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Solar Farm, Manildra NSW

Noise Monitoring & Assessment

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Noise Monitoring & Assessment

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1 INTRODUCTION

Infigen Pty Ltd propose to establish a solar farm near Manildra NSW. It is a requirement of the Director-General of the Department of Planning that an Environmental Assessment (EA) be carried out for the development. The EA involves the identification of limits for noise from the development during the construction and operating periods.

Noise will occur from the solar farm during the construction phase. Significant levels of noise are not expected during everyday operation of the facility.

Heggies have carried out background noise monitoring relative to the site to assist in the determination of limits for construction noise. The monitoring results and their implications for noise limits are included in this report.

2 SUBJECT SITE

The subject site is located on the outskirts of Manildra, which is approximately 150 km west north west of Sydney.

Noise sensitive receivers in the vicinity of the proposed Manildra solar farm are all residential. The nearest residential receivers are at the 4205 Henry Parkes Way and 'Hillview', 1998 Molong Manildra Road. These sites are respectively approximately 300 m and 100 m from the boundary of the development site.

Refer to **Appendix A** for the location of the receivers relative to the subject site.

3 CONSTRUCTION NOISE

The following noise sources are anticipated during the construction of the solar farm:

- Increased truck and car traffic on local roads and on the subject site
- Noise from excavation equipment, including: rockbreakers; bulldozers; vibratory rollers and graders
- Noise from construction equipment including: generators; air compression power tools; vibratory piling and concrete pumps.

4 NOISE CRITERIA

In NSW, construction noise is currently assessed with reference to the Department of Environment and Climate Change (DECC) *Interim Construction Noise Guideline,* 2009. Recommended maximum levels for construction noise at noise sensitive locations are based on the Rating Background Level or RBL, as defined in Section 3.1 of the NSW *Industrial Noise Policy*, 2000.

4.1 Short Term Construction Noise (less than 3 weeks)

Construction noise with an anticipated duration of less than 3 weeks can be managed using a 'qualitative' approach under the *Interim Construction Noise Guideline*. The approach requires the preparation of a noise management plan which is to be kept on site. The plan is to include the following:

- Identification of nearby residences and other noise sensitive uses
- Description of approved hours of work and what work will be undertaken
- Description of what work practices will be applied to minimise noise

- Description of complaints handling process

(Reference: Part 5, *Interim Construction Noise Guideline*, 2009)

Recommended noise management procedures include:

- Operate high level noise equipment during recommended standard hours, as defined in the *Guideline*, only.
- Liaise with the potentially affected community by making the noise management plan available and by publicising times when noisy equipment will be operated.
- Using best practical methods to minimise high levels of noise to the community.

4.2 Long Term Construction Noise (more than 3 weeks)

The Guideline provides recommended 'Management Levels' for construction activities with an anticipated duration of more than three weeks. The Management Levels are presented in **Table 1**.

Table 1: DECC Recommended Management Levels for Construction Noise, Residential Locations

Time of Day		Management Level, dBA $L_{eq,\ 15\ min}$	Guideline Comment / Classification
Recommended standard hours	Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm	RBL + 10	Noise affected
		75	Highly noise affected
Outside recommended hours	All other times and public holidays	RBL + 5	Noise affected

Where the RBL is less than 30 dBA, the value of 30 is used for the determination of noise limits.

5 NOISE MONITORING

Background noise monitoring was undertaken at both 4205 Henry Parkes Way and 'Hillview'. Details of the monitoring locations, periods and conditions are included in **Table 2**.

Table 2: Manildra Monitoring Sites

Monitoring Location	UTM Coordinates	Approximate distance to solar farm boundary	Start date	End date	No. days full monitoring	Monitoring Conditions
4205 Henry Parkes Way	UTM 55 H 660254.01mE 6326704.05mS	300 m	Fri 10 Sept	Thurs 16 Sept	5	Weather conditions during the monitoring period ranged from calm to periods of high winds. Refer to **Appendix B** for weather data.
'Hillview', 1998 Molong Manildra Road	UTM 55 H 658844.49mE 6327992.35mS	100 m	Fri 10 Sept	Thurs 16 Sept	5	

5.1 Unattended Monitoring Results

Full background monitoring results are included in **Appendices C** and **D**. The graphs display statistical data in 15 minute intervals for the entire monitoring period. The statistical parameters displayed include:

- The L_{90} noise level, that is the sound pressure that is exceeded 90% of each 15 minute measurement interval. The L_{90} is used to calculate the RBL.
- The L_{eq} or A-weighted equivalent noise level (basically the average noise level). The L_{eq} is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
- The L_{10} noise level, that is the sound pressure level that is exceeded 10% of the measurement interval. The L_{10} approximates to the average maximum noise level.
- The L_1, that is the sound pressure level that is exceeded 1% of the measurement interval. The L_1 approximates to the maximum noise level.

The data obtained during long term monitoring has been used to calculate the RBL. As weather conditions were fine for a large percentage of the monitoring period, no data has been excluded from calculations.

The calculated RBLs for the two monitoring sites are included in **Table 3**.

Table 3: Rating Background Levels Relative to Manildra Site

	Rating Background Level (RBL) dBA		
	Day	**Evening**	**Night**
'Hillview', 1998 Molong / Manildra Road	34	30	30
4205 Henry Parkes Way	31	32	26
Average OR 30 dBA (whichever is greater)	**32**	**31**	**30**

5.2 Attended Noise Measurements and Observations

Attended noise measurements were carried out at 4205 Henry Parks Way following deployment of the noise logger. Results are included in **Table 4**.

Table 4: Attended Noise Measurements, Manildra

Location	Date	Start time	Duration	Descriptor	A weighted noise level	Comment
4205 Henry Parkes Way	10 Sept 2010	1143 h	12 mins	**L_{90}**	**42.5**	Moderate winds and rain. Unsuitable measurement conditions. Air conditioning noise audible at low level. Bird and insect noise throughout measurement.
				L_{eq}	55.9	
				L_{10}	59.9	

Due to the unsuitable weather conditions at the time of the attended monitoring, the measured L_{90} noise level was much higher than the RBL.

6 DECC MANAGEMENT LEVELS

The average measured RBL has been used to determine noise management levels for construction. Results are included in **Table 5**.

Table 5: Construction Noise Management Level, Manildra Solar Farm

	Day	Evening	Night
RBL	**32**	**31**	**30**
Allowance	10	5	5
Noise Management Level	**42**	**36**	**35**

7 NOISE TO RESIDENCES

The level of noise produced at the subject site will vary during construction. For the purpose of predicting noise to residential locations, consideration has been given to noise generated by typical single items of construction equipment and to noise produced by a number of items operating concurrently.

Refer to **Table 6** for the items and combination of items considered.

The 'Total' figure provided in **Table 6** is considered to be representative of the typical maximum sound power level likely to be produced in one area of the site at any one time during construction of the solar farm.

The buffer zone between noise source and receiver locations required to meet the Management Levels has been calculated. Calculations have been made using the Concawe prediction method. *Concawe, the propagation of noise from petroleum and petrochemical complexes to neighbouring communities* is a method of noise prediction developed for assessing environmental noise propagation from petrochemical plants. The method draws on both acoustic theory and extensive measurements of noise carried out in the field. Calculations takes into account the effects of ground absorption, winds and temperature inversion on noise propagation.

The Concawe model allows predictions to be carried out for a range of meteorological conditions, from conditions extremely favourable to the propagation of sound from the source to the receiver, ie. temperature inversions and favourable winds (Categories 5 and 6), to conditions unfavourable to the propagation of sound. For the purpose of this assessment, all calculations have been carried out assuming favourable meteorological conditions.

Calculations assume that 30% of the ground between the noise source and the receiver location is absorptive. During the winter months, the percentage of absorptive ground is likely to be greater, and lower noise levels can be expected.

The minimum buffer distances for achieving the noise Management Levels are included in **Table 6**.

Table 6: Typical Construction Sound Power Levels and Buffer Distances

Item	Sound Power Level, dBA	Management Level, Lp, dBA (day)	Buffer Distance, m
Rockbreaker	115	42	900
Grader	109	42	600
Compactor	113	42	800
Truck	109	42	800
TOTAL (all items operating at once)	**118**	**42**	**1100**

The distance of the residential receiver from the boundary of the subject site has been subtracted from the recommended buffer zone in **Table 7**. The resultant distance can be used to determine the area of the subject site wherein construction noise has the potential to exceed the Management Levels during intensive periods of construction.

Table 7: Distance from Subject Site Boundary for Achieving Management Levels (multiple items of equipment operating)

	4205 Henry Parkes Way	**'Hillview'**
Distance required to achieve buffer, m	1100	1100
Distance of residence to subject site boundary, m	300	100
Recommended minimum distance for construction from subject site boundary for achieving management levels, m	800	1000

In summary, construction activities that are carried out within 800 m of the subject site boundary in the direction of 'Hillview' have the potential to exceed Management Levels. Similarly, noisy construction activities carried out within 1 km of the subject site boundary in the direction of 4205 Henry Parkes Way, have the potential to exceed Management Levels.

In the instance that construction activities in the identified zones are likely to continue for more than 3 weeks, measures should be taken to control noise to residential locations. For construction periods of less than 3 weeks, the qualitative guidelines provided in the *Interim construction Noise Guidelines, 2009* should be followed.

8 NOISE MITIGATION OPTIONS

Methods for controlling noise to residential receivers include:

- Temporary barriers installed around the construction area
- Quieter methods for carrying out the same process, eg. equipment fitted with silencing devices.
- Use modern, serviced equipment.
- Minimise the duration of activities
- Substitute tonal reversing beepers with less intrusive broadband beepers
- Carry out extremely noisy activities during weather conditions that do not favour the propagation of sound to noise sensitive locations
- Minimise the number of items of plant operating concurrently.

9 SUMMARY

A preliminary assessment of construction noise from the proposed Manildra solar farm has been carried out in accordance with the NSW *Interim Construction Noise Guideline*, 2009.

Management Levels for construction noise have been determined through background noise monitoring at residential locations in the vicinity of the subject site. Areas of the subject site where construction noise is at risk of exceeding the Management Levels have been identified.

To comply with *Guideline,* construction activities carried out in the identified buffer zones for durations of more than 3 weeks are to be managed to control noise to residences. Conceptual options for noise control are included in **Section 8** of this report.

Construction activities carried out in the identified buffer zones for periods of less than 3 weeks are to be managed through qualitative methods, that is by restricting noisy activities to the recommended standard hours for construction and by keeping the community informed of the timing and duration of noisy activities.

10 CLOSURE

This report has been prepared by Heggies Pty Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of NGH Environmental; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Heggies.

Heggies disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

ABOVE: 4205 Henry Parkes Way.
UTM Coordinates: 55 H
660254.01 m E
6326704.05 m S

ABOVE: 1998 Molong / Manildra Road. View to road from in front of house.
UTM Coordinates: 55 H
658844.49 m E
6327992.35 m S

ABOVE: Aerial showing solar farm and noise monitoring locations

0 0.5 km 1 km 1.5 km 2 km 2.5 km 3 km 3.5 km 4 km

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APPENDIX A: Manildra Solar Farm

Site and Noise Receiver Locations
Reference: Google Earth

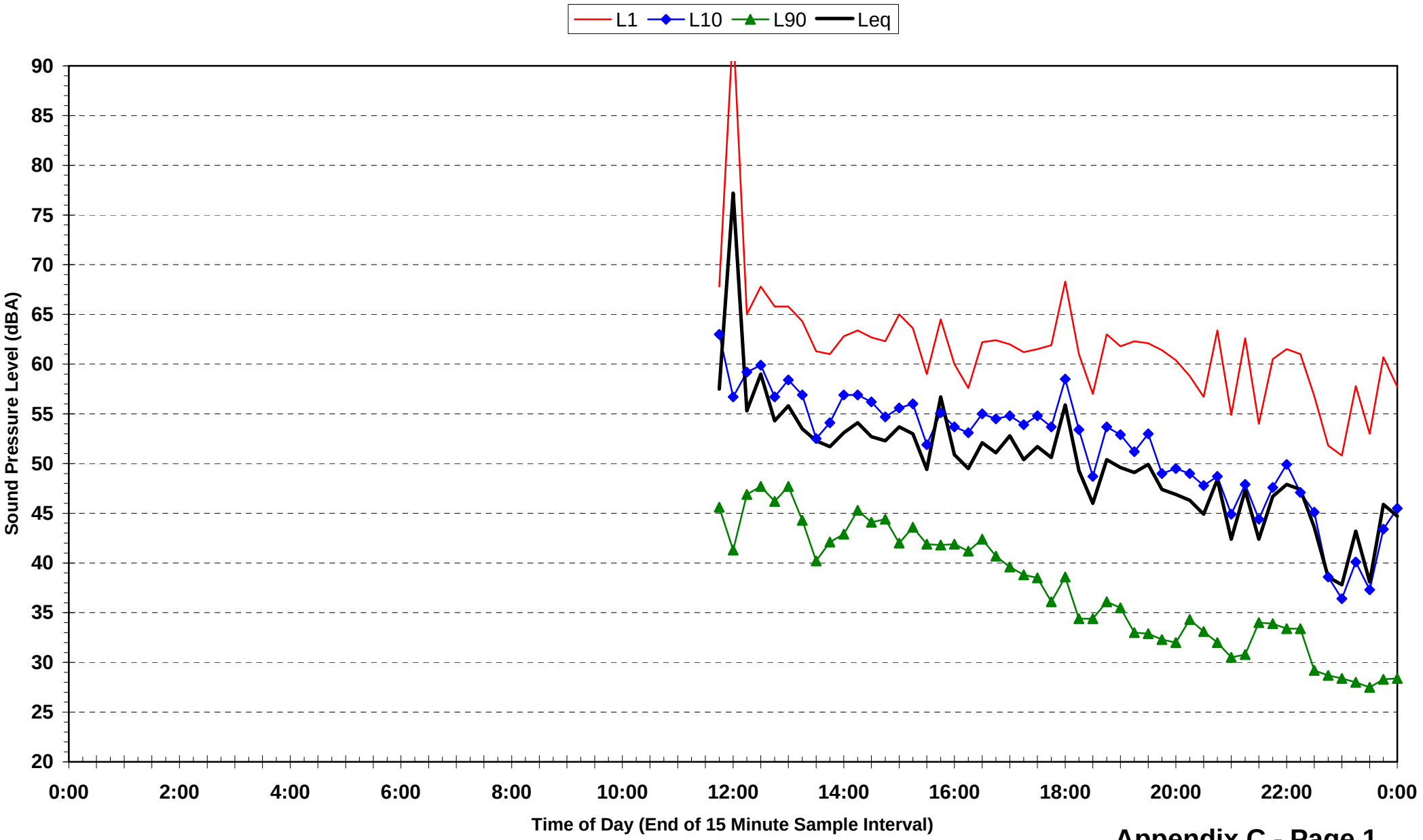
DRAWN	DATE	SCALE	FILE	JOB No.	DRG. No.	REVISION
DW	28-Oct-10	Approx. only	640.10006 DRAWINGS 20101025.XLS	640.10006		

WEATHER CONDITIONS DURING LONG TERM MONITORING FOR MANILDRA SOLAR FARM

Parkes Weather Station (Source: Bureau of Meteorology)

Day	Date	Rain	9 am		3 pm	
			Direction	Wind speed	Direction	Wind speed
Friday	10 Sep 2010	15.1	NW	13	WSW	30
Saturday	11 Sep 2010	0.6	Calm	-	W	13
Sunday	12 Sep 2010	0	Calm	-	Calm	-
Monday	13 Sep 2010	0	Calm	-	WSW	9
Tuesday	14 Sep 2010	1.2	NNE	17	E	17
Wednesday	15 Sep 2010	19.4	SW	28	WSW	22
Thursday	16 Sep 2010	0.6	WSW	17	SW	26

Statistical Ambient Noise Levels
4205 Henry Parkes Way - Friday 10 September 2010



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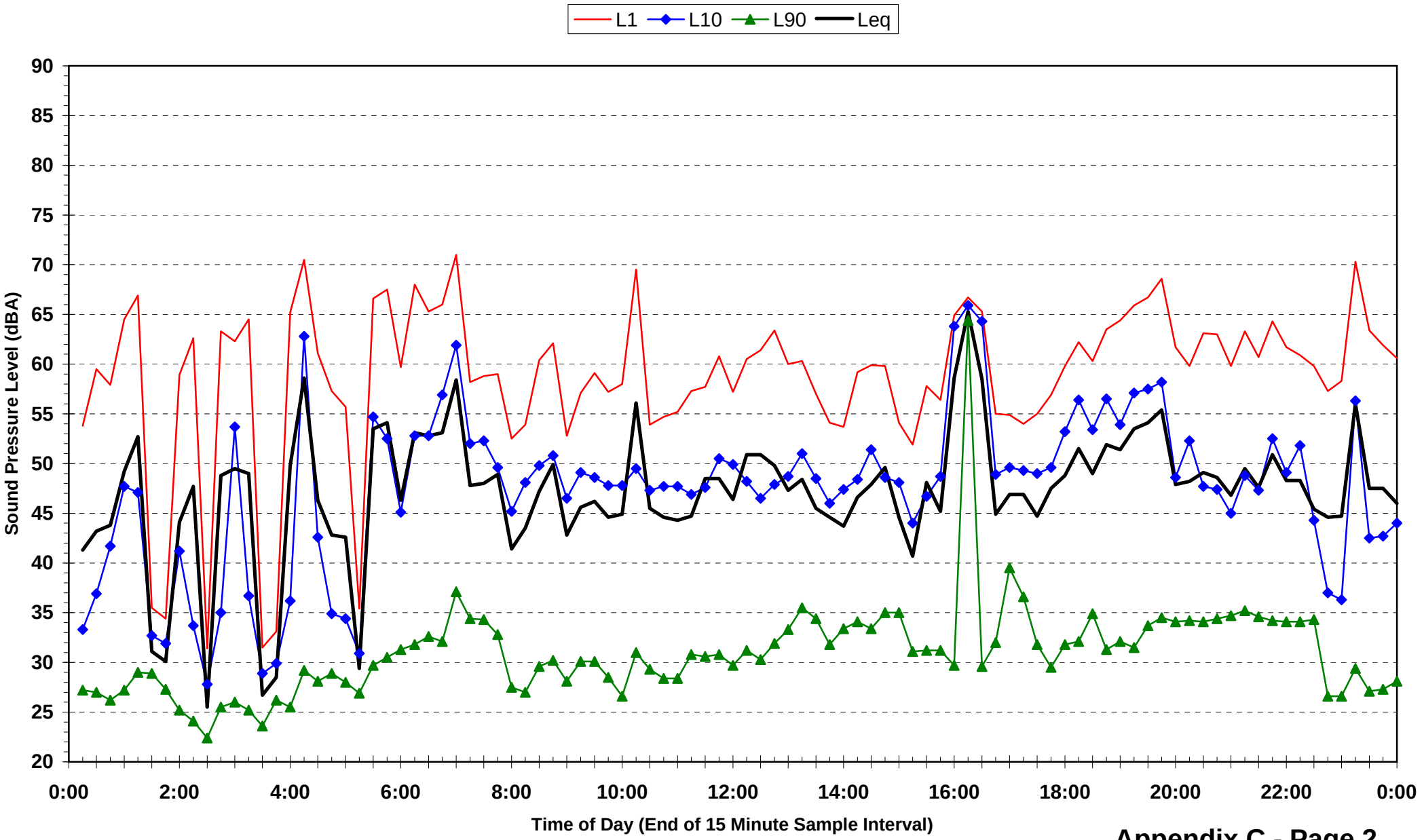
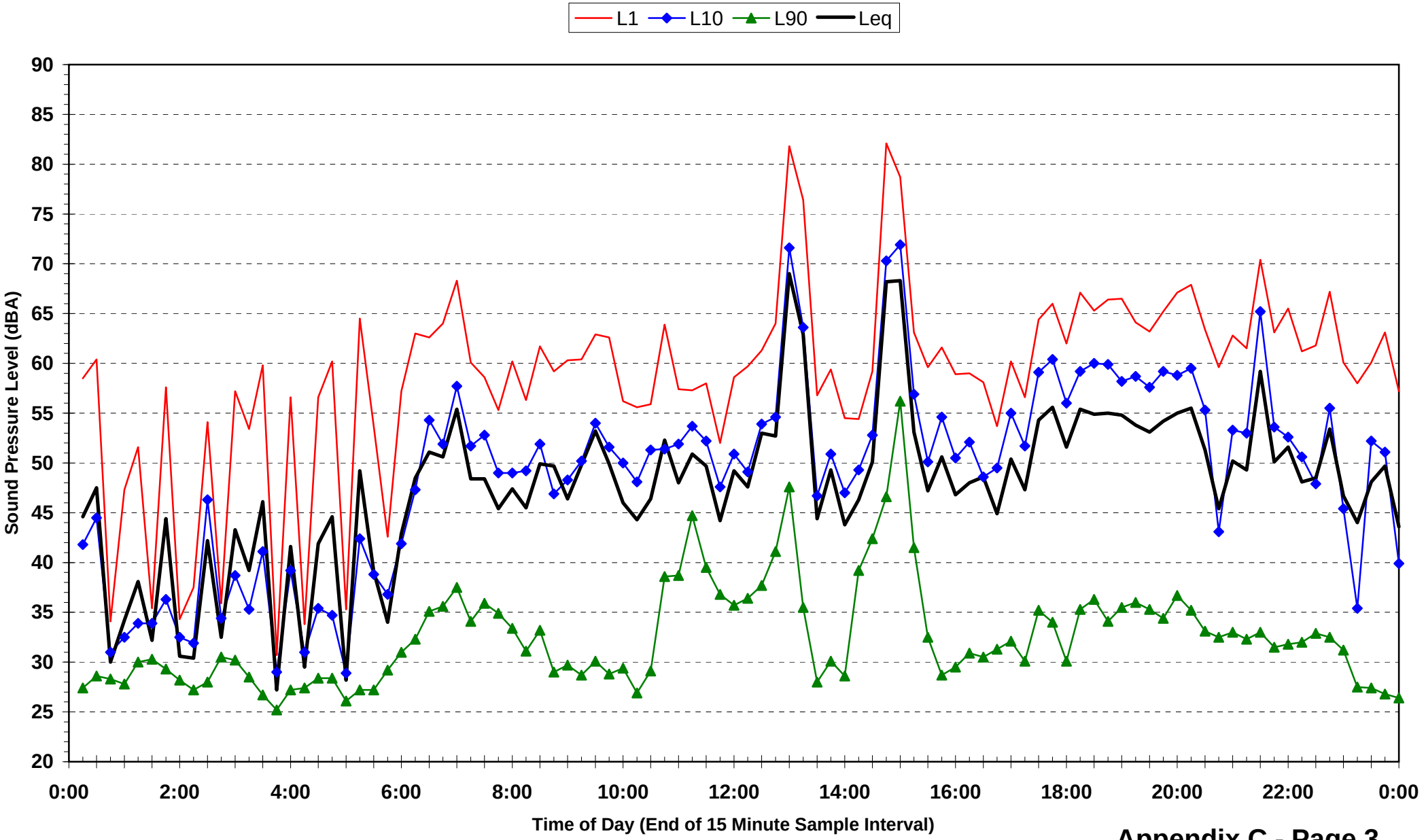
Statistical Ambient Noise Levels
4205 Henry Parkes Way - Saturday 11 September 2010



Statistical Ambient Noise Levels
4205 Henry Parkes Way - Sunday 12 September 2010



Statistical Ambient Noise Levels
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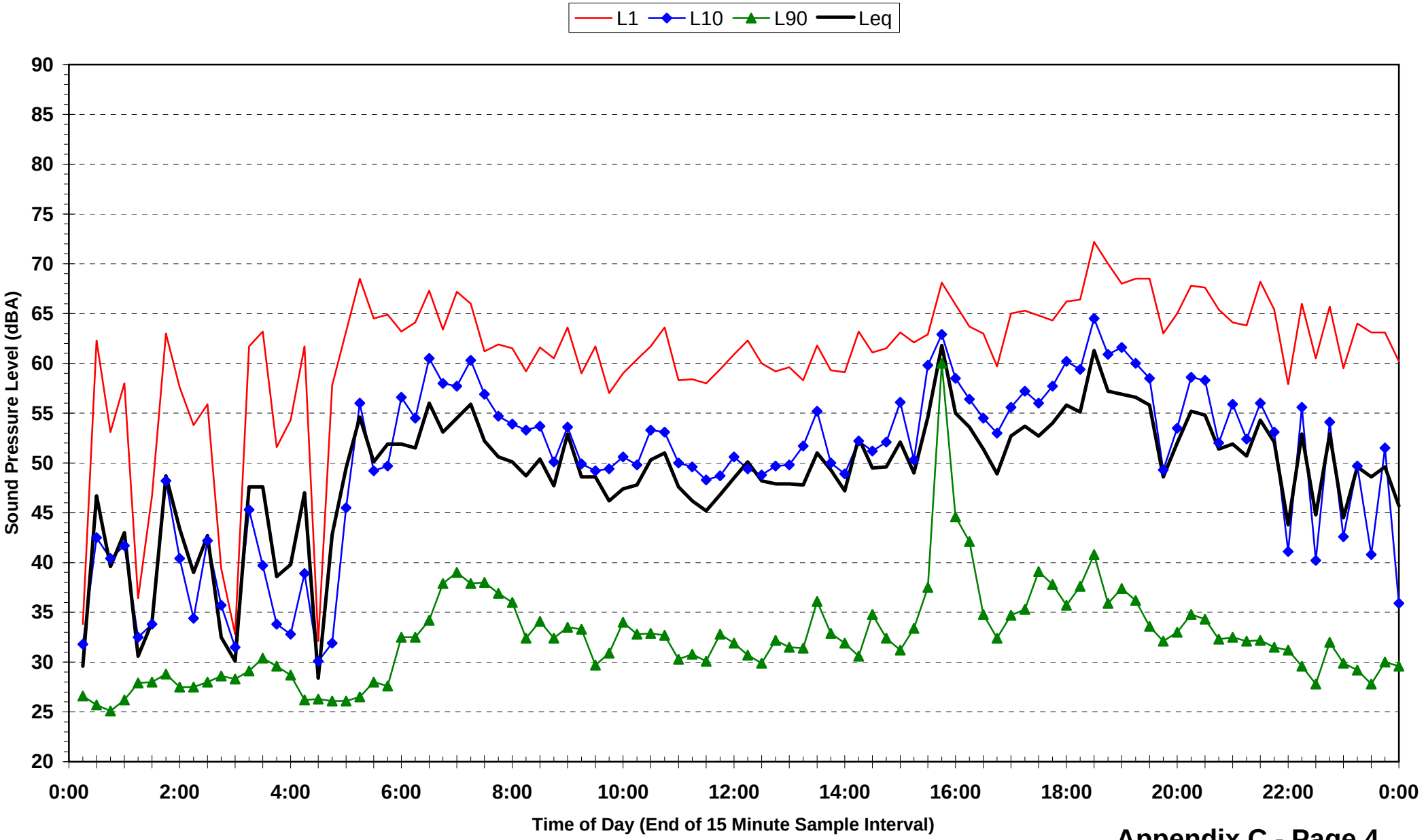

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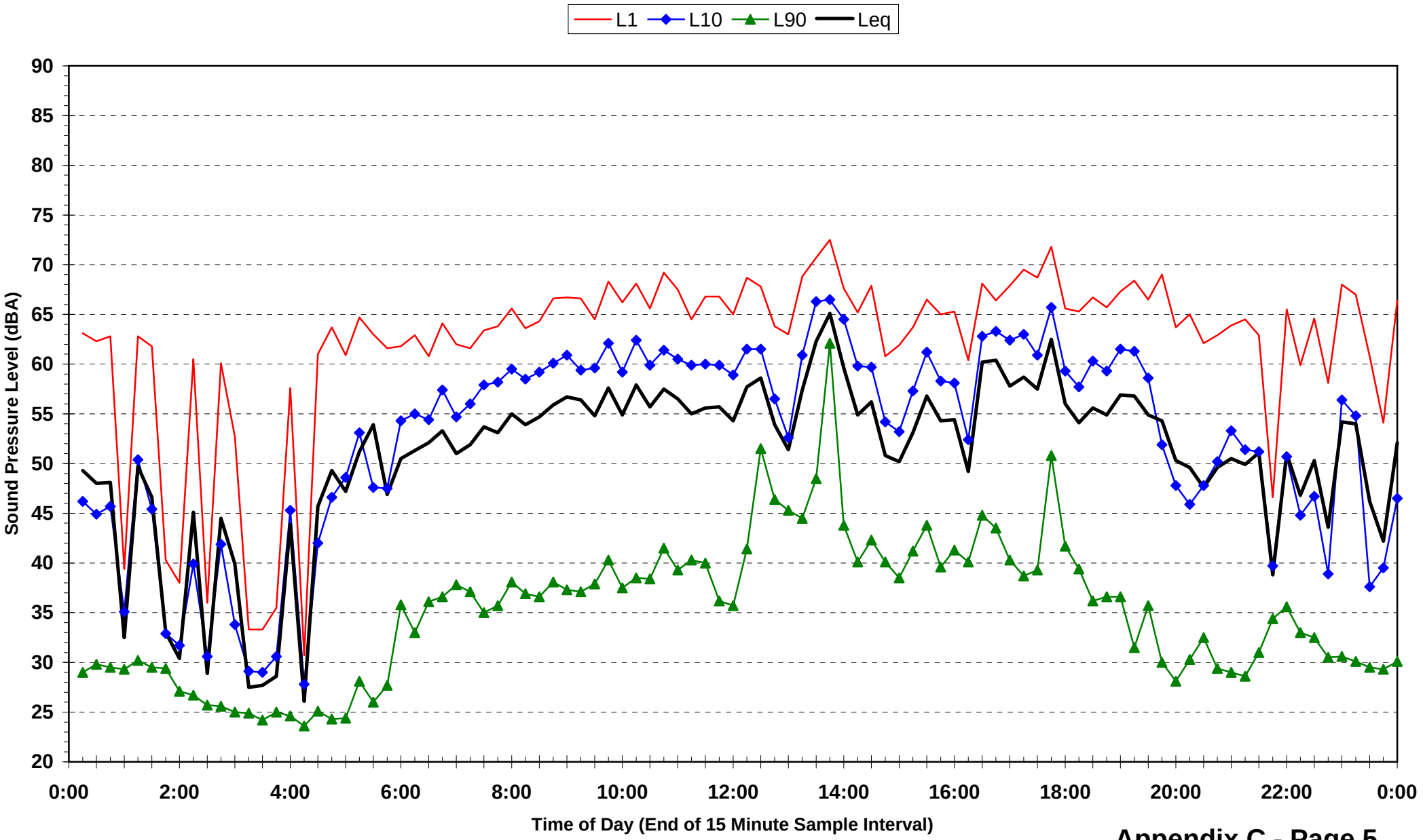

Statistical Ambient Noise Levels
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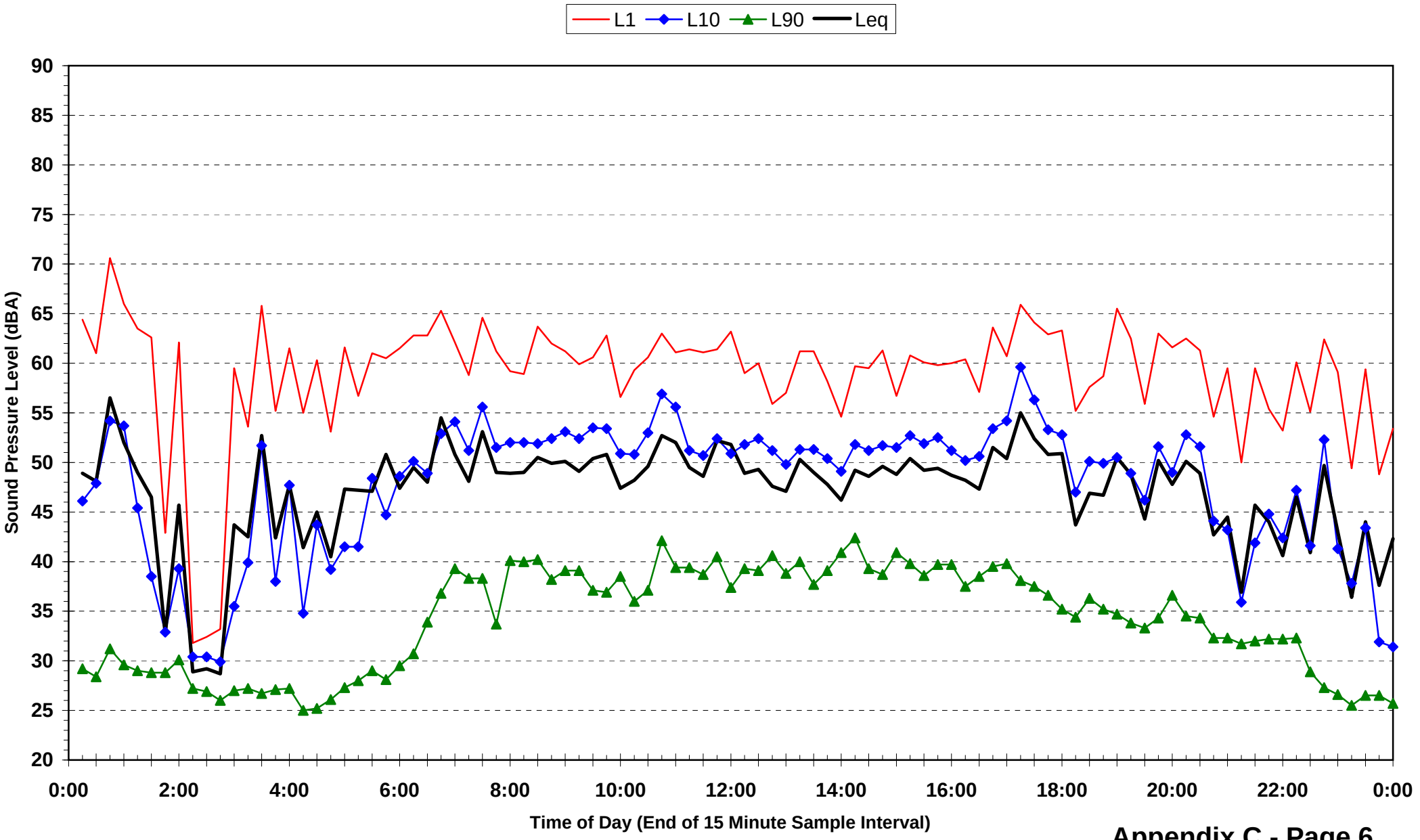

Statistical Ambient Noise Levels
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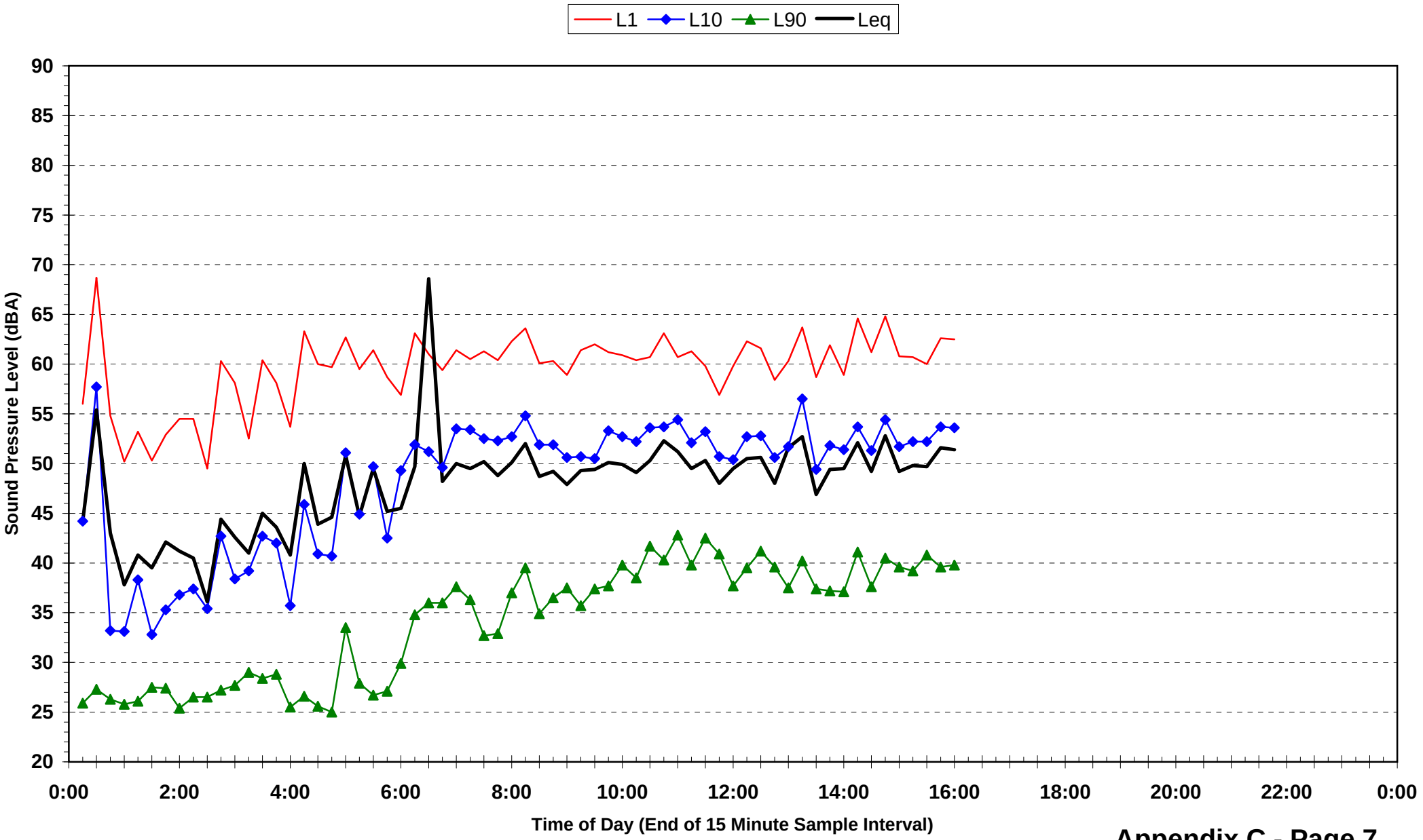
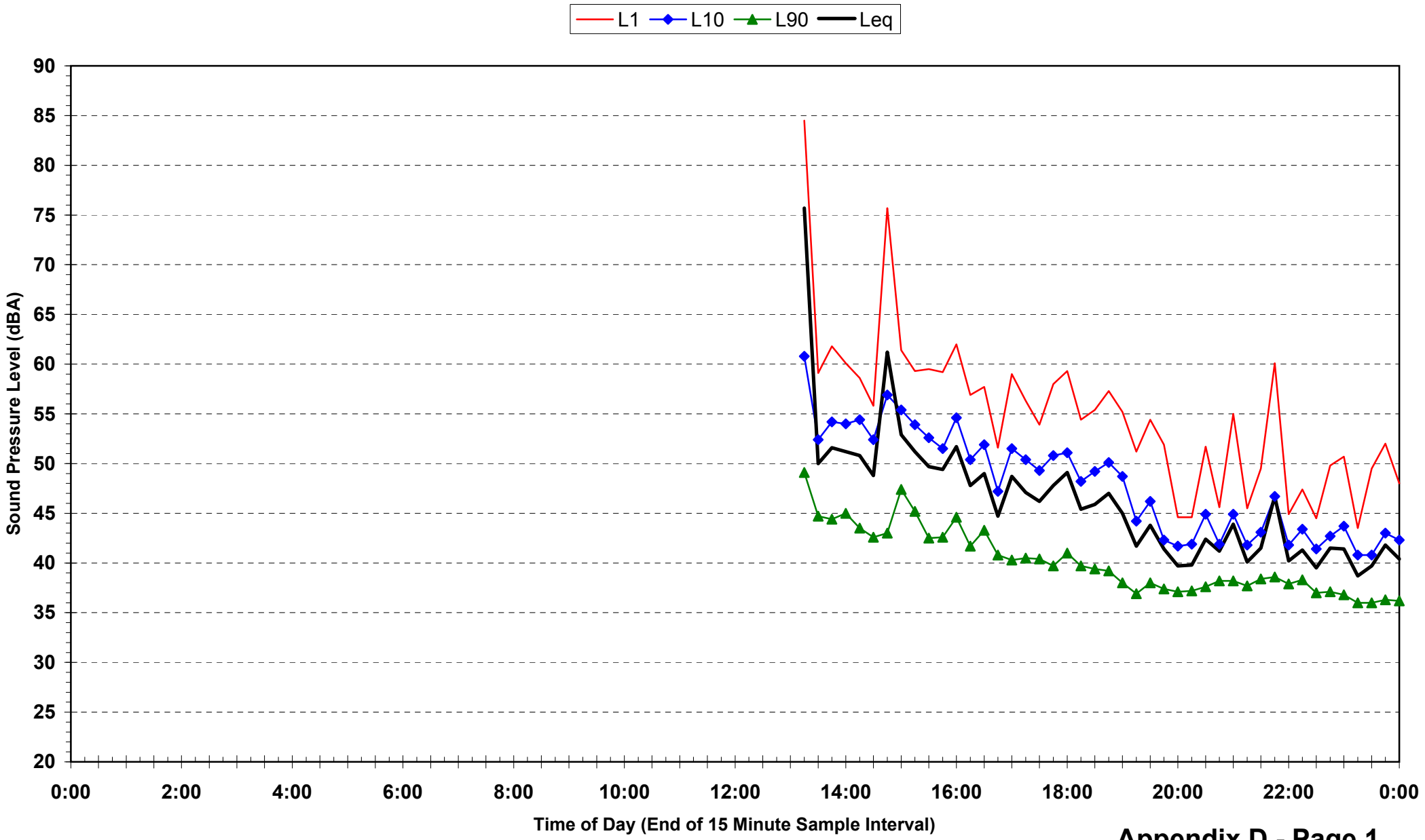


Statistical Ambient Noise Levels
Hillview', 1998 Molong Manildra Road, Manildra - Friday 10 September 2010



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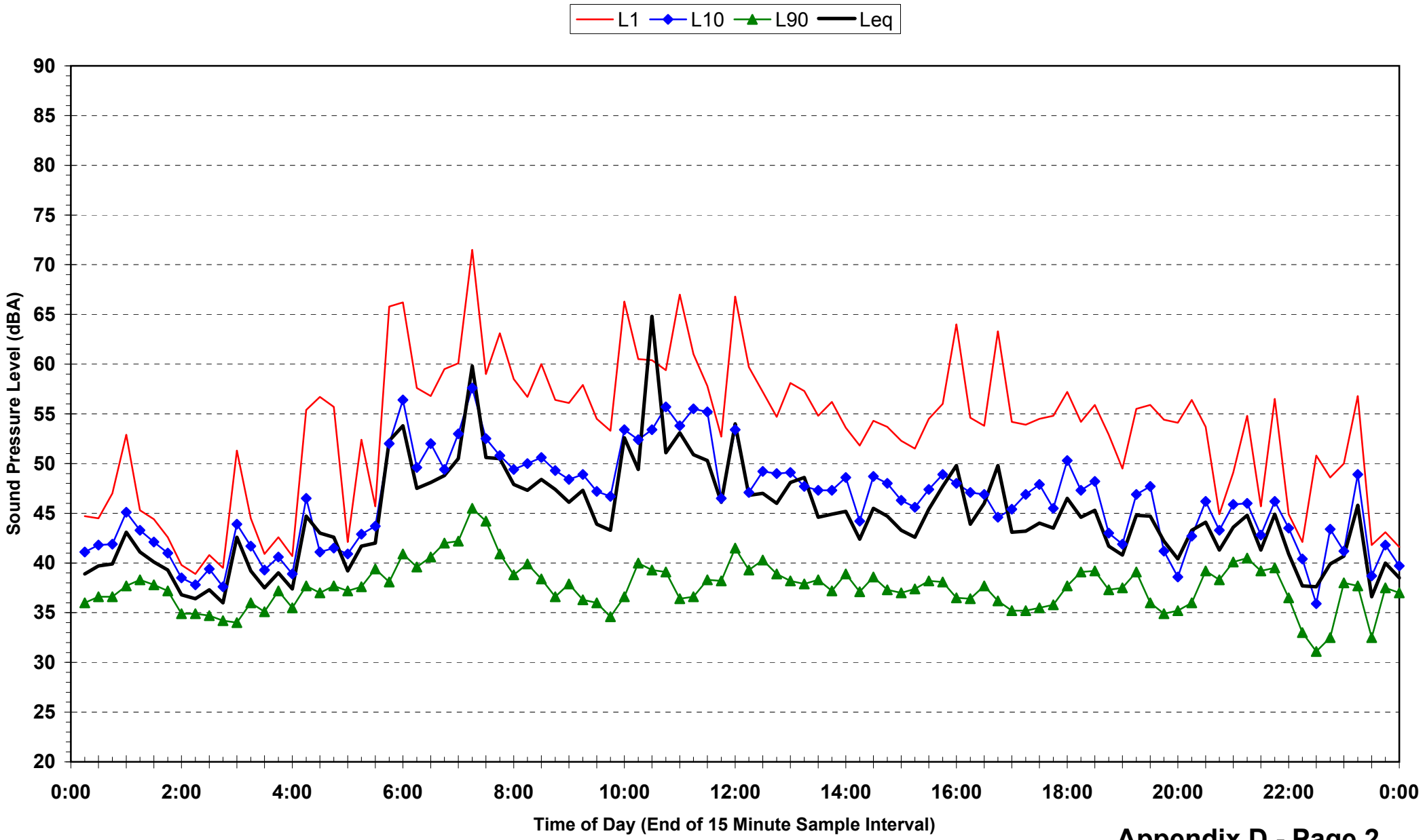
Hillview', 1998 Molong Manildra Road, Manildra - Saturday 11 September 2010



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Statistical Ambient Noise Levels
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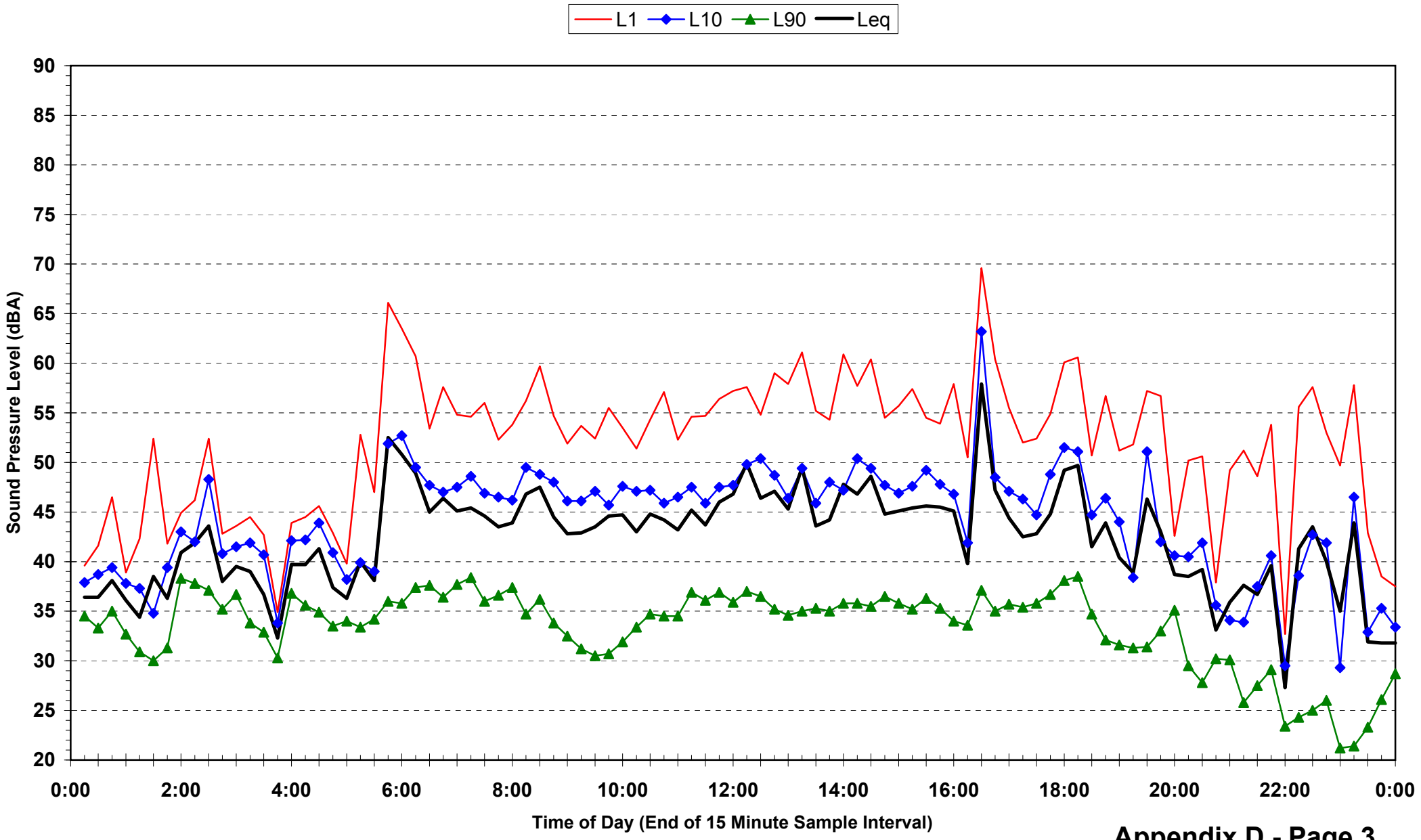

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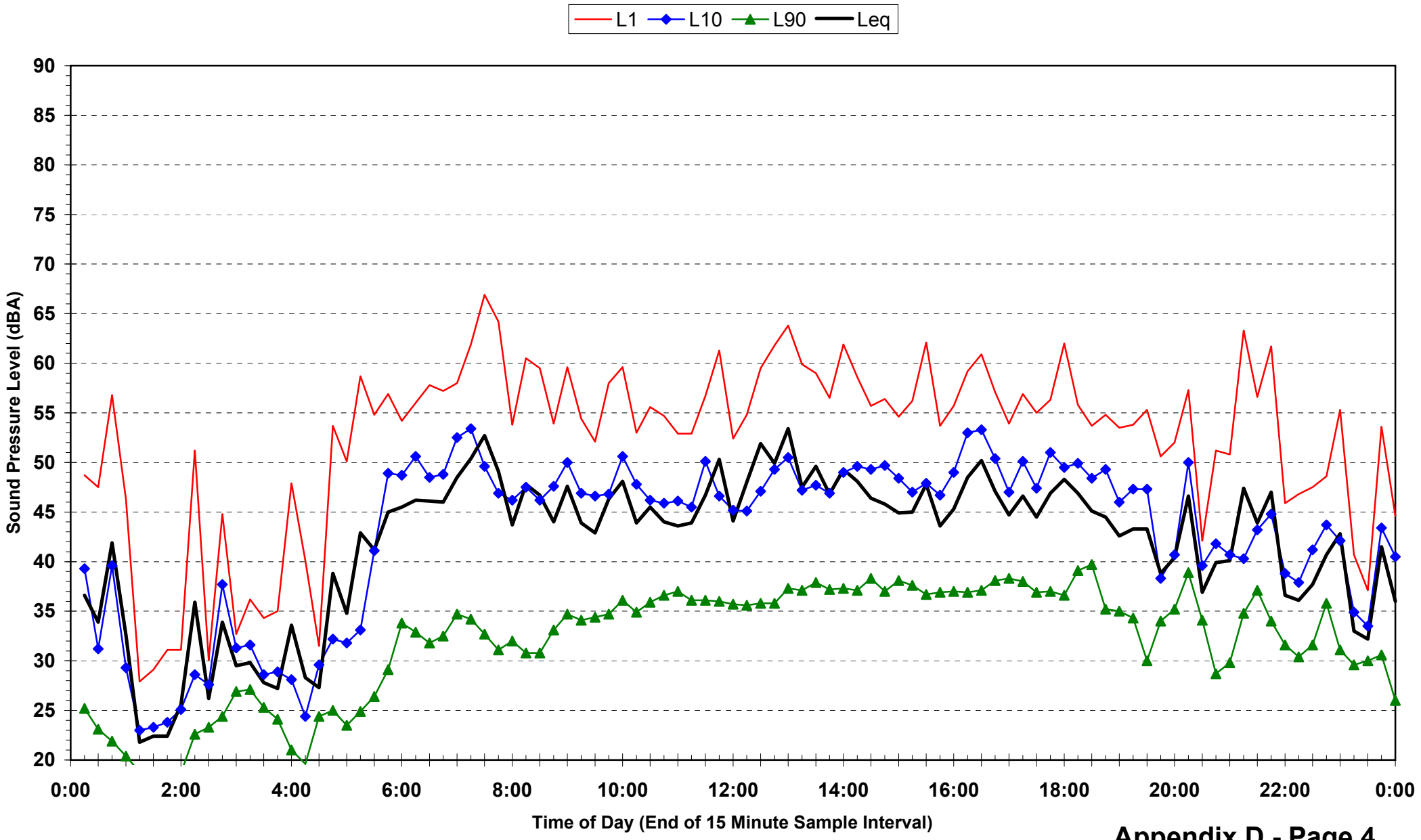
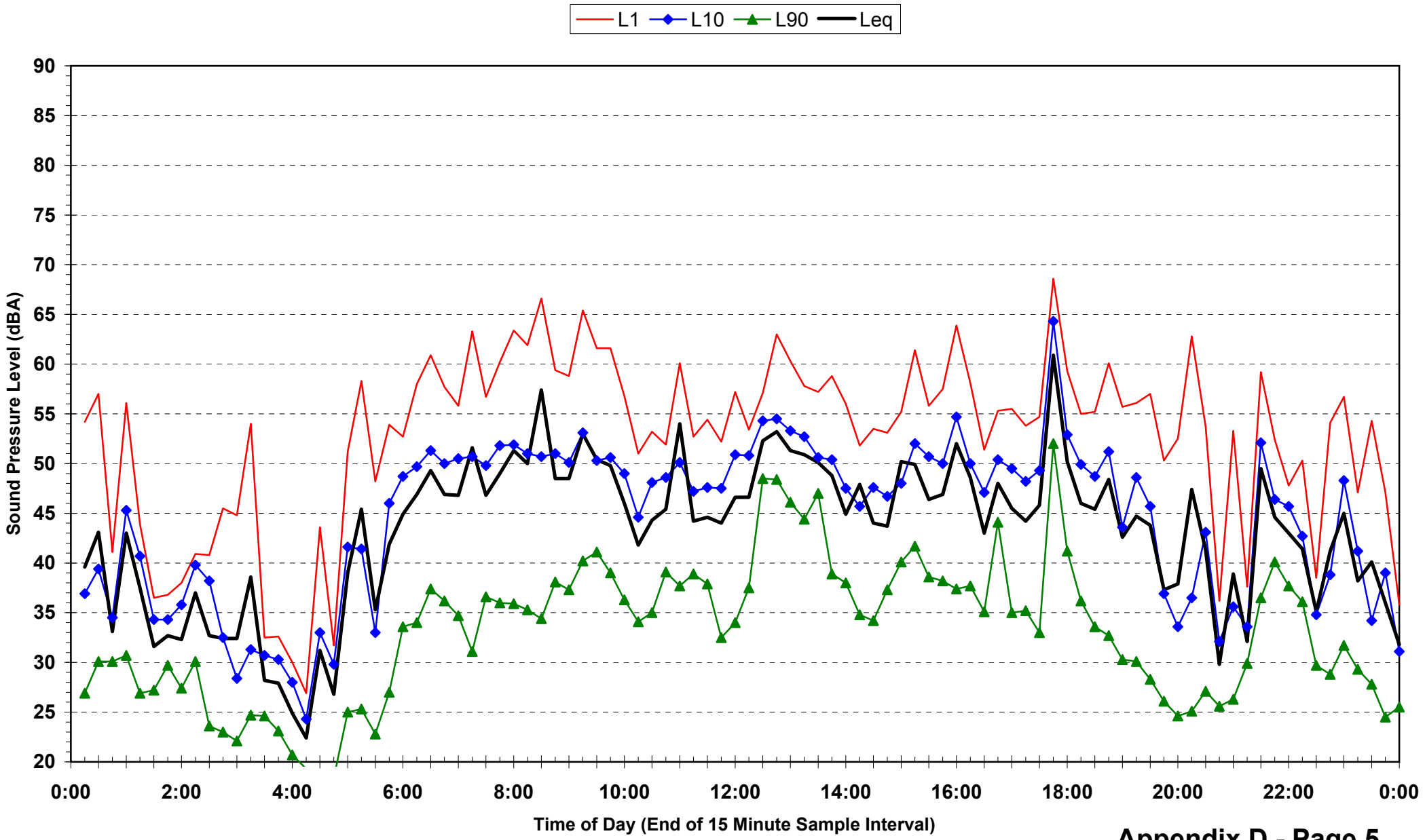
Hillview', 1998 Molong Manildra Road, Manildra - Monday 13 September 2010



Statistical Ambient Noise Levels
Hillview', 1998 Molong Manildra Road, Manildra - Tuesday 14 September 2010



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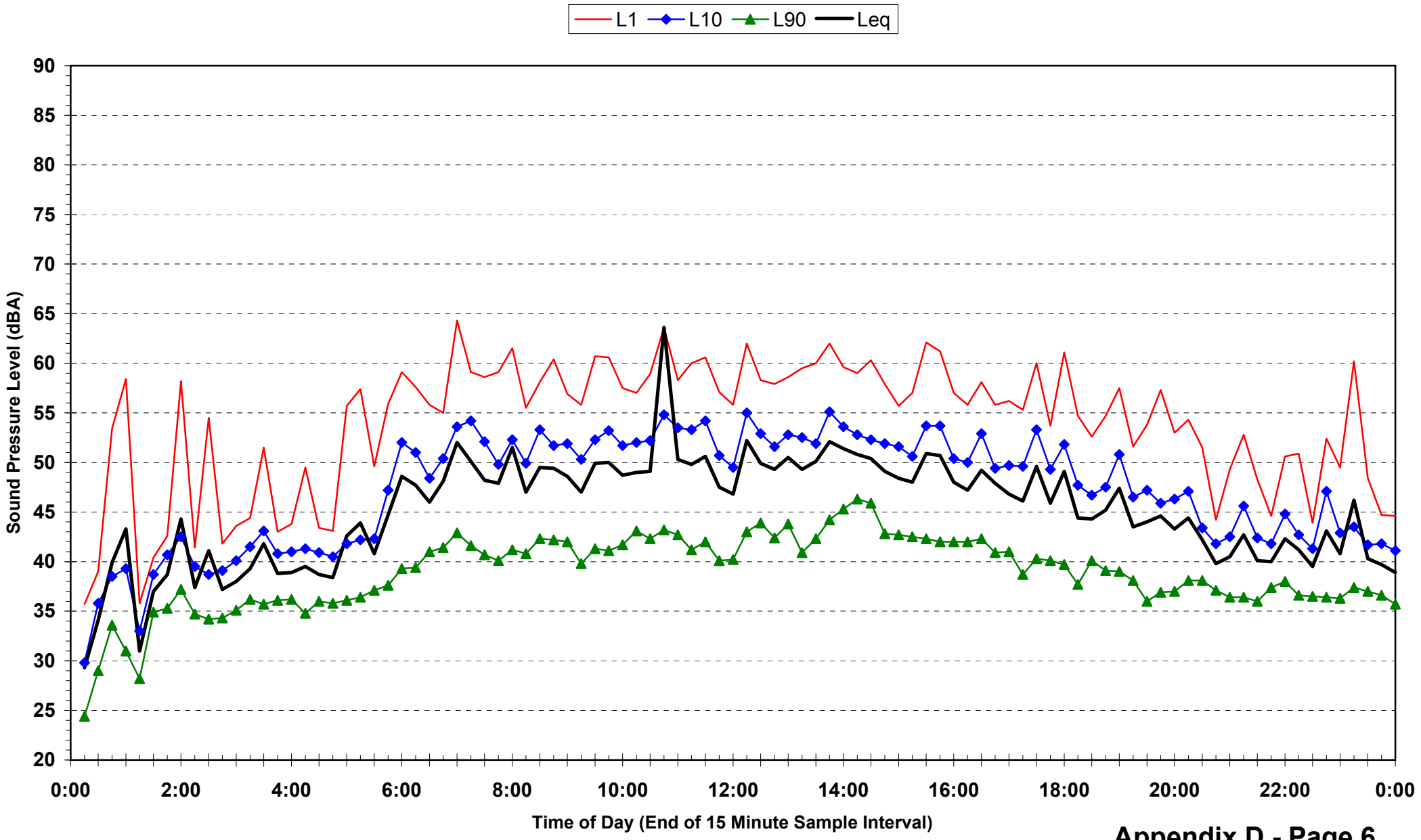

Statistical Ambient Noise Levels
Hillview', 1998 Molong Manildra Road, Manildra - Thursday 16 September 2010