It is to be noted that where shots were audible but not measurable due to extraneous noise, the L<sub>zPeak</sub> level rarely above the 75 dBZ criteria. The arithmetic average of the received shot levels is below the L<sub>zPeak</sub> 75 dBZ criteria when measured at Hill Top.

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 15 June 2023 between 10.30am and 1.00pm. 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 June 2024 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>z</sub> Peak	Shot L <sub>z</sub> Peak	Difference	Category
1	59	62	3	B
2	55	59	4	A
3	56	58	2	B
4	56	58	2	B
5	55	57	2	B
6	56	58	2	B
7	55	56	1	B
8	55	56	1	B
9	57	58	1	B
10	56	57	1	B
11	55	58	3	B
12	55	57	2	B
13	54	57	3	B
14	54	57	3	B
15	55	56	1	B
16	58	59	1	B
17	53	58	5	A
18	61	64	3	B
19	59	61	2	B
20	57	67	10	A
21	57	60	3	B
22	56	57	1	B
23	55	56	1	B
24	53	56	3	B
25	58	60	2	B
26	53	55	2	B
27	54	56	2	B
28	56	58	2	B
29	56	58	2	B
30	56	58	2	B
31	55	56	1	B
32	55	56	1	B
33	55	56	1	B
34	54	56	2	B
35	55	57	2	B



No.	Pre-Shot LzPeak	Shot LzPeak	Difference	Category
36	54	55	1	B
37	54	55	1	B
38	54	56	2	B
39	54	56	2	B
40	55	56	1	B
41	55	56	1	B
42	58	60	2	B
43	58	60	2	B
44	57	58	1	B
45	57	58	1	B
46	54	56	2	B
47	54	56	2	B
48	54	55	1	B
49	54	55	1	B
50	54	57	3	B
51	54	55	1	B
52	54	56	2	B
53	53	54	1	B
54	53	55	2	B
55	55	57	2	B
56	53	54	1	B
57	53	54	1	B
58	57	60	3	B
59	53	55	2	B
60	56	59	3	B
61	54	57	3	B
62	54	57	3	B
63	57	60	3	B
64	53	55	2	B
65	51	55	4	A
66	52	55	3	B
67	55	58	3	B
68	52	55	3	B
69	54	56	2	B
70	53	56	3	B
71	55	56	1	B
72	54	58	4	A
73	56	58	2	B
74	59	62	3	B





No.	Pre-Shot LzPeak	Shot LzPeak	Difference	Category
75	59	60	1	B
76	60	62	2	B
77	59	62	3	B
78	60	61	1	B
79	58	60	2	B
80	58	60	2	B
81	56	58	2	B
82	60	64	4	A
83	59	61	2	B
84	59	61	2	B
85	59	61	2	B
86	63	65	2	B
87	53	55	2	B
<b>Total no. of Category A Shots</b>				6
<b>Total no. of Category B Shots</b>				38
<b>Average of Category A Shots</b>				60 dBZ
<b>Average of Category A Shots and Category B Shots</b>				58 dBZ
<b>Final Noise Level</b>				58 dBZ

### Wattle Ridge Noise Monitoring Data

No.	Pre-Shot LzPeak	Shot LzPeak	Difference	Category
1	57	59	2	B
2	58	61	3	B
3	56	61	5	A
4	56	59	3	B
5	52	57	5	A
6	52	54	2	B
7	52	54	2	B
8	66	67	1	B
9	55	58	3	B
10	54	56	2	B
11	62	67	5	A
12	62	67	5	A
13	58	63	5	A
14	57	59	2	B
15	53	60	7	A
16	52	55	3	B



No.	Pre-Shot LzPeak	Shot LzPeak	Difference	Category
17	52	55	3	B
18	53	54	1	B
19	53	56	3	B
20	53	56	3	B
21	64	71	7	A
22	55	66	11	A
23	63	71	8	A
24	62	64	2	B
25	52	57	5	A
26	61	68	7	A
27	61	68	7	A
28	64	70	6	A
29	54	60	6	A
30	56	65	9	A
31	58	61	3	B
32	61	63	2	B
33	58	63	5	A
34	63	69	6	A
35	59	67	8	A
36	63	67	4	A
37	54	57	3	B
38	67	71	4	A
39	61	68	7	A
40	56	64	8	A
41	63	73	10	A
42	65	69	4	A
43	58	71	13	A
44	55	64	9	A
45	55	64	9	A
46	55	64	9	A
47	56	63	7	A
48	56	63	7	A
49	62	66	4	A
50	59	63	4	A
51	59	61	2	B
52	59	63	4	A
53	58	68	10	A
54	58	68	10	A
55	55	62	7	A



No.	Pre-Shot LzPeak	Shot LzPeak	Difference	Category
56	59	71	12	A
57	61	70	9	A
58	60	68	8	A
59	60	68	8	A
60	61	67	6	A
61	61	66	5	A
62	63	68	5	A
63	61	66	5	A
64	67	71	4	A
65	65	70	5	A
66	67	74	7	A
67	61	68	7	A
68	56	58	2	B
69	57	61	4	A
70	58	60	2	B
71	62	65	3	B
72	64	66	2	B
73	63	67	4	A
74	65	69	4	A
75	64	65	1	B
76	61	68	7	A
77	64	69	5	A
78	65	69	4	A
79	58	61	3	B
80	64	68	4	A
81	64	69	5	A
82	63	69	6	A
83	62	65	3	B
84	65	72	7	A
85	67	73	6	A
86	70	76	6	A
87	64	70	6	A
88	66	70	4	A
89	64	75	11	A
90	64	67	3	B
91	66	70	4	A
92	68	73	5	A
93	72	75	3	B
94	76	78	2	B





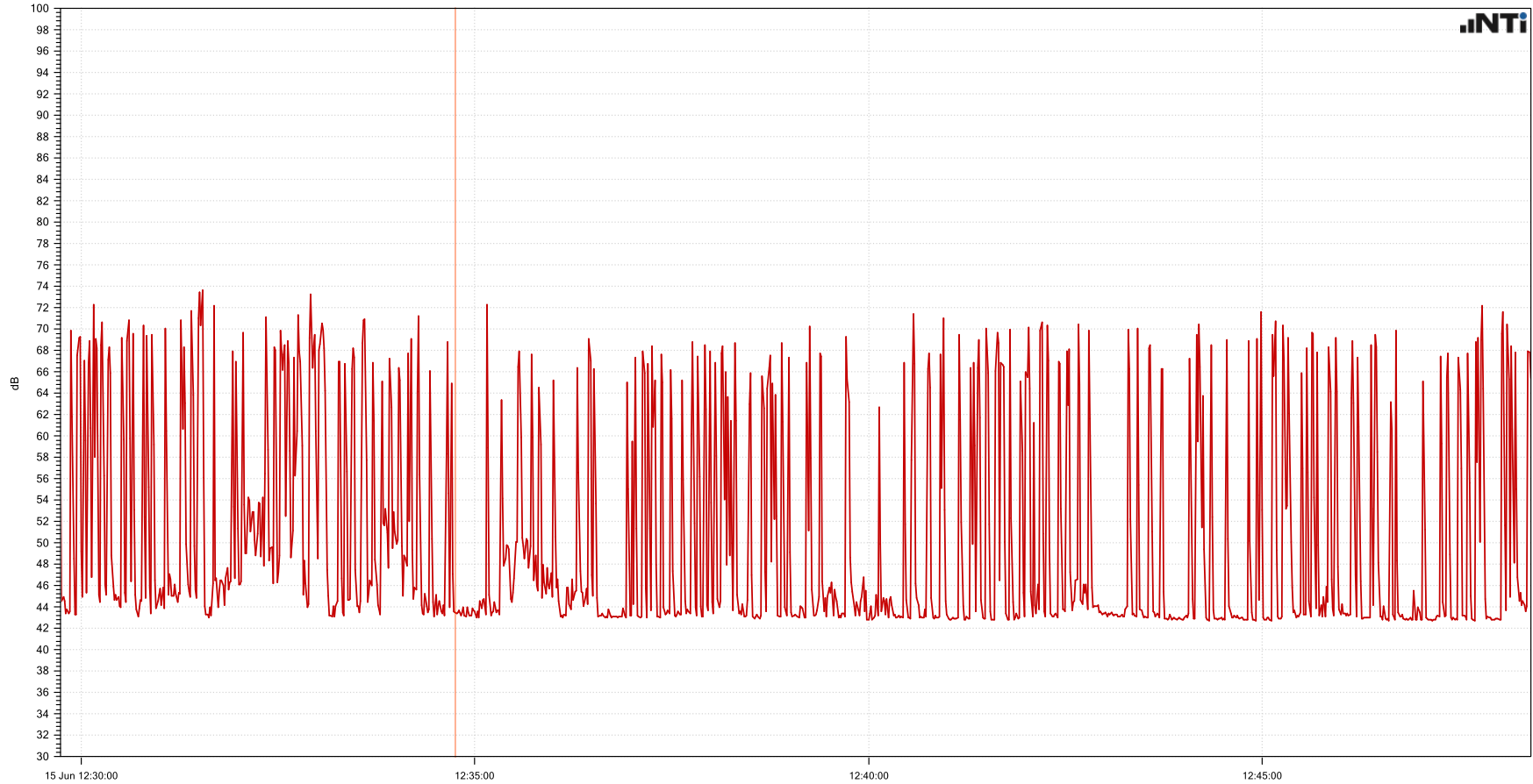
No.	Pre-Shot LzPeak	Shot LzPeak	Difference	Category
95	70	74	4	A
96	68	73	5	A
97	62	64	2	B
98	66	72	6	A
99	68	72	4	A
100	63	68	5	A
101	62	73	11	A
102	62	71	9	A
103	66	69	3	B
104	56	65	9	A
105	62	68	6	A
106	64	72	8	A
107	66	72	6	A
108	66	71	5	A
109	67	73	6	A
110	66	70	4	A
111	66	68	2	B
112	66	69	3	B
113	63	65	2	B
114	67	72	5	A
115	67	72	5	A
116	66	72	6	A
117	66	71	5	A
118	59	63	4	A
119	63	71	8	A
120	65	71	6	A
121	66	67	1	B
122	64	68	4	A
123	71	76	5	A
124	68	75	7	A
125	64	71	7	A
126	64	71	7	A
127	64	72	8	A
128	60	69	9	A
129	60	70	10	A
130	54	57	3	B
131	62	65	3	B
132	66	73	7	A
133	67	69	2	B



No.	Pre-Shot LzPeak	Shot LzPeak	Difference	Category
134	68	70	2	B
135	65	69	4	A
136	73	75	2	B
137	67	72	5	A
138	64	68	4	A
139	66	70	4	A
140	69	71	2	B
141	67	70	3	B
142	63	64	1	B
143	66	73	7	A
144	61	70	9	A
145	58	62	4	A
146	61	63	2	B
147	57	65	8	A
148	57	61	4	A
149	55	57	2	B
150	58	65	7	A
151	58	65	7	A
152	58	65	7	A
153	63	66	3	B
154	63	71	8	A
155	61	67	6	A
156	55	60	5	A
157	55	63	8	A
158	56	59	3	B
159	56	59	3	B
160	66	70	4	A
<b>Total no. of Category A Shots</b>				<b>112</b>
<b>Total no. of Category B Shots</b>				<b>19</b>
<b>Average of Category A Shots</b>				<b>68 dBZ</b>
<b>Average of Category A Shots and Category B Shots</b>				<b>67 dBZ</b>
<b>Final Noise Level</b>				<b>68 dBZ</b>



## APPENDIX C: SAMPLE ON-RANGE NOISE PROFILES



**Figure C1: Sample from monitor at 50m range (12:30pm-12:45pm)**

Note: Peaks are due to activity on the 500m range



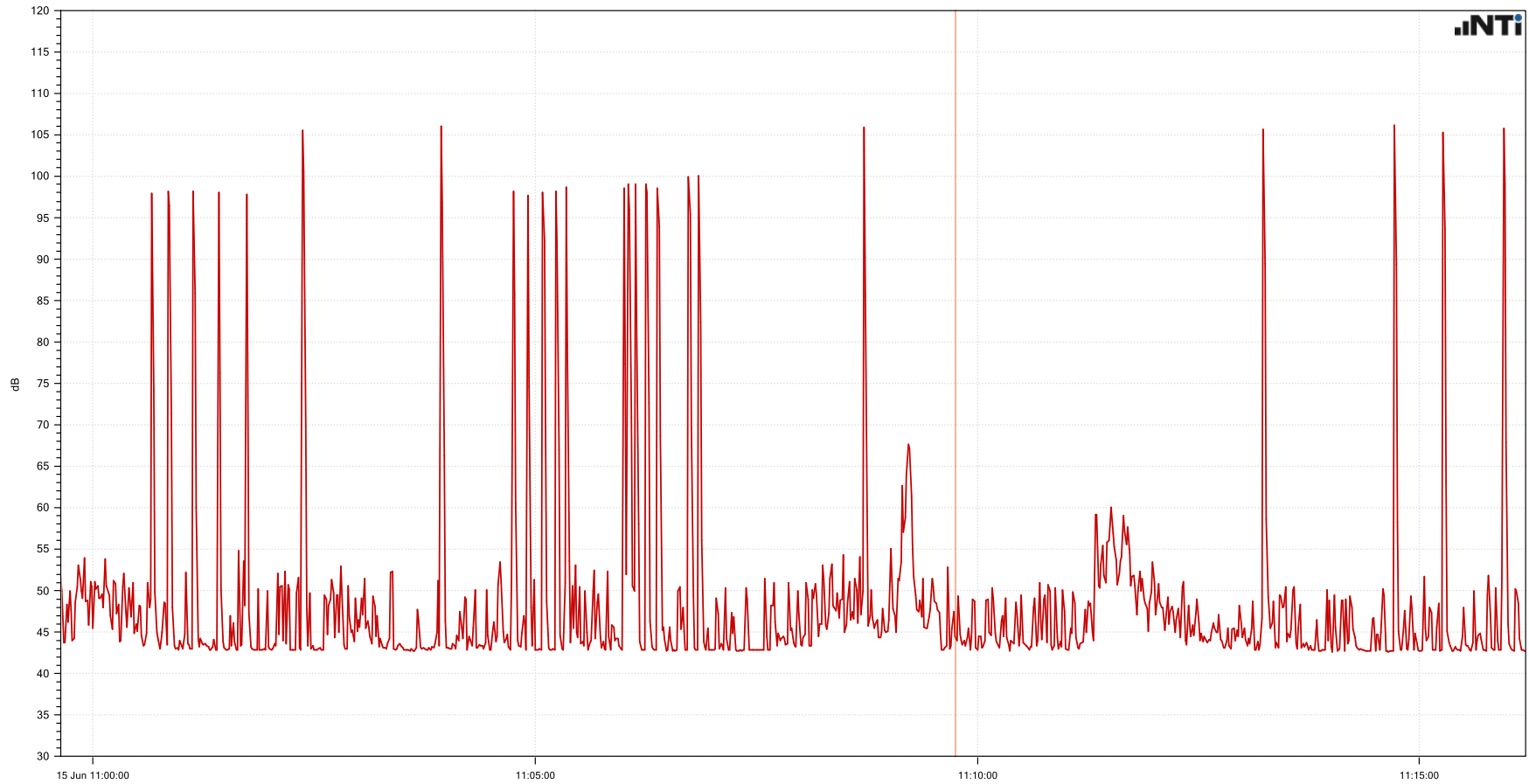


Figure C2: Sample from monitor at 800m range (11:00am-11:15am)

## APPENDIX D: NOISE MONITORING SETUP

### Wattle Ridge Noise Monitoring Setup





## Rocky Waterhole Noise Monitoring Setup





## 50 m On-range





## 800 m On-range (Set up at 200m distance)

