Blackett Acoustics

Noise & Vibration Consultants

THORNBERRY DEVELOPMENT

DEVELOPMENT APPLICATION (DA) ACOUSTIC ASSESSMENT

Report No BA13802A
Version A

September 2013

Prepared for

Fenlor Group Pty Ltd
1 Borrodell Drive
ORANGE, NSW 2800

TABLE OF CONTENTS

GLOSSARY

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 defined below.

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.

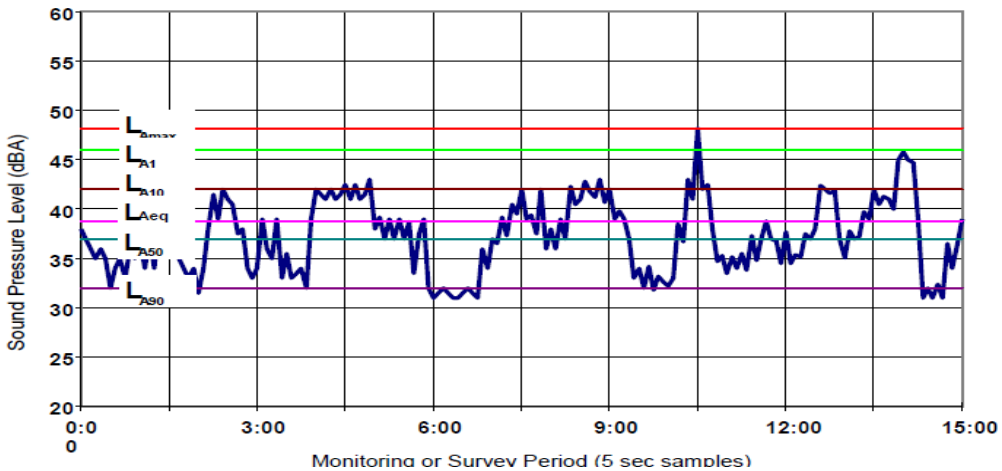
L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

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_{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 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.



1 INTRODUCTION

Blackett Acoustics has been engaged by Fenlor Group Pty Ltd to conduct an Development Application (DA) Acoustic Assessment for the proposed subdivision development along the Northern Distributor Road in Orange. The Project Site is located between Burrendong Way and Molong Road and is known as the Thornberry Development.

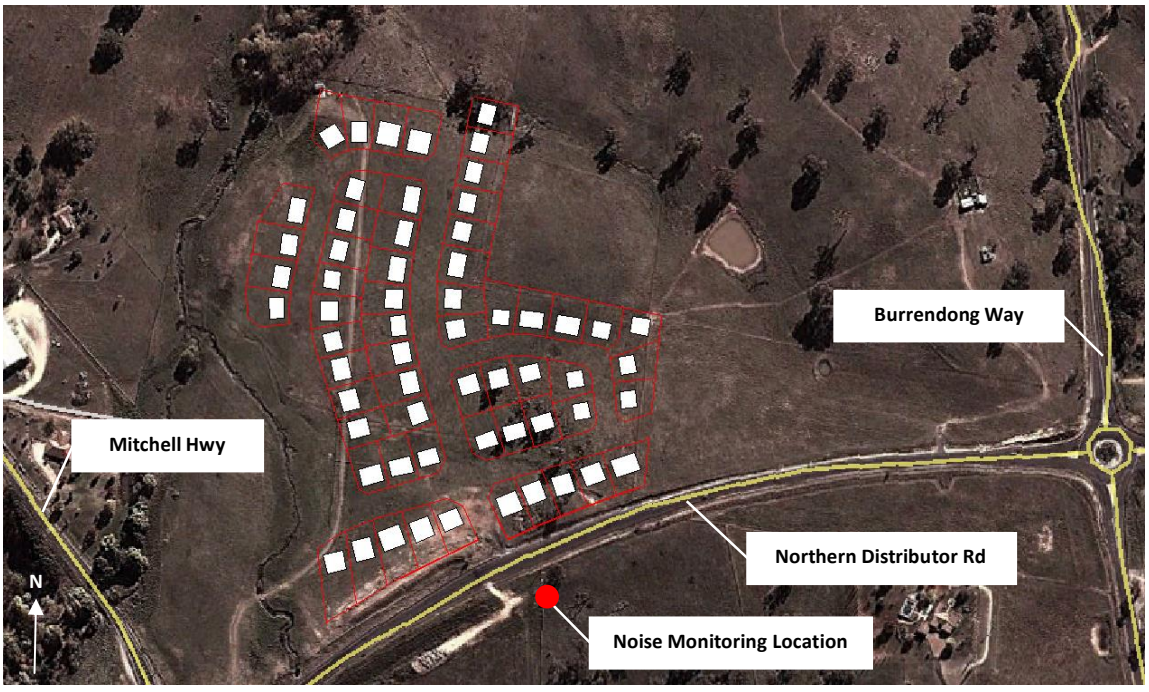
This report addresses the acoustic issue of traffic noise intrusion; investigate the degree of traffic noise exposure and recommends construction to reduce traffic noise ingress to the proposed development.

2 SITE DESCRIPTION

The Project Site location is situated along the Northern Distributor Road; between Mitchell Highway and Burrendong Way. A total of 61 free standing single storey houses are proposed to be built within the Project Site. The building configuration within the Project Site is yet to be finalised at the time of this assessment. During a site survey conducted on Friday, 23 August 2013, it was visually and aurally observed that the Project Site has relatively flat terrain and main noise emission is from traffic on Northern Distributor Road.

Figure 2-1 presents an aerial outlining the Project Site with the indicative building envelope, the surroundings buildings and noise measurement location.

Figure 2-1 Aerial of Project Site and Identified Residential Receptors



3 EXISTING ACOUSTIC ENVIRONMENT

Unattended noise monitoring equipment consisted of an Environmental Noise Logger. This was deployed by Blackett Acoustics within the Project Site to establish the existing traffic noise impact from Northern Distributor Road (NDR). The noise logger was setup on the south side of NDR in a free field position with a setback distance of approximately 30m from the nearest kerbside. The noise monitoring location is also outlined in Figure 2-1.

The monitoring period was from Friday, 24 to Wednesday, 29 August 2012. The calibration of the logger was checked prior to, and following, each measurement survey and the variation in calibration was found not to exceed 0.5 dB. The noise logger was set to record statistical noise descriptors in continuous 15-minute sampling periods for the duration of its deployment.

Based on the monitoring data, it has been established that the traffic noise level recorded during daytime and night time hours are as follows:

- Daytime $L_{Aeq,15hr}$ (7.00am - 10.00pm) : 59dBA
- Night time $L_{Aeq,9hr}$ (10.00pm - 7.00am) : 54dBA

These established noise levels will be used to for the purpose of this assessment. This data is used to verify and calibrate the road traffic noise modelling. The unattended noise monitoring data are graphically presented in Appendix A.

4 NSW INFRASTRUCTURE SEPP REQUIREMENTS

The Department of Planning and Infrastructure's (DoPI) document entitled *"Development near Rail Corridors and Busy Roads – Interim Guideline"* (DRCBR) supports specific road and rail provisions of the State Environmental Planning Policy (Infrastructure) 2007 (the 'Infrastructure SEPP').

The DRCBR Guideline provides guidance in relation to mitigation of noise sensitive developments to achieve acceptable acoustic amenity by meeting the internal noise criteria specified in the Infrastructure SEPP.

Table 4-1 provides a summary of the recommended internal noise levels under Clause 102 of the Infrastructure SEPP, where noise sensitive spaces are likely to be impacted by traffic noise ingress.

Table 4-1 Infrastructure SEPP Recommended Internal Noise Levels

Residential Buildings		
Type of occupancy	**Internal L_{Aeq} Noise Level (dBA)**	**Applicable time period**
Sleeping areas (bedroom)	35	Night time 10.00pm to 7.00am
Other habitable rooms (excluding garages, kitchens, bathrooms & hallways)	40	At any time

5 EVALUATION OF TRAFFIC NOISE INTRUSION

This Section presents the predicted noise levels at each building lot and the recommended building fabric constructions to meet the recommended internal noise levels under Clause 102 of the Infrastructure SEPP.

5.1 Predicted Noise Levels

Based on the proposed subdivided lots and indicative building envelopes within the Thornberry Development, worst-case traffic noise emissions to the proposed building envelopes have been predicted using CadnaA acoustic noise prediction software. The CadnaA program incorporates a procedure to determine the most-affected location on a façade, and this was used for the purpose of identifying the maximum noise level within each building envelope. Factors that have been taken into consideration in the noise modeling are:

- screening effects from buildings
- building envelope locations
- ground topography
- noise attenuation due to geometric spreading
- ground absorption

To validate the noise model, a single receiver point representing the unattended noise monitoring location was established in the model. The noise model was then used to calculate noise level at the single receiver point. Table 5-1 presents the comparison between the predicted noise levels and the unattended noise measurements at the noise logger location.

Table 5-1 Predicted Noise Level Compared With Measured Level

Location	Measured $L_{Aeq,period}$ Traffic Noise Level		Predicted $L_{Aeq,period}$ Traffic Noise Level	
30m from kerbside of NDR	Daytime 15hr	Night Time 9hr	Daytime 15hr	Night Time 9hr
	59	54	59	54

The established model validate well with the measured existing noise environment and will be used for predicted noise levels to areas beyond the unattended noise measurement point.

Figure 5-1 to Figure 5-5 graphically present the predicted daytime and night time noise levels associated with traffic on the NDR at each building lot. The numerical value on the bottom left quadrant within the circle presents the predicted daytime L_{Aeq} noise level and the numerical value on the bottom right quadrant presents the predicted night time L_{Aeq} noise level.

Figure 5-1 Predicted Daytime and Night Time L_{Aeq} Noise Levels - Section 1

Figure 5-2 Predicted Daytime and Night Time L_{Aeq} Noise Levels - Section 2

Figure 5-3 Predicted Daytime and Night Time L_{Aeq} Noise Levels - Section 3

5.2 Recommended Building Construction

The worst case predicted noise levels presented in Section 5.2 have been used to determine the minimum glazing requirements for the specific spaces. The calculations used to determine the required performance of building components have been done using spectral information so that low frequency components of noise have been correctly accounted for. Masonry wall construction for the building facade has been assumed.

Based on the calculations, the required performance of the building components can generally be classified into two categories, namely Category A and Category B.

Figure 5-6 presents an aerial further illustrates the Thornberry Development lots associated with each category.

Figure 5-4 Category of Recommended Building Construction Required

Table 5-2 provides the minimum recommended glazing and building constructions that should be adopted for the different categories in order to meet the recommended internal noise levels detailed in Infrastructure SEPP.

Table 5-2 Recommended Building Construction

Category	Building Element Recommended Construction***	
	Glazing**	**Ceiling/roof**
A*	6.38mm laminated glass with a R_w rating of 32	Insulation (similar to R2.0 Bradford Gold Ceiling Batts, nominal thickness 115mm) in roof cavity and ceiling consisting of 1 layer of 13mm Fyrchek plasterboard. This assumes that the ceiling cavity is not less than 200mm at any point.
B	Standard glazing i.e. 4mm float glass with a R_w rating of 25	Insulation (similar to R2.0 Bradford Gold Ceiling Batts, nominal thickness 115mm) in roof cavity and ceiling consisting of 1 layer of 13mm Fyrchek plasterboard. This assumes that the ceiling cavity is not less than 200mm at any point.

* It is recommended that considerations to the building orientation and layout of sleeping spaces to be situated away from the façade fronting Northern Distributor Road.

** All glazing areas require good acoustic perimeter seals and mohair seals are not considered as adequate seals acoustically.

*** 13mm Fyrcheck plasterboard can be replaced with 10mm Soundchek plasterboard.

External front doors fronting Northern Distributor Road shall be minimum 40mm solid core timber with full perimeter acoustic seals (Raven RP10 or equivalent) to the top, sides and drop-seal (Raven RP8 or equivalent) to the base.

The above recommendations are indicative only, subject to final assessment when the final building design, layout and configuration become available.

5.3 Ventilation

In order to fully comply with Clause 102 of Infrastructure SEPP, it is necessary to provide alternative ventilation so that external windows and doors can be kept closed. In this ways the indoor noise goals can be met while providing room ventilation that meets the Building Code of Australia. Any mechanical ventilation system that is installed should be acoustically designed such that acoustic performance for the acoustic performance of the recommended construction are not reduced by any duct or pipe penetrating the building fabric elements. Noise emission to the adjacent property boundaries by any ventilation system shall comply with Council requirements.

Two typical ways to achieve this are:

1. Ducted Air-Conditioning System where the Fan Coil Units also provide Outside Air mixed with the Return Air. Air-conditioning ductwork and plenums must be acoustically treated.
2. A device similar to the Aeropac Room Ventilator and Air-Filter. (Available from Acoustica – ph: 1300 722 825).

6 CONCLUSION

This report has presented a DA acoustic assessment of the proposed Thornberry Development located on Northern Distributor Road, Orange. Assessment of traffic noise intrusion in accordance with the requirements of Infrastructure SEPP has been conducted.

Recommendations have been made for the roof and glazing building elements to control noise ingress to within design levels recommended in the "*Development near Rail Corridors and Busy Roads – Interim Guideline"* (DRCBR).

The recommended building constructions in this report are designed to comply with the acoustic requirements of DRCBR. No other mitigation such as noise barrier/perimeter fence is required to achieve compliance.

Note

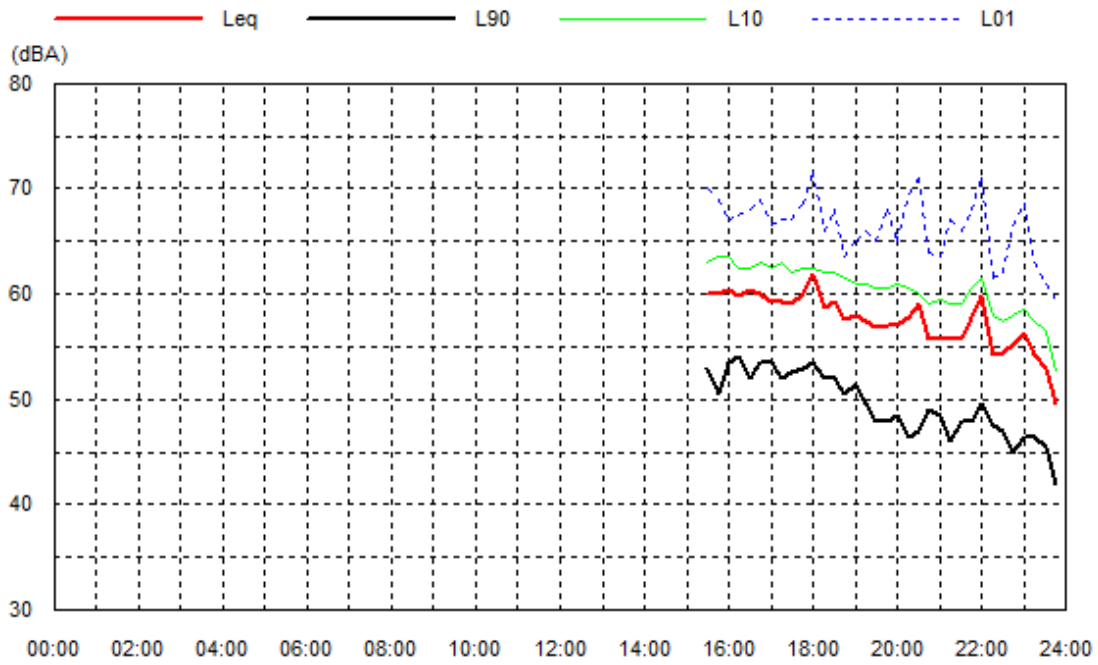
All materials specified by Blackett Acoustics have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

Version	Status	Issue Date	Prepared by
A	Final	30 September 2013	Jimi Ang

Appendix A - Unattended Noise Monitoring Data

Location: 30m Setback from NDR (Free field)

Fri 23 Aug 13



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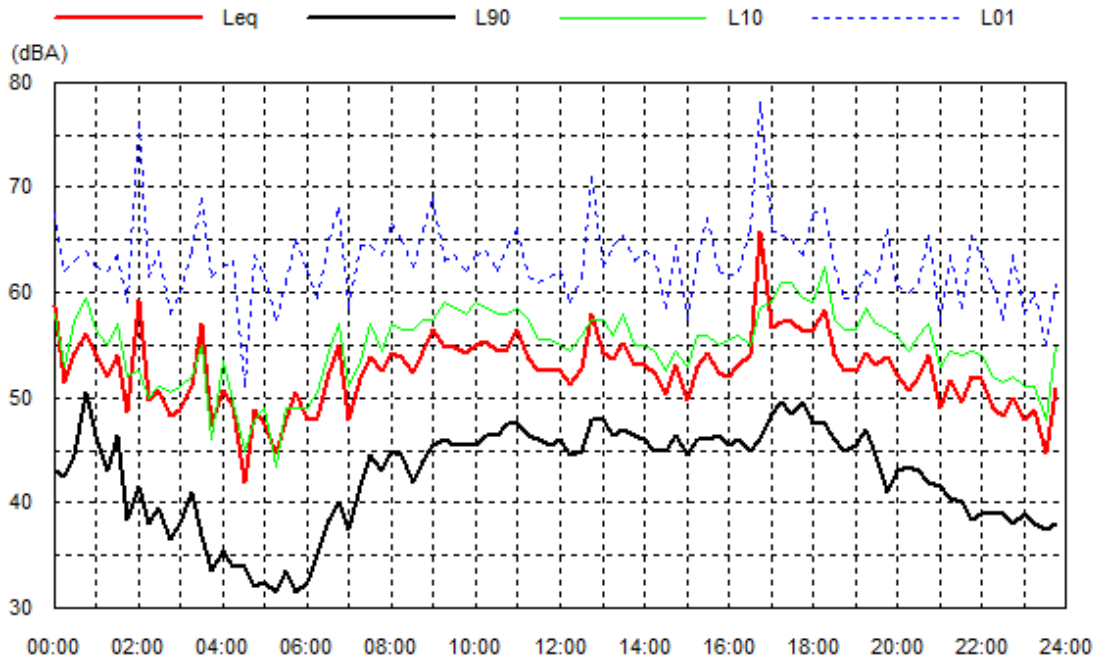

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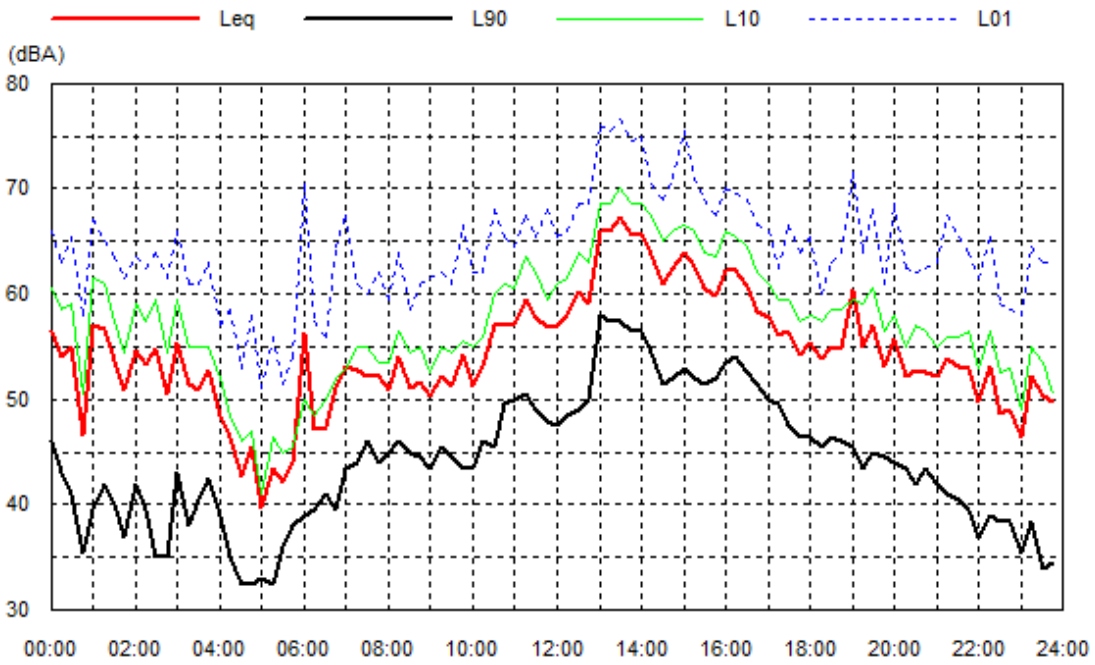

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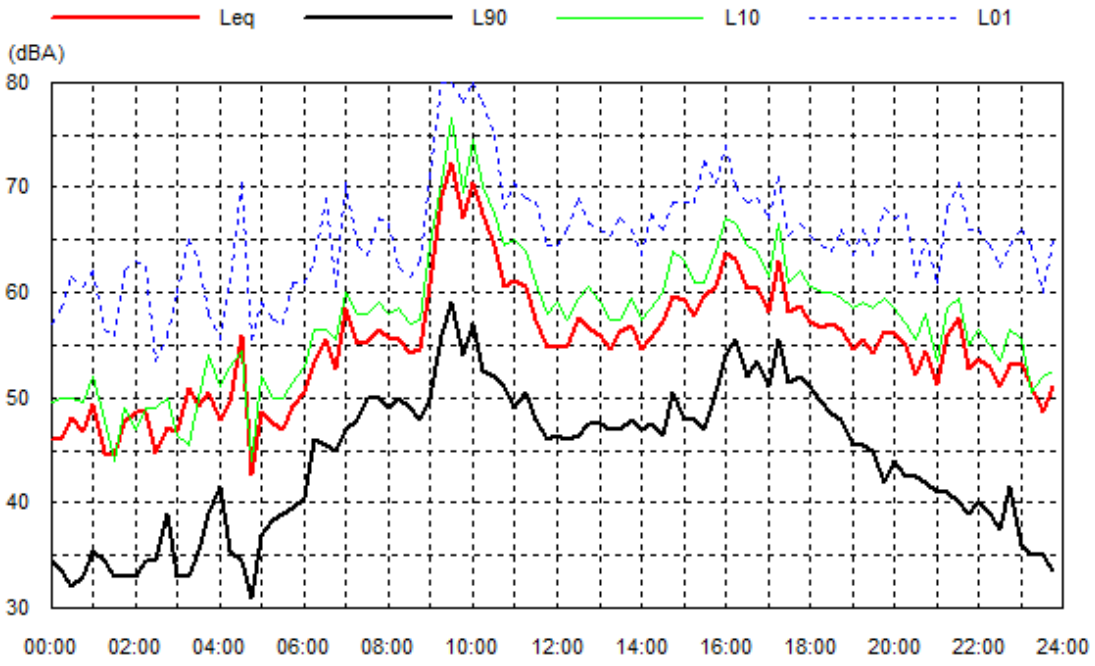

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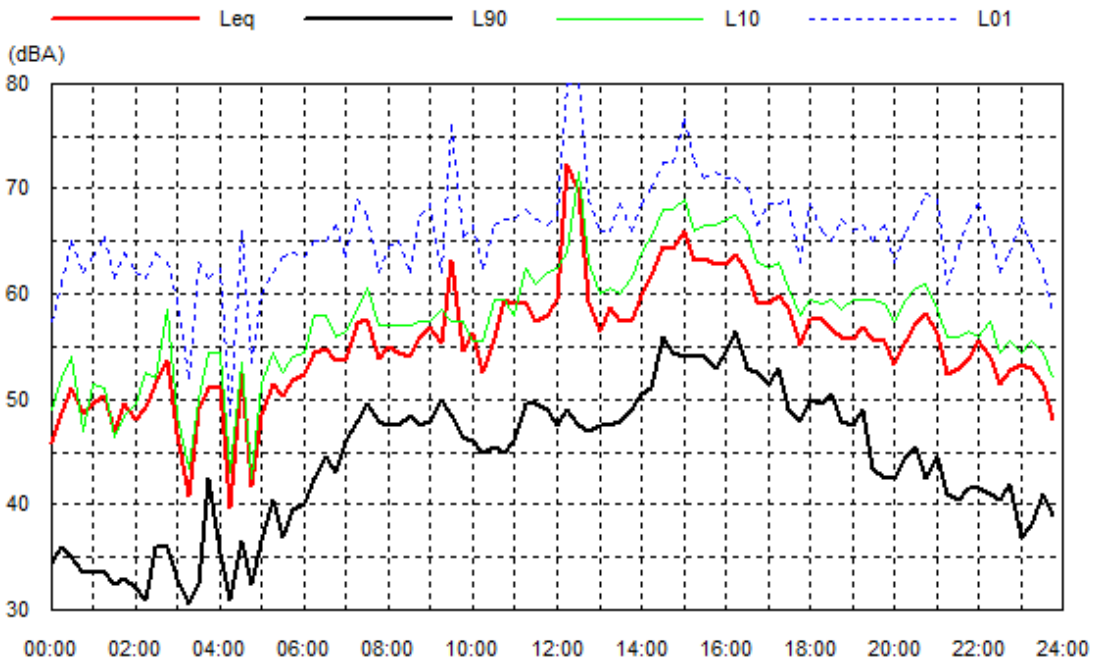
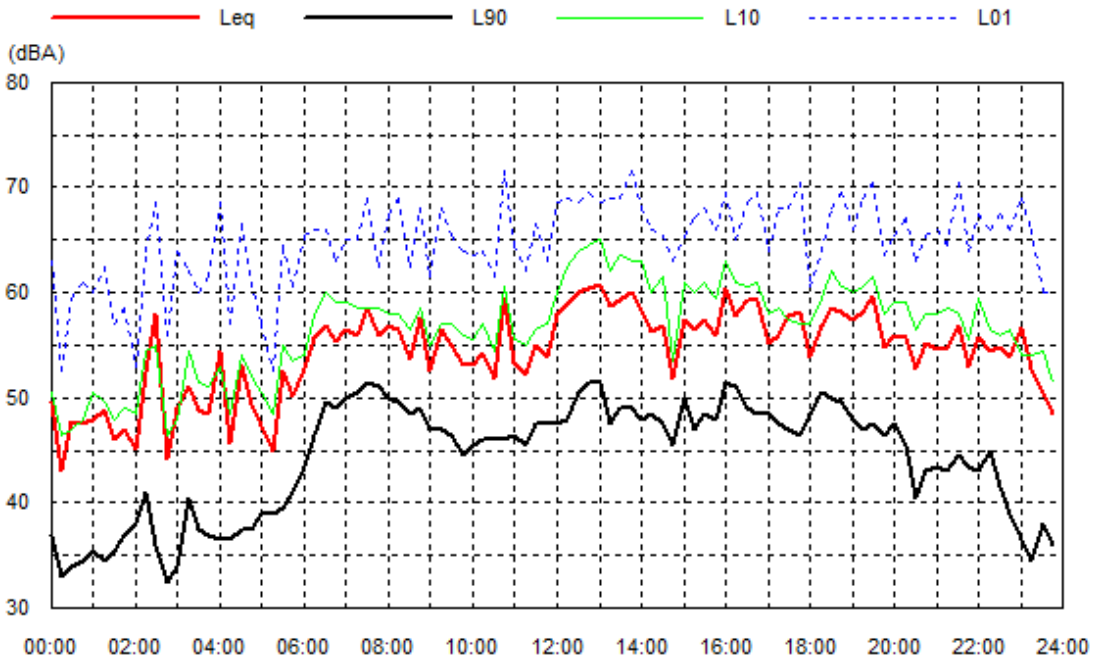


Wed 28 Aug 13



Location: 30m Setback from NDR (Free field)

Thu 29 Aug 13