

CALGA SAND QUARRY

ATTENDED AND UNATTENDED COMPLIANCE NOISE MONITORING JULY-AUGUST 2014

**REPORT NO. 01127-E
VERSION A**

SEPTEMBER 2014

PREPARED FOR

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DOCUMENT CONTROL

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A	Final	4 September 2014	Roman Haverkamp	Sean Flaherty

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APPENDIX A – Noise Measurement Results

GLOSSARY OF ACOUSTIC TERMS

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

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

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

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

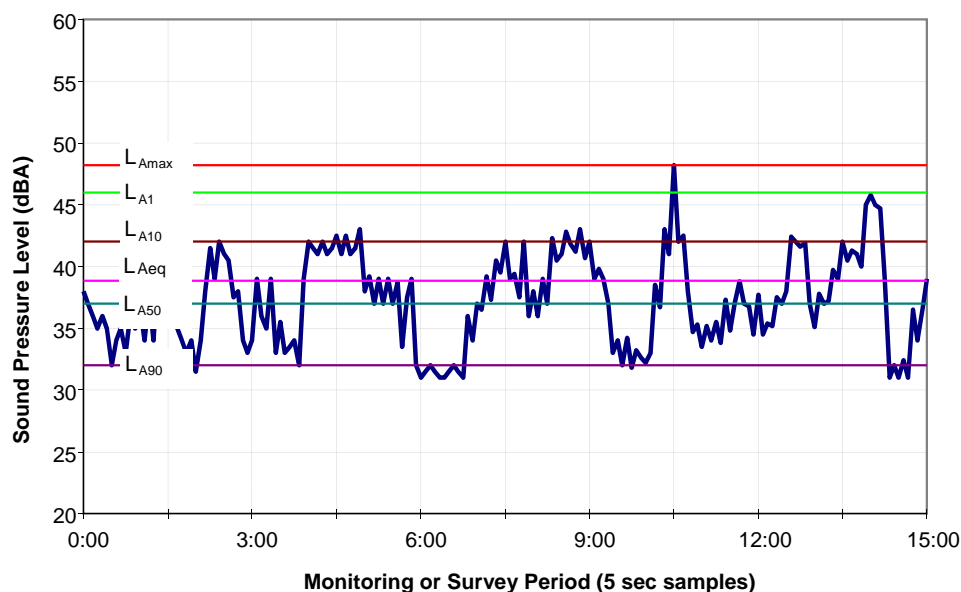
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

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

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

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

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

This report summarises the results of the combined yearly unattended noise monitoring and quarterly attended monitoring carried out in the vicinity of the Calga Sand Quarry in July and August 2014 consistent with Condition 3(7) of Development Consent DA 94-4-2004.

The Noise Monitoring Program (NMP) prepared by R.W. Corkery & Co. Pty. Ltd summarises all relevant criteria, monitoring locations, and frequency / timing of monitoring.

2 NOISE MONITORING

Attended and unattended measurements were made at each of the following locations (shown in Figure 2-1):

- CN-1 Gazzana Residence
- CN-2 King Residence
- CN-3 Kashouli Residence
- CN-4 Townsend Residence

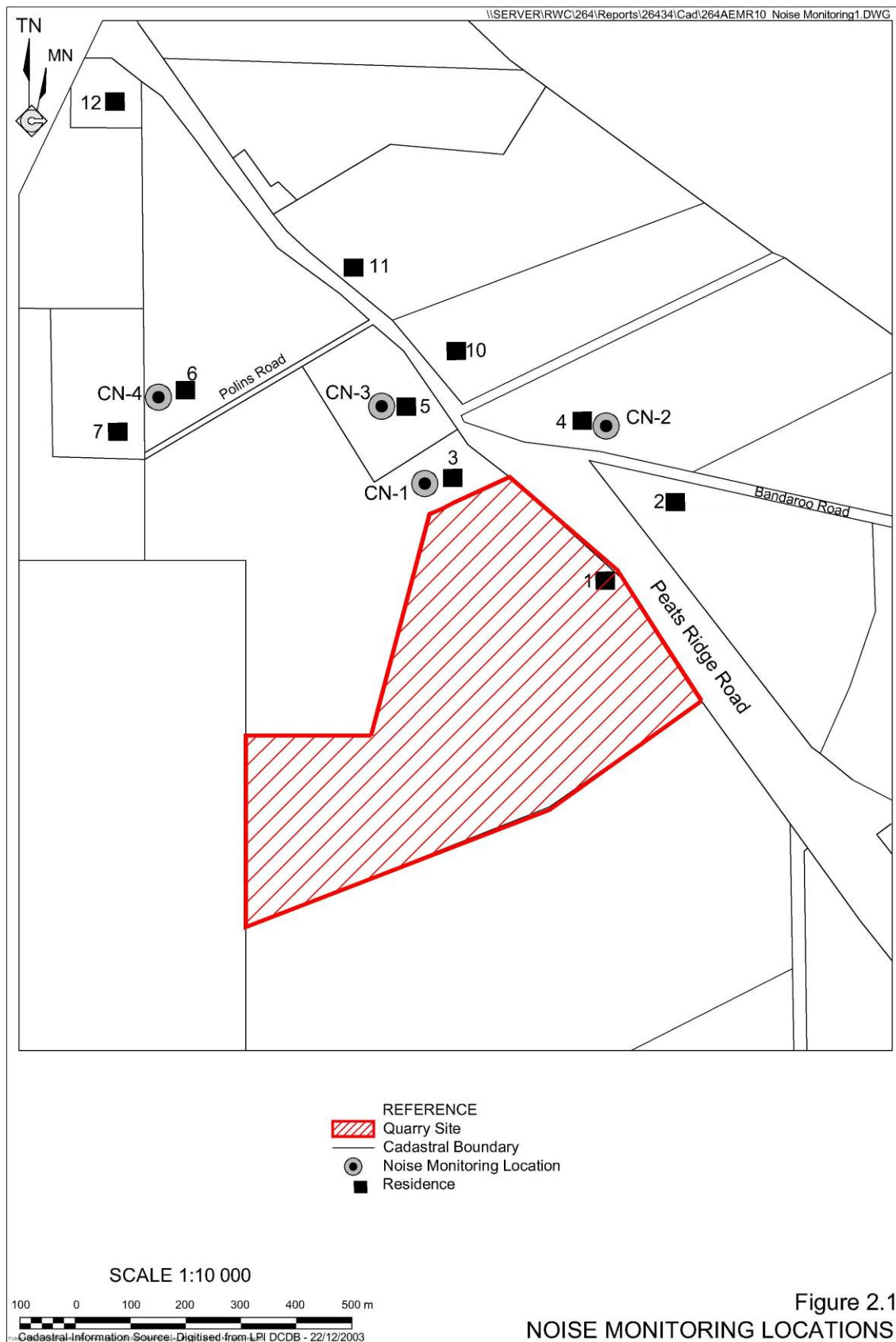
Attended measurements were carried out on Tuesday, 22 July 2014 and unattended noise monitoring was undertaken between Tuesday, 22 July and Sunday, 3 August 2014.

The noise monitoring equipment used for these measurements consisted of environmental noise loggers set to A-weighted, fast response continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1} , L_{A10} , L_{A90} and L_{Aeq} levels of the existing noise environment (see Glossary of Terms). The L_{A1} , L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample time respectively. The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. The L_{A90} level is normally taken as the background noise level. The L_{Aeq} level is the Equivalent Continuous Sound Level and has the same sound energy average over the sampling period as the actual noise environment with its fluctuating sound levels.

All measured noise levels obtained from the unattended monitoring equipment are graphically summarised in Appendix A.

Figure 2-1 Noise Monitoring Locations



3 OPERATIONAL NOISE CRITERIA

The Noise Monitoring Program presents noise criteria for the operation of plant or equipment on the premises as required by the Environment Protection Authority (EPA) licence (EPL 11295). It states that noise levels emanating from the site must not exceed the relevant criteria when measured within 30m of the residences or noise sensitive areas.

Daytime operational noise is assessed as an $L_{Aeq,15min}$ noise level. The L_{Aeq} level is the Equivalent Continuous Sound Level and represents the level of a continuous sound with the same average sound energy over the sampling period as the actual noise environment with its fluctuating sound levels.

Table 3-1 summarises the daytime noise criteria.

Table 3-1 Operational Noise Criteria *

Location	Criteria (dBA)		
	Day	Evening	Night Time
	$L_{Aeq,15min}$	$L_{Aeq,15min}$	$L_{A1,1min}$
CN-1	41	35	35
CN-2	40	35	35
CN-3	39	35	35
CN-4	35	35	35

Source: EPL 11295

Table 3-2 summarises the operating hours set in the NMP.

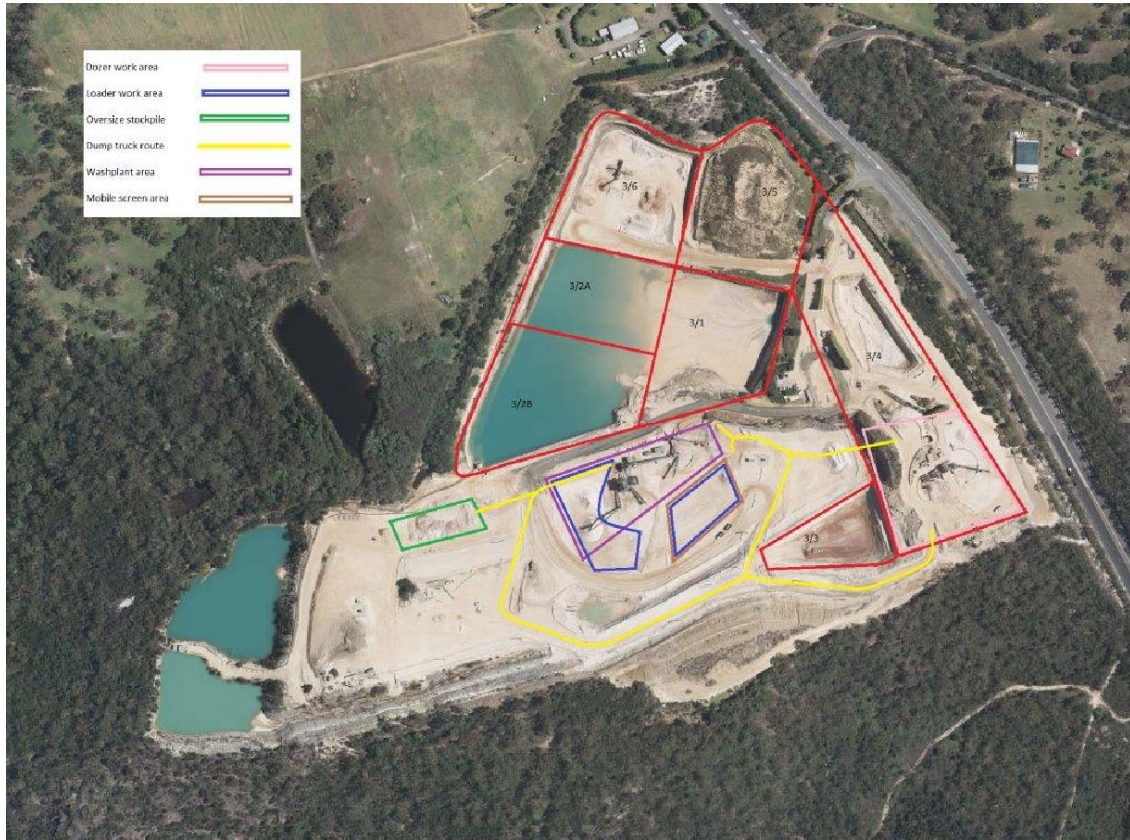
Table 3-2 Operating Hours

Activity	Day	Time
Extraction and processing	Monday – Friday	7.00am to 6.00pm
	Saturday	7.00am to 4.00pm
	Sunday & Public Holidays	Nil
Delivery and Distribution	Monday – Friday	5.00am to 10.00pm
	Saturday	5.00am to 4.00pm
	Sunday and Public Holidays	Nil
Maintenance (if inaudible at neighbouring residences)	Anytime	Anytime

4 DESCRIPTION OF SITE OPERATIONS

Figure 4-1 presents an aerial of the quarry site with the works generally taking place during the monitoring survey.

Figure 4-1 Quarry Site Layout and Operational Areas



The following mobile plant and equipment were in operation during the time of the survey. It should be noted however that not all of the items described below were constantly in operation within the operating hours throughout the unattended monitoring period.

- Dozer ripping and pushing sandstone in Stage 3/4
- Excavator loading dump truck with raw feed from Stage 3/4 to go to washplant and brickies raw feed stockpile
- Dump truck taking raw feed from Stage 3/4 to washplant and brickies raw feed stockpile
- Front end loader producing brickies sand, loading sales trucks and loading dump truck with oversize to be taken to oversize stockpile
- Front-end-loader feeding washplant from surge pile, loading oversize from washplant onto dump truck and loading sales trucks
- Water truck was in operation to suppress dust on designated haul road
- Washplant and dry screening plant were in full production

5 ASSESSMENT OF NOISE LEVELS

5.1 Attended Noise Monitoring

Based on site observations, weather conditions were appropriate for conducting environmental noise measurements during the day of survey. This was confirmed by meteorological data obtained from the site's weather station.

Table 5-1 summarises meteorological conditions during the noise survey obtained from the site's weather station.

Table 5-1 Meteorological Conditions during Noise Survey (Tuesday, 22 July 2014)

Time Period	Wind Speed (m/s)	Wind Direction	Rain (mm)
11.15am – 11.30am	1.3	W	0
11.30am – 11.45am	0.9	WSW	0
11.45am – 12.00pm	0.9	WSW	0
12.00pm – 12.15pm	0.9	WSW	0
12.15pm – 12.30pm	0.4	WSW	0
12.30pm – 12.45pm	0.4	WSW	0
12.45pm – 1.00pm	0.9	SW	0
1.00pm – 1.15pm	1.3	SW	0

Table 5-2 summarises the measurement results and compares them against the relevant daytime noise criteria.

Table 5-2 Attended Noise Measurement Results (Tuesday, 22 July 2014)

Location	Time	L _{Aeq,15min} due to Quarry Operations (dBA)	Daytime Criteria L _{Aeq,15min} (dBA)	Comments
CN-1	11.19am	34	41	Distant site noise audible, est. 34dBA. Traffic on Peats Ridge
	–			Road controlled maximum noise levels as follows: light vehicles:
	11.34am			L _{Amax} 60dBA and heavy vehicles: L _{Amax} 68dBA.
CN-3	11.49am	inaudible	39	Quarry operations inaudible throughout measurement. Traffic on
	12.04pm			Peats Ridge Road controlled maximum noise levels as follows:
CN-4	12.14pm	inaudible	35	light vehicles: L _{Amax} 58dBA and heavy vehicles: L _{Amax} 69dBA.
	–			Quarry operations inaudible throughout measurement.
	12.29pm			Traffic on Peats Ridge Road controlled maximum noise levels as follows: light vehicles: L _{Amax} 37dBA and heavy vehicles:
CN-2	12.47pm	inaudible	40	L _{Amax} 43dBA.
				Quarry operations inaudible throughout measurement.

Location	Time	L_{Aeq,15min} due to Quarry Operations (dBA)	Daytime Criteria L_{Aeq,15min} (dBA)	Comments
	– 1.02pm			Traffic on Peats Ridge Road controlled maximum noise levels as follows: light vehicles: L _{Amax} 56dBA and heavy vehicles: L _{Amax} 65dBA.

The results of the attended measurements indicated that noise emissions from the Calga Sand Quarry plant are within the limits set in the Noise Monitoring Program at all the identified receivers.

5.2 Unattended Noise Monitoring

Weather data was obtained from the site meteorological station to ensure that adverse weather conditions are considered when interpreting the monitoring results of the unattended noise survey.

5.2.1 Measured Noise Levels

Table 5-3 provides a summary of the noise results in terms of L_{Aeq,15min} levels during the day and evening periods and in terms of L_{A1,1min} levels at night between 5.00am and 7.00am.

Table 5-3 Unattended Noise Measurement Results during Operating Hours

Location	Measured L _{Aeq,15min}		Measured L _{A1,1min}
	Day (7.00am-6.00pm Mon-Fri & 7.00am-4.00pm Sat)	Evening (6.00pm-10.00pm Mon-Fri)	Night (5.00am-7.00am Mon-Sat)
CN-1	50-67dBA (typically 50-60dBA)	45-63dBA (typically 45-54dBA)	66-75dBA
CN-2	43-68dBA (typically 43-56dBA)	43-53dBA	63-76dBA
CN-3	50-67dBA (typically 50-58dBA)	43-55dBA	65-70dBA
CN-4	35-55dBA (typically 35-52dBA)	34-46dBA	50-75dBA

5.2.2 Discussion

Site observations showed that measured noise levels at all four locations are likely affected by

extraneous noises such as traffic passing on Peats Ridge Road as well as natural noises associated with birds, trees, insects and frogs. Local farming activities might also have contributed to the captured noise levels.

Based on the attended measurements conducted at all identified locations, the measured $L_{Aeq,15min}$ noise levels were due to traffic on Peats Ridge Road. When measureable, the $L_{Aeq,15min}$ noise level due to quarry operations was at least 10dB lower than the measured $L_{Aeq,15min}$.

The graphical representation of the measured noise data show that the measured $L_{Aeq,15min}$ levels do not fluctuate at the starting and finishing hours of the quarry operations as expected if they were dominated by noise associated with quarry activities. Instead, $L_{Aeq,15min}$ levels tend to gradually increase between 4.00am and 6.00am and gradually drop between 6.00pm and 8.00pm which is indicative of traffic noise. Similarly, $L_{A1,1min}$ noise levels do not change before and after 10.00pm when delivery and distribution activities stop.

The unattended measurement results show that noise levels during the day, evening and night time periods are likely to have been dominated by extraneous noises associated with the natural environment surrounding the residences and traffic on Peats Ridge Road. Therefore, the measurements during this survey indicate that the noise conditions are likely to be complied with at all four locations.

It is important to note that it is impossible to confirm this with a 100% certainty as the measurements were unattended. However, compliance is indicated by the attended noise measurements.

6 CONCLUSION

A compliance noise monitoring survey was conducted during July and August 2014 and included both attended and unattended measurements.

The results of both attended and unattended measurements indicated that noise emissions from the Calga Sand Quarry plant were within the limits set in the Noise Monitoring Program at all the identified receivers.

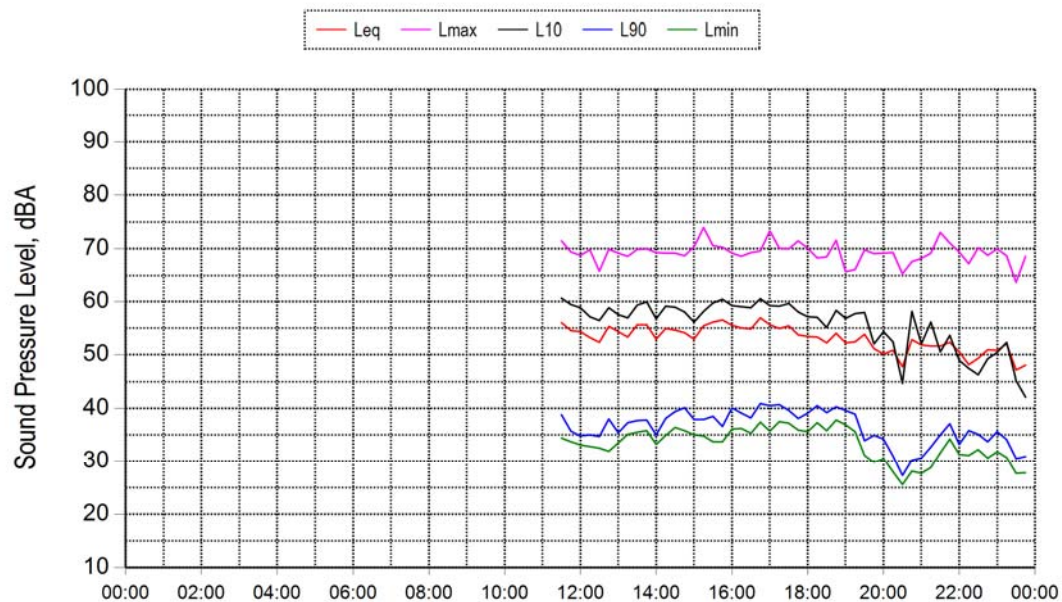
APPENDIX A

NOISE MEASUREMENT RESULTS

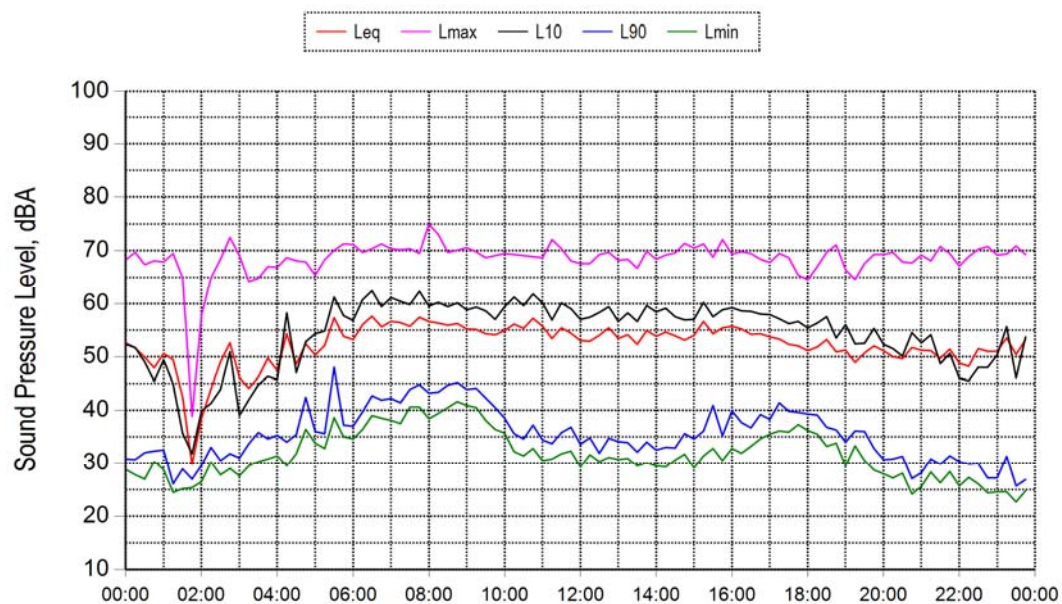


CN-1 Gazzana Residence

Tuesday 22 July 2014

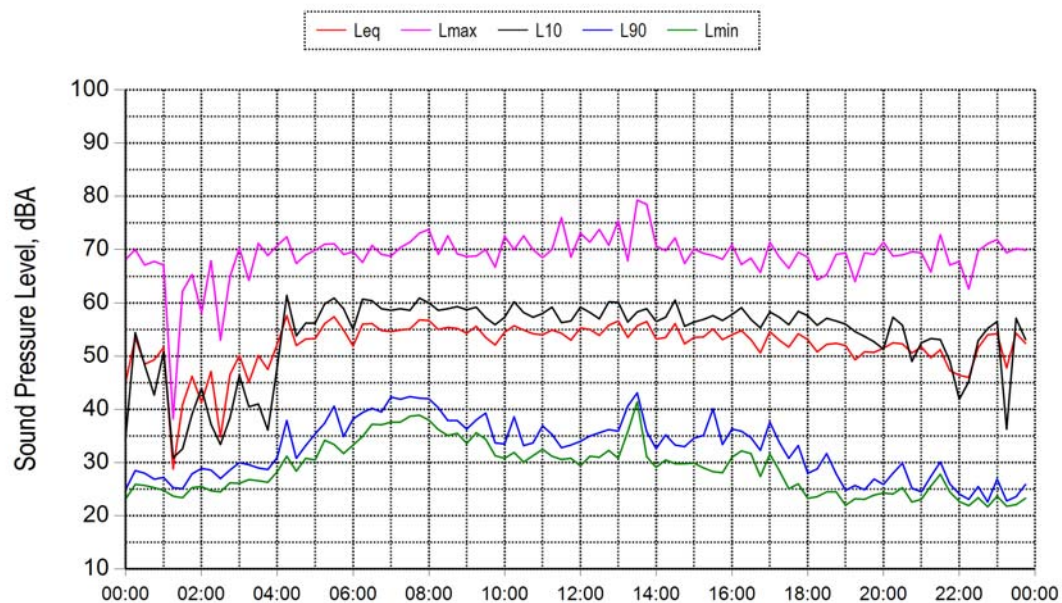


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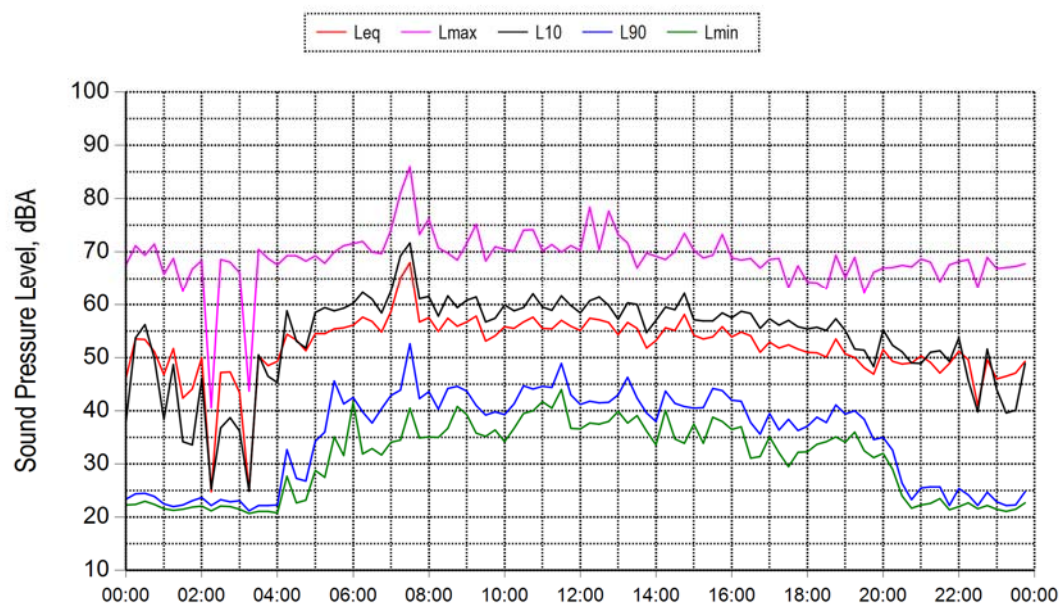


CN-1 Gazzana Residence

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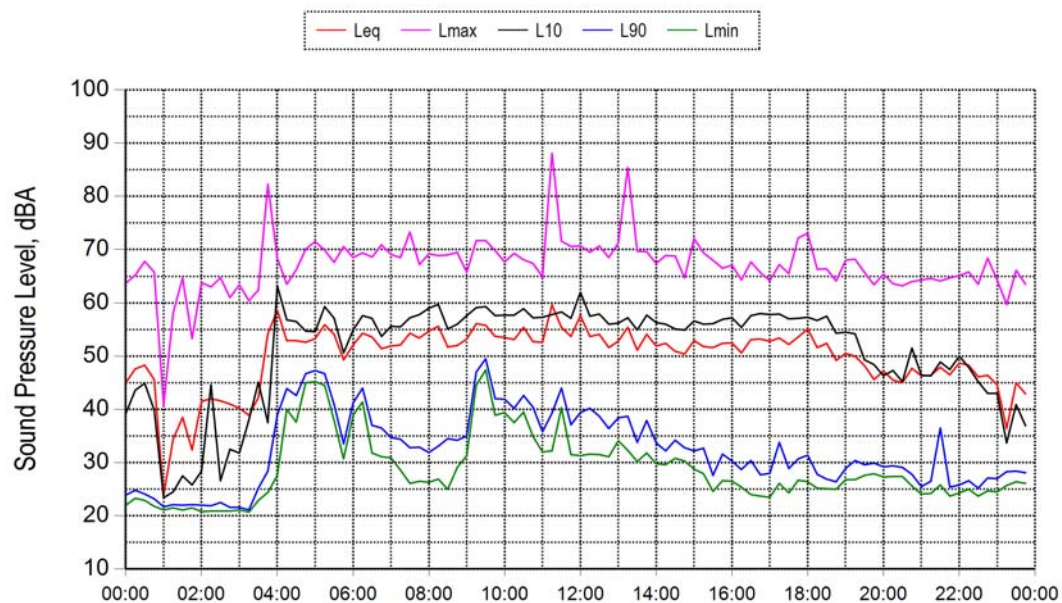


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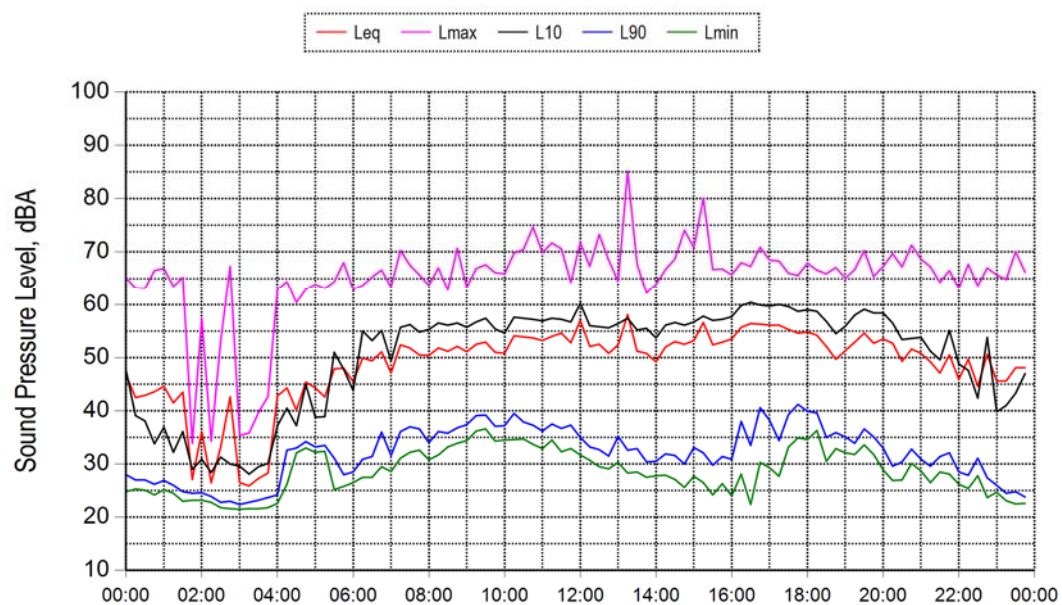


CN-1 Gazzana Residence

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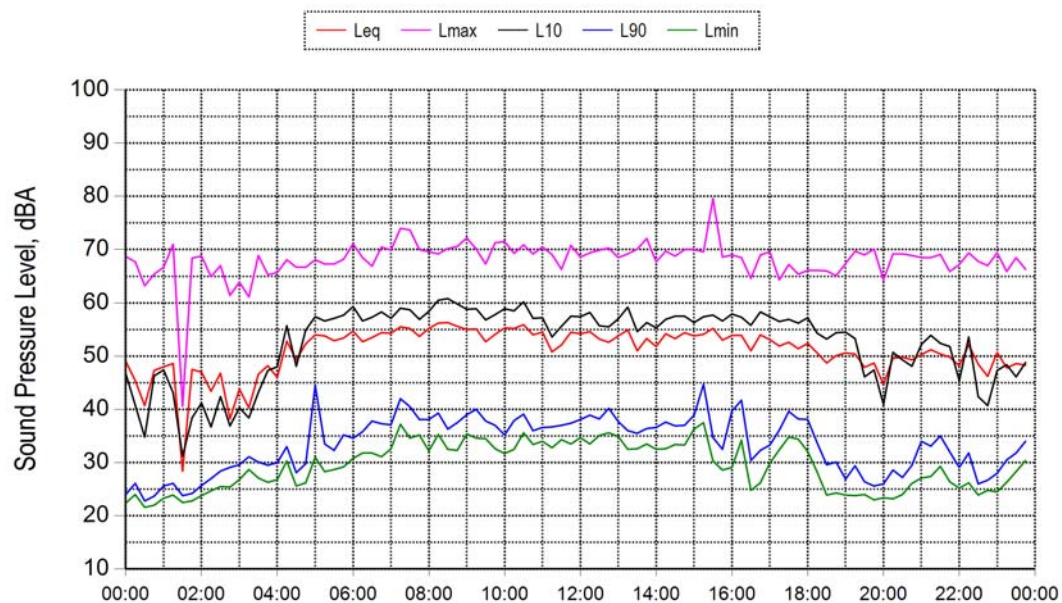


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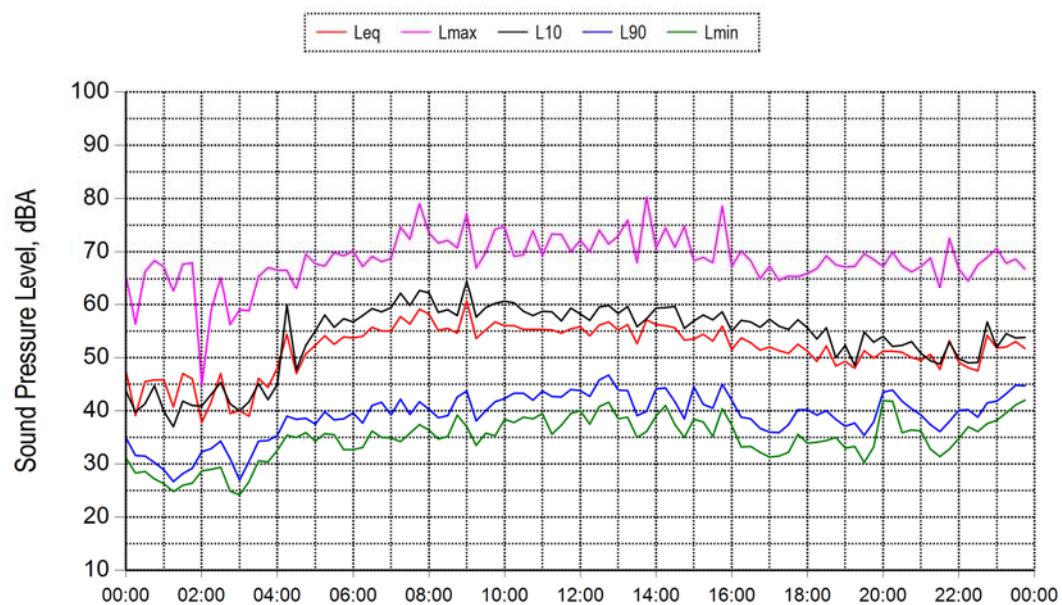


CN-1 Gazzana Residence

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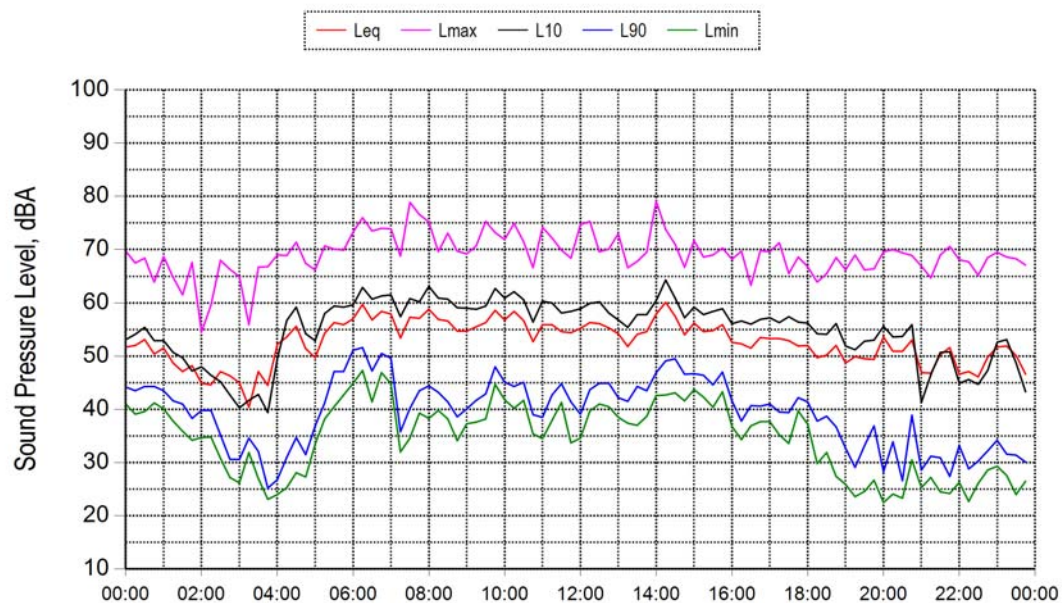


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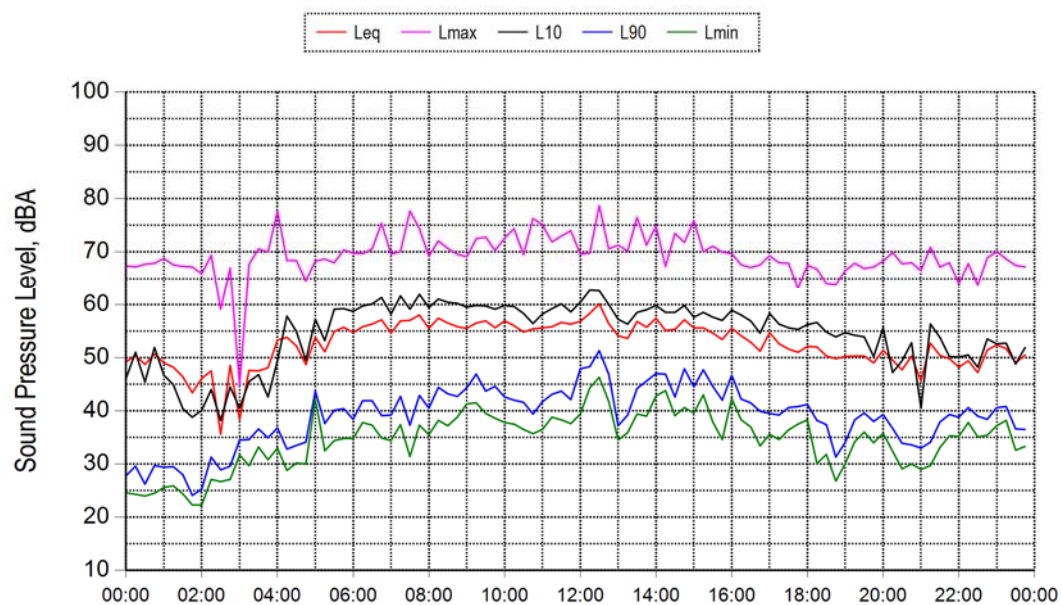


CN-1 Gazzana Residence

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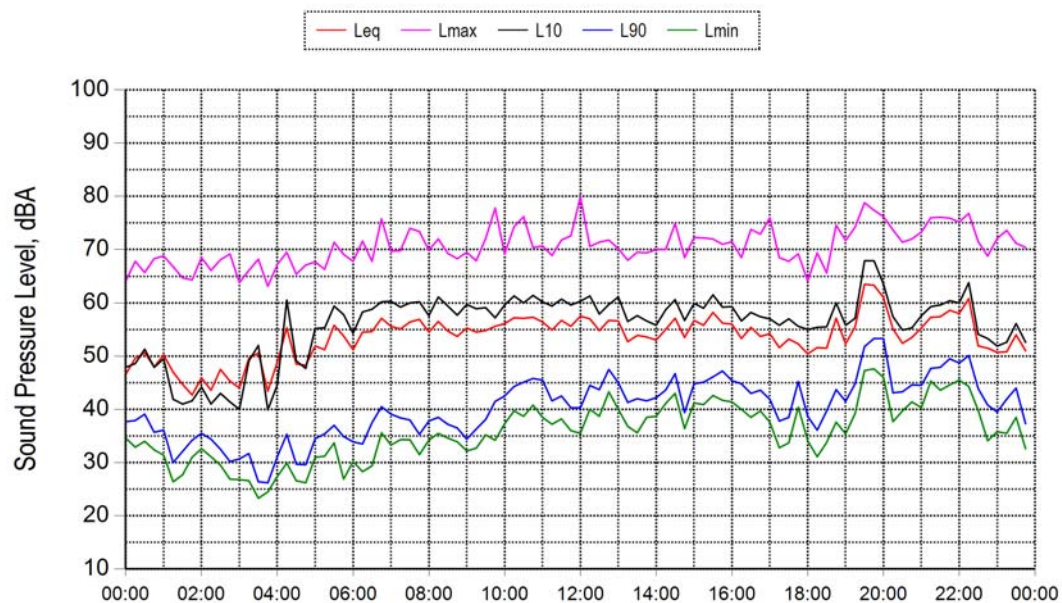


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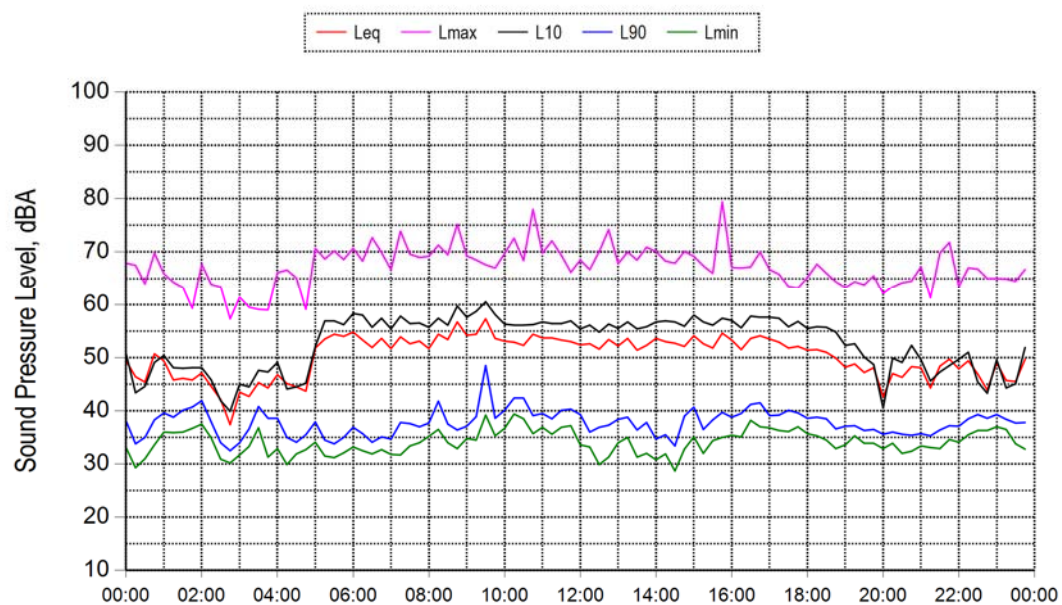


CN-1 Gazzana Residence

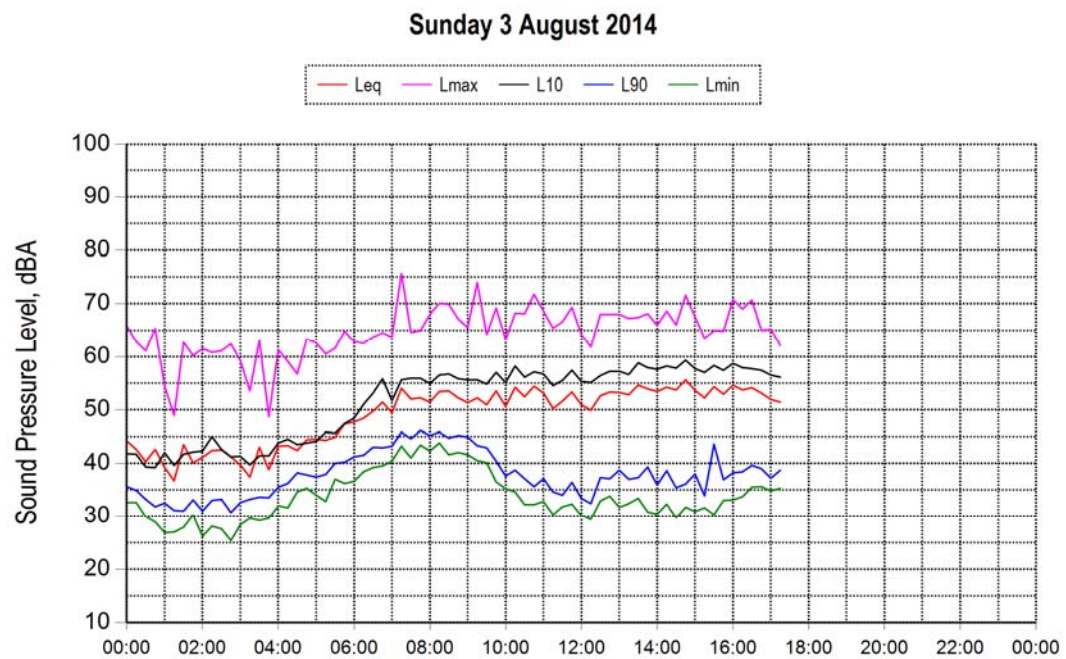
Friday 1 August 2014



Saturday 2 August 2014



CN-1 Gazzana Residence

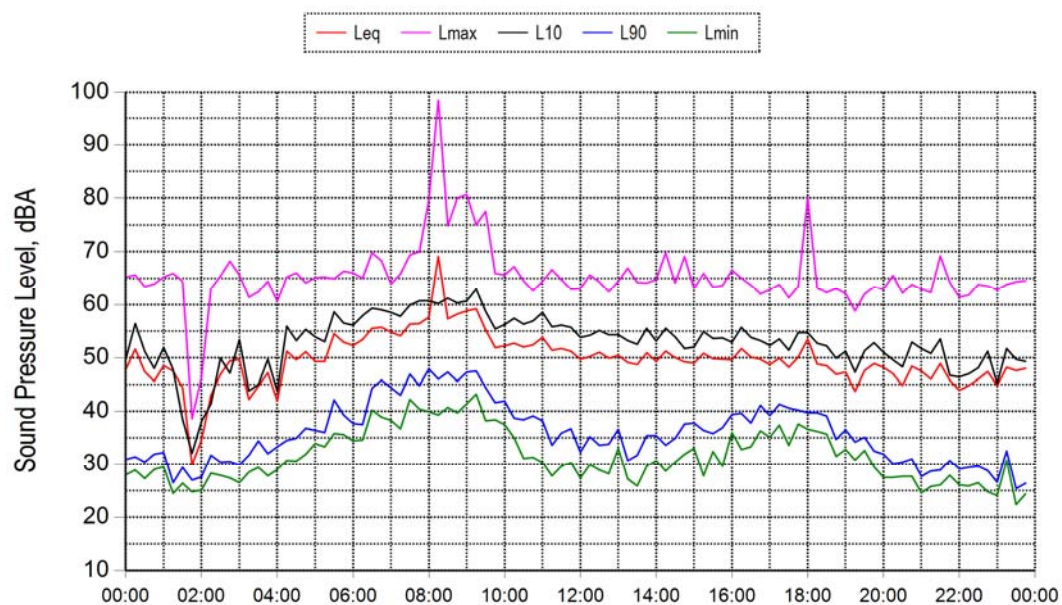


CN-2 King Residence

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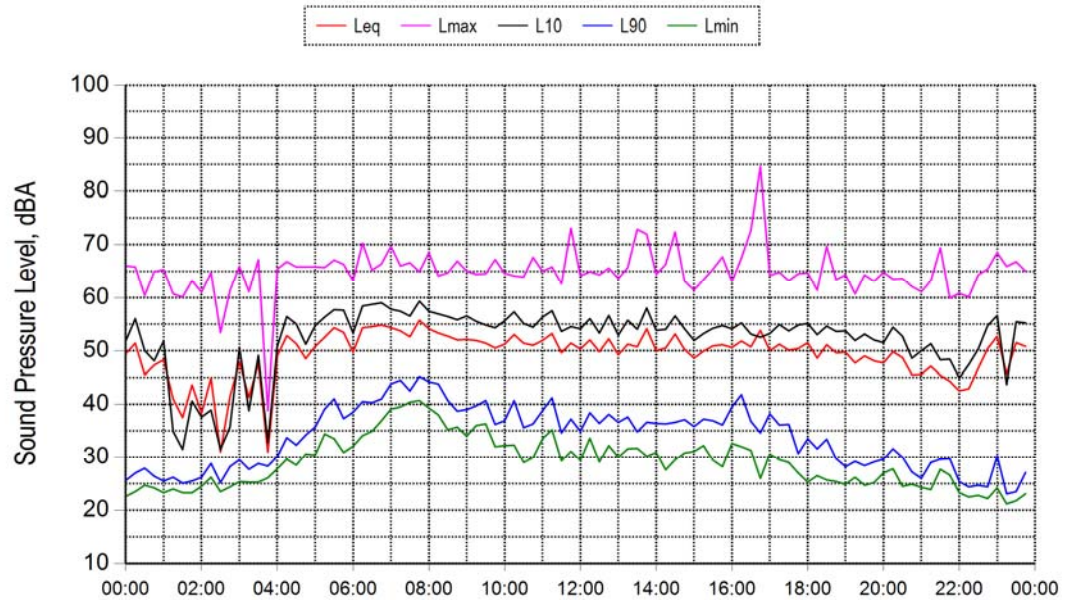


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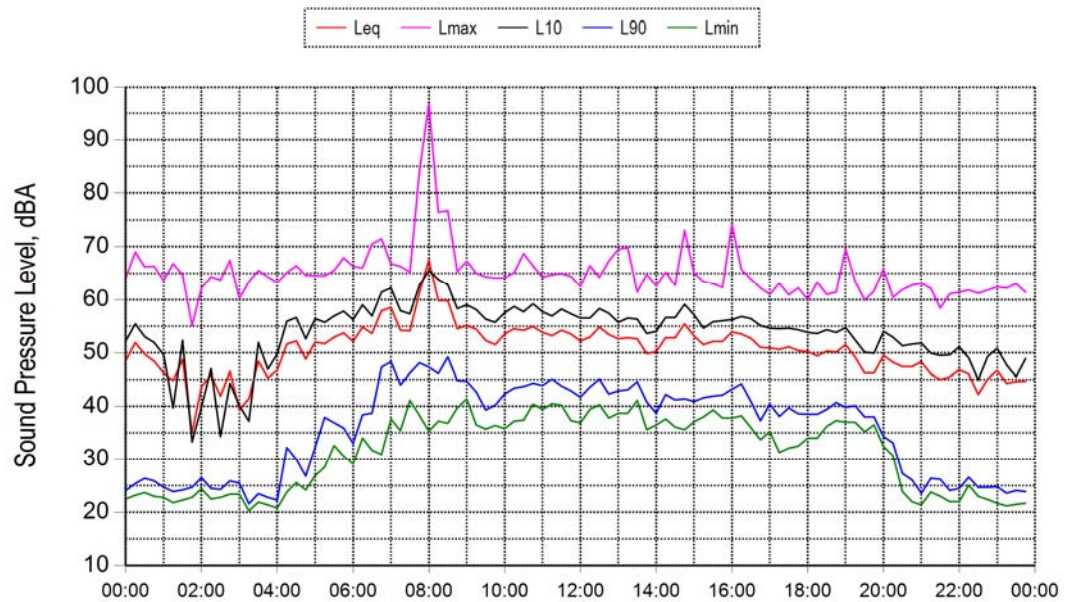


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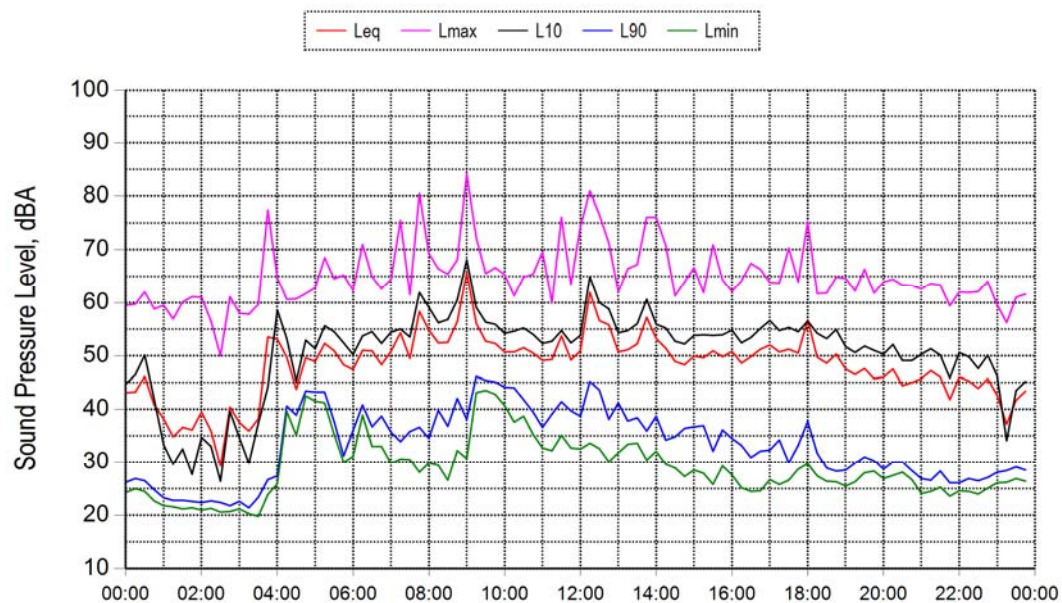


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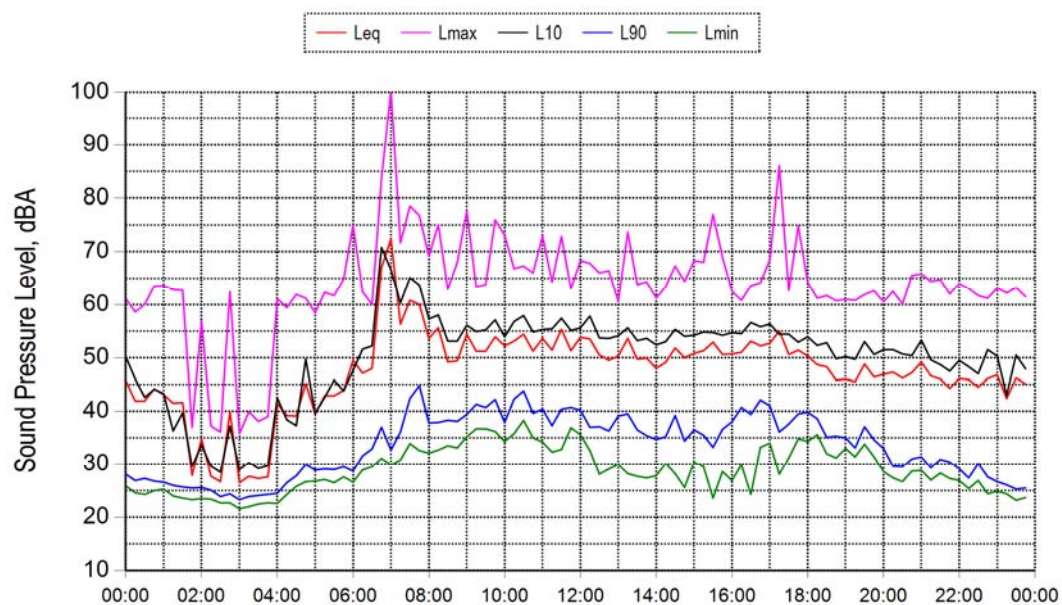


CN-2 King Residence

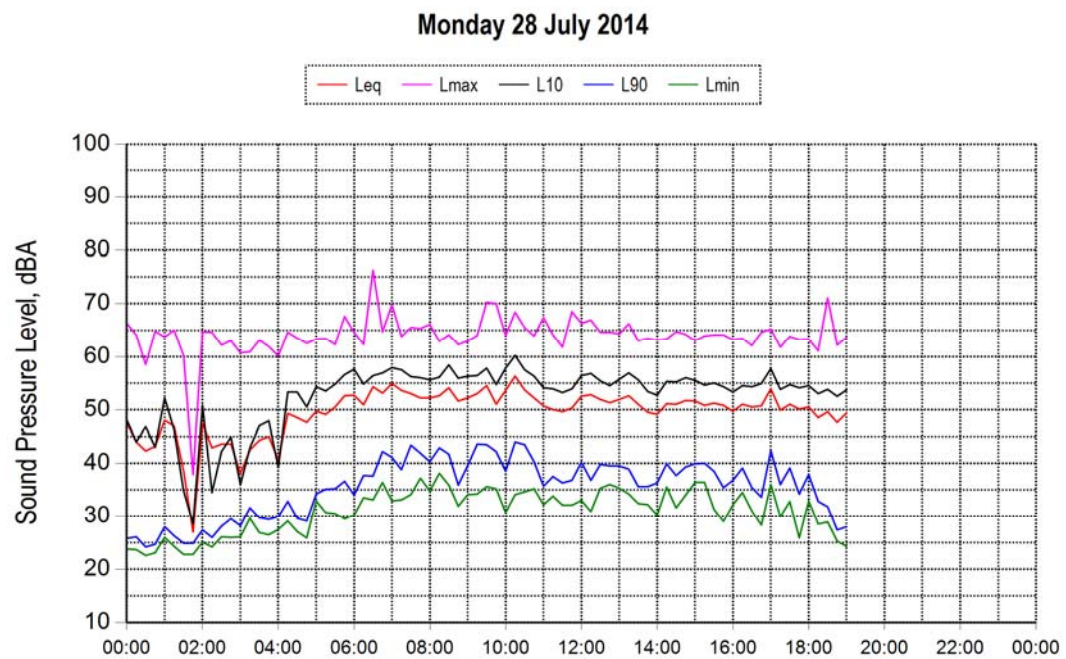
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Sunday 27 July 2014



CN-2 King Residence

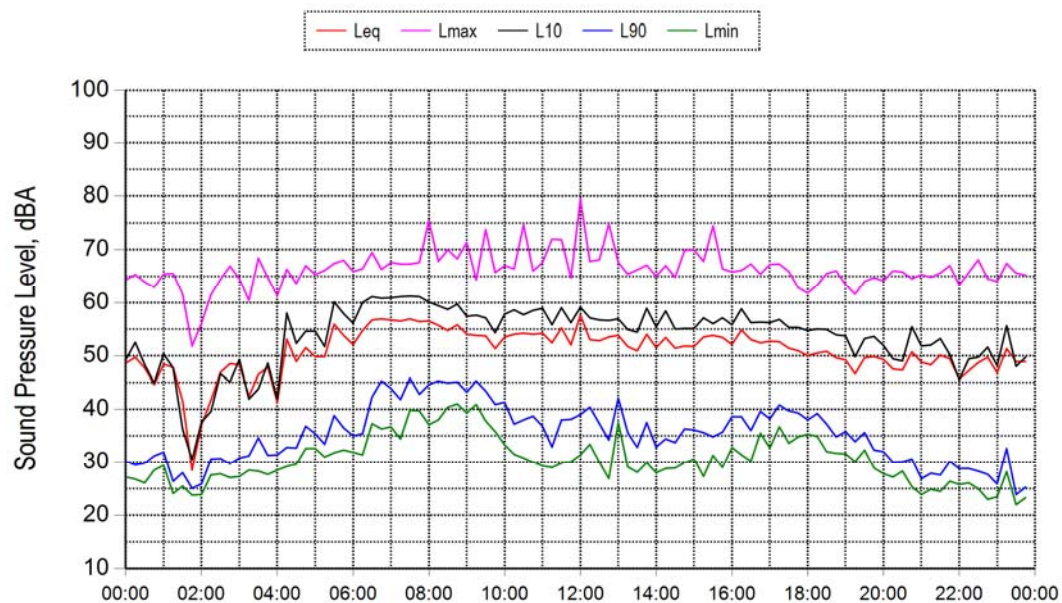


CN-3 Kashouli Residence

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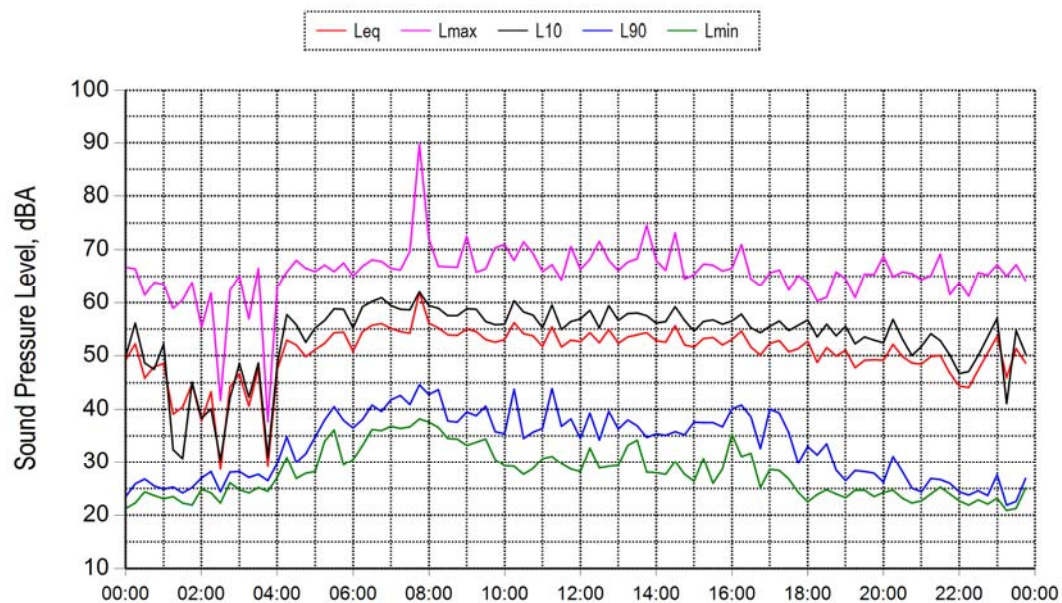


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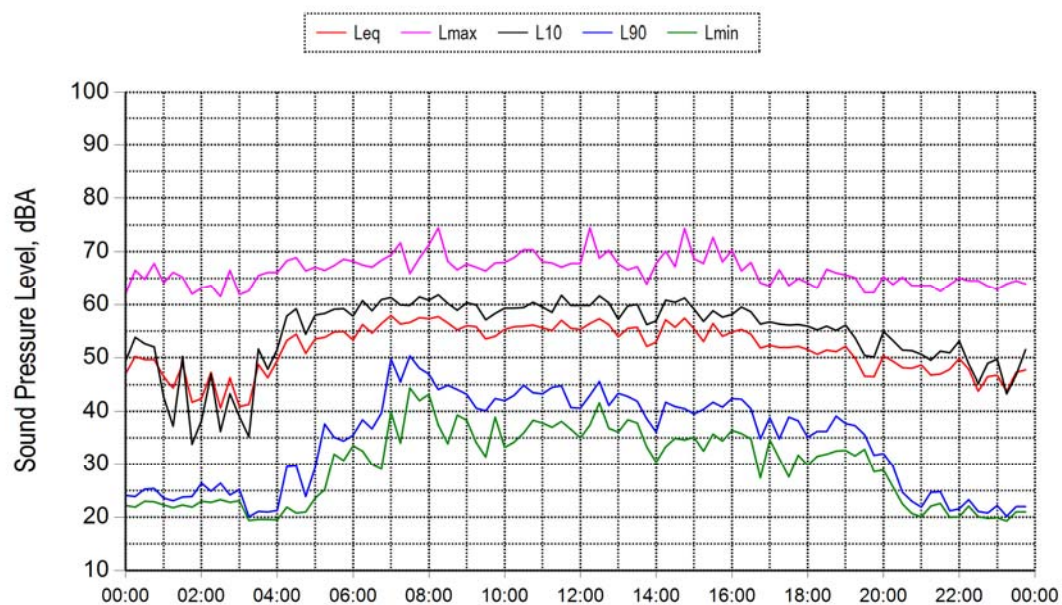


CN-3 Kashouli Residence

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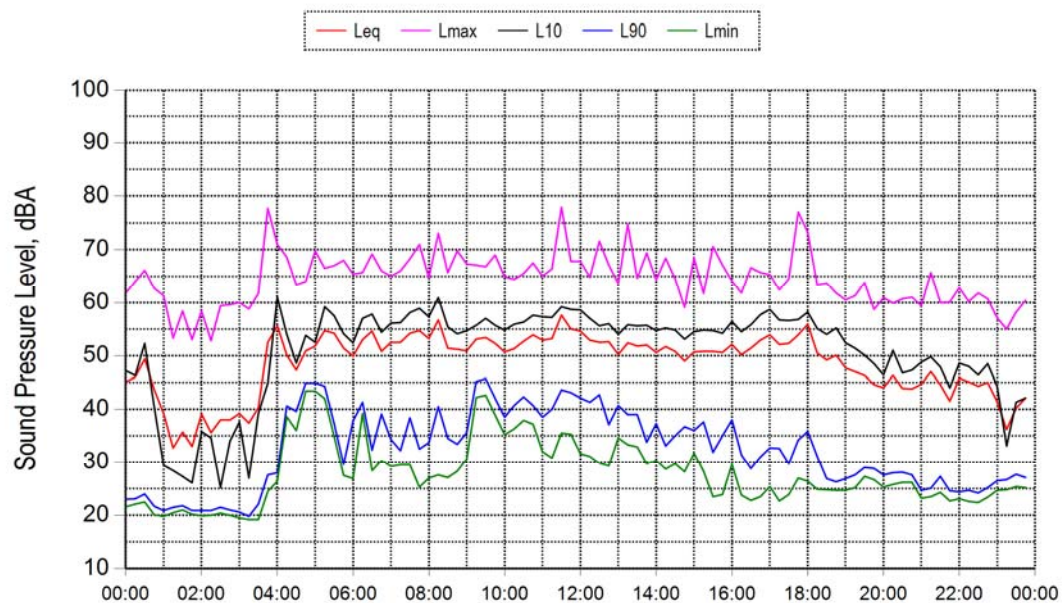


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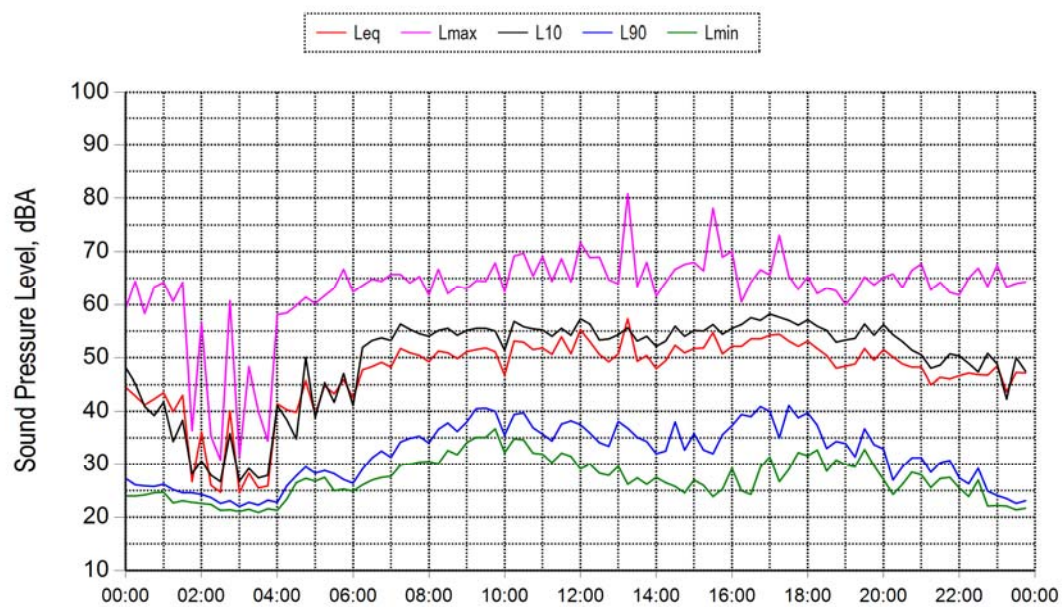


CN-3 Kashouli Residence

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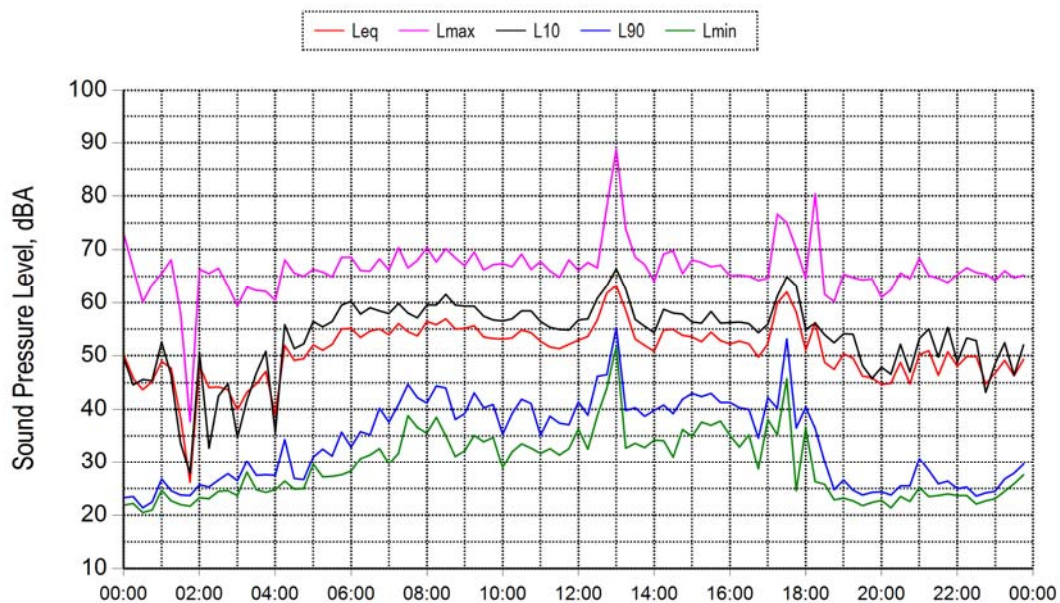


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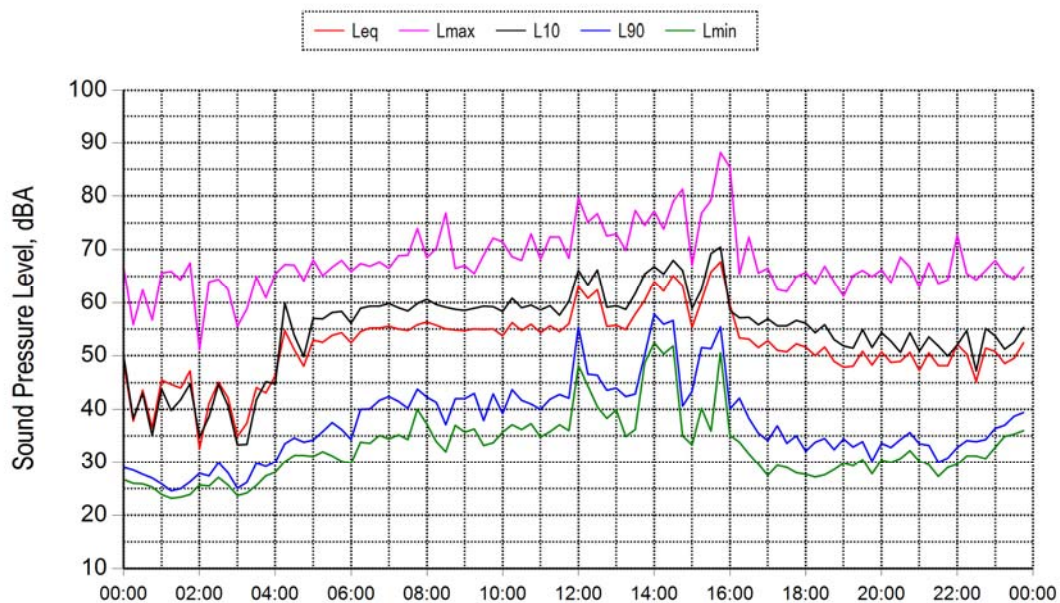


CN-3 Kashouli Residence

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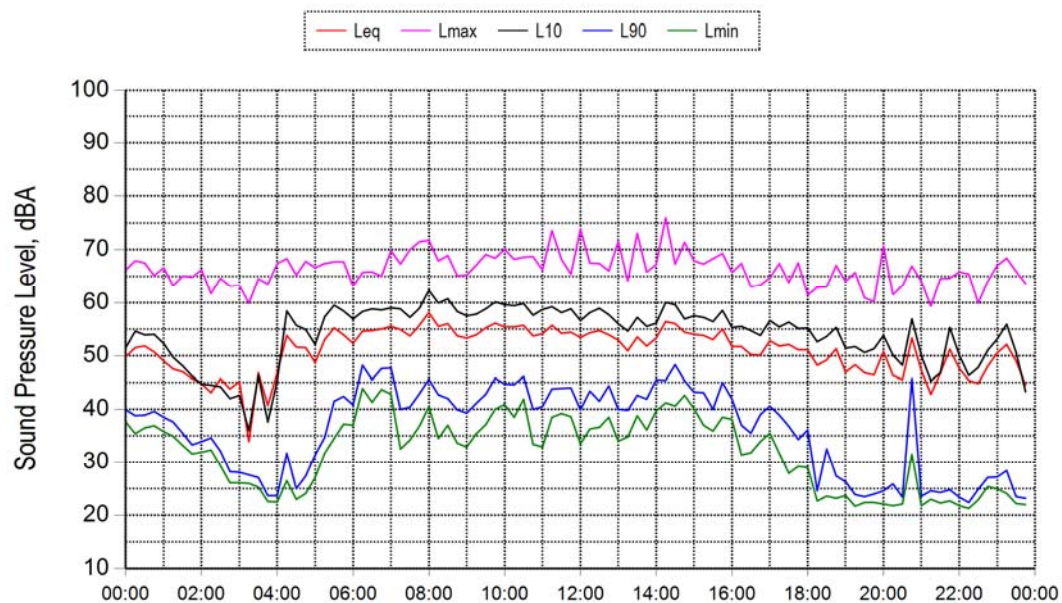


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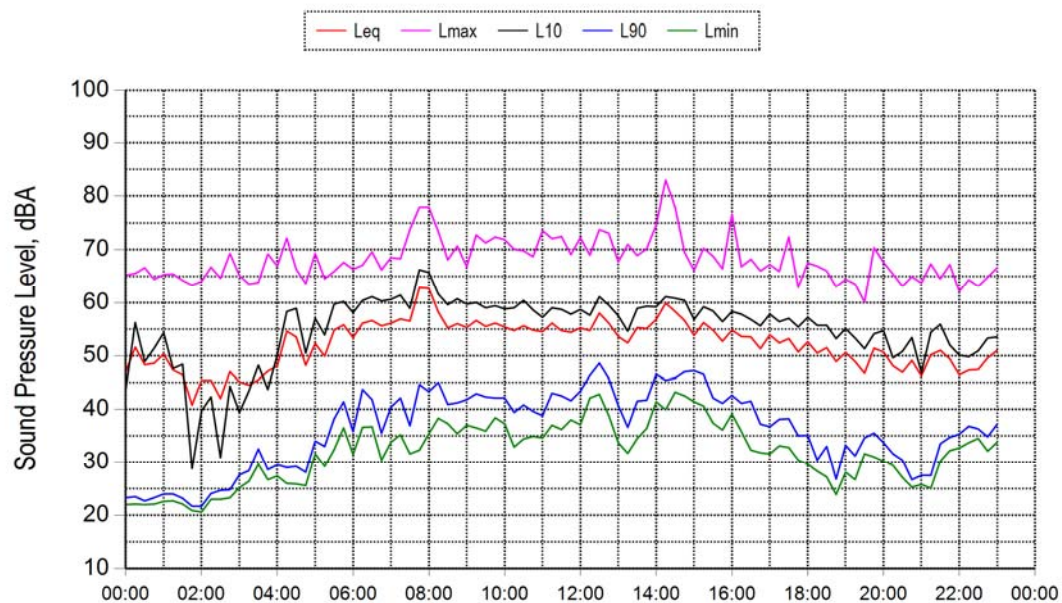


CN-3 Kashouli Residence

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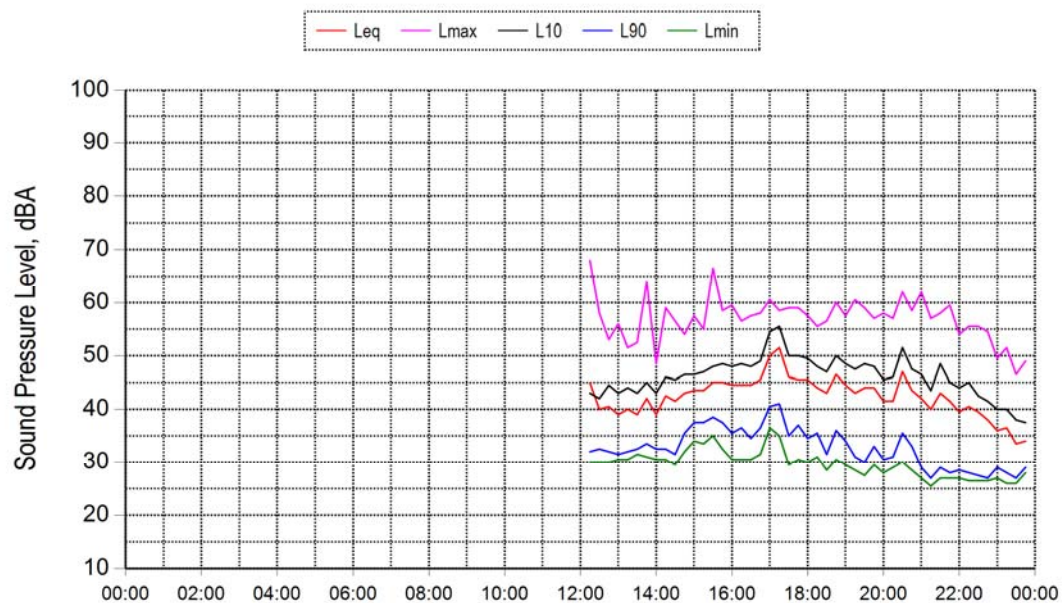


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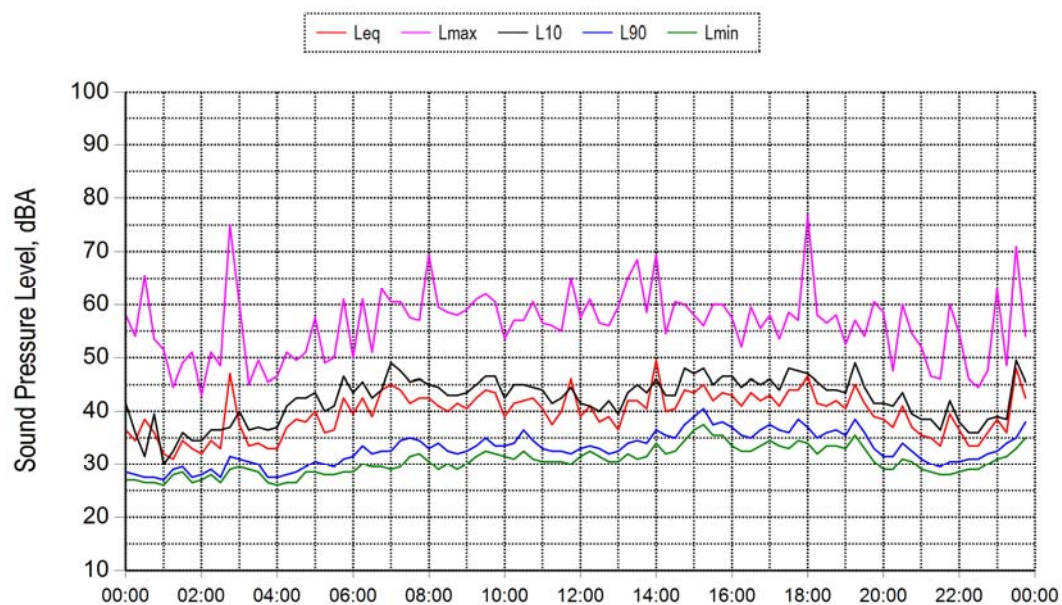


CN-4 Townsend Residence

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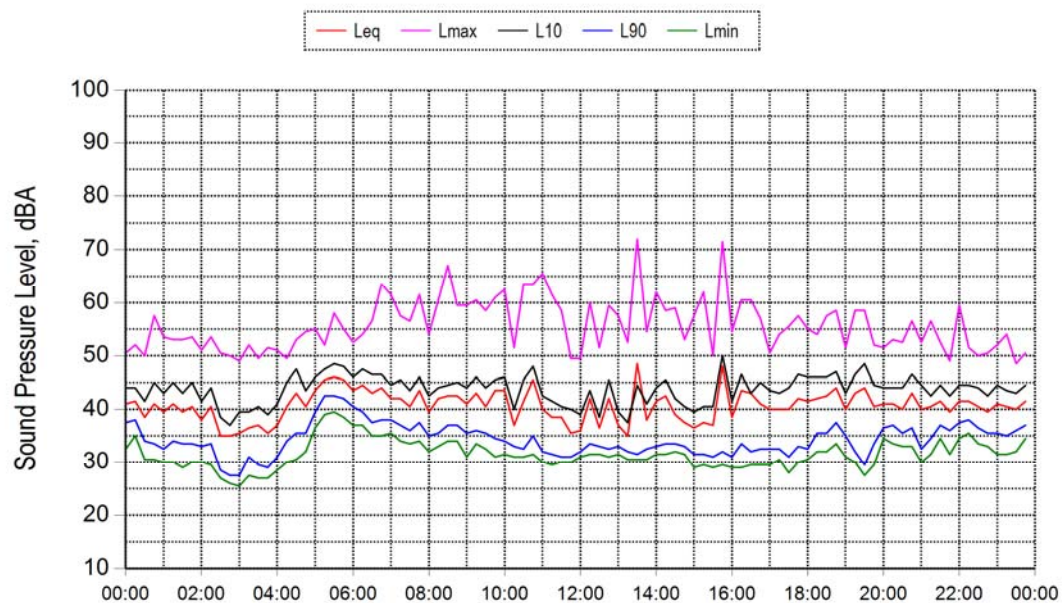


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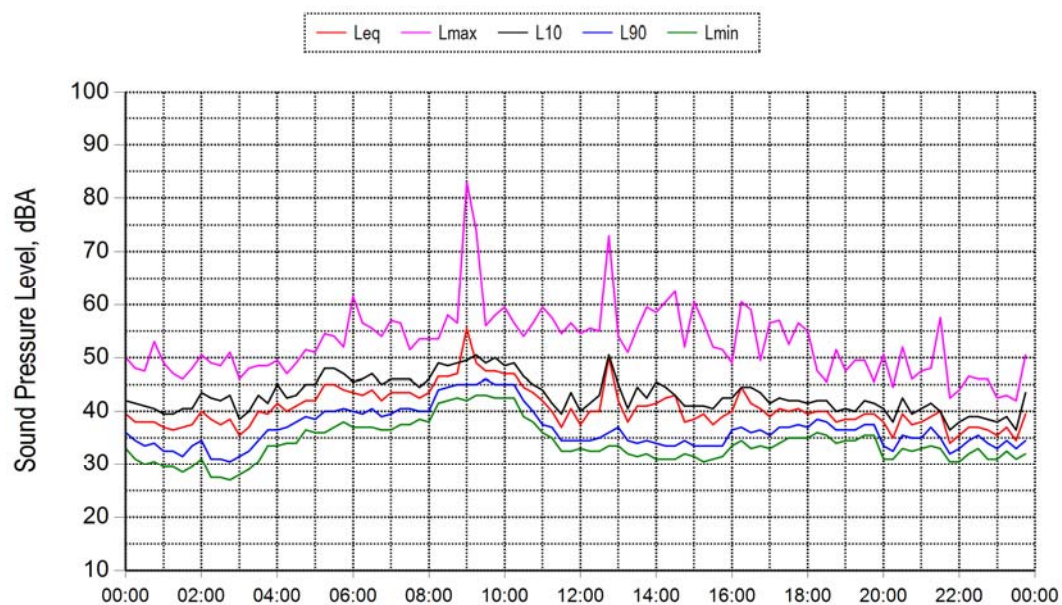


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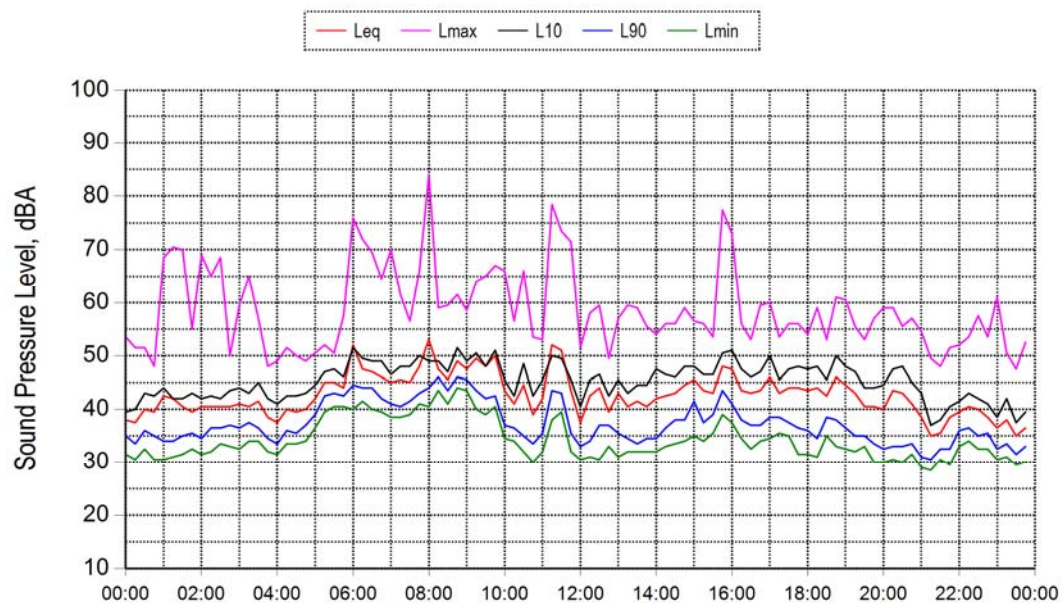


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CN-4 Townsend Residence

Saturday 26 July 2014



Sunday 27 July 2014

