3 Murray Rose Drive (Building B)

Acoustic Assessment

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TABLE OF CONTENTS

1 INTRODUCTION

This report presents our acoustic assessment of 3 Murray Rose Drive, a proposed commercial development at 3 Parkview Place, Sydney Olympic Park.

This report has been prepared in order to satisfy the acoustic reporting requirements of Director General Requirement 6.

In this report we will:

- Identify environmental noise sources with the potential to impact the site (noise from major events in the Sydney Olympic Park precinct, rail noise) and recommend acoustic treatments to reduce these impacts to acceptable levels.

- Identify noise emissions which will be generated by the site (primarily noise from external mechanical plant and construction noise) and recommend acoustic and management controls in order to reduce noise impacts on nearby properties to levels complying with relevant acoustic criteria.

In each case, we will identify acoustic criteria to be used for assessment.

This report is based on the architectural plans by Turner and Associates dated July 2012.

2 SITE DESCRIPTION / PROPOSAL

The site is located at the eastern end of Parkview Place, Homebush. 3 Murray Rose Drive is the second proposed building in a mixed use development consisting of 5 buildings which will contain a mixture of commercial, retail and residential development.

3 Murray Rose Drive will consist of a five storey development comprising approximately 12,965m^2 of net lettable area with four levels basement car park.

The site will be bounded as follows:

- To the west by 5 Murray Rose Drive, being almost identical in size to the subject site, although with three basement car park levels only.

- Further to the west of Murray Rose Drive lies a car park is also used for a period of approximately 2-3 weeks for year for rides at the Royal Easter Show.

- To the north by undeveloped land (future park) and the Brick Pit.

- To east by a proposed residential apartment development (to be know as 1 Murray Rose Drive).

- To the south by Murray Rose Avenue. On the opposite site of Murray Rose Ave will be 4 Murray Rose Rive (a similar sized commercial building) and 2 Murray Rose Drive (a proposed residential building). of the Parkview Place development (another residential apartment complex).

Nearest residential development to the site are the proposed developments and 1 and 2 Murray Rose Drive.

Development in the vicinity of the site with the potential to create an acoustic impact on the site is as follows:

- The car park adjoining the site to the west, particularly when used for amusement rides during the Royal Easter Show.
- ANZ Stadium and the Sydney Showground, to the west of the site.
- Noise from the rail line serving the Olympic Park train station.

Potential noise sources associated with the development are:

- Noise from external mechanical plant (primarily roof top plant) which has the potential to adversely impact adjoining (existing and future) development.
- Noise during construction.

3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental 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.

In analysing 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 intervals.

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 15 minute 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 environmental noise.

4 BACKGROUND NOISE MONITORING

Ambient noise levels in the vicinity of the site were determined using long term, unattended noise logging conducted on site.

Unattended noise monitoring was conducted between 11 and 16 March 2008 using an Acoustic Research Laboratories monitor set on A-weighted fast response mode. The monitor was calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded.

The long term noise logger was installed near the eastern property boundary of the site (away from existing commercial development in the vicinity of the site) at the approximate location of the future residential building at 1 Murray rose Dtive.

The long term logging data was collected as part of an assessment for 5 Murray Rose Dtive and background noise levels measured at this time will still be applicable now.

Supplementary manned measurements of ambient noise levels were undertaken on 13 July 2012 to ensure previously measured level remain applicable.

Measured background noise levels from long term logging are presented below. Refer to Appendix 1 for unmanned noise monitoring data.

Table 1 – Measured Background Noise Levels – Long Term Noise Logging

Location	Background noise level dB(A)L_{90}		
Unattended noise logger	Daytime (7am-6pm)	Evening (6pm-10pm)	Night time (10pm-7am)
	49	49	41

5 ASSESSMENT REQUIREMENTS AND ACOUSTIC CRITERIA

This report has been prepared in order to satisfy the acoustic reporting requirements of the following:

- The Director General Requirements (issued 6 July 2011).
- The EPA Industrial Noise Policy.

Director general requirements are as follows (DGR Item 6):

- *Construction and operational noise impacts should be addressed against relevant guidelines and legislation, such as NSW Office of the Environment and Heritage guidelines in consultation with relevant agencies, where appropriate.*
- *Acoustic treatment and noise attenuation measures in the proposed building, particularly during event mode.*

The following assessment will be made to meet the requirements presented above:

- Noise impacts from major events. Noise from ANZ stadium, the Sydney Showground, the use of the car park for Easter Show amusement rides and from rail movements at Sydney Olympic Park station will be assessed. Appropriate acoustic treatments will be determined to mitigate these impacts.
- Noise impacts generated by the site. The only significant noise source which will be generated by the site will be from external mechanical plant, which will be assessed.
- In addition, a discussion of construction noise impacts will be presented.

5.1 NOISE IMPACTS FROM MAJOR EVENTS

Major events such as use of ANZ Stadium, the Showground and noise generated by rides during the Royal Easter Show will be assessed to ensure there is no unacceptable impact on the proposed development.

Acoustic objectives to be adopted for the proposed development have been determined with reference to Australian Standard 2107 "Acoustics-Recommended Design Sound Levels and Reverberation Times for Building Interiors", as presented below.

Table 2 – Internal Noise Level Goals for External Noise Impacts

Space type	Time	Criteria
Commercial / Retail Spaces	When in Use	45dB(A)$L_{eq(Worst\ 1\ hour)}$

The following noise sources will not be assessed:

- Noise from the rail line. As the rail line lies more than 60m from the site, Rail Infrastructure Corporation guidelines do not require assessment of potential noise and vibration impacts.

- Noise from the V8 Supercar Street circuit. Proposed circuit layout shows that the closest the circuit will come to the site is as it runs along Australia Ave (at the western end of Murray Rose Drive, approximately 300m from the site). We note that this circuit will be used for a three day event only once per year, with only one day of the event expected to be on a weekday (and therefore affecting the commercial spaces). Given the infrequency of the event, the building will not be specifically upgraded for that noise impact alone.

5.2 OPERATIONAL NOISE GENERATED BY THE SITE

Operational noise will consist primarily of noise from mechanical plant.

Noise from mechanical services should comply with the EPA Industrial Noise Policy and the Noise Control Manual Sleep Disturbance Guidelines, as summarised below.

Noise emissions to both nearby (future and existing) residential and commercial development will be assessed).

As is consistent with the EPA Noise Control Manual, noise from emergency plant (generators) may be an additional 5dB(A) louder than the levels allowed for plant running during standard operation (as documented below)

5.2.1 EPA Industrial Noise Policy - Intrusiveness Criteria (Residential Receivers Only)

The Intrusiveness guideline is intended to limit the audibility of noise emissions at a residential property and requires that noise emissions measured using the $L_{eq(15min)}$ descriptor not exceed the background noise level by more than 5 dB(A) (i.e- noise from a particular noise source, when averaged over a 15 minute period, must not exceed background noise levels by more than 5dB(A).

The allowable noise level for all times of day is set out below.

Table 3 – EPA Intrusiveness Criteria

PERIOD/TIME	BACKGROUND NOISE LEVEL dB(A)L_{90}*	ACCEPTABLE LEVEL dB(A)$L_{eq(15min)}$
Daytime (7am-6pm)	49	54
Evening (6pm-10pm)	49	54
Night (10pm-7am)	41	46

*As presented in section 1.

5.2.2 EPA Industrial Noise Policy - Amenity Objectives

Noise emission objectives for "suburban" receivers based on the Industrial Noise Policy "Amenity Criteria" are presented below. Amenity criteria are assessed using the $L_{eq(Period)}$ descriptor – ie noise from the a particular noise source is average over the entire daytime/evening/night time period. Acoustic criteria are as follows:

Table 4 - Amenity Objectives

Location	Time of Day	Amenity Noise Objective dB(A)$L_{eq(Period)}$
Potentially Affected Residential Properties.	Day Time (7am – 6pm)	55
	Evening (6pm – 10pm)	45
	Night (10pm-7am)	40
Potentially Affected Commercial Properties	When in use	65

5.2.3 Noise Control Manual – Sleep Disturbance Guidelines (Residential Receivers Only)

Sleep arousal is a function of both the noise level and the duration of the noise. The EPA (now DECC) in its Environmental Noise Control Manual states that noise controls should be applied with the general intent to protect people from sleep arousal.

To assess potential sleep arousal impacts, an emergence test is first carried out. That is, the L_1 noise level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. If the noise events are within this, then sleep arousal impacts are unlikely and no further analysis is needed. If there are noise events that could exceed the emergence level, then an assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This more detailed sleep arousal test is conducted with reference to the DECC Environmental Criteria for Road Traffic Noise (appendix B of that document).

The guideline level is set out below.

Table 5 – Sleep Arousal Emergence Criteria (10pm-7am)

Location	BACKGROUND NOISE LEVEL dB(A)L_{90}	EMERGENCE LEVEL (dB(A) L_1)
Potentially Affected Residential Properties.	41	56

5.3 NOISE GENERATED DURING CONSTRUCTION.

Where possible, noise generated by construction should comply with EPA Interim Construction Noise Guidelines. Where exceedances of recommended levels are likely, noise impacts on nearby properties should be minimised through appropriate noise management controls. Recommended levels are as follows:

Table 6– Construction Noise Emission Guidelines

Location	Time of Day	Noise Objective dB(A)$L_{eq(15min)}$)
Potentially Affected Residential Properties.	Standard construction hours (7am-6pm)	59 (BG+10dB(A))
Potentially Affected Commercial Properties	When in use	70

With respect to construction noise impacts:

- Impacts on residential properties are not excpted to be significant. This building will be completed before the proposed residential buildings at 1 and 2 Murray Rose Drive, and so those buildings will not be impacts.
- The nearest existing residential properties are located approximately 300m from the site, and will not be significantly impacted.
- If necessary, a construction noise and vibration management plan can be conducted at Construction Certificate stage, once construction methodologies and a building program has been determined.

The following noise sources will be assessed in order to determine their impact on the development:

- Noise from ANZ Stadium and the Sydney Showground.
- Noise from rides during the Sydney Easter Show.

5.4 NOISE LEVELS USED FOR ASSESSMENT

5.4.1 ANZ Stadium and Sydney Showground

These venues will potentially have large crowds (during sporting events etc) and amplified music performances.

Noise from ANZ Stadium was measured on Parkview Drive on 4 October 2009 during the Rugby League Grand Final (approximately 80,000 crowd, amplified music). This will be indicative of a peak period of operation of the stadium. Given that the size of the Sydney Showground and the distance between the Showground and the site is similar, noise from the Showground is expected to be similar in noise level to that from ANZ Stadium.

During the site visit, noise from ANZ stadium (crowd/music) was inaudible at Parkview Drive. The only audible noise associated with the event was that from the media helicopters flying over the stadium, generating noise levels of 61-64dB(A)L_{eq}. Given that other noise was inaudible over the helicopter noise, it is the helicopter noise which will be the loudest typical noise level associated with the use of the stadium / showground. Satisfactory attenuation of helicopter noise will also provide sufficient protection against the other noise sources.

5.4.2 Noise from the Easter Show Rides.

This is the most significant potential noise impact on the site, as amusement rides will be located as close as (approximately) 70m from the western façade of 3 Murray Rose Drive. In order to determine the noise levels likely to be generated, a noise survey of the Luna Park amusement park (Milsons Point) was undertaken. The loudest typical noise sources are presented below.

Table 7 – Measured Noise Levels

Ride	Primary Noise source	Measured Noise Level – dB(A)$L_{eq(15min)}$
Power Surge Ride (high speed ferris wheel)	Motor noise, screaming	77dB(A) at 10m
Wild Mouse (single carriage roller-coaster)	Motor noise, noise from carriage on track	70dB(A) at 25m

In determining the acoustic treatments, it will be assumed that one of these rides (loudest typical noise source based on our survey) is located near the eastern boundary of the rides area, as close possible to the western façade of 3 Murray Rose Drive.

5.5 RECOMMENDED TREATMENTS

Recommended glazing constructions for control of external noise impacts to levels complying with the acoustic guidelines presented above are presented below:

Table 8 – Recommended Glazing

Location	Required Glazing	Acoustic Seals Required
All	Minimum : 6mm laminated/12mm airgap/6mm*	Yes

*If thicker glazing is required for thermal or structural reasons, this is also acceptable.

In addition to complying with the minimum scheduled glazing thickness, the STC rating of the glazing fitted into openable frames and fixed into the building opening should not be lower than the values listed in the table below for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of openable frames and the frame will need to be sealed into the building opening using a flexible sealant. Note that mohair seals in windows and doors are not acceptable where acoustic seals are required. The proposed suppliers should provide evidence that the window systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum STC requirements listed in the table below, and that they will be constructed and installed in a manner equal to the test samples.

Table 9 – Minimum STC of Glazing

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
6mm/12mm airgap/6mm	Yes	31

Provided that these treatments are installed, noise levels will comply with the acoustic criteria set out in section 5.1.

6 NOISE EMISSION ASSESSMENT

6.1 NOISE FROM MECHANICAL PLANT

6.1.1 Equipment Selection

Primary roof top mechanical plant is as follows (indicative selections only at this stage):

- Chillers (typical sound pressure level of 65-70dB(A) at 1m).
- Cooling towers.
- Air handling plant (air handling units, exhaust fans, outside air fans etc).

6.1.2 Recommendations

Detailed review of noise from mechanical plant should be undertaken once plant selections and layouts are finalised. However, preliminary analysis indicates that noise emissions from plant items can be adequately addressed using standard acoustic treatments, as discussed below:

- Chiller – to be located within an enclosed plant room.
- Cooling towers – To be located on the western side of the plant room, as far as practicable future residential properties (and no line of site between cooling tower and the residential properties to the east or south of the site).
- All plant items should be installed using vibration isolation mounts to prevent structure borne noise transfer to offices below.

6.2 NOISE GENERATED DURING CONSTRUCTION

As with any major construction site there will be noise associated with construction. The management of impacts arising from these activities is now routine practice, both to address impacts to surrounding properties, and for commercial reasons, to limit impacts on retail tenancies. We note that there will be not residential development on the Parkview Place site prior to the construction of 3 Murray Rose Drive.

Adequate control of construction noise can be achieved through the development of a Construction Demolition Noise Management Plan which may be required to be undertaken prior to works commencing and (if required) and be undertaken at construction certificate stage (once a cosntruciton program has been determined).

7 CONCLUSION

Potential noise impacts associated with proposed development at 3 Murray Rse Avenue assessed to address the acoustic concerns raised by the Department of Planning (as set out in Draft Director general requirement 6.

Both an assessment of noise impacts on the site (from major events and other local noise sources) and noise generated by the site have been assessed against appropriate acoustic criteria.

Compliance with appropriate acoustic goals is achievable provided that the recommendations in sections 6.2, 7.1 and 7.2 are adopted.

Yours faithfully,

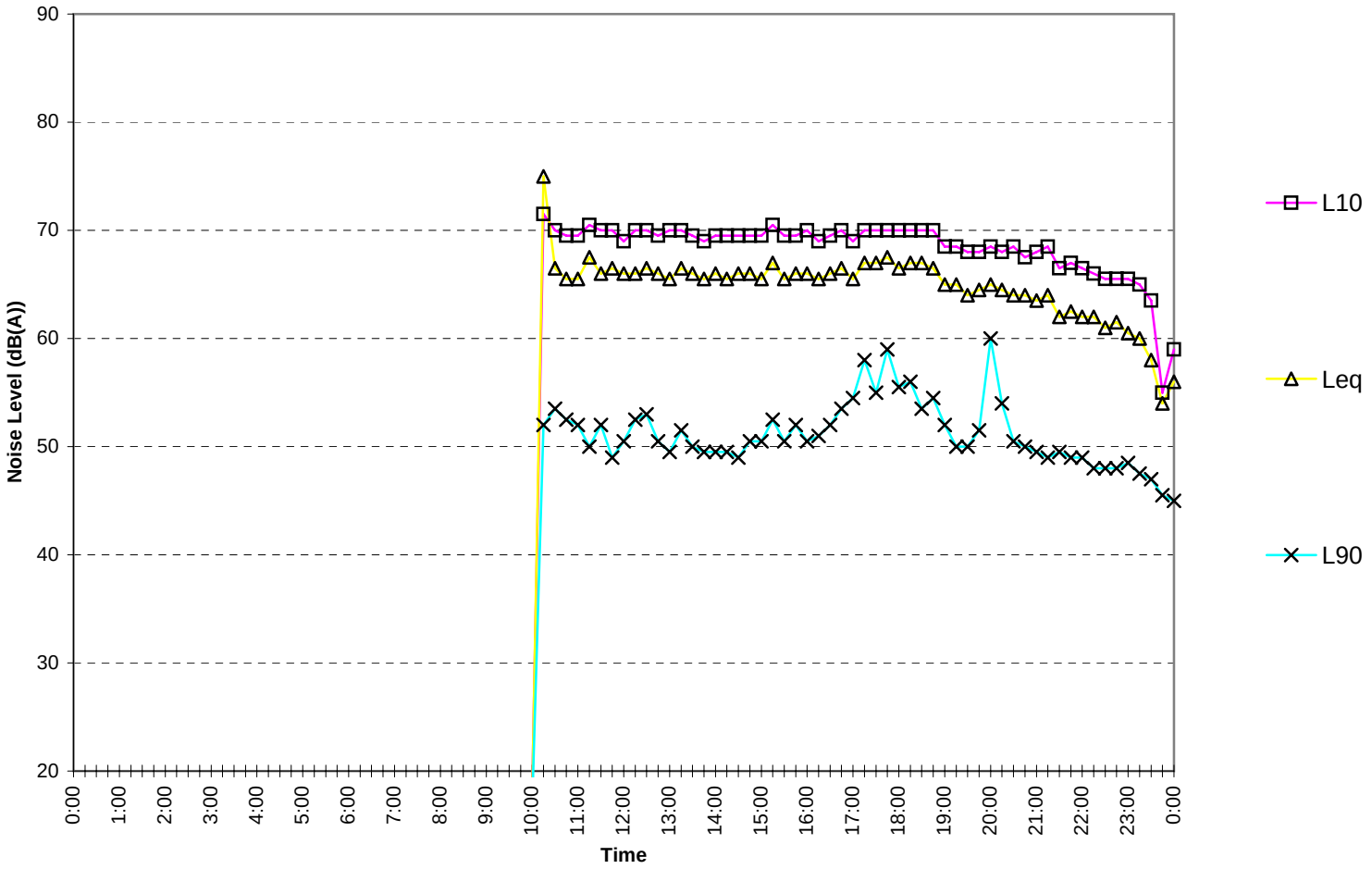
Acoustic Logic Consultancy Pty Ltd
Thomas Taylor

Appendix 1

Background Noise Logging Data

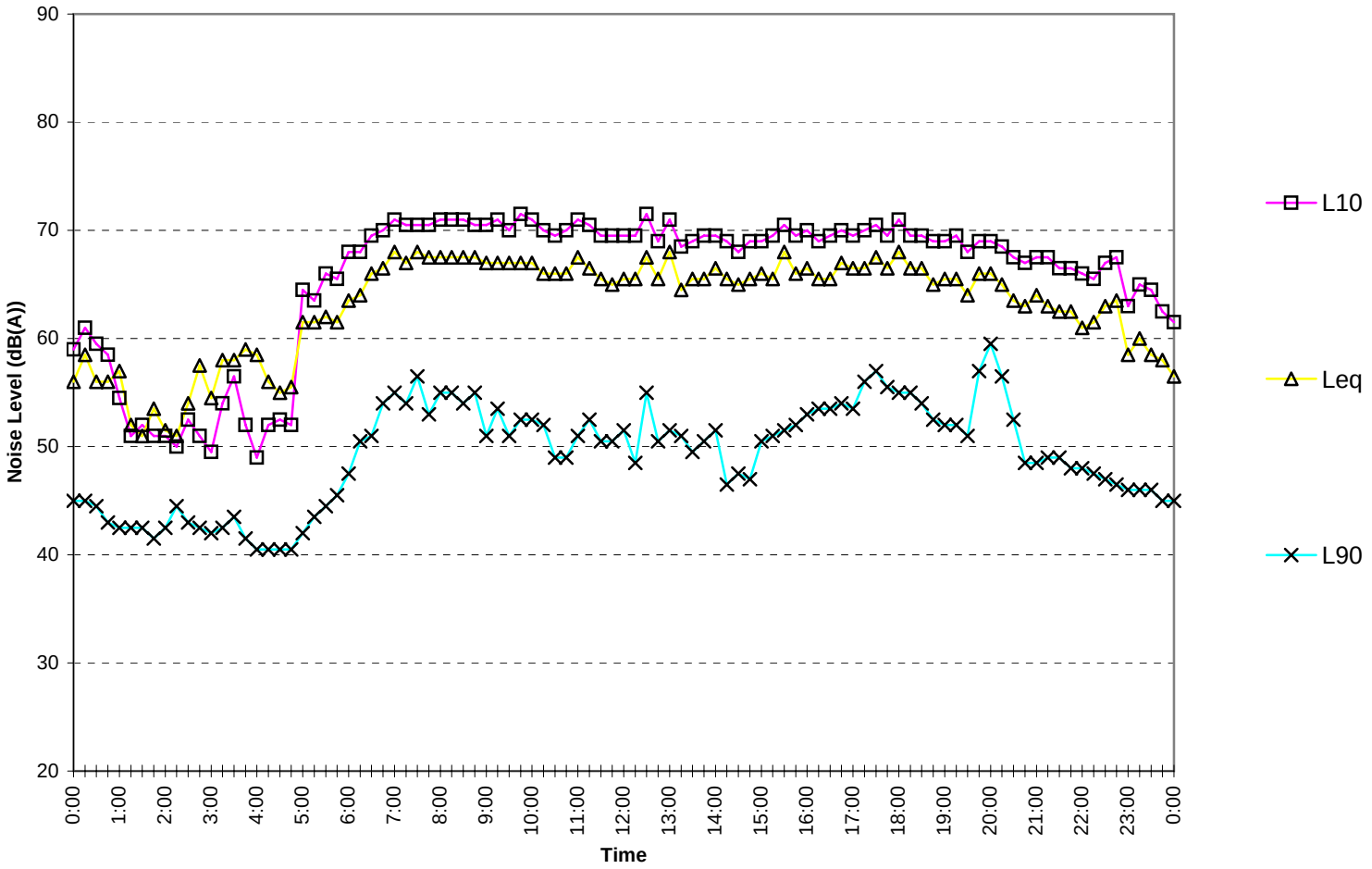
Parkview Drive

Tuesday March 11,2008



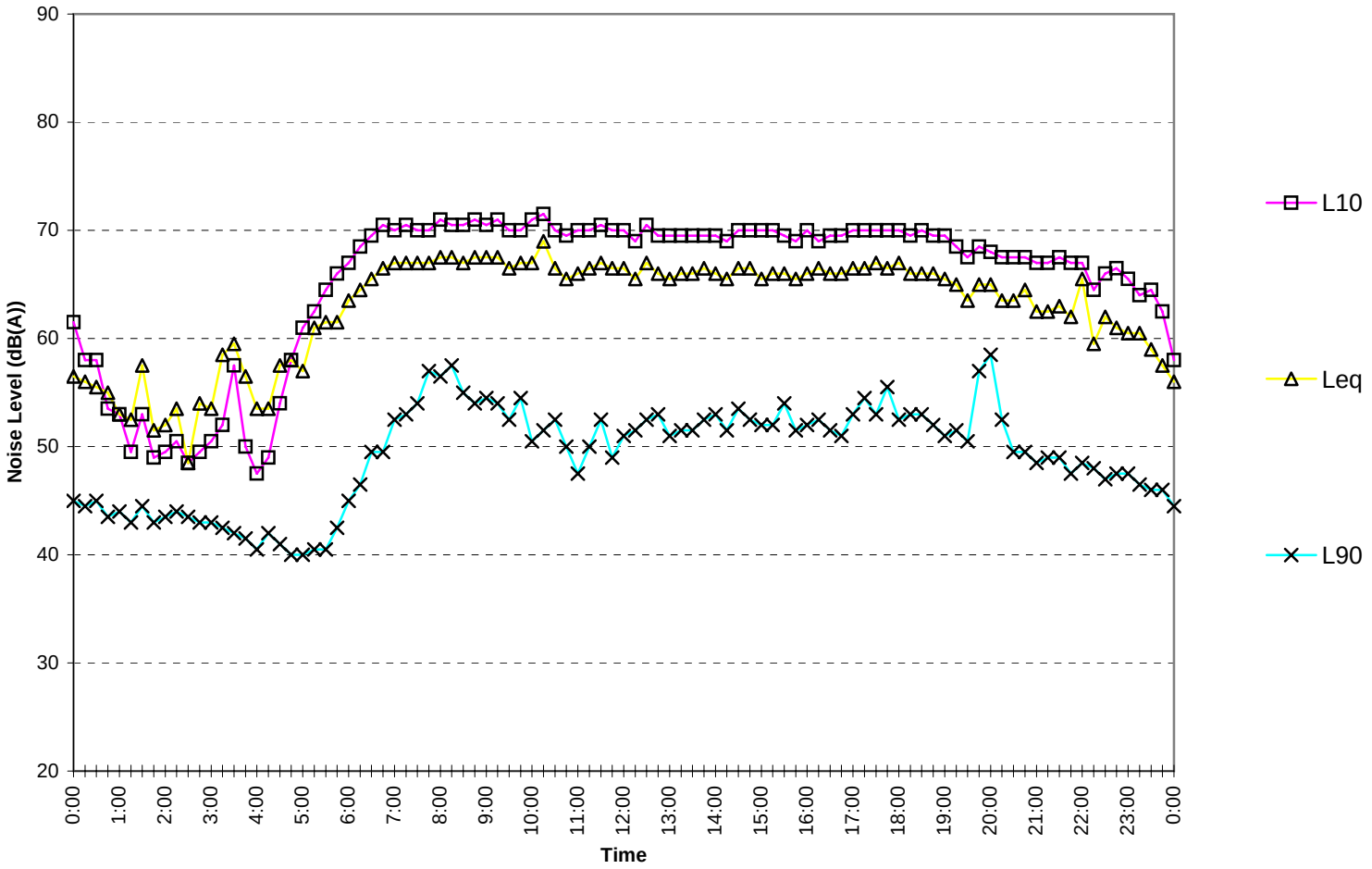
Parkview Drive

Wednesday March 12,2008



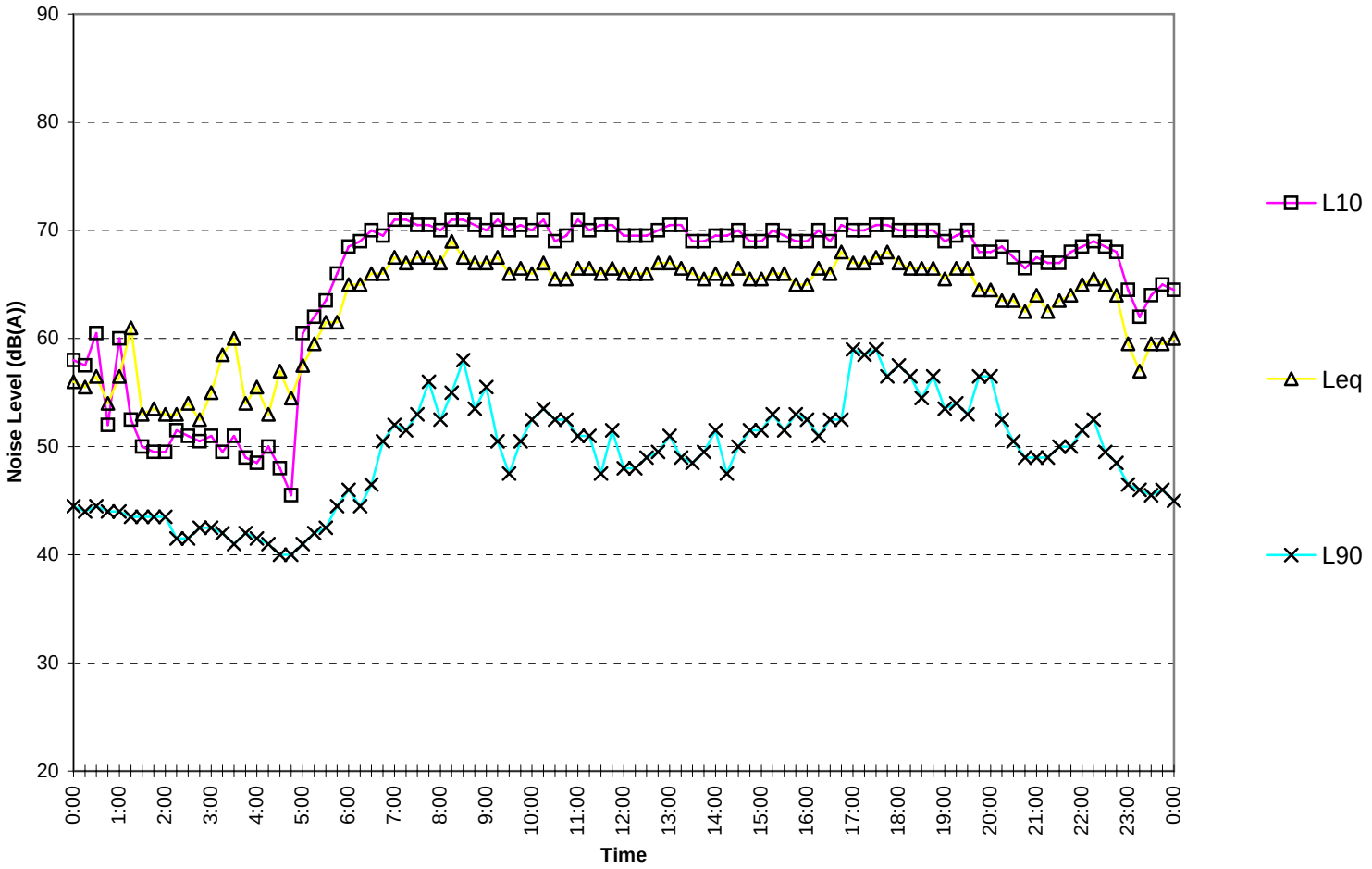
Parkview Drive

Thursday March 13,2008



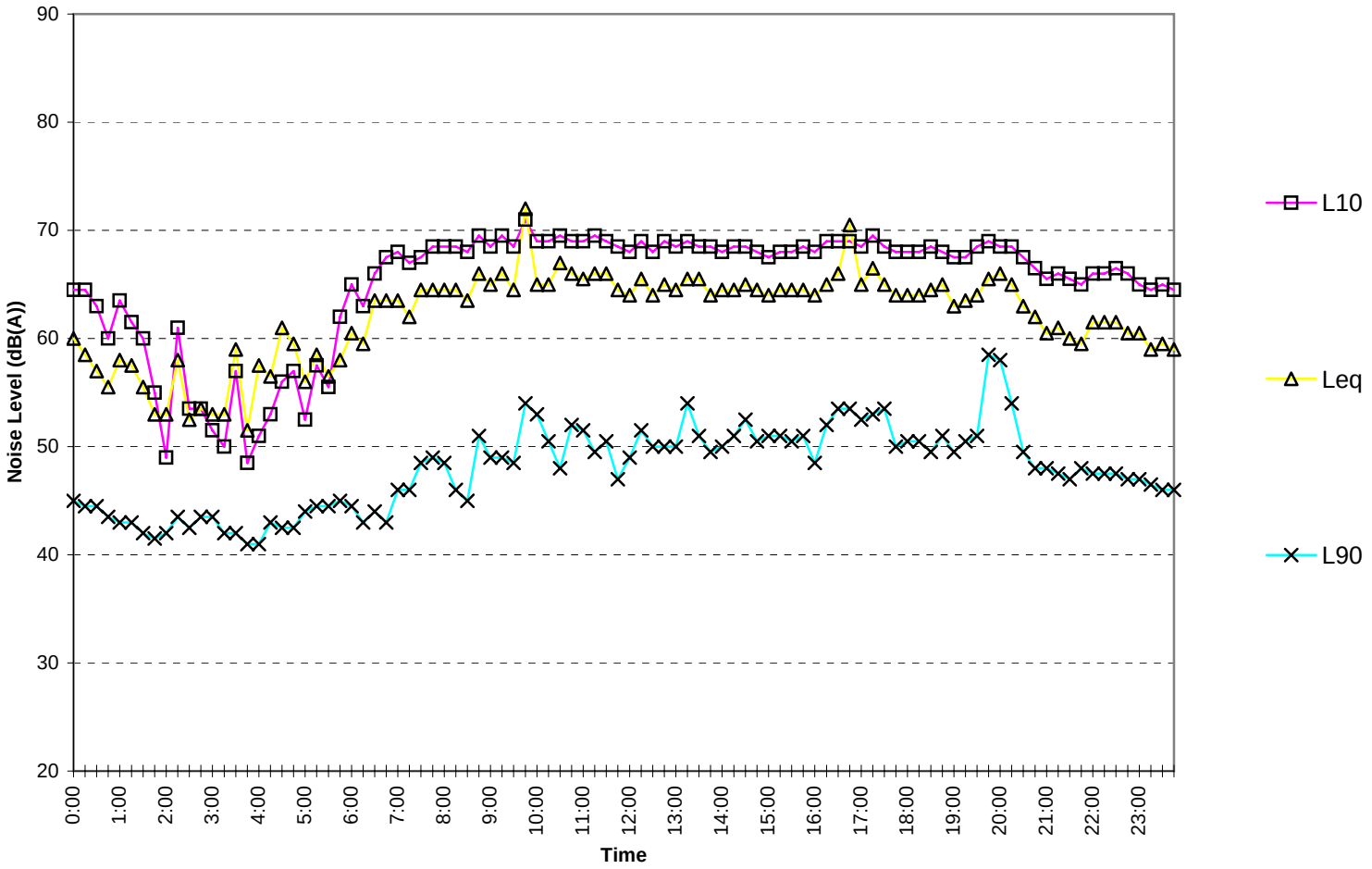
Parkview Drive

Friday March 14,2008



Parkview Drive

Saturday March 15,2008



Parkview Drive

Sunday March 16,2008