

ACOUSTICS AND AIR

CALGA SAND QUARRY  
ATTENDED AND UNATTENDED COMPLIANCE NOISE MONITORING  
MAY 2011

REPORT NO. 01127-E  
VERSION A

WILKINSON  MURRAY

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**PREPARED FOR**

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### **APPENDIX A – Noise Measurement Results**

## GLOSSARY OF 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 overleaf, 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.

**$L_{Aeq}$**  – 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.

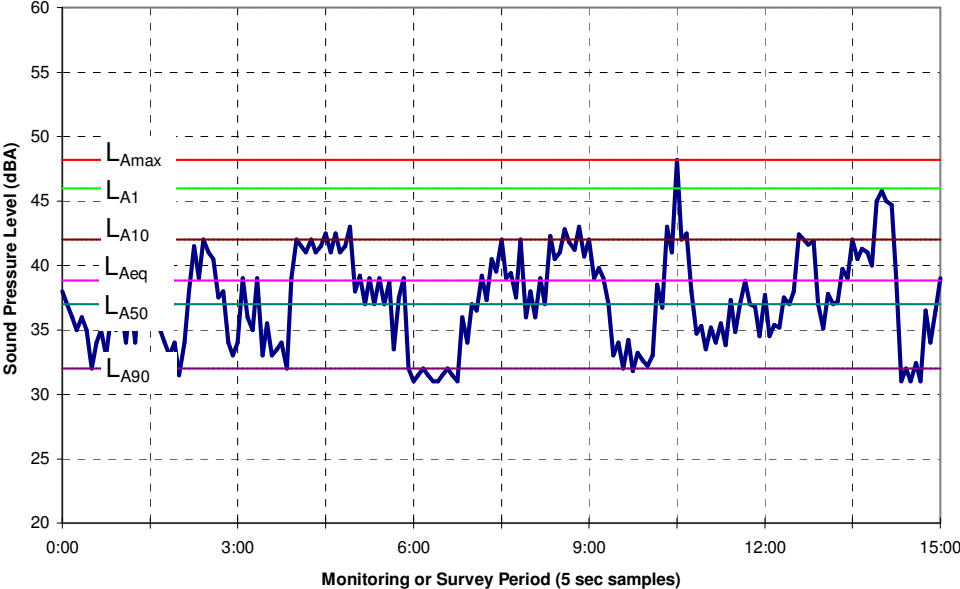
**$L_{A50}$**  – The  $L_{A50}$  level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the  $L_{A50}$  level for 50% of the time.

**$L_{A90}$**  – 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.

**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 10<sup>th</sup> percentile (lowest 10<sup>th</sup> 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 May and June 2011 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

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 done at all four identified locations on Thursday, 19 May 2011.

Unattended noise monitoring was conducted at CN-2, CN-3 and CN-4 from Thursday, 19 May until Friday, 3 June 2011. Unattended measurements at CN-1 had to be repeated due to equipment malfunction and were conducted from Friday, 17 June until Monday, 27 June 2011.

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

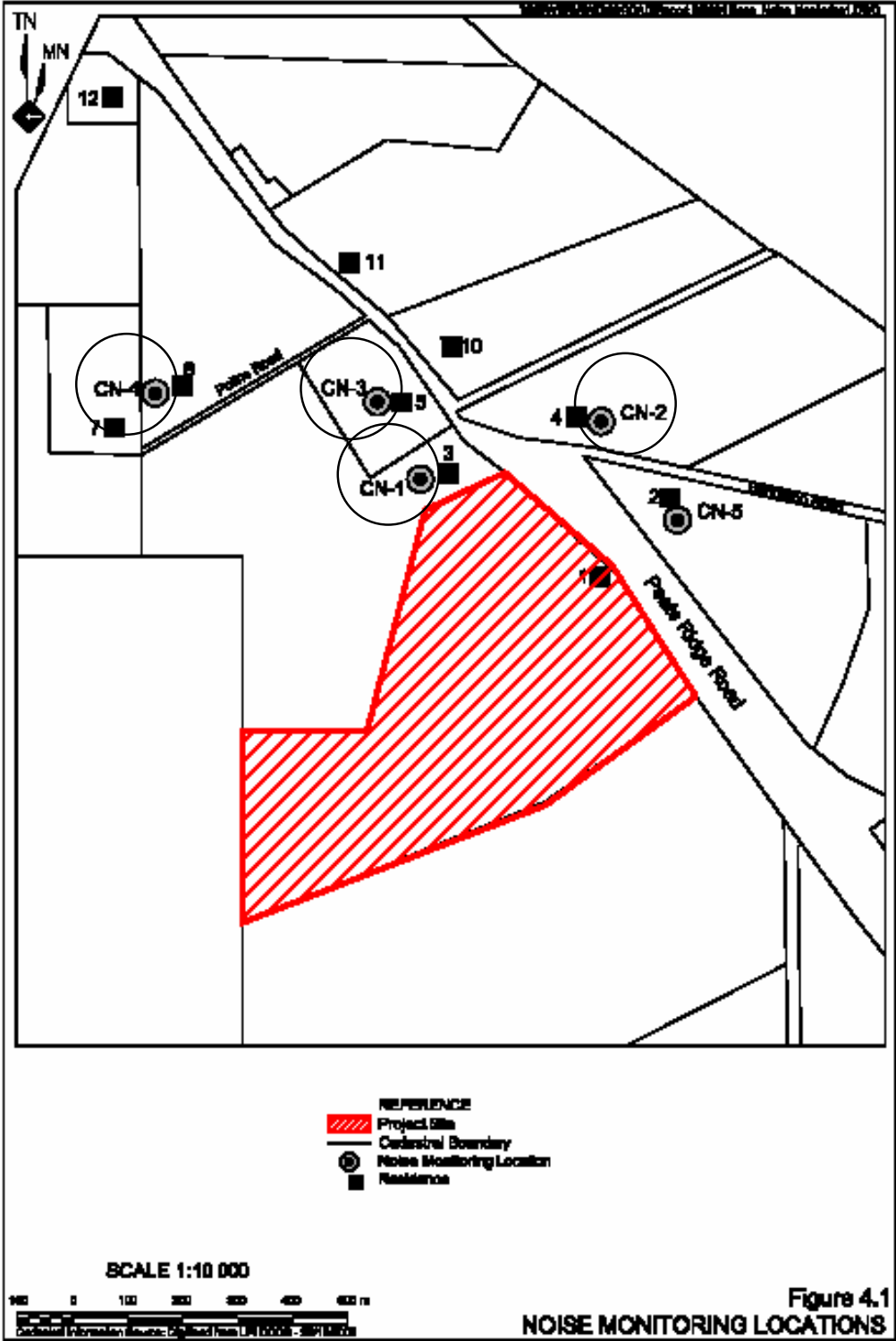


Figure 4.1 NOISE MONITORING LOCATIONS

### 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 Department of Environment, Climate Change and Water (DECCW) now known as the Department of Environment & Heritage (OEH) licence. It states that noise levels emanating from the premises 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              |                       |                     |
|----------|-----------------------|-----------------------|---------------------|
|          | Day                   | Evening               | Night Time          |
|          | $L_{Aeq,15min}$ (dBA) | $L_{Aeq,15min}$ (dBA) | $L_{A1,1min}$ (dBA) |
| CN-1     | 41                    | 35                    | 35                  |
| CN-2     | 40                    | 35                    | 35                  |
| CN-3     | 39                    | 35                    | 35                  |
| CN-4     | 35                    | 35                    | 35                  |

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

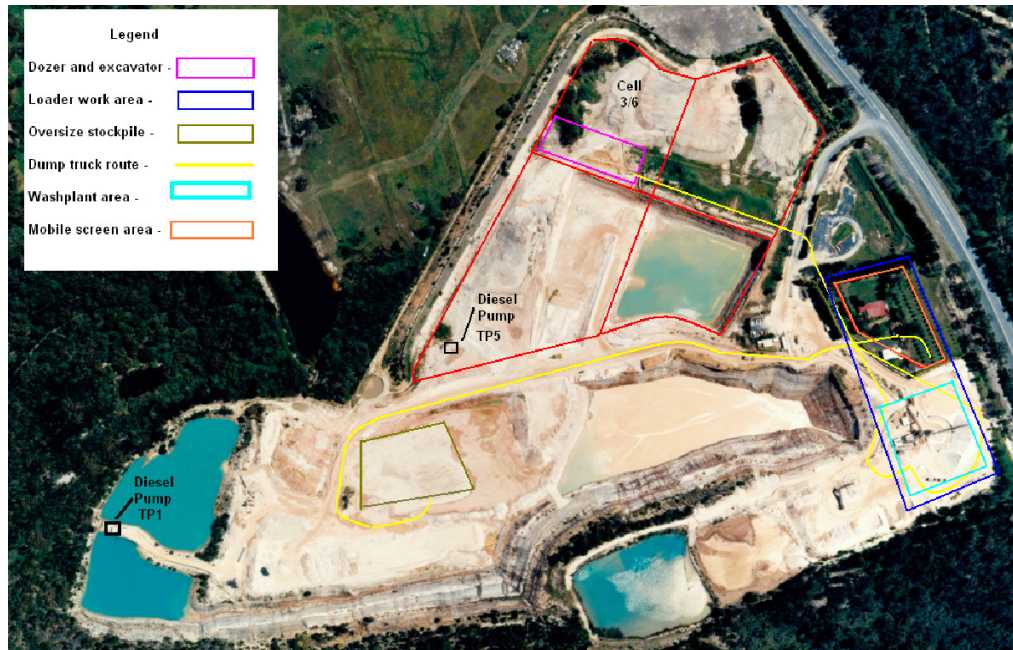
**Table 3-2 Operating Hours**

| 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 SITE ACTIVITIES

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

**Figure 4-1 Work Activities**



The following mobile plant and equipment were in operation during the time of the survey:

- Dozer ripping and pushing sandstone in Cell 3/6;
- Excavator loading dump trucks with raw feed from 3/6 to go to washplant and brickies raw feed stockpile;
- Dump truck taking raw feed from 3/6 to go to washplant and brickies raw feed stockpile;
- Front-end-loader producing brickies sand, loading sales trucks and loading dump trucks 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 roads;
- Transfer pump 5 was in constant operation;
- Transfer pump 1 was in operation for only 2 days; and
- Washplant and dry screening plant were in full production.

## 5 ASSESSMENT OF NOISE LEVELS

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. The Wilkinson Murray representative ensured that weather conditions were suitable for attended monitoring and this was confirmed with the obtained weather data.

### 5.1 CN-1 Gazzana Residence

At the Gazzana residence, noise results show  $L_{Aeq,15min}$  noise levels typically ranging 50-57dBA during the day and 45-55dBA in the evening. The measured  $L_{A1,15min}$  noise levels during the night typically range 60-75dBA.

Site observations showed that measured noise levels were 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. Quarry activities were noted to be barely audible by the Wilkinson Murray representative during the four site visits (measurements had to be repeated due to equipment malfunction).

An attended measurement was also done at the Gazzana residence when setting up the unattended noise monitoring equipment on Thursday, 19 May 2011. The measured  $L_{Aeq,15min}$  noise level was established at 54dBA and was due to traffic on Peats Ridge Road. The  $L_{Aeq,15min}$  noise level due to quarry operations was estimated at approximately 37dBA.

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 consistent with traffic noise. Similarly,  $L_{A1,15min}$  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 receiver and traffic on Peats Ridge Road. Therefore, the measurements during this survey indicate that the noise conditions are likely to be complied with at the Gazzana residence. It is important to note that it is impossible to confirm this with a 100% certainty as the measurements were unattended. However, this is confirmed by the attended noise measurements.

### 5.2 CN-2 King Residence

At the King Residence, noise results show  $L_{Aeq,15min}$  noise levels typically ranging 48-57dBA during the day and 42-50dBA in the evening period. The measured  $L_{A1,15min}$  noise levels during the night typically range 60-67dBA.

Again, site observations showed that measured noise levels were likely affected by extraneous noises such as traffic passing on Peats Ridge Road and natural noises. Quarry activities were noted to be barely audible by the Wilkinson Murray representative during both site visits.

Attended monitoring was conducted at the King Residence when setting up the noise monitoring equipment on Thursday, 19 May 2011. The measured  $L_{Aeq,15min}$  noise level was established at 48dBA and the  $L_{Aeq,15min}$  noise level due to quarry operations was estimated at approximately 39dBA.

The graphical representation of the measured noise data show that the measured  $L_{Aeq,15min}$  and  $L_{A1,15min}$  noise 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.

The unattended measurement results show that noise levels are likely to have been dominated by extraneous noises associated with the natural environment surrounding the receiver and traffic on Peats Ridge Road. Therefore, the measurements indicate that the noise conditions are likely to be complied with at the King Residence. Again, it is impossible to confirm this with a 100% certainty as the measurements were unattended. However, this is confirmed by the attended noise measurements.

### **5.3 CN-3 Kashouli Residence**

At the Kashouli residence, noise results show  $L_{Aeq,15min}$  noise levels typically ranging between 50-57dBA during the day and 44-52dBA in the evening period. The measured  $L_{A1,15min}$  noise levels during the night typically range between 60-70dBA.

Again, site observations showed that measured noise levels were likely affected by extraneous noises such as traffic passing on Peats Ridge Road and natural noises. Quarry activities were inaudible during the attended measurement carried out on Thursday, 19 May 2011 and during the second site visit to collect the equipment.

The graphical representation of the noise results obtained also show that the measured levels do not fluctuate at the starting and finishing hours of quarry operations as expected if they were dominated by noise associated with quarry activities.

The unattended measurement results show that noise levels are likely to have been dominated by extraneous noises associated with the natural environment surrounding the receiver and traffic on Peats Ridge Road. Therefore, the measurements indicate that the noise conditions are likely to be complied with at the Kashouli residence. Again, it is impossible to confirm this with a 100% certainty as the measurements were unattended. However, this is confirmed by the attended noise measurements.

### **5.4 CN-4 Townsend Residence**

At the Townsend residence, noise results show  $L_{Aeq,15min}$  noise levels typically ranging 37-50dBA during the day and 33-45dBA in the evening. The measured  $L_{A1,15min}$  noise levels during the night typically range 48-67dBA.

Again, site observations showed that measured noise levels were likely affected by extraneous noises such as traffic passing on Peats Ridge Road and natural noises. Quarry activities were inaudible during the attended measurement carried out on Thursday, 19 May 2011 and during the second site visit to collect the equipment.

The graphical representation of the measured noise data show that the measured  $L_{Aeq,15min}$  and

$L_{A1,15min}$  noise 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.

The unattended measurement results show that noise levels are likely to have been dominated by extraneous noises associated with the natural environment surrounding the receiver and traffic on Peats Ridge Road. Therefore, the measurements indicate that the noise conditions are likely to be complied with at the Townsend residence. Again, it is impossible to confirm this with a 100% certainty as the measurements were unattended. However, this is confirmed by the attended noise measurements.

## 6 CONCLUSION

A compliance noise monitoring survey was conducted during May-June 2011 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 of the monitored residences.

### Note

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### Quality Assurance

We are committed to and have implemented AS/NZS ISO 9001:2008 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

### AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

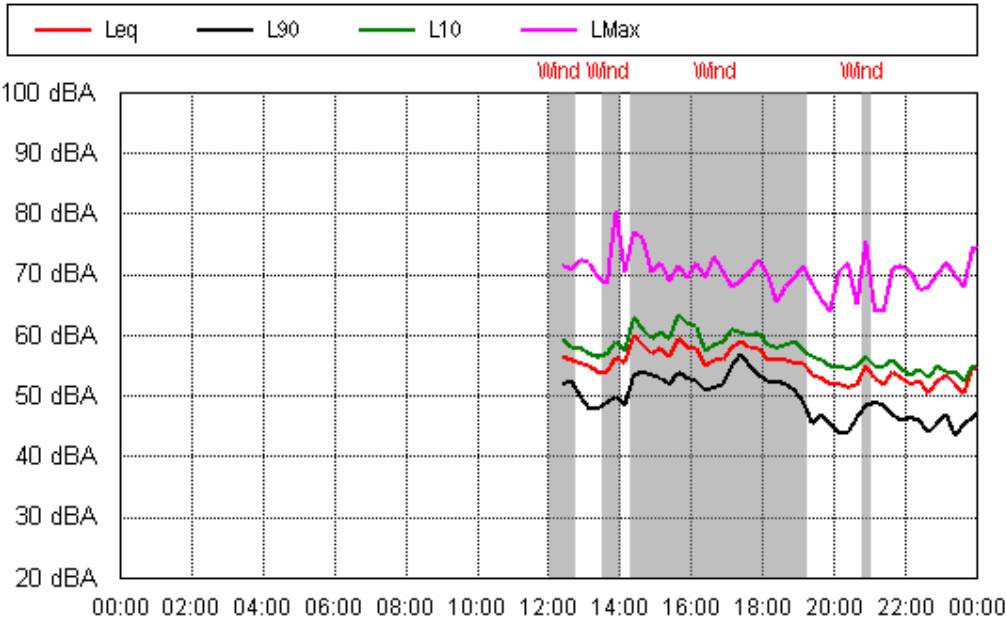
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|---------|--------|-------------|-----------------|-----------------|
| A       | Final  | 6 July 2011 | Roman Haverkamp | John Wassermann |

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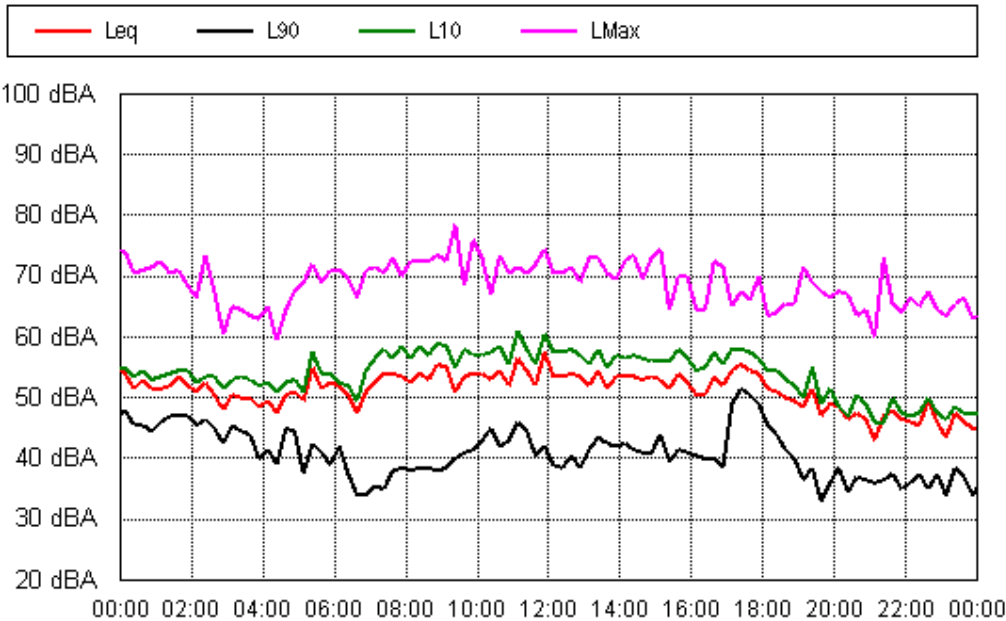
APPENDIX A  
NOISE MEASUREMENT RESULTS

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**Location: CN-1 Gazzana Residence**

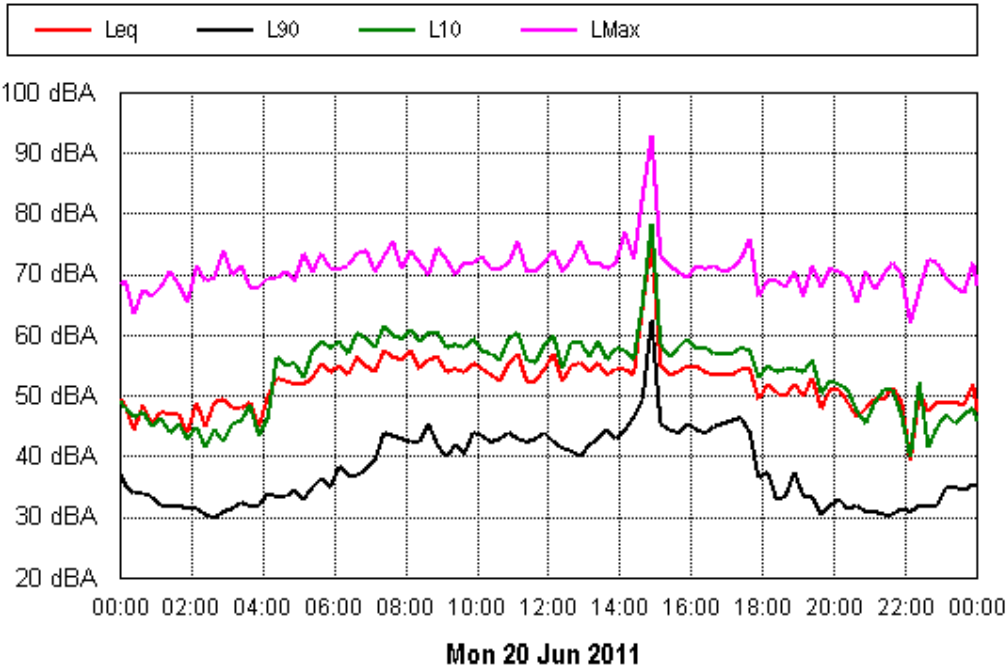
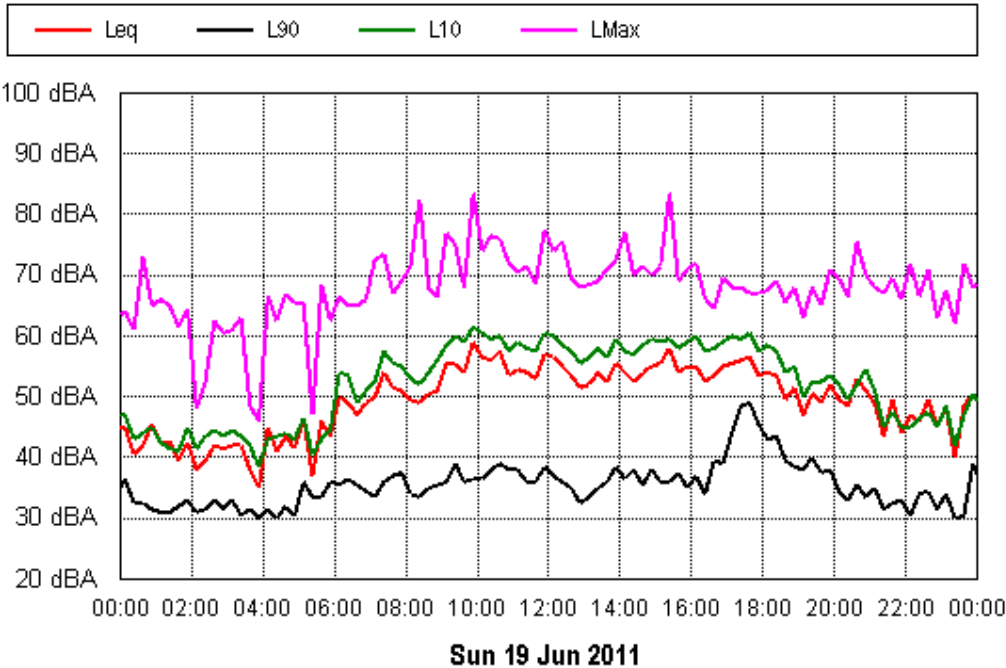


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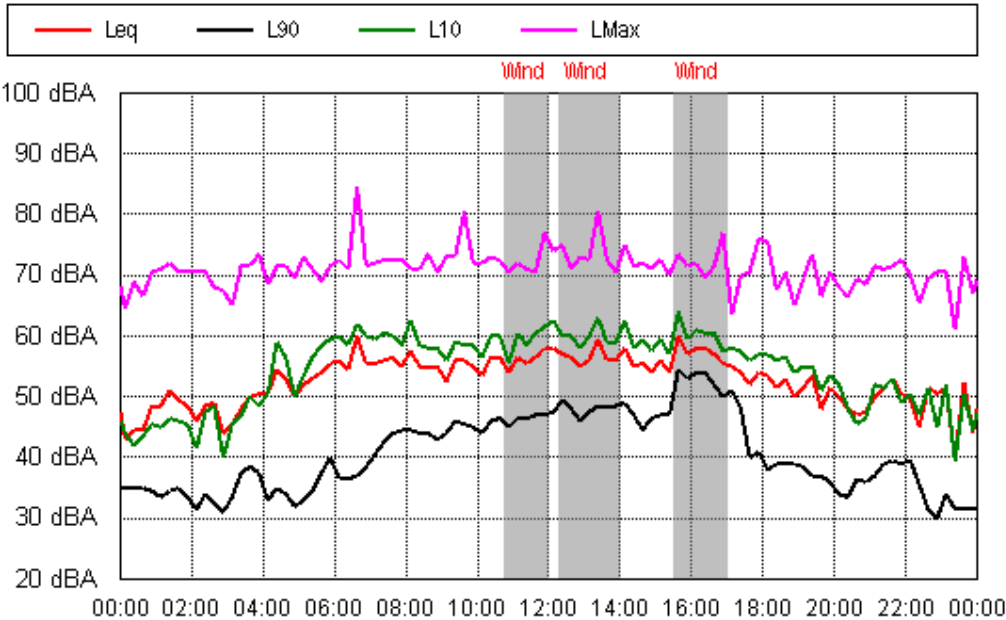


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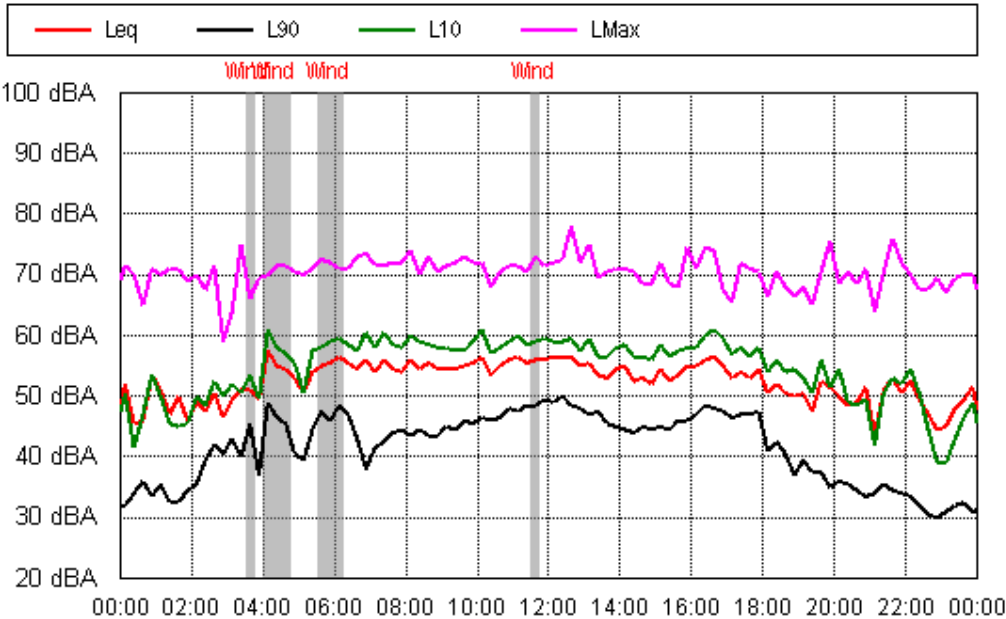
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**Location: CN-1 Gazzana Residence**



**Project: CALGA SAND QUARRY**  
**Location: CN-1 Gazzana Residence**

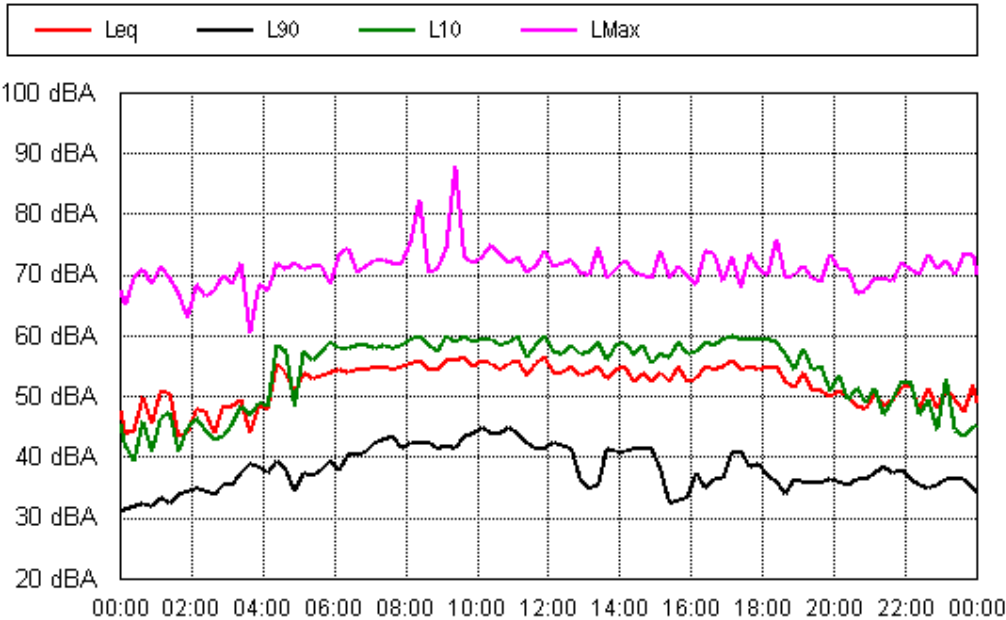


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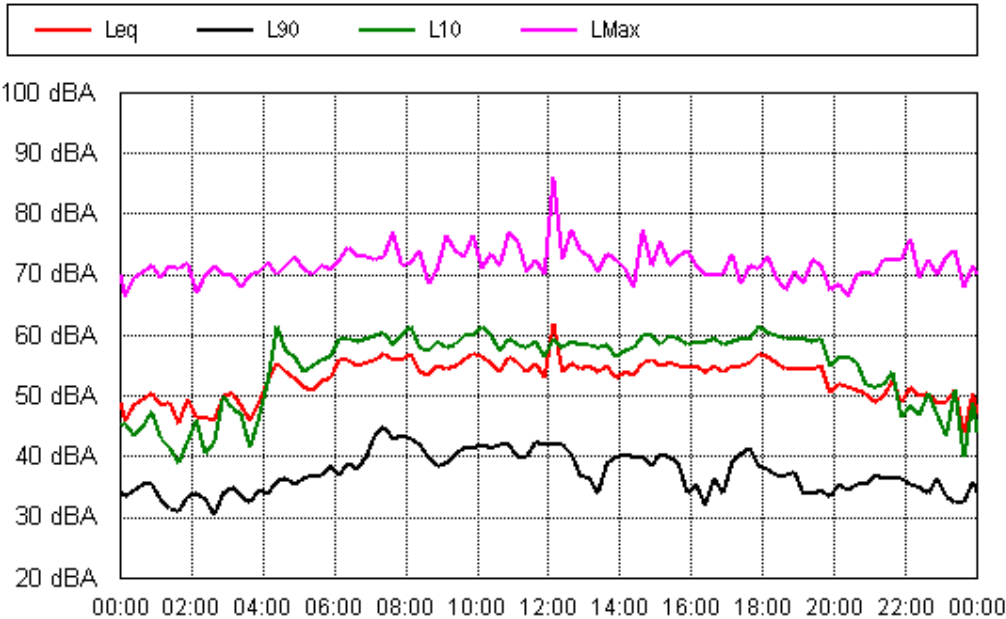


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**Location: CN-1 Gazzana Residence**

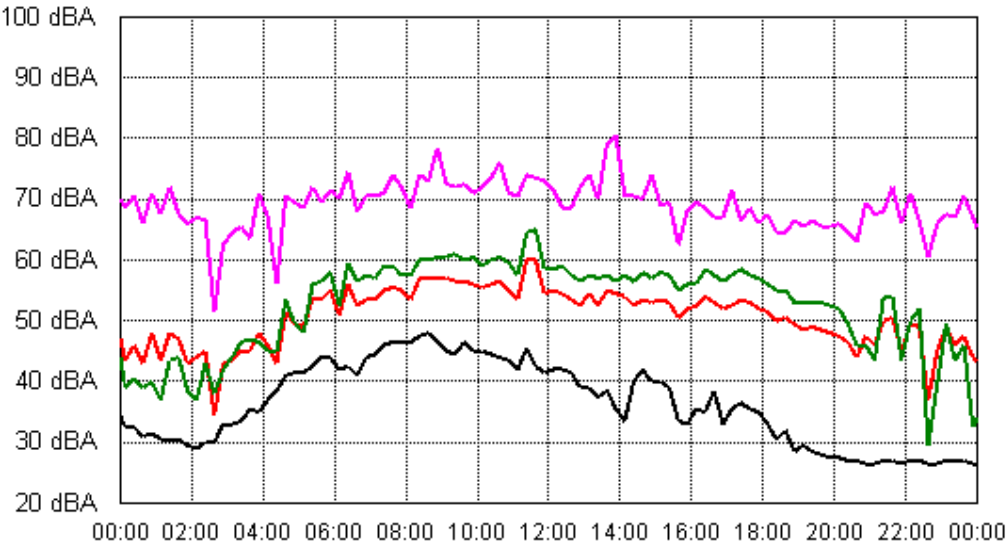
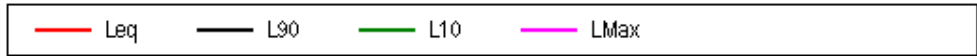


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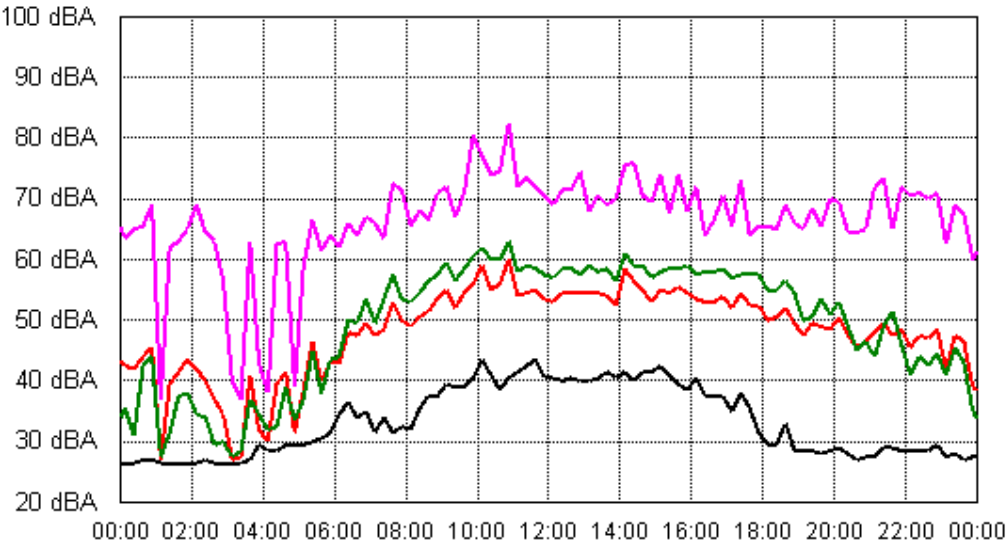
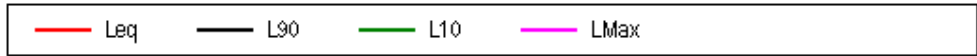


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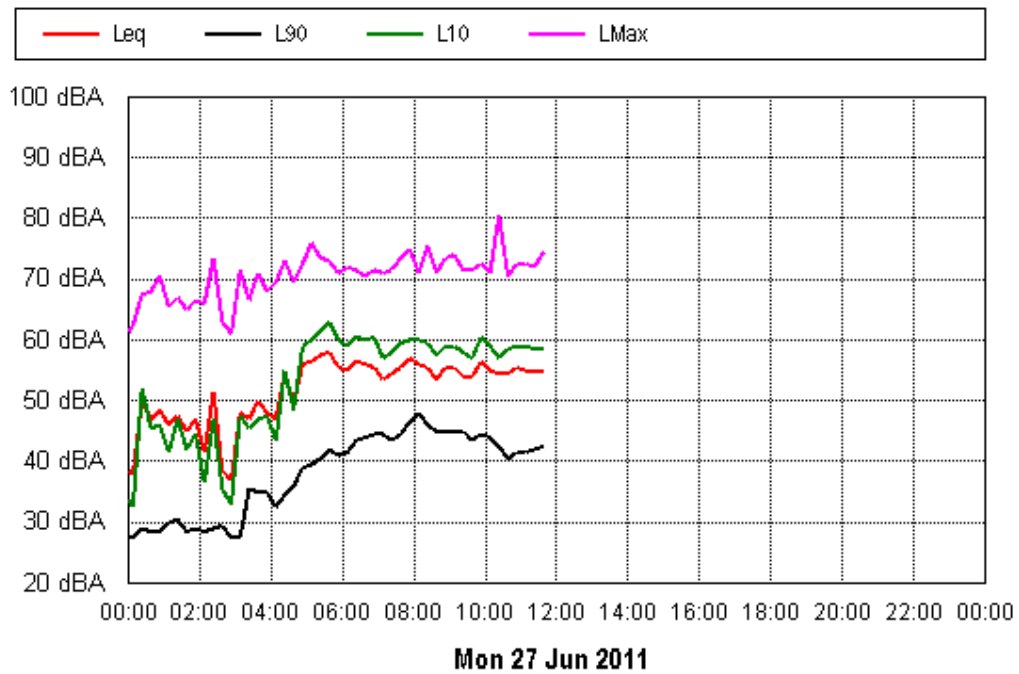


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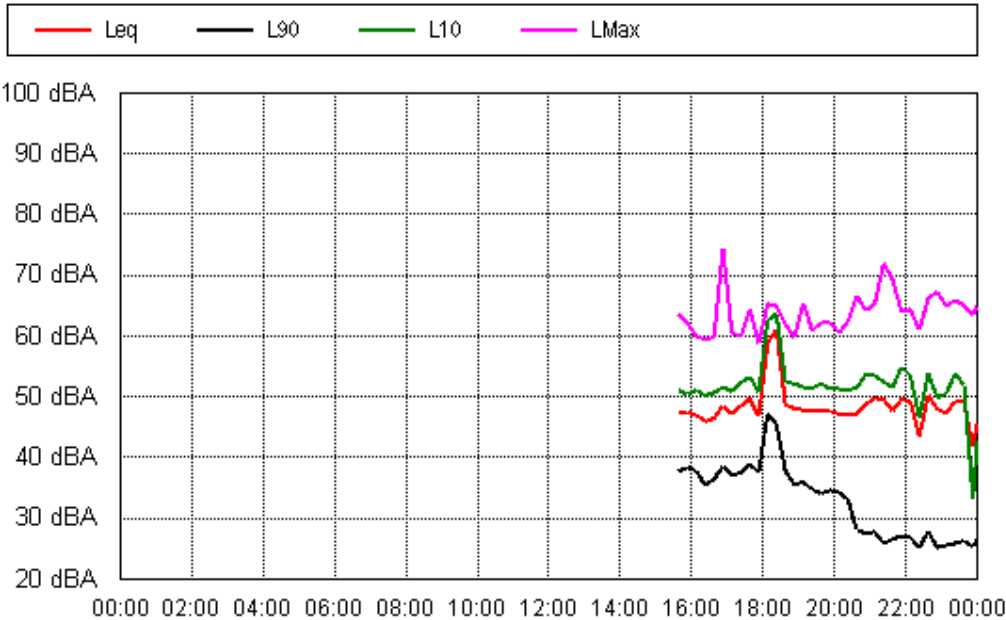


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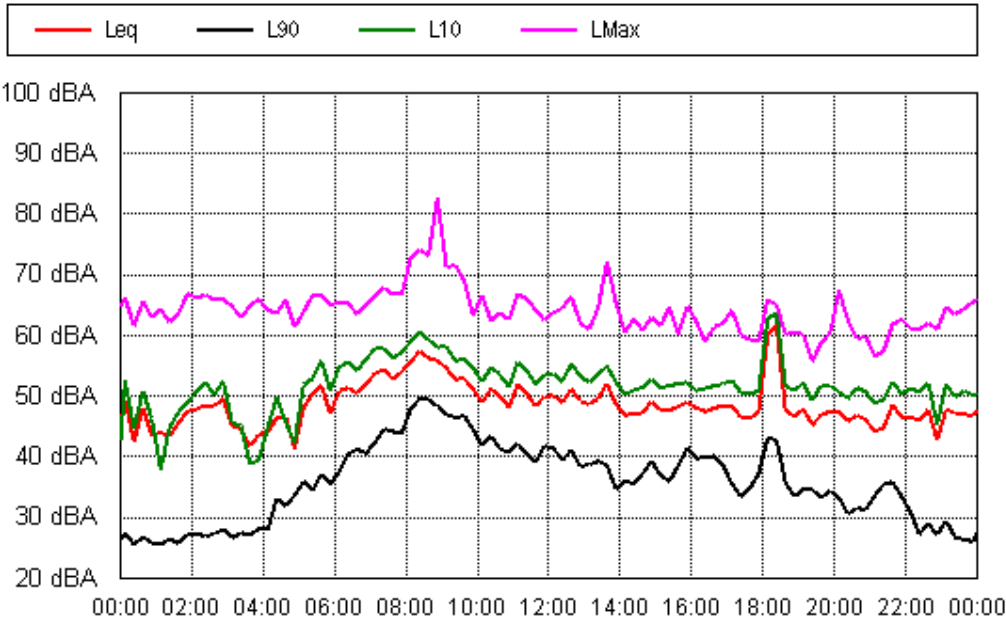
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**Location: CN-1 Gazzana Residence**



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**Location: CN-2 King Residence**

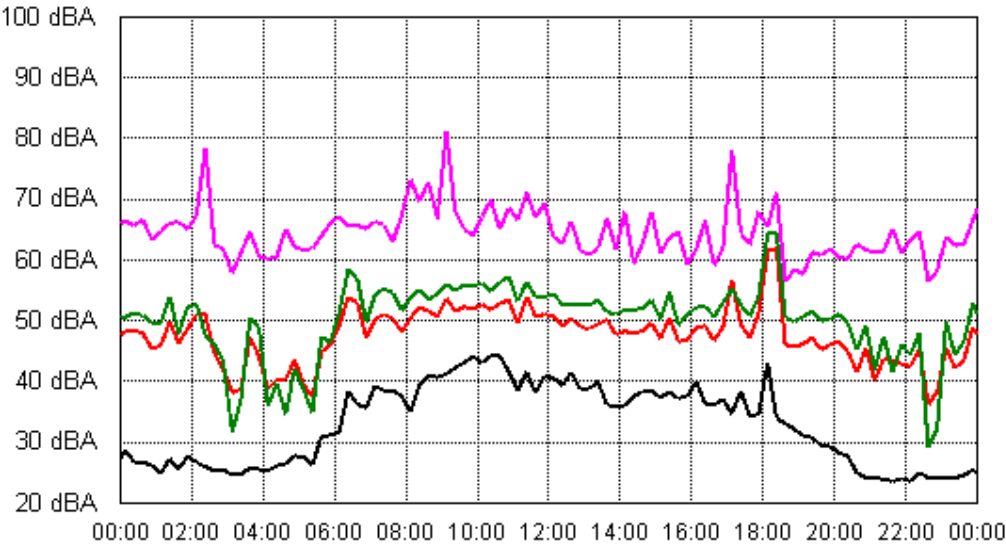
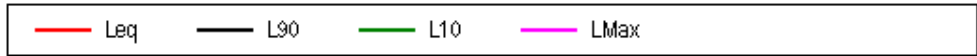


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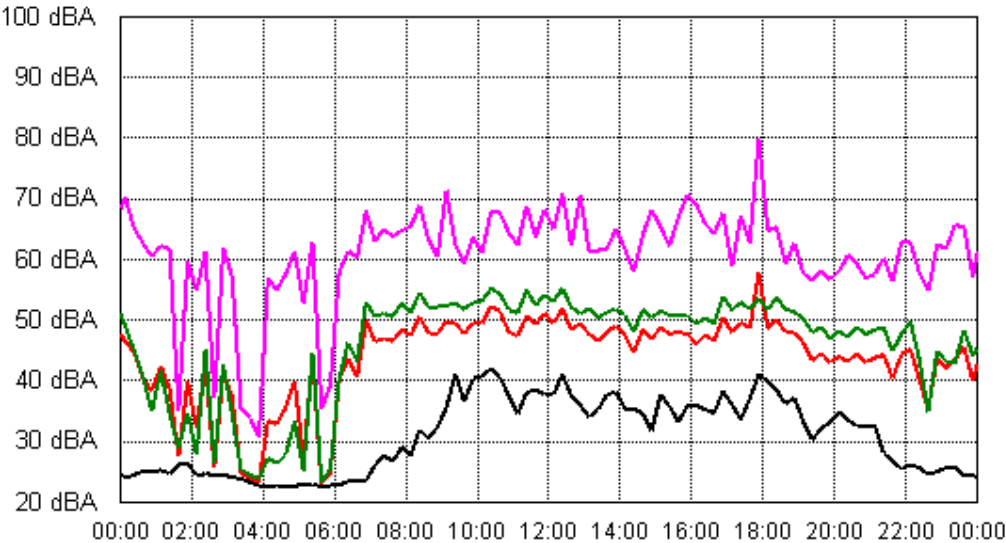
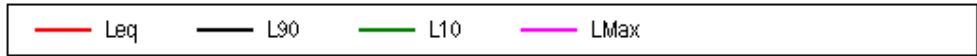


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**Location: CN-2 King Residence**

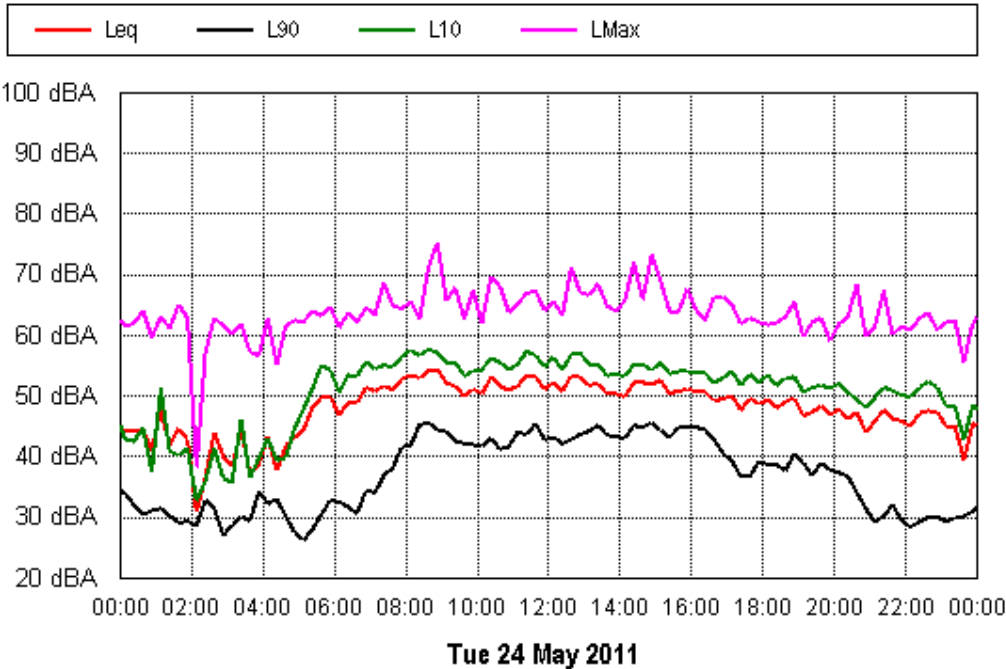
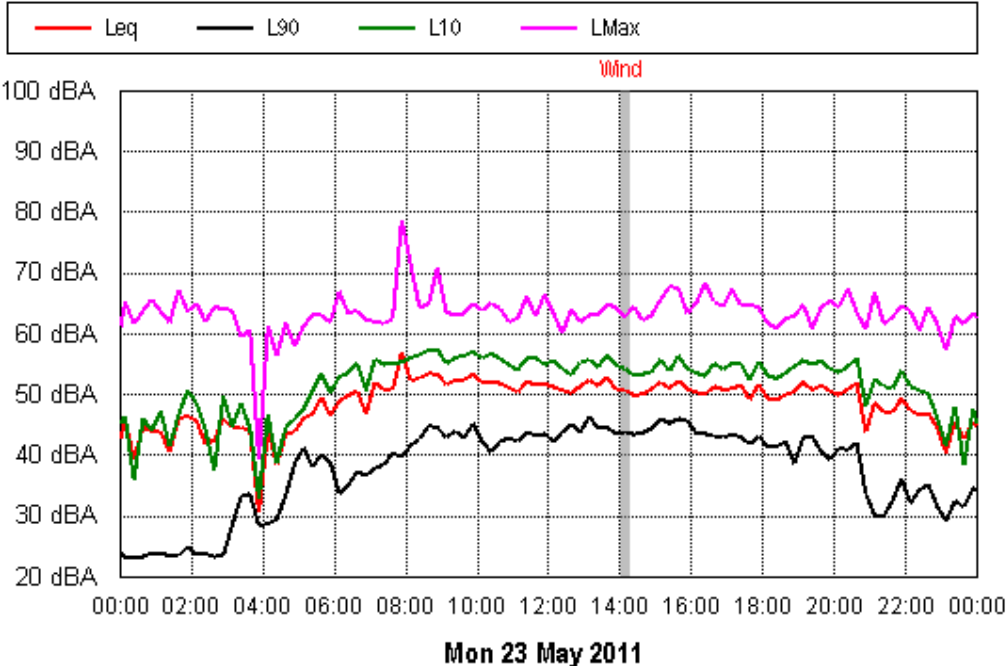


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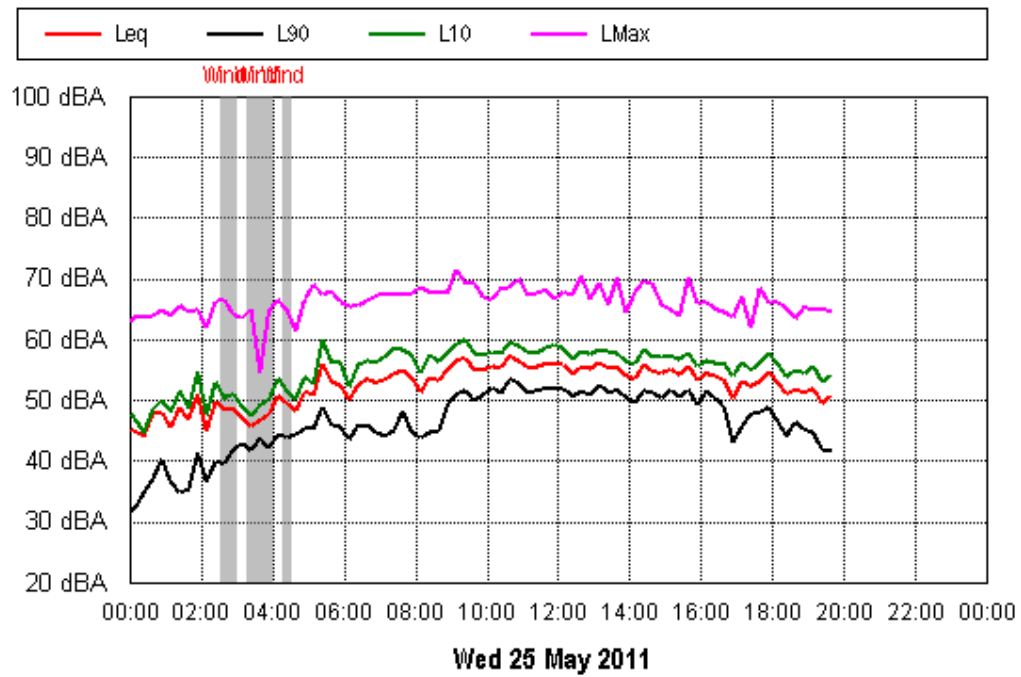


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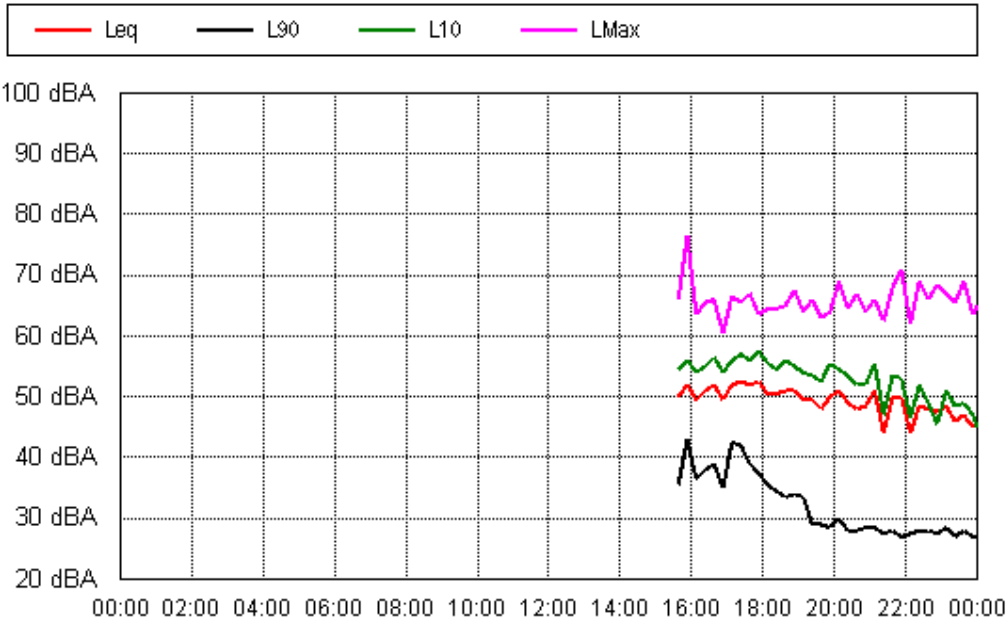
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**Location: CN-2 King Residence**



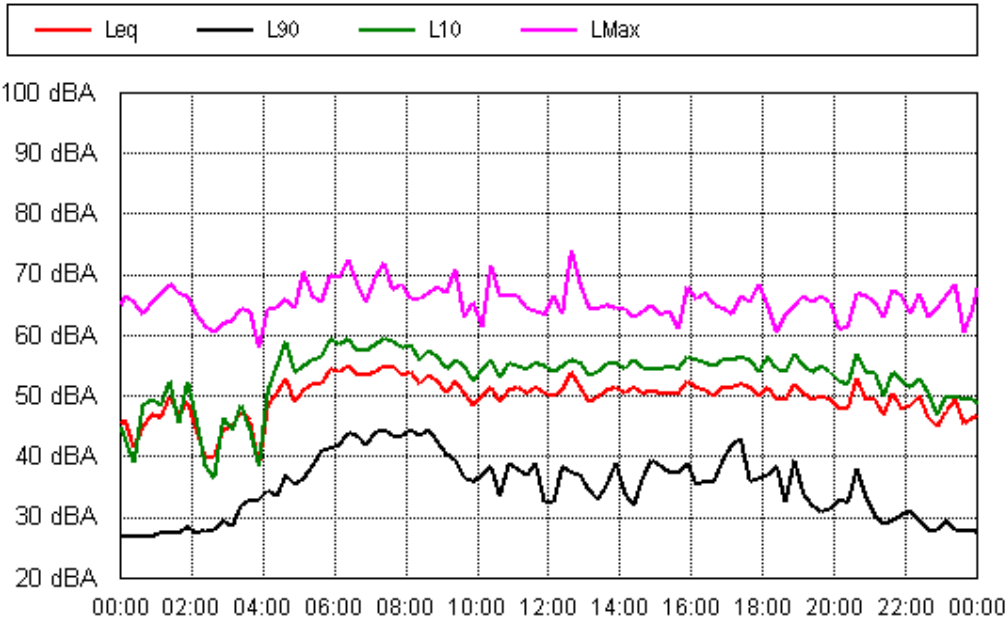
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**Location: CN-2 King Residence**



**Project: CALGA SAND QUARRY**  
**Location: CN-3 Kashouli Residence**

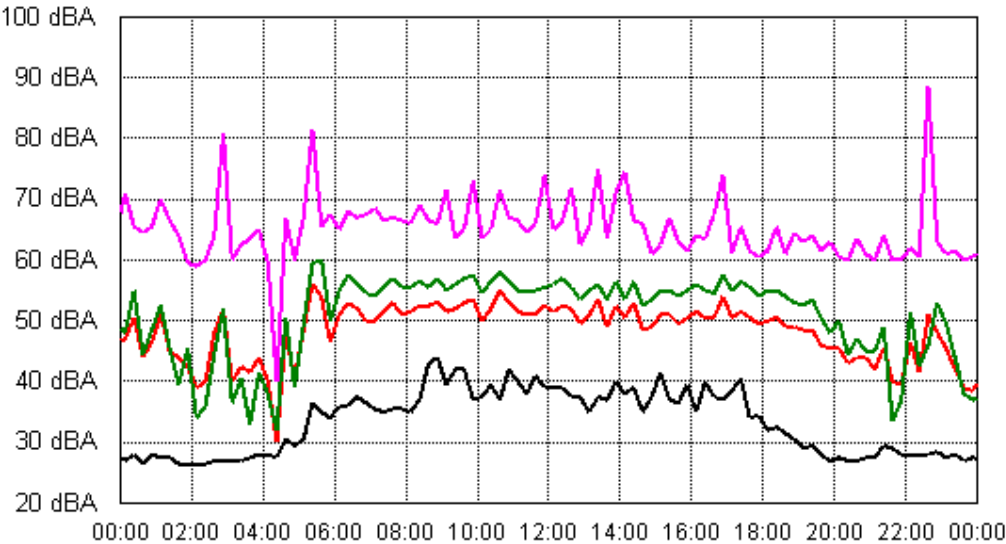


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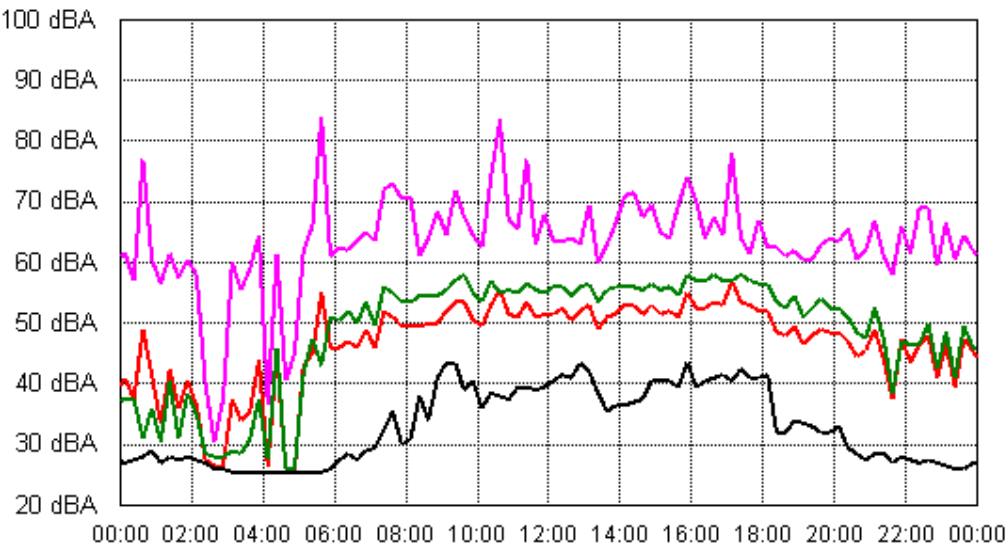
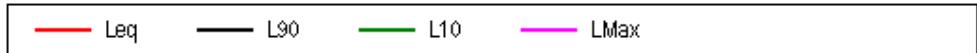


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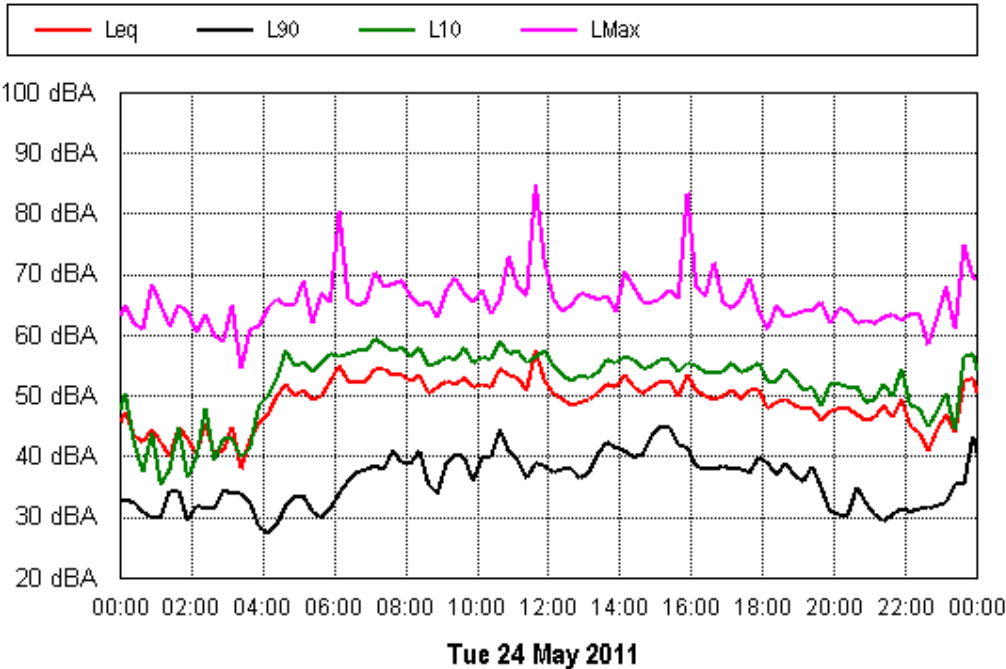
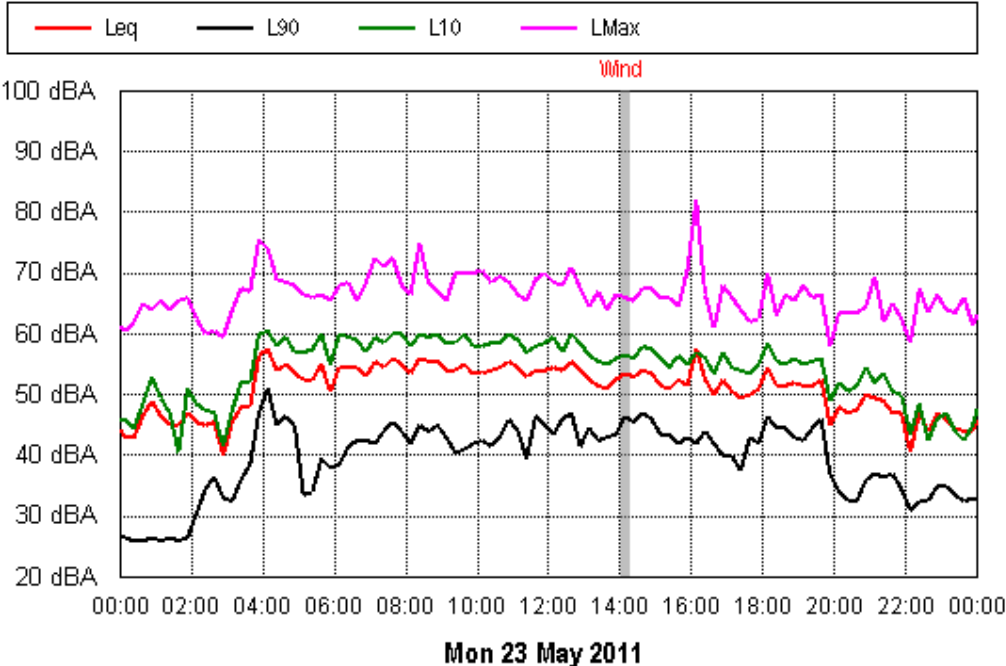


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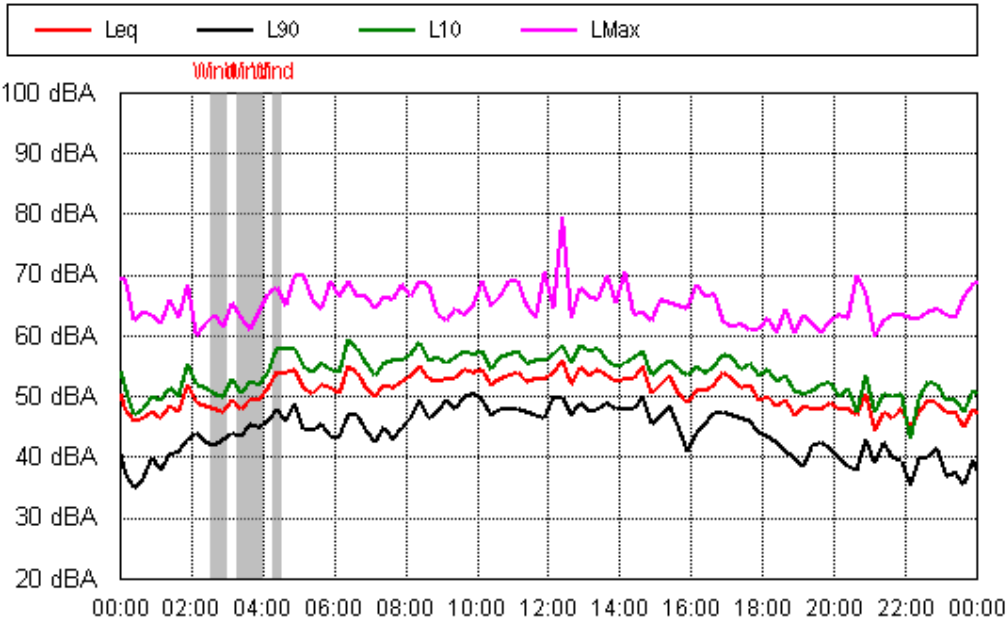


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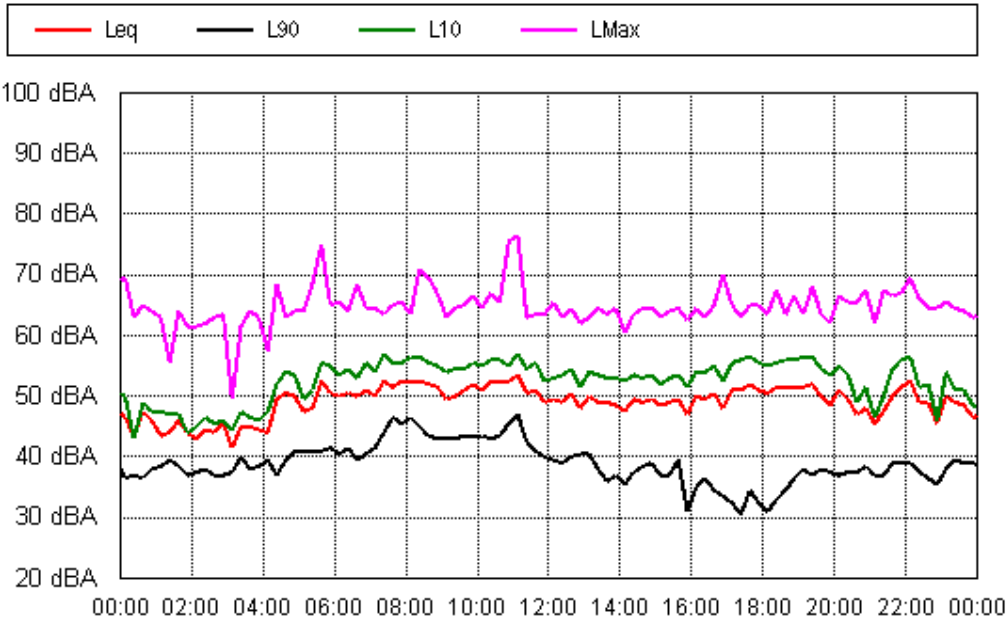
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**Location: CN-3 Kashouli Residence**



**Project: CALGA SAND QUARRY**  
**Location: CN-3 Kashouli Residence**

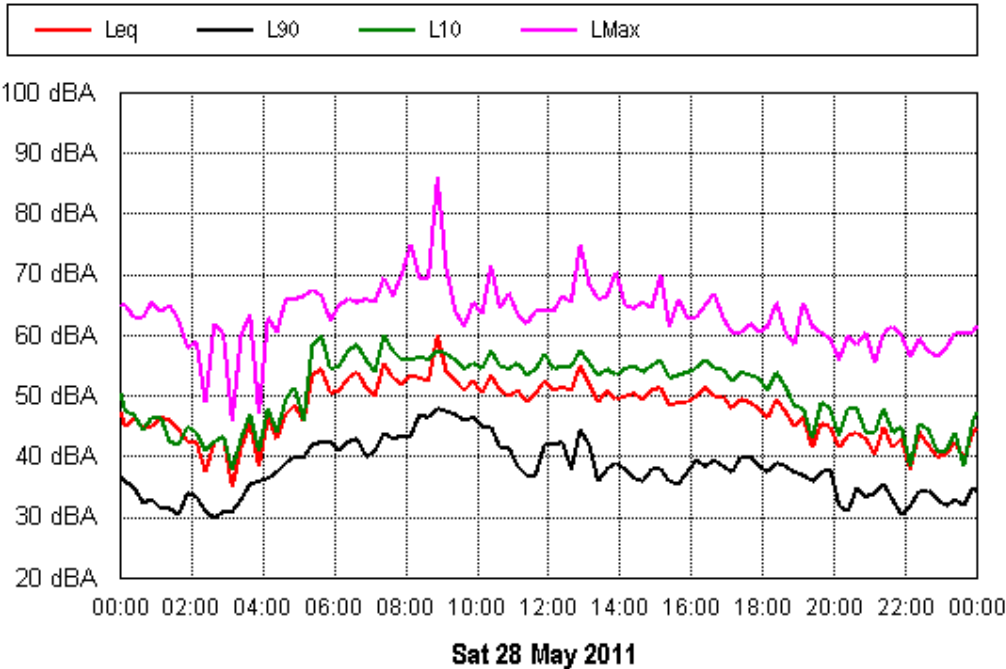
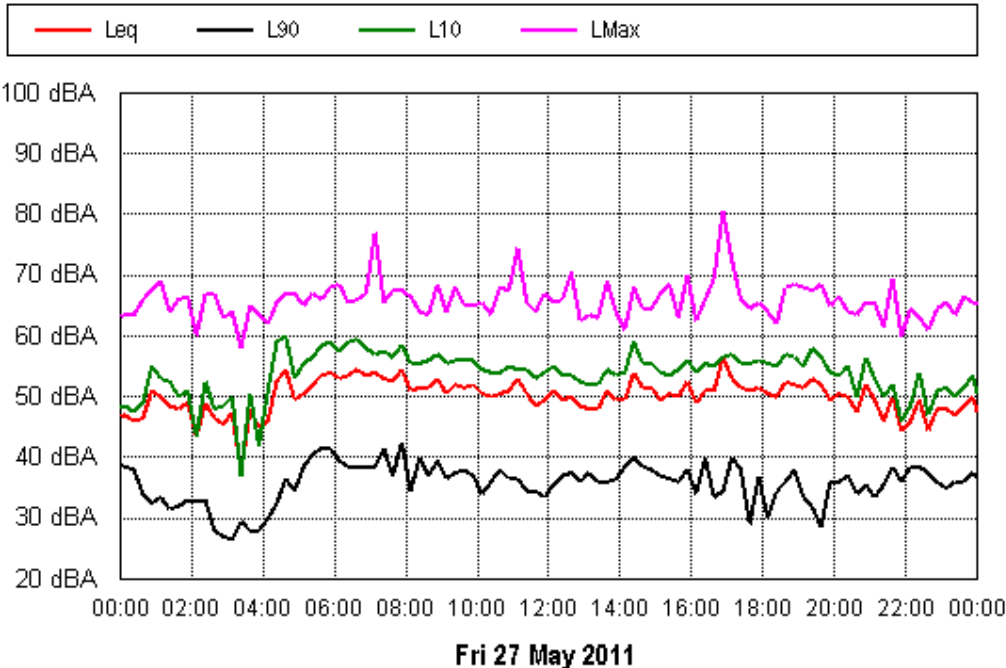


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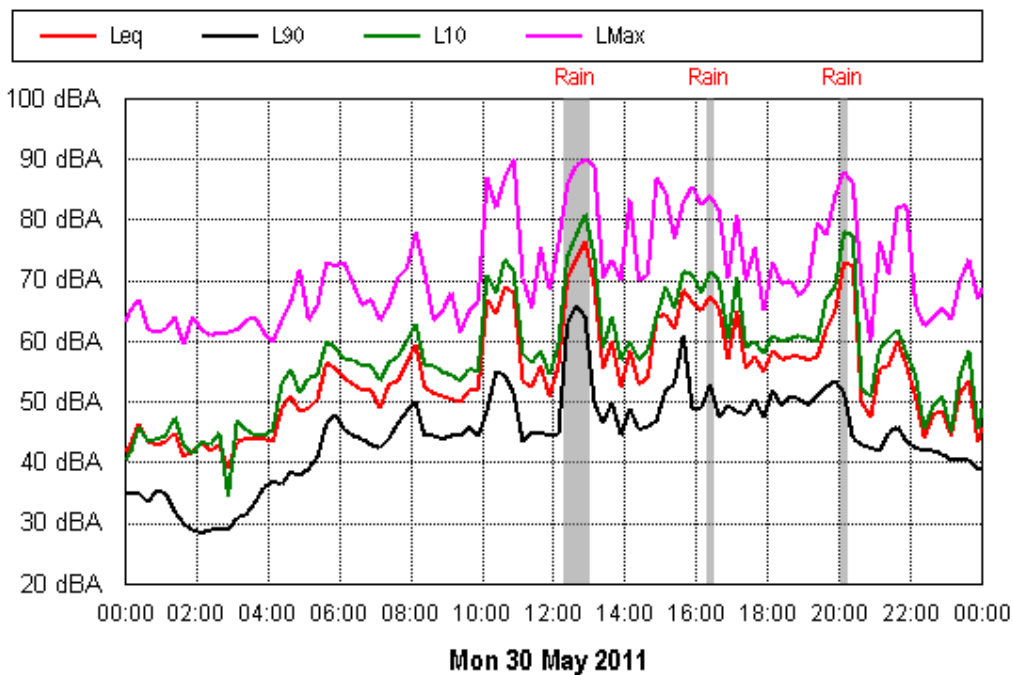
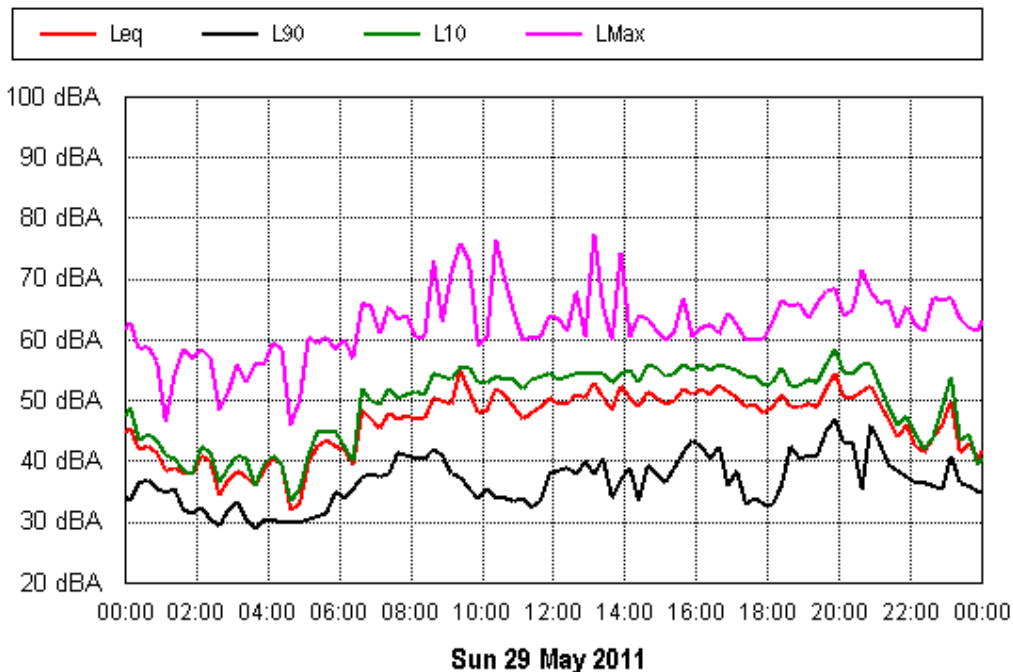


**Thu 26 May 2011**

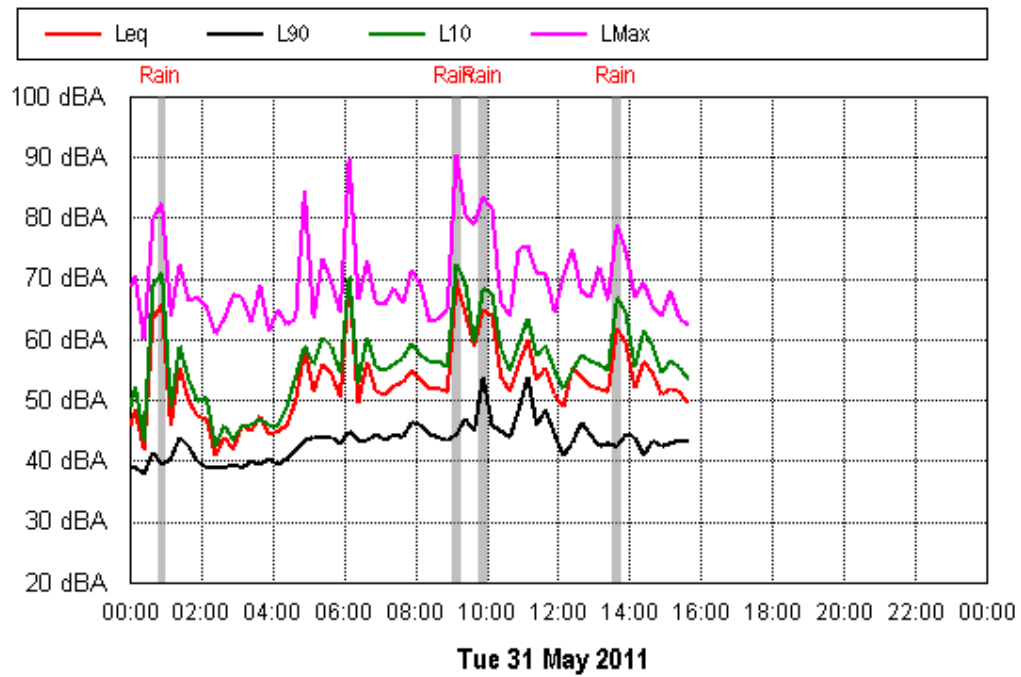
**Project: CALGA SAND QUARRY**  
**Location: CN-3 Kashouli Residence**



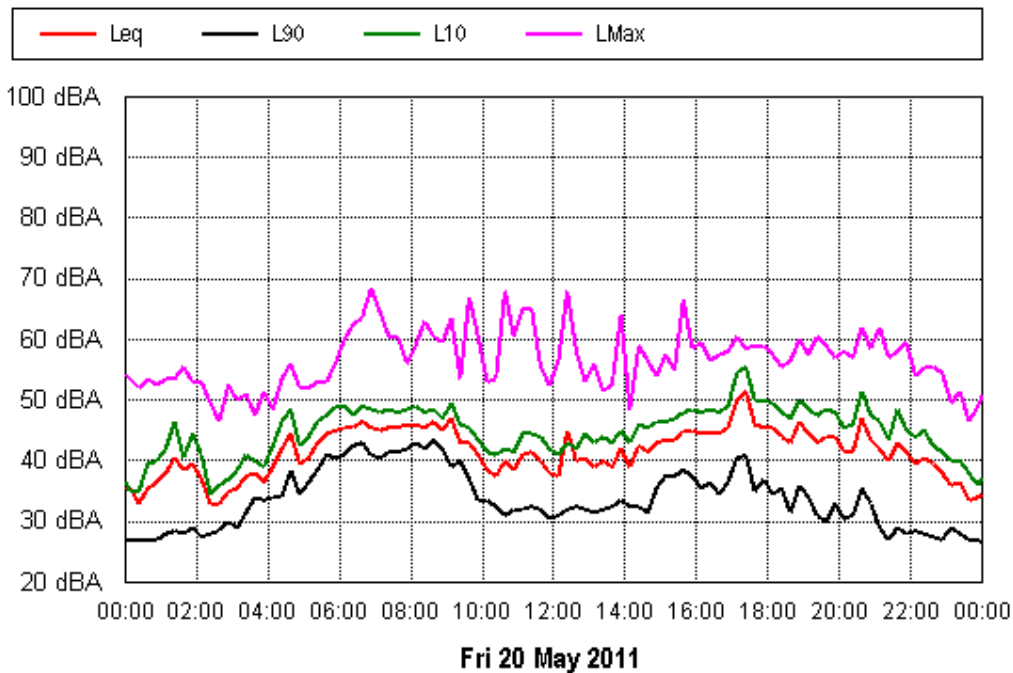
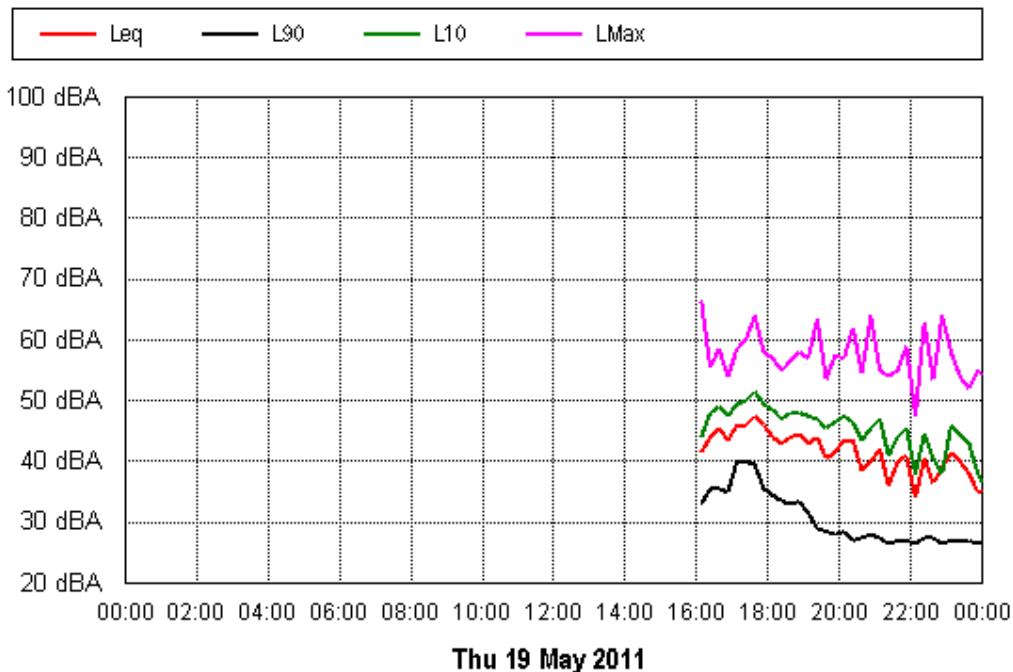
**Project: CALGA SAND QUARRY**  
**Location: CN-3 Kashouli Residence**



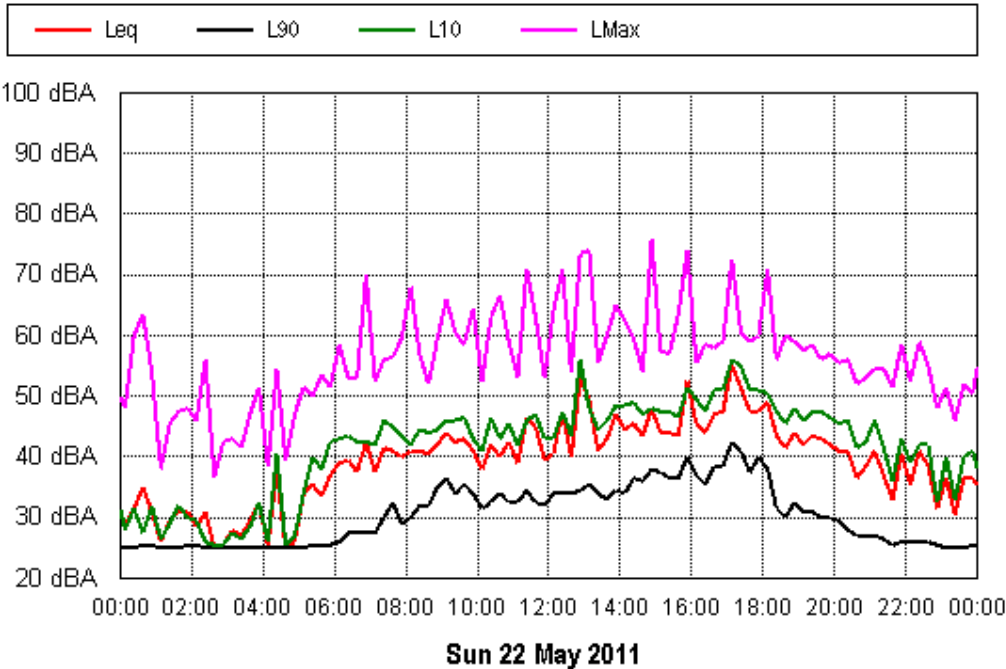
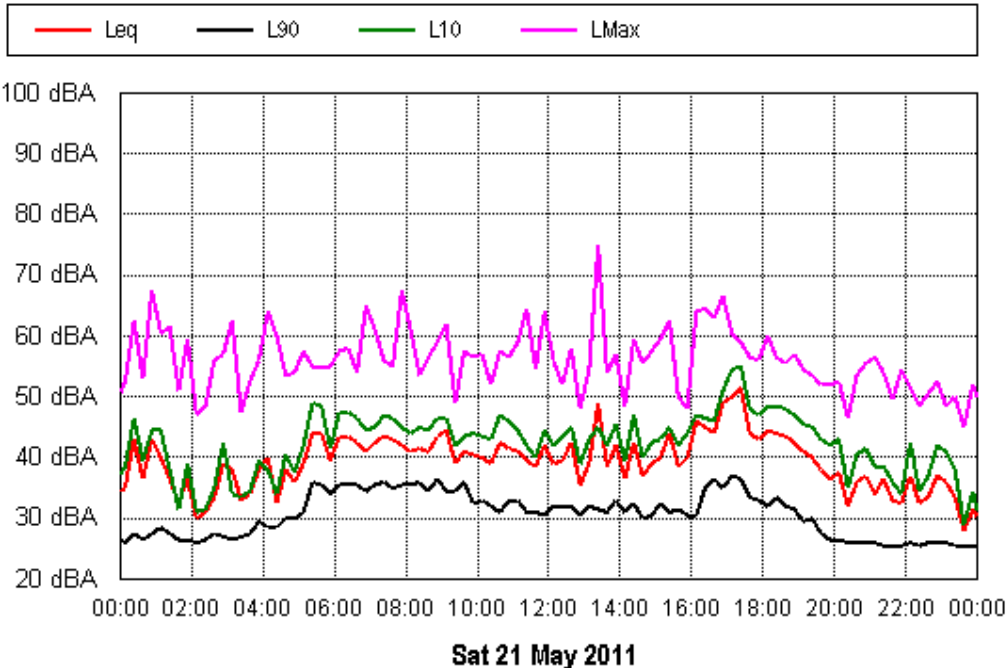
**Project: CALGA SAND QUARRY**  
**Location: CN-3 Kashouli Residence**



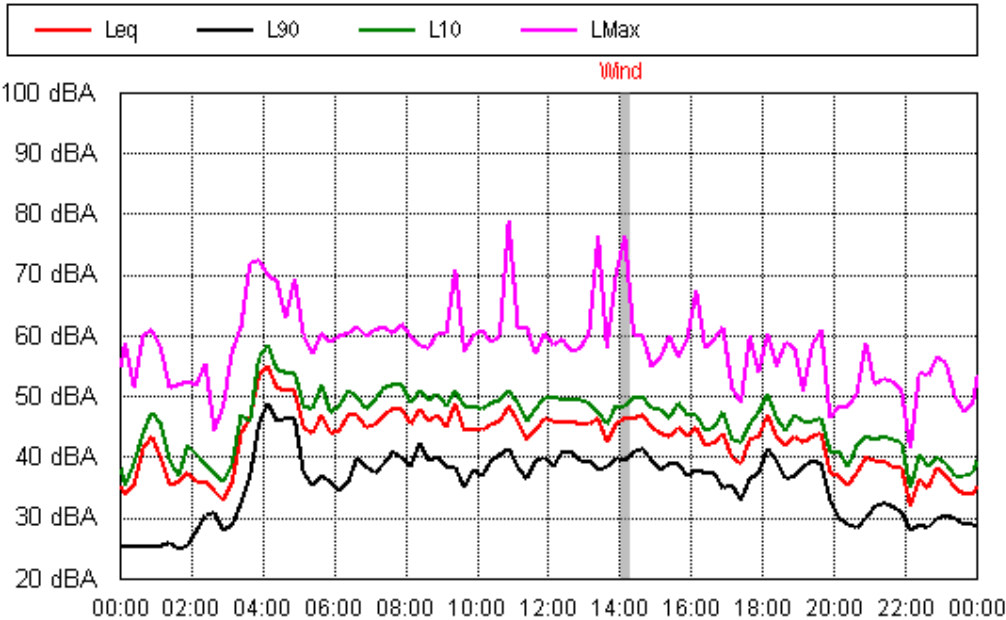
**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**



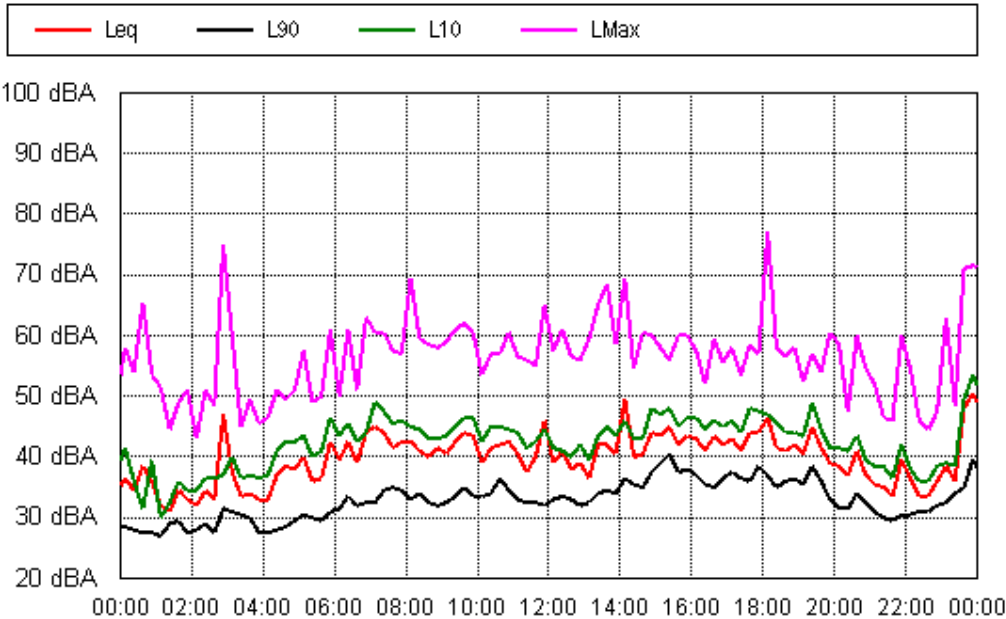
**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**



**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**

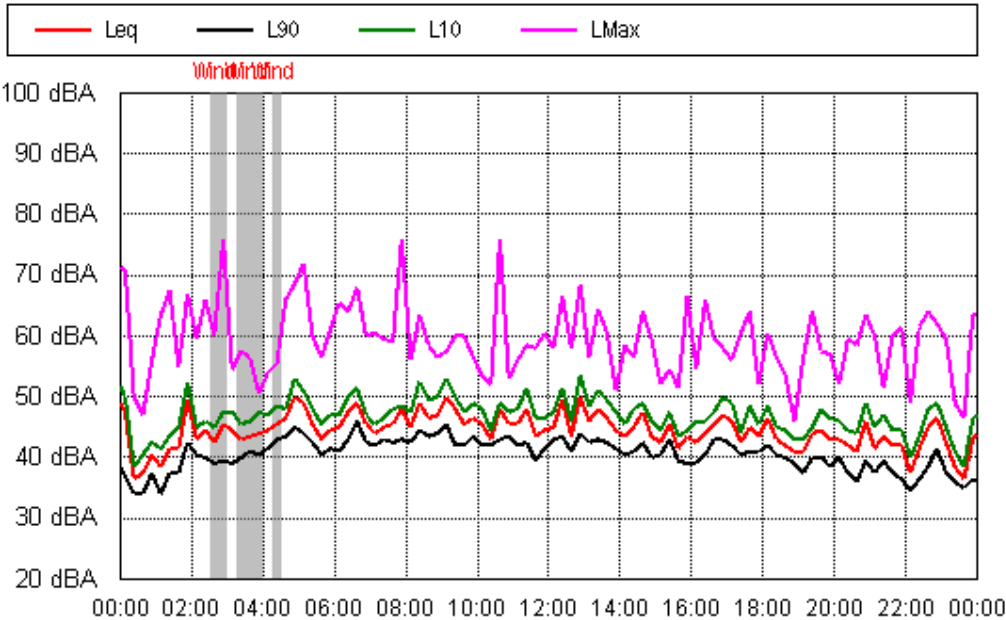


**Mon 23 May 2011**

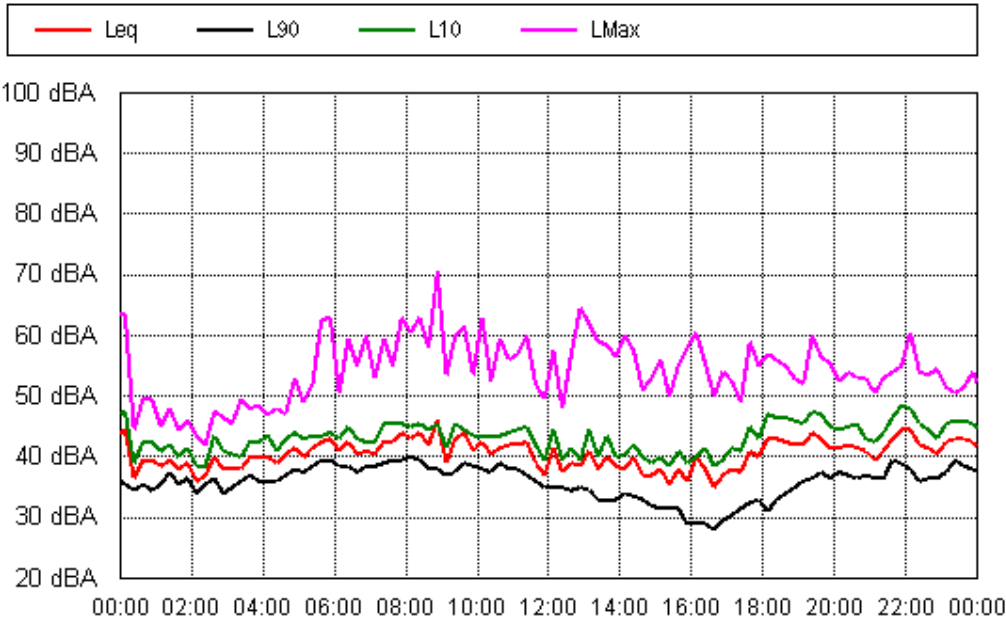


**Tue 24 May 2011**

**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**

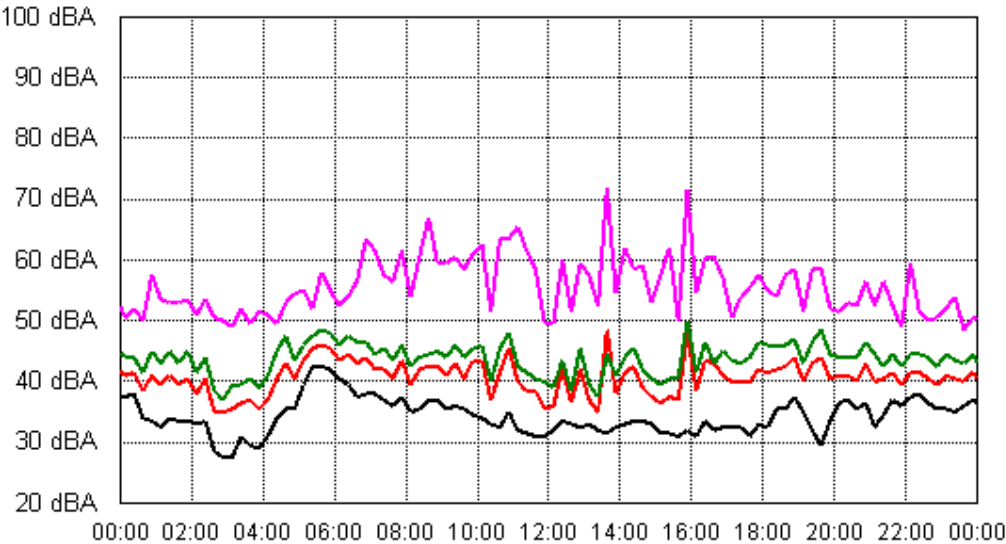
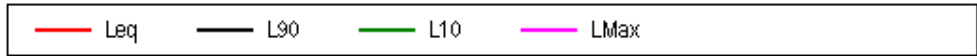


**Wed 25 May 2011**

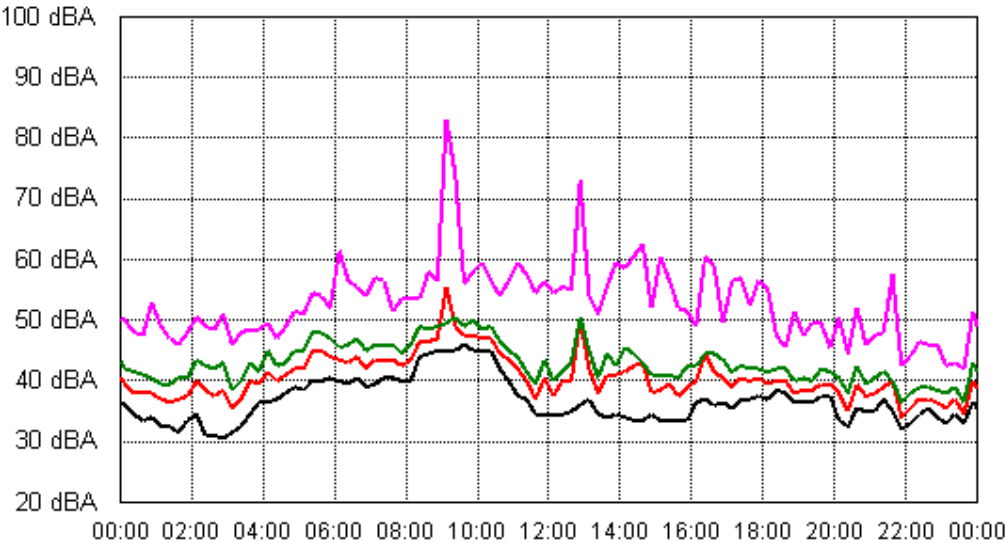


**Thu 26 May 2011**

**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**

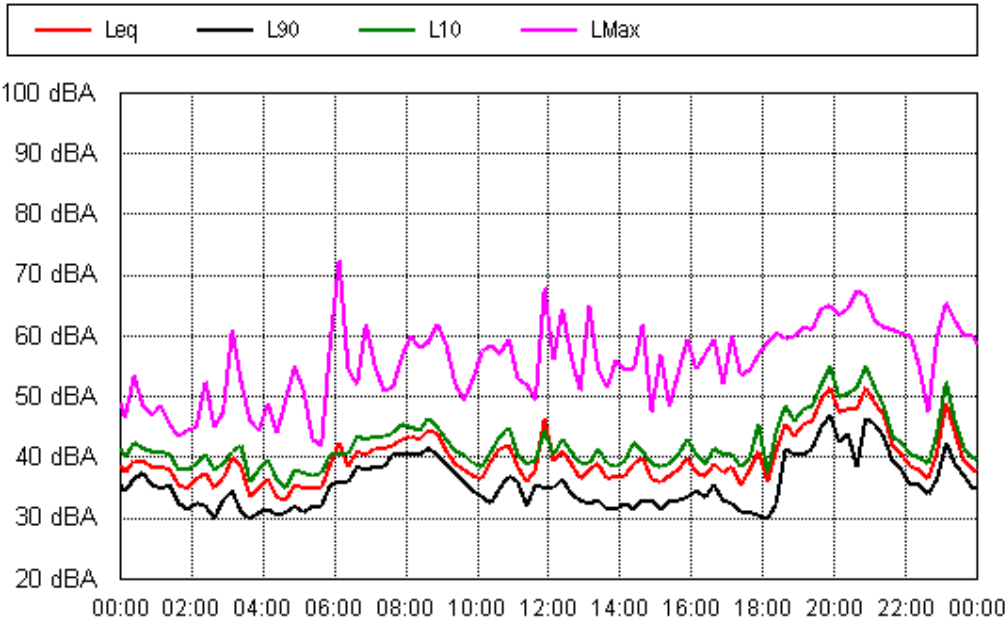


**Fri 27 May 2011**

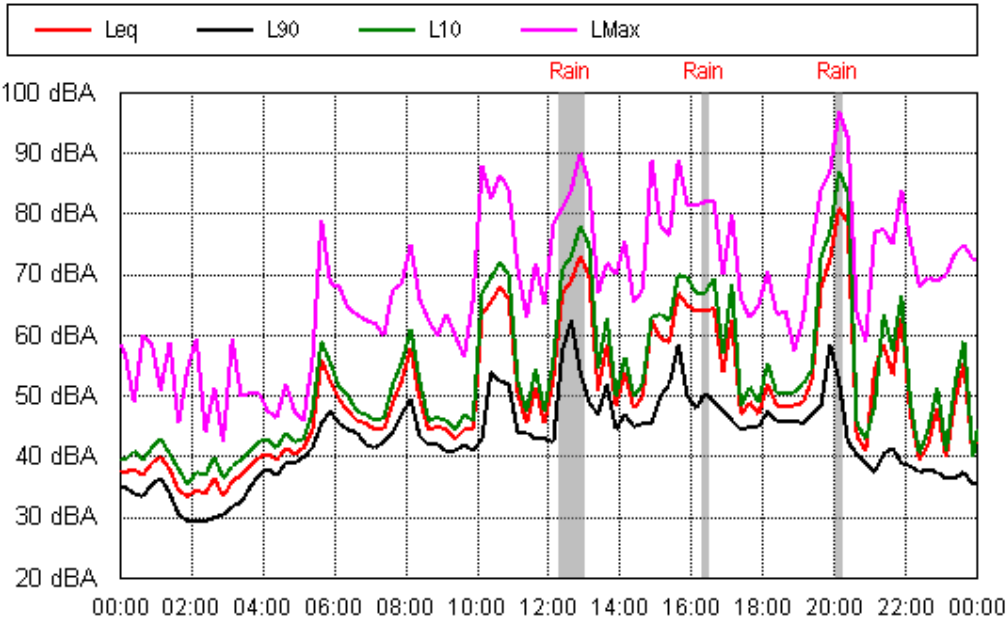


**Sat 28 May 2011**

**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**

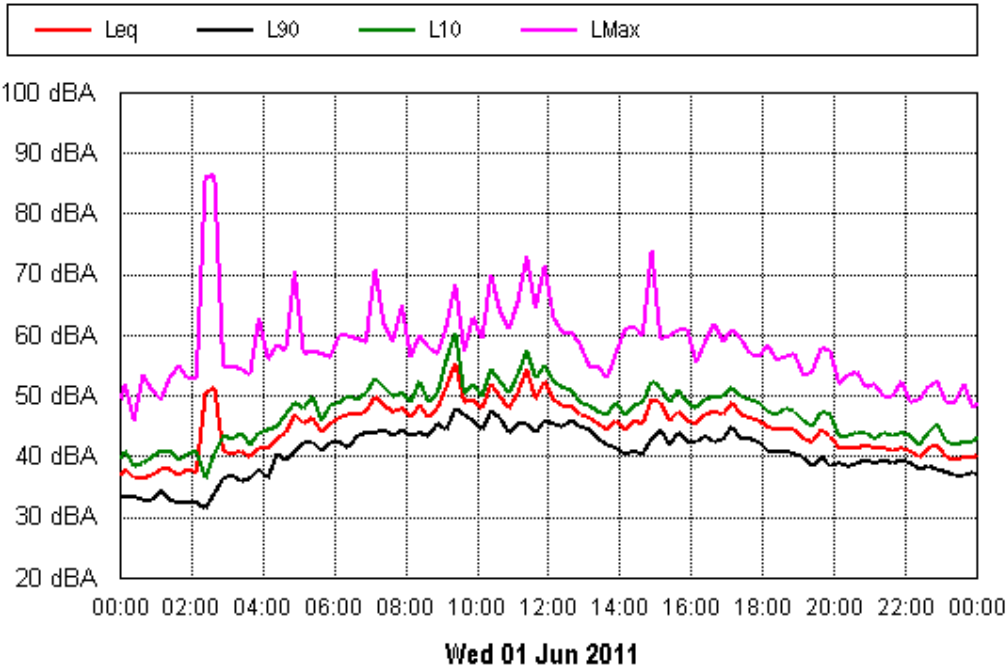
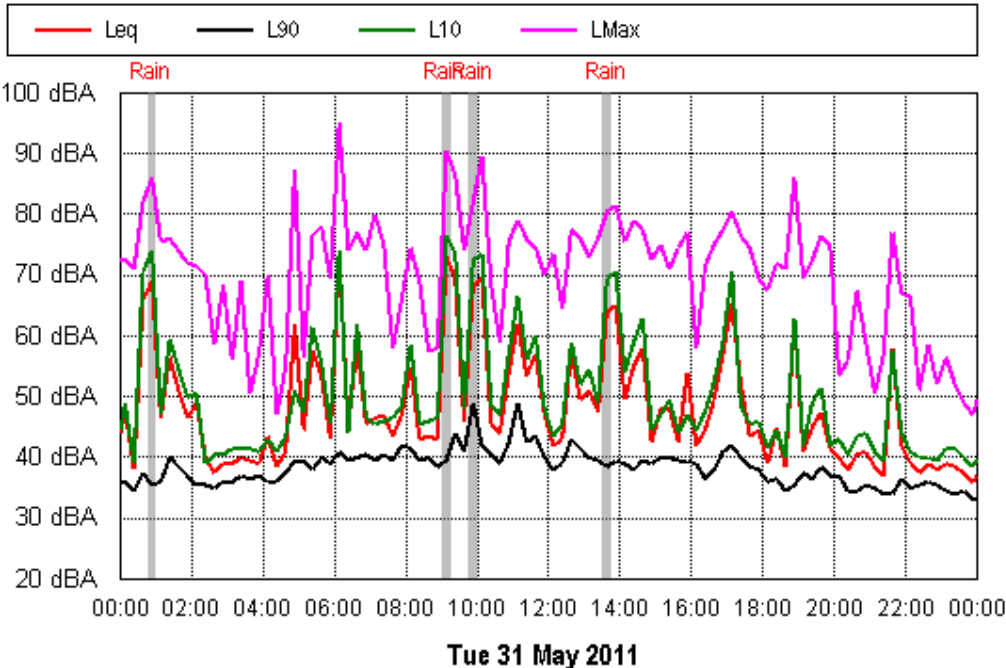


**Sun 29 May 2011**



**Mon 30 May 2011**

**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**



**Project: CALGA SAND QUARRY**  
**Location: CN-4 Townsend Residence**

