

APPENDIX I: ACOUSTIC ASSESSMENT (GLOBAL ACOUSTICS, 2004)



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20 December, 2004

WBM Oceanics Australia
126 Belford Road
Broadmeadow NSW 2292

Attention: Philip Haines

Dear Philip,

Regarding: Construction of Earth Bund, Shortland

1 INTRODUCTION

Global Acoustics was engaged by WBM Oceanics Australia (WBM) to conduct a noise impact assessment for the construction of a proposed earth bund in the Shortland area to prevent tidal inundation into the rear of properties in Shortland.

Background noise monitoring described in this report was undertaken from 7 to 17 December 2004. Figure 1 shows the location of the proposed bund and monitoring sites.

The purpose of this report is to quantify and describe the acoustic environment around the site and determine if the proposed facility meets with specified noise limits.

The following detailed scope of works for the noise assessment was derived:

- Quantify the existing environment
 - Noise logging at residences near the facility;
 - Collate logged data for environmental noise.
- Construction noise
 - Determine construction noise criteria;
 - Calculate construction noise;
 - Assess impact.

Construction of the bund involves minimal traffic movements, primarily through Hunter Water Land. It is estimated that approximately 175 loads will occur over a 2 to 3 month period. Accordingly, the acoustic impact from truck movements is expected to be low and has not been assessed.

1.1 Project Description

The project involves construction of a earth bund approximately 700 metres long and up to 40 centimetres high. The bund will run south to north and is designed specifically to prevent tidal inundation of certain properties in Shortland when the flood gates on Ironbark Creek are opened further.

1.2 Terminology

Some definitions of terminology used in this report are as follows:

- L_A , the A-weighted root mean squared (RMS) noise level at any instant;
- L_{A10} , the noise level which is exceeded for 10 per cent of the time, which is approximately the average of the maximum noise levels;
- L_{A90} , the level exceeded for 90 per cent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes;
- L_{Aeq} , the average noise energy during a measurement period;
- L_{pk} , the unweighted peak noise level at any instant;
- dB(A), noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise;
- sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals;
- sound exposure level (SEL), the A-weighted noise energy during a measurement period normalised to one second.; and
- Hertz (Hz), cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together.

2 METHODOLOGY

2.1 Background Noise Measurement

Local environmental noise level measurements were made from 7 to 17 December 2004 using noise data loggers. The loggers were configured to provide a statistical noise data summary every 15 minutes. Note that problems were experienced with the noise logger at Mawson Street and data was obtained only up to the 16 December 2004.

Equipment used for logging sound pressure level (SPL) was:

- ARL EL215 noise data logger, serial number (serial number 194676, calibration valid till 4 February 2006);
- ARL EL215 noise data logger, serial number (serial number 193400, calibration valid till 25 February 2006); and
- Bruel and Kjaer sound level calibrator (serial number 523178, calibration valid till 18 August 2005).

There were 2 monitoring locations (as shown on Figure 1) during this survey being:

- 43 Mawson Street, Shortland; and
- 170 Marsden Street, Shortland.

2.2 Construction Noise

Construction noise levels at the nearest residences have been calculated using plant sound power and, conservatively, loss for geometrical spreading only.



Figure 1 **Locality Plan and Monitoring Sites**

3 RESULTS

3.1 Background Noise Levels

Table 1 provides a summary of noise logger data, graphs are provided as Attachment 1.

Table 1 AVERAGE LOGGED NOISE LEVELS, ALL DATA

Receptor	Period	L _{Aeq} dB	L _{A10} dB	L _{A90} dB
Mawson Street	Day	47	49	41
	Evening	46	48	42
	Night	42	44	37
170 Marsden Street	Day	49	51	40
	Evening	50	52	43
	Night	40	43	35

Notes: 1. Day: 7:00 am to 10:00 pm, ~ Night: 10:00pm to 7:00 am.

Rating background levels, generally derived in accordance with EPA guidelines, are provided in Table 2.

Table 2 MEASURED RBL

Location	Day	Evening	Night
	RBL L _{A90} dB	RBL L _{A90} dB	RBL L _{A90} dB
43 Mawson Street	38	38	34
170 Marsden Street	36	37	33

Notes: 1. Day: 7:00 am to 6:00 pm, ~ Evening: 6:00 pm to 10:00 pm, ~ Night: 10:00pm to 7:00 am.

3.2 Construction Noise Criteria

Noise criteria guidelines for construction are provided in the EPA 'Environmental Noise Control Manual' (ENCM) and are:

- For construction periods of four weeks and less, the L_{A10} should not exceed the existing background (L_{A90}) by more than 20 dB;
- For construction periods between four and 26 weeks, the L_{A10} should not exceed the existing background (L_{A90}) by more than 10 dB; and
- For construction periods greater than 26 weeks, the L_{A10} should not exceed the existing background (L_{A90}) by more than 5 dB, this is similar to criteria for a permanent noise source.

Further, the guidelines suggest that construction noise audible at residential premises should be limited to the following times:

- Monday to Friday, 7.00 am to 6.00 pm;
- Saturday, 8:00 am to 1:00 pm; and
- No construction work on Sunday and public holidays.

Table 3 provides criteria at each representative location for daytime construction that have been derived as per the ENCM. It is understood the total construction period would be between 4 and 26 weeks, and, that construction would occur during the day only.

Table 3 DAYTIME CONSTRUCTION NOISE LEVEL LIMITS

Receptor	Construction Period	Measured L_{A90} dB ¹	Allowable L_{A10} dB
Mawson Street	Up to four weeks	38	58
	Four to 26 weeks	38	48
	Greater than 26 weeks	38	43
Marsden Street	Up to four weeks	36	56
	Four to 26 weeks	36	46
	Greater than 26 weeks	36	41

Notes: 1. RBL.

3.3 Construction Noise Results

It is assumed that construction sub-base work, involving earthmoving machinery, will be undertaken along the length of the proposed earth bund.

Table 4 provides a list of equipment likely to be being used including typical sound power levels (L_W).

Table 4 CONSTRUCTION PLANT AND SOUND POWERS

Item	Sound Power dB(A)
Bulldozers	110
Dump trucks	108
Excavators	105
Water carts	109

Two construction scenarios were evaluated at a variety of distances from construction to indicate the likely range of received noise levels. The equipment used in each scenario is detailed in Table 5 and Table 6.

Scenario 1 is a worst-case prediction based on all equipment operating concurrently at maximum power for a 15-minute period. In practice, this is unlikely to occur and Scenario 2 details activities that will occur at other times. In reality, received noise levels are expected to be somewhere between the results for each scenario.

Table 5 CONSTRUCTION SCENARIO 1

Item	Number in use
Bulldozers	1
Dump trucks	1
Excavators	1
Water carts	1

Table 6 CONSTRUCTION SCENARIO 2

Item	Number in use
Bulldozers	1
Excavators	1

Noise levels have been calculated for a range of distances for each construction scenario is detailed in Table 7 and Table 8.

Table 7 CALCULATED CONSTRUCTION NOISE LEVELS, L_{A10} dB - SCENARIO 1

Distance	Number of plant items in use	Calculated Level	Criterion ¹	Exceedance
250	4	58	48/46	10/12
300	4	57	48/46	9/11
350	4	55	48/46	7/9
400	4	54	48/46	6/8
450	4	53	48/46	5/7
500	4	52	48/46	4/6
550	4	52	48/46	4/6
600	4	51	48/46	3/5
650	4	50	48/46	2/4
700	4	49	48/46	1/3
750	4	49	48/46	1/3
800	4	48	48/46	0/2

Notes: 1. Daytime criteria for a total construction period of 4 to 26 weeks at Mawson Street and Marsden Street.

**Table 8 CALCULATED CONSTRUCTION NOISE LEVELS, L_{A10} dB -
SCENARIO 2**

Distance	Number of plant items in use	Calculated Level	Criterion ¹	Exceedance
250	2	55	48/46	7/9
300	2	54	48/46	6/8
350	2	52	48/46	4/6
400	2	51	48/46	3/5
450	2	50	48/46	2/4
500	2	49	48/46	1/3
550	2	48	48/46	0/2
600	2	48	48/46	0/2
650	2	47	48/46	0/1
700	2	46	48/46	0/0
750	2	46	48/46	0/0
800	2	45	48/46	0/0

Notes: 1. Daytime criteria for a total construction period of 4 to 26 weeks at Mawson Street and Marsden Street.

4 SUMMARY AND MITIGATION MEASURES

Predicted noise levels for hypothetical construction scenarios, as shown in Table 7 and Table 8, are often well above the adopted daytime criterion. Noise control options include:

- Selection of low noise emission plant (some plant can be 5 dB or more quieter with engineering noise controls, smaller plant items are often quieter);
- Temporary noise barriers (erect hoarding adjacent to work areas as required); and
- Educate contractors about quieter work practices during toolbox talks (this can be particularly useful with regard to limiting maximum noise levels, eg. “Do not drop excavator bucket onto ground”).

However, some predicted noise levels are high and, even with various mitigation measures as listed above the L_{A10} criteria may still be exceeded. This is not uncommon for construction projects, however, it is recommended that community information and liaison will be required, preferably by direct contact.

Traffic noise impacts from road movements associated with the project are considered unlikely.

I trust this information is per your requirements. Please contact me if you require further details or advice.

Yours faithfully,

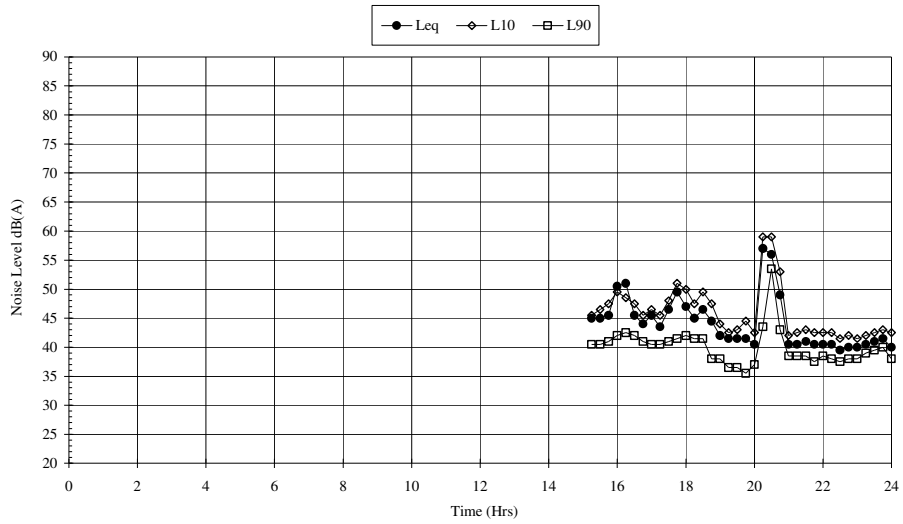
Tony Welbourne
Director

Attachments

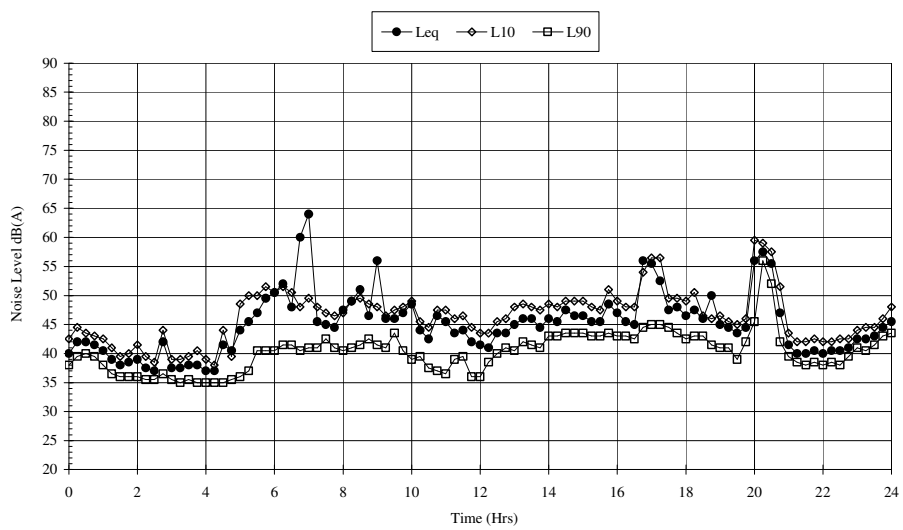
Attachment 1

Logger Data Graphs

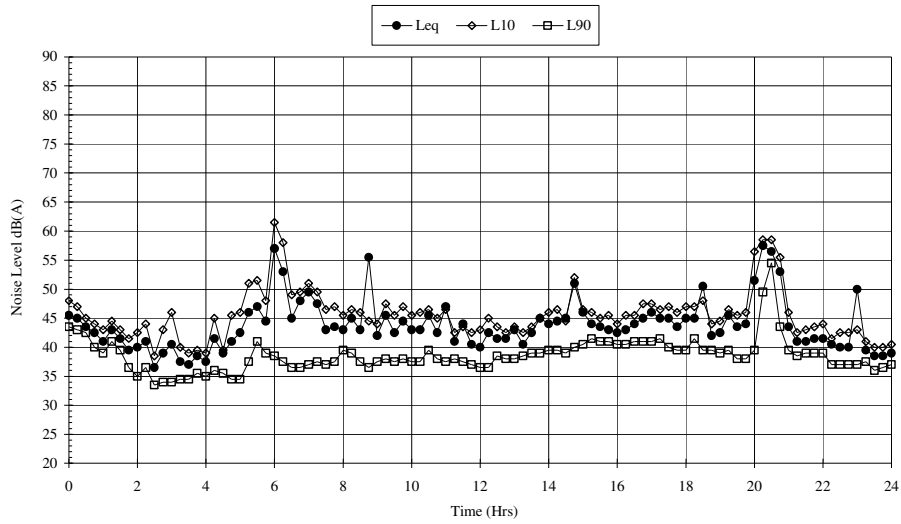
Environmental Noise Levels At 43 Mawson Street
7/12/2004



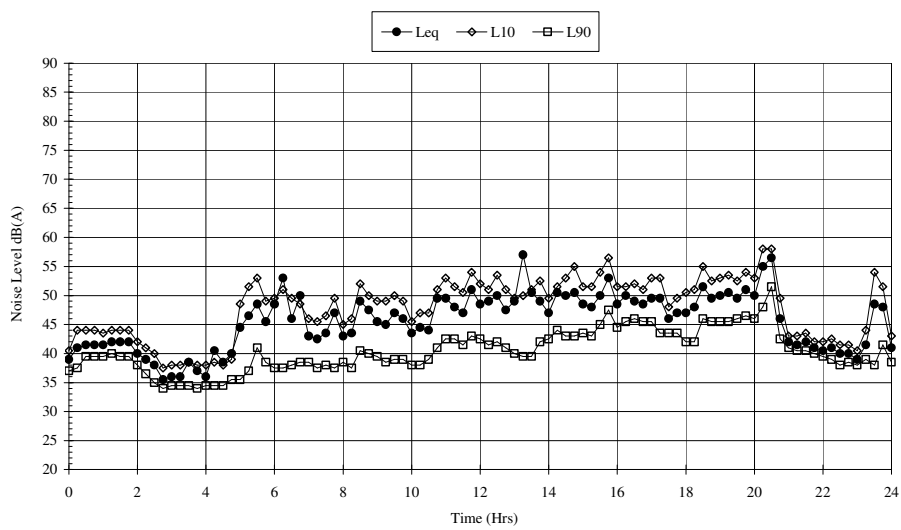
Environmental Noise Levels At 43 Mawson Street
8/12/2004



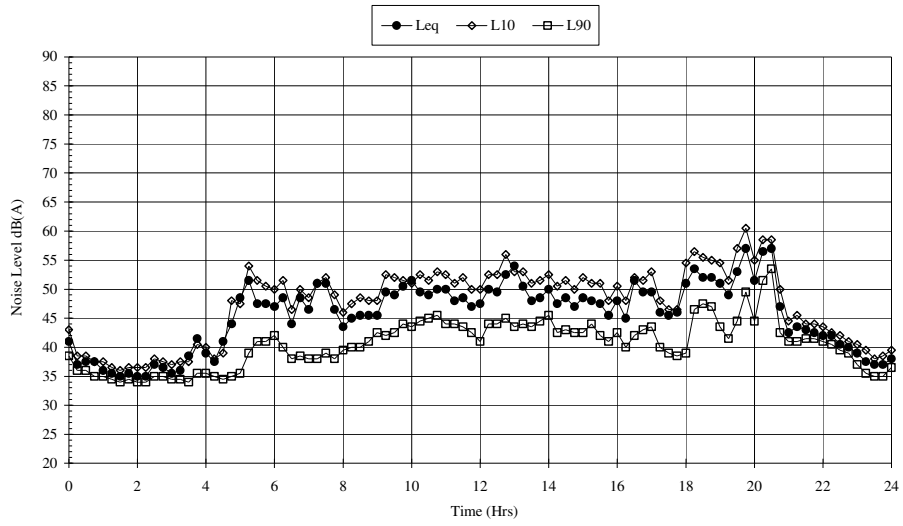
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9/12/2004



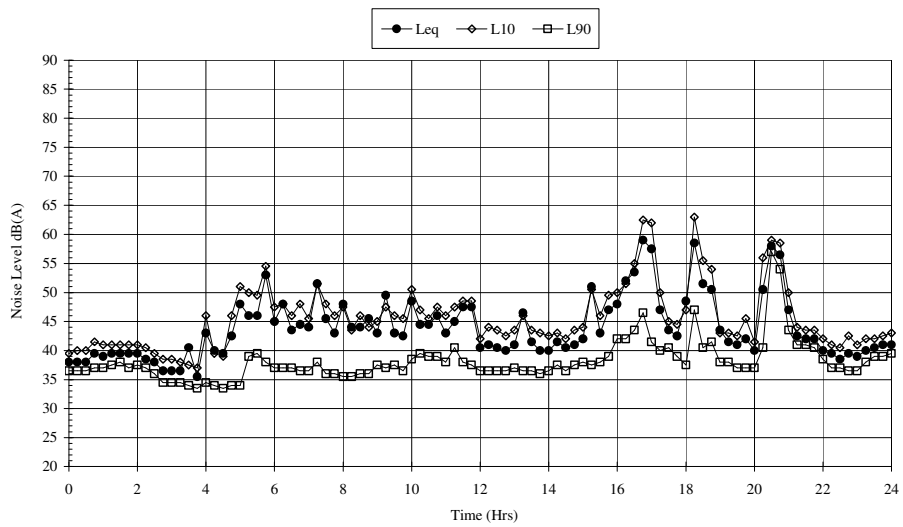
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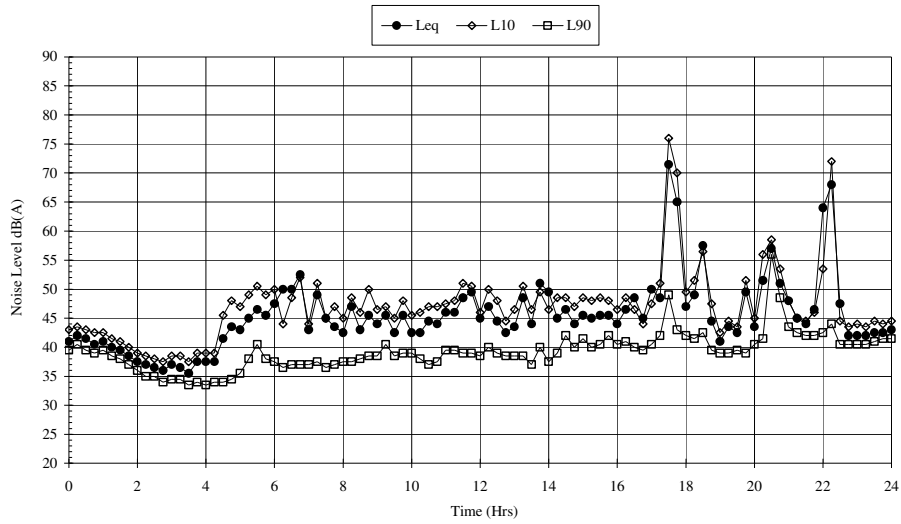
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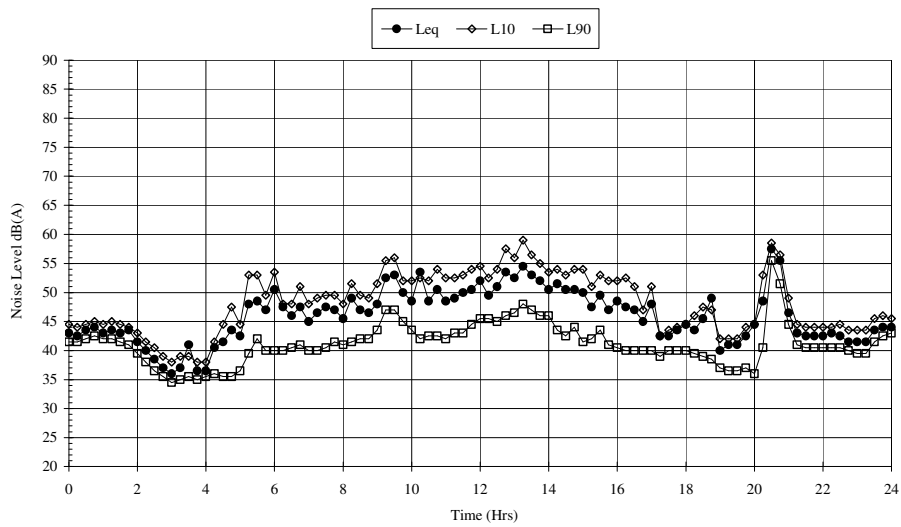
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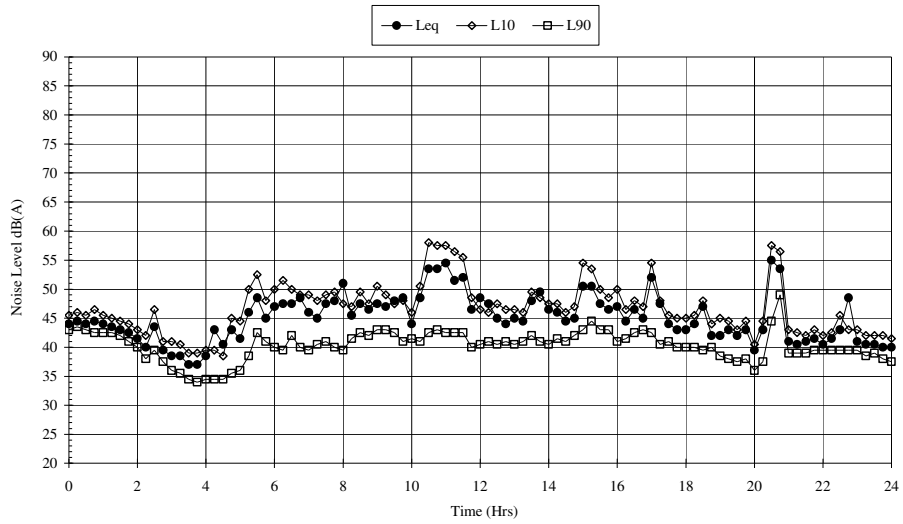
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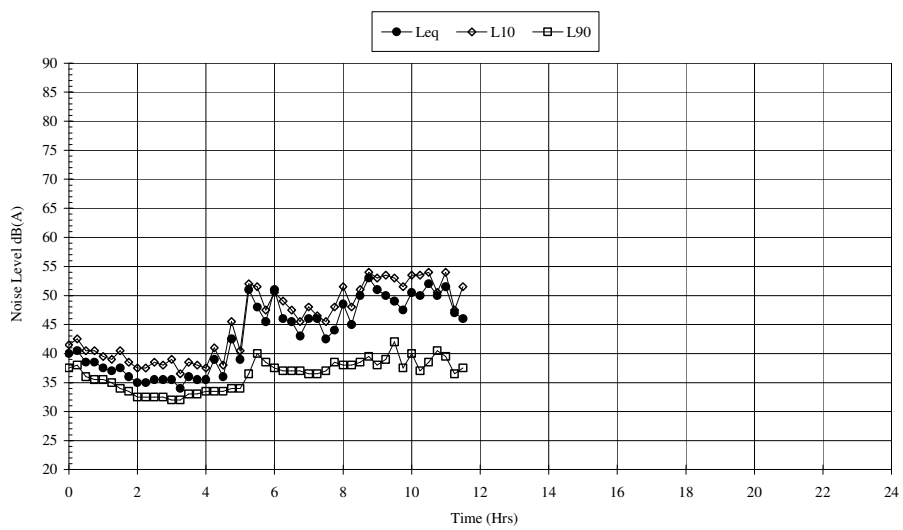
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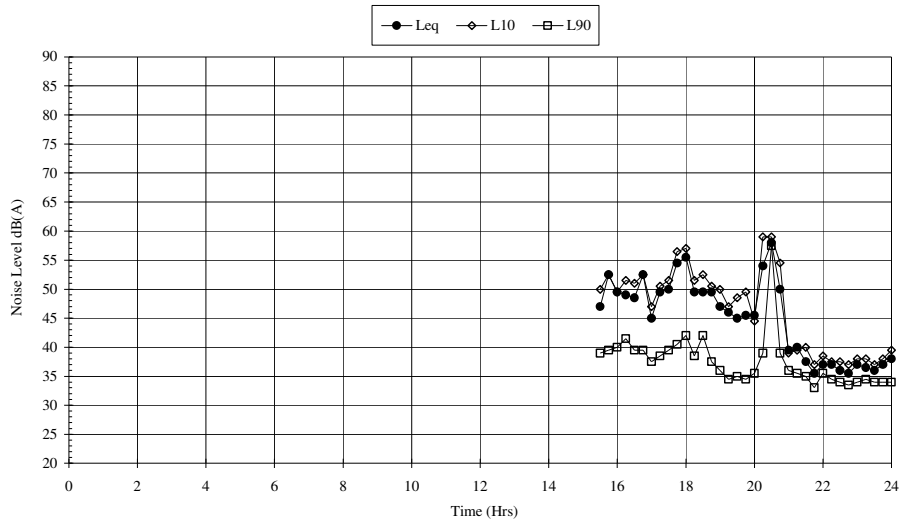
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15/12/2004



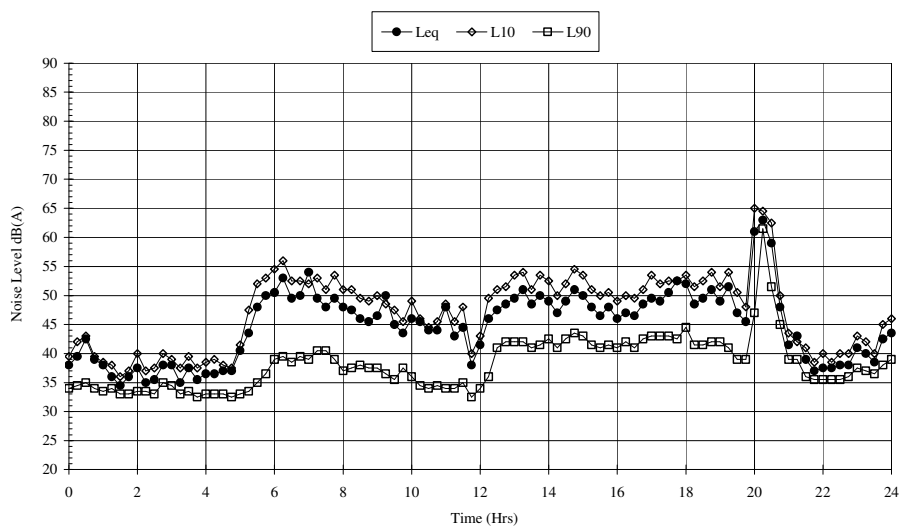
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16/12/2004



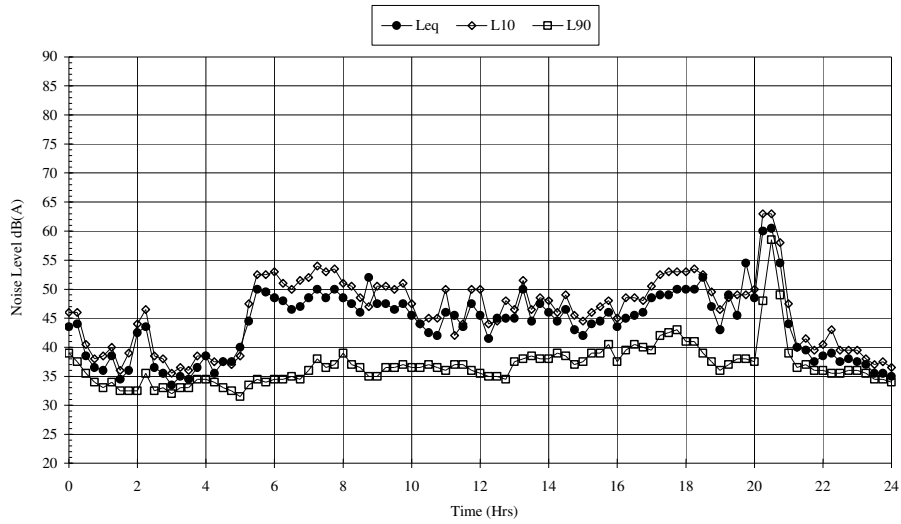
Environmental Noise Levels At 170 Marsden Street
7/12/2004



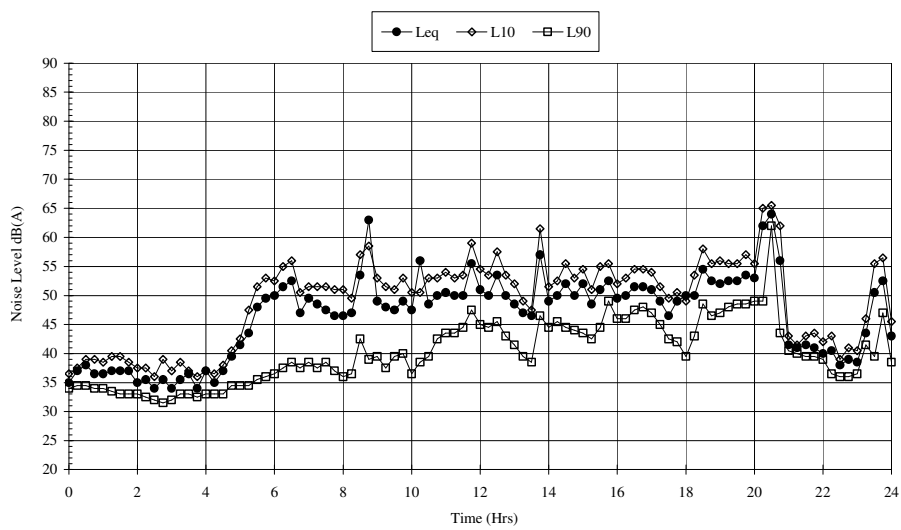
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8/12/2004



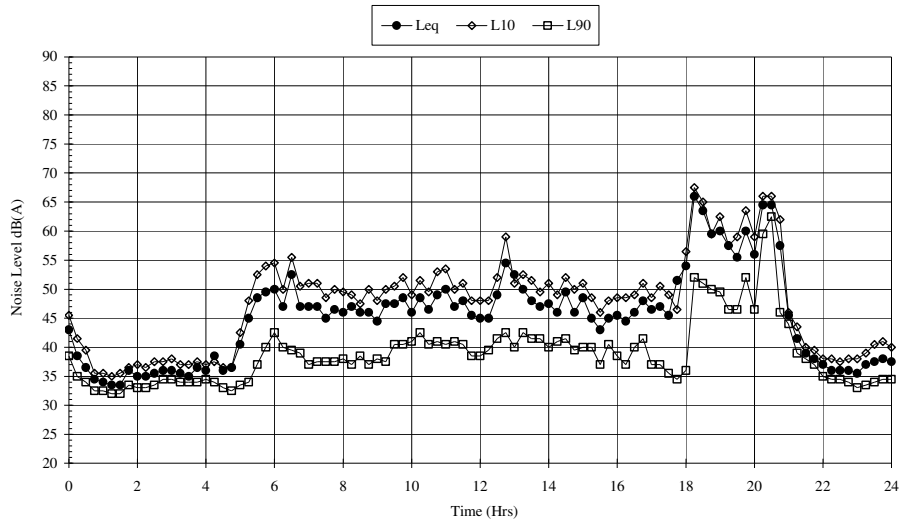
Environmental Noise Levels At 170 Marsden Street
9/12/2004



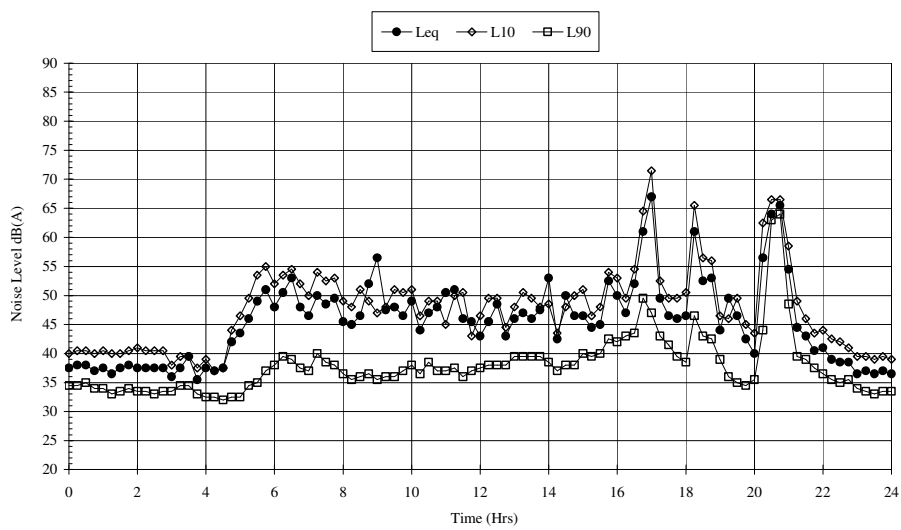
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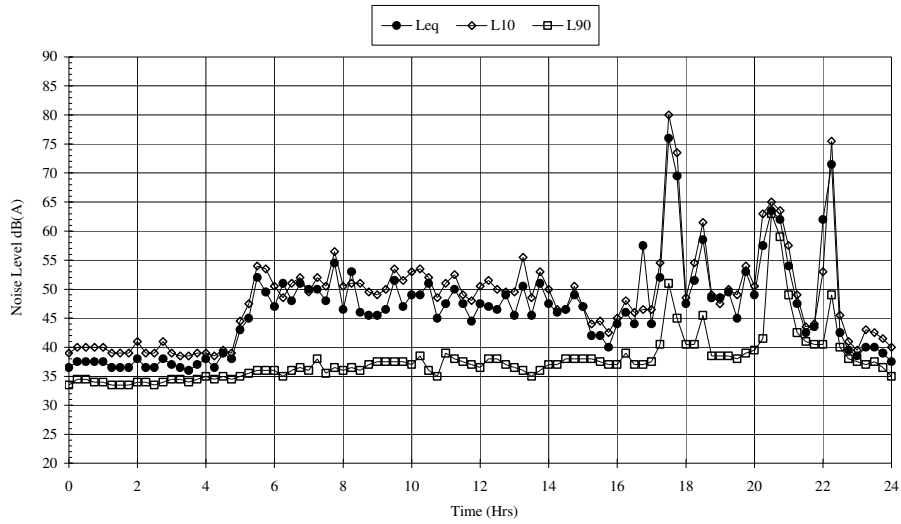
Environmental Noise Levels At 170 Marsden Street
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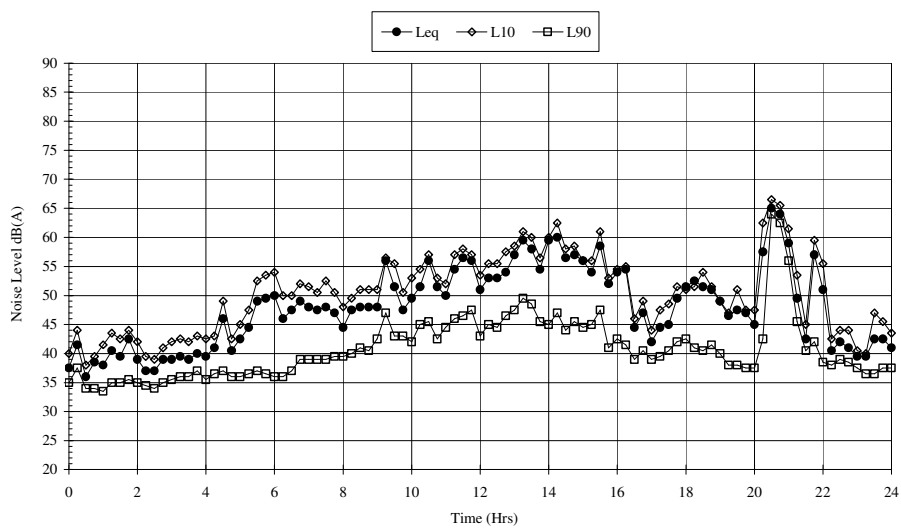
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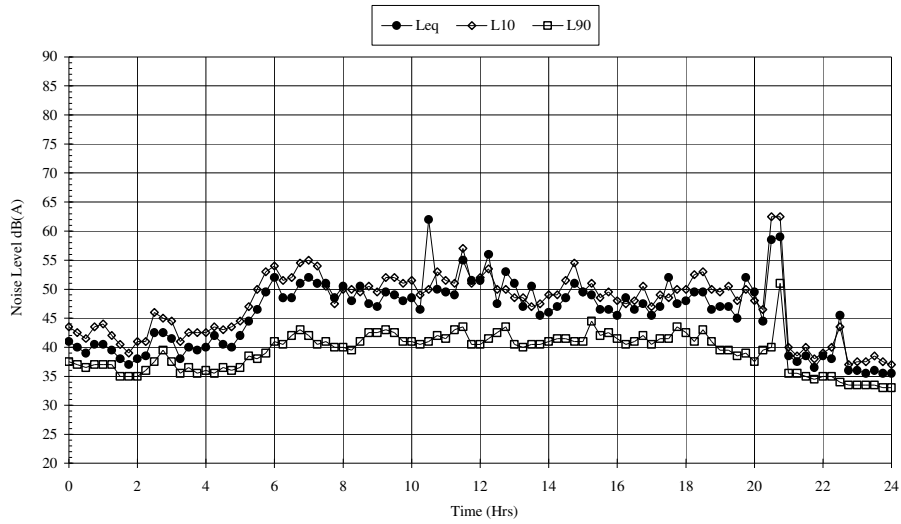
Environmental Noise Levels At 170 Marsden Street
13/12/2004



Environmental Noise Levels At 170 Marsden Street
14/12/2004



Environmental Noise Levels At 170 Marsden Street
15/12/2004



Environmental Noise Levels At 170 Marsden Street
16/12/2004

