ACOUSTICS AND AIR

CALGA SAND QUARRY

ATTENDED & UNATTENDED COMPLIANCE NOISE MONITORING
JULY 2012

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PREPARED FOR

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DOCUMENT CONTROL

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GLOSSARY OF ACOUSTIC TERMS

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

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

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

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

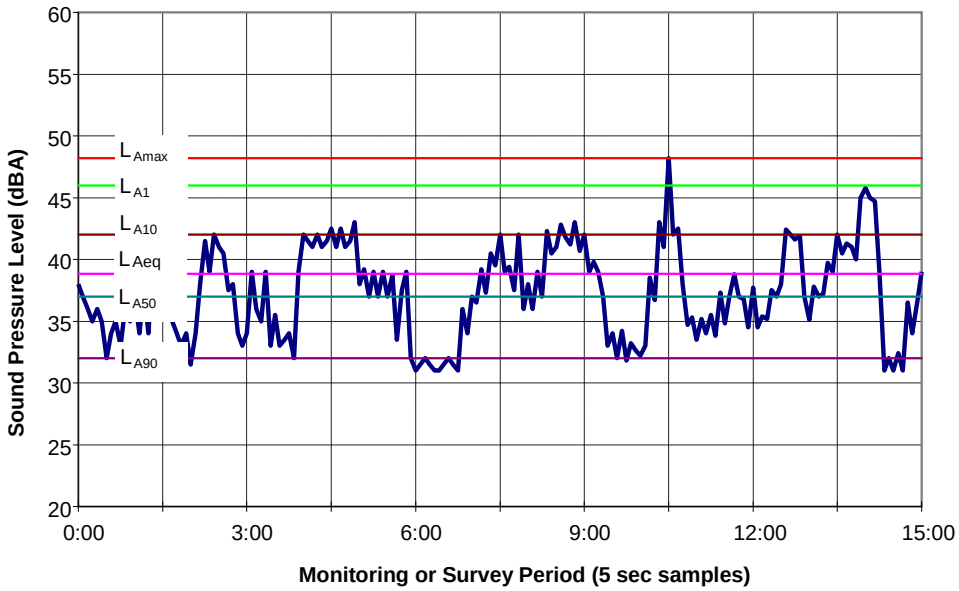
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

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

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10^{th} percentile (lowest 10^{th} 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 June and July 2012 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 CN-1, CN-3 and CN4 on Wednesday, 27 June 2012. Attended monitoring was not possible the same day at CN-2 due to extraneous noise and had to be conducted on Friday, 6 July 2012.

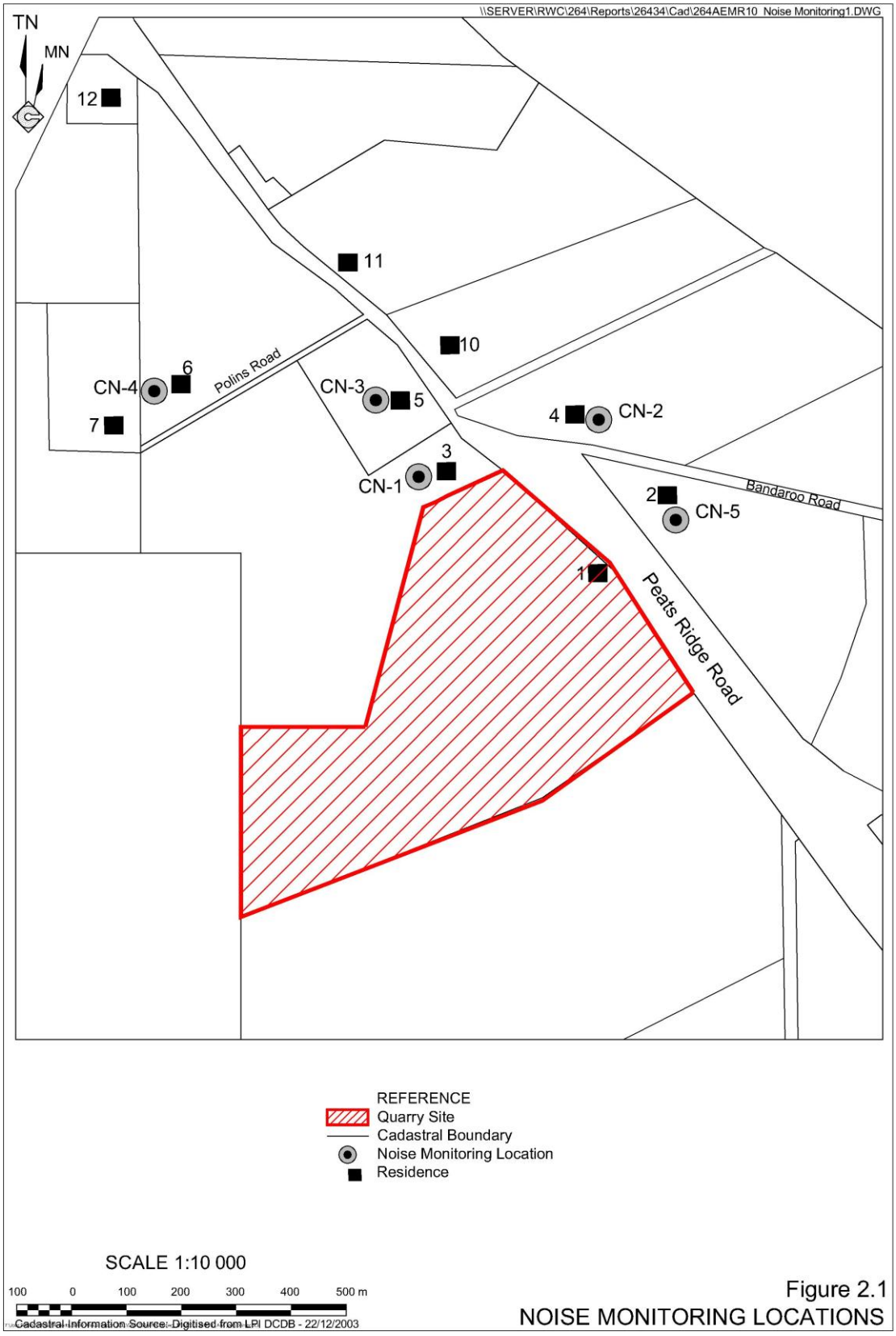
Unattended noise monitoring was conducted at all identified receivers from Wednesday, 27 June until Friday, 6 July 2012.

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 Office of Environment and Heritage (OEH) licence (EPL 11295). 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

Source: EPL 11295

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

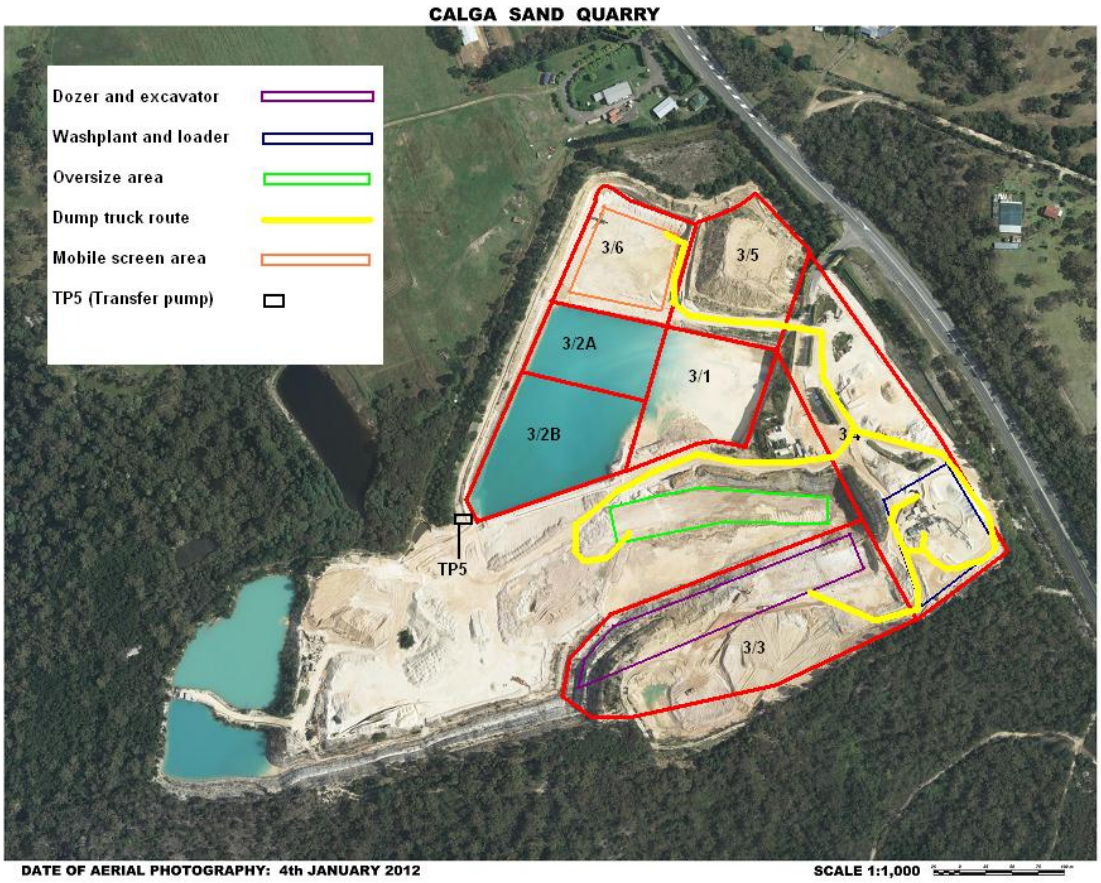
Table 3-2 Operating Hours

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 DESCRIPTION OF SITE OPERATIONS

Figure 4-1 presents an aerial of the quarry site with the works generally taking 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:

- Dozers ripping and pushing sandstone and overburden in Stage 3/3.
- Excavator loading dump truck with raw feed from 3/3 to go to washplant and brickies raw feed stockpile.
- Dump truck taking raw feed from 3/3 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.
- Transfer pump 5 (TP5) was in constant operation.
- 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 days of survey. This was confirmed by meteorological data obtained from the site's weather station.

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

Table 5-1 Meteorological Conditions during Attended Noise Measurements

Date	Time Period	Wind Speed (m/s)	Wind Direction	Rain (mm)
27 June	12.00pm – 12.15pm	0	-	0
27 June	12.30pm – 12.45pm	0	-	0
27 June	12.45pm – 1.00pm	0.4	SW	0
27 June	1.00pm – 1.15pm	0.4	SW	0
6 July	1.30pm – 1.45pm	0	-	0
6 July	1.45pm – 2.00pm	0	-	0

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

Table 5-2 Attended Noise Measurement Results

Location	Date	Time	$L_{Aeq,15min}$ due to Quarry Operations (dBA)	Daytime Criteria $L_{Aeq,15min}$ (dBA)	Comments
CN-1	27 June	12.05pm – 12.20pm	44	41	Mobile plant engine noise combined with water pump noise audible most of the time 42-45dBA. Impact noise from mobile plant heard occasionally L_{max} 45-47dBA. Typical and heavy traffic on Peats Ridge Road measured with L_{max} 50-56dBA and 60-68dBA respectively.
CN-3	27 June	12.30pm – 12.45pm	40	39	Mobile plant engine noise combined with water pump noise audible most of the time 37-41dBA. Impact noise from dozer

Location	Date	Time	$L_{Aeq,15min}$ due to Quarry Operations (dBA)	Daytime Criteria $L_{Aeq,15min}$ (dBA)	Comments
					heard occasionally L_{max} 42-48dBA. Typical and heavy traffic on Peats Ridge Road measured with L_{max} 52-56dBA and 58-62dBA respectively.
CN-4	27 June	12.55pm – 1.10pm	30	35	Quarry operations just audible at times 30dBA (estimated). Typical and heavy traffic on Peats Ridge Road measured with L_{max} 38-44dBA and 43-47dBA respectively.
CN-2	6 July	1.35pm – 1.50pm	47	40	Mobile plant engine noise combined with water pump noise audible most of the time 44-50dBA. Typical and heavy traffic on Peats Ridge Road measured with L_{max} 56-60dBA and 63-68dBA respectively.

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 CN-1 Gazzana Residence

At the Gazzana residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging 50-55dBA during the day and 40-55dBA in the evening. The measured $L_{A1,15min}$ noise levels during the night typically range 60-70dBA.

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 local fauna. Local farming activities might also have contributed to the captured noise levels. Quarry activities were noted to be clearly audible by the Wilkinson Murray representative during both site visits.

The noise logger graphs do not show clear fluctuations in noise levels at the start and finish times of the quarry operations or between Sunday and the other days of the week. Based on the attended measurement and logger results, it is believed $L_{Aeq,15min}$ noise levels due to quarry operations are likely to range 40-46dBA. This is only an estimated range as it is not possible to establish source noise levels with any certainty from logger graphs, in particular when source noise levels are not dominating the local acoustic environment.

5.2.2 CN-2 King Residence

At the King Residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging 50-58dBA during the day and 40-53dBA in the evening period. The measured $L_{A1,15min}$ noise levels during the night typically range 50-62dBA.

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 clearly audible by the Wilkinson Murray representative during both site visits.

The noise logger graphs do not show clear fluctuations in noise levels at the start and finish times of the quarry operations or between Sunday and the other days of the week. Based on the attended measurement and logger results, it is believed $L_{Aeq,15min}$ noise levels due to quarry operations are likely to range 42-48dBA. This is only an estimated range as it is not possible to establish source noise levels with any certainty from logger graphs, in particular when source noise levels are not dominating the local acoustic environment.

5.2.3 CN-3 Kashouli Residence

At the Kashouli residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging between 50-60dBA during the day and 40-50dBA in the evening period. The measured $L_{A1,15min}$ noise levels during the night typically range between 40-63dBA.

Site observations showed that measured noise levels were dominated by extraneous noises such as traffic passing on Peats Ridge Road and natural noises. Quarry activities were just audible during both site visits.

The noise logger graphs do not show clear fluctuations in noise levels at the start and finish times of the quarry operations or between Sunday and the other days of the week. Based on the attended measurement and logger results, it is believed $L_{Aeq,15min}$ noise levels due to quarry operations are likely to range 37-42dBA. This is only an estimated range as it is not possible to establish source noise levels any certainty from logger graphs, in particular when source noise levels are not dominating the local acoustic environment.

5.2.4 CN-4 Townsend Residence

At the Townsend residence, noise results show $L_{Aeq,15min}$ noise levels typically ranging 40-53dBA during the day and 35-46dBA in the evening. The measured $L_{A1,15min}$ noise levels during the night typically range 40-50dBA.

Site observations showed that measured noise levels were dominated by extraneous noises such as traffic passing on Peats Ridge Road and natural noises. Quarry activities were barely audible during both site visits.

The noise logger graphs do not show clear fluctuations in noise levels at the start and finish times of the quarry operations or between Sunday and the other days of the week. Based on the attended measurement and logger results, it is believed $L_{Aeq,15min}$ noise levels due to quarry operations are likely to range 30-34dBA when audible. This is only an estimated range as it is not possible to establish source noise levels any certainty from logger graphs, in particular when source noise levels are not dominating the local acoustic environment.

6 CONCLUSION

A compliance noise monitoring survey was conducted during June-July 2012 and included both attended and unattended measurements.

The results of the measurements indicated that noise emissions from the Calga Sand Quarry plant were only within the limits set in the Noise Monitoring Program at CN-4. Attended monitoring established exceedances at CN-1 (3dBA), CN-2 (7dBA) and CN-3 (1dBA) due to a combination of mobile plant engine noise and noise generated by the water pump (TP5).

APPENDIX A

NOISE MEASUREMENT RESULTS

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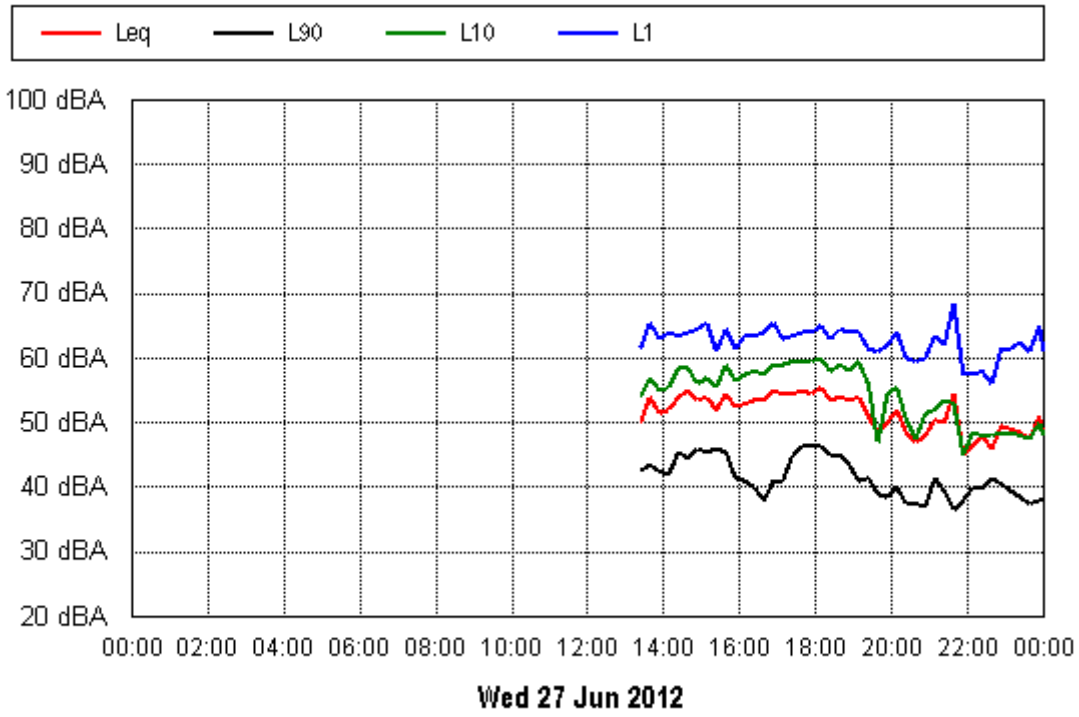

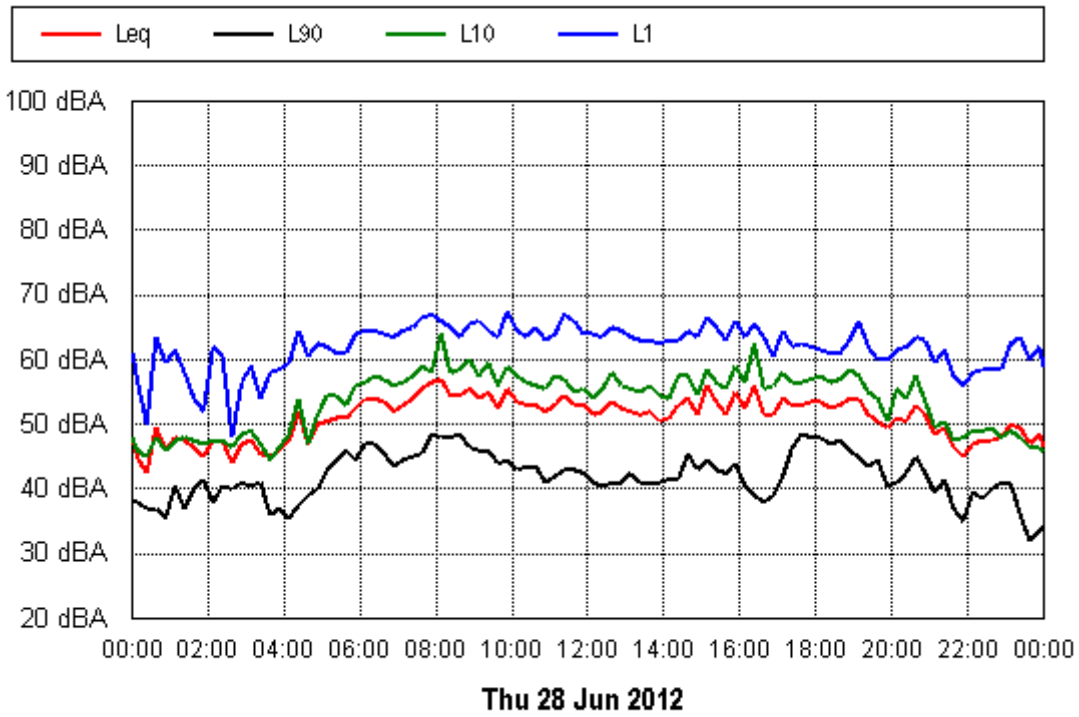

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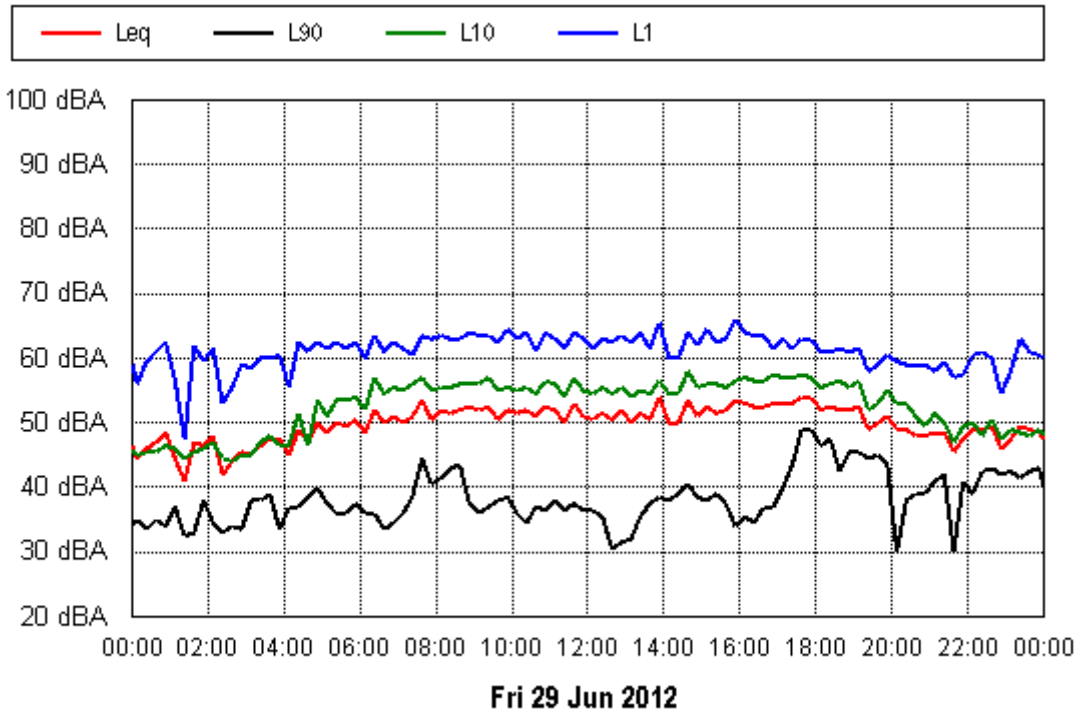

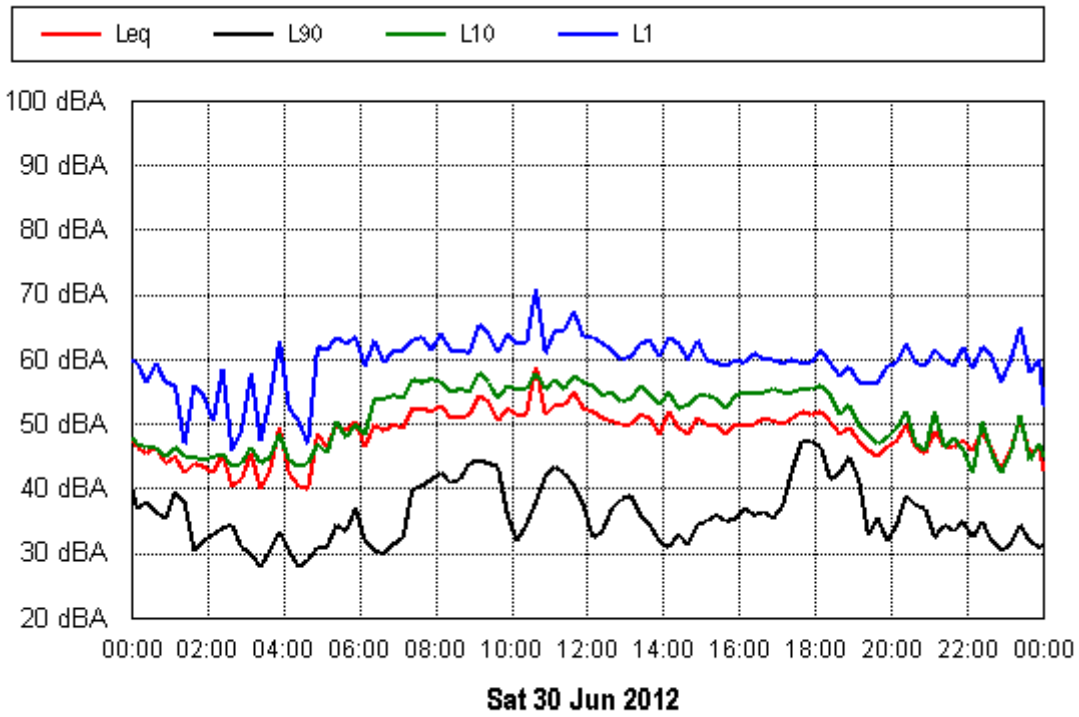

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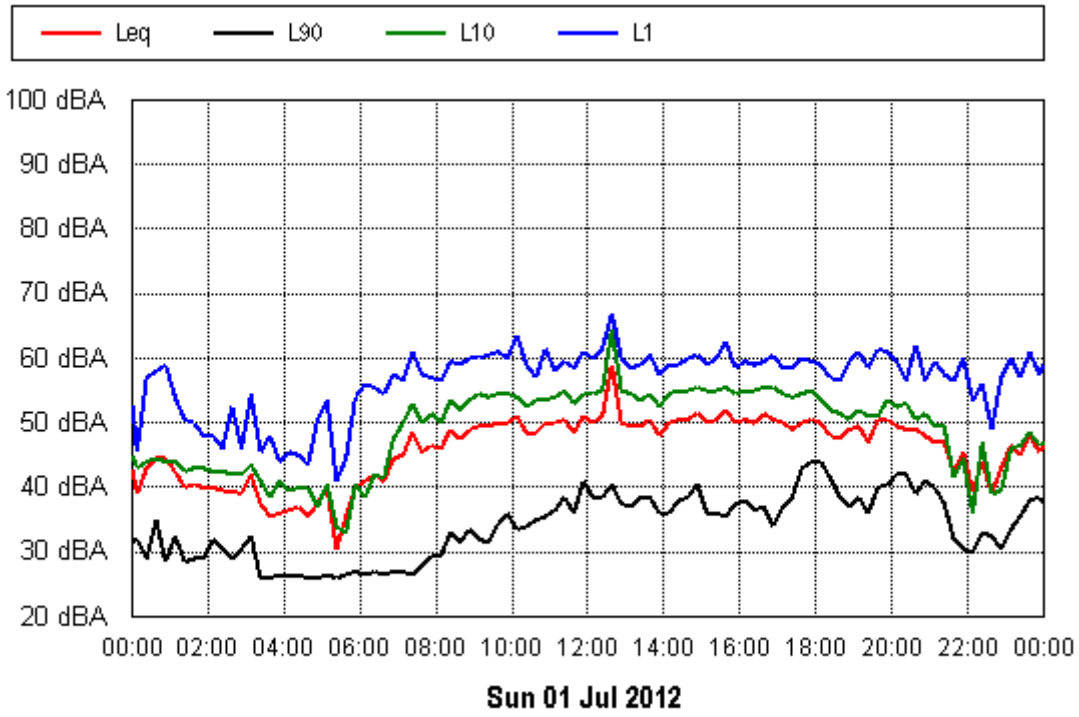

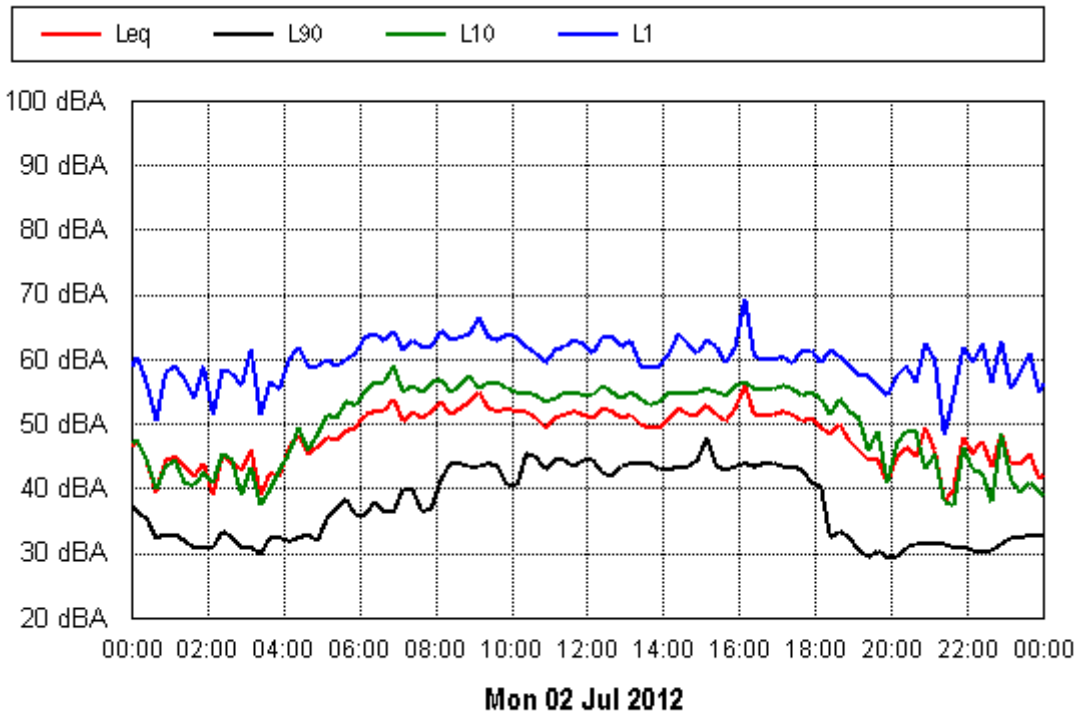

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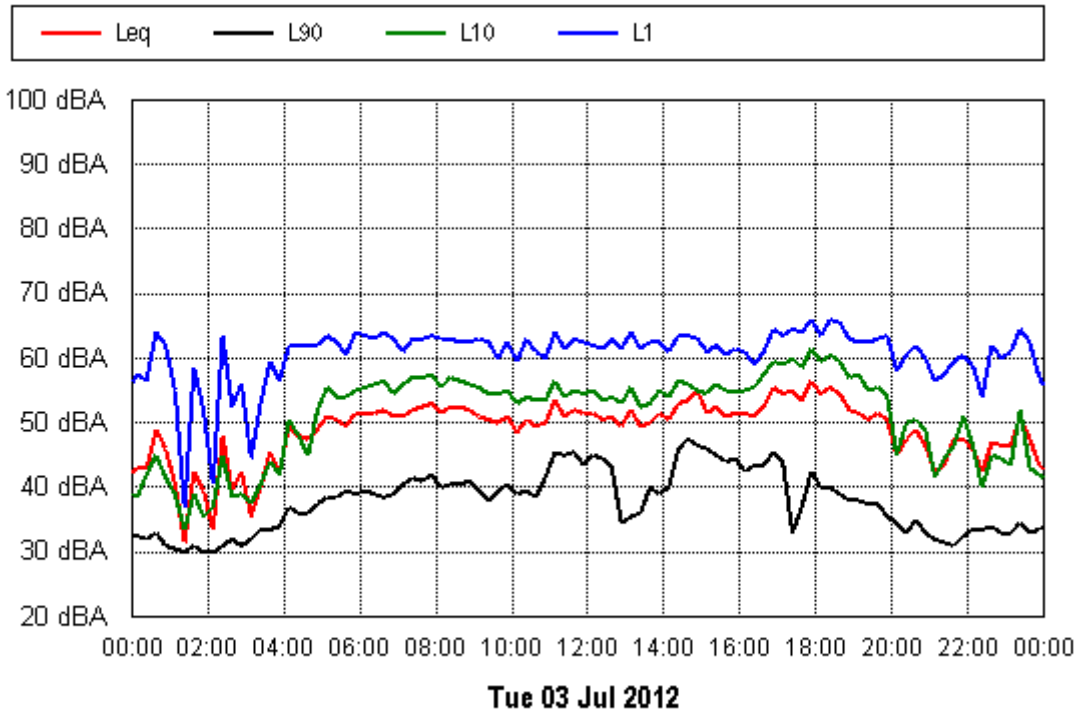

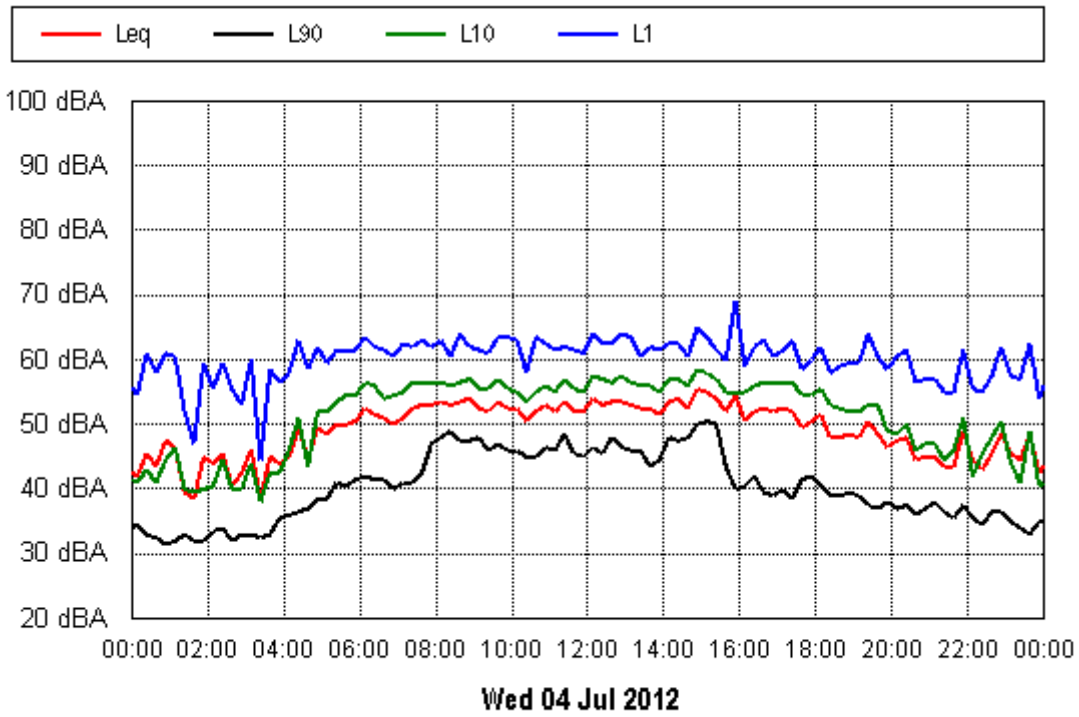

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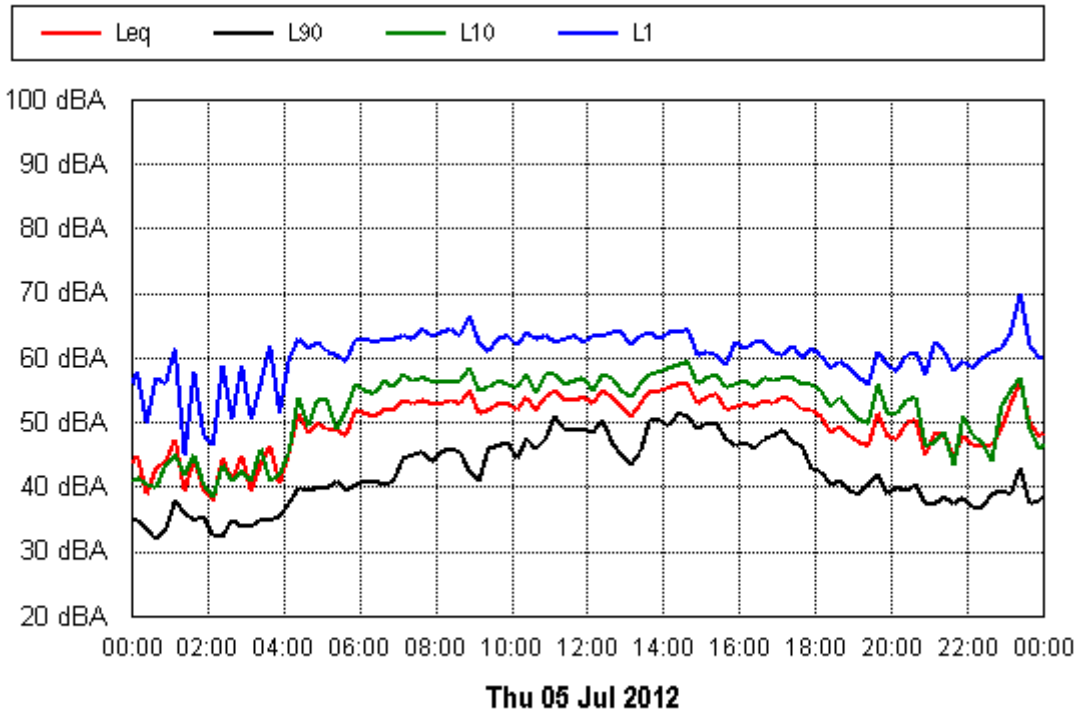

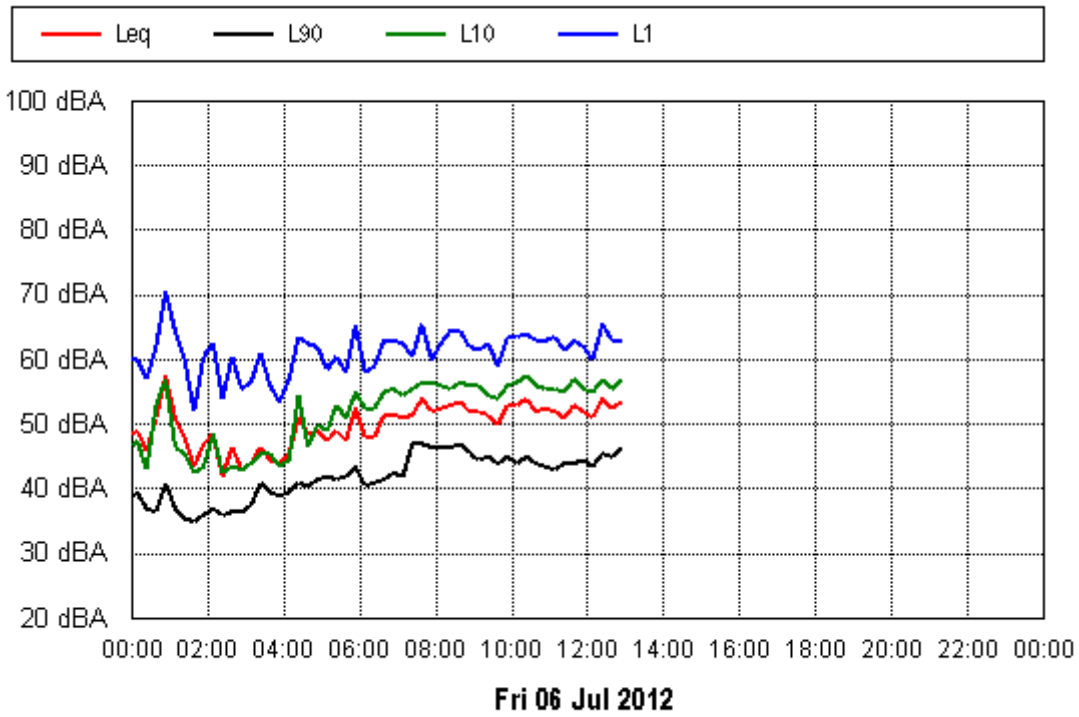

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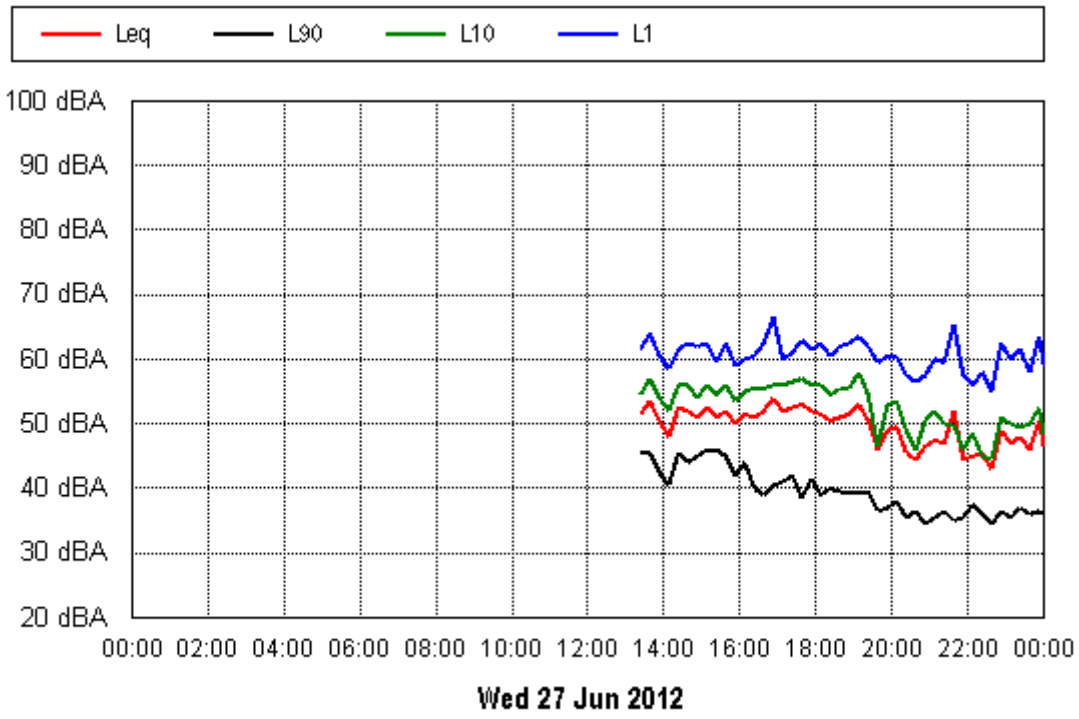

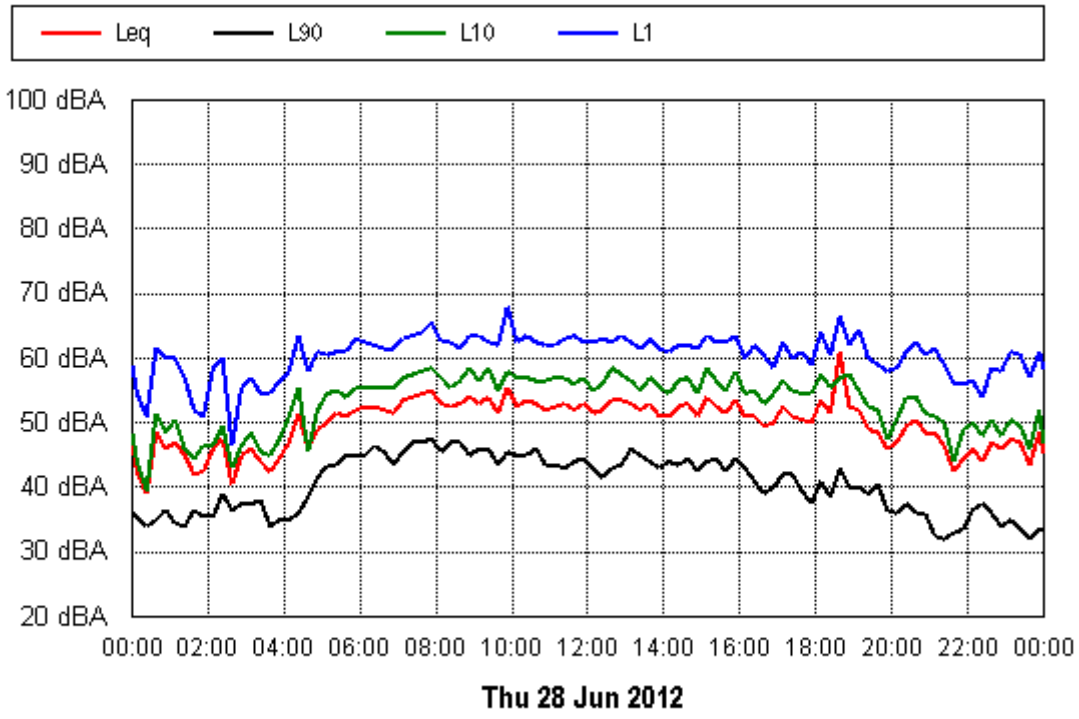

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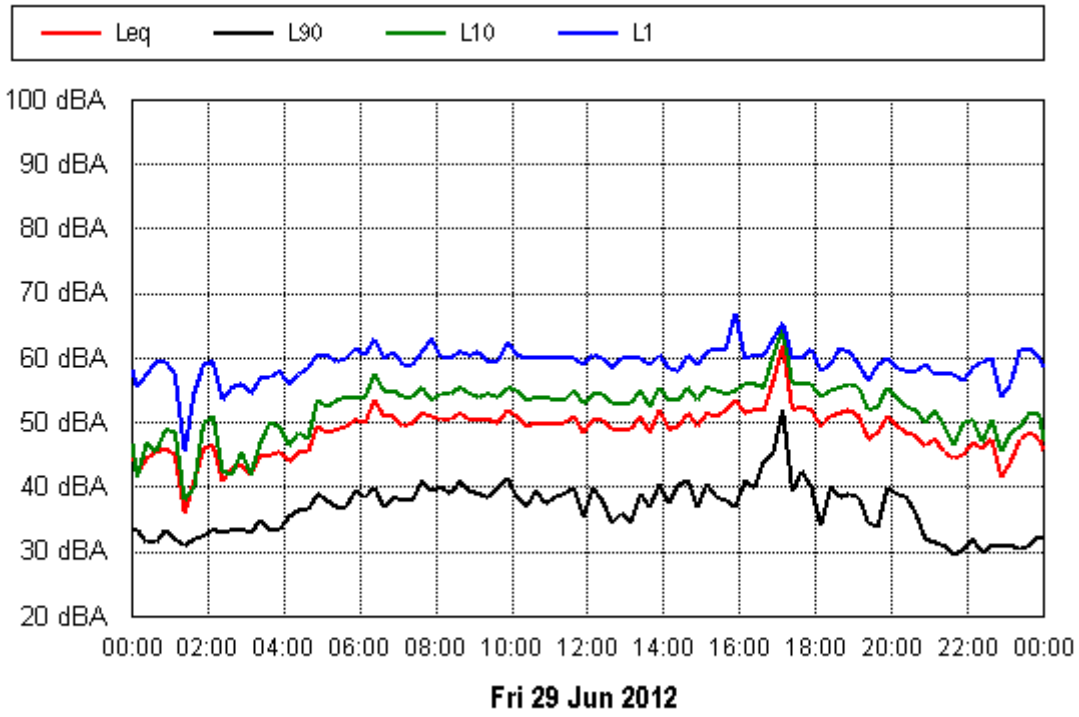

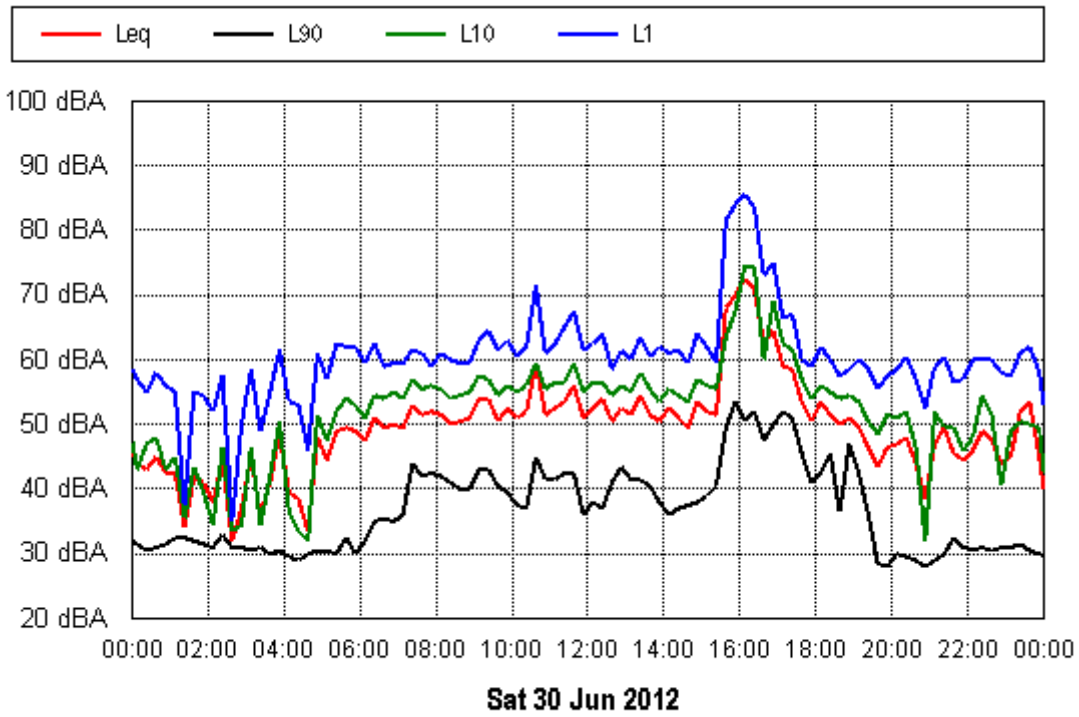

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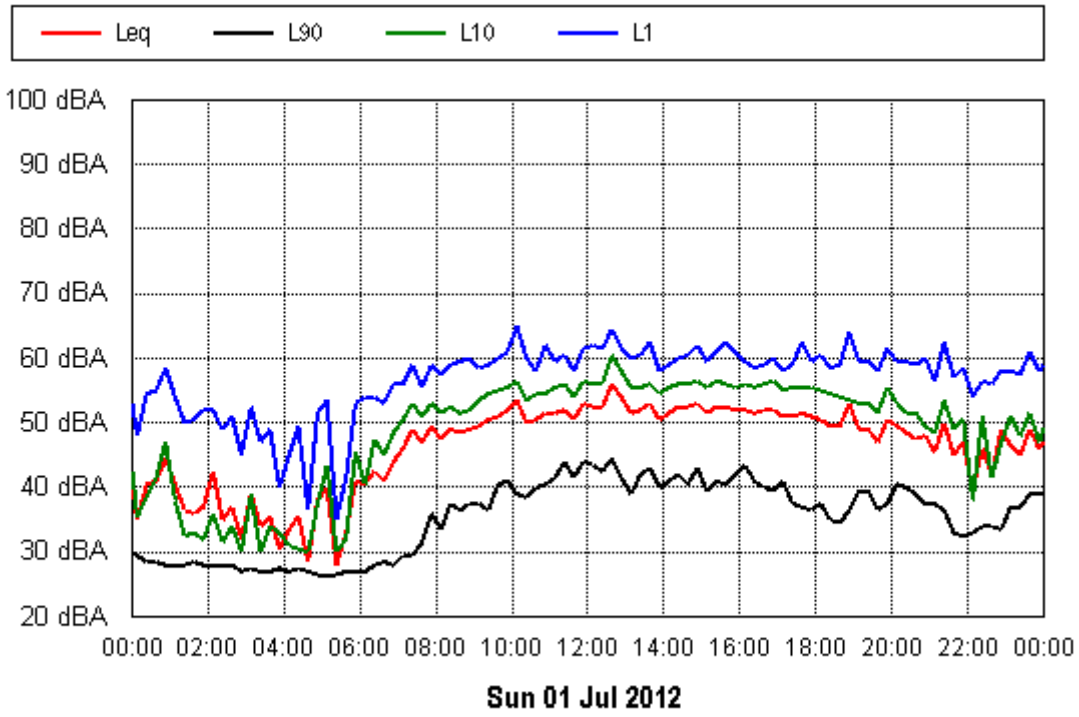

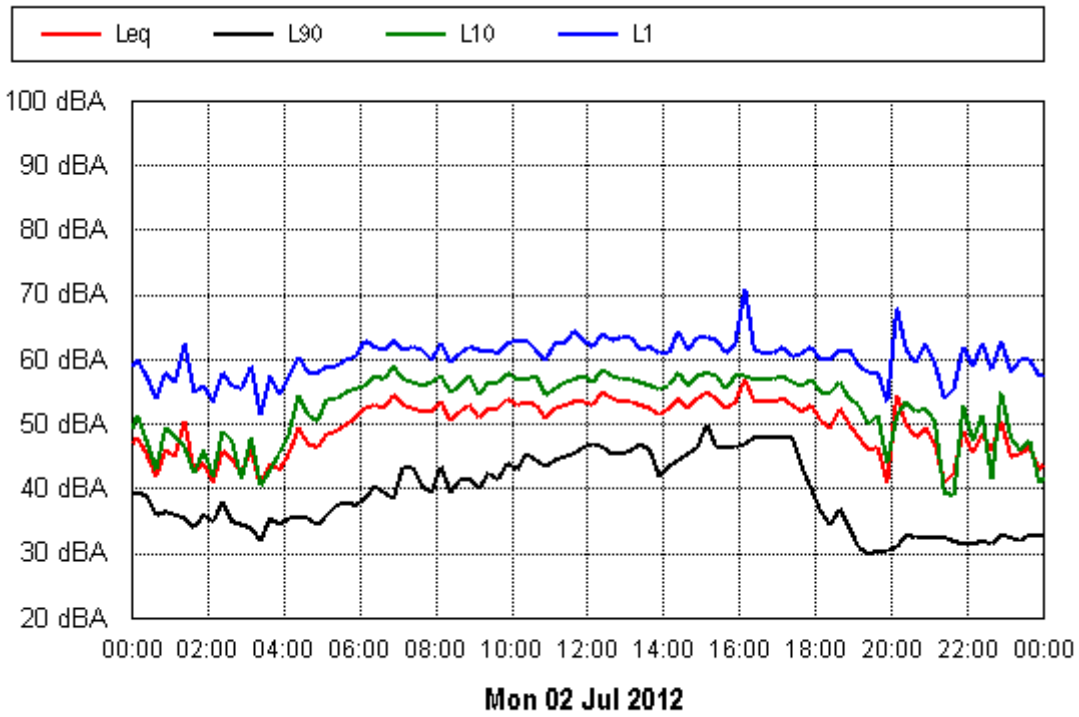

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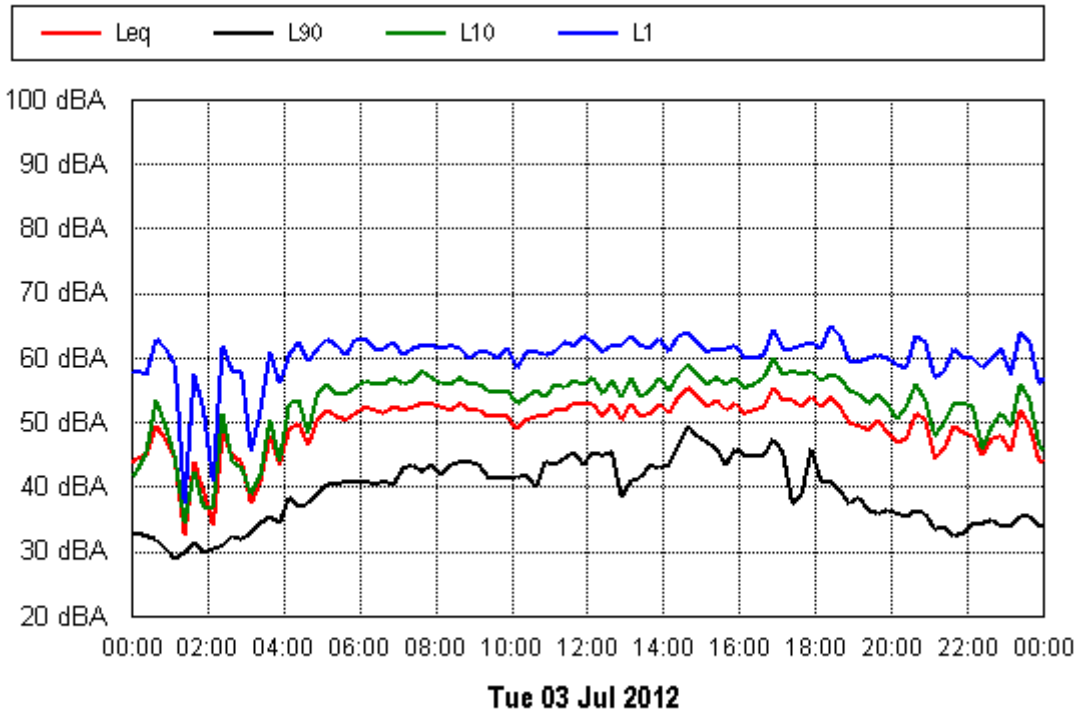

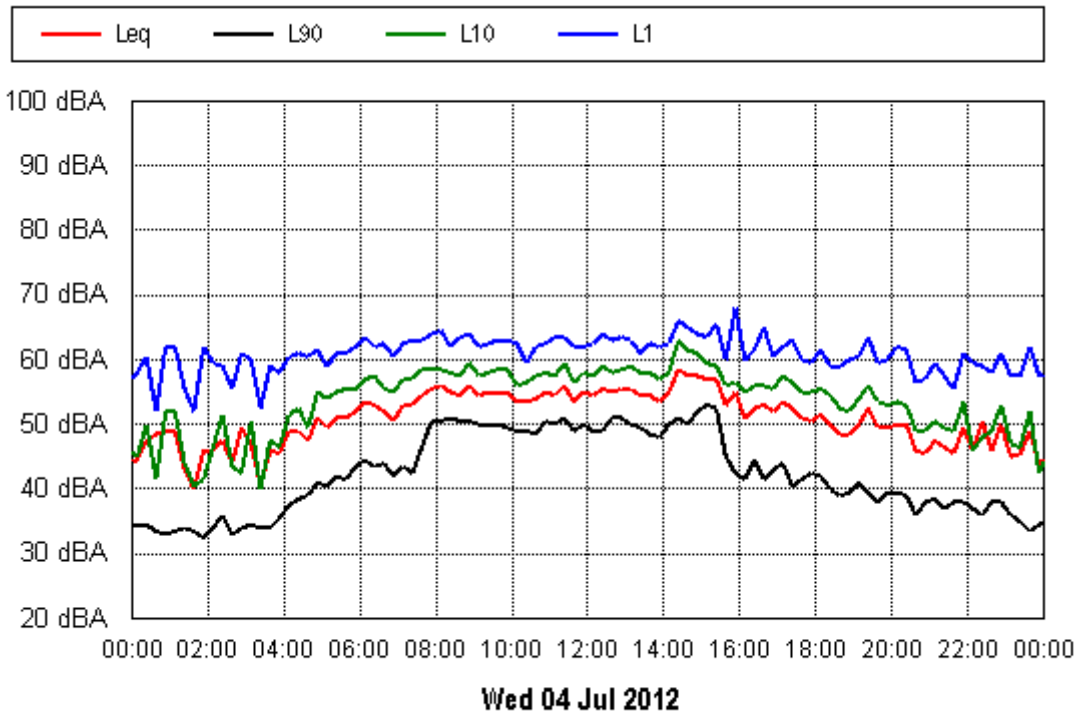

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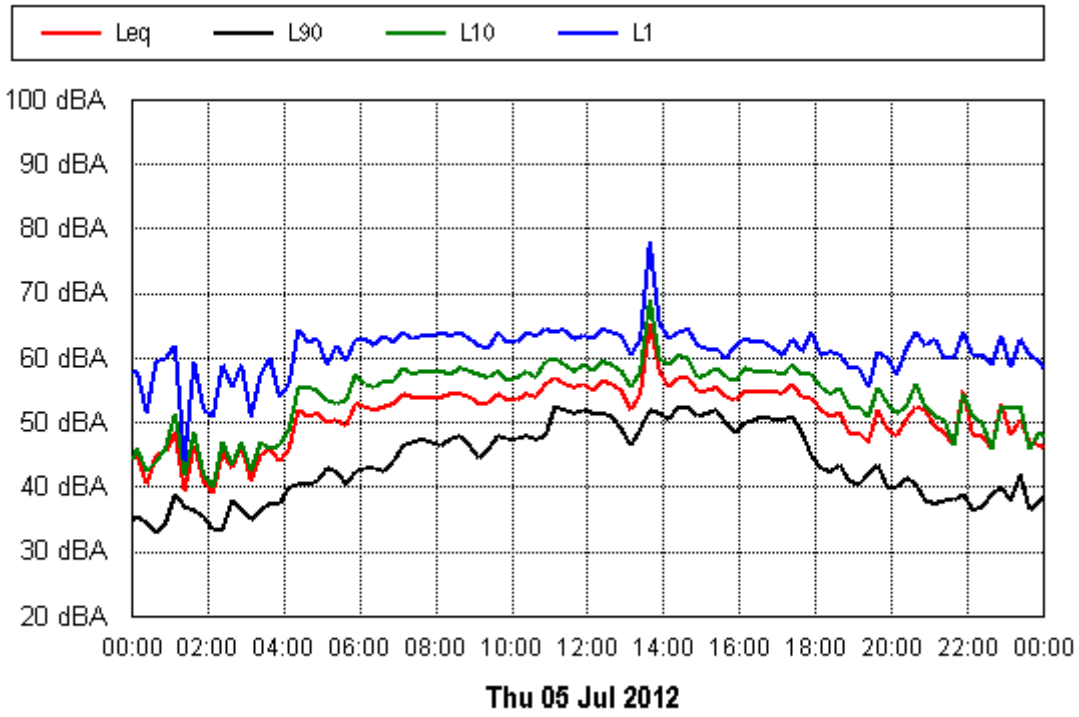

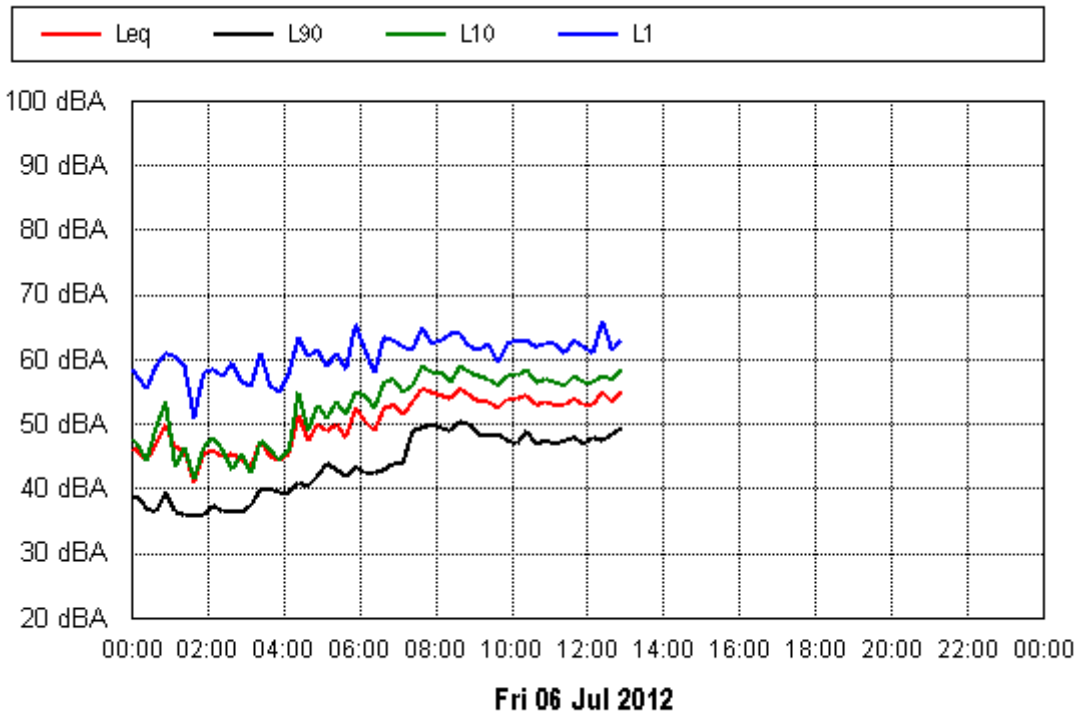

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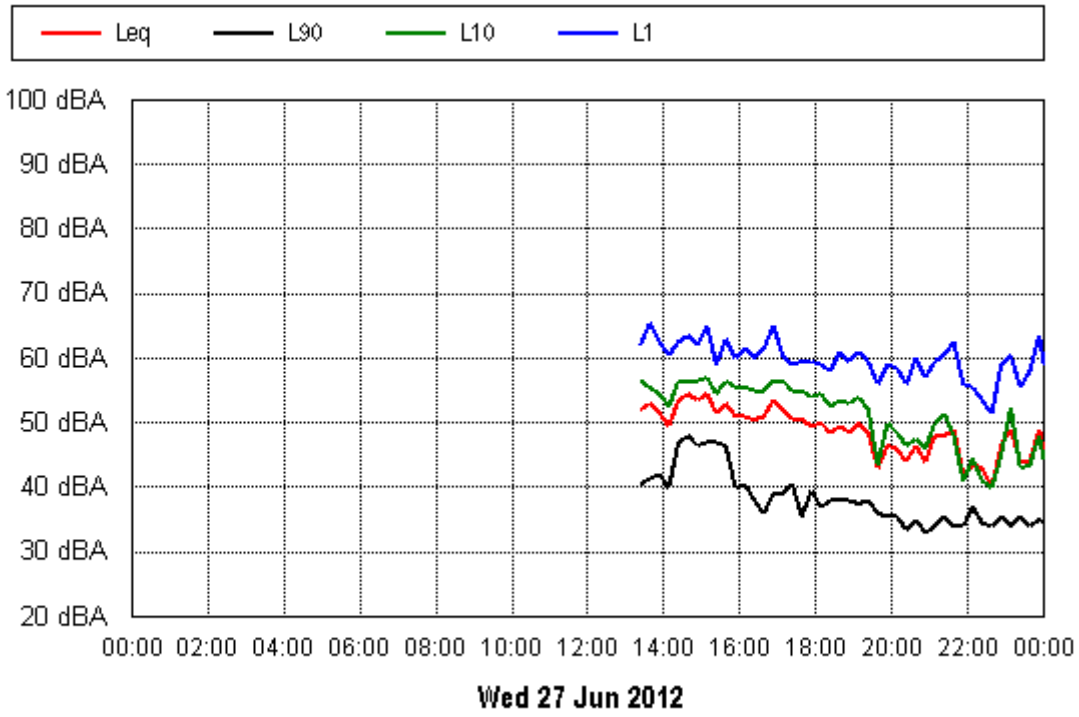

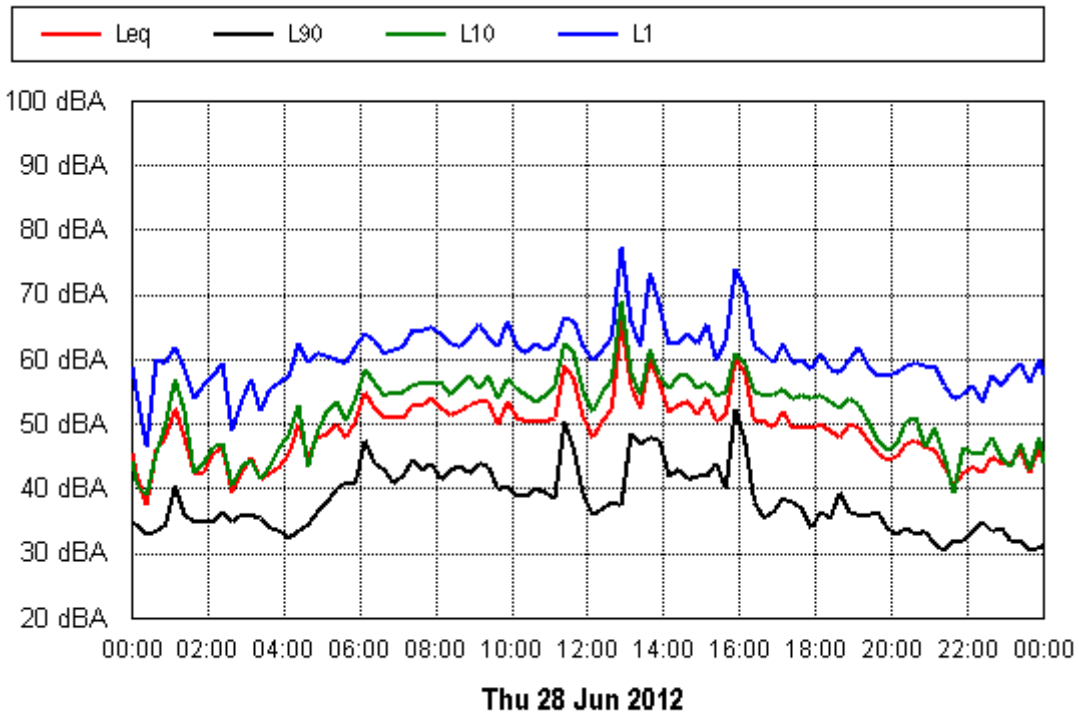

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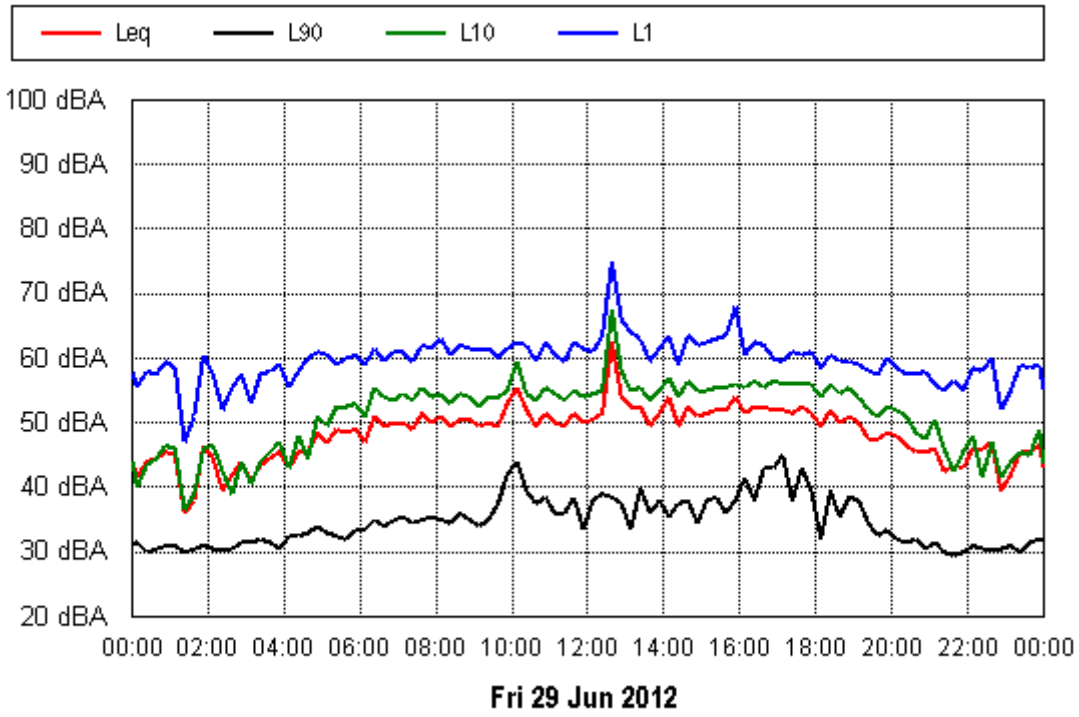

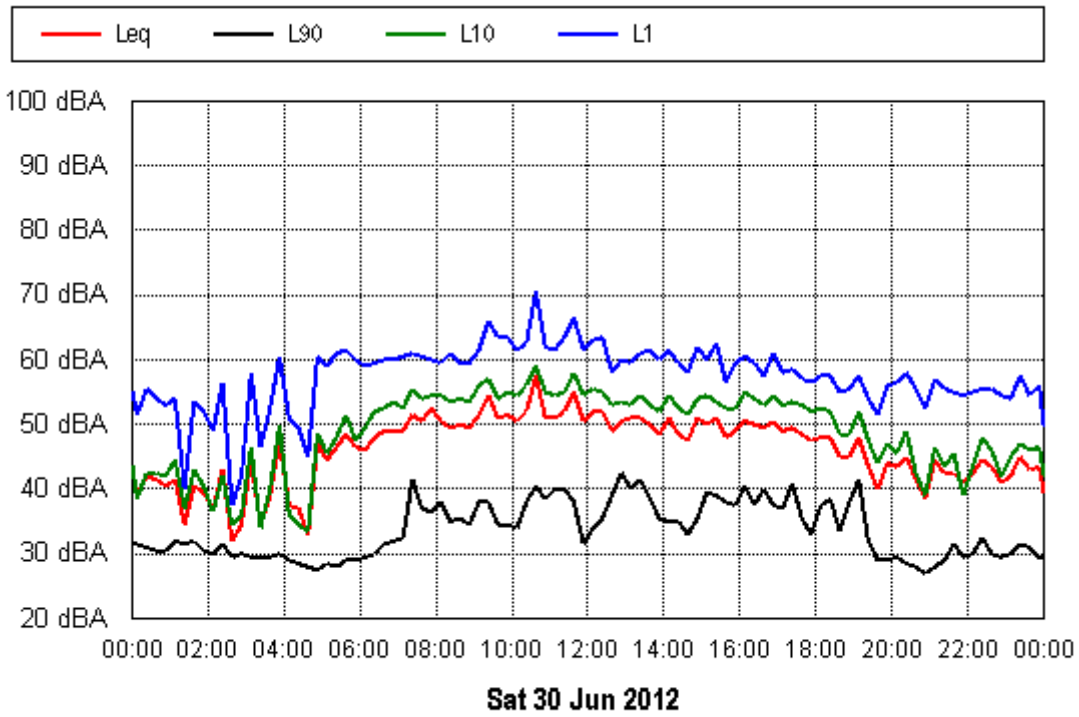

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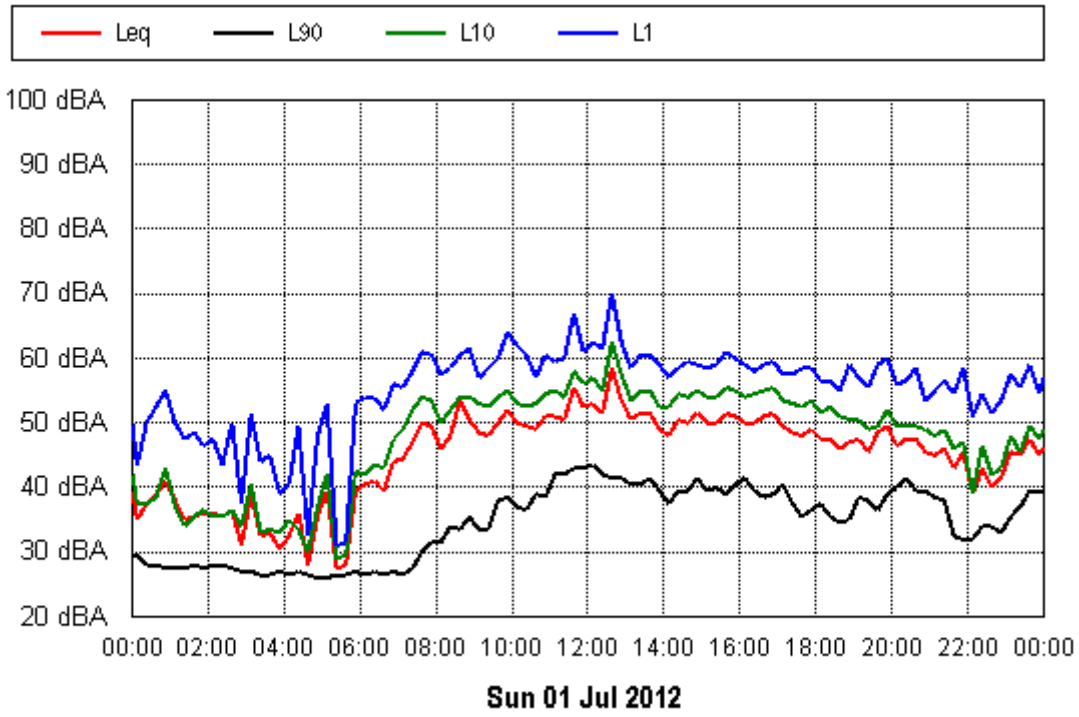

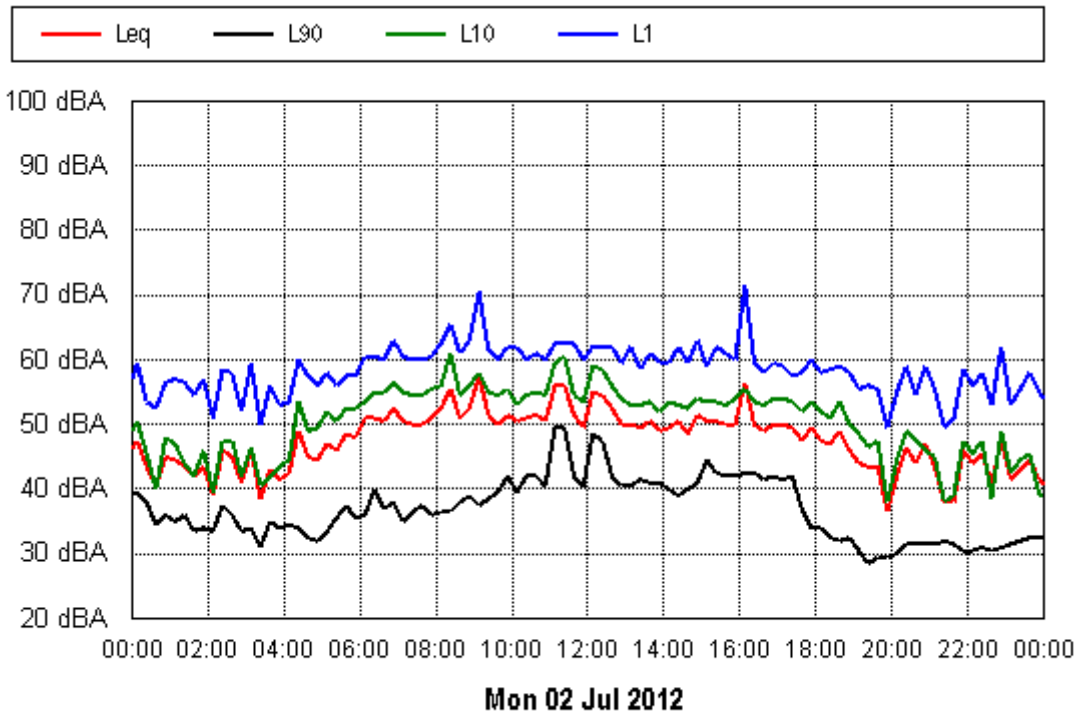

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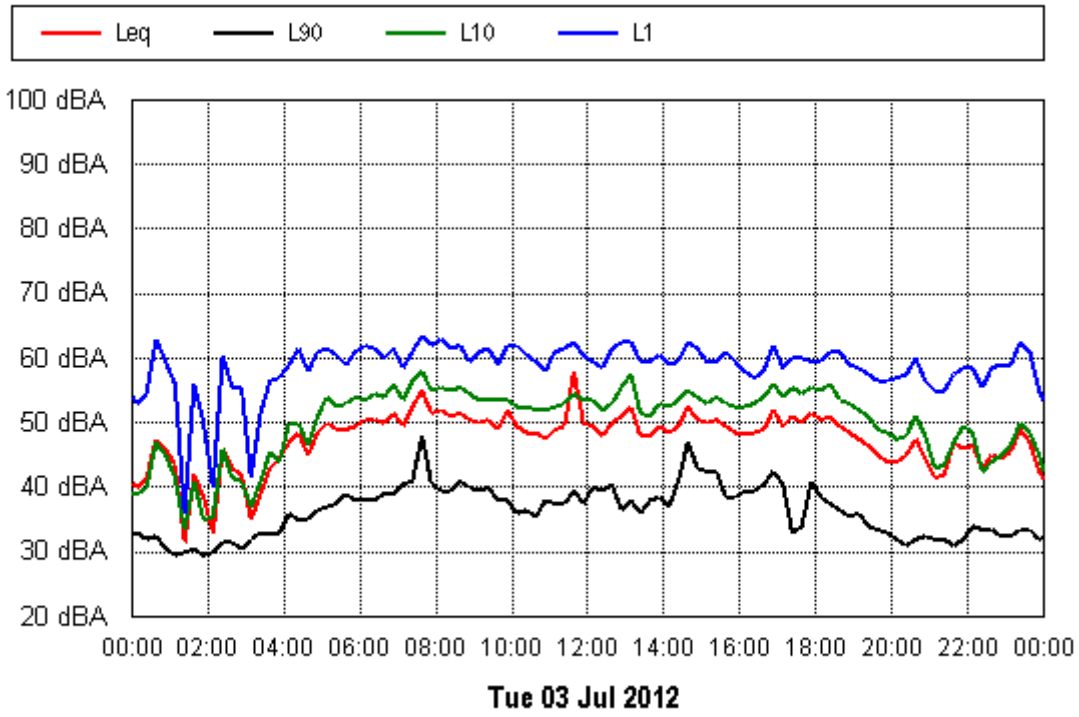
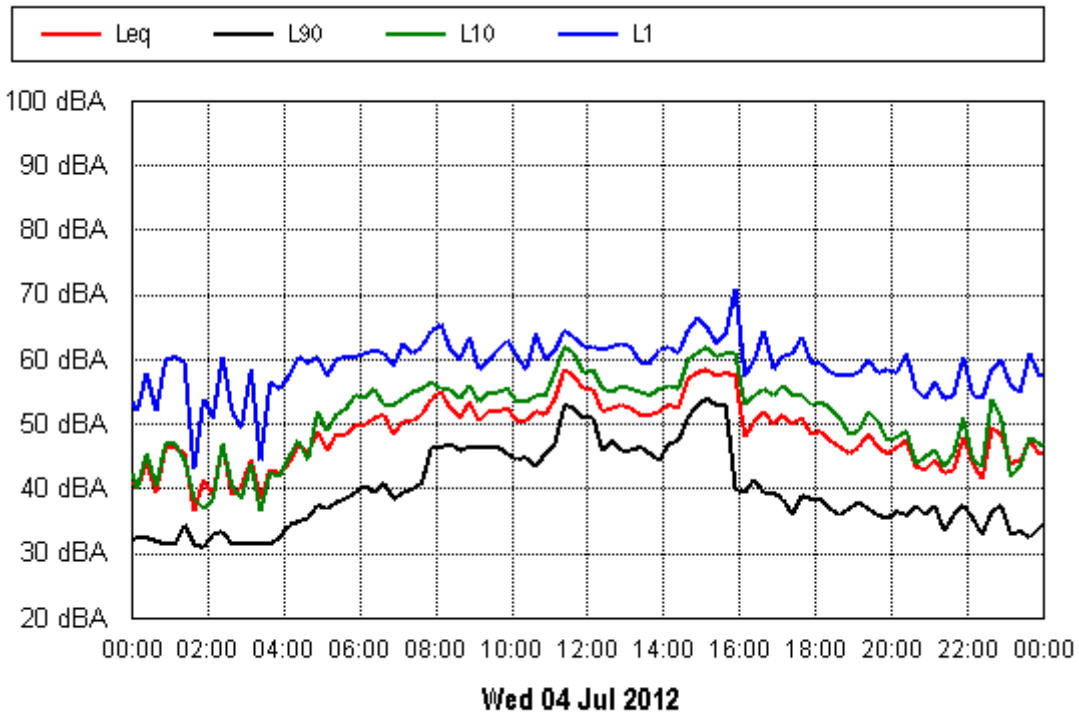
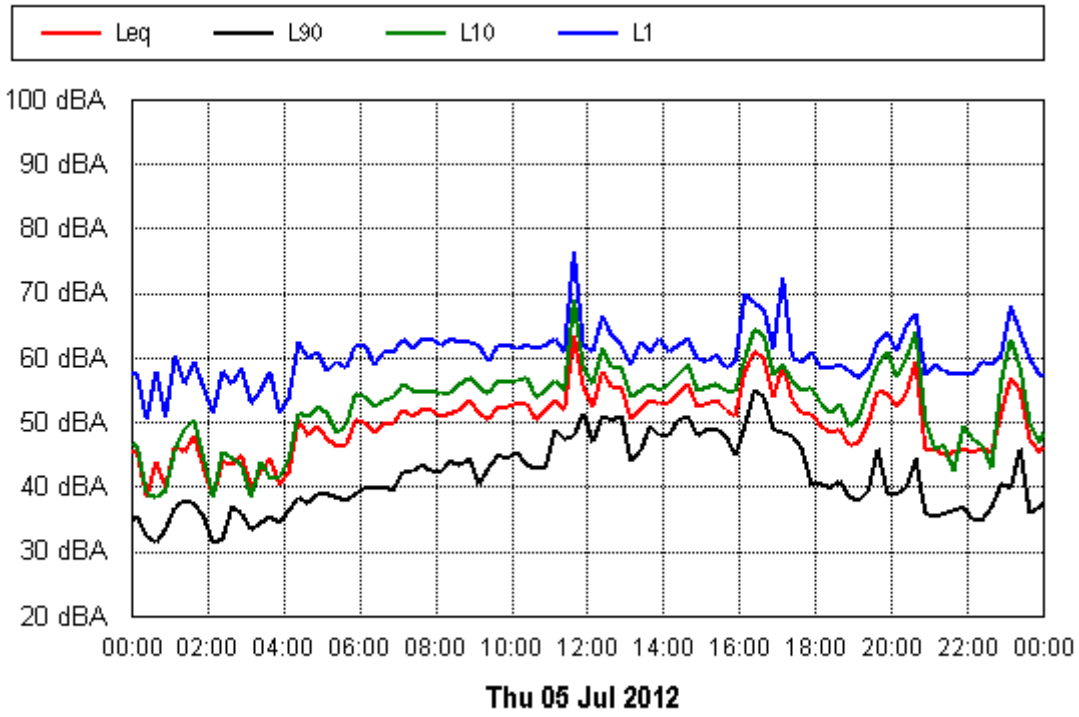
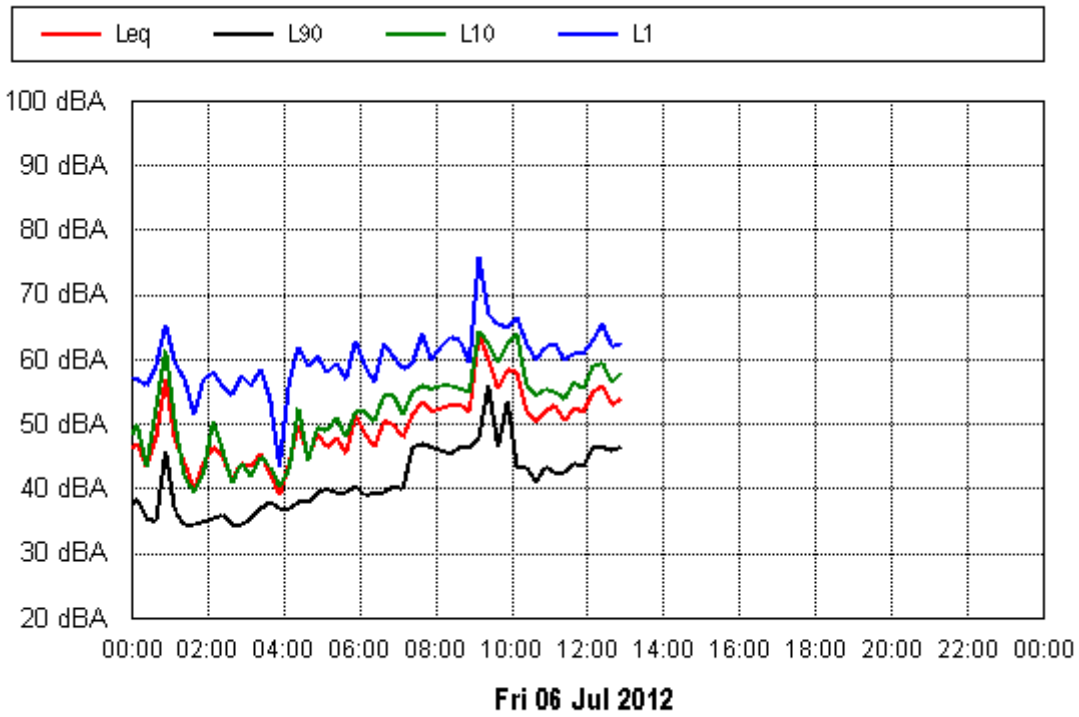
Location: CN-3
Filter: A



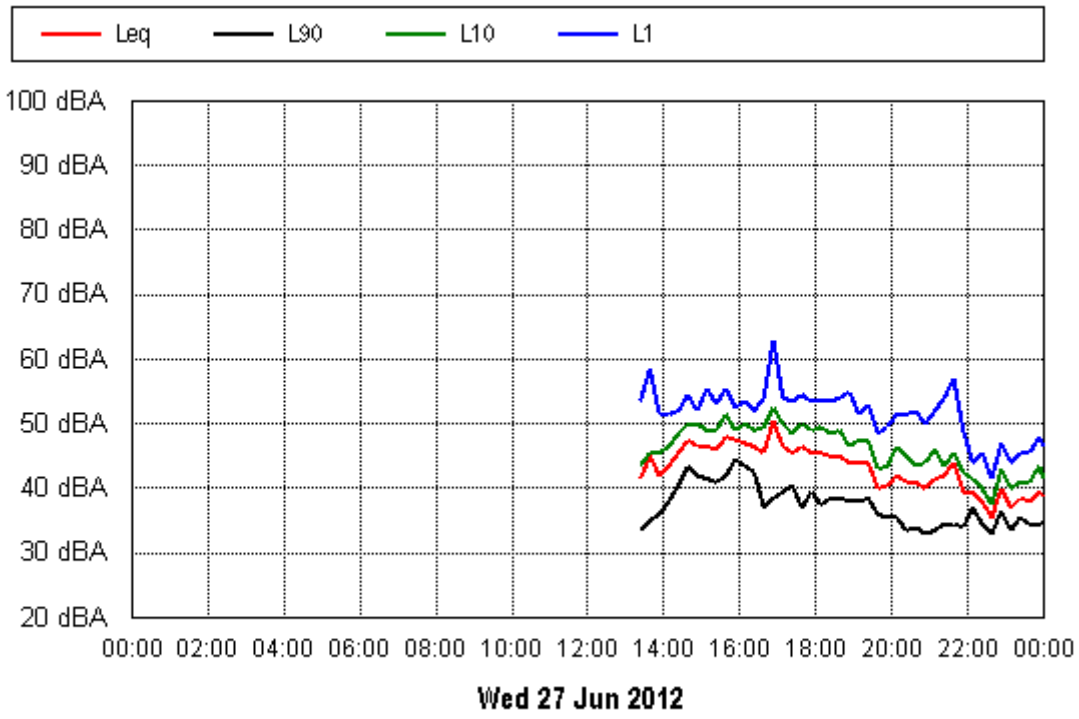


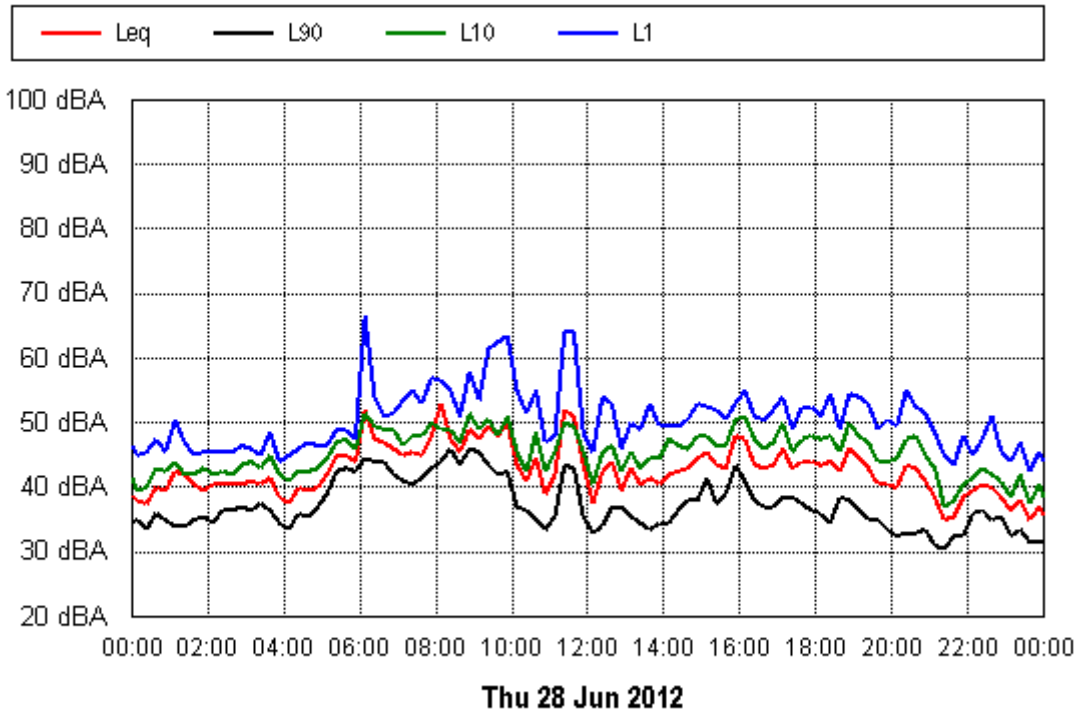
Project: Calga Sand Quarry
Location: CN-3
Filter: A



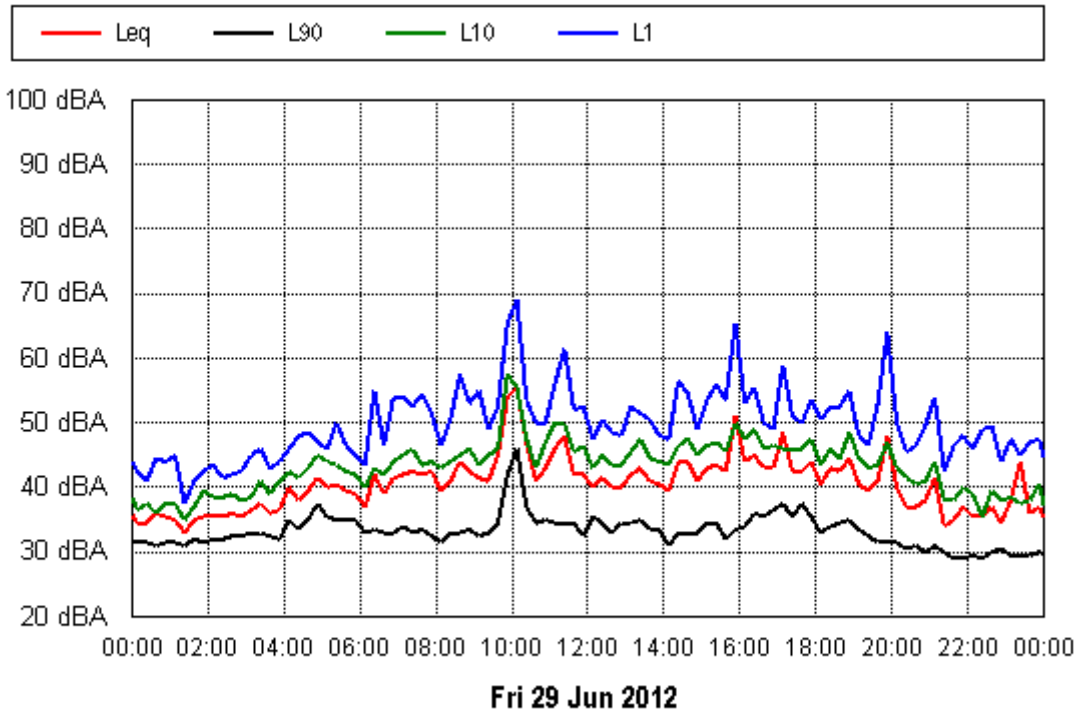


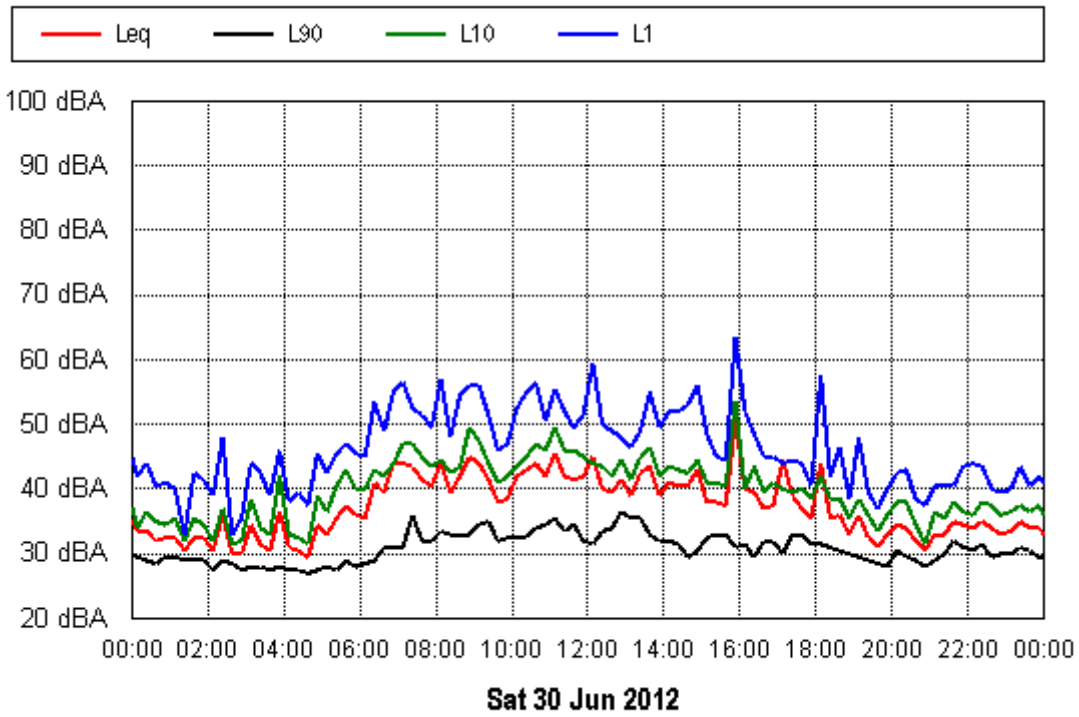
Project: Calga Sand Quarry
Location: CN-4
Filter: A



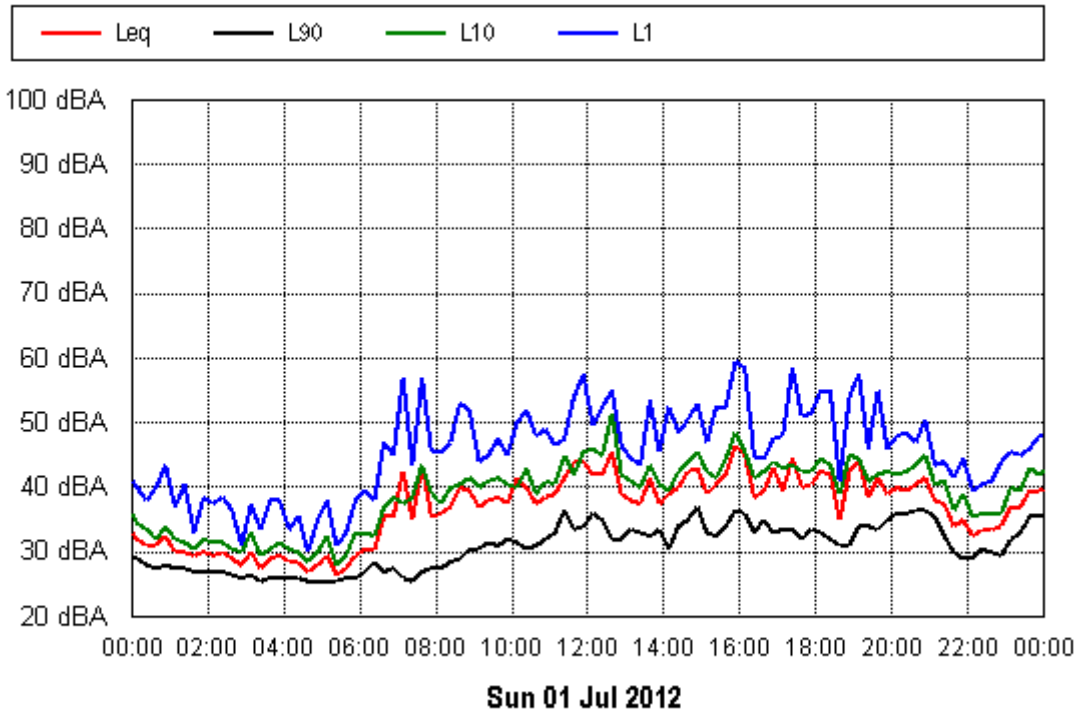


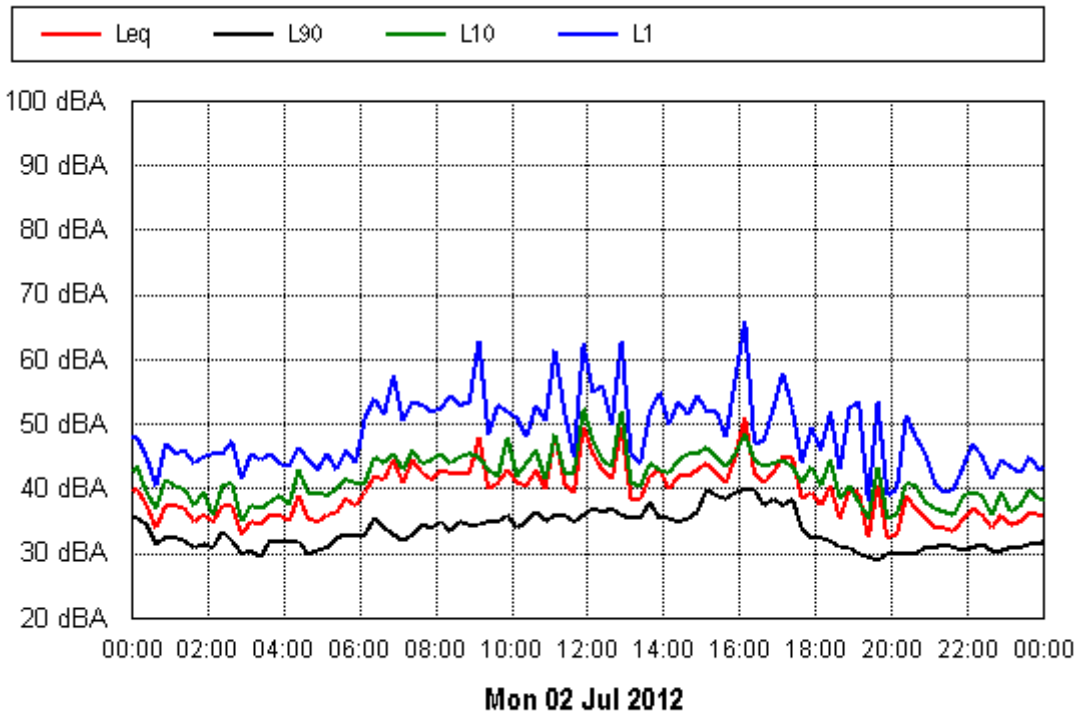
Project: Calga Sand Quarry
Location: CN-4
Filter: A



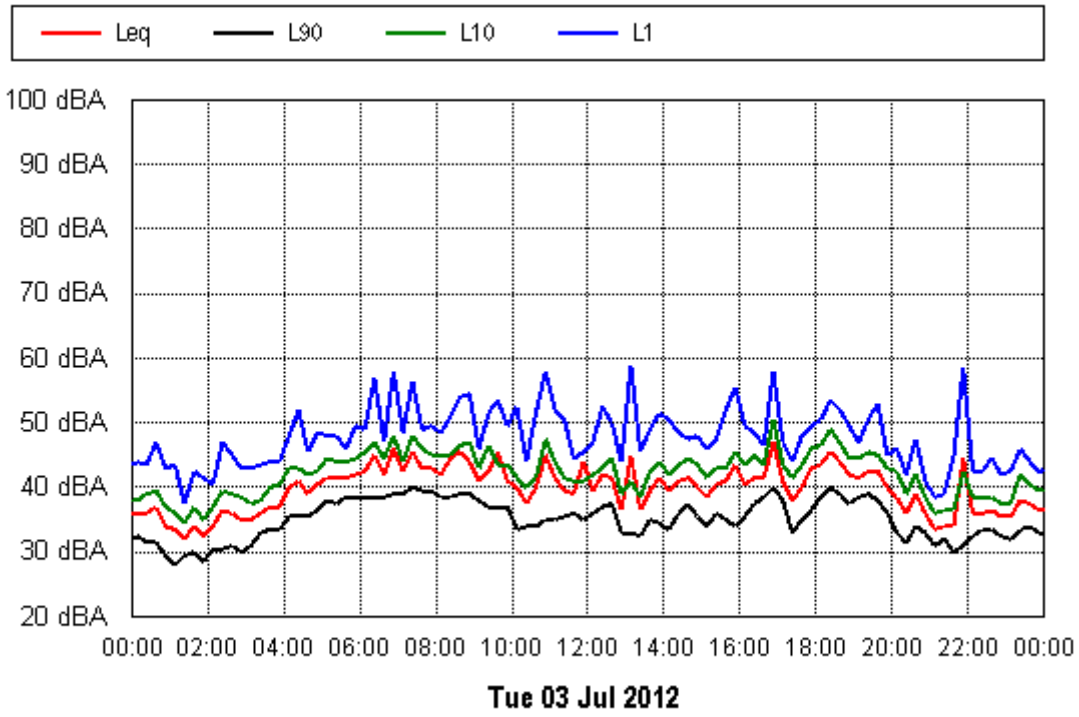


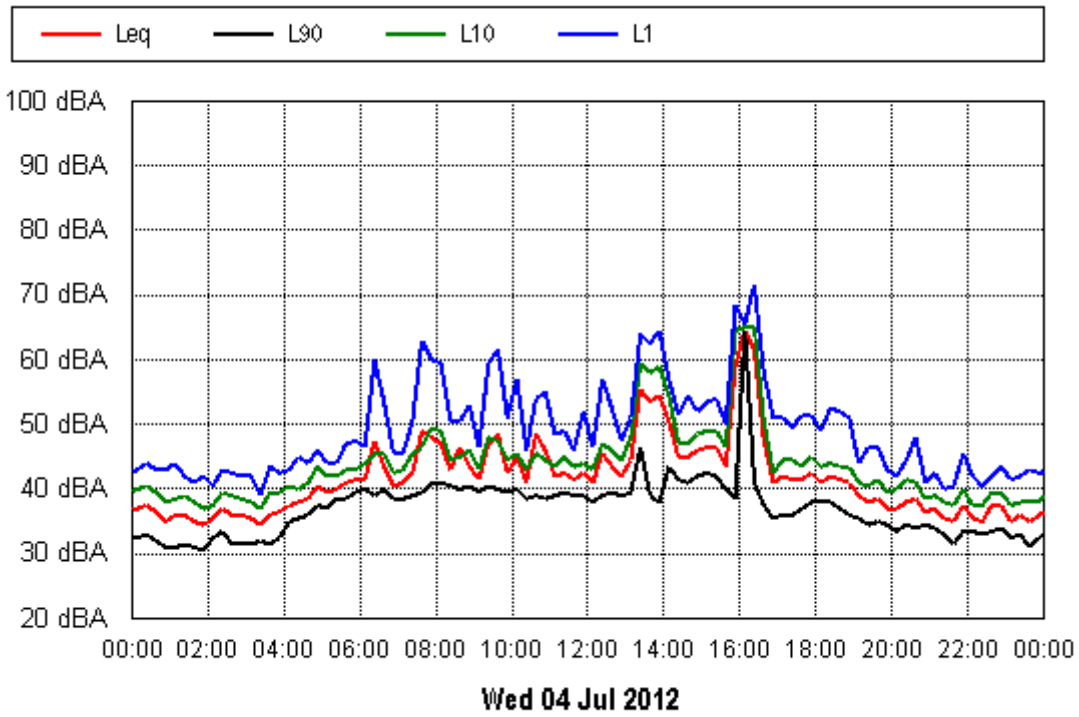
Project: Calga Sand Quarry
Location: CN-4
Filter: A





Project: Calga Sand Quarry
Location: CN-4
Filter: A





Project: Calga Sand Quarry
Location: CN-4
Filter: A