

SOUTH EDMONDSON PARK
STAGE 1 PROJECT APPLICATION
NOISE & VIBRATION IMPACT ASSESSMENT

ACOUSTICS AND AIR

REPORT NO. 09190-LP
VERSION A

WILKINSON  MURRAY

SOUTH EDMONDSON PARK STAGE 1 PROJECT APPLICATION NOISE & VIBRATION IMPACT ASSESSMENT

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VERSION A**

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PREPARED FOR

LANDCOM

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1 INTRODUCTION

This noise and vibration assessment has been prepared by Wilkinson Murray (Sydney) Pty Limited to accompany a Project Application under Part 3A of the Environmental Planning & Assessment Act, 1979 (EP&A Act) and a proposal for State significant site listing under Schedule 3 of State Environmental Planning Policy Major Development 2005 (SEPP Major Development) in relation to the former Ingleburn Army Base and certain adjoining lands within the Edmondson Park Precinct of the South West Growth Centre (referred to herein as 'Edmondson Park').

Landcom is proposing to deliver a new diverse and sustainable urban community at Edmondson Park South. Once complete, Edmondson Park will accommodate a mix of land uses, a diversity of housing (approximately 3,200 dwellings), a new town centre incorporating 35,000 – 45,000m² retail, business and commercial floor space with employment opportunities for 1,000 people, multi-purpose community and education facilities, a new 150 hectare Regional Park, a number of other local parks and environmental conservation areas.

The new urban community at Edmondson Park South will meet the State Government's objectives to increase housing supply, provide community benefits and create jobs.

The Stage 1 Project Application (submitted concurrently with the Concept Plan) relates to early works, infrastructure and subdivision for the initial phases of the development and will enable site works to begin in 2010.

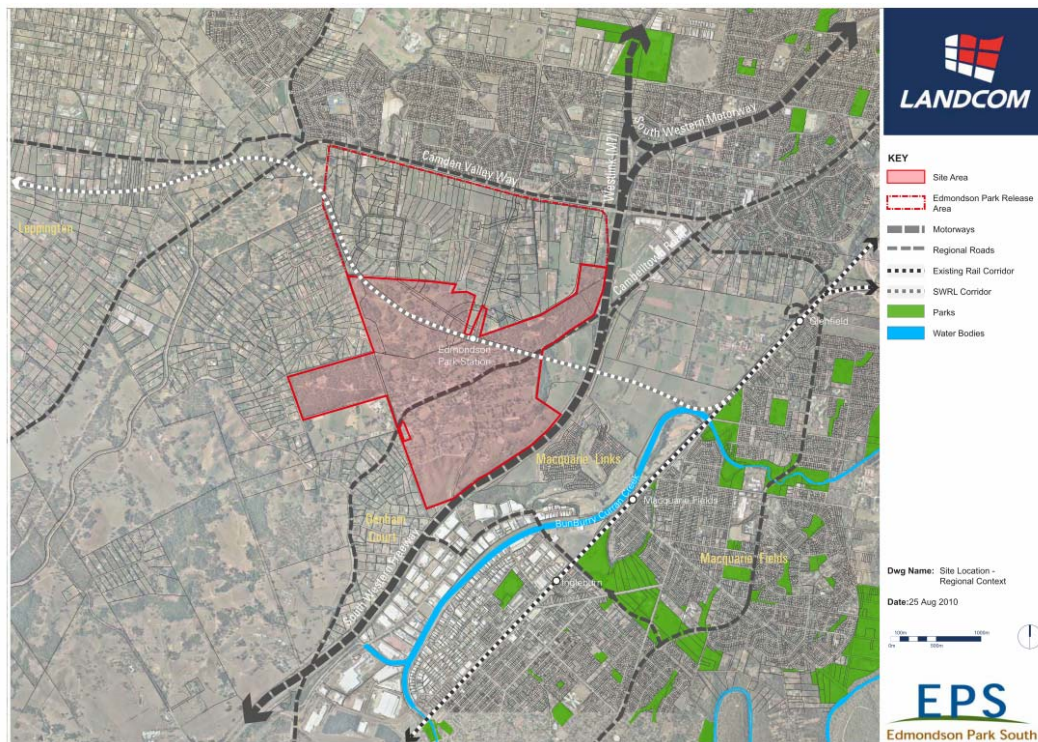
This report assesses noise and vibration impacts associated with the following sources:

- traffic noise associated with Campbelltown Road, Macdonald Road and the Motorway; and
- construction noise and vibration associated with the Stage 1 project Application.

2 THE SITE

The Stage 1 Project Application site comprises an area of approximately 40 hectares and forms part of the larger Edmondson Park Release Area within the South West Growth Centre. It is located within the southernmost portion of the larger development site to the north of the M5 Motorway and to the east of Zouch Road and is approximately 40 km to the south west of Sydney CBD. The site is wholly located within the Campbelltown LGA (refer to Location Plan at Figure 1). A location plan is shown at Figure 2-1.

Figure 2-1 Site Plan



2.1 Concept Plan

The Concept Plan establishes the overall planning framework for the site, including:

- land use type and distribution;
- a mix of housing types and densities (approximately 3,300 dwellings);
- concept location for approximately 35,000 – 45,000 m² of retail / commercial floor space within the new Edmondson Park Town Centre;
- identification and location of open space and drainage corridors, environmental conservation lands (to form the new Regional Park), and local active and passive recreation facilities;
- road network layout;

- utilities (including power, telecommunications and gas), infrastructure strategy, potable water strategy, sewer concept plan and water cycle management plan;
- location and dimensions of Bushfire Asset Protection Zones; and
- appropriate interpretation of European and Aboriginal heritage located on the site.

The Concept Plan also sets out an approval framework that will enable the carrying out of the works necessary to remediate the site in accordance with a Remedial Action Plan, without the need for undertaking further environmental assessment.

A variety of housing types is proposed to be delivered. The range of densities will enable a range of dwelling types and will include moderate income housing and housing for seniors.

It is proposed to develop the Edmondson Park site progressively in stages over a 15-20 year period. The Concept Plan will address the staging and delivery of the overall development having regard to the progressive delivery of necessary infrastructure, services and facilities; and market demand.

The Concept Plan is accompanied by a proposal with respect to the future developer contributions framework for the provision of local facilities and services within both the Liverpool and Campbelltown LGAs, as well as State Infrastructure.

2.2 Project Application

The residential subdivision Project Application comprises:

- the creation of 206 residential lots, 8 super lots for future subdivision 15 Environmental Living lots and 3 lots for dedication to Campbelltown City Council as Public Reserve in 5 stages*;
- the dedication of roads to Campbelltown City Council;
- On-site works comprising:
 - tree removal;
 - earthworks including excavation, cut and fill;
 - design and construction of physical infrastructure, including roads, stormwater drainage and utility reticulation, traffic management works, establishment of open space areas;
 - retaining walls as determined during detailed design;
 - design and construction of staged stormwater water quantity and quality infrastructure to achieve objectives required by the Water Cycle Management (WCM) strategy for the greater site;
 - demolition of all existing structures;
 - erosion and sediment control to areas of roadworks and bulk earthworks including provision of temporary sedimentation ponds and diversion drains;
 - Design and construction of an ornamental pond;
 - Landscaping of road reservations;
 - erection of signage and billboards; and;
 - Embellishment of open space.

- Off-site works comprising:
 - construction of the sewer lead in from the Sydney Water carrier main at Ash Road;
 - upgrade of overhead mains and construction of electrical lead-in feeders from the existing zone substation at Prestons;
 - connection to utility services, potable and recycled water, electricity, gas and telecommunications in Campbelltown and MacDonald Roads;
 - Connection to existing stormwater drainage;
 - tree removal;
 - earthworks including excavation, cut and fill;
 - design and construction of physical infrastructure, including roads, stormwater drainage and utility reticulation, traffic management works, including the connection to the existing MacDonald Road;
 - design and construction of staged stormwater water quantity and quality infrastructure to achieve objectives required by the Water Cycle Management (WCM) strategy for the greater site;
 - erection of an acoustic wall;
 - erection of signage and billboards;
 - extension or relocation of existing services including potable and recycled water, gas, telecommunication, power;
 - demolition of all existing structures; and;
 - Proposed new intersection to existing Macdonald Road.

It is intended to seek staged Construction Certificates as necessary to facilitate the efficient delivery of each phase of the development works.

The first stage residential Project Application will include the proposed construction of a gravity sewer line through the future Regional Park.

* A number of residue lots will be created in undertaking the Project Application, the number of lots identified in the above description relate to the ultimate number of lots that will be created in the Project Application.

Figure 2-2 shows the Stage 1 site.

Figure 2-2 Stage 1 Site Layout

2.3 Planning Background

The Edmondson Park Precinct, including the subject site, has been the subject of broad strategic planning investigation and environmental assessment over a number of years by Liverpool and Campbelltown City Councils, the Department of Planning, the Department of Defence (the current landowner of the Ingleburn Army Base) and Landcom (owner of certain lands).

The whole of the Edmondson Park Precinct has been released for urban development by the Minister for Planning. Part of the site - the Ingleburn Army Camp - is currently the subject of a 'delayed' rezoning for urban purposes under Liverpool Local Environmental Plan 2008 and Campbelltown (Urban Area) Local Environmental Plan 2002.

In June 2010 the Minister for Planning considered a Preliminary Assessment Report for the Edmondson Park Project that provided justification for the planning, assessment and delivery of the project to occur under Part 3A of the EP&A Act, having regard to the demonstrated contribution that the project will have to achieving State and regional planning objectives.

The Minister for Planning formed the opinion that the Edmondson Park Project constitutes a Major Project to be assessed and determined under Part 3A of the EP&A Act, and also authorised the submission of a Concept Plan for the site. In doing so, the Minister also formed the opinion that a State significant site (SSS) study should be undertaken to determine whether to list the site as a State Significant site in Schedule 3 of SEPP Major Development.

The Part 3A process under the EP&A Act allows for the Edmondson Park Project to be planned, assessed and delivered in a holistic manner, with a uniform set of planning provisions and determination by a single consent authority. Given the scale of the proposal, the Concept Plan and SSS listing provide the opportunity to identify and resolve key issues such as land use and urban form, development staging, infrastructure delivery and environmental management in an integrated and timely manner.

This report has been prepared to fulfil the Environmental Assessment Requirements issued by the Director General for the inclusion of the Edmondson Park site as a State Significant Site under SEPP Major Development, and for a Concept Plan approval for the development.

Specifically, this report addresses the following overall requirements:

Noise

- (1) Demonstrate that the proposal will be designed, constructed, operated and maintained so that there is no unacceptable impact from noise. In particular assess the noise impact for the proposed rail line and existing and proposed roads having regard for increased traffic generated by the proposal. This should be assessed in accordance with the *Environmental Criteria for Road Traffic Noise (EPA 1999)*, and *Development Near Busy Road – Interim Guideline (Department of Planning)*.

In addition, the following is required in the Project Application stage:

Construction Impacts

- (1) Provide an assessment of construction impacts of the site preparation and any other works associated with the project application, and propose appropriate mitigation measures. This should include (but not limited to) construction noise, air quality, soil and erosion, ground water impact, and traffic in accordance with relevant guideline.

The site is affected by noise from the existing road traffic on the South Western Freeway which is located on the South Eastern side of the site. To a lesser extent noise from Campbelltown Road will affect land bounding this road which crosses the site.

Whilst the South Western Rail Link is to cross the Northern end of the site it is remote from Stage 1 whereby noise and vibration from its operation is not of significance.

2.4 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in Appendix A.

3 AMBIENT NOISE LEVELS & SURROUNDING RECEIVERS

Long-term ambient noise levels were monitored at three locations, selected to cover the range of environments around the site. The locations are presented in Table 3-1, and shown in Figure 3-1.

Table 3-1 Long-Term Noise Monitoring Locations

Monitoring Site	Area	Relevant Noises Noted on Site Visits
A	South West of Site	Motorway Noise
B	Leichhardt Road	General and Motorway Noise
C	North East of Site	Motorway Noise

Noise monitoring was conducted between Friday, 16 July and Monday, 26 July 2010. The noise monitoring equipment used for these measurements consisted of AR L Type EL -215 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 ambient noise. L_{A1} , L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Appendix A for definitions). 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 during the relevant period.

Detailed results for each monitoring location are shown in graphical form in Appendix B. The graphs show measured values of L_{Aeq} , L_{A90} , L_{A10} and L_{A1} for each 15-minute monitoring period.

Table 3-2 summarises the noise results, for daytime, evening and night time periods as defined by the DECCW. The summary noise descriptors are:

- $L_{Aeq,period}$ – the L_{Aeq} noise level measured over the assessment period; and
- RBL – Rating Background Level is a measure of typical background noise levels which is used in determining noise criteria.

Table 3-2 Summary of Measured Noise Levels

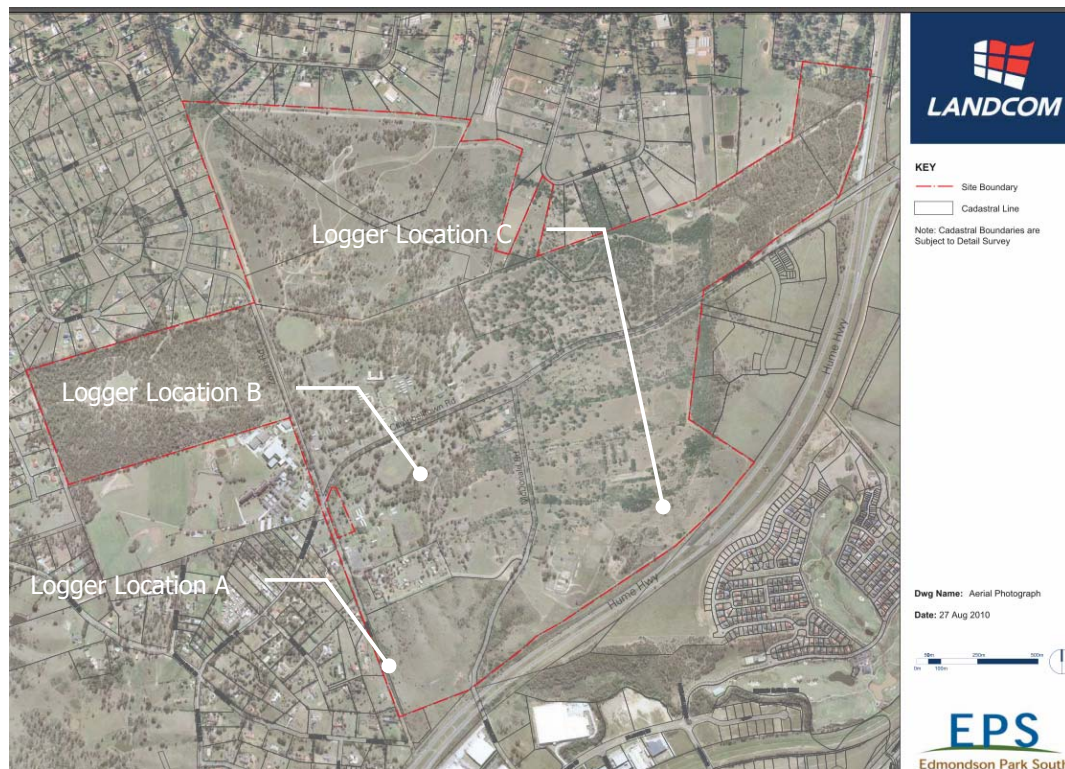
Noise	RBL (dBA)				$L_{Aeq,period}$ (dBA)			
Logging Site	Daytime 7am-6pm	Evening 6-10pm	Night Time 10pm-7am	Saturday 8am-1pm	Daytime 7am-6pm	Evening 6-10pm	Night Time 10pm-7am	Saturday 8am-1pm
A 49		46	41	46	56	53	51	52
B 48		49	44	46	55	55	51	51
C 51		52	44	49	58	58	56	56

In addition, the results of noise monitoring were processed to establish traffic noise descriptors over the day and night periods as defined in the DECCW's *Environmental Criteria for Road Traffic Noise*. These are presented in Table 3-3.

Table 3-3 Measured Free Field Traffic Noise levels

Location	Daytime $L_{Aeq}(15 \text{ hrs})$ - dBA	Night Time $L_{Aeq}(9 \text{ hrs})$ - dBA
A 54.2		50.6
B 55.1		50.9
C 58.2		56.2

Figure 3-1 Noise Monitoring Locations



4 PERFORMANCE CRITERIA

The following sections detail the applicable site specific construction and operational noise and vibration criteria based on guidelines from the DECCW and the Department of Planning, being;

- *Interim Construction Noise Guideline,*
- *Environmental Criteria for Road Traffic Noise and;*
- *Development Near Rail Corridors and Busy Roads – Interim Guideline.*

4.1 Construction Noise Criteria

DECCW released the “*Interim Construction Noise Guideline*” (CNG) in July 2009. The guideline provides noise goals that assist in assessing the impact of construction noise.

For residences, the basic daytime construction noise goal is that the noise should not exceed the RBL background noise by more than 10dBA. This is for construction during standard hours: Monday to Friday 7.00am to 6.00pm, and Saturday 8.00am to 1.00pm. Outside the standard hours, the criterion would be background + 5dBA. A more complete description of the guidelines is in Table 4-1.

Table 4-1 Construction Noise Goals at Residences using Quantitative Assessment

Time of Day	Management Level $L_{Aeq,(15min)}$ *	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10dBA	• The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dBA	• The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. • If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.

Time of Day	Management	How to Apply
	Level $L_{Aeq,(15min)}$ *	
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. - The proponent should apply all feasible and reasonable work practices to meet the noise affected level. - Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. - For guidance on negotiating agreements see section 7.2.2.

In addition, the following construction noise management levels $L_{Aeq,15 min}$ are recommended for other receivers and areas as follows.

- Active recreation areas (such as parks): external $L_{Aeq,15 min}$ 65dBA;
- Industrial premises: external $L_{Aeq,15 min}$ 75dBA; and
- Offices, retail outlets external $L_{Aeq,15 min}$ 70dBA.

Based on the above, Table 4-2 presents the applicable noise management levels for Stage 1 construction activities. These are based on the noise logger at location B, which is the location most representative of noise levels at existing surrounding residences to the South of the site.

Table 4-2 Site Specific Construction Noise Management Levels

Location	Construction Noise Management Level, L_{Aeq} (dBA)				Maximum Construction Noise Level, L_{Aeq} (dBA)
	Day	Evening	Night	Saturday	
Southern Residences	58	54	49	56	75
Active recreation areas (such as parks)	65 dBA				

4.2 Traffic Noise Criteria – Residences External to the Site

It is proposed that Campbelltown Road will be redeveloped by the RTA to a four lane roadway to service this development and others. In addition, the eastern motorway is currently being upgraded so that there are four lanes in the northern direction.

Criteria for assessment of road traffic noise are set out in the NSW Government's *Environmental Criteria for Road Traffic Noise (ECRTN)*. Under the definitions in that document, the project would be described under "Land use developments with potential to create additional traffic on existing freeways / arterials".

Table 4-3 shows the relevant noise criteria for this case. The criteria in columns 2 and 3 of the table are referred to as “base” criteria. These should be met in all cases, where possible. Criteria in the fourth column of the table are referred to as “allowance” criteria. The “existing” noise levels referred to here represent traffic noise immediately before opening of the project. Noise levels for comparison with these criteria should be for a time 10 years after opening of the project, and in this report, predicted traffic volumes for the year 2026 are used in noise assessment.

In summary, the noise level goals at the residential receivers, for this project, based on the *ECRTN* are:

- $L_{Aeq,15hr} = 60\text{dBA day};$
- $L_{Aeq,9hr} = 55\text{dBA night};$ or
- where base criteria are already exceeded, *ECRTN* allowance criteria (existing +2dBA) applies.

Table 4-3 Traffic noise criteria extracted from the NSW *ECRTN*

Type Of Development	Criteria		
	Day (7am-10pm) dB(A)	Night (10pm-7am) dB(A)	Where Criteria Are Already Exceeded
Land use developments with potential to create additional traffic on existing freeways / arterials	$L_{Aeq,15hr}$ 60	$L_{Aeq,9hr}$ 55	Where feasible, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using ‘quiet’ vehicles; and using barriers and acoustic requirements. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA

Accordingly, all existing residences potentially affected by traffic noise arising from the development will be assessed with respect to the above criteria.

4.3 Road Traffic Noise at Residences within the Site

Noise and Vibration criteria relevant to the amenity of future residential development subjected to road and rail operations is documented in the New South Wales Government Infrastructure SEPP. Guidance for application of this SEPP is provided in the NSW Department of Planning’s “Development near Rail Corridors and Busy Roads– Interim Guideline” 2008.”

The following noise criteria are applicable for the site.

If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:

- *in any bedroom in the building : 35dB(A) at any time 10pm–7am*
- *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time.*

If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

The above criteria are consistent with the Edmondson Park DCP.

The SEPP criteria can be translated to external noise levels by allowing an additional 10 dBA for the noise reduction from outside to inside through an opening.

Table 4-4 $L_{Aeq(period)}$ Road Noise Criteria

Room Type	Internal Criteria dBA	External Criteria (open windows) dBA	Level at Which Ventilation is Required dBA
Bedrooms (Night Only)	35	45	55
Any Habitable Room	40	50	60

5 NOISE ASSESSMENT

The following noise issues have been assessed:

- construction noise impact on existing residences to the south west of Stage 1;
- traffic generated by stage 1 on Campbelltown Road;
- noise impact of the M5 Motorway and Macdonald Road on future residences.

5.1 Construction Noise

Typical Sound Power Levels (SWL) of the plant likely to be used during earthworks and road building when the site is being established are identified in Table 5-1. These SWLs have recently been measured at other similar construction sites.

Table 5-1 Typical Construction Plant Sound Power Levels (SWL)

Plant	L _{Amax} SWL (dBA)
Excavator 107	
Front End - Low Loader	112
Dump Trucks	112
Tower Crane or Mobile Crane	105
Generators 9	5
Smooth Drum Roller	107
Scrapers 119	
Graders 109	
Dozer	119
Concrete Trucks	109
Concrete Paver Roller	121
Water Truck	110
Vibratory Rollers	110

Likely airborne noise at surrounding residential receivers has been assessed during excavation and construction.

Site related noise emissions were modeled with the “CadnaA” acoustic noise prediction software using ISO 9613 noise prediction algorithm. Factors that are addressed in the noise modeling are:

- equipment sound level emissions and location;
- screening effects from buildings;
- receiver locations;
- ground topography;

- noise attenuation due to geometric spreading;
- ground absorption; and
- atmospheric absorption.

During the initial site consolidation stage the following works are proposed:

- upgrade of existing roads and construction of new roads in the vicinity of the site;
- construction (and use) of utility connections to the site;
- demolition, relocation or removal of existing dwellings and structures on the site;
- sub-division of the site and associated works including construction of stormwater drainage systems, sewerage and water works, utilities and services; landscaping; and earthworks;
- works for the site water management strategy; and
- construction and use of buildings and associated works.

The loudest construction period is expected to be the earthmoving phase and, with perhaps six machines including scrapers, excavators, trucks, a dozer and a grader working around the site simultaneously, a total site L_{Aeq} sound power of 116dBA can be expected. Earthmoving activity is likely to occur in various sections of the development and given the size of the site, equipment would be in the vicinity of residences for only a relatively short period.

Table 5-2 presents the results of initial noise calculations at surrounding residential receivers based on distance attenuation alone, allowing for the noise source to be generally around the centre of warehouse site.

Table 5-2 Predicted L_{Aeq} Construction Noise Levels at Residential Receivers – dBA

Receiver Area	Predicted Construction Noise (dBA)	Construction Noise Objective (dBA)*	Compliance
9A Keating Place	46	58 / 56	Yes
6 Zouch Road	47	58 / 56	Yes
4 Zouch Road	42	58 / 56	Yes
10 Zouch Road	37	58 / 56	Yes

*Normal construction hours and Saturday criteria are shown.

These initial calculations show the construction noise criterion is likely to be met during the earthmoving phase at rural residences immediately to the south west of the site when Stage 1 is developed.

Nevertheless, construction noise will be audible, and the following noise mitigation measures are considered best practice.

- Construction activities that are likely to be audible at any residence must not occur outside the usual hours of 7.00am-6.00pm Monday to Friday and 8.00am-1.00pm on Saturday. Construction vehicles should not approach the site from the south west along Campbelltown Road before 7.00am.

- Noisy activities such as earthworks in close proximity to residences should ideally be programmed to avoid early mornings and Saturdays. While this may not be always practical, consideration should be given to surrounding residential receivers when planning the construction program.
- Spoil quantities should be carefully considered to avoid truck movements to and from the site to provide additional fill or remove excess spoil.
- Diesel powered machines such as trucks, bobcats and excavators should be switched off if not required for more than a few minutes, rather than left idling unnecessarily.
- Machines used on site should be maintained in good condition, particularly considering the exhaust system on diesel powered machines, to minimise noise emissions. Excessively loud machines should be repaired, modified or removed from the site. Sound pressure level measurements should be conducted on all plant prior to works beginning on-site.
- A representative from the construction contractor should be available to respond to questions and complaints from the community in a professional, considerate and timely manner.
- Reversing alarms should be controlled to the minimum sound level consistent with safety by replacing, shielding or relocating the alarm unit on noisy machines.

5.2 Traffic Noise Intrusion on Site

Predictions of traffic noise affecting the Stage 1 site have been based on projected traffic volumes in 2026 using the *CoRTN* traffic noise prediction algorithms as implemented in the Cadna A noise model. Table 5-3 presents vehicle speed and percentage of heavy vehicles used in the model.

Table 5-3 $L_{Aeq(period)}$ Rail and Road Noise Criteria

	North Bound	Percentage HV	South Bound	Percentage HV
Motorway - M5 Motorway				
Day (7 am - 10 pm)	54827	13	68786	13
Night 10 pm to 7 am)	17600	21	9357	7
Campbelltown Road				
Day (7 am - 10 pm)	7969	5	7396	5
Night 10 pm to 7 am)	1897	5	930	5
Macdonald Road				
Day (7 am - 10 pm)	7693	5	7927	5
Night 10 pm to 7 am)	1375	5	1523	5

A noise model of the site has been created to establish indicative traffic noise propagation across the site. Factors that are addressed in the noise modeling are:

- traffic flows and percentage heavy vehicles;
- source heights;

- screening effects from barrier;
- receiver locations;
- ground topography;
- noise attenuation due to geometric spreading;
- ground absorption; and;
- atmospheric absorption.

The model was validated with respect to measured existing traffic noise levels as detailed in Table 3-2. Results of the validation are shown in Table 5-4.

Table 5-4 Validation of Traffic Noise Model

Location	Daytime $L_{Aeq(15\text{ hrs})}$ - dBA		Night time $L_{Aeq(9\text{ hrs})}$ - dBA	
	Measured	<i>Predicted</i>	Measured	<i>Predicted</i>
A 54.2		57.7	50.6	52.3
B 55.1		55.1	50.9	49.2
C 58.2		60.2	56.2	55.7

Some variation has been identified at location A which is affected by the partial southern barrier on the motorway and roadworks.

It is noted that a 5m barrier extends partially across the southern end of the site adjacent to the Motorway. Figure 5-1 shows this barrier.

Figure 5-1 Motorway Barrier at the southern side of the Site adjacent to Stage 1 rural residential area



Noise modelling has been conducted across the Stage 1 site based on:

- an extension of the roadside barrier shown above along the edge of the motorway for a distance of approximately 250 metres to the north east. (The barrier is to extend 80 metres beyond the Macdonald Road flyover;
- indicative houses on the residential subdivision;
- 2026 traffic flows as detailed in Table 5-3.

The results of site noise modelling are presented in Figure 5-2 and Figure 5-3.

Figure 5-2 Stage 1 Daytime $L_{Aeq(15\text{ hr})}$ 2026 Traffic Noise Levels

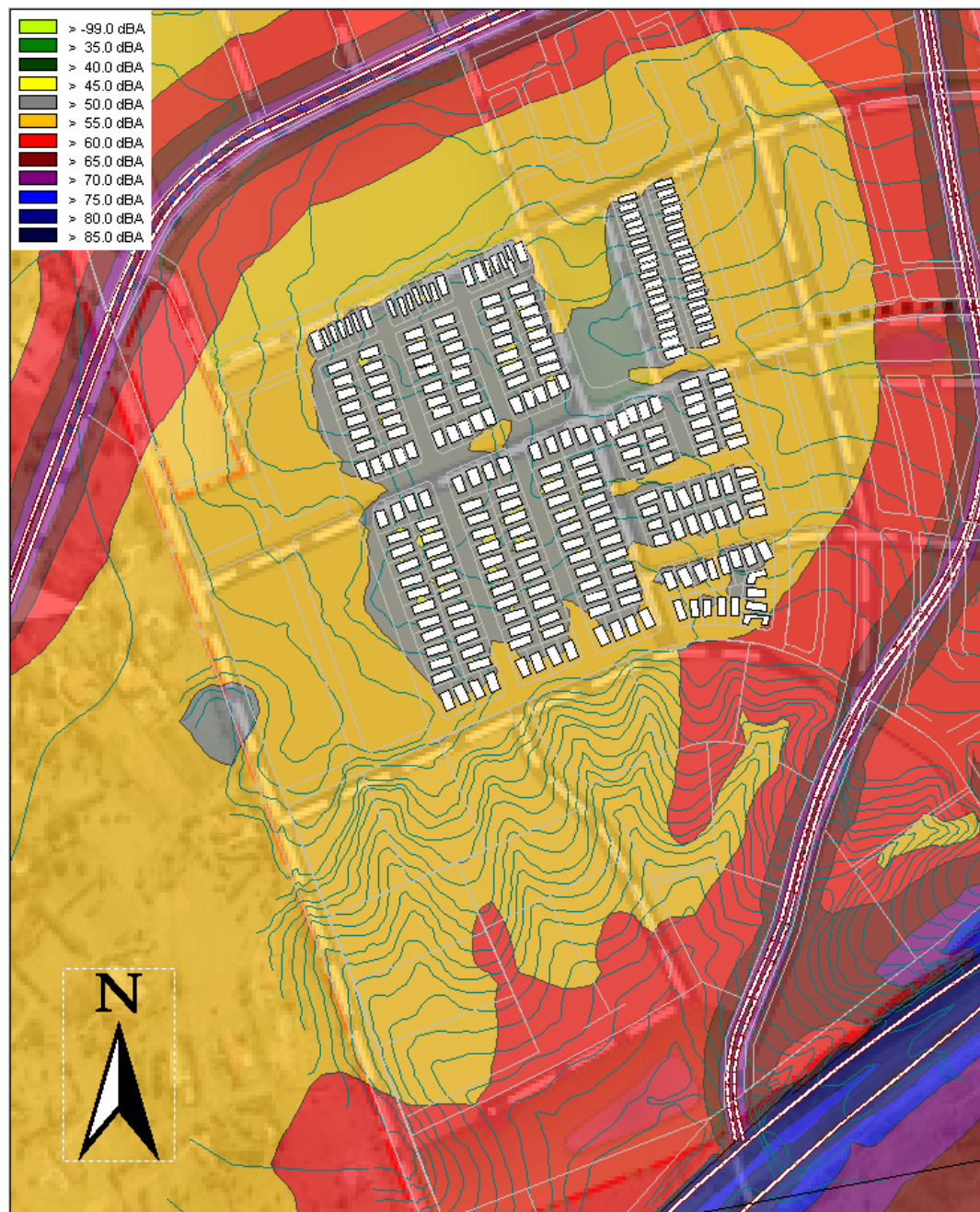
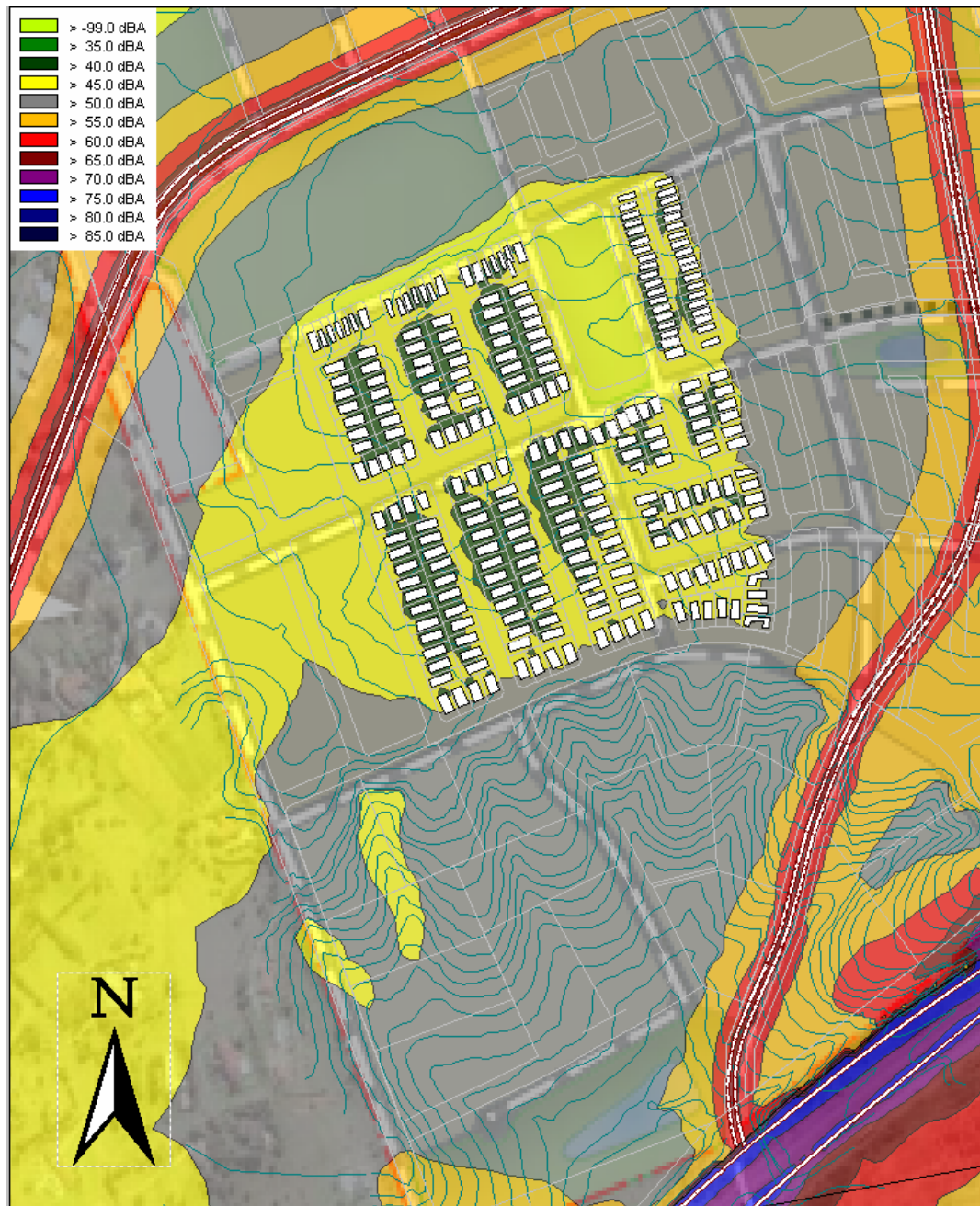


Figure 5-3 Stage 1 Night time $L_{Aeq}(9 \text{ hr})$ 2026 Traffic Noise Levels

A review of the noise contours reveals that noise levels in the residential area do not exceed the daytime 60 dBA and night time 55 dBA external noise levels that require ventilation to be considered. Therefore residences in this area will not require any measures to be adopted to mitigate traffic noise impact.

In the case of the environmental living area at the southern end of the site, the daytime 60 dBA noise criterion is exceeded for some of the land adjacent the motorway and Macdonald Road. These areas are shown in red in Figure 5.2. Residences that are built in this area will need to be assessed on an individual basis with respect to the need for mechanical ventilation; however, it is not envisaged that any special glazing will be required to habitable areas in this zone.

5.3 Traffic Noise Impact on Existing Residences

Advice for the Traffic consultant (AECOM) advises that the Stage 1 development is estimated to generate approximately 290 car trips during peak hours and that would roughly equate to 3000 vehicles per day with 94 % of the trips generated travelling north-east along Campbelltown Road.

The only existing residences that could be potentially affected by traffic noise generated from Stage 1 are those on Campbelltown Road to the south west of the site. Based on the above advice, only additional 180 vehicle trips per day will pass by these residences. This compares with current 2010 traffic which is in the order of 8,200 vehicles per day.

Based on the above information the noise contribution from Stage 1 at existing residences will be insignificant and well below 2 dBA "allowance" criterion specified in the *ECRTN*.

6 CONCLUSION

A review of noise and vibration for the proposed South Edmondson Park Stage 1 development has been conducted based on current applicable criteria, as stipulated in the Director General's Requirements for the project.

In the case of the Stage 1 Project Application, noise due to road traffic has been modelled in detail. It has been determined that no treatment to the residential area is required. A 250 metre extension of the motorway noise barrier is recommended to improve the amenity of future residences in the environmental living residential area. Some of the residences on the southern side of this area are likely to require ventilation. This will require a detailed review of the housing design at DA stage.

Impacts of construction noise, and of road traffic noise generated by the development, are both predicted to be within relevant criteria. Best-practice techniques are recommended to ensure that construction noise is controlled to the maximum reasonable extent.

Note

All materials specified by Wilkinson Murray (Sydney) Pty Limited 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.

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.

Version	Status	Date	Prepared by	Checked by
A	Final	26 August 2010	Brian Clarke	Rob Bullen

APPENDIX A

GLOSSARY OF TERMS

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 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.

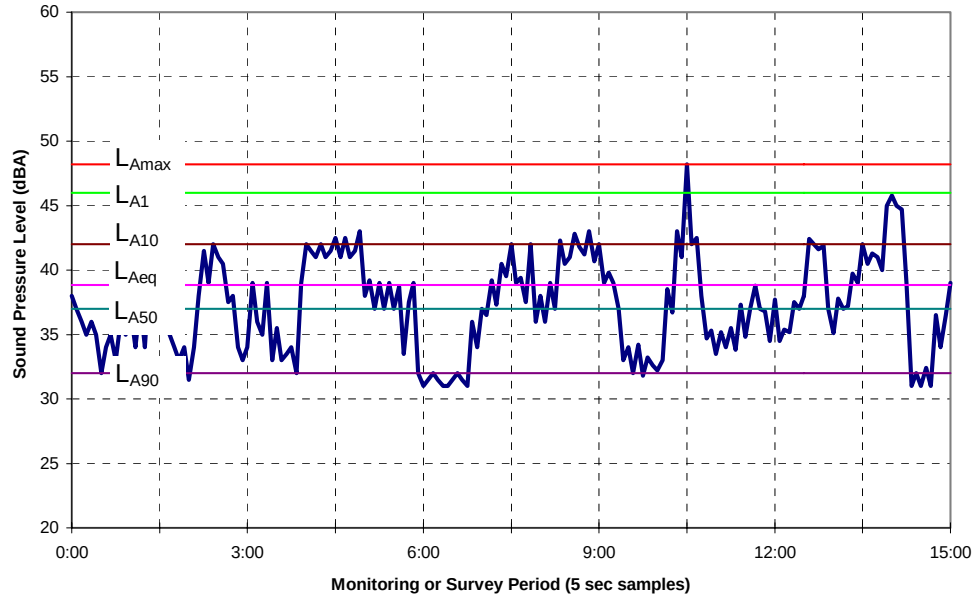
L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise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



Sound pressure level (SPL) or sound level L_p is a logarithmic measure of the effective sound pressure of a sound relative to a reference value. It is measured in decibels (dB) above a standard reference level.

$$L_p = 10 \log_{10} \left(\frac{p_{rms}^2}{p_{ref}^2} \right)$$

where p_{ref} (20 μ Pa) is the reference sound pressure and p_{rms} is the rms sound pressure being measured.

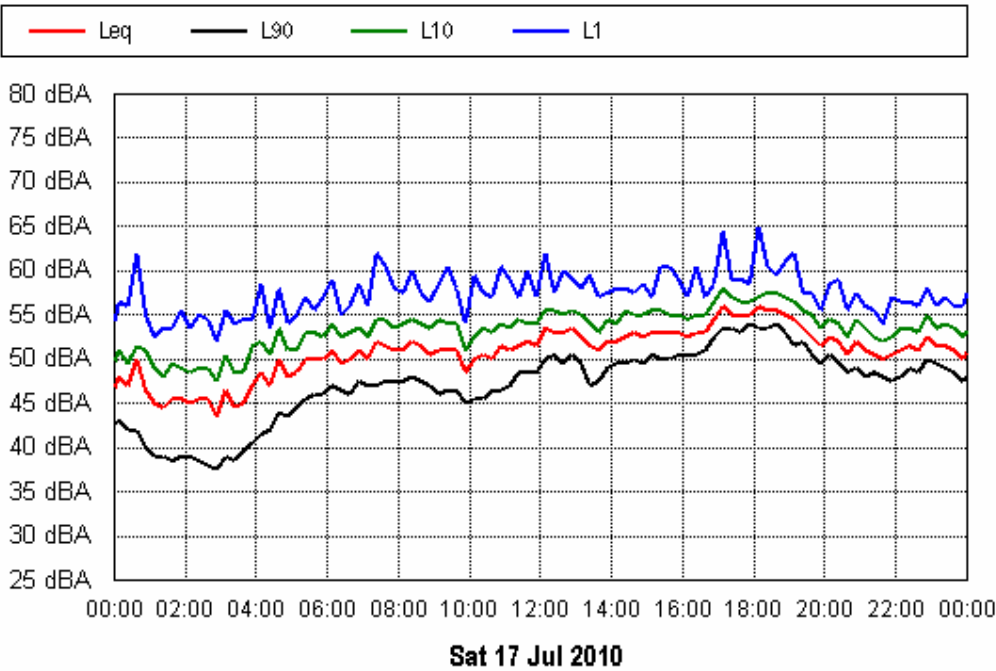
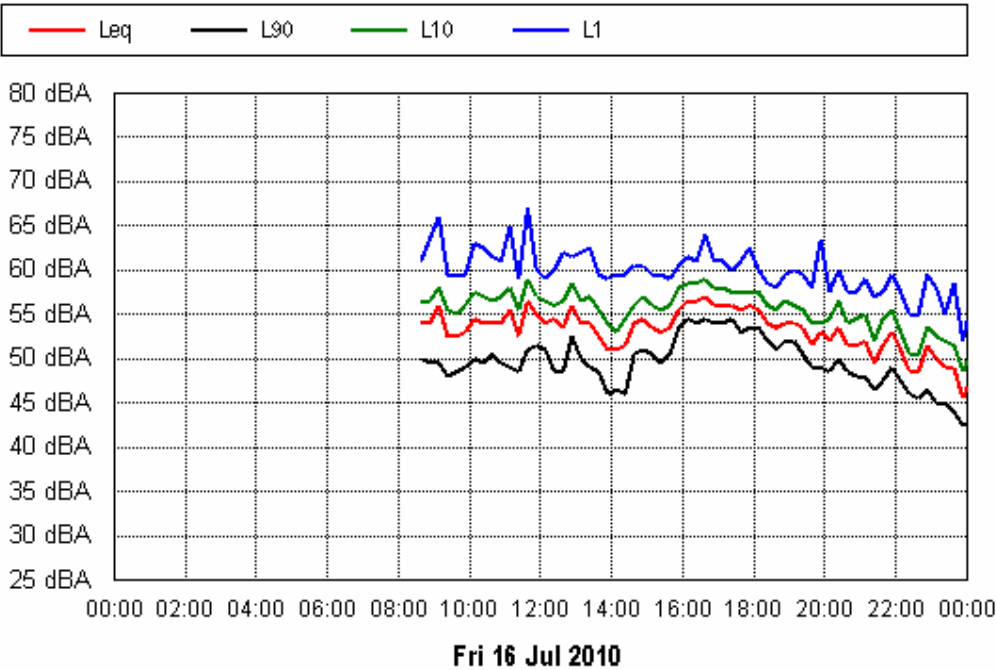
Sound power level is a logarithmic measure of the sound power in comparison to a specified reference level. While sound pressure level is given in decibels SPL, or dB SPL, sound power is given in dB SWL. The dimensionless term "SWL" can be thought of as "sound watts level," the acoustic output power measured relative to a very low base level of watts given as 10^{-12} watts.

$$L_W = 10 \log_{10} \left(\frac{W}{W_0} \right) \text{ dB}$$

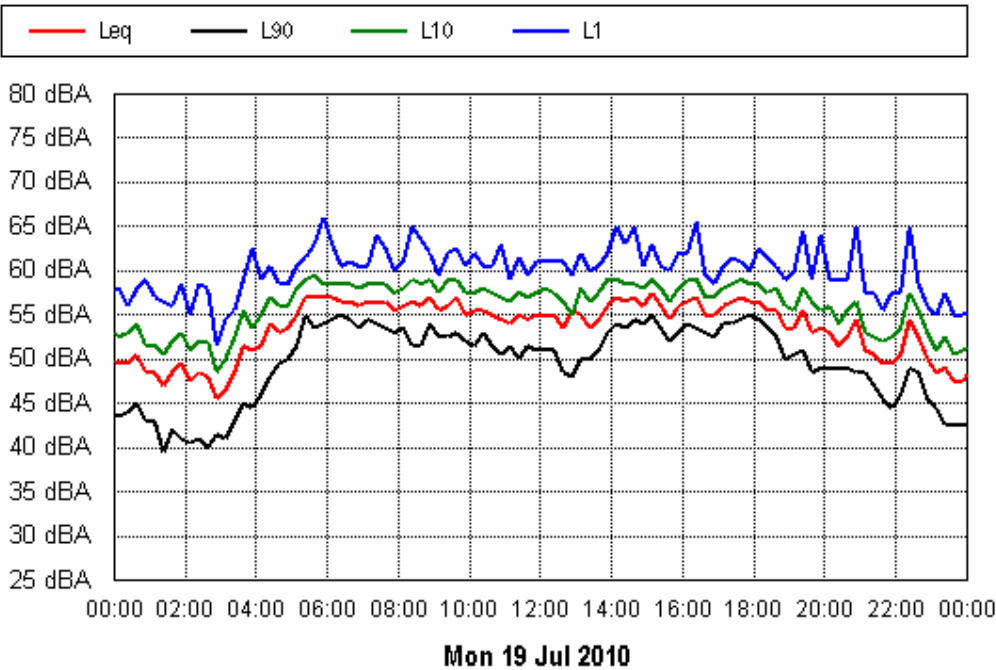
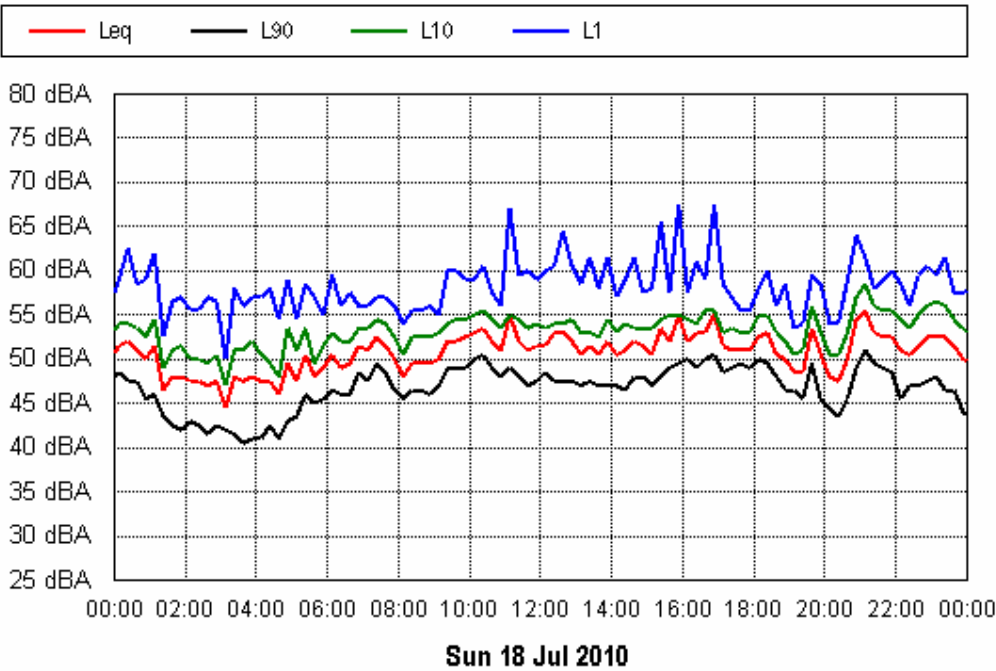
APPENDIX B

NOISE MEASUREMENT RESULTS

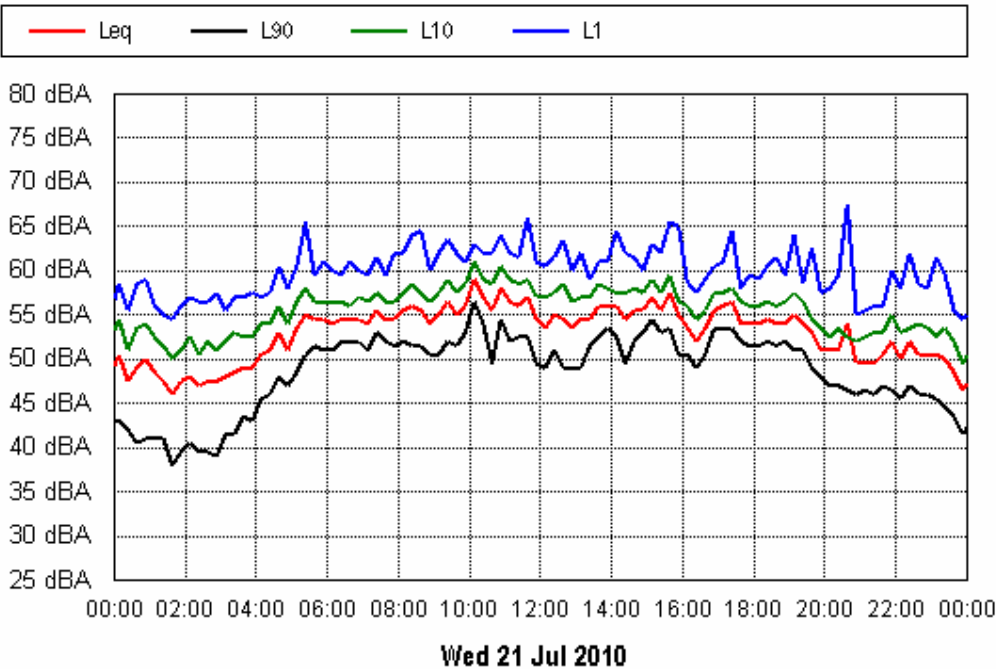
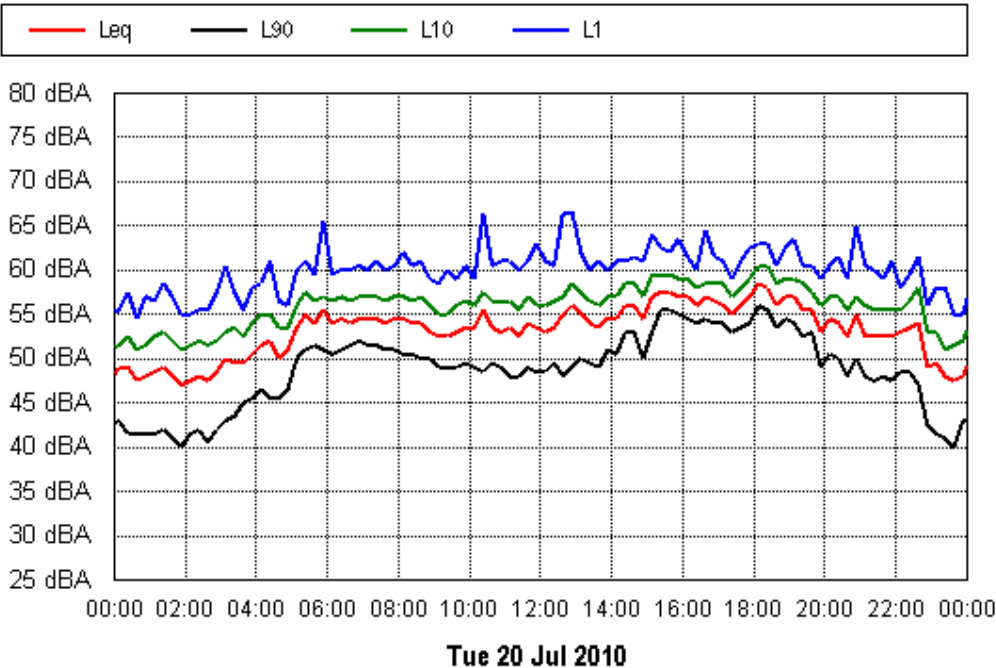
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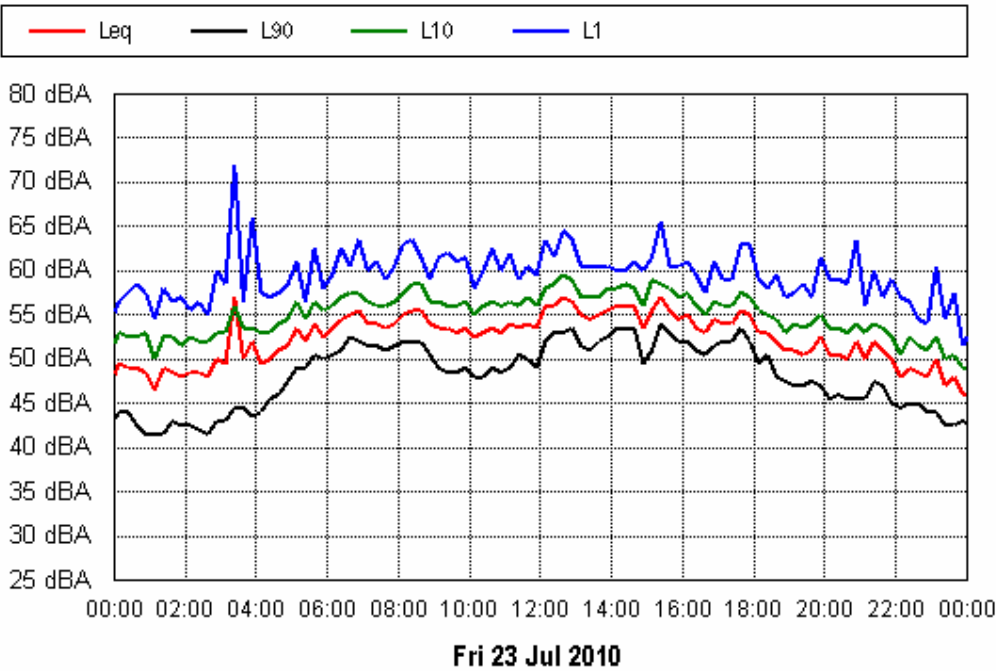
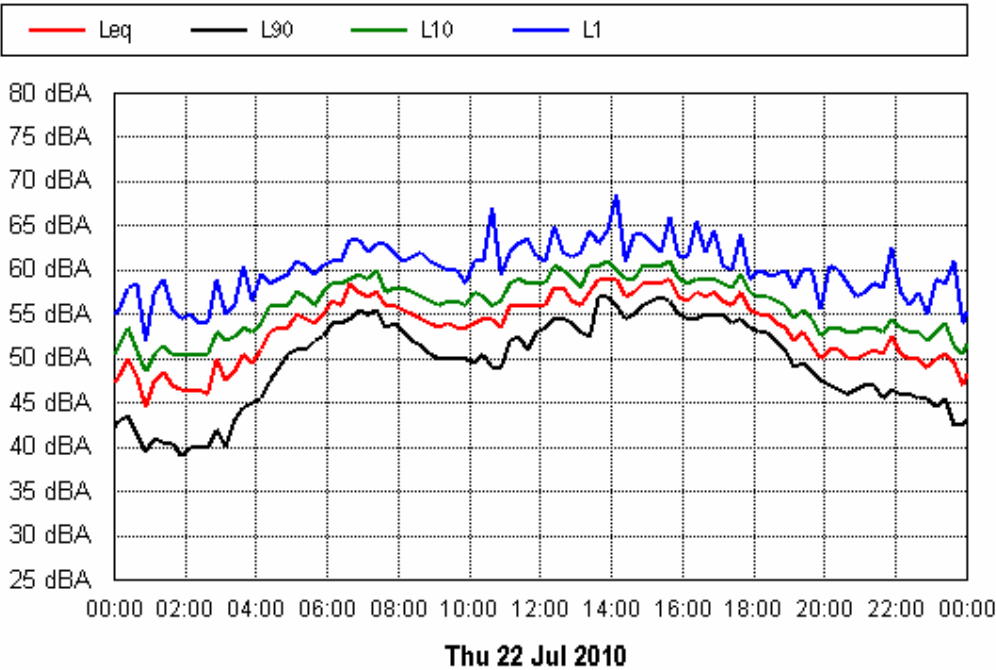
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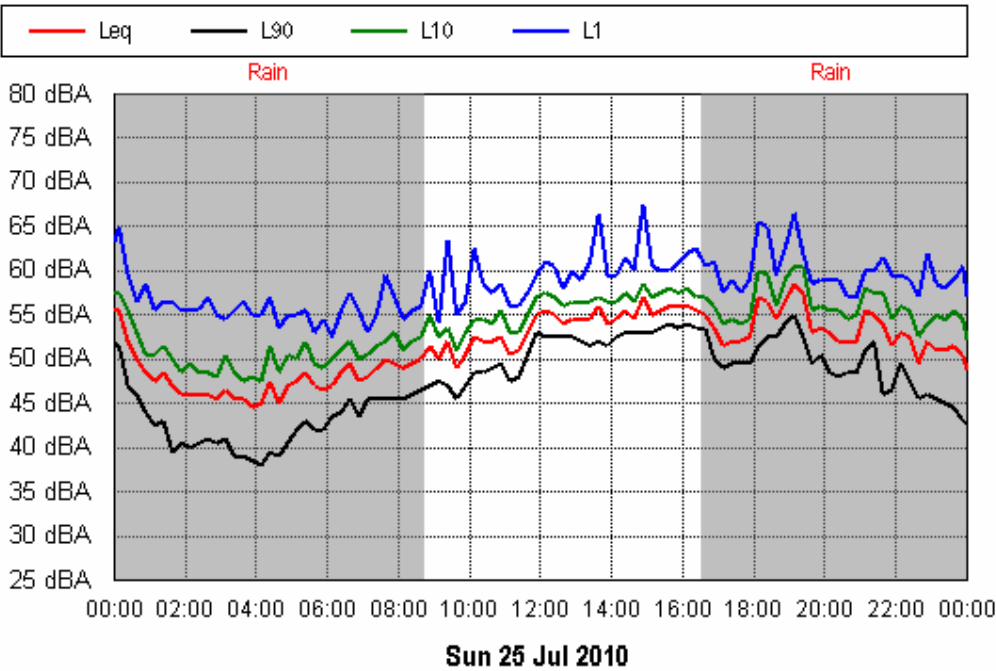
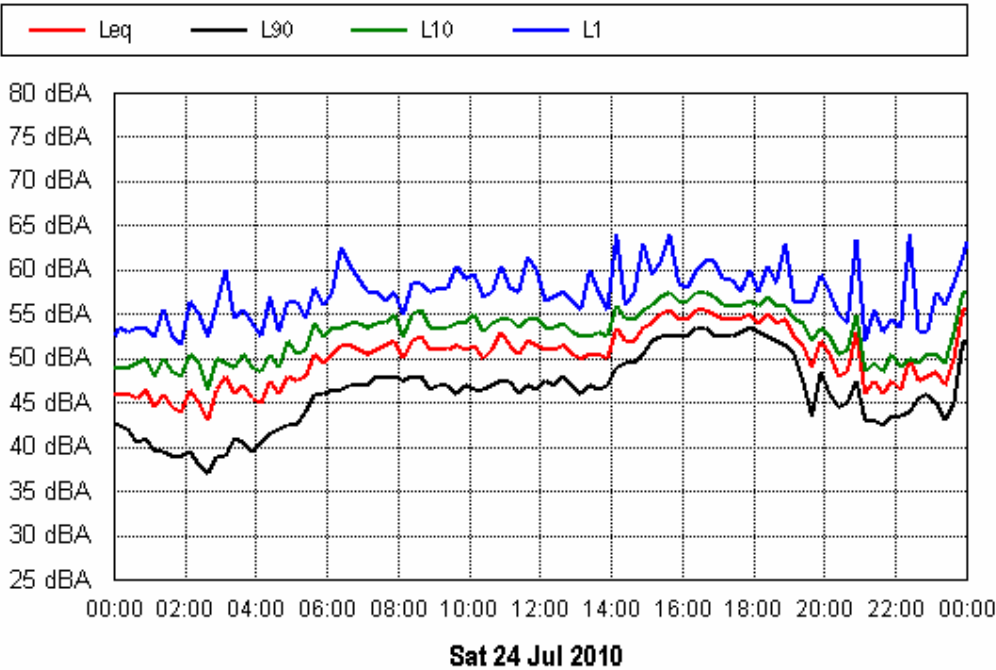
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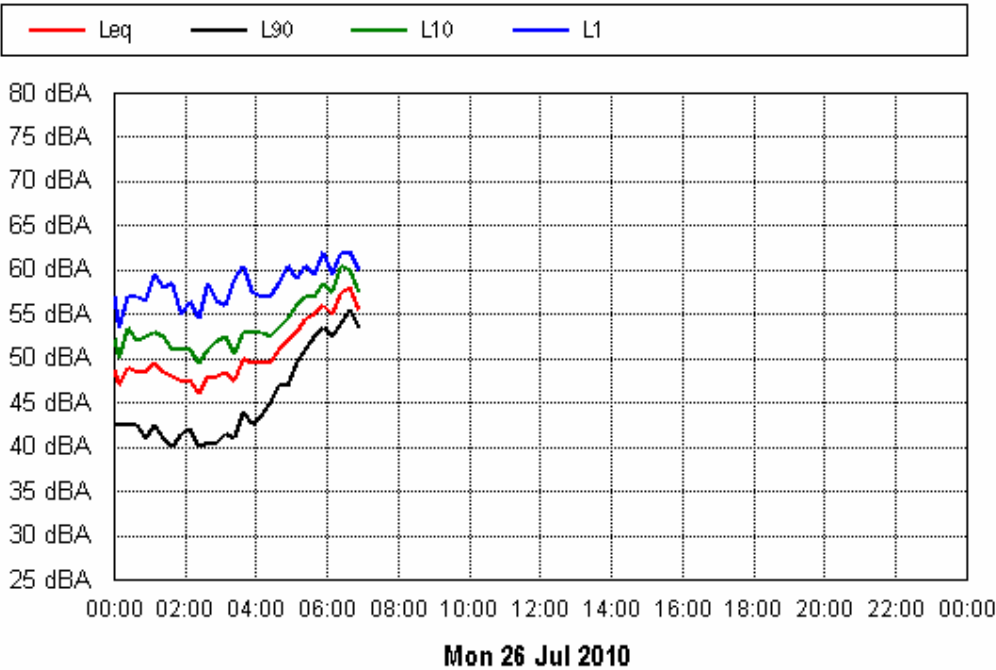
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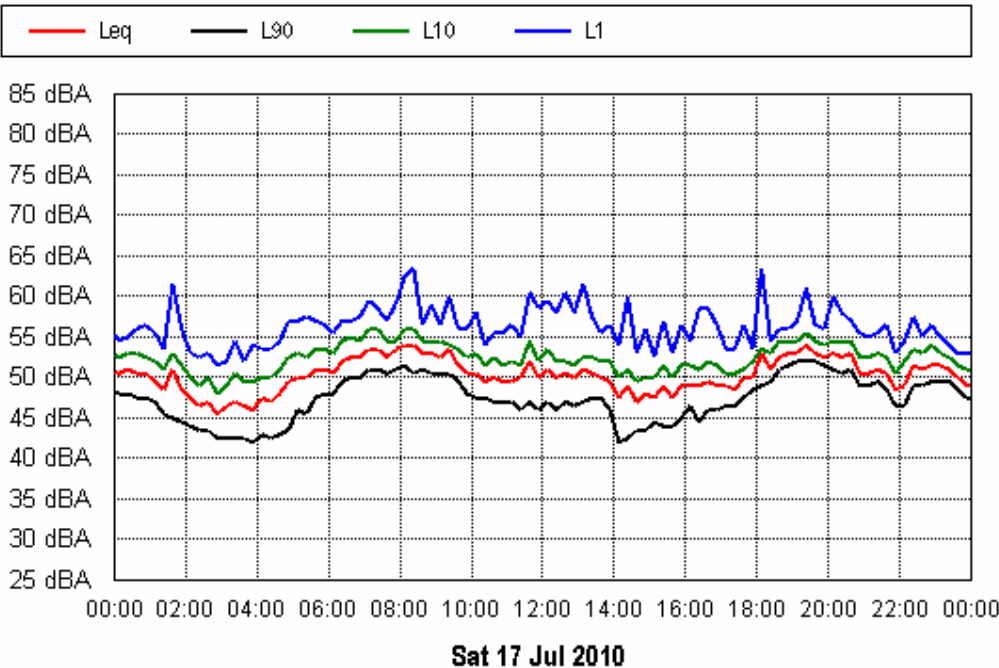
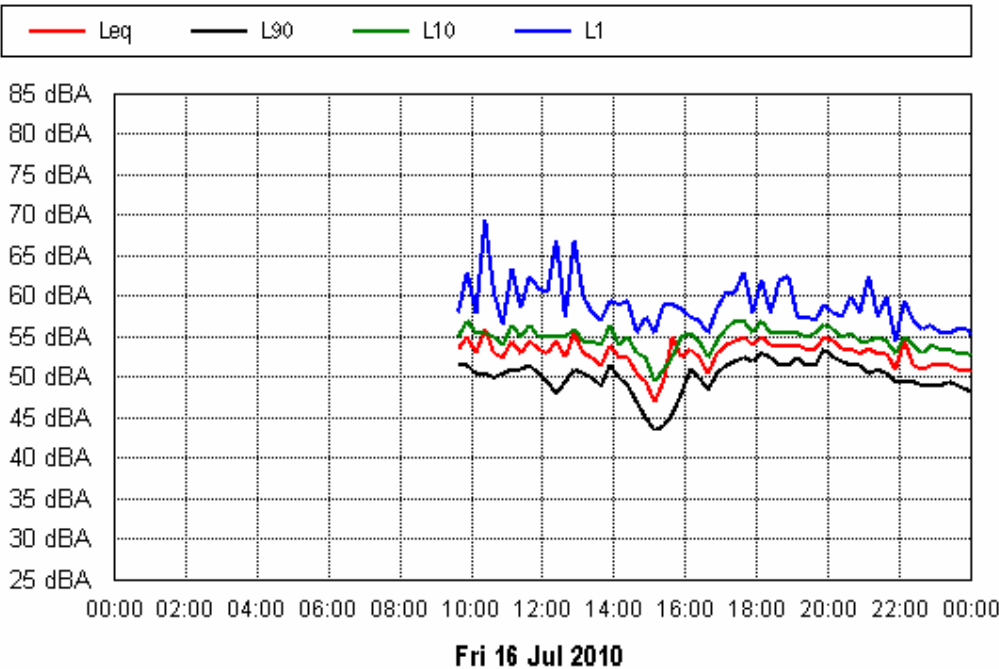
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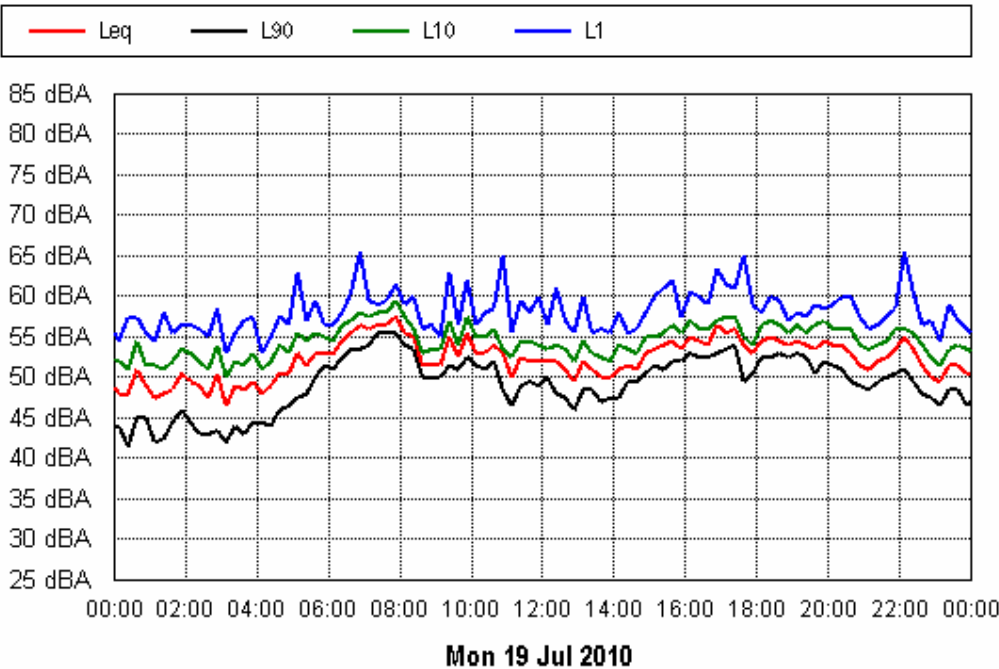
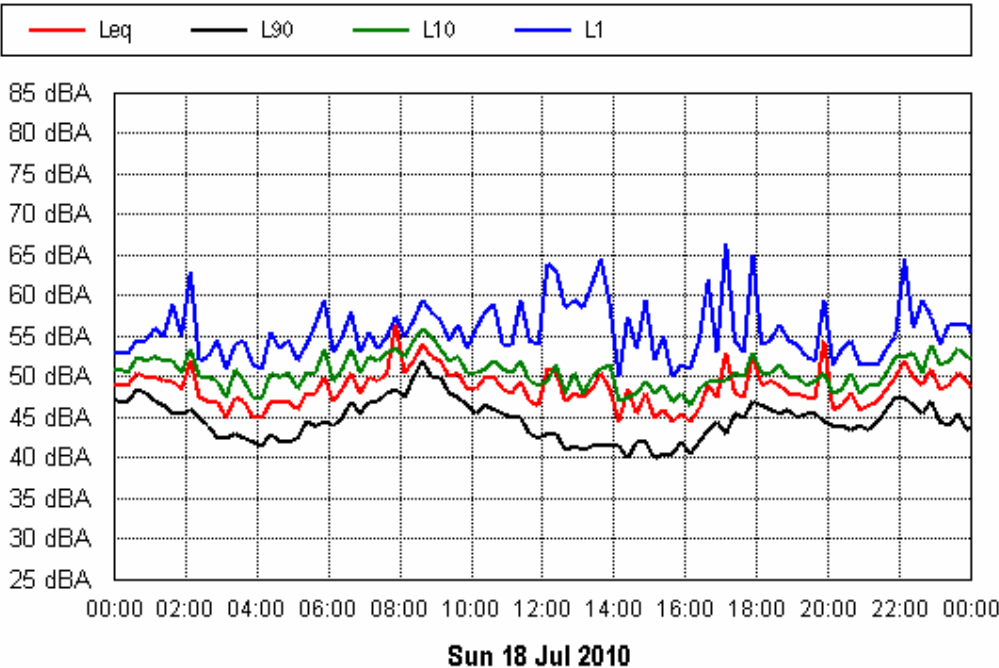
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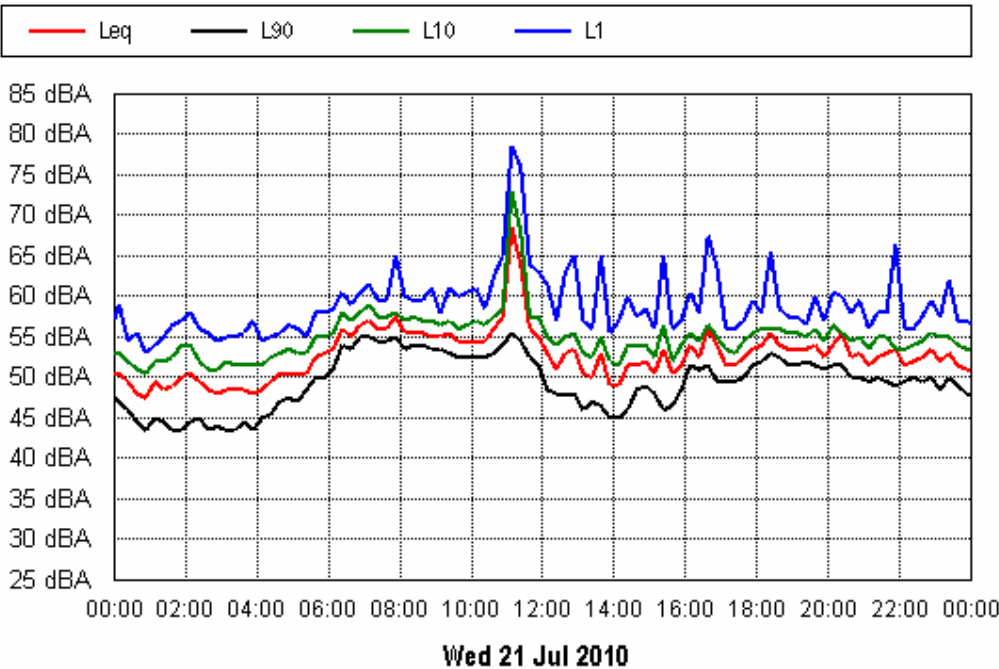
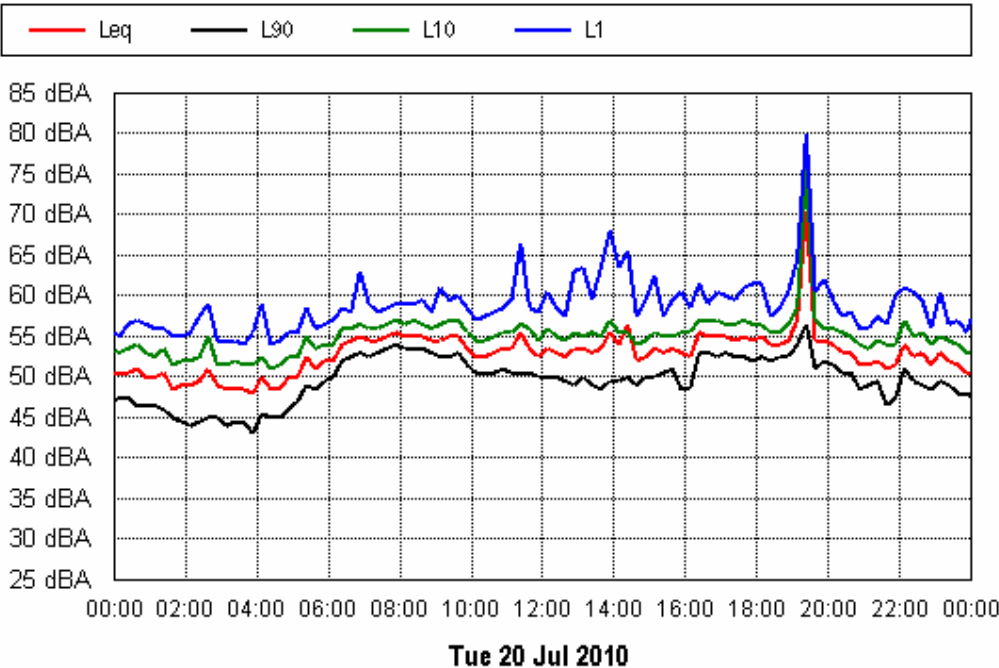
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Location 2

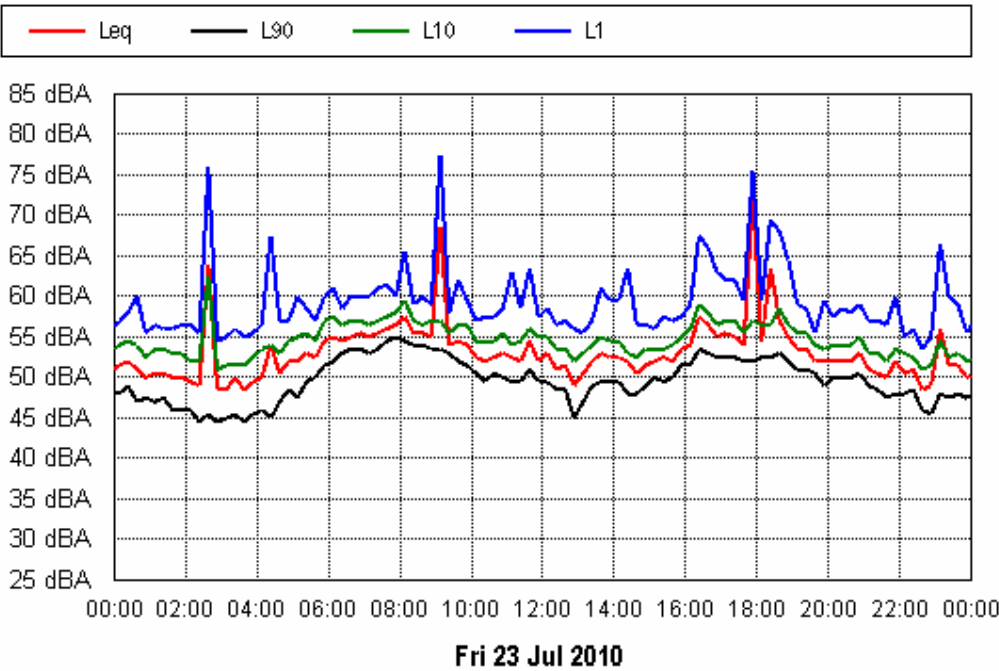
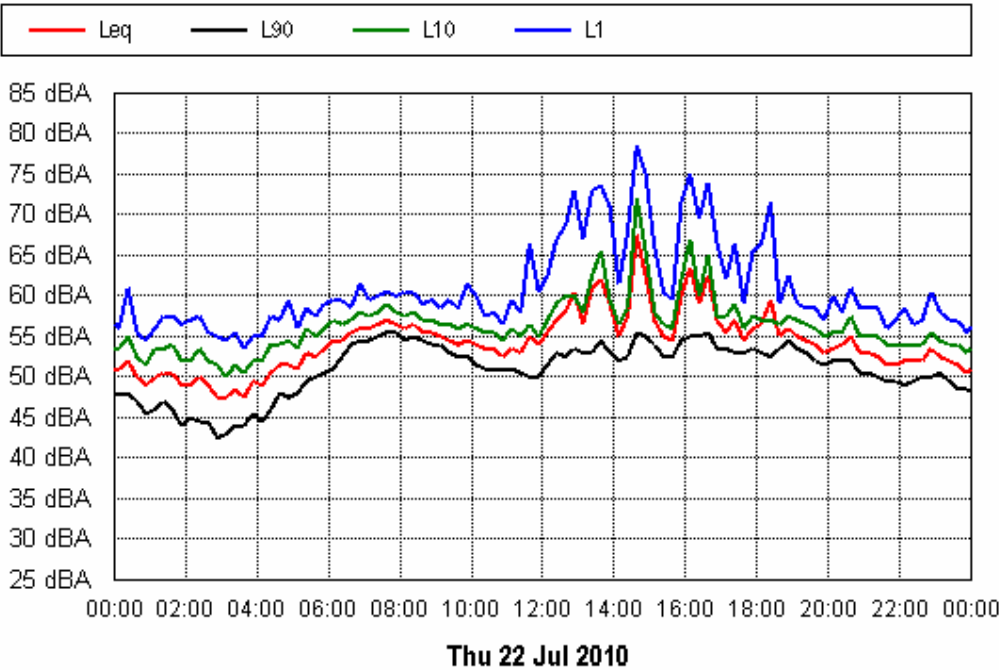


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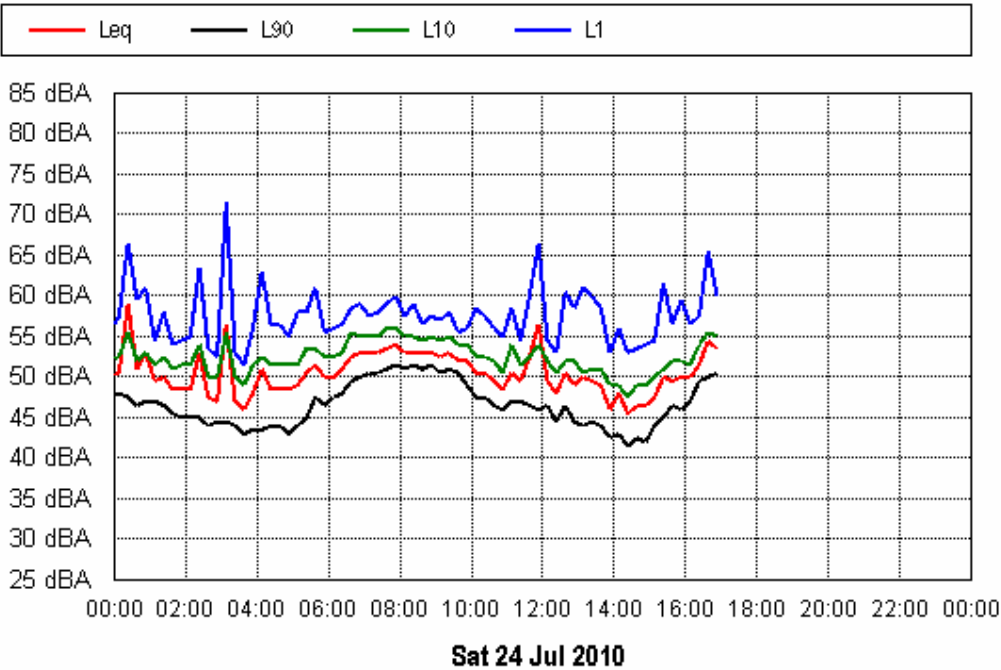


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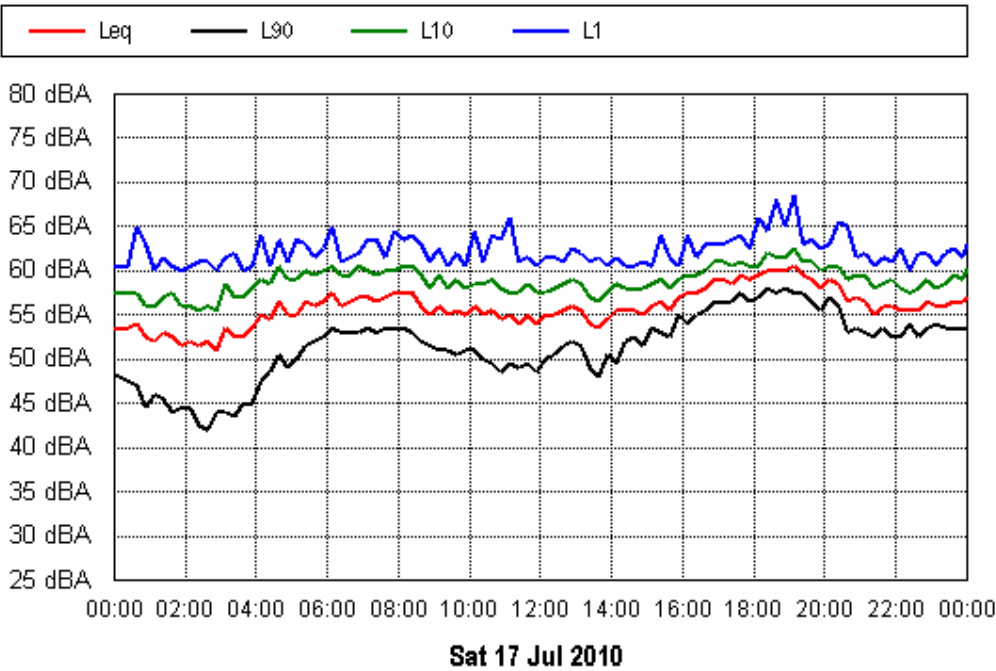
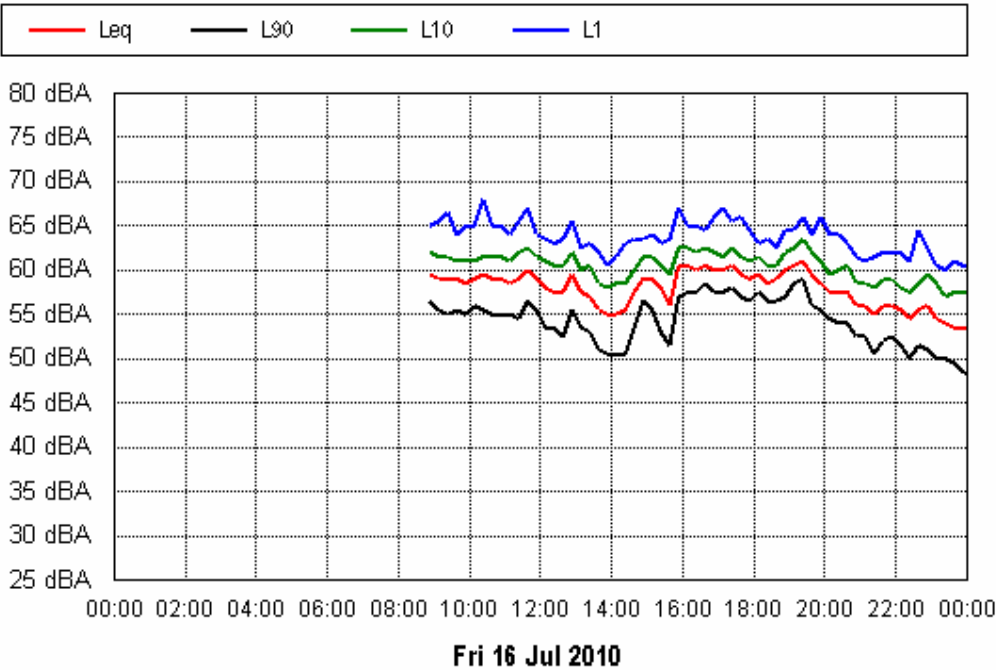
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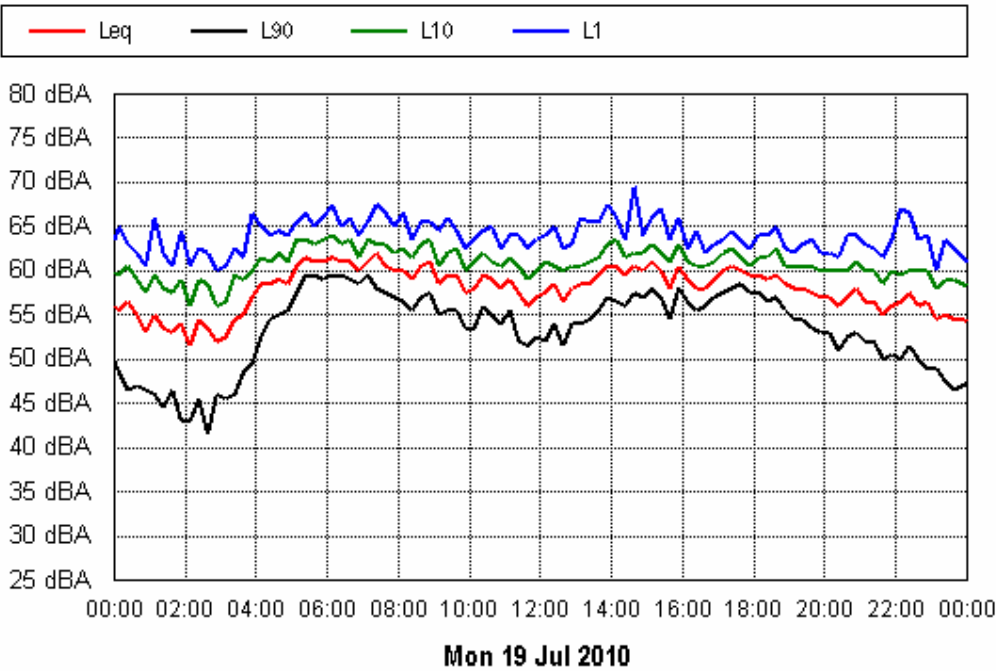
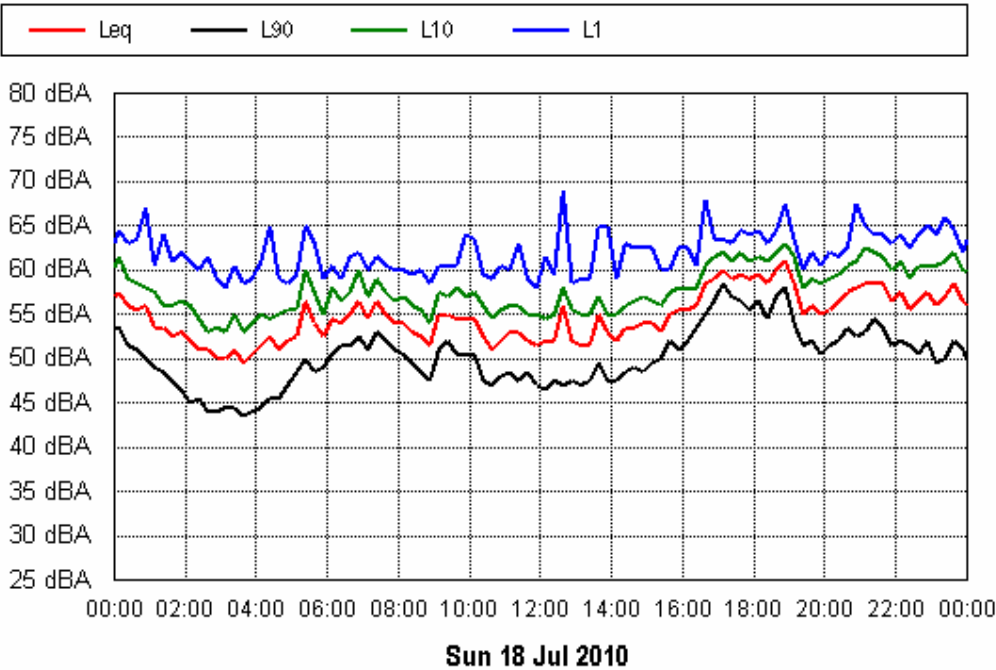
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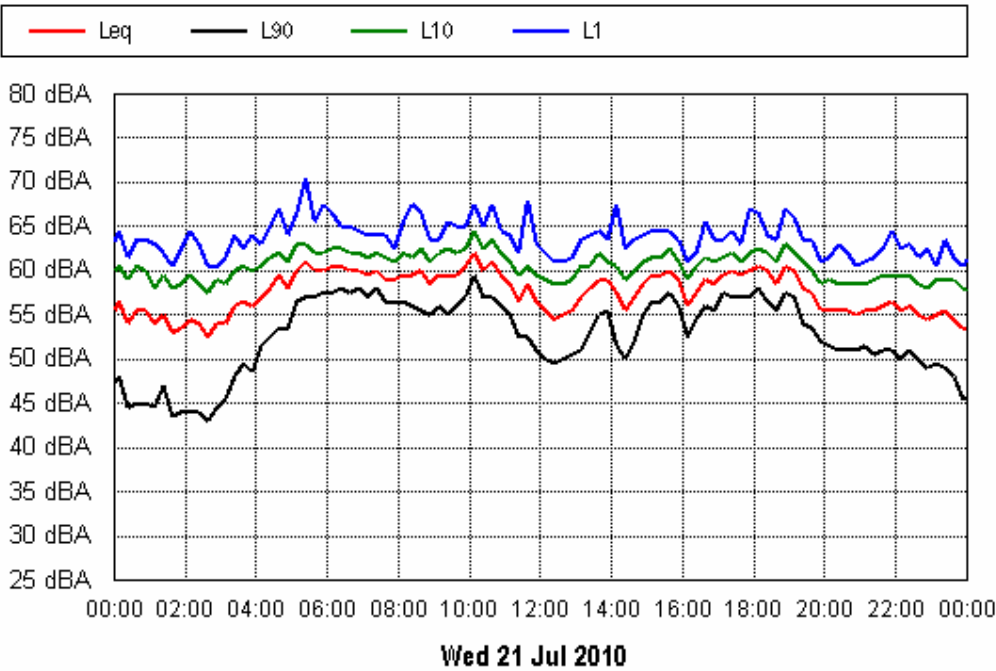
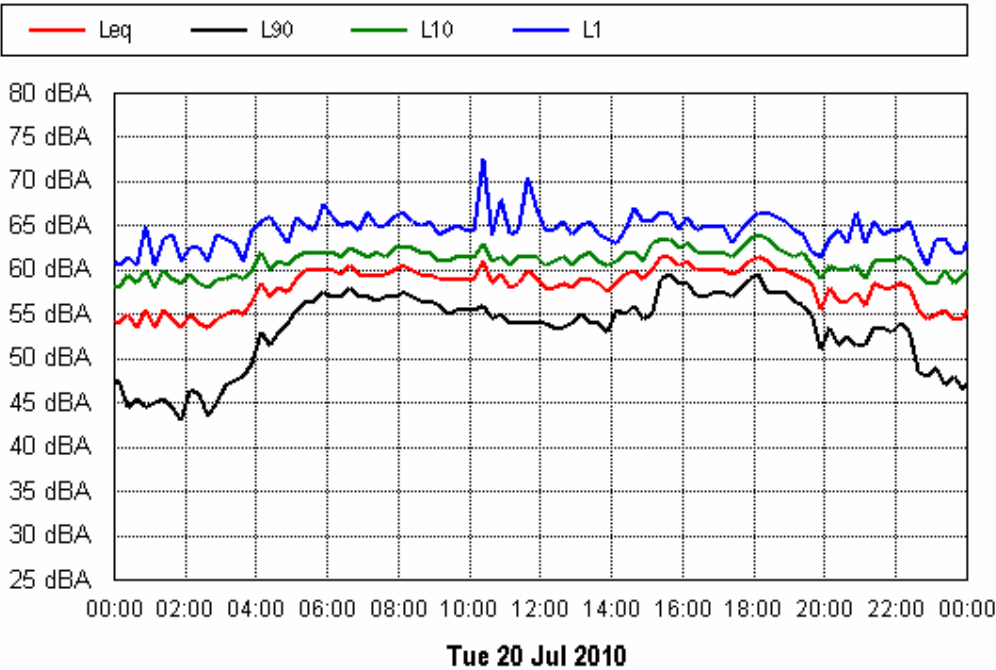
Location 3



Location 3



Location 3



Location 3

