HEGGIES

REPORT 10-8045-R1

Revision 0

Proposed Retail Development
Wolli Creek
Acoustic Assessment

PREPARED FOR

Nahas Constructions Pty Ltd
4 Dunlop Street
PARRAMATTA NSW 2151

24 SEPTEMBER 2009

HEGGIES PTY LTD
ABN 29 001 584 612

Proposed Retail Development

Wolli Creek

Acoustic Assessment

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
10-8045-R1	Revision 0	24 September 2009	Howard Gwatkin	Ian Wallbank	Ian Wallbank

TABLE OF CONTENTS

TABLE OF CONTENTS

1 INTRODUCTION

Heggies Pty Ltd (Heggies) has been engaged by Nahas Constructions to address the potential noise impacts which may be associated with the small retail development proposed at Wolli Creek, NSW.

This report identifies noise sources associated with the proposed project, details the relevant assessment criteria applicable to the site and presents in-principle noise control recommendations for the proposed Settlement City Shopping Centre expansion and partial redevelopment at Port Macquarie, NSW.

This report:

- Establishes the existing ambient noise levels at the site – from one week's noise logging
- Assesses of the proposed activity noise levels in accordance with the DECCW's Industrial Noise Policy
- Provides advice on the noise constraints of operational noise levels to comply with the policy requirements, where applicable

The site is found to lie outside the ANEF 25 contour and, as such, further assessment of aircraft noise at the site, in accordance with AS 2021, is not required.

2 SITE LOCATION

The site is at the junction of Arncliffe Street, Brodie Spark Drive and Princes Highway, approximately 1km to the west of Kingsford Smith Airport.

Figure 1 Site Location

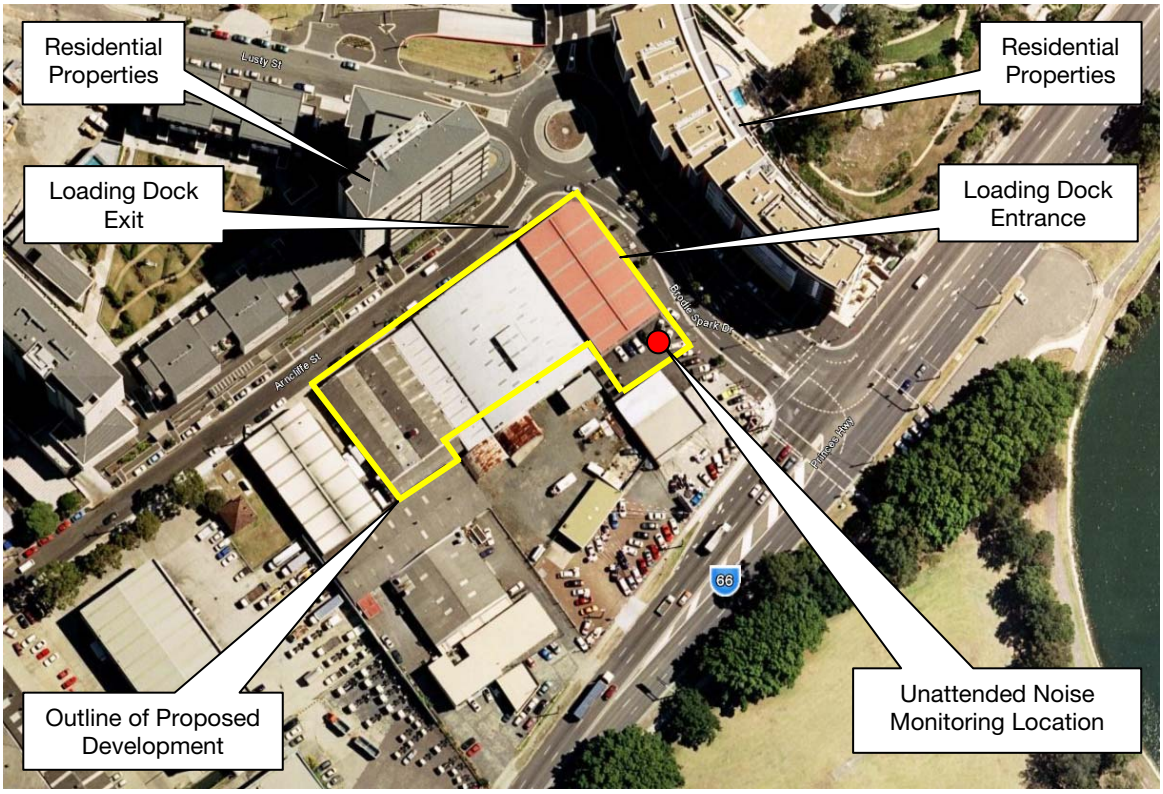


Image courtesy of Google Earth

3 AMBIENT NOISE MONITORING

To establish the existing ambient noise in the vicinity of the nearest sensitive residential receivers, unattended environmental noise monitoring was conducted over 7 days from Monday 14 September 2009 to Tuesday 22 September 2009.

An Acoustic Research Laboratories' Environmental Noise Logger Type EL-215 (serial number: 194574) fitted with a microphone windshield. Calibration of the logger was checked prior to and following measurements using a Brüel & Kjær Electronic Calibrator Type 4230. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

3.1 Noise Monitoring Location

The monitoring location was selected giving consideration to other noise sources which may influence the readings, the proximity of noise-sensitive locations (eg residential receivers), security issues for the noise monitoring devices and gaining permission for access from the residents or landowners.

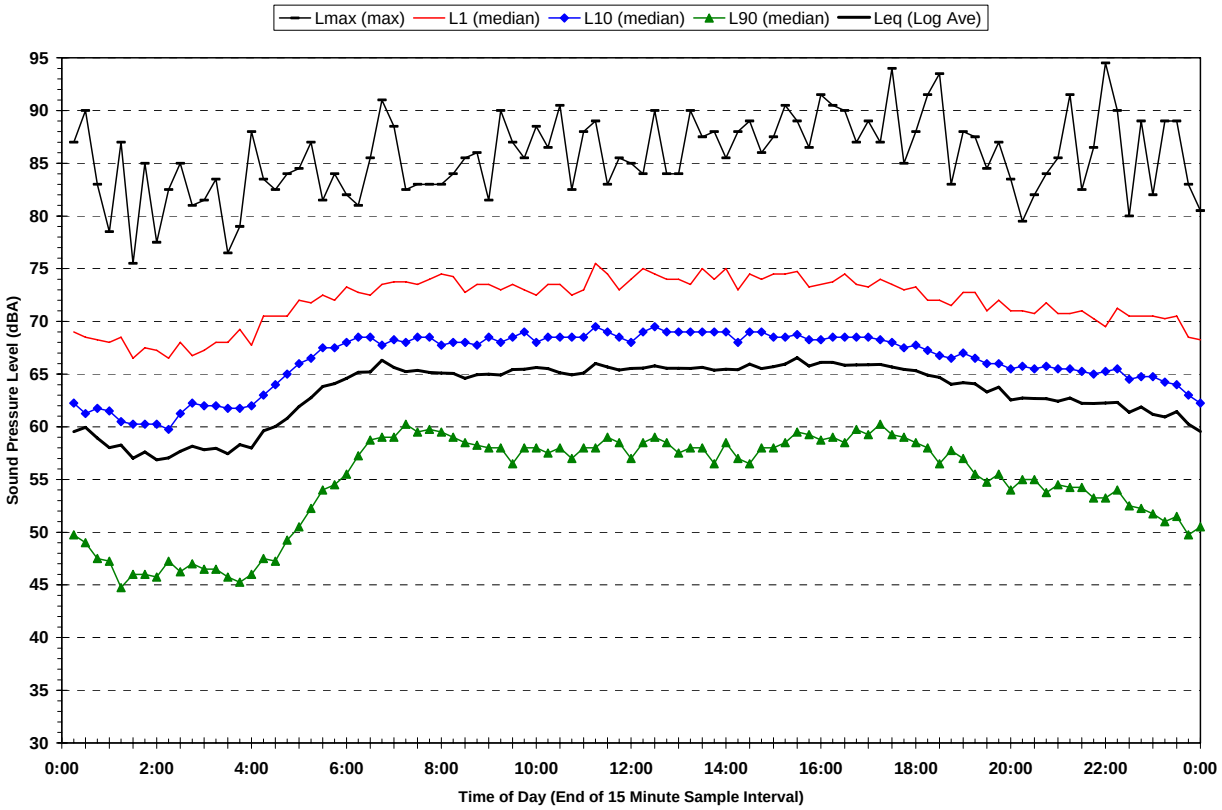
The selected monitoring location was approximately 10m from the kerb of Brodie Spark Drive and approximately 4m from the south-east façade of an existing industrial building on the site, and is shown in Error! Reference source not found..

3.2 Noise Monitoring Results

The noise levels collected over the entire measurement period are shown in **Figure 2**. This information is presented as a 24 hour period by incorporating median values of the LA1, LA10 and LA90 together with the logarithmic average of the LAeq levels for the corresponding 15 minute periods of each day. An explanation of the acoustic terminology used is given in **Appendix A**.

For completeness, the full, 7-day, graphical results are shown in **Appendix B**.

Figure 2 Measured Noise Levels - Brodie Spark Drive (Monday 14 September 2009 to Tuesday 22 September 2009)



3.2.1 Statistical Noise Levels

The statistical descriptors shown on the graphs are:

- L_{A1} The noise level exceeded for 1% of the sample time (15 minutes) and representative of the highest noise level events (eg passing heavy vehicles, aircraft, etc).
- L_{A10} The noise level exceeded for 10% of the sample time (15 minutes) and is typically described as the average maximum noise level.
- L_{A90} The L_{A90} is the level of noise exceeded for 90% of the sample time (15 minutes). The L_{A90} noise level is often described as the "*average minimum background*" sound level or simply the "*background level*".
- L_{Aeq} The L_{Aeq} is the energy-average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

4 DATA PROCESSING

4.1.1 Data Processing to Assess Noise Emission

The results of the noise monitoring have been processed in accordance with the procedures contained in the NSW Department of Environment, Climate Change and Water's (DECCW) Industrial Noise Policy (INP) and are presented in **Table 1**. (The noise levels are rounded to the nearest 1 dBA).

The Rating Background Level (RBL) has been established. This is the background noise level used for assessment purposes at the nearest potentially affected residence. It is the median of the daily background noise levels during each assessment period, being day, evening and night.

Table 1 Measured Residential Ambient Noise Levels

Logger Location	Noise Level – dBA re 20 µPa					
	Daytime 0700 hrs – 1800 hrs		Evening 1800 hrs – 2200 hrs		Night-time 2200 hrs – 0700 hrs	
	RBL [1]	LAeq [2]	RBL	LAeq	RBL	LAeq
Location 1	57	66	53	63	45	61

Note 1: The Rating Background Level (RBL) is representative of the "typical minimum background" sound level. By definition the RBL is the 90th percentile value (ie, the lowest 10th percentile) of the 15 minute background noise level measurements taken over the assessment period.

Note 2: The LAeq is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

Note 3: An explanation of the acoustic terminology used is given in **Appendix A**.

4.1.2 Data Processing to Assess Traffic Impact

To assess the likely impact due to any change in traffic noise, the data obtained has been processed in accordance with the DECCW's Environmental Criteria for Road Traffic Noise (ECRTN). Results are presented in **Table 2.** In accordance with the ECRTN, the values presented are facade reflected values and as such include an additional 2.5 dBA component of facade reflected noise energy.

Table 2 Ambient Noise Levels Corresponding to Defined ECRTN Periods

Location	Period	L_{Aeq} External Noise Levels dBA [1]	$L_{Aeq\ (1\ hour)}$ External Noise Levels dBA [2]
Logger Location 1	Day 7:00 am - 10:00 pm	65	67
	Night 10:00 pm - 7:00 am	61	64

Note 1: $L_{Aeq(period)}$ – In line with the procedures set out in the DECCW's ECRTN, this is LAeq over the entire, respective, assessment period.

Note 2: The 90-percentile highest noise level during the defined period.

5 NOISE CRITERIA

5.1 Site Activity Noise

The noise emissions from any on-site activities associated with the proposed development (such as loading dock use, air conditioning plant and on-site vehicular movement) should be controlled to avoid undue impact upon the acoustic amenity of nearby residential premises.

Noise criteria relating to operational noise emissions at nearby residential areas are contained in the DECCW's INP. The policy is applicable to commercial and industrial facilities. The policy has the following broad objectives:

- Controlling intrusive noise impacts.
- Maintaining noise level amenity for particular land uses over the medium to long-term.

Noise criteria derived from the noise logging are used for assessing noise impact on the nearby residences located to the north and to the east of the site.

5.1.1 Assessing Noise Intrusiveness

In setting an "Intrusive" noise criterion, a statistically rigorous estimate of the ambient (background) L_{A90} noise level, termed the RBL, needs to be established at the nearest sensitive receivers. Normally, an "RBL plus 5 dBA" criterion is applied to the 15-minute L_{Aeq} noise emissions of the site in question – and usually at the property boundary of the receivers of interest. (The exception to this is where the RBL is found to be below 30 dBA – in which case the INP recommends the RBL is set at 30 dBA.)

In this instance, the Intrusive Design Criterion becomes $\leq$ RBL + 5 dBA ($L_{Aeq(15minute)}$)

5.1.2 Assessing Noise Amenity

The amenity criterion is based on land use and associated activities (and their sensitivity to noise emission). The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. The criteria relate only to other industrial-type noise sources and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industrial-type noise sources, (including air-conditioning mechanical plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the criterion. For areas of high road traffic, there are further considerations that influence the selection of the noise criterion.

5.1.3 Area Classification

We have deemed this area to fall under the "Urban Area" classification. The INP characterises an urban area as an area with an acoustical environment that:

- is dominated by "urban hum" or industrial source noise – where urban hum means the aggregate sound of many unidentifiable, mostly traffic-related sound sources.
- has through traffic with characteristically heavy and continuous traffic flows during peak periods
- is near commercial districts or industrial districts
- has any combination of the above

An extract from the DECCW's INP that relates to the amenity criteria is given in **Table 3**.

Table 3 Amenity Criteria – Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level (dBA)	
			Acceptable	Maximum
Residence	Urban	Day	60	65
		Evening	50	55
		Night	45	50

Notes: For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am.

On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.

The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

5.1.4 Project-Specific Noise Criteria

The resultant INP criteria for noise emission to nearby residences are presented in **Table 4**. As existing industrial noise sources do not control the noise environment and since the existing (L_{Aeq}) noise levels exceed the recommended "Acceptable" ANL (**Table 3** refers) the proposed Amenity criteria are the most stringent applicable (ie, 10dB below the existing noise environment levels).

The project specific goals are determined from the lower of the Intrusive and Amenity criteria for each period and are shown in bold.

Table 4 Industrial Noise Criteria for Residences Surrounding the Development Site

Location	Time of Day	ANL (L_{Aeq})[1] (dBA)	Measured RBL (L_{A90})[2] (dBA)	Measured L_{Aeq} Noise Level (dBA)	Intrusive L_{Aeq} Criterion for New Sources (dBA)	Amenity L_{Aeq} Criterion for New Sources[3] (dBA)
26 Morgan Street (east of site)	Day	60	57	66	62	**56**
	Evening	55	53	63	58	**53**
	Night	45	45	61	**50**	51

Note 1: ANL Acceptable Noise Level

Note 2: RBL Rating Background Level

Note 3: Assuming there are no existing industrial sources

Where mechanical plant will operate 24 hours a day, controlling the noise during the night period will be the over-riding criterion for mechanical noise sources. Controlling noise to the night-time criterion of 50 dBA will ensure compliance at all other times.

5.2 Road Traffic Noise

The NSW DECCW's *"Environmental Criteria for Road Traffic Noise"* (ECRTN, May 1999) sets noise goals for road traffic noise. The policy document provides road traffic noise criteria for proposed road or commercial land use developments as well as noise goals for other sensitive land uses. The relevant criteria relating to land use developments with potential to create additional traffic on "*existing collector roads"* roads is summarised in **Table 5**.

Table 5 ECRTN Guidelines for Road Traffic Noise at Residences

Type of Development	Criteria		
	Day (7am to 10pm)	**Night (10pm to 7am)**	**Where Criteria are Already Exceeded**
Land use developments with potential to create additional traffic on existing collector roads	$L_{Aeq(1hr)}$ 60 dBA	$L_{Aeq(1hr)}$ 55 dBA	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 treatments. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Definitions: Land use development with potential to create additional traffic on existing roads implies increases to the magnitude of the traffic flow and/or changes to the traffic mix brought about by new land use developments or significant alterations to existing land use developments, which may not involve any construction to the road. This category does not cover minor changes that are not subject to either development consent or amendment to an EPA licence.

The criteria are below the existing measured levels (**Table 2** refers), thereby traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

5.3 Sleep Disturbance

5.3.1 Environmental Noise Control Manual (ENCM)

The DECCW's Environmental Noise Control Manual (ENCM) contains a guideline in relation to sleep disturbance. This provides a useful assessment tool for short duration, high noise level events which may not be assessed or controlled sufficiently by the INP's long-term-noise assessment procedures.

In order to minimise the risk of sleep disturbance during night-time operation, the DECC'Ws ENCM recommends that:

- The $L_{A1(60second)}$ noise level outside a bedroom window should not exceed the L_{A90} background noise level by more than 15 dBA. The $L_{A1(60second)}$ noise level may conservatively be estimated by the typical maximum level of noise emission.

The measured RBL during the night was 50 dBA – resulting in a sleep disturbance criterion of 65 dBA.

5.3.2 DECCW Current Policy

The DECCW's current policy (as of June 2004) recognises that the ENCM criterion (ie, that $L_{A1, (1\ minute)}$ should not exceed the L_{A90} background noise level, at that time, by more than 15 dBA) is less than ideal, but advises that, as there is insufficient evidence to conclude what should replace it, the DECCW "*will continue to use it as a guide that identifies the likelihood of sleep disturbance. This means that where it is met, sleep disturbance is not likely, and where it is not met, more detailed analysis is required*".

The DECCW considers an appropriate screening criteria for sleep disturbance to be an $L_{A1, (1\ minute)}$ 15 dBA above Rating Background Level for the night-time period.

Where more detailed analysis is required, the DECC advises it should cover:

- the maximum noise level (or $L_{A1, (1\ minute)}$)
- the extent that the maximum noise level exceeds the background level, and
- the number of times this happens in the night period

The DECC does not give specific criteria in relation to these aspects, but does state that "*some guidance on possible impact is contained in the review of research results in the appendices to the ENCM*". This guidance is discussed in **Section 5.3.3**.

5.3.3 Environmental Criteria for Road Traffic Noise (ECRTN)

The DECC has presented a review of sleep disturbance in Appendix B of the ECRTN. The review concludes:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions.
- One or two events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and well being.

5.3.4 Summary of Sleep Disturbance Criteria

Translating the internal noise levels given in **Section 5.3.3** to external noise levels, by adding 10 dBA (assuming an open window), the external sleep arousal noise criteria become:

- Maximum facade noise levels of 60 dBA to 65 dBA (*are unlikely to cause awakening reactions*).

6 ACOUSTIC ASSESSMENT

6.1 External Plant Noise to Nearby Residences

Rooftop plant is located in the south-west corner of the site – as far away as possible (approximately 50m) from the residential premises to the north-west. (Marchese + Partners International drawing No. DA 02.02 refers.) An unenclosed condenser deck, with visual screening by louvers, and an enclosed plantroom is proposed.

This is conventional airconditioning plant and it is likely it will require conventional noise control treatments, using standard engineering treatment methods involving silencers etc, to comply with the site specific noise criteria presented in **Section 5.1.4**.

When specific plant selection and location is determined (during the detailed design stage) the selected mechanical equipment must be reviewed and assessed for conformance with established noise criteria.

6.2 Loading Dock Noise Emissions

The Loading Dock is located on the northern corner of the site, approximately 30m from the residential premises to the north-east and north-west. (Marchese + Partners International drawing No. DA 02.01 refers.) Entry and exit (off Brodie Spark Drive and Arncliffe Street, respectively) will be via powered roller-shutter doors.

The noise of the occasional delivery vehicle entering and departing the Loading Dock will be negligible compared to the noise of other vehicles passing along Brodie Spark Drive and Arncliffe Street.

Loading Dock noise will thus be attenuated via the Dock's steel deck roof and the roller-shutter doors.

When the powered roller-shutter doors are selected (during the detailed design stage) they must be reviewed and assessed for conformance with established noise criteria.

Experience of loading dock activities, indicates truck engines, trolleys and reversing alarms produce the highest noise levels, with the entire loading /unloading procedure typically lasting less than half an hour.

Table 6 details the loading dock sources that have been considered along with the noise levels and duration for a typical 15 minute loading dock scenario.

Table 6 Typical Loading Dock Activities and Noise Levels Data

Noise Source	Sound Power Level dBA	Duration (mins) 15 minute Scenario
Truck Engine	108	2
Reversing Alarm	110	0.5
Trolley	93	2
People Talking	78	5
Raised Voices	83	5

This assessment assumes that truck loading and unloading activities may occur at any time during the day or night, and that it will all take place inside the building, with trucks driving straight in and straight out of the roller-shutter doors and minimal, if any, reversing within the Loading Dock.

A typical 15 minute operational scenario has been modelled. It is found that the steel deck roof and roller-shut door adequately control noise transmission to the residential premises. The resultant noise levels at the nearest residences 30m away to the north would be $L_{Aeq(15minute)}$ 38 dBA – being chiefly due to truck movement. The calculations assume the underside of the steel deck roof is lined with 100mm thick acoustically absorptive mineral fibre-type material.

The predicted level is well within the INP night-time criterion (**Section 5.1.4** refers).

6.3 Carpark

The car parking area (of 186 spaces) is located to the south-east and south-west of the proposed building, which generally provides shielding to the residences to north-east and north-west. It is unlikely that use of the carpark will generate significant noise at the residences.

Assuming 186 vehicle changes per hour, we estimate the noise to the residences will be in the order of 45 dB $L_{Aeq(1hour)}$.

The predicted level is well below the existing daytime background noise of 57 dB L_{A90}.

6.4 Road Traffic Noise

Traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB. (**Section 5.2** refers.)

The traffic flow on the roads would need to increase by 60% to result in an increase in noise level of 2 dBA.

It is clear that 186 vehicles per hour using the carpark will not materially affect the road traffic noise in the vicinity of the site.

6.5 Sleep Disturbance

Noise from the enclosed Loading Dock is predicted to be in the order of 46 dBA L_{max} and, as such, will not exceed the "screening criteria" for sleep disturbance of 65 dBA (**Section 5.3.4** refers).

The noise from delivery vehicles slowly entering and departing the Loading Dock will be less than the noise of other vehicles passing along Brodie Spark Drive and Arncliffe Street and noise management techniques should be exercised to minimise the noise from such vehicles.

7 CONCLUSION

Heggies have assessed the noise impact on the surrounding residential environs associated with the proposed development.

Appropriate noise criteria for the project have been established based on appropriate noise guidelines (NSW DECCW's INP, ECRTN and ENCM).

It is our opinion that compliance with the criteria can be achieved at all residential receivers.

Specific plant selection has not been made at this stage of the project and, as such, it is recommended that such equipment be reviewed at the detailed design stage to ensure compliance with the proposed criteria at all residential receivers.

It is concluded that with the adoption of standard engineering treatments to the rooftop mechanical plant, and given the enclosed Loading Dock, the proposed commercial development will not adversely impact on acoustic amenity of surrounding residences.

ACOUSTIC TERMINOLOGY

1 GLOSSARY AND ABBREVIATIONS

ABL	The Assessment Background Level is the single-figure background level representing each assessment period – day, evening and night. Three ABLs are determined for each 24-hour monitoring period. (See also Background Noise and RBL.)
AHD	Australian Height Datum.
Ambient Noise	The all-encompassing noise associated with a given environment. It is the composite of sounds from many sources, both near and far, and is often (but need not necessarily be) assigned the L_{Aeq} descriptor.
ANEF	The Australian Noise Exposure Forecast system. A scientifically based computational procedure for determining aircraft noise exposure levels around aerodromes and airports.
Attenuation	The reduction of noise levels.
A-weighting	Adjustment carried out to the measured noise spectra via use of an electronic filter, to approximate the response of the human ear.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor. (See also ABL and RBL.)
Compliance	Where noise levels meet the criteria.
Day or Daytime	The duration of the assessment period – which may change according to the particular Standard or Guideline. For ANEF purposes, it is 7.00 am to 7.00 pm (Monday to Sunday); For ECRTN purposes, 7.00 am to 10.00 pm. For INP purposes, it is 7.00 am to 6.00 pm (Monday to Saturday) and 08.00 am to 6.00 pm on Sundays and public holidays.
DEC	NSW Department of Environment and Conservation. (Previously the EPA and now the DECCW.)
DECC	NSW Department of Environment and Climate Change. (Previously the DEC and now the DECCW.)
DECCW	NSW Department of Environment, Climate Change and Water. (Previously the DECC.)
dB	Abbreviation for decibel – a unit of (amongst other things) sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.
dBA or dB(A)	A-weighted decibel. A single number measurement of the sound pressure based on the decibel but weighted to approximate the response of the human ear with respect to frequencies. A noise level of 56 dBA may also be written as 56 dB(A) L_A 56, or 56 L_A.

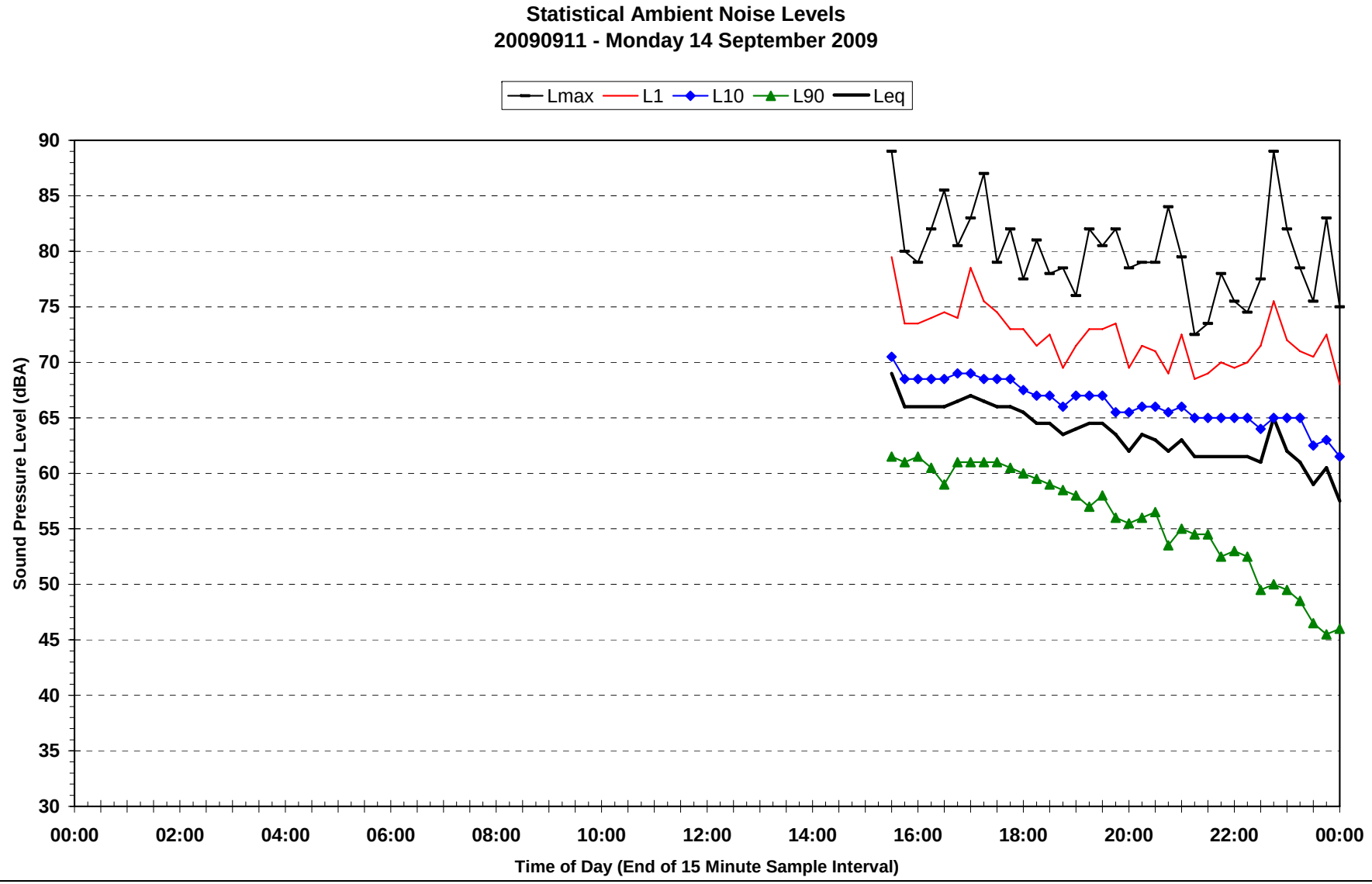
ACOUSTIC TERMINOLOGY

ECRTN	Environmental Criteria for Road Traffic Noise. Administered by the NSW Government's DECCW. The ECRTN is a response to the need for for "programs to complement strategies that are geared towards reducing motor vehicle use with more effective ways of managing existing traffic noise, through influencing the nature of road design, road use and development adjacent to roads".
EIS	Environmental Impact Statement - A study that assesses potential environmental and social impacts associated with the construction and operation of a project.
ENCM	Environmental Noise Control Manual. First published by the NSW EPA (now DECCW) in 1985. The ENCM provides guidelines for the assessment of many activities that are not covered elsewhere.
EPA	Environment Protection Authority. (Now the DECCW.)
Feasible and Reasonable	Terms used in relation to noise mitigation measures: Feasibility relates to engineering considerations and what is practical to achieve in terms of mitigation. Reasonableness relates to the application of judgement in arriving at a decision.
GA	General Aviation – usually refers to the type of airport.
Guideline	information intended to advise what the noise level should be. Guidelines are non-mandatory.
INP	Industrial Noise Policy. Administered by the NSW Government's DECCW. The INP provides a framework and process for deriving noise limit conditions for consents and licenses that will enable the DECCW to regulate premises.
L_{Amax}	Maximum noise level measured at a given location over a specified time interval.
L_{AN}	L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. (See also L_{A1} etc.)
L_{A1}	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{A10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured. During a 15 minute survey, it would represent the loudest 90 seconds.
L_{A90}	The A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise. During a 15 minute survey, it would represent the quietest 90 seconds.
L_{Aeq}	Equivalent sound pressure level - the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{Aeq(15minute)}$	The L_{Aeq} noise level for the 15 minute period. In accordance with the NSW INPs Intrusive criteria, $L_{Aeq(15minute)}$ from industry is assessed against the RBL + 5 dBA.
$L_{Aeq(period)}$	The L_{Aeq} noise level for the assessment period. For the NSW INP day is 7.00 am to 6.00 pm, evening 6.00 pm to 10.00 pm and night 10.00 pm to 7.00 am. In accordance with the INP amenity criteria, $L_{Aeq(period)}$ from industry is assessed against the day/evening/night amenity goal.

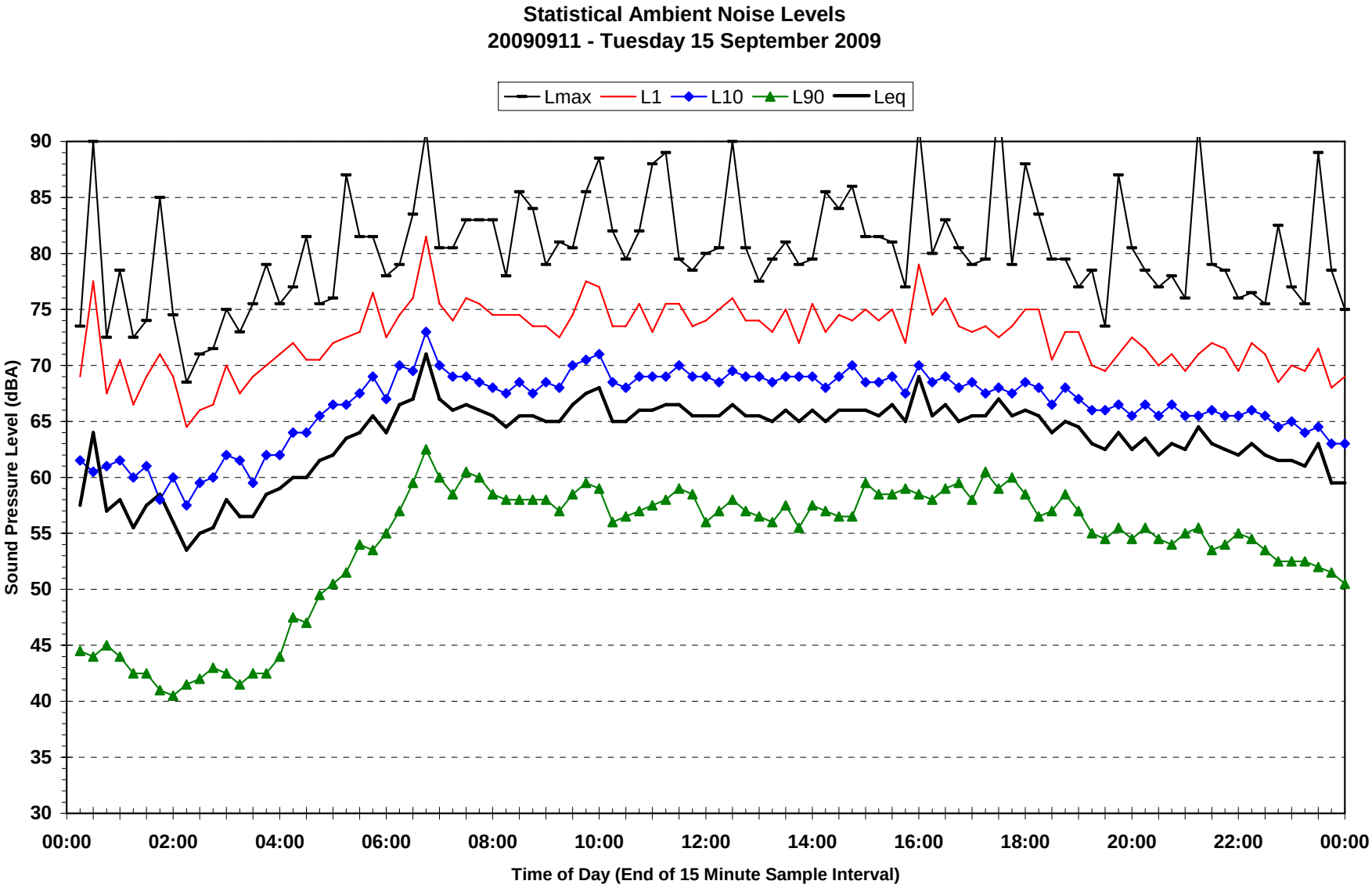
ACOUSTIC TERMINOLOGY

Level	See Sound Pressure Level.
Median	The middle value in a series of values. Eg for the values 11, 9, 2, the median is 9. Where there is an even number of values in the series, the median is the average of the middle two values.
Night or Night-time	The duration of the assessment period – which may change according to the particular Standard or Guideline. For ECRTN purposes, 10.00 pm to 7.00 am. For INP purposes, it is 10.00 pm to 7.00 am (Monday to Saturday) and 10.00 pm to 8.00 am on Sundays and public holidays. (Evening is 6.00 pm to 10.00 pm, every day.)
Noise Level	See Sound Pressure Level.
RPT	Regular Passenger Transport – usually with reference to the type of airport operation.
RBL	The Rating Background Level is obtained by calculating the median values of day/evening/night Assessment Background Levels (ABLs). For example, for a weeks worth of monitoring, the night RBL is the median of the seven ABLs. (See also ABL and Background Noise.
Sound Level	See Sound Pressure Level.
Sound Power Level SWL or Lw	The Sound Power Level of a noise source is an inherent quality of that source does not depend upon its location or the distance from it. On the other hand, however, the sound pressure level, of say a vacuum cleaner, will depend upon the distance from it and /or the acoustic conditions ("reverberant" or not) of the room in which it is located.
Sound Pressure Level	The level of noise, usually expressed in dBA, as measured by a sound level meter with a microphone. The sound pressure level due to a noise source (eg, a vacuum cleaner, or an item of mechanical plant) will depend upon the distance from the source and /or the acoustic conditions ("reverberant" or not) of the space in which it is located, as well as the "directionality" of the noise source and the location of any reflecting surfaces near to the source and /or the measurement location. (See also Sound Power Level.)

STATISTICAL NOISE LEVELS



STATISTICAL NOISE LEVELS



STATISTICAL NOISE LEVELS

Statistical Ambient Noise Levels
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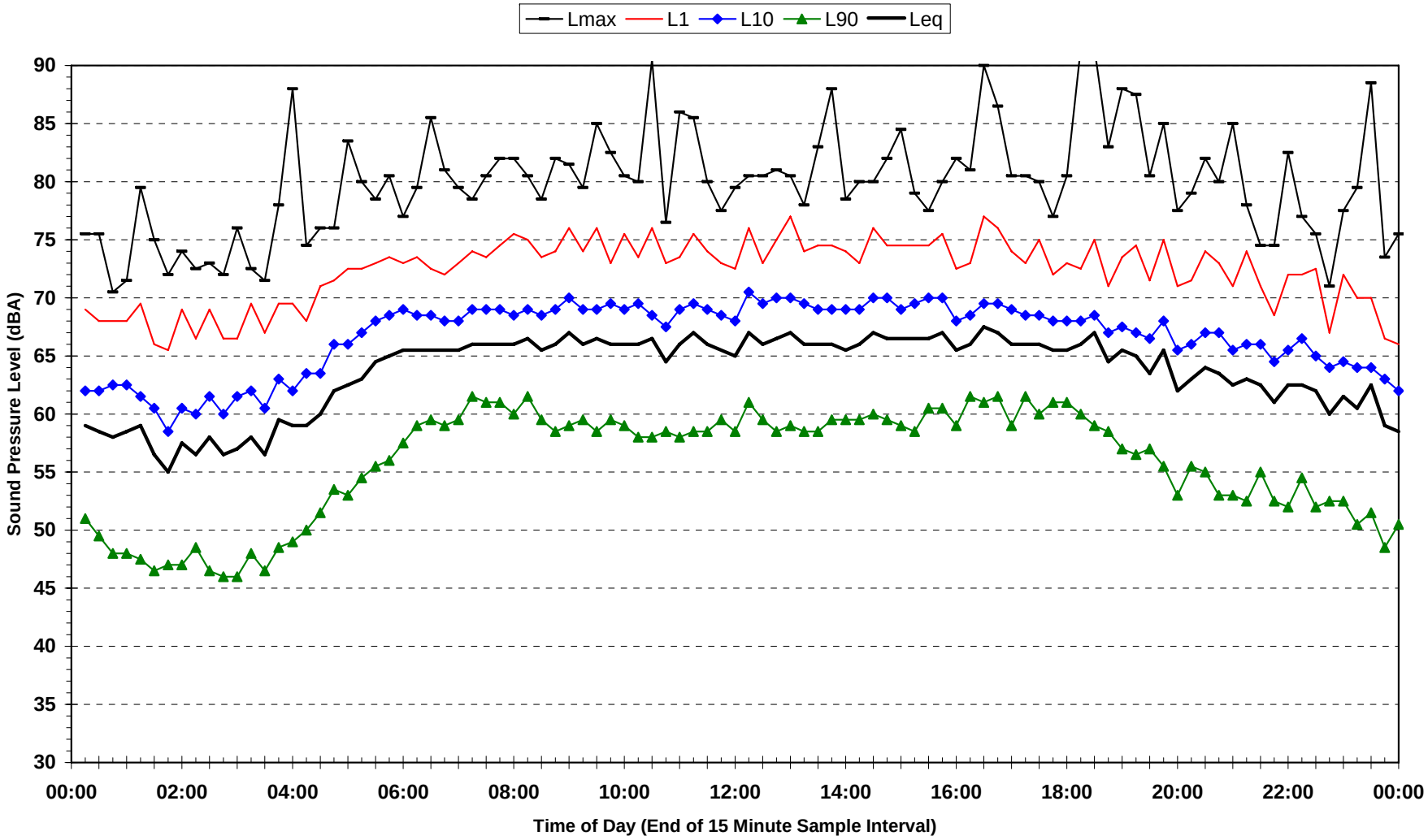
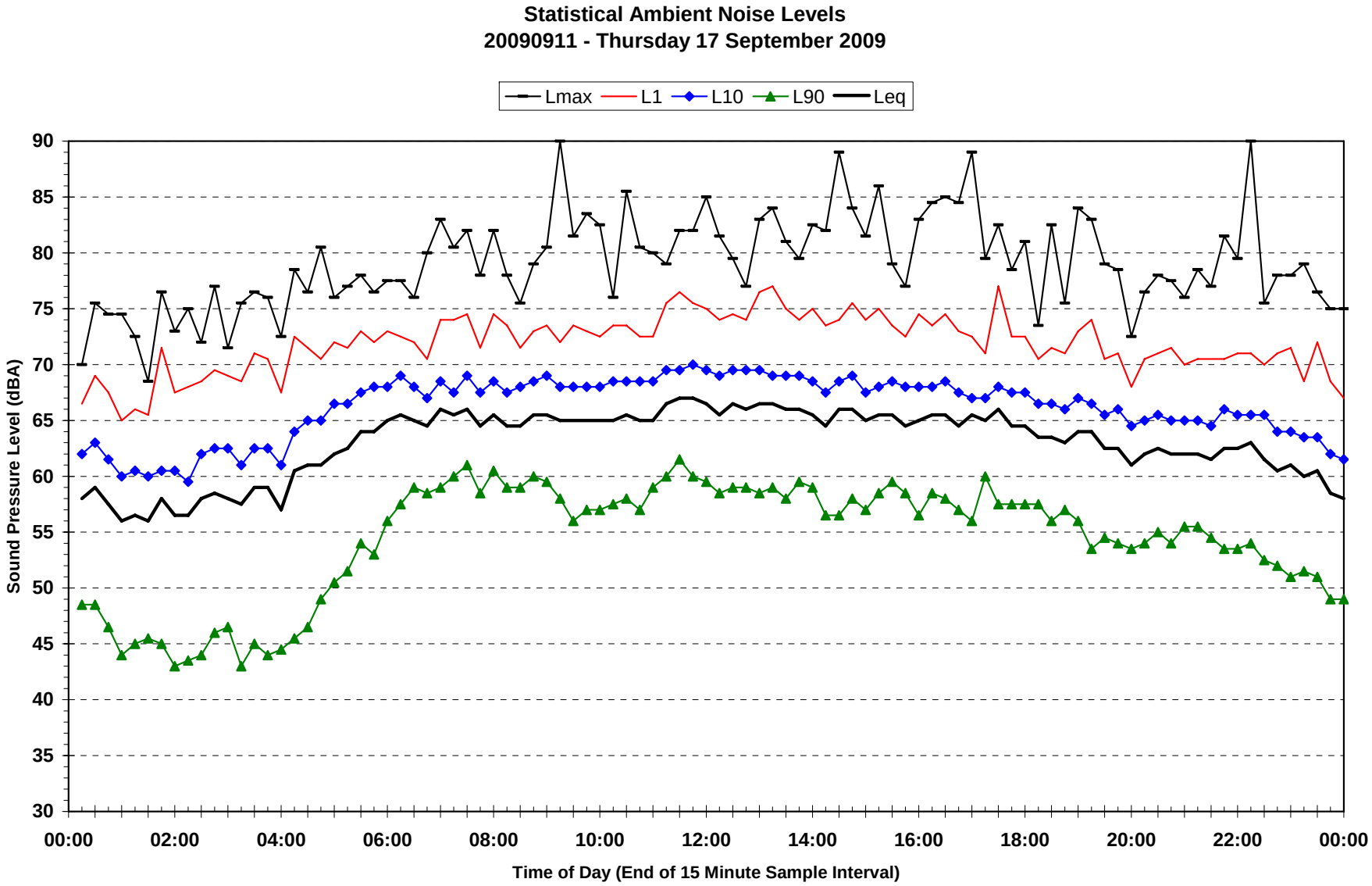
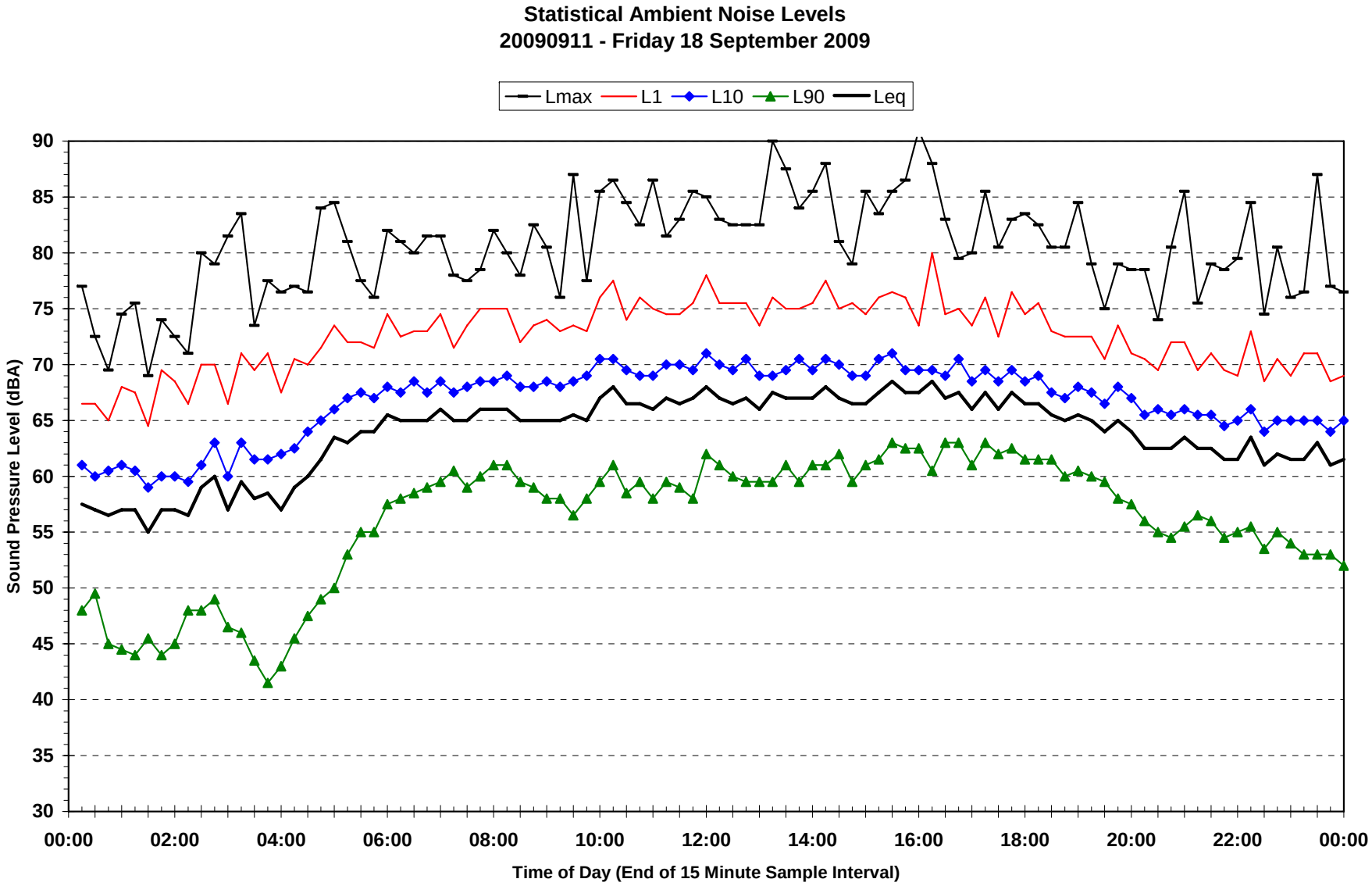


STATISTICAL NOISE LEVELS

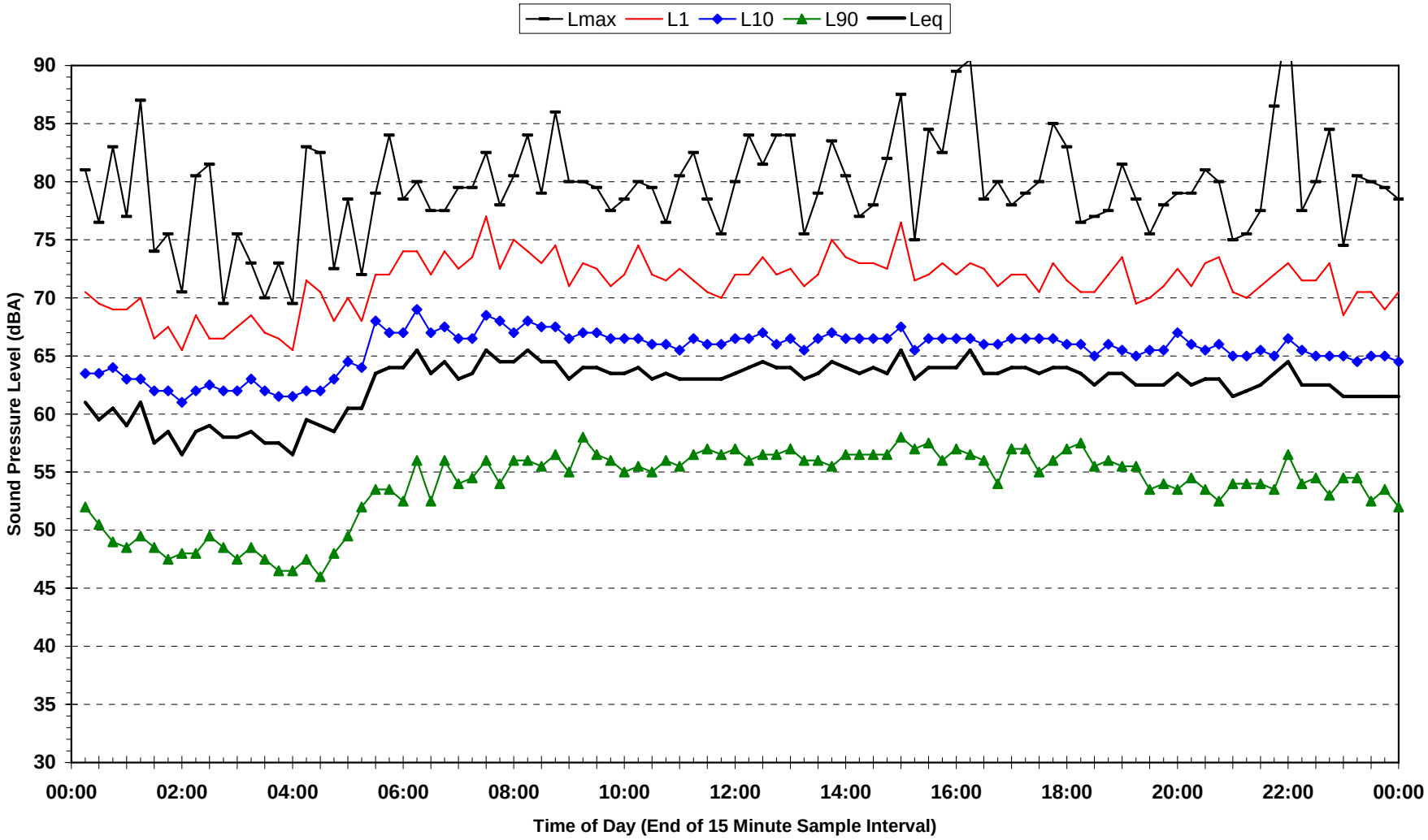


STATISTICAL NOISE LEVELS



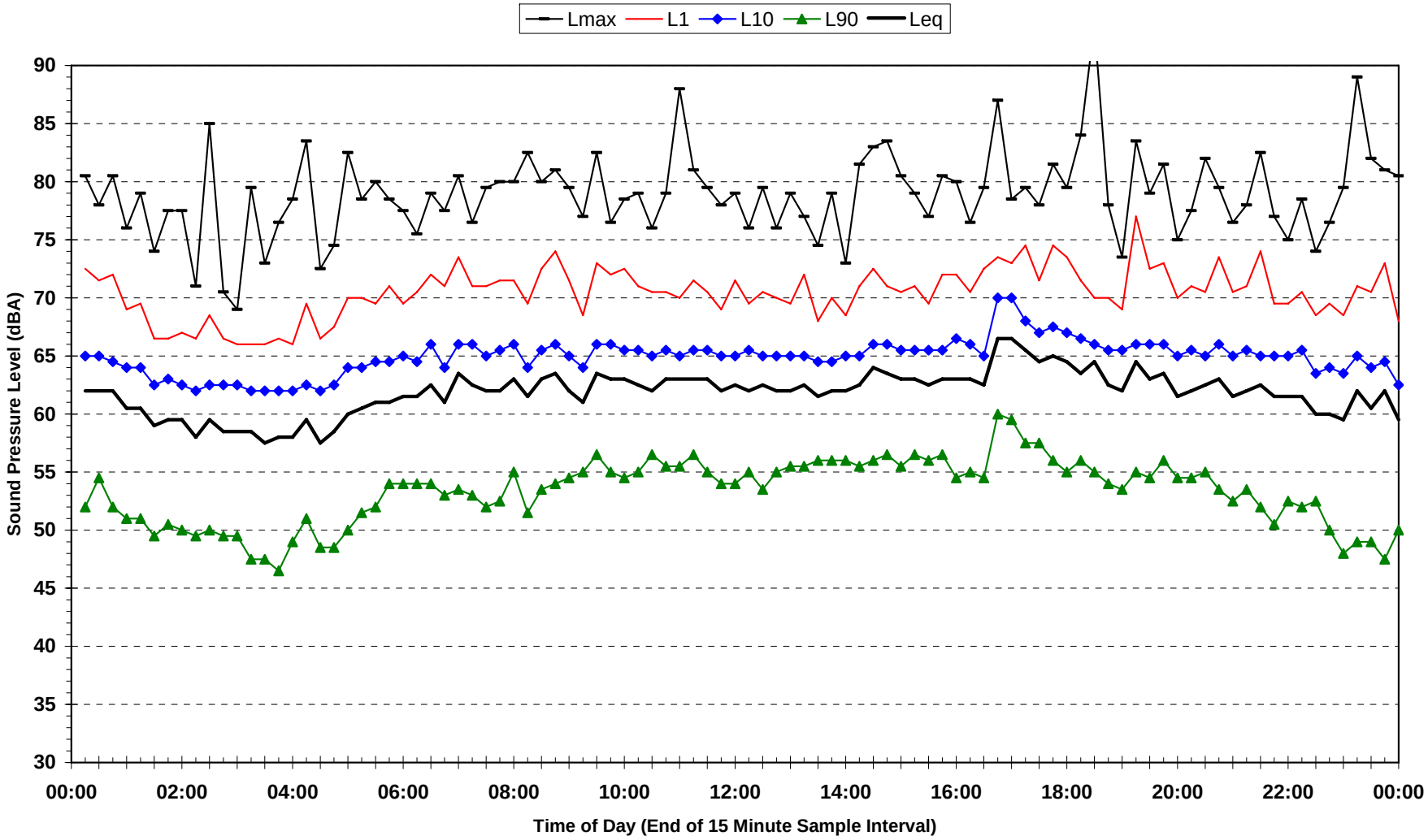
STATISTICAL NOISE LEVELS

Statistical Ambient Noise Levels
20090911 - Saturday 19 September 2009

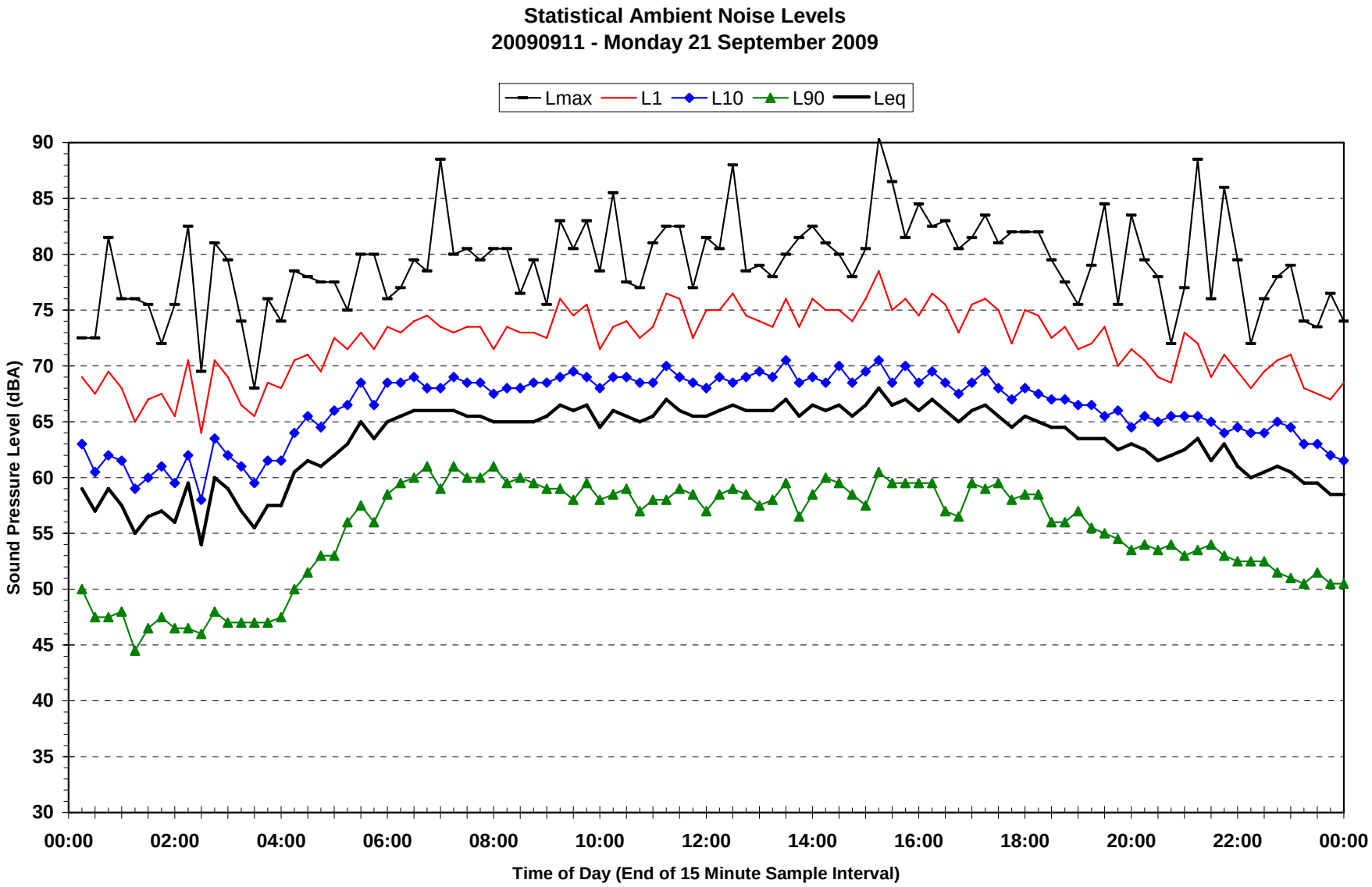


STATISTICAL NOISE LEVELS

Statistical Ambient Noise Levels
20090911 - Sunday 20 September 2009



STATISTICAL NOISE LEVELS



STATISTICAL NOISE LEVELS

Statistical Ambient Noise Levels
20090911 - Tuesday 22 September 2009