3 December 2020

John Roser
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Dear John,

RE – Noise Monitoring -Tharbogang Quarry and Landfill Operations 18-393

Impact on six sensitive receivers adjacent to quarry and landfill operations

INTRODUCTION

Griffith City Council (Council) currently operates a Landfill and Quarry in Tharbogang, approximately 10 km northwest of Griffith. Access to the site is via Hillside Drive, off Kidman Way (MR80). The Department of Planning, Industry and Environment (DPIE) have issued Conditions of Approval (CoA) for the site that requires a noise and vibration monitoring program to be prepared and implemented. Council has engaged NGH to monitor operational noise from the Tharbogang Quarry/Landfill annually for a period of three years.

Monitoring noise from facility operations will enable comparisons between actual noise levels from the facility to noise management levels at six sensitive receiver locations (Appendix A).

This letter details the results of the noise monitoring conducted at the six sensitive receivers, three times during operating hours on 19 and 20 November 2020.

NOISE MONITORING

An NGH environmental scientist attended each sensitive receiver location to conduct noise monitoring for 15 intervals using a Type 1 noise logger (Svantek/Svan 957). The noise logger was positioned between 5 m and 30 m from an external wall of each residential building, on a tripod 50 cm off the ground, with the microphone facing the main noise source(s).

The noise logger was calibrated at the beginning of each monitoring round and was within the service calibration period as shown in Figure 1.

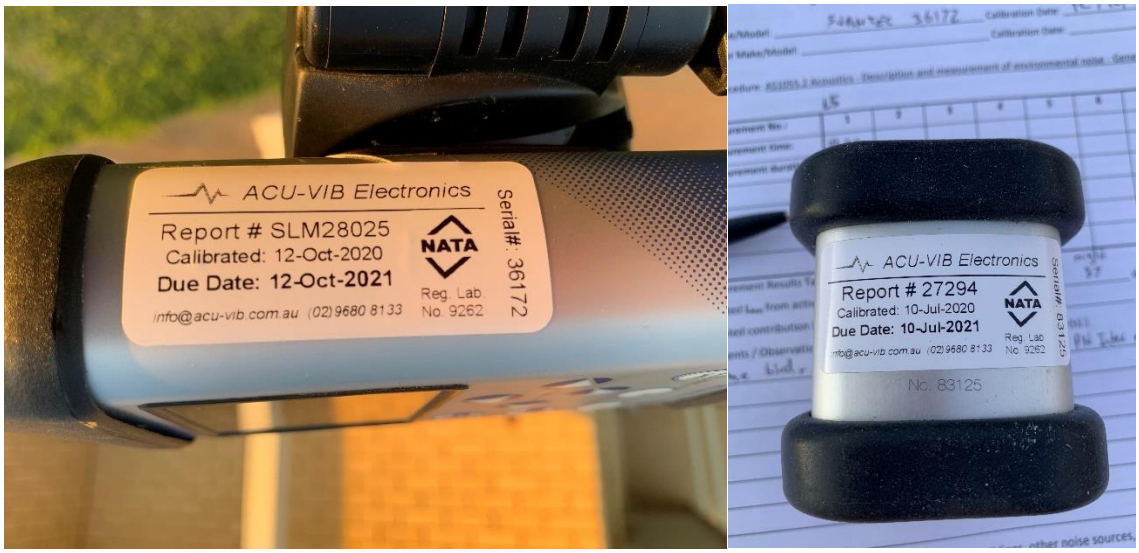

Figure 1 Equipment service calibration dates

A variety of foreground and background noises were audible from sensitive receiver locations including dogs barking, people talking, cicadas, tractors working in nearby orange orchards and road traffic from Slope Road and Kidman Way. Line graphs showing the noise levels for each monitoring period are provided in Appendix B.

Noise monitoring datasheets developed for the noise and vibration monitoring program by GHD in 2013 were completed for each monitoring period and are provided in Appendix C.

WEATHER CONDITIONS

The weather in Tharbogang on 19 and 20 December was fine and sunny with cloud cover ranging from 0% to 30%. There was little wind experienced during monitoring periods with minor impacts on monitoring results where indicated in Appendix B. A summary of the weather data throughout the day from the weather station at Griffith Airport is provided in Table 1 and Table 2.

Table 1 Griffith meteorological data 19/11/2019

Time	Temp °C	Wind direction	Wind speed (km/h)	Gust (km/h)
1:00pm	35.2	NW	20	32
1:30pm	35.8	NW	19	32
2:00pm	36.4	NNW	17	30
2:30pm	36.5	NNW	17	28
3:00pm	36.6	NW	17	28
3:30pm	36.8	NNW	20	32
4:00pm	37.5	N	15	24
4:30pm	37.1	N	17	30
5:00pm	38	NW	15	28

Table 2 Griffith meteorological data 20/11/2020

Time	Temp °C	Wind direction	Wind speed (km/h)	Gust (km/h)
7:30am	23.6	NW	6	7
8:00am	23.2	WNW	7	9
8:30am	25.8	WNW	9	13
9:00am	27.9	WSW	17	22
9:30am	29.5	W	13	19
10:00am	31.9	W	11	20
10:30am	32.9	WSW	11	17
11:00am	34.5	WNW	13	19
11:30am	35.1	WNW	11	19
12:00pm	36.6	NW	9	19
12:30pm	36.9	SW	11	17
1:00pm	37.2	WSW	9	19

NOISE MONITORING RESULTS

The noise assessment criterion is 35 L_{Aeq} for all times the facility is operational. The L_{Aeq} (15 min) for each monitoring period is provided in Table 3.

While it is apparent that the assessment criterion was exceeded at every monitoring period, dominant audible noises sources varied throughout the day and at each location. Noise monitoring was undertaken at the upper landfill site when the facility was fully operational (morning and afternoon) and when no plant was used (midday). The quarry was not operational, but the landfill was active during the monitoring. The noise assessment criterion 35 L_{Aeq} (15 min) was exceeded at all monitoring locations at various times and 18 of the 21 monitoring periods. A combination of noise sources contributed to exceedances of the noise assessment criterion including non-related road traffic, dogs barking, cicadas and machinery associated with the orange orchards surrounding all sensitive receivers. Noise from the landfill was not audible from any of the sensitive receivers. Noise monitoring datasheets, noting the main noise sources for each monitoring period are provided in Appendix C.

Table 3 Noise monitoring results summary

Time	L_{Aeq} (dB)		
	Morning	Midday	Afternoon
Receiver 1	41.3	36.6	41.2
Receiver 2	45.2	39.5	36.4
Receiver 3	55.8	34.9	49.5
Receiver 4	40.0	34.2	31.5
Receiver 5	39.5	52.8	58.5

Time	L_{Aeq} (dB)		
	Morning	Midday	Afternoon
Receiver 6	68	41.1	52.9
Landfill	43.9	29.9	52.3

IMPACT OF QURRY/LANDFILL ON SENSITIVE RECEIVERS

The monitored noise level L_{Aeq} (15 min) exceeded the assessment criterion of 35 L_{Aeq} (15 min) across all monitoring periods, at all sensitive receiver sites. However, it is unlikely that the landfill contributed to monitored noise levels at the sensitive receivers. Machinery movements associated with the Landfill were not audible at any of the sensitive receivers and the quarry was not operational during the monitoring. It was clear that noise from the quarry/landfill was not a key noise contributor at any of the sensitive receiver locations.

Yours sincerely,

Michial Sutherland
Manager Riverina and Western NSW
(02) 6923 1532
NGH

Appendix A Sensitive Receiver Map

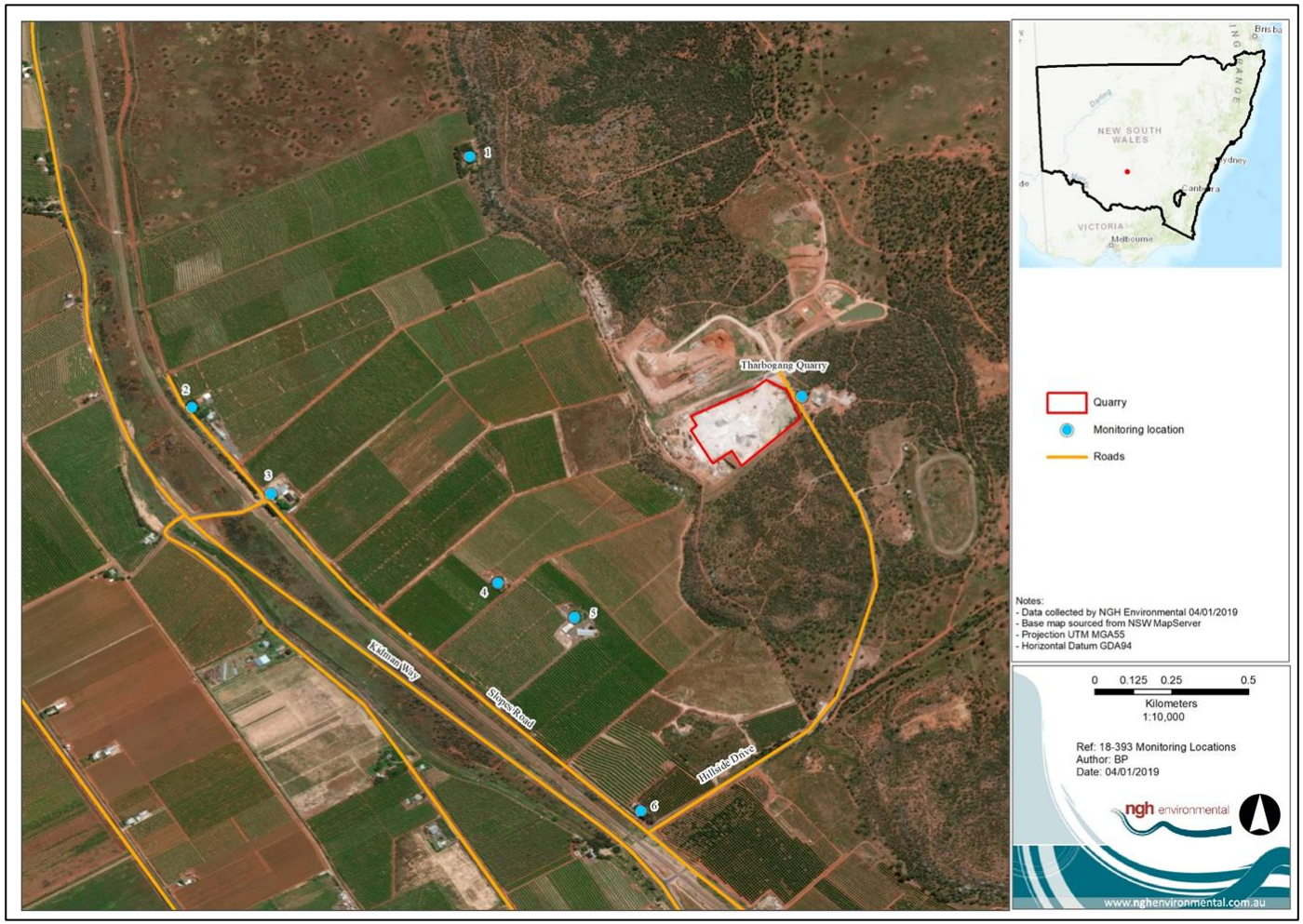

Figure 2 Location of sensitive receivers from Tharbogang Quarry

Appendix B Noise Monitoring Results

Sensitive Receiver 1

This sensitive receiver was located approximately 980 m off Slopes Road and approximately 1020 m from Tharbogang Quarry. The residence was situated overlooking orange orchard to the south and was buffered by rocky hillside from the quarry to the northeast.

MORNING

The noise logger was positioned facing north, approximately 50 m from the residence at the edge of the orange orchard as shown in Figure 3. Dominant noises included traffic from Kidman Way, pickers working in the orchard (with a tractor) and bird activity. Landfill activities were inaudible. The L_{Aeq} (15 min) attended monitoring period was 41.3 dB, exceeding the 35 L_{Aeq} (15 min) criteria.

Figure 3 – Sensitive Receiver 1 Morning

MIDDAY

The noise logger was positioned facing north, approximately 10 m from the residence as shown in **Figure 4**. Dominant noises included traffic from Kidman Way and bird activity. Landfill activities were inaudible. The LAeq (15 min) attended monitoring period was 36.6 dB, slightly exceeding the 35 LAeq (15 min) criteria.

Figure 4 – Sensitive Receiver 1 Midday

AFTERNOON

The noise logger was positioned outside the garden wall near the orchard facing north as shown in Figure 5. The dominant background noise was again the drone of traffic southeast of the location, a dog barking, and birds. The L_{Aeq} (15 min) was 41.2 dB, above the 35 L_{Aeq} (15 min) assessment criterion.

Figure 5 – Sensitive Receiver 1 Afternoon

Sensitive Receiver 2

This sensitive receiver was located directly off Slopes Road, approximately 1300 m from the Tharbogang Quarry site. The residential building was surrounded by tall garden vegetation, which may offer some protection from background noise emitted from the landfill, while increasing foreground noise emissions from birds, rustling leaves and insects.

MORNING

The noise logger was positioned at the base of the driveway, approximately 30 m from the southwestern wall of the dwelling, facing northeast as shown in Figure 6.

The dominant foreground noises were music and the air conditioner coming from the residence. Noise from the landfill was inaudible. The L_{Aeq} (15 min) for the period was 45.2 dB, over the 35 L_{Aeq} (15 min) criterion. The dominant background noise was the drone of light vehicle traffic from main roads to the southeast.

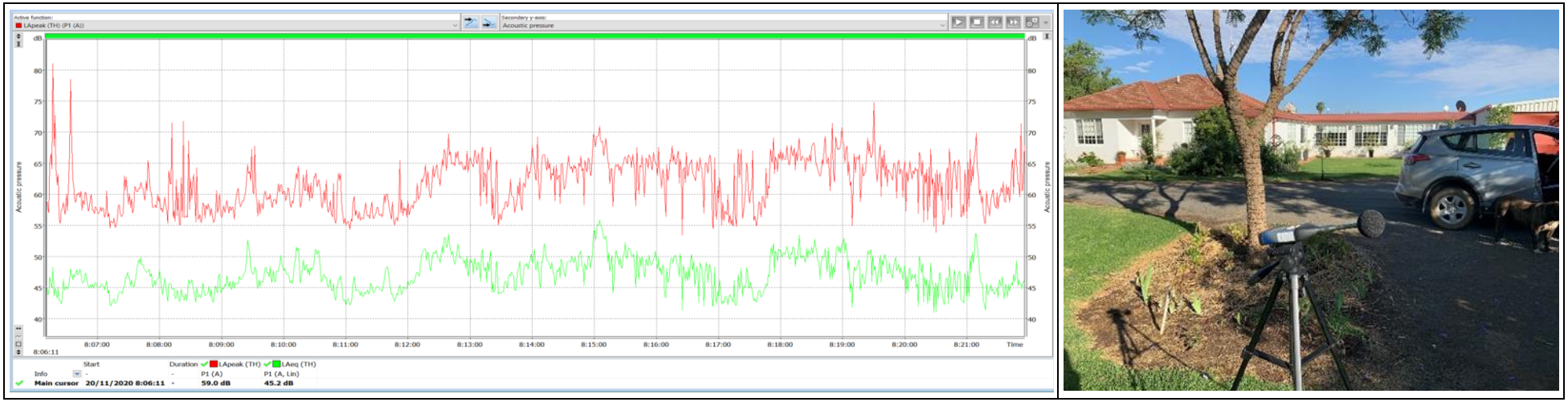

Figure 6 – Sensitive Receiver 2 Morning

MIDDAY

The noise logger was set up in the front yard, approximately 10 m from the residential building, facing east. The dominant foreground noise sources were again music and the air conditioner throughout the monitoring period. The L_{Aeq} (15 min) for the midday period was 39.5 dB, exceeding the 35 L_{Aeq} (15 min) assessment criterion.

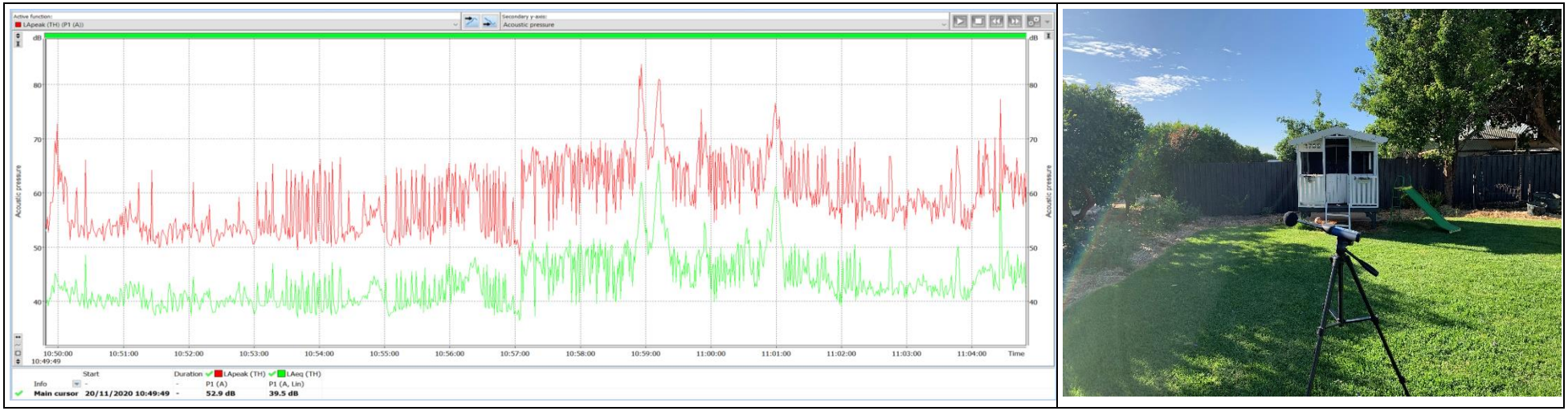

Figure 7 – Sensitive Receiver 2 Midday

AFTERNOON

The noise logger was again set up in the front garden of the residence, facing east. The dominant noise sources were birds and rustling trees in the foreground and the drone of traffic in the background. The L_{Aeq} (15 min) for the period was 36.4 dB, only slightly over the 35 L_{Aeq} (15 min) assessment criterion.

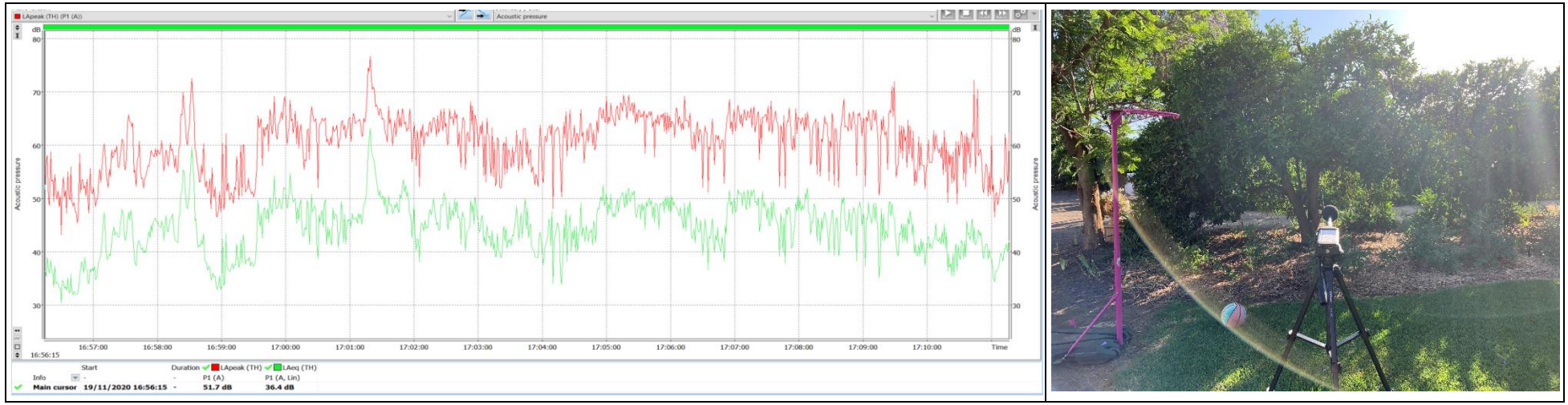

Figure 8 – Sensitive Receiver 2 Afternoon

Sensitive Receiver 3

This sensitive receiver was located directly off Slopes Road, approximately 1760 m from the Tharbogang Quarry. The residential building was surrounded by tall garden vegetation, which may have offered some protection from background noise emitted from the quarry, while increasing foreground noise emissions from birds, rustling leaves and insects.

MORNING

The noise logger was positioned on the edge of Slopes Road,5 m from the southern external wall of the residence.

The dominant background noise source was the constant drone of vehicle traffic emitted from main roads including Kidman Way, approximately 220 m from the monitoring location. Dominant foreground noise included activity from the residents moving around within the dwelling, and birds in the trees nearby. Machinery from the landfill was inaudible The L_{Aeq} (15 min) for the period was 55.8 dB, exceeding the 35 L_{Aeq} (15 min) criterion.

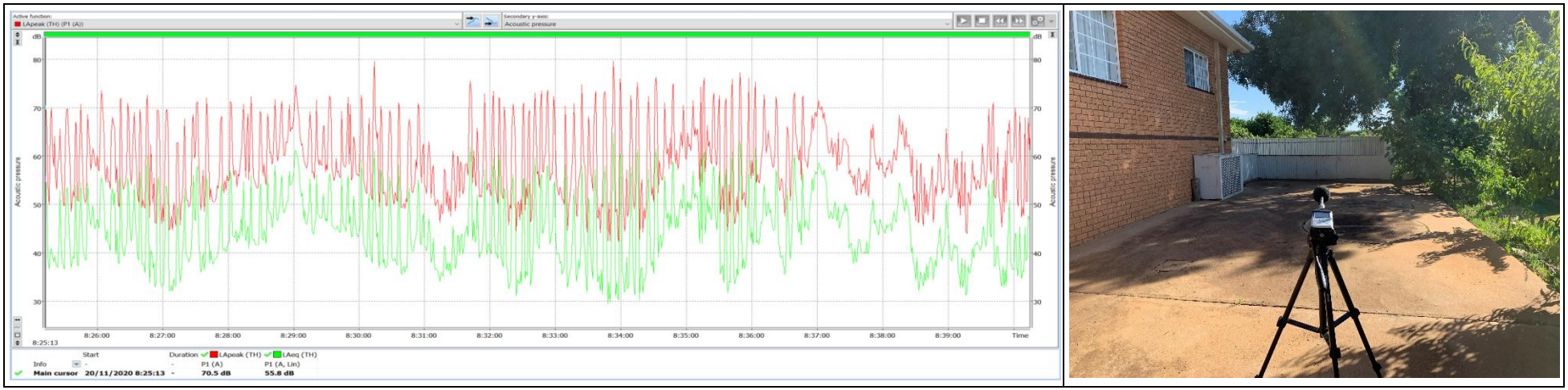

Figure 9 – Sensitive Receiver 3 Morning

MIDDAY

The noise logger was positioned in the same location as for the morning period as shown in Figure 10 below.

A vehicles passed the residence on Slopes Road at 11:10, and two light vehicles passed at 11:13 and 11:17. The dominant background noise was vehicle traffic emitted from main roads, south of the Tharbogang area. Noise from the landfill was audible. The L_{Aeq} (15 min) for the period was 34.9 dB, which is just below the 35 L_{Aeq} (15 min) assessment criterion.

Figure 10 – Sensitive Receiver 3 Midday

AFTERNOON

The noise logger was positioned in the same location at front of the residence, just off Slopes Road. The dominant background noise source was the drone of traffic from the southwest. The dominant foreground noises were wind in the trees. An aeroplane passed overhead at 4:44pm. The L_{Aeq} (15 min) was 49.5 dB, above the 35 L_{Aeq} (15 min) assessment criterion.

Figure 11 – Sensitive Receiver 3 Afternoon

Sensitive Receiver 4

This sensitive receiver was located approximately 280 m off Slopes Road and approximately 1757 m from the Tharbogang Quarry. The dwelling was embedded within orange orchard with an internal access road connecting it with sensitive receiver 5.

MORNING

The noise logger was positioned facing east into orange orchard, approximately 20 m from the residence as shown in Figure 12 below. Music from the premises included music playing in the shed nearby and sprinklers on the lawn. The pool pump and birds also contributed to local noise. A light vehicle passed the property at 8:56am. Audible background noise included the distant drone of continuous traffic only. The L_{Aeq} (15 min) for the period was 40.0 dB, which was over the 35 L_{Aeq} (15 min) criterion.

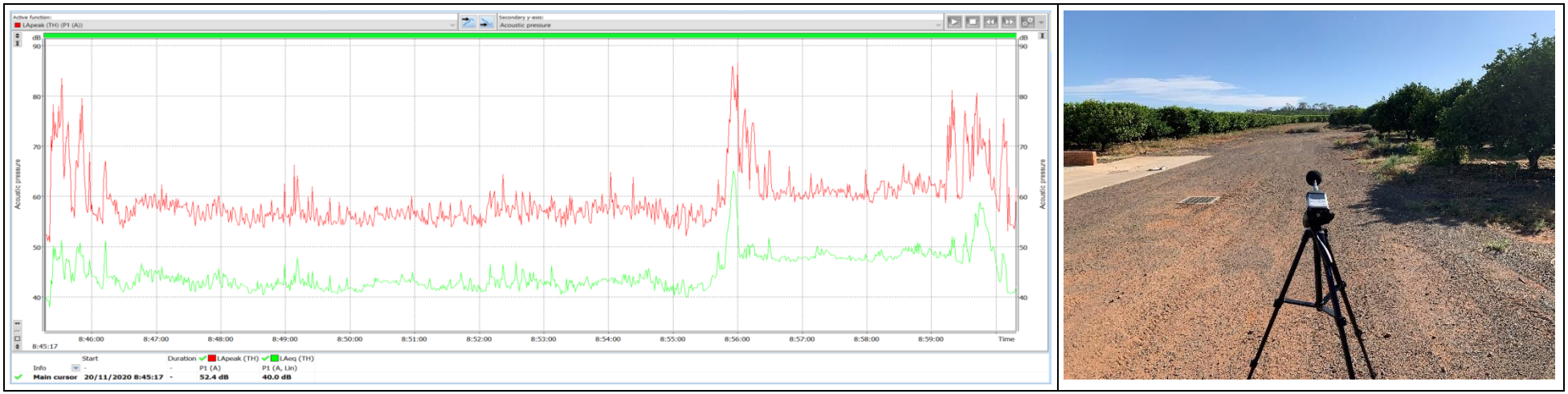

Figure 12 – Sensitive Receiver 4 Morning

MIDDAY

The noise logger was positioned in the same location, facing northeast, approximately 20 m from the eastern external wall of the residential building. The dominant source of foreground noise was the hum on an air conditioner from the residence and infrequent road noise from vehicles on Slopes Road. A light vehicle arrived at the dwelling at 11:32am. The L_{Aeq} (15 min) for the period was 34.2 dB, which was just under the 35 L_{Aeq} (15 min) criterion.

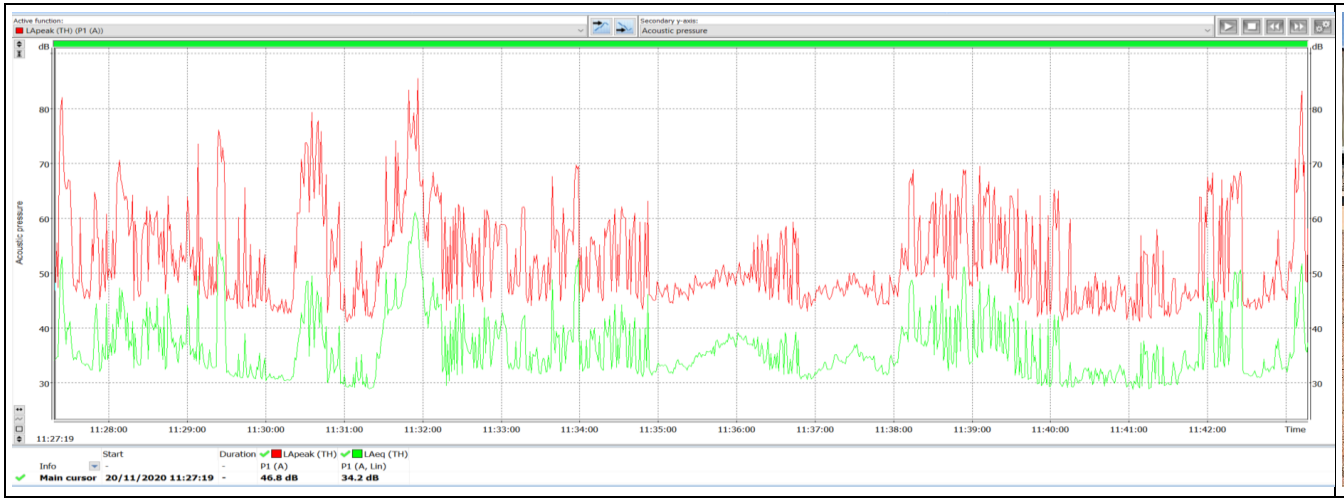

Figure 13 – Sensitive Receiver 4 Midday

AFTERNOON

The noise logger was placed closer to the residence, facing northeast, approximately 10 m from the eastern external wall as shown in Figure 14. The dominant background noise source was heavy vehicle movements from the quarry as well as the drone of vehicles on main roads to the south. The foreground was generally quiet with birds chattering throughout the monitoring period. The L_{Aeq} (15 min) was 31.5 dB, under the assessment criterion of 35 L_{Aeq} (15 min).

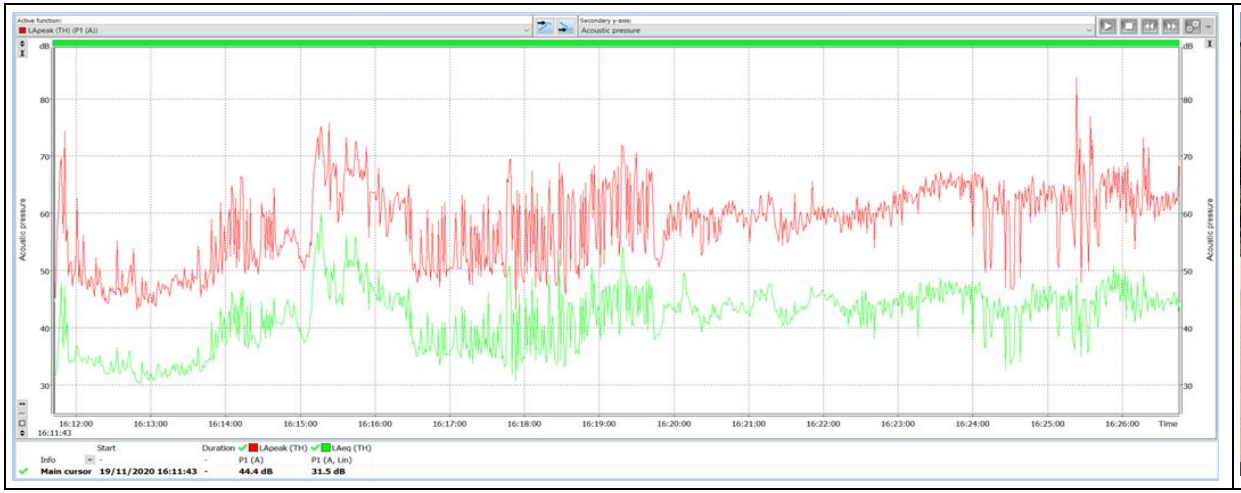

Figure 14 – Sensitive Receiver 4 Afternoon

Sensitive Receiver 5

This sensitive receiver was located within orange orchard, approximately 350 m off Slopes Road and approximately 1020 m from Tharbogang Quarry. The residential building is also within the same compound as two large sheds and a commercial refrigerator, which was operational and emitting an audible 'hum' throughout the day.

MORNING

The noise logger was positioned facing northeast 7 m southwest of the residential building as shown in Figure 15. The constant hum of the commercial fridge 30 m from the house and bird activity were audible in the foreground and a dog barked loudly at 9:09am. The dominant background noise was road traffic from Kidman Way. Vehicles at the landfill were inaudible. The L_{Aeq} (15 min) over the period was 39.5 dB, which is above the 35 L_{Aeq} (15 min) assessment criterion.

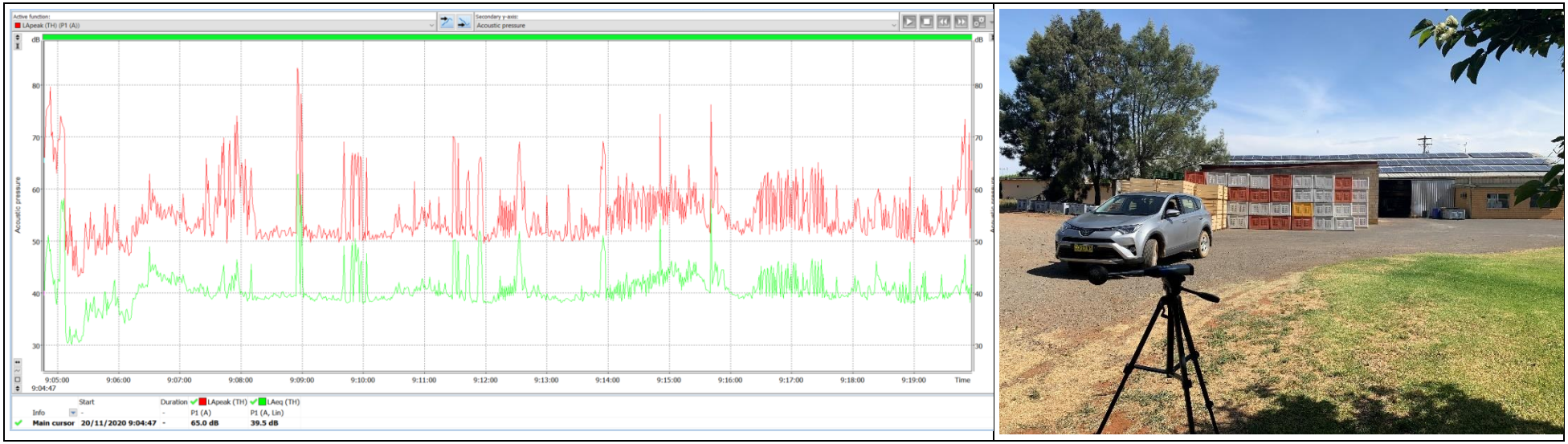

Figure 15 – Sensitive Receiver 5 Morning

MIDDAY

The noise logger was positioned facing northeast 10 m southwest of the residential building. The constant hum of the commercial fridge 30 m from the house and a tap was also running. The drone of traffic from main roads south of the location was also audible at low levels. The L_{Aeq} (15 min) over the period was 52.8 dB, which is above the 35 L_{Aeq} (15 min) assessment criterion.

Figure 16 – Sensitive Receiver 5 Midday

AFTERNOON

The noise logger was positioned 10 m southeast of the residence, facing northeast as shown in Figure 17.

Audible background noise was limited to traffic from the local road network. The dominant foreground noises were rustling lives, birds singing and the commercial refrigerator, located 30 m east of the residence. The L_{Aeq} (15 min) was 58.5 dB, which exceeded the assessment criterion of 35 L_{Aeq} (15 min).

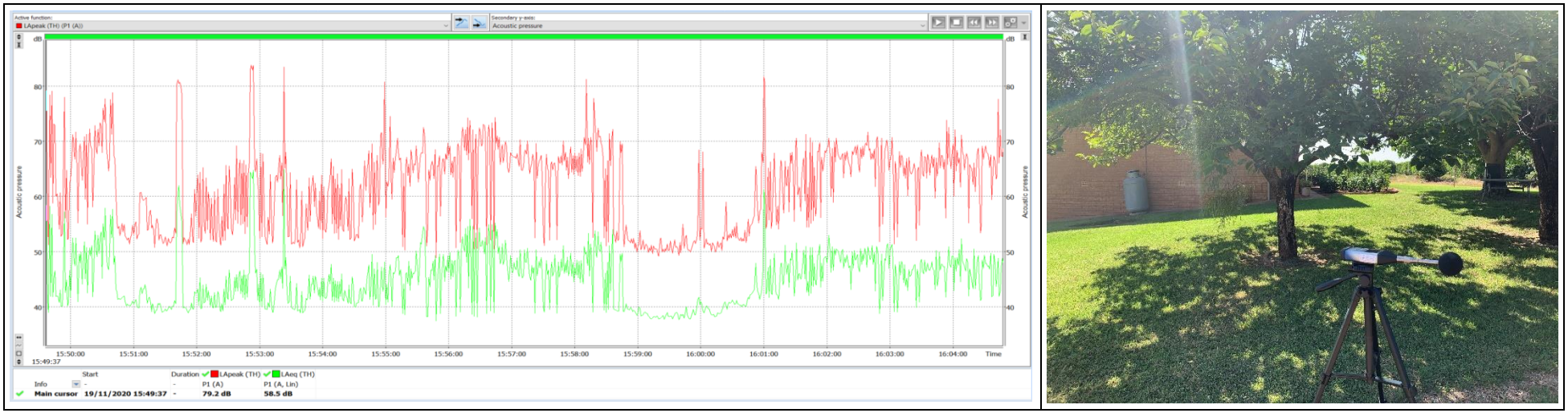

Figure 17 – Sensitive Receiver 5 Afternoon

Sensitive Receiver 6

This sensitive receiver was located on the corner of Slopes Road and Hillside Drive. A condition of approval for the quarry and landfill operations was that noise monitoring at this sensitive receiver should include traffic noise monitoring of heavy vehicles on Hillside Drive. The resident may then be provided with the opportunity to have amelioration works done on their property, should the monitoring demonstrate that the assessment criteria is exceeded.

MORNING

The noise logger was positioned within the yard, approximately 25 m southeast of the nearest external wall of the building as shown in Figure 18. The dominant noise in the foreground was the resident's dogs barking for the first four minutes prior to 9:27am. The other dominant noise was a heavy vehicle movement on Hillside Drive at 9:27am. Background noise from the landfill was inaudible. Traffic noise from the local road network was consistent throughout the monitoring period. The L_{Aeq} (15 min) was 68 dB, well above the 35 $L_{Aeq\ (}$15 min) assessment criterion.

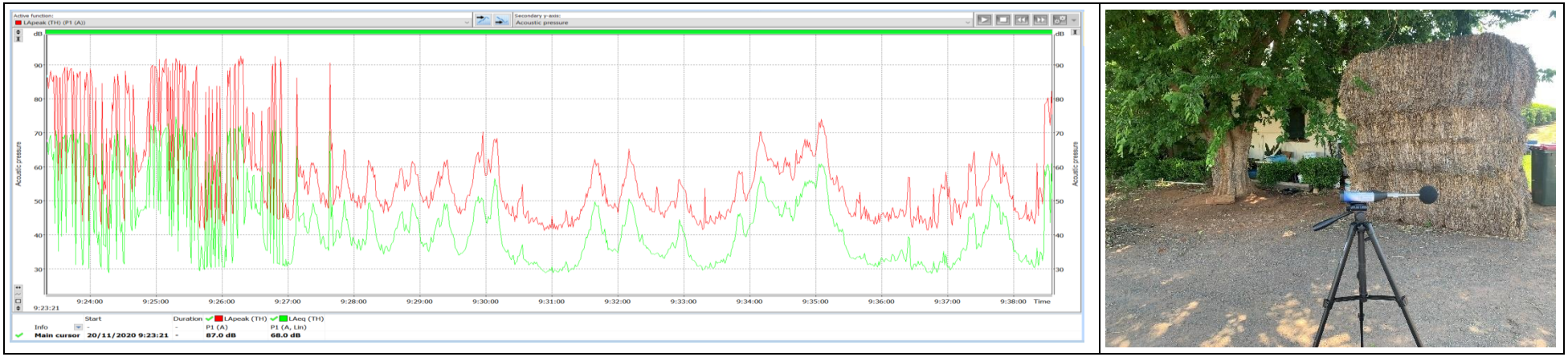

Figure 18 – Sensitive Receiver 6 Morning

MIDDAY

The noise logger was placed in the orange orchard adjacent to the residence, facing northeast towards the quarry/landfill as shown in Figure 19. The dominant noise source was the dog barking for the first five minutes, followed by birds and the resident of the house talking at 12:13pm. The occupants switched on their air conditioning unit at 12:15pm. Heavy and light vehicles passed along Kidman Way at 12:16pm. The L_{Aeq} (15 min) over the period was 41.1 dB, which is over the 35 L_{Aeq} (15 min) assessment criterion.

Figure 19 – Sensitive Receiver 6 Midday

AFTERNOON

The noise logger was placed in the orange orchard adjacent to the residence, facing northeast towards the quarry/landfill and Hillside Drive as shown in Figure 20.

The dominant background noise source was the drone of traffic from main roads south of the location. Light vehicles passed at 15:30pm and 15:31pm. Noise from the landfill was inaudible. The L_{Aeq} (15 min) was 52.9 dB, well above the assessment criterion of 35 L_{Aeq} (15 min).

Figure 20 – Sensitive Receiver 6 Afternoon

Landfill Upper Level

MORNING

The noise logger was positioned facing onto the landfill at the approximately 100 m from the edge of the tip face. At the time of monitoring the compactor was not working, two heavy vehicles arrived onsite to deliver waste and one light vehicle entered and exited the site. Traffic noise from the local road network was audible in the background throughout the monitoring period. The L_{Aeq} (15 min) for the monitoring period was 43.9 dB, which was above the 35 L_{Aeq} (15 min) assessment criterion but noticeably lower than the morning L_{Aeq} (15 min) recorded for receivers 2, 3 and 6.

Figure 21 – Landfill Morning

MIDDAY

The noise logger was again positioned facing onto the landfill at the approximately 100 m from the edge of the tip face. No activity occurred at the landfill when monitoring commenced. The dominant noise was background traffic from the local road network. The L_{Aeq} (15 min) for the period was 29.9 dB, which was below the 35 L_{Aeq} (15 min) assessment criterion and the L_{Aeq} (15 min) recorded at all receivers.

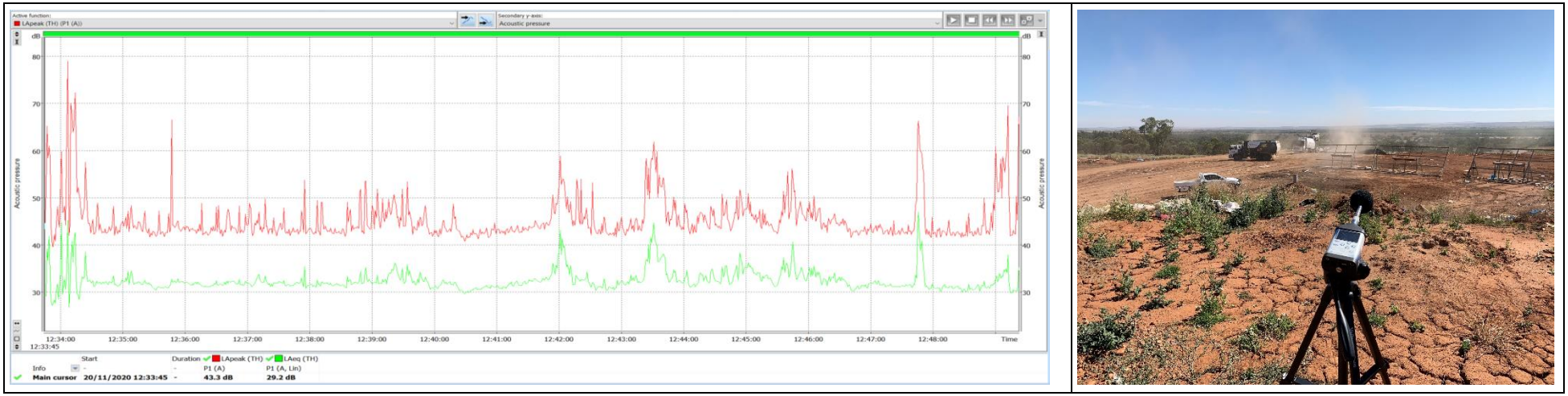

Figure 22 – Landfill Midday

AFTERNOON

The noise logger was again positioned facing northwest onto the landfill at the approximately 100 m from the edge of the tip face. The compactor was working during the afternoon monitoring period. Two heavy vehicles delivered waste at 3:07pm and 3:11pm. The L_{Aeq} (15 min) for the period was 52.3 dB, which well above the 35 L_{Aeq} (15 min) assessment criterion and the L_{Aeq} (15 min) recorded at all receivers during the afternoon except receiver 5.

Figure 23 – Landfill Afternoon