

1 February 2019



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John Roser
Waste Operations Manager
Griffith City Council

John.Roser@griffith.nsw.gov.au

Dear John,

RE – Noise Monitoring – Tharbogang Quarry Operations 18-393

Impact on six sensitive receivers in close proximity to quarry 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 and Environment (DP&E) has issued Conditions of Approval (CoA) for the site that require a noise and vibration monitoring program to be prepared and implemented. Council has contracted NGH Environmental to monitor operational noise from the Tharbogang Quarry/Landfill.

Noise monitoring and reporting aims to compare the noise from quarry operations with its conditional limits as described in the CoAs. This will compare monitored noise levels at six sensitive receivers adjacent to the facility (Appendix A) with the noise management levels.

This letter details the results of the noise monitoring conducted at the six sensitive receivers. Monitoring was conducted at three separate times during operating hours on 11 December 2018. Both the quarry and the landfill were in operation during monitoring.

NOISE MONITORING

An NGH Environmental consultant 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, mounted on a tripod with the microphone facing the main noise source(s).

The noise logger was field 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. These noise sources included 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 were completed for each monitoring period and are provided in Appendix C.

WEATHER CONDITIONS

The weather in Tharbogang on 11 December 2018 was fine and sunny with cloud cover ranging from 60% to 80%. There was very 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.

Table 1 Griffith weather temperature and wind data.

Time	Temp °C	Direction	Wind			
			Average Speed km/h	Average Speed m/s	Gust km/h	Gust m/s
10:00am	25.1	NE	11	3.1	17	4.7
10:30am	27.8	N	17	4.7	28	7.8
11:00am	28.1	N	19	5.3	26	7.2
11:30am	29.6	NW	17	4.7	26	7.2
12:00pm	28.7	NW	19	5.3	22	6.1
12:30pm	29.1	NW	17	4.7	26	7.2
01:00pm	29.8	NNW	15	4.2	24	6.7
01:30pm	30.9	NW	13	3.6	24	6.7
02:00pm	31.3	NW	15	4.2	22	6.1
02:30pm	32.1	NNW	11	3.1	24	6.7
03:00pm	32.5	WNW	13	3.6	22	6.1
03:30pm	32.1	NNW	11	3.1	19	5.3
03:56pm	32.5	NNW	28	7.8	37	10.3
04:00pm	32	NNW	28	7.8	37	10.3
04:30pm	32.4	N	22	6.1	33	9.2
05:00pm	32	NNW	22	6.1	35	9.2

NOISE MONITORING RESULTS

The development consent (06_0034MOD2) CoA 28 describes the impact assessment criteria as:

Noise Impact Assessment Criteria

28. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1:

Table 1: Operational noise impact assessment criteria dB(A)

Location and Locality	Day <i>L_{Aeq}(15 min)</i>	Evening <i>L_{Aeq}(15 min)</i>	Night <i>L_{Aeq}(15 min)</i>
All Surrounding Sensitive Receivers	35	35	35

The noise impact assessment criteria is 35 dB(A)_{L_{Aeq}} for all times the Quarry is operational. A comparison between the impact assessment criteria and the monitored _{L_{Aeq}(15 min)} noise levels for each location and period is provided below (Table 2).

The monitored noise levels exceed the noise impact assessment criteria at each location for every monitoring period. The dominant audible noise sources at each location varied throughout the day. In most cases the quarry and landfill was not audible, or just audible above other background noise. The sources of audible noise dominating the monitoring including road traffic, dogs barking, cicadas and orchard machinery associated with the sensitive receivers.

Noise monitoring was undertaken 60 m from the quarry face between 13:17 and 13:32 when the facility was fully operational. At 60m from the quarry face the noise level was recorded as 44.3 dB(A) $L_{Aeq(15\text{ min})}$. The contribution that 44.3 dB(A) (at site) would make at the nearest receiver(650m) is 23 dB(A). When 23 dB(A) is added to the typical rural background noise level of 30 dB(A), it is equal to 31 dB(A).

Noise monitoring datasheets are provided in Appendix C.

Table 2 Noise monitoring results summary

	Monitored Noise Levels dB(A) $L_{Aeq(15\text{min})}$			Distance from facility to receiver (m)
	Morning	Midday	Afternoon	
Assessment Criteria	35	35	35	-
Sensitive receiver 1	36.4	51.6	52.0	1020
Sensitive receiver 2	55.2	54.4	43.4	1300
Sensitive receiver 3	49.9	46.0	46.1	1000
Sensitive receiver 4	42.3	47.8	40.3	650
Sensitive receiver 5	-	40.6	43.6	690
Sensitive receiver 6	65.0	53.8	67.3	1250
Quarry Face	-	44.3	-	60

IMPACT OF QUARRY ON SENSITIVE RECEIVERS

The impact of quarry and landfill noise emission was shown to be relatively minor when attenuated for distance. The site observations at the sensitive receivers reinforce the notion that the facility noise impact is a minor contributor to ambient noise levels. While the recorded noise levels at each of the sensitive receivers ($L_{Aeq(15\text{ min})}$) exceeded the assessment criteria of 35 dB(A) $L_{Aeq(15\text{ min})}$, it is likely that this was due to a range of noise sources at the sensitive receiver sites. As such it is likely that noise from the quarry was not consistently the main contributor to noise at any of the sensitive receiver locations.

Yours sincerely,



B Poulton
Environmental Consultant

NGH Environmental
Ph 6923 1564

APPENDIX A SENSITIVE RECEIVERS MAP

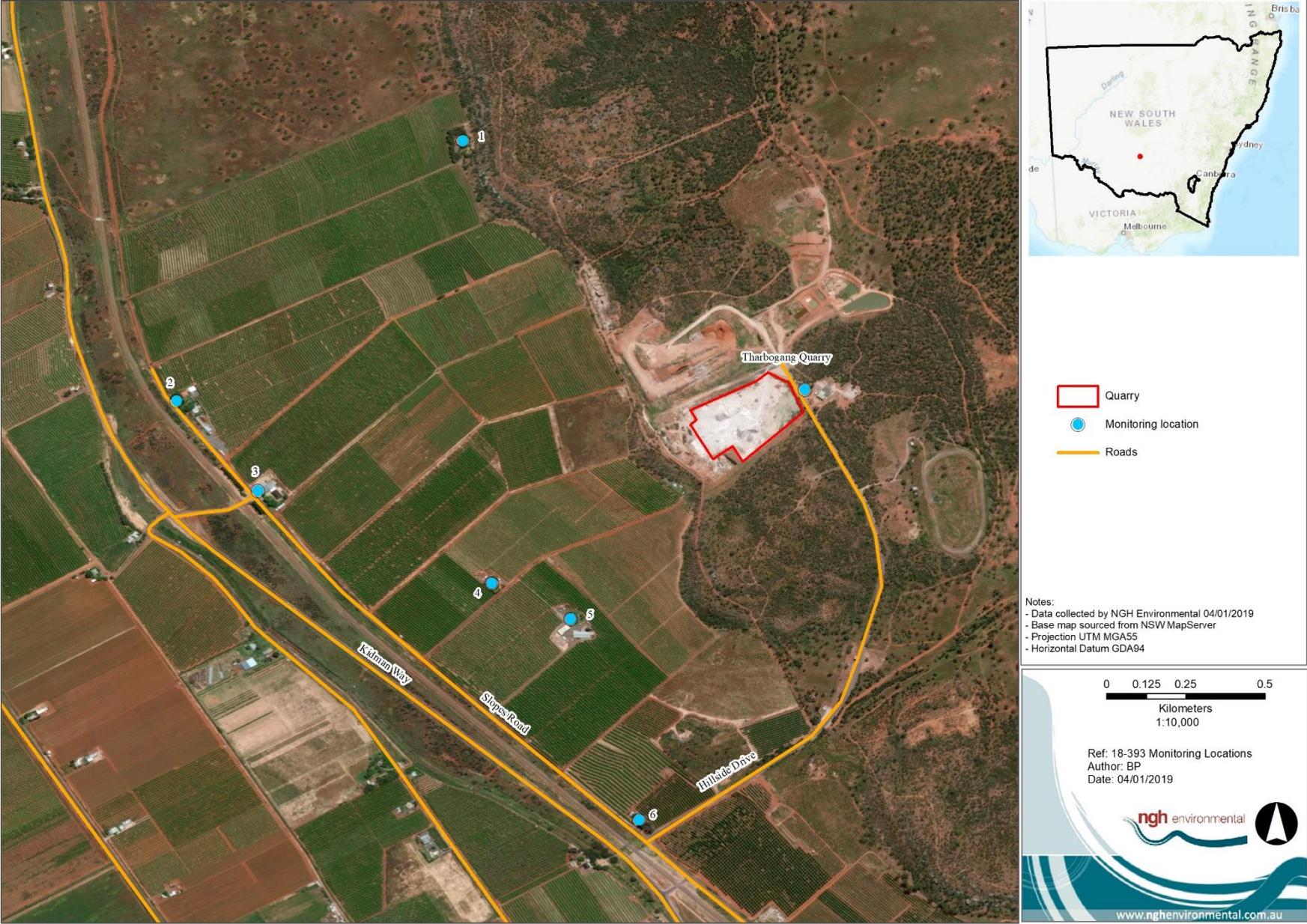


Figure 2- Location of sensitive receivers from Tharbogang Quarry

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 an orange orchard to the south. A rocky hillside was located between the house and the quarry to the southeast.

Morning

There was no audible human made noise emitted from the residence, except at 10:55am when the occupant left the premises in her car. Rustling leaves were the dominant foreground noise, while the dominant background noise was the traffic from Kidman Way, to the southwest. Heavy vehicles and noise from the crushing plant at the quarry were not audible. The noise level recorded by the attended monitoring was 36.4 dB(A) L_{Aeq} (15 min), slightly over the 35 dB(A) noise impact assessment criteria.



Figure 3 – Sensitive Receiver 1 Morning

Midday

The noise logger was positioned facing north, 7 m from the eastern wall of the residence as shown in Figure 4.

The dominant foreground noise was the high-pitched hum of cicadas coming from vegetation on the rocky hillside directly northeast of the location. There was also a gentle breeze that caused vegetation surrounding the house to rustle periodically. Additional background noise was traffic coming from Kidman Way past the orchards. Heavy vehicles or activity from the crusher were not audible. The recorded noise level for the period was 51.6 d(B(A) L_{Aeq} (15 min), over the 35 dB(A) noise impact assessment criteria.



Figure 4 – Sensitive Receiver 1 Middy

Afternoon

The noise logger was positioned approximately 6 m from the eastern wall of the residence facing northeast (Figure 5). The background noise included traffic southeast of the location, birds and the rustling of leaves from trees surrounding the residence. The recorded noise level for the period was 52.0 d(B(A) L_{Aeq} (15 min), over the 35dB(A) noise impact assessment criteria.

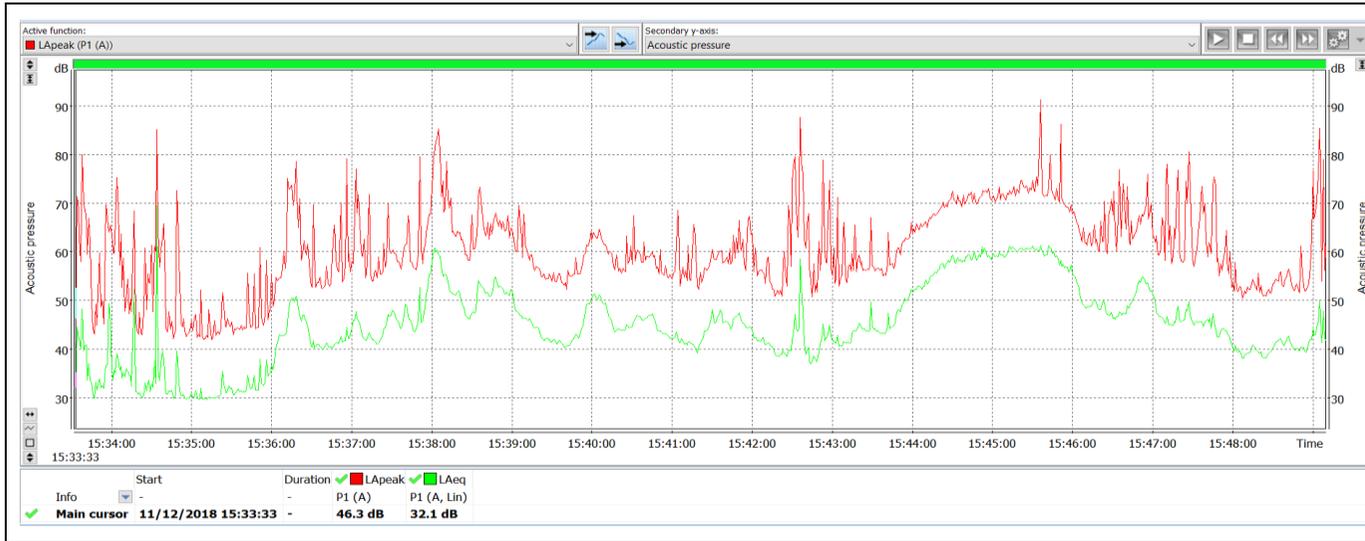


Figure 5 – Sensitive Receiver 1 Afternoon

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 quarry, while increasing foreground noise emissions from birds, rustling leaves and insects.

Morning

The noise logger was positioned at the base of the driveway, approximately 25 m from the southwestern wall of the dwelling, facing northeast as shown in Figure 6.

The dominant foreground noises were vehicles passing along Slopes Road including heavy vehicles at 10:22am and 10:23am, a tractor at 10:20am and a resident on their lawnmower at 10:28am. A group of Australian Ravens was also active during the monitoring, emitting the second loudest source of foreground noise. Background from the landfill/quarry was faintly audible throughout the monitoring period in the form of a continuous drone of heavy vehicles. The dominant background noise was the drone of light vehicle traffic from main roads to the southeast. The noise level recorded by the attended monitoring was 55.2 dB(A) L_{Aeq} (15 min), over the 35 dB(A) noise impact assessment criteria.



Figure 6 – Sensitive Receiver 2 Morning

Midday

The noise logger was set up in the same location as for the morning session at the base of the driveway, 20 m from the residential building, facing east.

The dominant foreground noise source was a small tractor mowing the verge on the other side of Slope Road throughout the monitoring period. A chainsaw was audible in the distance at 12:29pm and a tractor was used in the orange orchard behind the residence from 12:38pm. Crushing and heavy vehicles from the quarry were not audible. The dominant background noise was main road traffic noise, which remained consistent throughout the monitoring period. The noise level recorded by the attended monitoring was 54.4 dB(A) L_{Aeq} (15 min), over the 35 dB(A) noise impact assessment criteria.

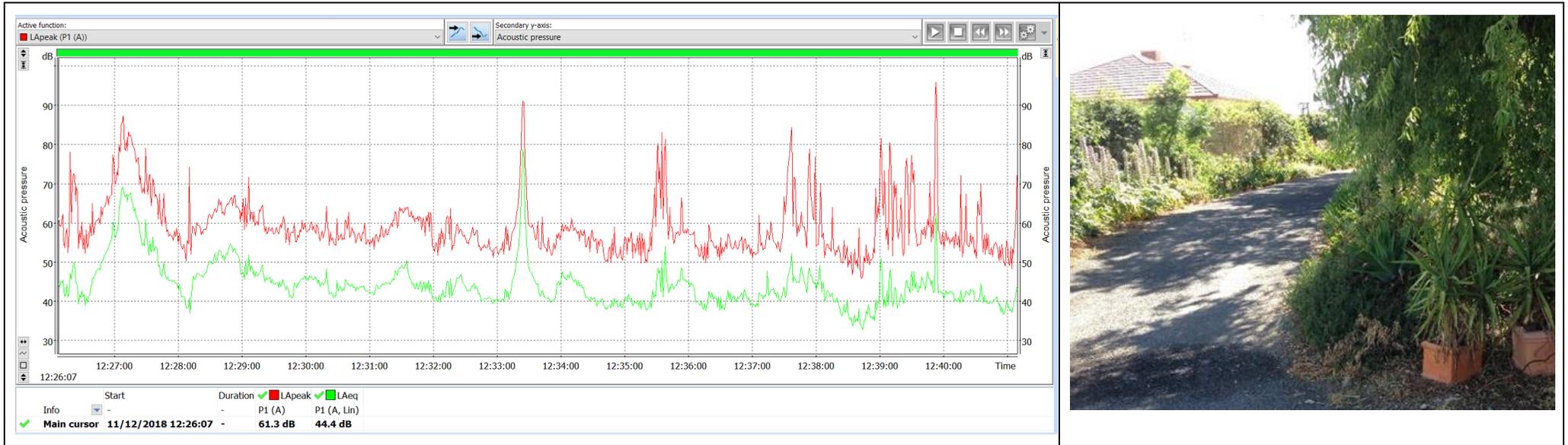


Figure 7 – Sensitive Receiver 2 Middy

Afternoon

The noise logger was set up in the same location as for the morning session at the base of the driveway, 20 m from the residential building, facing east.

The dominant background noise was from main roads to the southeast, while heavy vehicles from the quarry were faintly audible. A vehicle passed along Slopes Road at 3:24pm. The noise level recorded by the attended monitoring was 43.4 dB(A) L_{Aeq} (15 min), over the 35 dB(A) noise impact assessment criteria.

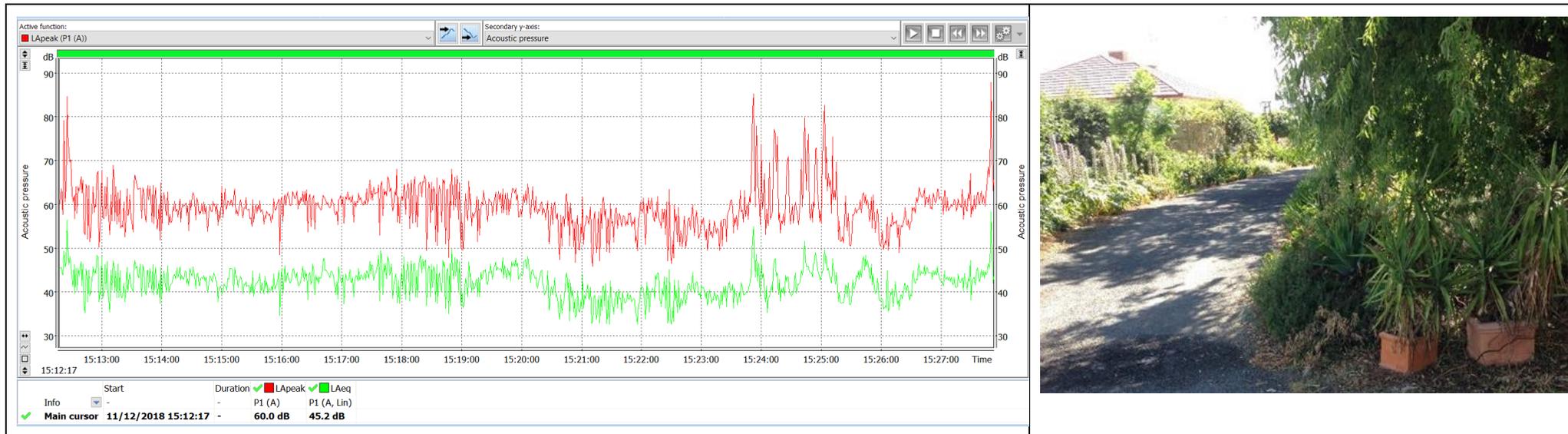


Figure 8 – Sensitive Receiver 2 Afternoon

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, 20 m from the southern external wall of the residence.

The dominant 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 several light vehicle movements on Slopes Road at 9:57am, 10:00am and 10:10am. Heavy vehicle movements from the quarry site were barely audible throughout the monitoring period. The noise level recorded by the attended monitoring was 49.9 dB(A) $L_{Aeq(15\text{ min})}$, over the 35 dB(A) noise impact assessment criteria.

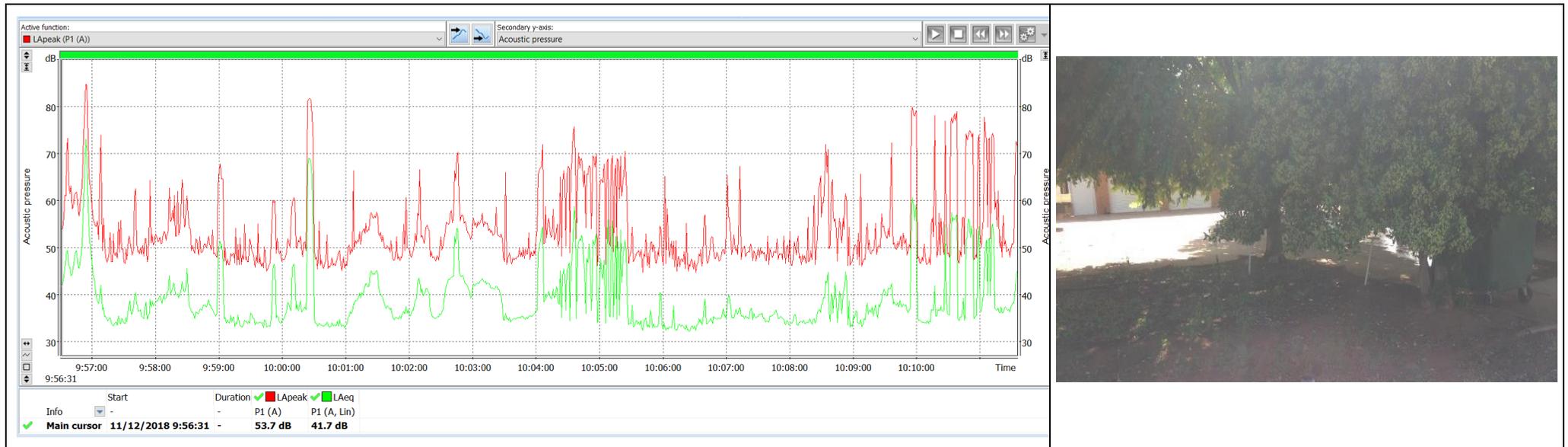


Figure 9 – Sensitive Receiver 3 Morning

Midday

The noise logger was positioned facing northeast on the edge of Slopes Road, 20 m southeast of the residential building as shown in Figure 10 below.

Gardens were being watered from above ground sprinklers during the monitoring period. The hum of an air conditioner or refrigerator was also audible from the premises. The dominant background noise was vehicle traffic emitted from main roads south of the Tharbogang area. Neither heavy vehicles nor the crusher from the quarry were audible over the monitoring period. The noise level recorded by the attended monitoring was 46.0 dB(A) $L_{Aeq(15\text{ min})}$, which is over the 35 dB(A) noise impact assessment criteria.



Figure 10 – Sensitive Receiver 3 Midday

Afternoon

The noise logger was positioned 7 m from the north eastern wall of the residence and 10 m from the edge of Slopes Road, facing east.

The dominant background noise source was the drone of traffic from the southwest. The dominant foreground noise source was bird chatter in the garden. Heavy vehicles from the quarry were barely audible. The noise level recorded by the attended monitoring was 46.1 dB(A) $L_{Aeq (15 \text{ min})}$, above the 35 dB(A) noise impact assessment criteria.



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 orchards with an internal access road connecting it with sensitive receiver 5.

Morning

The noise logger was positioned facing east into the orange orchard, 25 m from the residence as shown in Figure 12 below. A map of the location is provided in noise monitoring datasheets (Appendix C).

The loading of oranges into a truck for transport was being undertaken at sensitive receiver 5 throughout the monitoring period, which provided the dominant source of background noise. An operational hand tool could also be heard from one of the neighbouring properties. Occupant activities occurred at the residence between 9:37am and 9:39am, including cleaners loading materials into their car. Human activity at the location including the opening and closing of doors also occurred between 9:44am and 9:50am. Heavy vehicles from the quarry provided the dominant background noise source throughout the monitoring period. The noise level recorded by the attended monitoring was 42.3 dB(A) L_{Aeq} (15 min), over the 35 dB(A) noise impact assessment criteria.

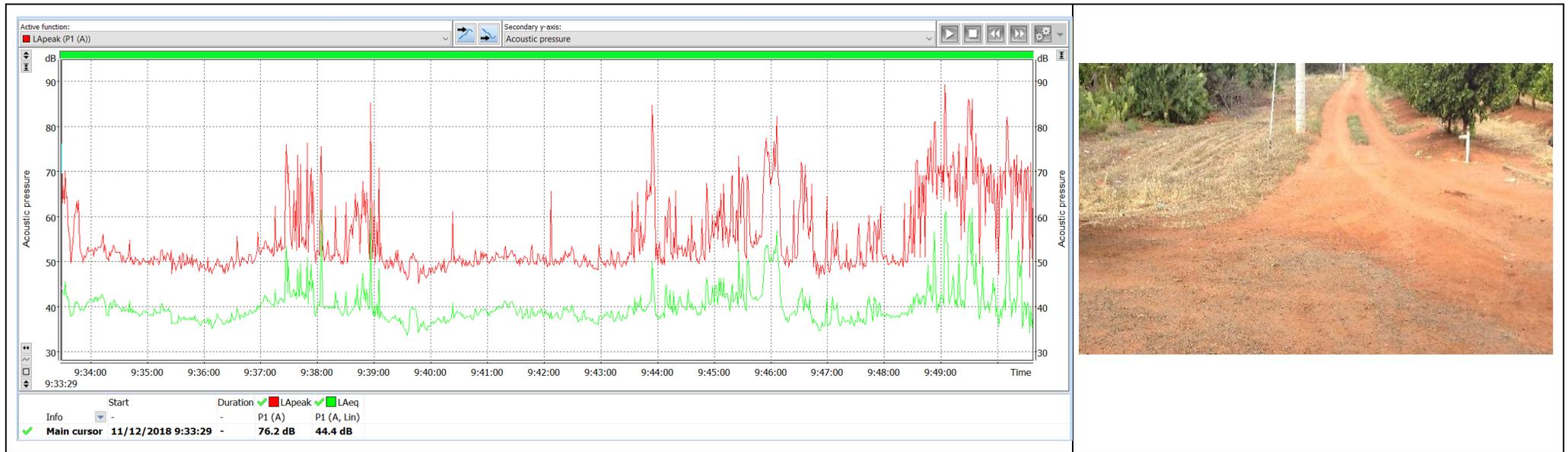


Figure 12 – Sensitive Receiver 4 Morning

Midday

The noise logger was positioned facing northeast, approximately 5 m from the eastern external wall of the residential building.

The dominant source of noise during the monitoring period was a tractor moving within the orange orchard north and east of the residence. A light vehicle arrived at the dwelling at 11:53am. The two spikes between 11:53am and 11:56am were the car door opening and closing. The hum of heavy vehicles from the quarry was audible throughout the monitoring period as was the drone of traffic from main roads south of the location. The noise level recorded by the attended monitoring was 47.8 dB(A) LAeq (15 min), over the 35 dB(A) noise impact assessment criteria.

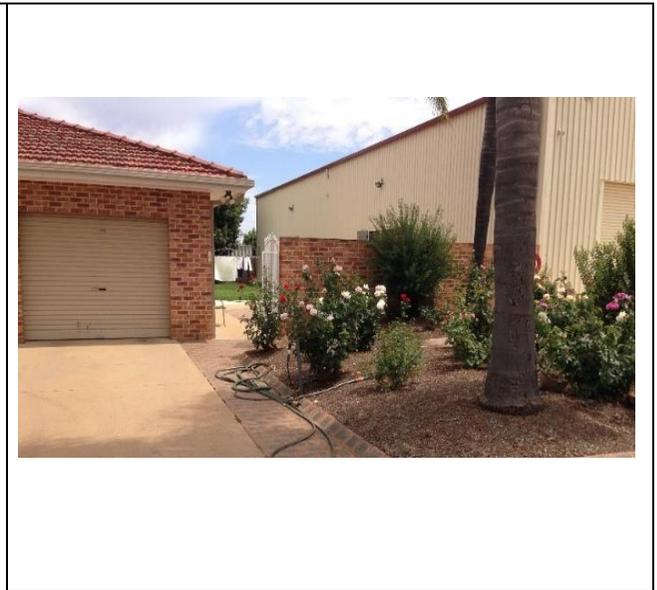
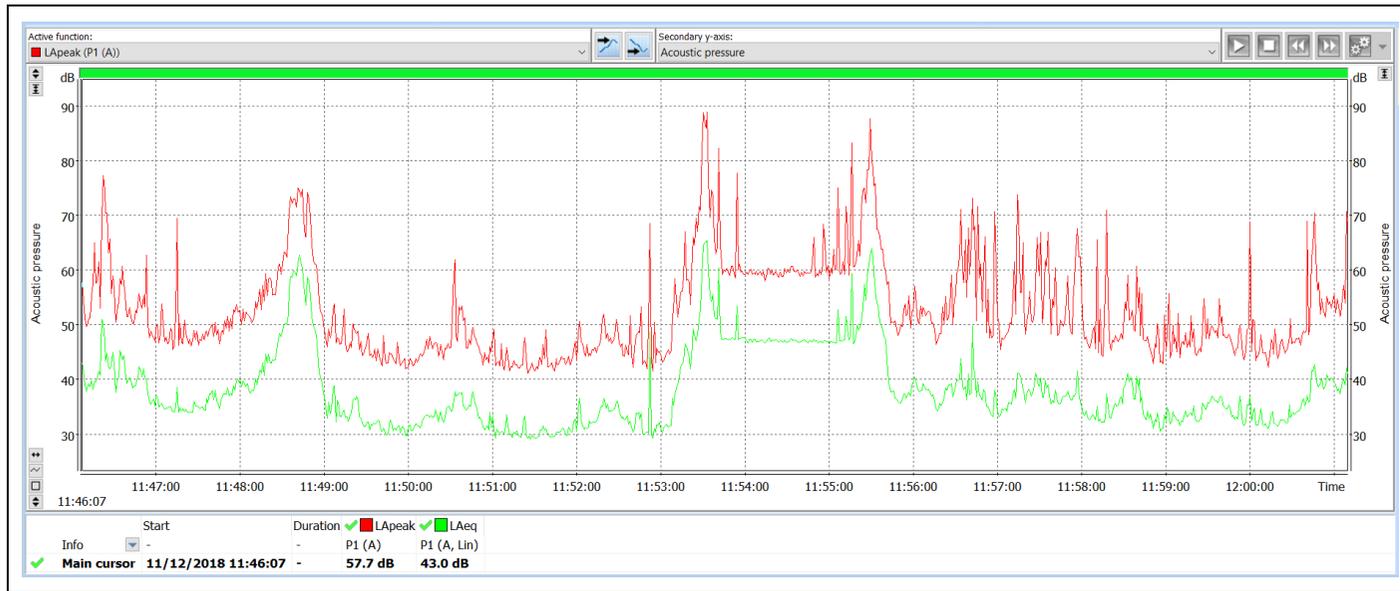


Figure 13 – Sensitive Receiver 4 Midday

Afternoon

The noise logger was positioned 6 m from the eastern wall of the residence, facing northeast 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 noise level recorded by the attended monitoring was 40.3 dB(A) L_{Aeq} (15 min), over the 35 dB(A) noise impact assessment criteria.



Figure 14 – Sensitive Receiver 4 Afternoon

Sensitive Receiver 5

This sensitive receiver was located within an 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

Noise monitoring was not undertaken at this location in the morning as the resident was loading oranges from the orchard into a heavy vehicle container for transport. This was a noisy activity including the use of a forklift, with a reverse alarm. The resident suggested that he would be finished in approximately 1 hour and to return after 11 am.

Midday

The noise logger was positioned facing northeast 6 m southwest of the residential building. The constant hum of the commercial fridge 30 m from the house was audible in the foreground. The dominant background noise was heavy vehicle movements from the quarry including high pitched reversing alarms. The drone of traffic from main roads south of the location were also audible but at levels below vehicles from the quarry. The noise level recorded by the attended monitoring was 40.6 dB(A) L_{Aeq} (15 min), which is above the 35 dB(A) noise impact assessment criteria.



Figure 15 – Sensitive Receiver 5 Midday

Afternoon

The noise logger was positioned 10 m southeast of the residence, facing northeast as shown in Figure 16.

The dominant background noise was the movement of heavy vehicles at the quarry including high pitched reversing alarms. The dominant foreground noises were air conditioning coming from the house and the commercial refrigerator located 30 m east of the residence. The noise level recorded by the attended monitoring was 43.6 dB(A) $L_{Aeq}(15 \text{ min})$, over the 35 dB(A) noise impact assessment criteria.



Figure 16 – Sensitive Receiver 5 Afternoon

Sensitive Receiver 6

This sensitive receiver was located on the corner of Slopes Road and Hillside Drive.

The CoA for noise monitoring at this sensitive receiver includes 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 30 m southeast of the nearest external wall of the building as shown in Figure 17. A layout diagram is provided in the noise monitoring datasheets (Appendix C).

The dominant noise in the foreground was the resident's dogs barking between 9:09am and 9:10am and then again between 9:21am and 9:24am. The other dominant noise was a heavy vehicle movement on Hillside Drive at 9:19am. Background heavy vehicle noise from the quarry was audible throughout the monitoring period and emissions seemed equal to traffic noise from nearby main roads including Kidman Way. The noise level recorded by the attended monitoring was 65.0 dB(A) $L_{Aeq(15\text{ min})}$, over the 35 dB(A) noise impact assessment criteria.

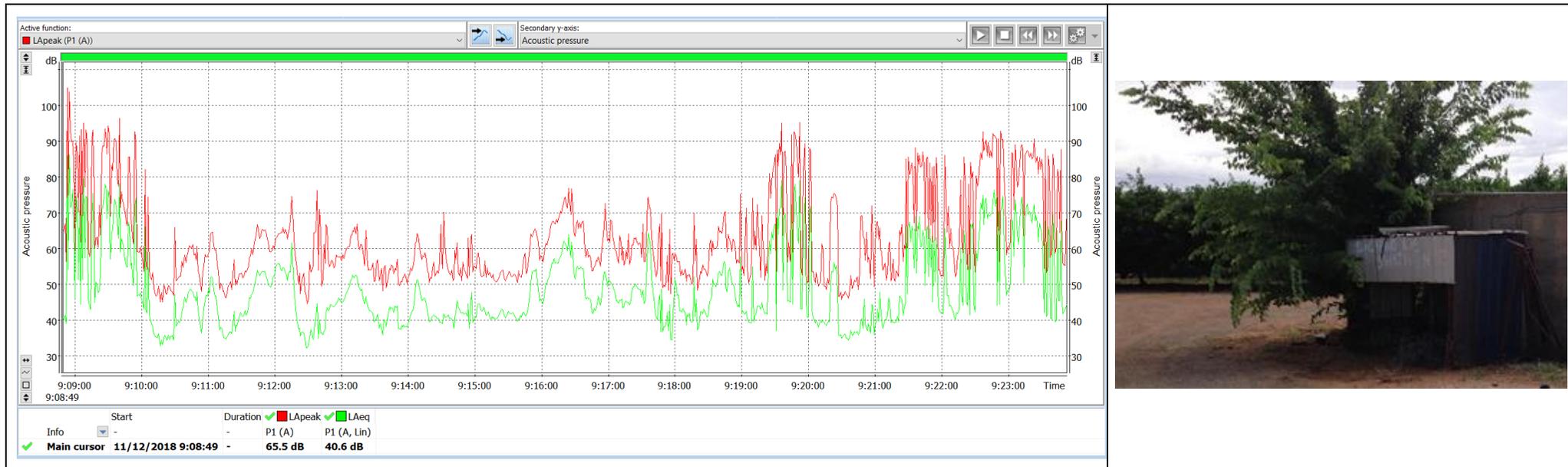


Figure 17 – Sensitive Receiver 6 Morning

Midday

The noise logger was placed approximately 20 m east of the residence, facing northeast towards the quarry.

The dominant noise sources were heavy vehicles from the quarry and vehicles on Slopes Road and Hillside Drive, including a heavy vehicle at 11:09am and a tractor passing at 11:11am. The occupant arrived home at 11:10am and asked questions about the monitoring. The occupant’s dogs also barked at various times during the monitoring period. The air conditioner mounted on the external wall produced a constant buzz in the foreground. The noise level recorded by the attended monitoring was 53.8 dB(A) $L_{Aeq(15\text{ min})}$, which is over the 35 dB(A) noise impact assessment criteria.



Figure 18 – Sensitive Receiver 6 Midday

Afternoon

The noise logger was again placed approximately 20 m east of the residence, facing northeast towards the quarry site and Hillside Drive.

The dominant background noise source was the drone of traffic from main roads south of the location. Heavy vehicle movements from the quarry were barely audible. The dogs were barking on the premises at 1:52 pm and 1:57pm. The resident came outside to talk at 1:58 pm. No heavy vehicles passed along Hillside drive during the monitoring period. The noise level recorded by the attended monitoring was 67.3 dB(A) L_{Aeq} (15 min), well above the 35dB(A) noise impact assessment criteria.

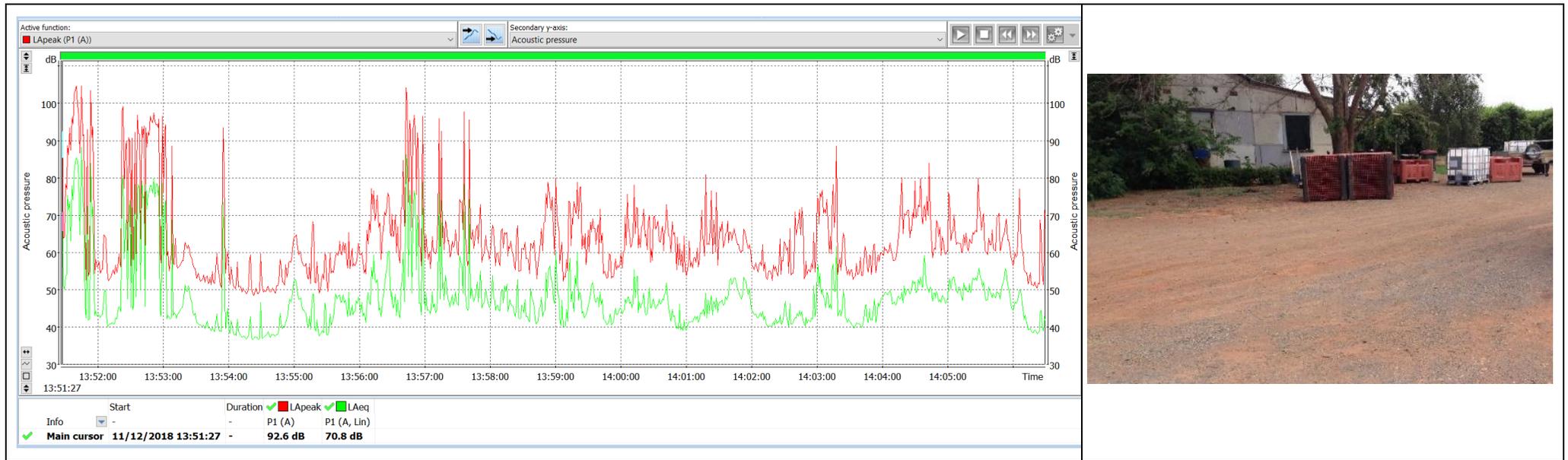


Figure 19 – Sensitive Receiver 6 Afternoon

Quarry Face

Midday

The noise logger was positioned facing southwest towards the quarry face on other side of the internal access road. A diagram is provided in Appendix C. The pit face was located 60 m from the noise logger.

The Quarry was approximately 60 m deep, which may have partially contained the noises emitted from heavy vehicles below. Staff conversing within the site office 30 m from the logger was also audible but less so than activities within the pit. No heavy vehicle movements associated with the landfill were observed during the monitoring period. The noise level recorded by the attended monitoring was 44.3 dB(A) L_{Aeq} (15 min), which was above the 35 dB(A) noise impact assessment criteria but notably lower than all of the midday readings except 40.6 dB(A) L_{Aeq} (15 min) recorded at sensitive receiver 5.

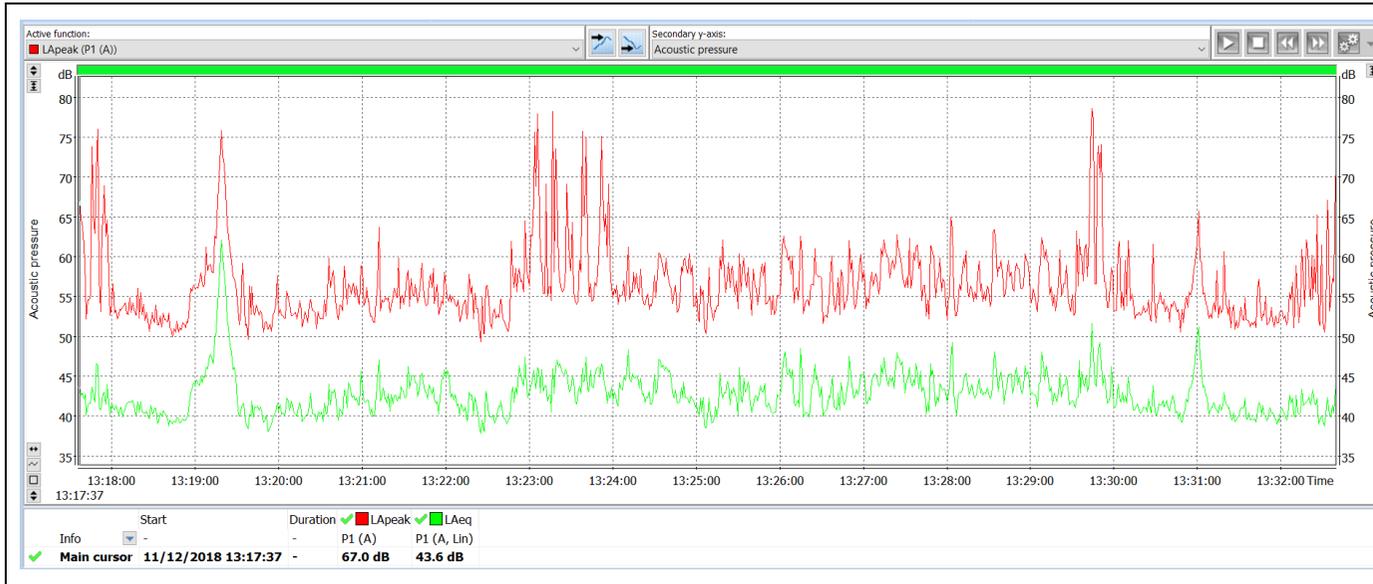


Figure 20 – Quarry Face Middy

APPENDIX C NOISE MONITORING DATASHEETS



SOUND LEVEL RECORDING FORM

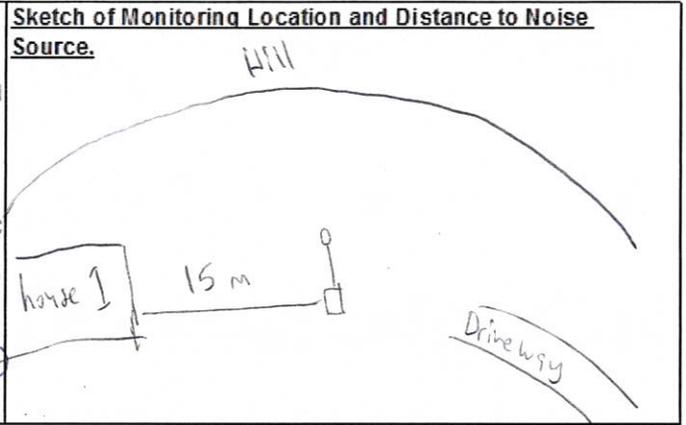
Project No: 19-662 Date 11/12/18
 Project Name: Tharbogang Quarry Page 1 of 18
 Client: Griffith City Council Performed by B. Paulson
 Site: House 1 Monitoring Position N

Sound level Meter Make and Model Svantek / Swan 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 10:41 Finish Time 10:56
 3. Calibration performed before monitoring Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA

L_{eq} = 36.4 L1 = 43.9 Lpeak = 81.8
L₁₀ = 38.9 Lmax = 53.7 L90 = 31.9
Lmin = 9.0 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring
 Wind Speed No wind - 4.5 m/second
 (note: max allowable = 5m/sec)
 Approximate Direction =
 Ambient Temperature = 27 °C
 Relative Humidity
 Cloud Cover 70 %
 Inversion Layer
 Others (fog, drizzle)



DISTINCTIVE NOISE SOURCES Dominant noise source Traffic from down (dispersed source)
Very quiet site, wind through trees and light traffic dominant noises. Property
might be vacant, no one home.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-622 Date 11/12/18
 Project Name: Tharbogang Quarry / Landfill Page 2 of 18
 Client: Griffith City Council Performed by B. Boulton
 Site: House 2 Monitoring Position NE

Sound level Meter Make and Model Svantek / Swan 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 10:20 AM Finish Time 10:35
 3. Calibration performed before monitoring Y Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA

L_{eq} = 55.2 $L1$ = 69.9 L_{peak} = 90.0
 L_{10} = 51.9 L_{max} = 74.4 L_{90} = 37.5
 L_{min} = 9.0 Height of meter 60cm (1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>No wind</u> m/second (note: max allowable = 5m/sec)	<p>North Source / Landfill</p> <p>House 2</p> <p>25m</p> <p>Slope road</p>
Approximate Direction = <u>N</u>	
Ambient Temperature = <u>27</u> °C	
Relative Humidity %	
Cloud Cover <u>70</u> %	
Inversion Layer <u>Y/N</u>	
Others (fog, drizzle)	

DISTINCTIVE NOISE SOURCES Dominant noise source Landfill / Birds / Vehicles
 Lots of little rangers calling in the background. Landfill activity - long noise in the background. Heavy vehicle on slope road. 10:22 + 10:23
 Tractor entered premises at 10:27. Residual on lawnmower at 10:28.

NOISE CHARACTER (broad band , impulsive, tonal) landfill long, vehicles impulsive.

METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-662 Date 11/12/18
 Project Name: Tharbogang Quarry / Landfill Page 3 of 18
 Client: Griffith City Council Performed by B. Poynton
 Site: House 3 Monitoring Position NE
 Sound level Meter Make and Model Sontek / Swan 959

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 9:56 Finish Time 10:11
 3. Calibration performed before monitoring Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA

L_{eq} = 49.9 $L1$ = 62.2 L_{peak} = 84.8
 L_{10} = 43.8 L_{max} = 73.9 L_{90} = 33.3
 L_{min} = 31.6 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>No wind</u> m/second (note: max allowable = 5m/sec) Approximate Direction = <u>N</u> Ambient Temperature = <u>27</u> °C Relative Humidity % Cloud Cover <u>70</u> % Inversion Layer <u>Y/N</u> Others (fog, drizzle)	<p style="text-align: right;">a Source (landfill)</p>

DISTINCTIVE NOISE SOURCES Dominant noise source Landfill / Road
light vehicles on Slopes Road, birds, landfill activities barely audible. Top 50% on Midman Way is the dominant noise source.

NOISE CHARACTER (broad band , impulsive, tonal) impulsive / tonal.
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

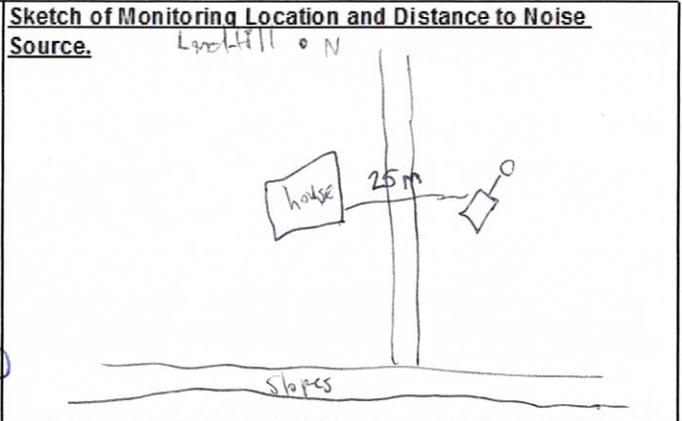
Project No: 18-662 Date 11/12/2018
 Project Name: Tharbogang Quarry / Landfill Page 4 of 18
 Client: Griffith City Council Performed by B. Poulton
 Site: House 4 Monitoring Position Northwest

Sound level Meter Make and Model Svantek / Super 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 9:33 Finish Time 9:48
 3. Calibration performed before monitoring Yes Y/N factor= dB(A)
 4. Calibration performed before monitoring Y/N factor= dB(A)

L_{eq} = 42.3 L1 = 52.2 Lpeak = 85.2
L₁₀ = 42.4 Lmax = 68.7 L90 = 36.2
Lmin = 32.6 Height of meter 60 cm (1.2m minimum)

Weather Conditions at time of Monitoring
 Wind Speed No wind m/second
 (note: max allowable = 5m/sec)
 Approximate Direction =
 Ambient Temperature = 27 °C
 Relative Humidity %
 Cloud Cover 70 %
 Inversion Layer Y/N
 Others (fog, drizzle)



DISTINCTIVE NOISE SOURCE S Dominant noise source Landfill

loudly crates of oranges is occurring at House 5. Can hear a neighbour's drill / hand tool in the background. Occupied moving stuff to and from car. House doors opening and closing.

NOISE CHARACTER (broad band , impulsive, tonal) tonal

METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

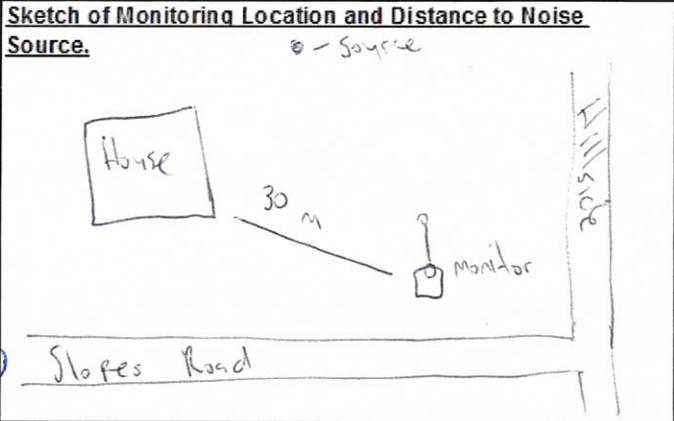
Project No: 18-662 Date 11/12/18
 Project Name: Tharbogang Quarry / Landfill Page 5 of 18
 Client: Griffith City Council Performed by B. P. Hill
 Site: House 6 Monitoring Position

Sound level Meter Make and Model Svantek/Sma957

1. Monitoring Interval 16 minutes mins (10 to 15 minutes standard)
 2. Start Time 9:08 am Finish Time 9:23
 3. Calibration performed before monitoring Yes. Y/N factor= dB(A)
 4. Calibration performed before monitoring Yes. Y/N factor= dB(A)

L_{eq} = 65.0 $L1$ = 77.7 L_{peak} = 105.0
 L_{10} = 59.2 L_{max} = 93.3 L_{90} = 37.0
 L_{min} = 31.1 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring
 Wind Speed No wind m/second
 (note: max allowable = 5m/sec)
 Approximate Direction =
 Ambient Temperature = 27 °C
 Relative Humidity %
 Cloud Cover 70 %
 Inversion Layer
 Others (fog, drizzle)



DISTINCTIVE NOISE SOURCES Dominant noise source Road including heavy vehicles
Road and dogs barking, landfill activity less audible than vehicles.

NOISE CHARACTER (broad band , impulsive, tonal) impulsive

METER SETTINGS (Linear, exponential; weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

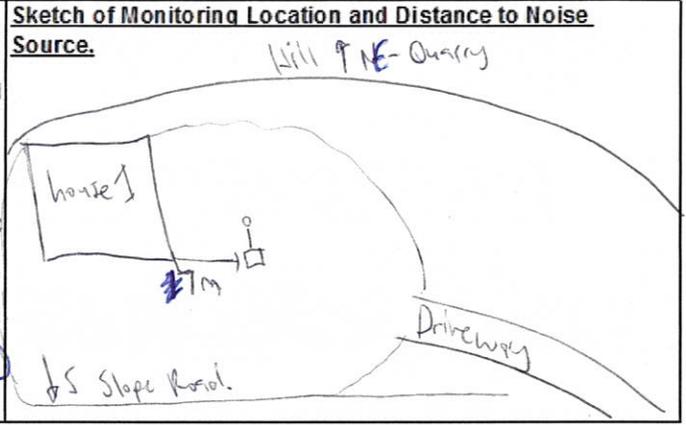
Project No: 18-383 Date 11/12/18
 Project Name: Tharbogang ~~City Council~~ Quarry Landfill Page 6 of 18
 Client: Griffith City Council Performed by B. Boulton
 Site: House 1 Monitoring Position N

Sound level Meter Make and Model Sventek / Sven 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 12:47 pm Finish Time 01:02 pm
 3. Calibration performed before monitoring Yes Y/N factor= dB(A)
 4. Calibration performed before monitoring Yes Y/N factor= dB(A)

L_{eq} = 51.6 $L1$ = 58.6 L_{peak} = 85.9
 L_{10} = 56.4 L_{max} = 64.3 L_{90} = 34.9
 L_{min} = 9.0 Height of meter 50 cm (1.2m minimum)

Weather Conditions at time of Monitoring
 Wind Speed 4.5 m/second
 (note: max allowable = 5m/sec)
 Approximate Direction = N
 Ambient Temperature = 29 °C
 Relative Humidity %
 Cloud Cover 80 %
 Inversion Layer
 Others (fog, drizzle)



DISTINCTIVE NOISE SOURCE S Dominant noise source Crickets / breeze through veg.
Very peaceful site. Quarry activities not audible. Minimal traffic noise

NOISE CHARACTER (broad band , impulsive, tonal) tonal. - insects. - cicadas?

METER SETTINGS (Linear, exponential; weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-393 Date 11/12/18
 Project Name: Tharbogang Quarry Leadfill Page 7 of 18
 Client: Griffith City Council Performed by B. Paulson
 Site: House 2 Monitoring Position NE

Sound level Meter Make and Model Sventek / Sven 957

1. Monitoring Interval <u>15 minutes</u>	mins (10 to 15 minutes standard)	
2. Start Time <u>1226</u>	Finish Time <u>1241</u>	
3. Calibration performed before monitoring	Y/N factor= dBA	
4. Calibration performed before monitoring	Y/N factor= dBA	
<u>L_{eq} = 54.4</u>	<u>L₁ = 48.6</u>	<u>L_{peak} = 95.9</u>
<u>L₁₀ = 43.6</u>	<u>L_{max} = 80.5</u>	<u>L₉₀ = 39.5</u>
<u>L_{min} = 31.7</u>	Height of meter	(1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>4.5</u> m/second (note: max allowable = 5m/sec) Approximate Direction = <u>NW</u> Ambient Temperature = <u>29</u> °C Relative Humidity % Cloud Cover <u>80</u> % Inversion Layer Others (fog, drizzle)	

DISTINCTIVE NOISE SOURCES Dominant noise source Tractor mowing verge
The garden has a lot of bushes attracting birds. Chats are in the background at 12:29
Crickets on other side of slope road also noisy. 12:38 - tractor working in orchard.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-392 Date 11/12/18
 Project Name: Tharbogang Quarry Landfill Page 8 of 18
 Client: Griffith City Council Performed by B. Poulton
 Site: House 3 Monitoring Position NE

Sound level Meter Make and Model Svantek / Swan 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 1206 Finish Time 1221
 3. Calibration performed before monitoring Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA

L_{eq} = 46.0 L1 = 58.6 Lpeak = 78.6
L₁₀ = 47.5 Lmax = 63.7 L90 = 35.7
Lmin = 34.1 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>4.5</u> m/second (note: max allowable = 5m/sec) Approximate Direction = Ambient Temperature = <u>29</u> °C Relative Humidity % Cloud Cover <u>80</u> % Inversion Layer <input checked="" type="checkbox"/> Y/N Others (fog, drizzle)	<p><u>Quarry.</u></p> <p>A hand-drawn sketch showing a rectangular box labeled 'house 3'. A line with an arrow points from the house to a horizontal line labeled 'Slope Road'. The distance between the house and the road is marked as '20m'.</p>

DISTINCTIVE NOISE SOURCES Dominant noise source Vehicles / sprinklers / Birds.
Sprinklers on in the garden. Can also hear the hum of a fridge or air conditioner from the premises

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-393 Date 11/12/18
 Project Name: Tharbagang Quarry Landfill Page 9 of 18
 Client: Griffith City Council Performed by B. Boulton
 Site: House 4 Monitoring Position N
 Sound level Meter Make and Model Svantek / Swan 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 11:46 Finish Time 12:01
 3. Calibration performed before monitoring Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA

L_{eq} = 47.8 $L1$ = 61.6 L_{peak} = 89.0
 L_{10} = 47.6 L_{max} = 68.8 L_{90} = 30.9
 L_{min} = 28.0 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>Nil</u> m/second (note: max allowable = 5m/sec)	
Approximate Direction =	
Ambient Temperature = <u>29</u> °C	
Relative Humidity %	
Cloud Cover <u>80</u> %	
Inversion Layer %	
Others (fog, drizzle) <input checked="" type="checkbox"/> Y/N	

DISTINCTIVE NOISE SOURCES Dominant noise source ~~Tractor~~ Tractor / Quarry
Tractor passed at 11:49. Can hear quarry activities and traffic in the background.
Vehicle arrived 11:53

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential; weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-393 Date 11/12/18
 Project Name: Tharbogang Quarry Landfill Page 10 of 18
 Client: Griffith City Council Performed by B. Poulton
 Site: House 5 Monitoring Position NE

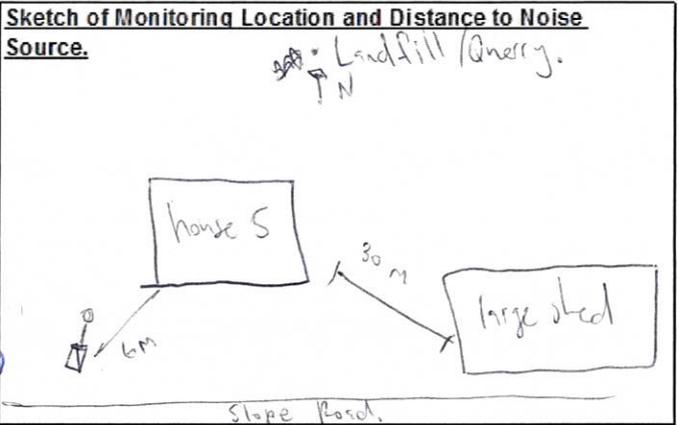
Sound level Meter Make and Model Svantek / Swan 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 11:27 Finish Time 11:42
 3. Calibration performed before monitoring Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA

L_{eq} = 40.6 $L1$ = 52.2 L_{peak} = 72.5
 L_{10} = 42.2 L_{max} = 58.8 L_{90} = 33.6
 L_{min} = 9.0 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring

Wind Speed 4.5 m/second
 (note: max allowable = 5m/sec)
 Approximate Direction =
 Ambient Temperature = 29 °C
 Relative Humidity %
 Cloud Cover 70 %
 Inversion Layer Y/N
 Others (fog, drizzle) Nil - light breeze



DISTINCTIVE NOISE SOURCES Dominant noise source Road traffic / Quarry activity
Can hear quarry in background - sounds like heavy vehicle movement. There is a buzz which may be the resident refrigerator or oranges or not as it's hard to tell.
Can hear heavy vehicles reversing.

NOISE CHARACTER (broad band, impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-392 Date 11/12/18
 Project Name: Tharbagang Quarry Landfill Page 11 of 18
 Client: Griffith City Council Performed by B. Poulton
 Site: House 6 Monitoring Position NE

Sound level Meter Make and Model Srntek / Swan 957

1. Monitoring Interval 16 minutes mins (10 to 15 minutes standard)
 2. Start Time 11:05 Finish Time 11:20
 3. Calibration performed before monitoring Y Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA
 L_{eq}= 53.8 L1= 64.4 Lpeak= 95
 L₁₀= 54.9 Lmax= 81.9 L90= 39.0
 Lmin= 37.0 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>4.5</u> m/second (note: max allowable = 5m/sec) Approximate Direction = <u>N</u> Ambient Temperature = <u>28</u> °C Relative Humidity % Cloud Cover <u>70</u> % Inversion Layer <u> </u> Y/N Others (fog, drizzle) <u> </u>	

DISTINCTIVE NOISE SOURCES Dominant noise source Vehicle from Slopes Road / Hillside Road.
Occupants arrived home, vehicle on premises. Dogs barking. 11:09. Occupants went
out to talk to me at 10:10. Occupants talking all night. Tractor passed 11:11
House airconditioner quite loud.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-392 Date 11/12/18
 Project Name: Tharbogang Quarry Landfill Page 12 of 18
 Client: Griffith City Council Performed by B. Boulton
 Site: House 1 Monitoring Position NE

Sound level Meter Make and Model Svantek / Swan 957

1. Monitoring Interval <u>15 minutes.</u>		mins (10 to 15 minutes standard)
2. Start Time <u>15:33</u>		Finish Time <u>16:48</u>
3. Calibration performed before monitoring <u>Yes</u>		Y/N factor= dBA
4. Calibration performed before monitoring <u>Yes</u>		Y/N factor= dBA
<u>L_{eq} = 52.0</u>	<u>L1 = 61.1</u>	<u>Lpeak = 91.3</u>
<u>L₁₀ = 57.6</u>	<u>Lmax = 75.1</u>	<u>L90 = 32.2</u>
<u>Lmin = 28.8</u>	<u>Height of meter 50 cm</u>	(1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>4.5</u> m/second (note: max allowable = 5m/sec) Approximate Direction = <u>N</u> Ambient Temperature = <u>32</u> °C Relative Humidity % Cloud Cover <u>30</u> % Inversion Layer <u>Y/N</u> Others (fog, drizzle) <u>Gentle breeze.</u>	<p>↑ N to Quarry</p> <p>House</p> <p>6m</p>

DISTINCTIVE NOISE SOURCES Dominant noise source Very quiet, mainly birds & wind through veg.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-383 Date 11/12/18
 Project Name: Tharbogang Quarry Landfill Page 13 of 18
 Client: Griffith City Council Performed by B. Poulton
 Site: House 2 Monitoring Position NE

Sound level Meter Make and Model Sontek (Svan 957)

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 1512 Finish Time 1627
 3. Calibration performed before monitoring Yes Y/N factor= dBA
 4. Calibration performed before monitoring Yes Y/N factor= dBA
 Leq = 43.4 L1 = 52.9 Lpeak = 85.3
 L10 = 46.9 Lmax = 61.2 L90 = 34.0
 Lmin = 29.2 Height of meter 50 cm (1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed 4.5 m/second (note: max allowable = 5m/sec)	
Approximate Direction = NW	
Ambient Temperature = 32 °C	
Relative Humidity %	
Cloud Cover 80 %	
Inversion Layer Y/N	
Others (fog, drizzle)	

DISTINCTIVE NOISE SOURCES Dominant noise source Airplanes + ~~power~~ road vehicles
 Mostly light vehicles from slope / Alderman.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18-393 Date 11/12/2018
 Project Name: Tharbogang Quarry Landfill Page 15 of 18
 Client: Griffith City Council Performed by B. Powell
 Site: House 4 Monitoring Position NE

Sound level Meter Make and Model Sonetek / Swan 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 1431 Finish Time 1446
 3. Calibration performed before monitoring Yes Y/N factor= dBA
 4. Calibration performed before monitoring Yes Y/N factor= dBA

L_{eq} = 40.3 L_1 = 46.8 L_{peak} = 83.7
 L_{10} = 43.5 L_{max} = 61.7 L_{90} = 34.7
 L_{min} = 9.0 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring	Sketch of Monitoring Location and Distance to Noise Source.
Wind Speed <u>4.5</u> m/second (note: max allowable = 5m/sec) Approximate Direction = <u>NW</u> Ambient Temperature = <u>32</u> °C Relative Humidity % Cloud Cover <u>70</u> % Inversion Layer Y/N Others (fog, drizzle)	<p>House 4 6m Access Road ↑ N to Quarry ↓ S to slope Road</p>

DISTINCTIVE NOISE SOURCES Dominant noise source Background probably from quarry.
Heavy vehicles in the background. Birds in foreground. Generally pretty quiet. Vehicles from Slope Rd / Kidman Way.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



SOUND LEVEL RECORDING FORM

Project No: 18/393 Date 11/12/18
 Project Name: Tharbogang Quarry Landfill Page 16 of 18
 Client: Griffith City Council Performed by B. Boulton
 Site: House 5 Monitoring Position NE

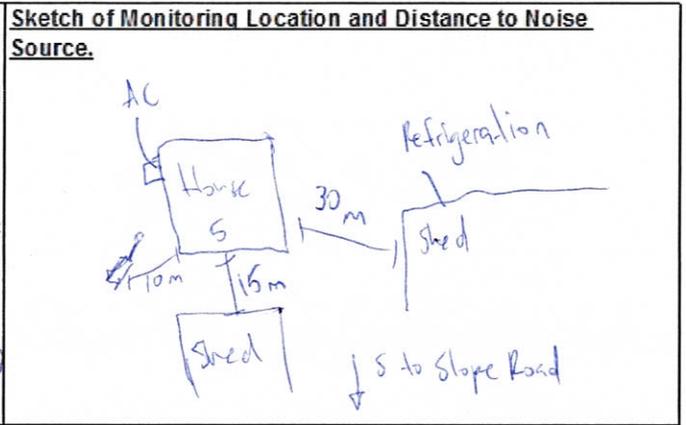
Sound level Meter Make and Model Svantek / Swan 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 14:12 Finish Time 14:27
 3. Calibration performed before monitoring Y/N factor= dBA
 4. Calibration performed before monitoring Y/N factor= dBA

L_{eq} = 43.6 $L1$ = 55.6 L_{peak} = 77.6
 L_{10} = 45.5 L_{max} = 61.0 L_{90} = 33.6
 L_{min} = 9.0 Height of meter 50cm (1.2m minimum)

Weather Conditions at time of Monitoring

Wind Speed < 5 m/second
 (note: max allowable = 5m/sec)
 Approximate Direction = N
 Ambient Temperature = 31 °C
 Relative Humidity %
 Cloud Cover 70 %
 Inversion Layer Y/N
 Others (fog, drizzle)



DISTINCTIVE NOISE SOURCES Dominant noise source Refrigeration / AC / traffic
from Hillside, Slope Kidman. Can hear quarry activities in the background.
including vehicles reversing.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)



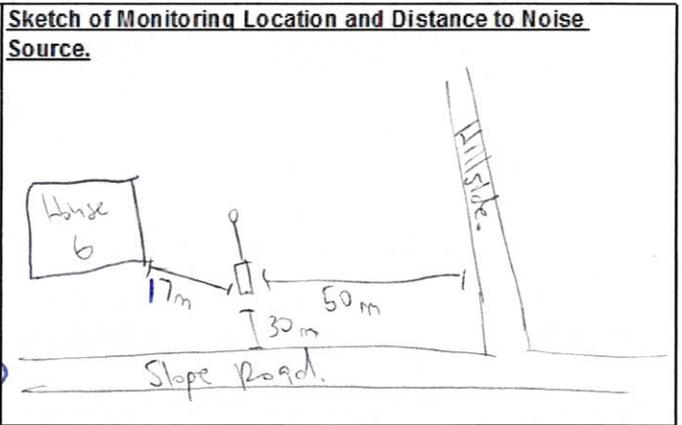
SOUND LEVEL RECORDING FORM

Project No: 18-393 Date 11/12/18
 Project Name: Tharbogang Quarry Landfill Page 17 of 18
 Client: Griffith City Council Performed by B. Boulton
 Site: House 6 Monitoring Position NE

Sound level Meter Make and Model Stantek / Stan 967

1. Monitoring Interval 16 minutes mins (10 to 15 minutes standard)
 2. Start Time 1350 Finish Time 1406
 3. Calibration performed before monitoring Yes Y/N factor= dBA
 4. Calibration performed before monitoring Yes Y/N factor= dBA
 L_{eq}= 67.3 L1= 80.6 Lpeak= 104.7
 L₁₀= 52.4 Lmax= 94.9 L90= 39.5
 Lmin= 36.1 Height of meter 50cm (1.2m minimum)

Weather Conditions at time of Monitoring
 Wind Speed < 5 m/second
 (note: max allowable = 5m/sec)
 Approximate Direction =
 Ambient Temperature = 31 °C
 Relative Humidity %
 Cloud Cover 70 %
 Inversion Layer
 Others (fog, drizzle)



DISTINCTIVE NOISE SOURCES Dominant noise source Dogs barking / traffic
Vehicles from quarry barely audible. Residents came to talk 1358.

NOISE CHARACTER (broad band , impulsive, tonal) tonal.
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)

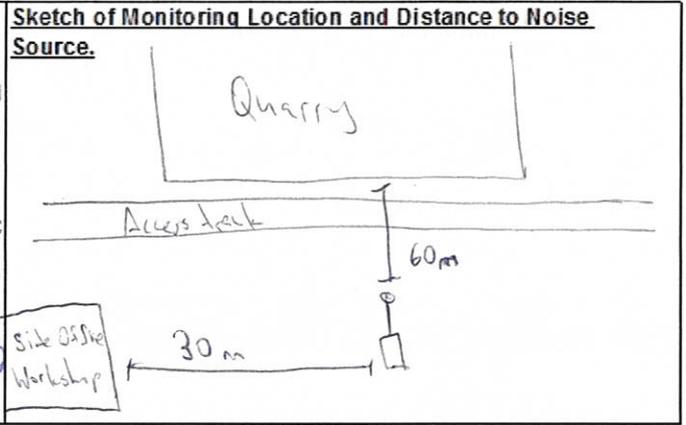


SOUND LEVEL RECORDING FORM

Project No: 18-383 Date 11/12/18
 Project Name: Tharbogang Quarry Landfill Page 18 of 18
 Client: Griffith City Council Performed by B. Boulton
 Site: Quarry fire / site office Monitoring Position
 Sound level Meter Make and Model Svetlak / Suga 957

1. Monitoring Interval 15 minutes mins (10 to 15 minutes standard)
 2. Start Time 1317 Finish Time 1352
 3. Calibration performed before monitoring Yes Y/N factor= dBA
 4. Calibration performed before monitoring Yes Y/N factor= dBA
 L_{eq}= 44.3 L1= 52.4 L_{peak}= 78.6
 L₁₀= 45.9 L_{max}= 64.5 L₉₀= 39.3
 L_{min}= 36.8 Height of meter (1.2m minimum)

Weather Conditions at time of Monitoring
 Wind Speed 4.5 m/second
 (note: max allowable = 5m/sec)
 Approximate Direction = N
 Ambient Temperature = 31 °C
 Relative Humidity %
 Cloud Cover 70 %
 Inversion Layer
 Others (fog, drizzle)



DISTINCTIVE NOISE SOURCES Dominant noise source Heavy vehicles from quarry
- Vehicles and reversing alarms, talking from site staff.

NOISE CHARACTER (broad band , impulsive, tonal)
METER SETTINGS (Linear, exponential, weightings: a, b, c; fast, slow, impulsive)

