1 Alfred Street and 10-31 & 31A Pitt Street, Sydney

DA Acoustic Assessment

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1 INTRODUCTION

This report presents an analysis of the acoustic impacts associated with the proposed residential, hotel and commercial development at 1 Alfred Street, Sydney.

This report has been prepared in relation to a Stage 1 development application for the site which incorporates two towers (a residential at the western end of the site and a hotel at the eastern end of the site) both with ground level retail.

This report has been prepared in relation to a Stage 1 development application for the whole of the site, however we note that Stage 1 and Stage 2 approval from the residential tower (at the western end of the site) has already been granted.

In this report we will:

- Conduct an external noise impact assessment (primarily traffic and rail) and recommend acoustic treatments to the Hotel Tower to ensure that a reasonable level of amenity is achieved for future tenants.

- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council acoustic requirements, ensuring that nearby developments are not adversely impacted by the subject development.

2 SITE DESCRIPTION

The subject site is 1 Alfred Street, Sydney. The site has Street frontages on George Street (to the west), Alfred Street (to the north) and Pitt Street (to the east).

At present, there is an approximately 25 storey commercial development on the site.

It is proposed to demolish this building and construct two new towers:

- The eastern tower is propose to be a 24 storey high hotel with ground level retail and will include a ball room, day spa and restaurant and bar both with outdoor terraces (level 5 and 22).

- The western tower (being approximately 50 storeys) with retail development at lower levels and residential apartments above. We note that Stage 1 ad Stage 2 development approval for this tower has been granted by City of Sydney Council basement car park.

This development application seeks Stage 1 approval for the entire site, including a minor amendment of the footprint of the residential tower. We note that an amended Stage 2 DA for the residential tower will also be lodged to reflect the change in footprint of that tower.

Development in the vicinity of the suite is:

- To the north – Alfred street and Circular Quay.

- To the east – Pitt Street. Further to the east, on the opposite side of Pitt Street lies commercial/retail development.

- To the south – the site is adjoined by commercial development.

- To the west by - George Street. Further to the west, on the opposite side of george Street, is commercial development, including the Four Seasons Hotel.

Primary noise sources impacting the site are as follows:

- Road traffic noise, particularly buses on George and Pitt Street, and to a lesser degree road traffic on the Cahill Expressway.

- Noise from roof top mechanical plant on the adjacent commercial buildings to the south.

- Noise from Circular Quay station and the city circle line.

3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement interval.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

4 EXTERNAL NOISE INTRUSION

Significant noise sources in the vicinity of the site are as follows:

- George, Alfred and Pitts Streets, which carry medium-heavy traffic flows during the day and night (including large numbers of buses).
- Roof top mechanical services noise from the adjacent buildings to the south of the site.
- To a lesser extent, noise form Circular Quay train station.

Noise impacts should comply with the requirements of the City of Sydney DCP 2012.

4.1 ASSESSMENT CRITERIA

4.1.1 Sydney City Council Development Control Plan 2012

Section 4.2 of the Sydney DCP 2012 relates to objectives and provisions for residential flat developments. Part 4.2.3.11 of this section of DCP 2012 outlines the following acoustic controls for new developments affected by traffic noise:

(7) The repeatable maximum $L_{Aeq(1hour)}$ for residential buildings and serviced apartments must not exceed the following levels:

(a) for closed windows and doors:

i) 35dB for bedrooms (10pm-7am); and

ii) 45dB for main living areas (24 hours).

(b) for open windows and doors:

i) 45dB for bedrooms (10pm-7am); and

ii) 55dB for main living areas (24 hours).

(8) Where natural ventilation of a room cannot be achieved, the repeatable maximum $L_{Aeq(1hour)}$ level in a dwelling when doors and windows are shut and air conditioning is operating must not exceed:

(a) 38dB for bedrooms (10pm-7am); and

(b) 46dB for main living areas (24 hours).

4.2 AS2107-2000 - RECOMMENDED DESIGN SOUND LEVELS AND REVERBERATION TIMES FOR BUILDING INTERIORS

For retail occupancies, recommended noise levels in AS2107-2000 "Recommended Design Sound Levels and Reverberation Times for Building Interiors" will be adopted.

4.2.1 Summary of Noise Intrusion Criteria

This assessment shall be conducted in accordance with the most stringent criteria specified above, which is the SEPP 2007, as shown in the table below.

Table 1 – Internal Noise Level Criteria

LOCATION	CRITERIA
Bedroom	35dB(A)$L_{eq(Worst\ 1\ hour)}$
Living Areas	45dB(A)$L_{eq(Worst\ 1\ hour)}$
Retail, Bar, Restaurant Areas	45-50 dB(A)$L_{eq(15hour)}$
Spa	40dB(A)$L_{eq(Worst\ 1\ hour)}$

4.3 TRAFFIC NOISE MEASUREMENTS

Measurements of road and rail noise impacts were conducted a part of the Stage 1 approval for the residential tower.

Measurement of external noise was conducted using both long term monitoring and short term, hand held measurements.

Long term monitoring was conducted using a noise monitor installed on site, using noise monitors installed on level 1 and level 25 of the existing building, with monitors installed on the George Street façade (at level 1) and on the southern façade (at level 25) between 21 and 29 April 2010) using Acoustic Research Laboratories noise monitors set to A-weighted fast response. The monitors were calibrated at the start and end of the monitoring period. No significant drift was noted. Noise logger data is provided in Appendix 1.

Short term noise measurements were conducted on 29 April (between 9am and 10am) and 13 May (between 6am and 7am) to supplement the long term monitoring.

A summary of measured noise levels is presented below.

Table 2 – Measured Noise Levels (Road and Rail Noise)

Building Facade	Level	Daytime Noise Level $dB(A)L_{eq,1\ hour}$ (24 hours)	Night Time Noise Level $dB(A)L_{eq,1\ hour}$ (2200 – 0700)
West (George Street – Western Tower)	1	71	68
	25	67	65
North (Alfred Street)	1	69	66
	25	67	65
East (Pitt Street – Eastern Tower)	1	68	66
	25	68	65
South	1	67	64
	25	66	65

4.4 RECOMMENDED TREATMENTS

External noise intrusion will primarily be as a result of noise transfer through the roof, windows and doors, as these are relatively light building elements, which offer less resistance to the transmission of sound.

The treatments set out in this section will ensure compliance with the noise objectives for both external noise sources (aircraft and traffic) likely to impact the potential development.

Calculations take into account the size and orientation of windows, barrier effects (from terrace areas), facade transmission losses and room sound absorption characteristics.

4.4.1 Recommended Glazing

The recommended glazing assemblies are presented in table 3 below. In all cases, the selected glazing type reduces internal noise levels to within the nominated criterion for the various space types.

The proposed glazing thickness will satisfy all acoustic requirements. Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

Glazing systems to address external noise impacts on the eastern tower are presented below. Analysis indicates that the tower will be capable of meeting City of Sydney internal noise level requirements. Indicative systems are presented below.

We note that detailed acoustic review of the glazing to the residential tower would be conducted as part of its detailed design/Stage 2 DA.

Table 2 – Recommended Glazing (Hotel Building)

Level	**Room Type**	Facade	**Glazing**	**Seals**
Ground, Level 1	Retail/Registered Club	North, East and West	10.38mm laminated	Yes
		South	6.38mm laminated	
Level 2	Ballroom and Meeting Rooms	North, East, South	10.38mm laminated/12mm airgap/6mm or 10.38mm laminated.	Yes
Level 3 and 4	Pool	North/East/West	6.38mm laminated/12mm airgap/6mm or 6.38mm laminated	Yes
	Yoga and Spa	North (Alfred Street)	10.38mm laminated/12mm airgap/6mm or 10.38mm laminated.	Yes
Level 5	Dining/Bar	North, East, West	10.38mm laminated/12mm airgap/6mm or 10.38mm laminated.	Yes
Level 5-20	Bedrooms/Suites	All	10.38mm laminated/12mm airgap/6mm or 10.38mm laminated.	Yes
Level 21,22	Premier/Presidential Suites	All	10.38mm laminated/12mm airgap/6mm or 10.38mm laminated.	Yes
	Bedrooms/Suites	East (Pitt Street)	10.38mm laminated/12mm airgap/6mm or 10.38mm laminated.	Yes
Level 23 and 24	Dining/Bar	North, East, West	6.38mm laminated/12mm airgap/6.38mm laminated	Yes

In addition to meeting the minimum glazing thickness requirements given, the design of the window mullions, perimeter seals and the installation of the windows/doors in the building openings shall not reduce the STC rating of the glazing assembly below the values nominated in the table above. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. **Note that mohair of fin type seals will not be acceptable for the windows requiring acoustic seals.**

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum listed STC requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

Table 3 - Minimum STC or R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum STC or R_W of Installed Window (with acoustic seals)
6.38mm laminated/12mm airgap/6mm or 6.38mm laminated	31
10.38mm laminated/12mm airgap/6mm or 10.38mm laminated.	35

4.4.2 External Doors

Any glass door or glazed panels set into solid doors should be constructed using glazing thickness as specified in table 3. Full perimeter acoustic seals around the doors are required.

4.4.1 Roof / Ceiling

Proposed roof consists of concrete slab. No additional treatment to the roof slab is required for acoustic purposes.

4.4.2 External Walls

External wall constructions are primarily masonry (and will have an Rw rating of approximately 50) and will not require any further upgrading for acoustic purposes.

In the event that a light weight external façade element is adopted, detailed acoustic review of any proposed cladding system is recommended at detailed design phase to ensure that suitable internal noise levels are still achieved.

4.4.3 Ventilation and Air Conditioning

Required internal noise levels cannot be achieved in rooms that have a window open on the eastern and southern facades.

Supplementary ventilation to meet the requirements of AS1668.1 is required. Any ventilation system that is installed should be acoustically designed such that the acoustic performance of the recommended building shell constructions are not reduced by any duct or pipe penetrating the wall/ceiling/roof. Noise emitted to the property boundaries by any ventilation system shall comply with Council noise emission requirements.

5 NOISE EMISSION ASSESSMENT

Noise emissions from the site should not adversely impact nearby development.

Other than noise from mechanical plant/ventilation, noise generated by the residential tower will not be significant. We would expect noise emission controls for plant and equipment will be addresses in a condition of consent in any Stage 2 development approval.

The primary noise sources associated with the Hotel tower will be for the functions/ball room and from the Level 5 and 24 outdoor terraces (in additional to noise from mechanical plant).

5.1 BACKGROUND NOISE MONITORING

Measurements of background noise were conducted a part of the Stage 1 approval for the residential tower. Detail of the original the original logging conducted for approved DA was as follows:

- Unattended noise monitoring was conducted between 21 and 29 February 2010 using two Acoustic Research Laboratories monitors set on A-weighted fast response mode. The monitors were calibrated before and after the measurements. No significant drift was recorded.

- Monitors were installed on the level one podium of the existing building (facing George Street) and a level 25 balcony (in the south-western corner of the building).

As expected, ambient noise conditions at the site are dominated by road traffic and roof top mechanical equipment serving nearby buildings. Logging is not impacted by adverse meteorological conditions as defined by section 3.4 if the Industrial Noise Policy (with any weather impact being more than 10dB(A) below the measured ambient noise levels).

In addition, the long term noise monitoring was supplemented by manned measurements of background noise levels on 16 June 2015 at 10pm on George Street, Pitt Street and Alfred Street.

Measured background noise levels are presented below. See appendix 1 for unmanned noise monitoring data.

Table 3 – Measured Background Noise Levels

Location	Background noise level dB(A)L_{90}	
	Daytime and Evening (7am-10pm)	Night (10pm-7am)
Level 1*	64	61
Level 25*	65	64

*Background noise levels measured on level 1 are likely to be representative of background noise levels up to level 7.

**Background noise levels measured on level 1 are likely to be representative of background noise levels above level 7.

Table 4 – Background Noise Spectrum

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Building Facade	68	68	69	60	58	55	53	51	42	**61**

5.2 NOISE EMISSION CRITERIA

Acoustic criteria typically adopted by the City of Sydney Council require that:

- Noise emissions (plant noise), comply with the noise emission requirements of the EPA Industrial Noise Policy.
- For Entertainment Venues (Ballroom):
    - Noise to *external* areas, typical City of Sydney Standard acoustic criteria requires that:
        - The L_{10} noise emissions not exceed background noise levels by more than 5dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 7am and 12am and
        - The L_{10} noise emissions not exceed background noise levels by more than 0dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 12am and 7am, and must be inaudible inside a habitable room of the residence.
    - Noise to *internal* areas (internal to internal area noise transmission through common walls), City of Sydney Standard acoustic criteria requires that the L_{10} noise emissions not exceed background noise levels by more than 3dB when measured in octave bands between 31.5Hz and 8,000Hz.

These requirements are outlined below.

5.2.1 Mechanical Plant Noise (EPA Industrial Noise Policy)

Noise sources covered by this code will be mechanical services noise. Both the Intrusiveness and the Amenity criteria (as set out below) must be complied with.

5.2.1.1 INP - Intrusiveness Assessment

Intrusiveness criteria permit noise generation to be no more than 5dB(A) above existing background noise levels.

Table 7 – Intrusiveness Assessment

Location	Time of Day	Background noise Level – dB(A)L_{90}	Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (Background + 5dB)
Monitor Location – Green Square Precinct	Day Time (7am - 6pm)	64	**69**
	Evening (6pm - 10pm)	64	**69**
	Night (10pm - 7am)	61	**66**

5.2.1.2 INP - Amenity Assessment

The Amenity criteria set additional criteria based on the land use of the noise sensitive receivers.

Amenity criteria are as follows:

Table 8 – Amenity Criteria

Receiver Location	Land Type	Time of Day	Amenity Noise Objective dB(A) $L_{eq(Period)}$
All Potentially Affected Residential Properties	Urban	Day Time (7am – 6pm)	60
		Evening (6pm – 10pm)	50
		Night (10pm-7am)	45
Commercial	All	When in use	65

5.2.2 Noise Emissions – Licenced Premises and Entertainment Venues

Typical noise emission criteria adopted by City of Sydney are presented below.

- Noise to *external* areas, typical City of Sydney Standard acoustic criteria requires that:
    - The L_{10} noise emissions not exceed background noise levels by more than 5dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 7am and 12am and
    - The L_{10} noise emissions not exceed background noise levels by more than 0dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 12am and 7am.
- Noise to *internal* areas (internal to internal area noise transmission through common walls), City of Sydney Standard acoustic criteria requires that:
    - The L_{10} noise emissions not exceed background noise levels by more than 3dB when measured in octave bands between 31.5Hz and 8,000Hz.

Based on the measured background noise levels and spectrums set out in section 6.3, corresponding noise emission goals are as follows. Noise emission requirements to both external areas (ie – residences outside the site) and to internal areas are presented.

Table 9 – Noise Emission Goals (Bar, Dining and Ballroom)

Time of Day	Criteria	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Day (7am-6pm) (External Noise Goal)	**64BG+5**	76	76	77	68	66	63	61	59	50	**69**
Evening (6pm-10pm) (External Noise Goal)	**64BG+5**	76	76	77	68	66	63	61	59	50	**69**
Night (10pm-12am) (External Noise Goal)	**61BG+5**	63	63	74	65	63	60	58	56	47	**66**
After midnight (12am-7am) (External Noise Goal)*	**61BG+0**	68	68	69	60	58	55	53	51	42	**61**

- In addition, after midnight, noise from the operation of the licenced premises must be inaudible in a habitable room of a nearby development.

5.3 ANALYSIS

Potential noise emissions from the site are assessed below.

The nearest potentially affected residential development is the residential tower to the west of the Hotel (part of the1 Alfred Street site).

5.3.1 Patron /Music Noise (Level 5 and 24 Terraces)

A separate development application for use of the bar/terrace would be expected to be lodged by the operator. The analysis below is intended to demonstrate that the terrace is capable of complying with Councils noise emission requirements, at least until 10pm..

Noise emissions at the nearest residential properties (the new residential tower to the west) are presented below and assessed against relevant acoustic criteria (Council's Licensed Premises criteria).

Predicted noise levels are based on the following assumptions:

- The average sound power per patron (raised voice) in an indoor bar (with moderate level music) is 80dB(A)L_{10}, and that one in two patrons are speaking at any one time. (This is a conservatively high assumption, which is typical of patron noise in crowded beer gardens. If used for dining or similar, patron noise on the terrace would typically be expected to be at least 3dB(A) lower).

- That the terraces are filled to capacity (approx. 80 patrons each).

- Music (live or amplified) is played at a background noise level (sound pressure of 65dB(A)L_{10}).

All noise emission predictions are based on the assumption that the acoustic treatments set out in section 5.4 of this report will be adopted. Nosie emissions have been predicted adopting the lowest (most stringent) background noise levels measured at the site.

Predicted noise levels are as follows. A sample noise emission calculation is presented in appendix 2.

Table 10 – Level 5 and 24 Terrace – Noise Emission Assessment to Nearest Residences (Assessment up to 10pm)

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Predicted Level dB(A)L_{10}	48	48	56	56	61	59	53	44	32	**63**
Allowable Noise Level (Up to midnight) – 64dBG+5dB	76	76	77	68	66	63	61	59	50	**69**
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Through appropriate management control, noise from the terrace a capable of meeting Council noise emission requirements.

5.3.2 Noise Emissions from External Mechanical Plant

Mechanical plant items are not typically selected at DA stage as plant selections and locations are not finalised prior to DA.

All plant can be satisfactorily attenuated to levels complying with noise emission criteria through appropriate location and (if necessary) standard acoustic treatments such as noise screens, enclosures, in-duct treatments (silencers/lined ducting) or similar.

Detailed acoustic review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in sections 5.1 of this report.

5.4 RECOMMENDATIONS

ALC recommends the following building/management controls to ensure ongoing compliance with noise emission goals:

- Mechanical Plant.

  Detailed review of mechanical plant should be undertaken at CC stage, once plant selections and locations are finalised.

  In particular, we note:

- Level 2 west facing plant room will most likely require acoustic louvres to any ventilation opening in order to minimum noise impacts on the apartments in the residential tower directly to the west of the site.

- Large roof top plant will require acoustic treatment as the future residential tower to the west is expected to overlook the roof the proposed development. Residential condensers are unlikely to require treatment although the need for this should be determined following final selection of equipment. Roof top cooling towers are likely to require variable speed drives and acoustic attenuators on the intake and discharge.

- Bar/Restaurant:

  - External terrace is not to be used before 8am or after 10pm.

  - Garbage collection/bottle removal to be done in the basement car park and not in external areas.

  - In the event that music other than background music is proposed for the terrace to the bar or dining areas (sound pressure of greater than 65dB(A)) detailed acoustic review should be undertaken of any audio system with respect to speaker placement. This analysis would form a part of any development application for use of the terrace.

  - Similarly, in the event that any terrace areas is proposed to be used after 10pm, a detailed acoustic review should be undertaken of patron noise (taking into account the proposed number of patrons and time of use). This would form a part of any development application for use of the terrace.

- Ballroom:

  - Windows to the ballroom to be kept closed during any use of amplified music (sound pressure of 75dB(A) or greater). Required window thicknesses are set out in table 3 of this report.

  - In the event that highly amplified music (greater than 85dB(A)L_{10} sound pressure) or if the ballroom is used after midnight, a detailed acoustic review should be undertaken of the proposed operating noise level and time of finish to determine whether any upgrade of the façade glazing is required in order to ensure noise emissions to adjacent development remains within Council and EPA noise emission requirements. to of any audio system with respect to speaker placement. This would form a part of any development application for use of the terrace.

6 CONCLUSION

Acoustic Logic have conducted an acoustic assessment of a proposed residential/hotel/retail development at 1 Alfred Street, Sydney.

We note:

- Provided that the acoustic treatments nominated within this report (section 4) are adopted noise impact on future occupants of the proposed Hotel development will comply with relevant Council and Planning NSW noise impact requirements.

- Provide that the acoustic treatments and management controls set out in section 5.4 of this report are adopted, noise generation by the site will comply with relevant EPA and Council noise emission controls.

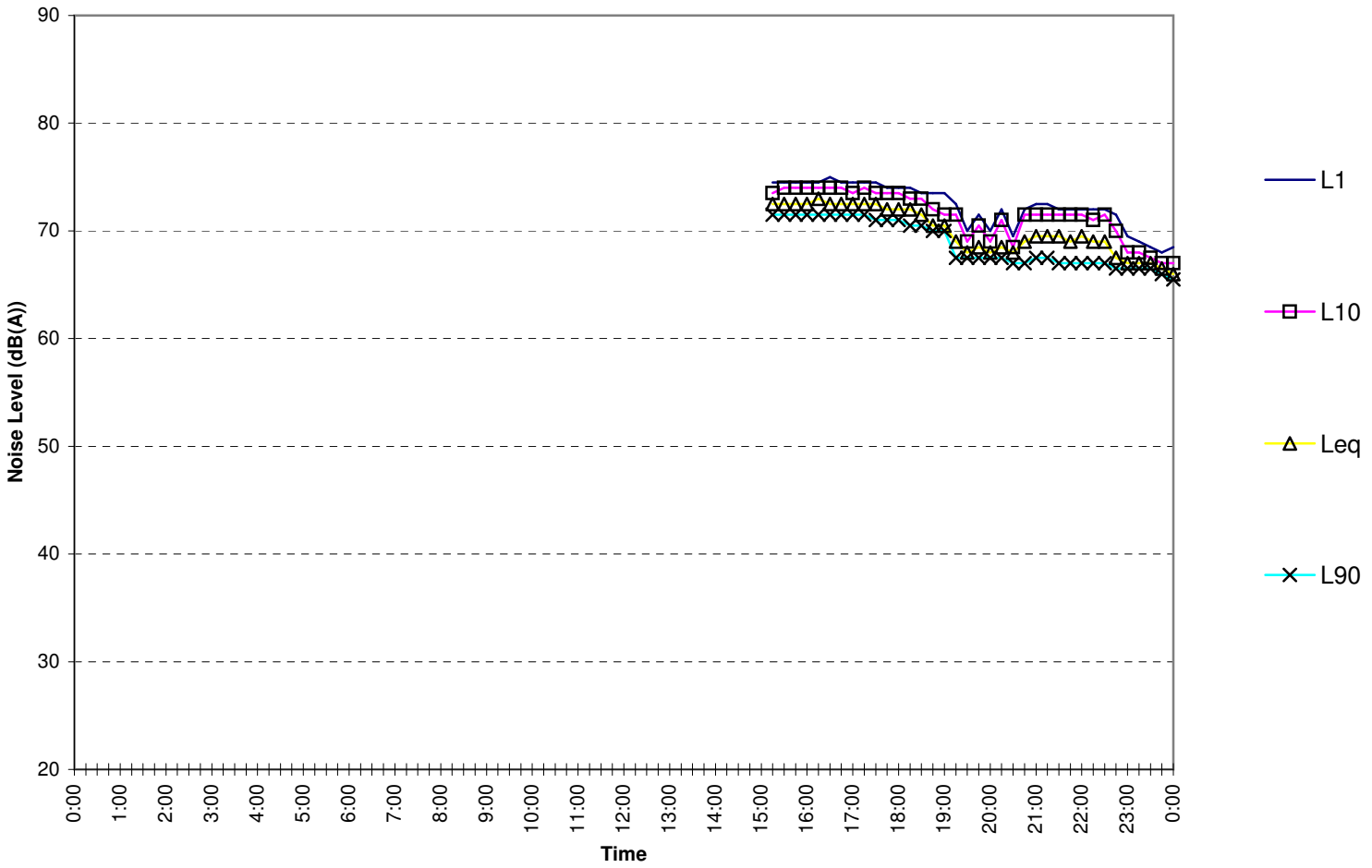
Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Thomas Taylor

APPENDIX 1 – ORIGINAL BACKGROUND NOISE LOGGING DATA

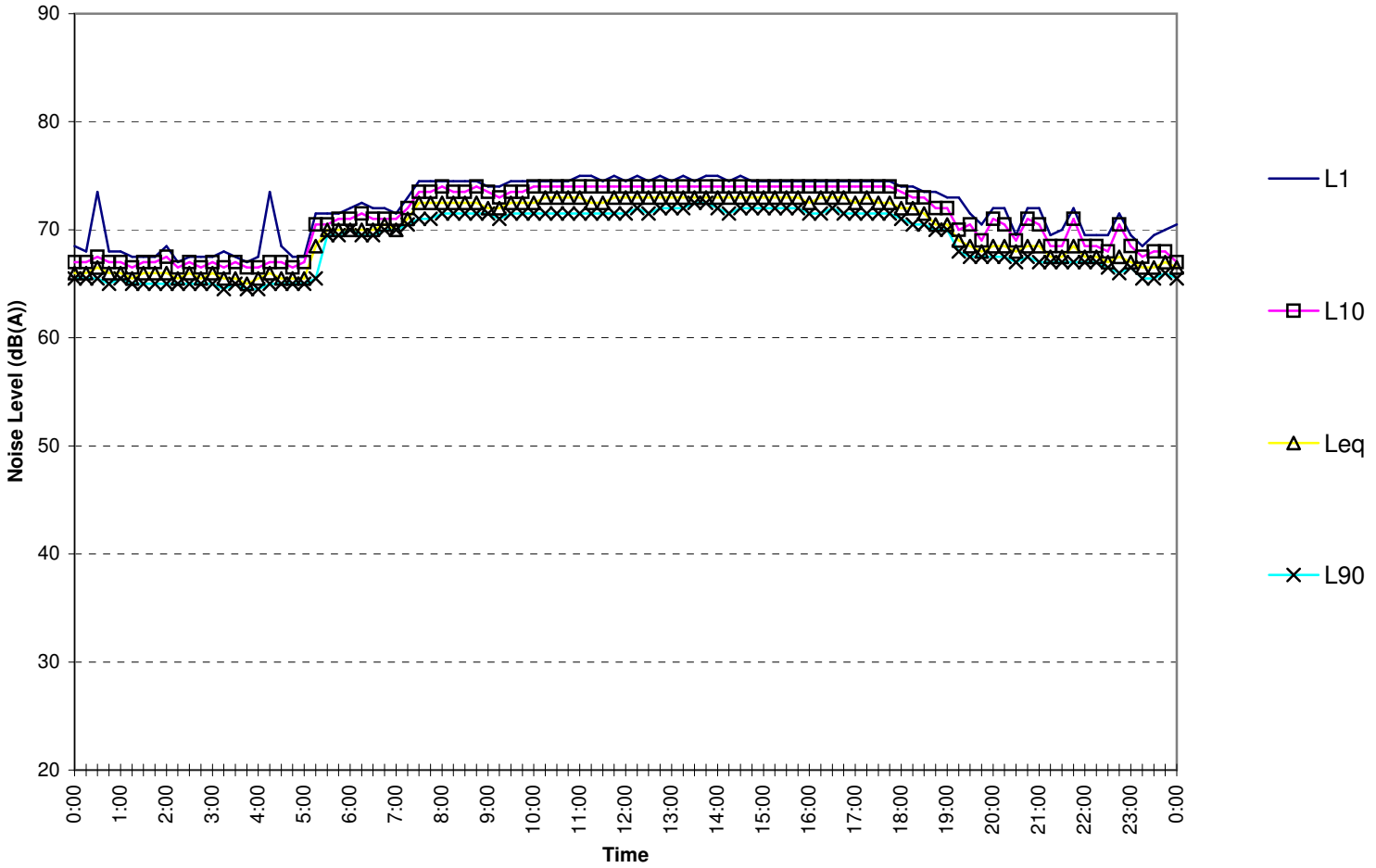
1 Alfred Street - Lev 25

Wednesday, 21 April 2010



1 Alfred Street - Lev 25

Thursday, 22 April 2010



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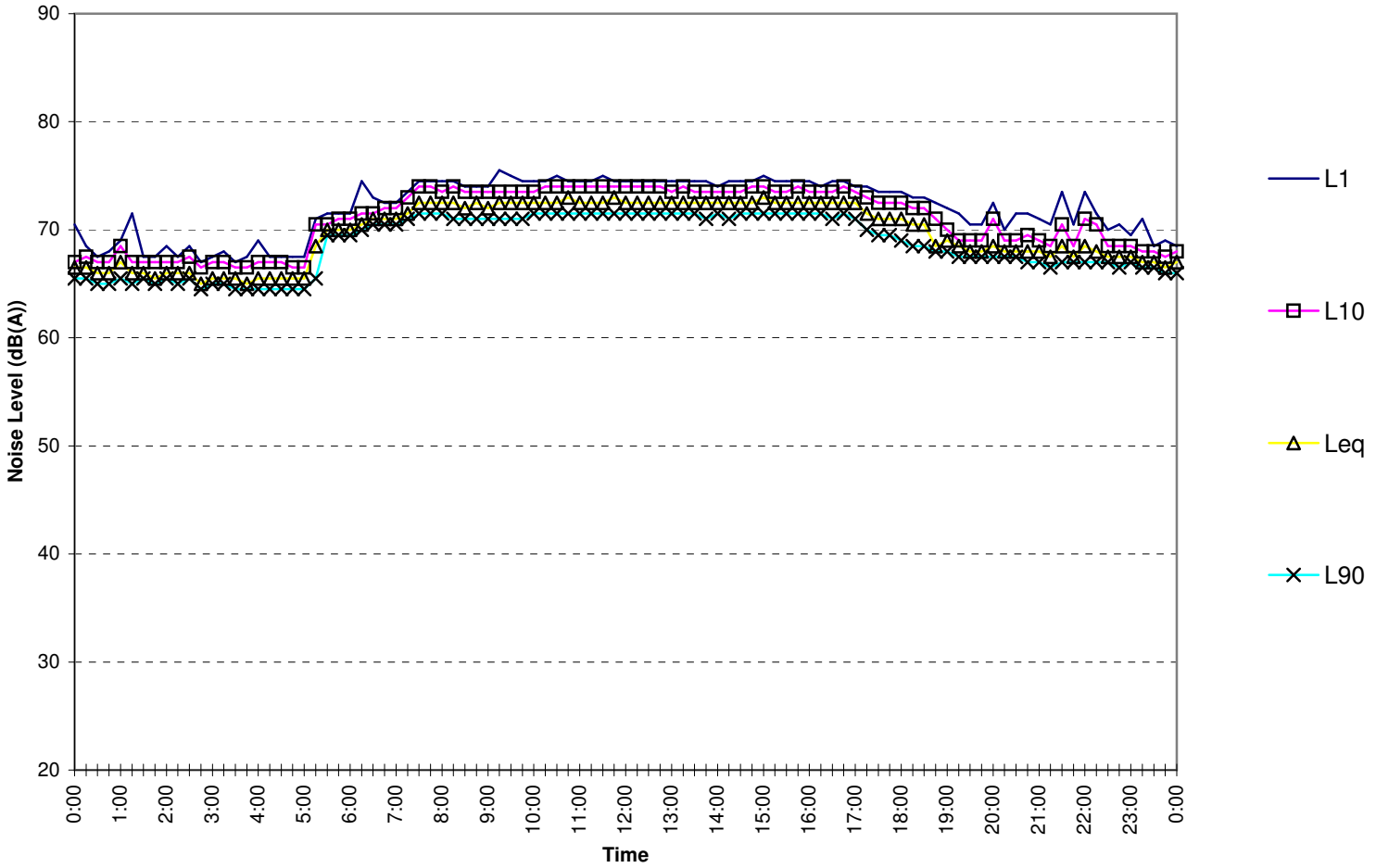
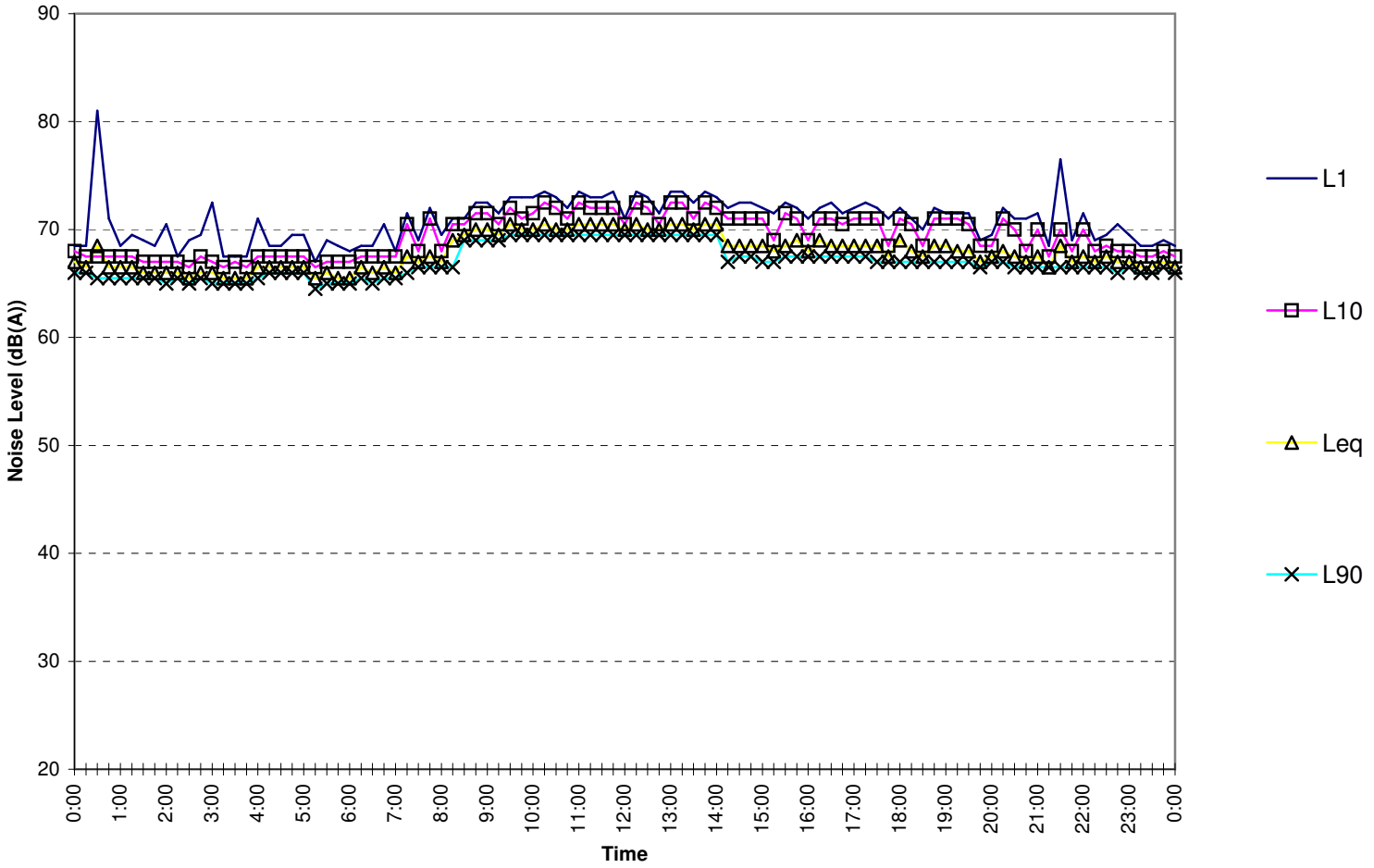


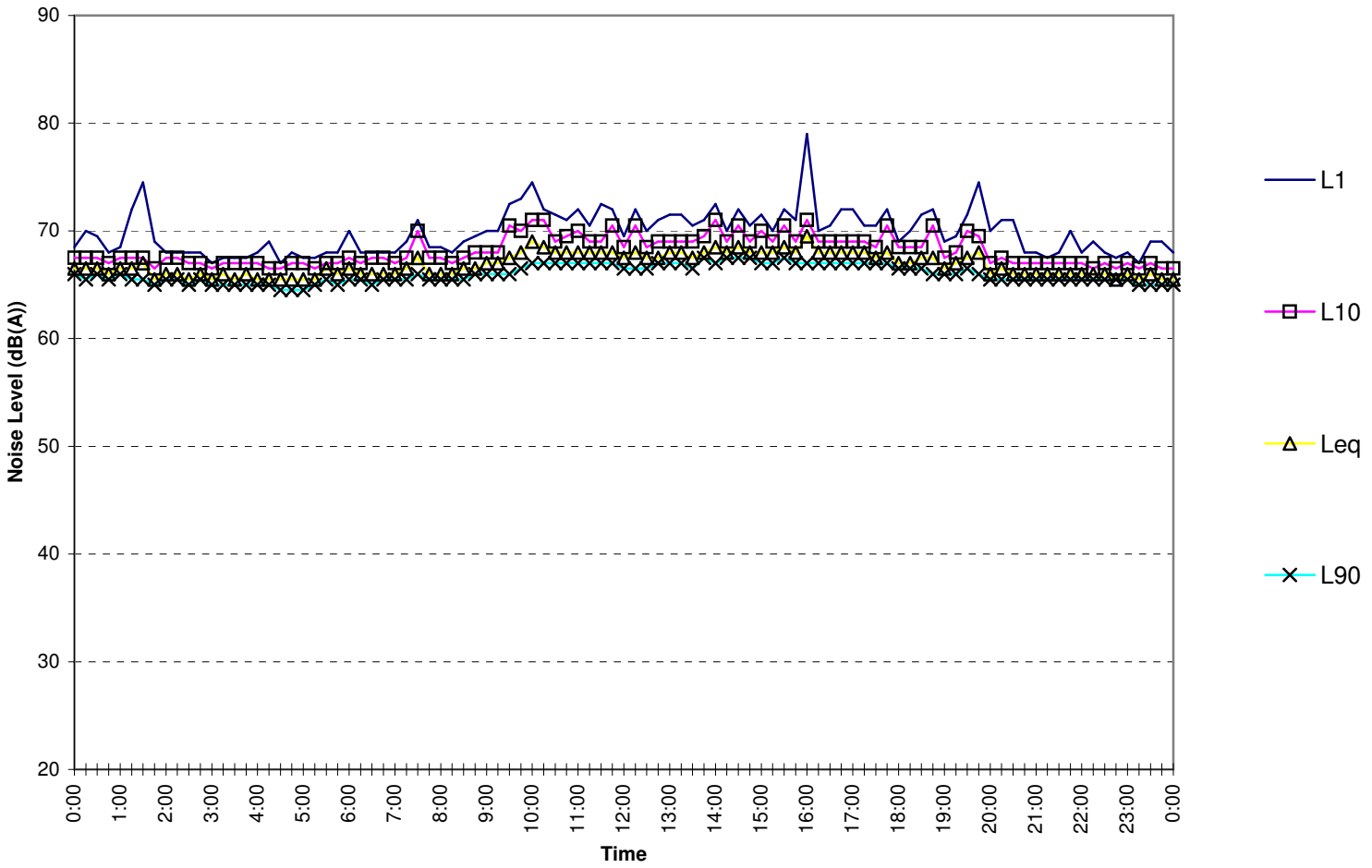
1 Alfred Street - Lev 25

Saturday, 24 April 2010



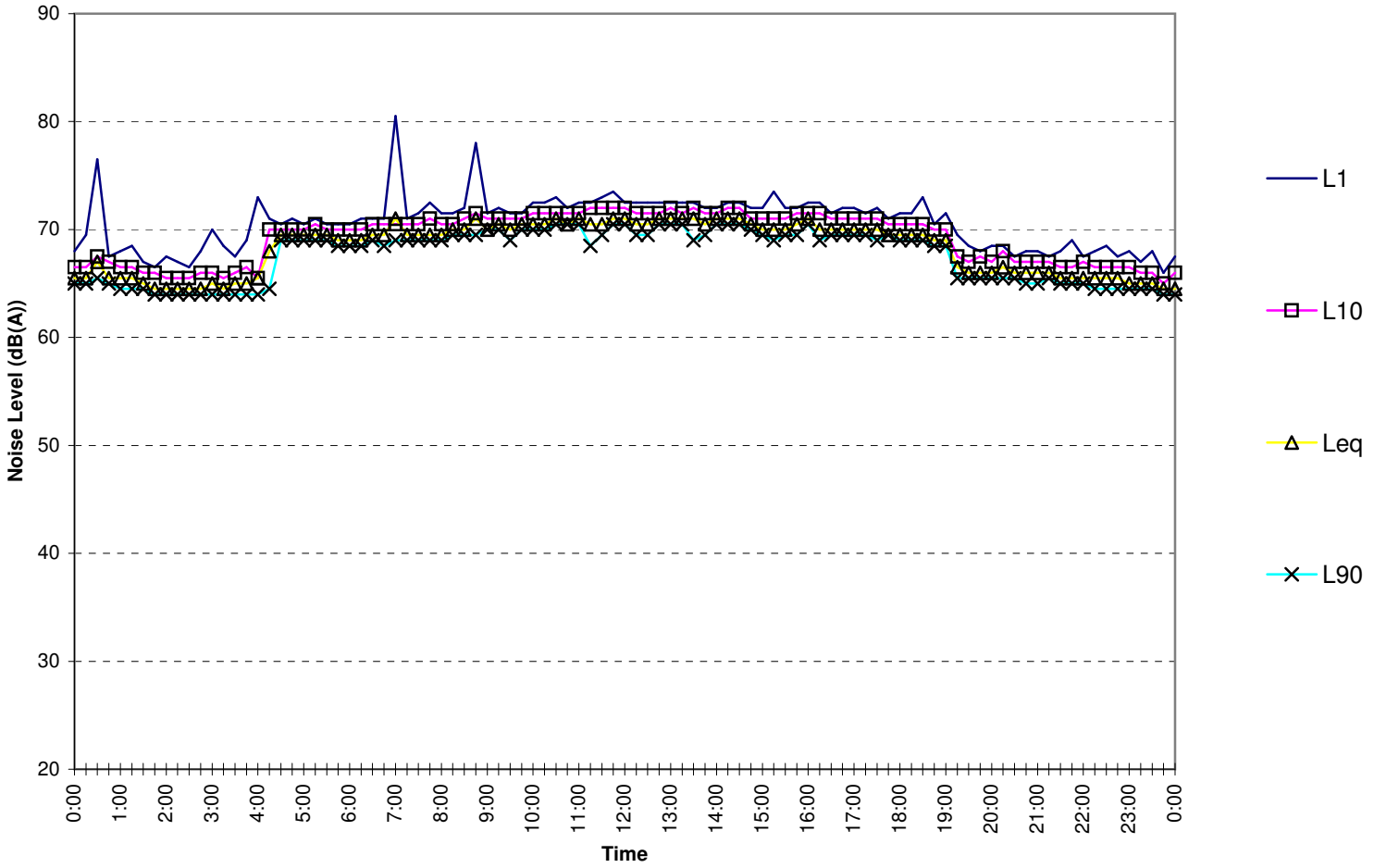
1 Alfred Street - Lev 25

Sunday, 25 April 2010



1 Alfred Street - Lev 25

Monday, 26 April 2010



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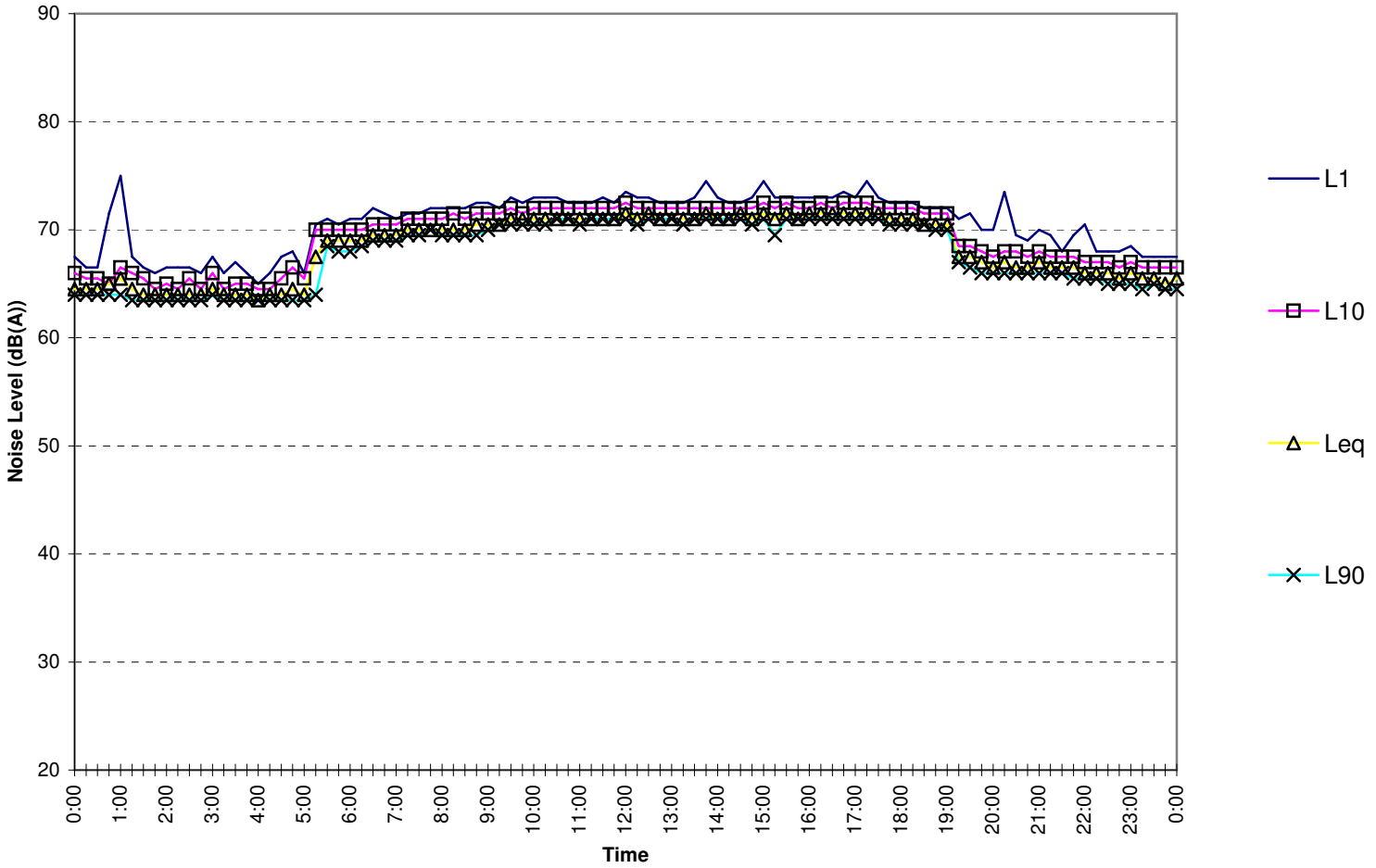

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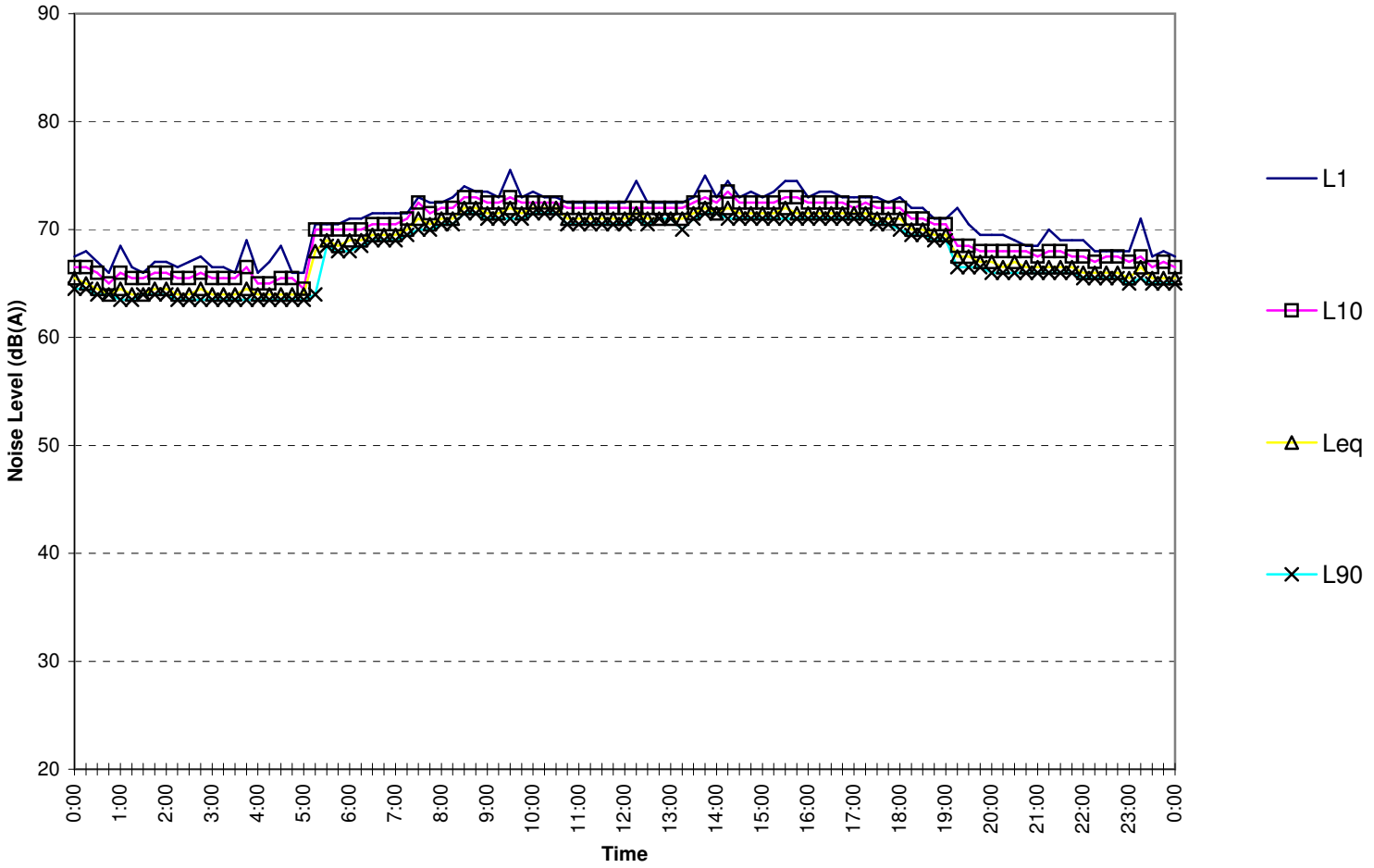

1 Alfred Street - Lev 25

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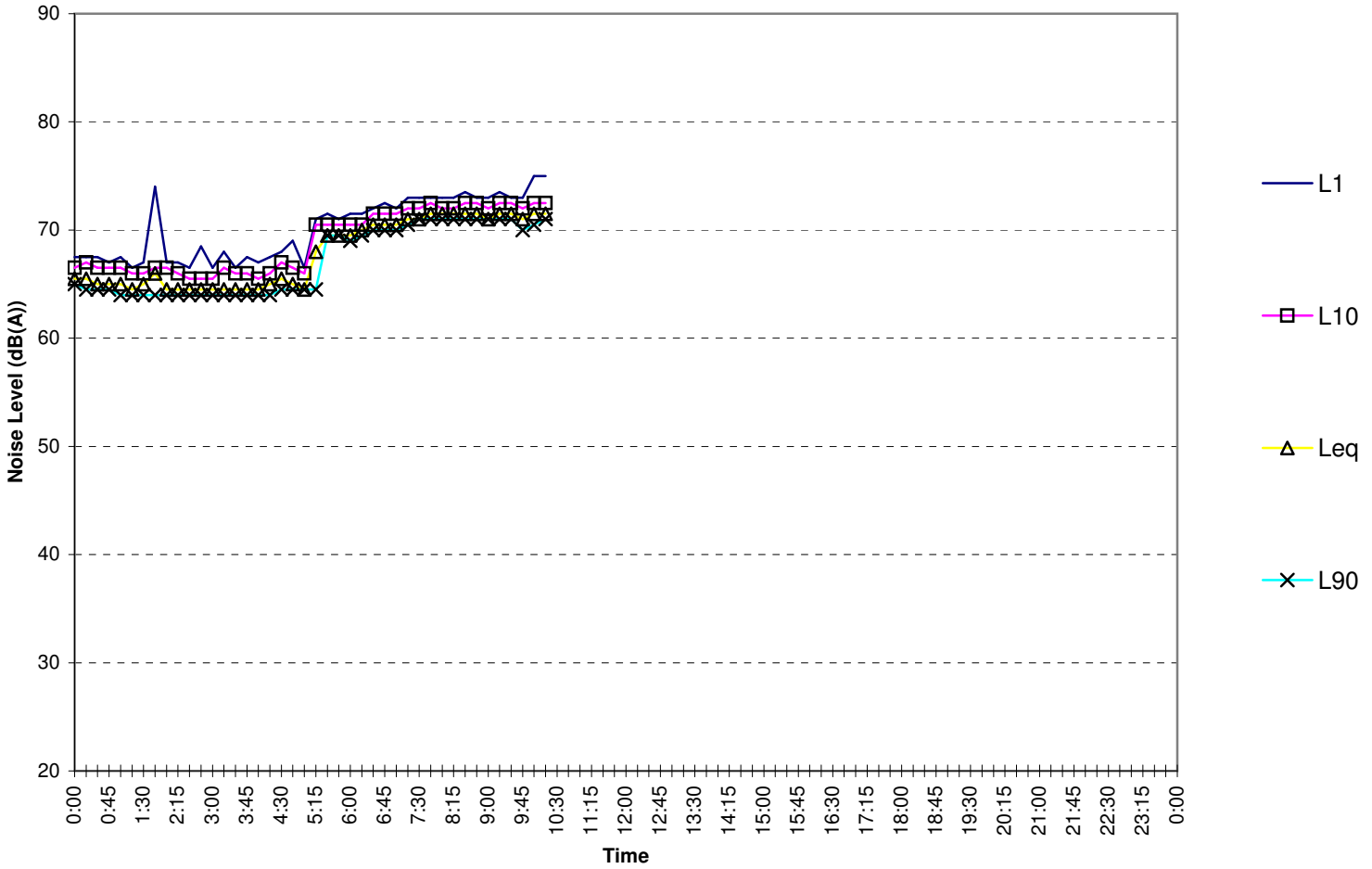

1 Alfred Street - Level 1

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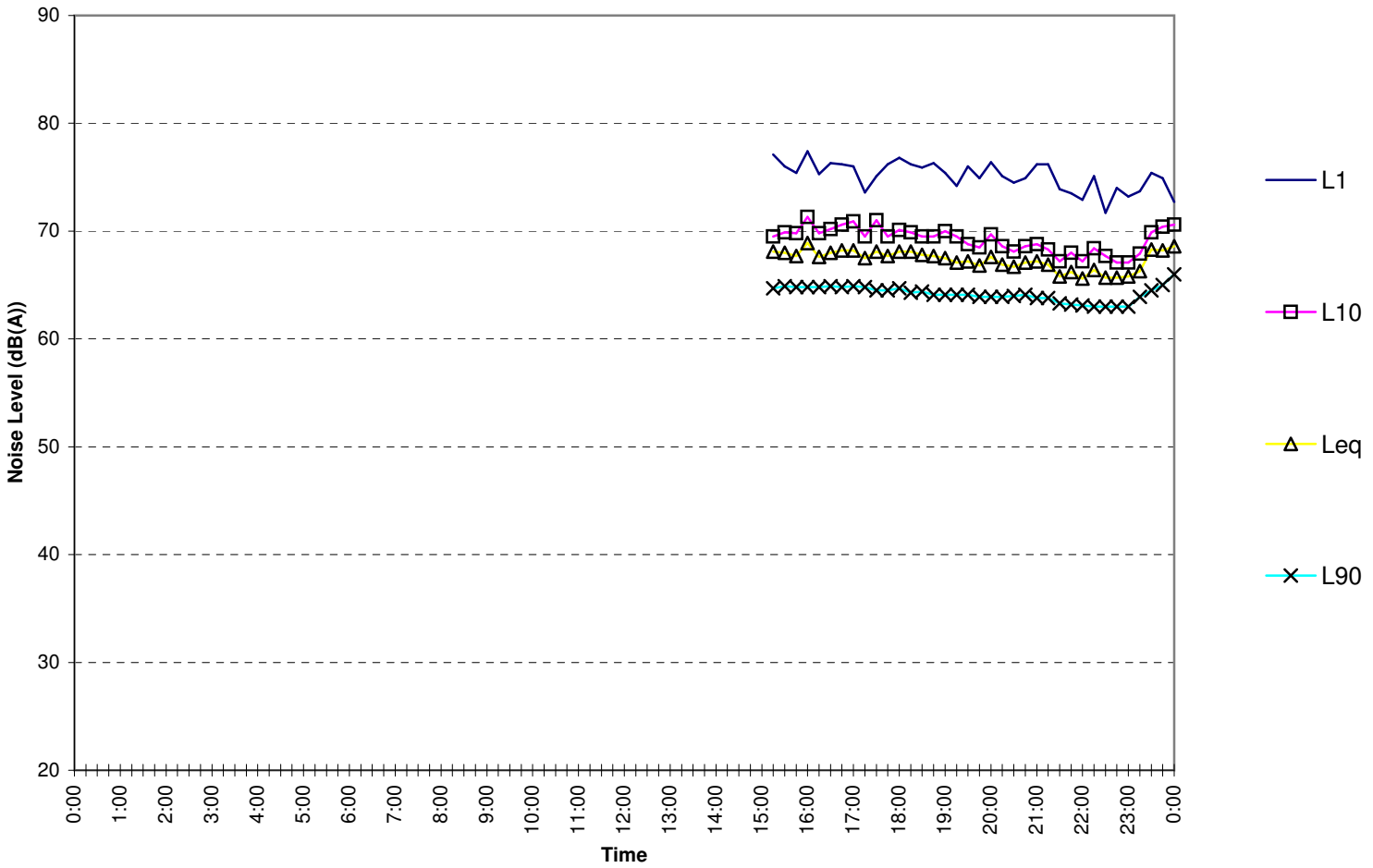
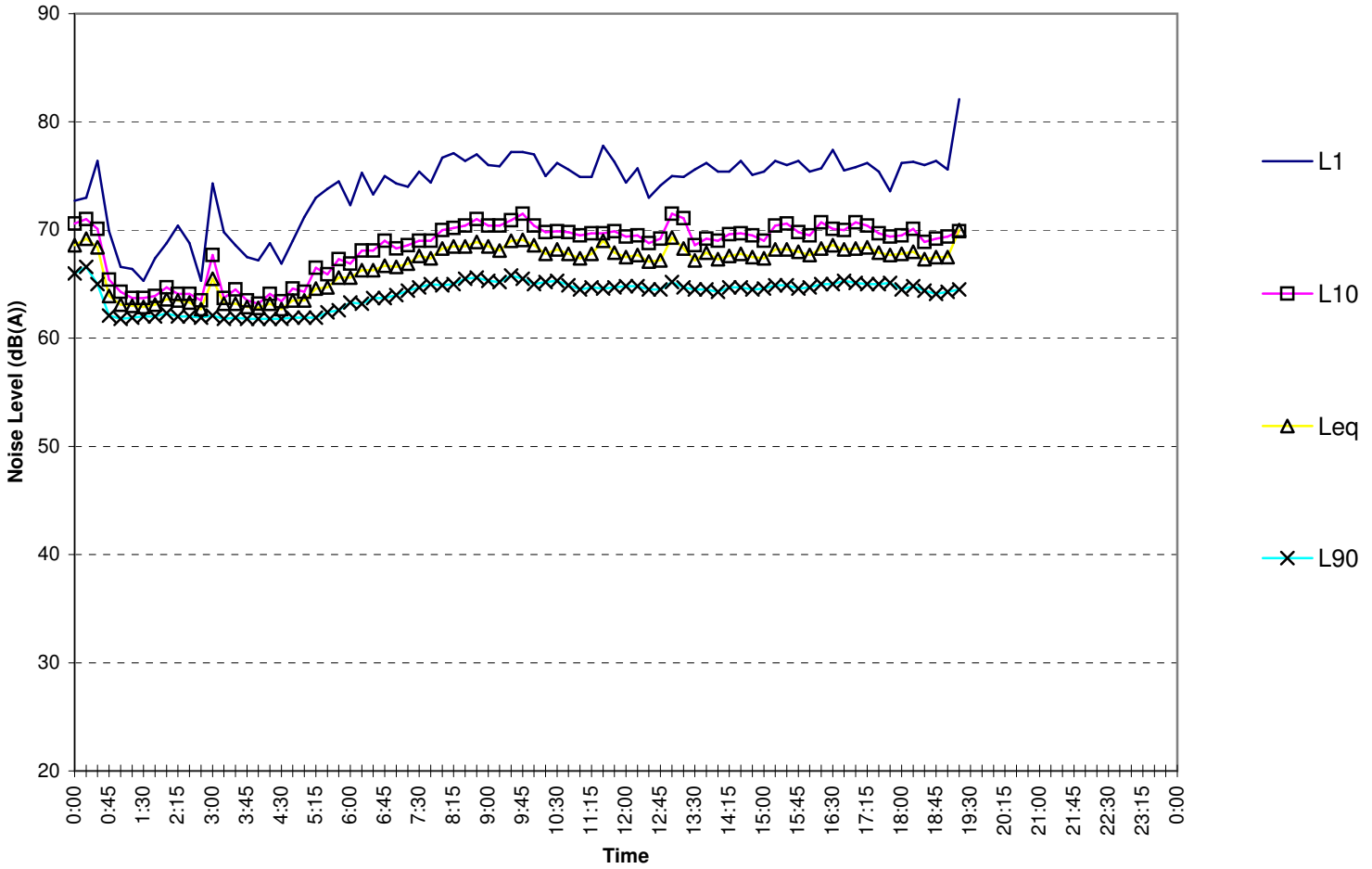


1 Alfred Street - Level 1

Thursday April 22,2010



APPENDIX 2 – LEVEL 5 AND 24 TERRACE NOISE EMISSION CALCULATION

Noise Emission Calculation – Level 5 or 22 Terrace to Western Tower Residences (Up to 10pm)

Noise Source/Correction	Noise level dBL_{10} – Frequency (Hz)									
	31.5	63	125	250	500	1k	2k	4k	8k	**A-wt**
Sound Power Level Per Patron - dBL_{10}	**65**	**65**	**73**	**73**	**79**	**76**	**71**	**62**	**50**	**80**
Correction – 80 people, one in two speaking	+16	+16	+16	+16	+16	+16	+16	+16	+16	
Correction for Distance (20m by 4m terrace, 8m from residential façade)	-34	-34	-34	-34	-34	-34	-34	-34	-34	
Predicted Noise Level at Residences – dBL_{10}	**48**	**48**	**56**	**56**	**61**	**59**	**53**	**44**	**32**	**63**
Criteria (64dB BG+5)	76	76	77	68	66	63	61	59	50	**69**
Complies	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**