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Prepared for: Davids Group

60 CHARLOTTE STREET, CLEMTON PARK

MASTER PLAN ENVIRONMENTAL NOISE ASSESSMENT

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1. INTRODUCTION

Acoustic Logic Consultancy Pty Ltd has been engaged by Davids Group in order to conduct a Master Plan, Environmental Noise Study for the purpose of assessing the potential impacts on the acoustic amenity of the proposed residents from both external and internal noise sources. The noise sources investigated are as follows:

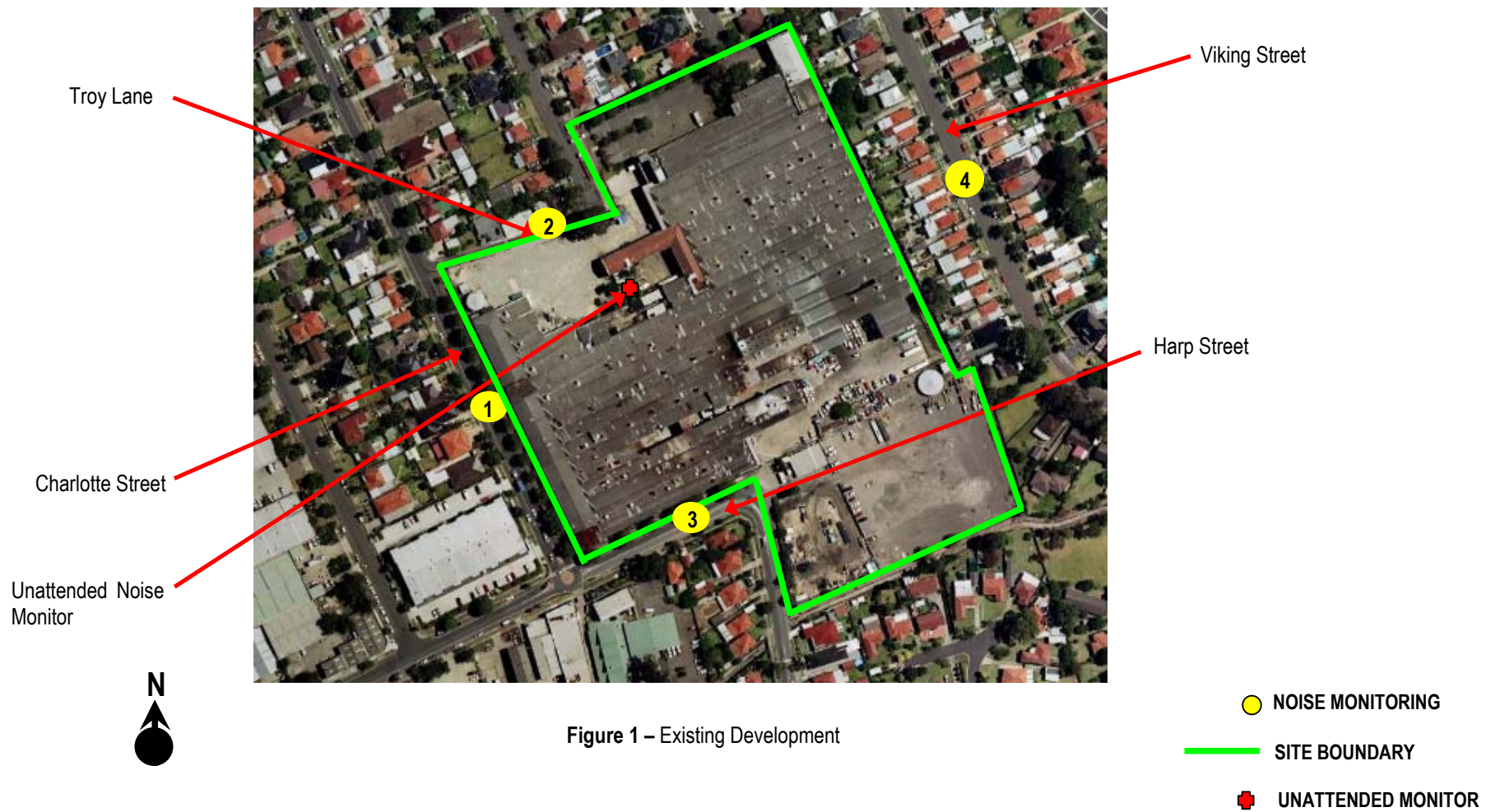
- The site perimeter roadways including Charlotte Street, Troy Lane, Harp Street and Viking Road.
- Noise emissions from the bulky good centre in Precinct A
- Internal mechanical plant noise such as air conditioning plant noise and fan noise.

Traffic noise will be covered first as it will most significantly influence the development. Attended noise monitoring was conducted in order to determine the existing traffic noise levels around the perimeter of the site.

The final part of the report will address inter development noise from occupants. At this early stage no detailed design has been conducted for mechanical plant. This cursory study will set the goal assessment criteria applicable to the project based on Council and other relevant statutory/regulatory requirements.

2. SITE DESCRIPTION

Figure 1 is an illustration of the existing development with Figure 2 illustrating the proposed development site which forms the proposed mixed use development.



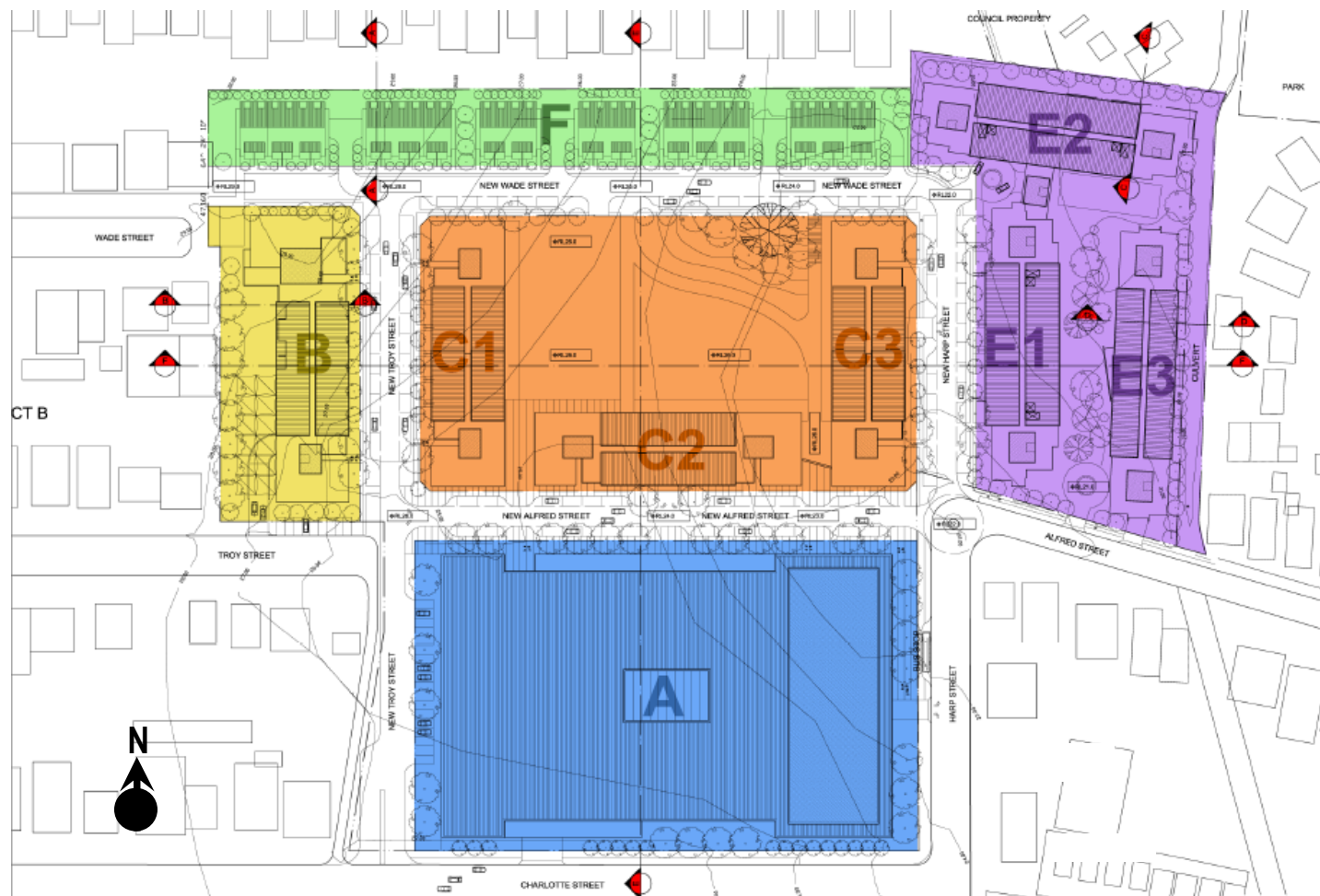


Figure 2 – Precinct Plan of Proposed Site

The existing environmental noise sources affecting the site are as follows:

- The development is affected by traffic noise on the site perimeter roadways including Charlotte Street, Troy Lane, Harp Street and Viking Street.

It is anticipated that the future acoustic environment impacting the proposed mixed use development at 60 Charlotte Street will not be altered significantly.

The environmental noise source outlined above has varying degrees of impact upon the proposed development which will be outlined in Section 3 of this Report.

3. SURROUNDING NOISE SOURCES

Traffic noise from the surrounding perimeter roadways are the main source of noise impacting upon the proposed development.

Charlotte Street and Harp Street carry medium volumes of traffic, primarily from vehicles travelling south-east from Canterbury Road and accessing residential premises off this road way. Viking Street, which forms the north-eastern boundary of the site, is principally accessed only by residents. Troy Lane is used as an access point to Troy Street, which carries low volumes of traffic.

It is noted that Charlotte Street bounds Precinct A of the Development, which is proposed to be used for commercial and industrial purposes.

Noise emissions from plant and equipment should also be limited so as not to adversely impact any of the surrounding properties.

3.1 TOPOGRAPHY

The topography of the site and surrounding land of the proposed development is generally undulating and the acoustic assessment has taken the varying topography into account.

3.2 BACKGROUND NOISE LEVELS

Existing background noise levels were measured in the vicinity as indicated in Figure 1 (Section 1) of the proposed development. These locations were selected in order to characterise the existing background noise levels within and surrounding the proposed development to obtain background noise levels.

3.2.1 Environmental Noise Levels

Environmental noise constantly varies in level, due to fluctuations in local noise sources including road traffic. Accordingly, a 15 minute measurement interval is normally 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 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 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 depends 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 industrial noise.

3.2.2 Monitoring Period

Unattended noise monitoring was conducted during the period of 26th August 2008 to 1st September 2008 in order to measure the existing background noise levels.

In addition to the unattended noise monitoring, attended noise monitoring was conducted in numerous locations around the perimeter of the site on 8th September 2008.

3.2.3 Monitoring Equipment

Unattended noise measurements were obtained using an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The noise monitors were calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator. No significant drift was detected. All measurements were taken on A-weighted fast response mode. There were no significant periods of adverse weather conditions during the measurement period.

Attended noise measurements were obtained using a Norsonics Type SA118 Precision Sound Level Analyser. The Precision Sound Level Analyser was calibrated at the beginning and the end of the measurement using a Norsonics Type 1251 Precision Sound Level Calibrator. No significant drift was noted. All measurements were conducted on A-weighted fast response mode. There were no significant periods of adverse weather conditions during the measurement period.

3.3 MONITORING LOCATIONS

Figure 1 in Section 1 of this document presents an illustration of the site. Additionally unmanned and manned noise monitoring positions have been presented. Manned monitoring locations have been numbered for referencing within this document.

3.4 LOCAL NOISE SOURCES

The following existing noise sources were identified within the area not associated with the proposed development.

- Traffic noise associated with typical vehicle movements associated with the perimeter roadways (varying degrees of impact as outlined in Section 3 of this report).

3.5 NOISE MONITORING RESULTS

Unattended monitoring was undertaken within the site in order to determine the existing acoustic environment. Additional attended noise measurements were also obtained at various locations corresponding to the perimeter of the proposed development. The unattended monitor results will be used to determine the variation between day, evening and night time noise levels. Attended measurements will be compared with the unattended monitoring data during the same measurement period so that relative differences between the attended and unattended locations can be formed thereby providing a comprehensive study of existing noise levels around the proposed site. Monitoring locations are indicated in Figure 1 in Section 1 of this document.

3.5.1 Existing Background Noise Levels

Background noise levels during day time are dominated by general vehicular traffic movements. The EPA NSW Industrial Noise Policy details specific steps in determining the background noise level for assessment of the day, evening and night time periods. Table 1 summarises the background determined at the monitoring location, based on the guidelines set out in the EPA NSW Industrial Noise Policy and the results of unattended noise monitoring.

Table 1 – Measured Ambient Noise Levels

Location	Description	Day Noise Level 7am to 6pm (dB(A))	Evening Noise Level 6pm to 10pm (dB(A))	Night Noise Level 10pm to 7am (dB(A))
Subject Site	Background L _{90,15min}	42	38	37

In addition to the background levels obtained at the unmanned monitoring position illustrated in Figure 1 and presented in Table 1, attended noise monitoring was conducted at 4 locations around the perimeter of the subject site as illustrated in Figure 1. The results of the attended noise measurements are presented in Table 2. It is noted that these measurements were conducted during the hours of 10:00pm and 11:00pm.

Table 2 – Measured Noise Levels

Position	Location	Measured Noise Level L _{eq} dB(A)	Measured Noise Level L ₉₀ dB(A)
1	Charlotte Street	66	44
2	Troy Lane	49	42
3	Harp Street	64	43
4	Viking Street	52	40

It is noted that the existing background noise levels are dominated by general transportation noise in the vicinity of the site.

3.6 PROJECT NOISE DESCRIPTORS

The determination of an acceptable level of traffic noise within the residential spaces requires consideration of the activities carried out within the space and the degree to which noise will interfere with those activities

As sleep is the activity most affected by traffic noise, bedrooms are the most sensitive rooms. Higher levels of noise are acceptable in living areas without interfering with activities such as reading, listening to television, etc. Noise levels in utility spaces such as kitchens, bathrooms, laundries, etc can be higher.

Assessment shall be conducted in accordance with Australian Standards AS2107-2000 *“Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors”* as well as AS3671-1989 *“Acoustics – Road Traffic Noise Intrusion – Building, Siting and Construction”* in the absence of specific acoustic criteria in Fairfield City Council’s planning policies’.

AS2107-2000 recommends maximum design sound levels for different areas of occupancy in the residential development while AS 3671-1989 *“Road Traffic Noise Intrusion - Building Siting and Construction”* recommends that an appropriate L_{eq} dB(A) or L_{10} dB(A) traffic noise descriptor be used for the occupancy being assessed. On this basis an appropriate descriptor for bedrooms is the L_{eq} between 10pm and 7am (known as $L_{eq(9hr)}$). This is taken as being the normal sleep period. For living rooms the L_{eq} measured between 7am and 10pm is appropriate (this is known as $L_{eq(15hr)}$).

Based on AS2107-2000 and AS3671-1989 the following assessment criteria would apply to the proposed development.

Table 4 - Traffic Noise Criteria for All Spaces within the Development

SPACE/ACTIVITY TYPE	NOISE LEVEL
Bedrooms	40 dB(A) $L_{eq,1(9hr)}$
Living Areas	45 dB(A) $L_{eq,1(15hr)}$
Commercial/Retail	45 dB(A) $L_{eq,1(15hr)}$
Medical	40 dB(A) $L_{eq,1(15hr)}$

4. NOISE EMISSION LIMITS – NOISE GENERATED ON THE SITE

The Environment Protection Authority (EPA) Industrial Noise Policy provides guidelines for assessing noise impacts from industrial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The EPA Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion. In addition, the EPA in its Environmental Noise Control Manual states that noise controls should be applied with the general intent to protect residences from sleep arousal.

For land use developments with the potential to create additional traffic on local roads the development should comply with the requirements detailed in the EPA Environmental Criteria for Road Traffic Noise (ECRTN).

4.1 INTRUSIVENESS CRITERION

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

4.2 AMENITY CRITERION

The guideline is intended to limit the absolute noise level from all industrial noise sources to a level that is consistent with the general environment.

The EPA's Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

Table 5 provides the recommended ambient noise levels for the suburban residential receivers for the day, evening and night periods. For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm; and
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

Table 5 – EPA Recommended Amenity Industrial Noise Levels

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A) L_{eq}
Residential	Day	55
	Evening	45
	Night	40

4.3 SLEEP AROUSAL

To minimise the potential for sleep arousal the L_1 (1 minute) noise level of any specific noise source does 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. The L_1 noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source. Where the typical repeatable existing L_1 levels exceed the above requirement then the existing L_1 levels form the basis for, sleep disturbance criteria.

4.4 SUMMARY OF ASSESSMENT CRITERIA FOR PROPOSED SITE

The intrusiveness, amenity and sleep arousal criteria for this project have been determined using these guidelines and the noise monitoring results. These are summarised below. We note that the formulation of the assessment criteria has been based on the lowest ambient levels determined from all monitoring data.

4.4.1 EPA Day Period

The following table sets out the measured L_{eq} amenity and L_{90} background noise levels, and the assessment criteria based on the suburban criteria. The day period applies between 7am and 6pm Monday to Saturday; and 8am to 6pm Sundays and public holidays.

Table 6 – Measured L_{eq} & L_{90} Noise Levels and Criteria - Daytime

Location	Measured L_{eq} Noise Level dB(A)*	Measured L_{90} Noise Level dB(A)	Amenity Criterion dB(A) L_{eq}	Intrusiveness Criterion dB(A) L_{eq}
1	74	49	55	54
2	57	47	55	52
3	72	48	55	53
4	60	45	55	50

* Unless otherwise stated the existing noise level is due to transportation noise and noise from plant serving the existing buildings on the site, which will be removed once the development is constructed.

4.4.2 EPA Evening Period

The following table sets out the measured L_{Aeq} and L_{90} background noise levels, and the assessment criteria based on the suburban criteria. The evening period applies between 6pm and 10pm.

Table 7 –Measured L_{eq} & L₉₀ Noise Levels and Criteria - Evening Period

Location	Measured L _{eq} Noise Level dB(A)*	Measured L ₉₀ Noise Level dB(A)	Amenity Criterion dB(A) L _{eq}	Intrusiveness Criterion dB(A) L _{eq}
1	69	45	45	50
2	52	43	45	48
3	67	44	45	49
4	55	41	45	46

* Unless otherwise stated the existing noise level is due to transportation noise and noise from plant serving the existing buildings on the site, which will be removed once the development is constructed.

4.4.3 EPA Night Period

The night period (that is, between 10pm and 7am) is the period where noise emissions can have the most significant effect on residential amenity. In addition to the quasi-steady state criteria the L₁ noise emission level should not exceed the background noise level by more than 15 dB(A) to prevent sleep arousal from intermittent events. The night time period applies between 10pm and 7am.

Table 8 –Measured L_{eq} & L₉₀ Noise Levels and Criteria - Night Time Period

Location	Measured L _{eq} Noise Level dB(A)	Measured L ₉₀ Noise Level dB(A)	Amenity Criterion dB(A) L _{eq}	Intrusiveness Criterion dB(A) L _{eq}	Noise Objective for Intermittent Activities dB(A) L ₁ (1 Min) (Background + 15 dB(A))	Measured Existing dB(A) L ₁ , 15 min
1	66	44	40	49	59	77
2	49	42	40	47	57	60
3	64	43	40	48	58	74
4	52	40	40	45	55	65

4.4.4 Assessment Criteria Summary

The table below provides a summary of the assessment criteria applicable to the proposed development based on the information documented above.

Table 9 – Noise Objectives for Residential Receivers near Proposed Development

Location	Daytime Noise Objective dB(A) L_{eq}	Evening Noise Objective dB(A) L_{eq}	Night Time Noise Objective dB(A) L_{eq}	Night Time Sleep Disturbance for Intermittent Activities dB(A) L_1 (1 Min) (Background + 15 dB(A))
1	54	45	40	77
2	52	45	40	60
3	53	45	40	74
4	50	45	40	65

The criteria for the various monitoring locations have been considered to the applicable receiver groupings in Table 10 below. As a number of locations were identified as containing noise associated with mechanical plant the following table presents noise level criterion for areas surrounding the proposed development. In all cases, if a discrepancy in attended and unattended noise levels were obtained at two nearby locations within a residential grouping the more conservative noise level criterion has been adopted.

Table 10 – Noise Objectives for Residential Receivers near Proposed Development

Location	Daytime Noise Objective dB(A) L_{eq}	Evening Noise Objective dB(A) L_{eq}	Night time Noise Objective dB(A) L_{eq}	Noise Objective for Intermittent Activities dB(A) L_1 (1 Min) (Background + 15 dB(A))
Charlotte Street	54	45	40	77
Troy Lane	52	45	40	60
Harp Street	53	45	40	74
Viking Street	50	45	40	65

Noise level criteria are to be applied to commercial traffic levels generated from vehicle movements on the site only, as presented by the Industrial Noise Policy. Noise levels generated from the movement of vehicles entering and exiting the site on ramps are generally required to comply with levels presented in the presented tables for surrounding receivers.

5. ASSESSMENT CRITERIA – ADDITIONAL TRAFFIC GENERATION

For land use developments with the potential to create additional traffic on local roads the development should comply with the requirements detailed in the EPA ECRTN. Criteria applicable to the development are detailed below. It is noted that the surrounding streets of Charlotte and Harp are collector roads. Viking Street and Troy Lane are deemed as local. If existing noise levels exceed those in Table 11 a 2 dB increase in noise is allowed.

Table 11 - Criteria for Traffic Noise for New Developments

Time of day	Criteria for Acceptable Traffic Noise Level dB(A)
Day (7am to 10pm)	60 $L_{Aeq(1hr)}$ – Collector Road 55 $L_{Aeq(1hr)}$ – Local Road
Night (10pm to 7am)	55 $L_{Aeq(1hr)}$ – Collector Road 50 $L_{Aeq(1hr)}$ – Local Road

Attended traffic noise levels measurements were conducted at a number of locations surrounding the development including locations 1, 2, 3 and 4 during night time periods (as indicated in Figure 1 of this report).

Table 12 - Criteria for Traffic Generation

Location	Criteria for Acceptable Traffic Noise Level dB(A) $L_{eq(1hr)}$	
	Day (7am to 10pm)	Night (10pm to 7am)
Charlotte Street	76	68
Troy Lane	59	50
Harp Street	74	66
Viking Street	62	54

Note: Noise levels calculated to potentially worst affected residential facades from results of on site testing.

6. CONCLUSION

This report provides the results of Environmental Noise Study for the proposed development located at 60 Charlotte Street, Clemton Park. Noise at the site has been measured and noise goals have been set in accordance with the requirements of the local council and relevant statutory/regulatory authorities.

Determination of noise assessment criteria based on the EPA's Industrial Noise Policy and ECRTN have been determined based on both unmanned and manned noise monitoring conducted at the proposed development.

We trust this information is satisfactory. Please contact us should you have any further queries.

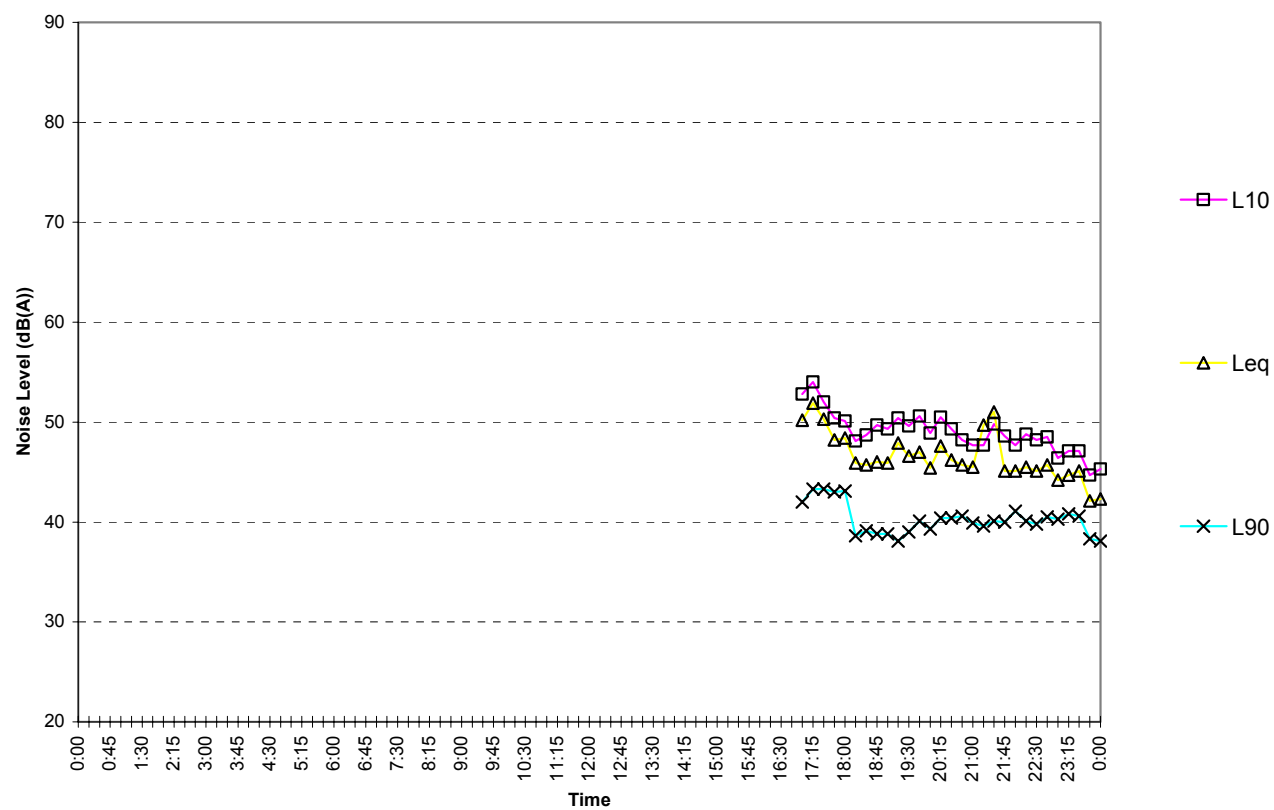
Report prepared by,

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ACOUSTIC LOGIC CONSULTANCY PTY LTD
Thomas Aubusson

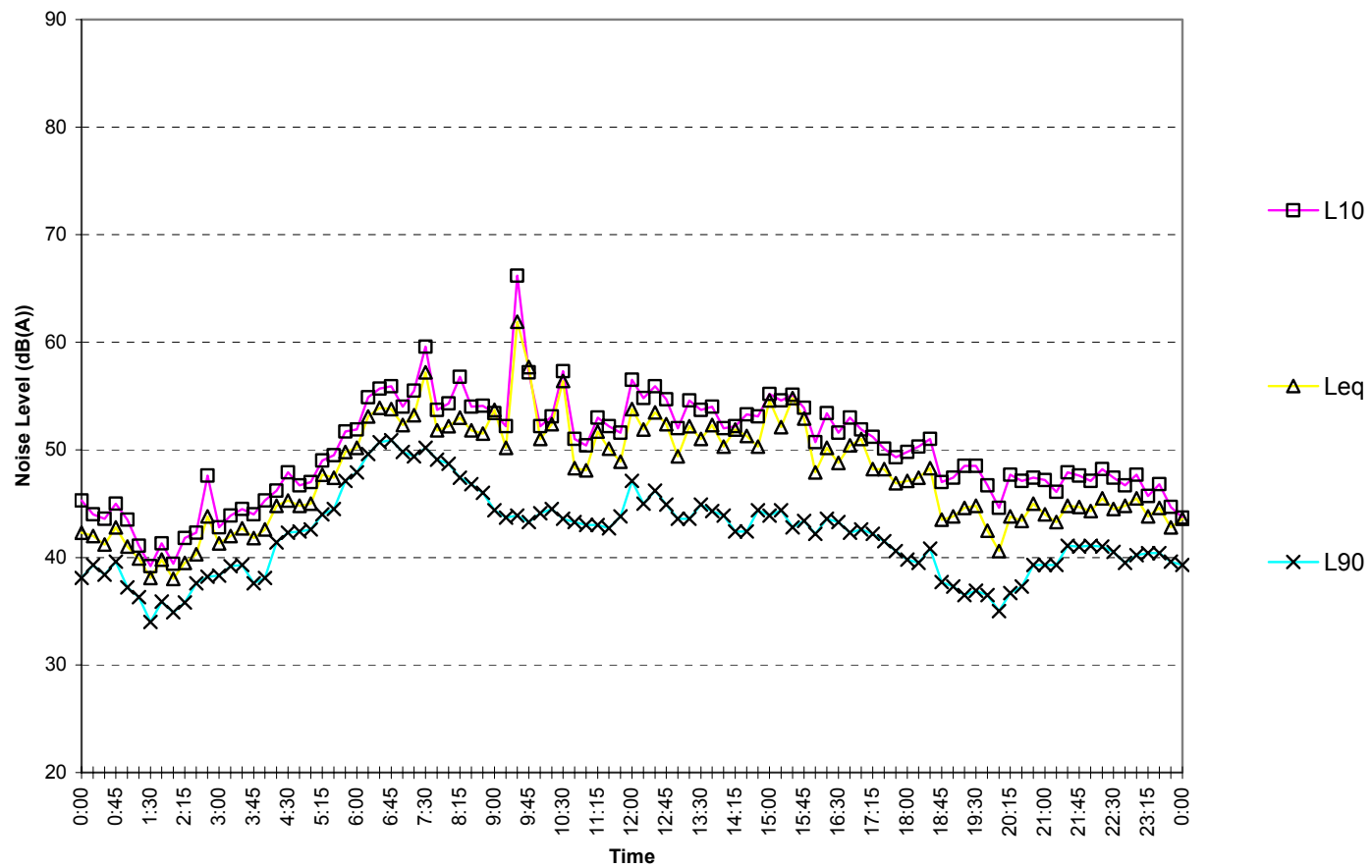
APPENDIX ONE
UNMANNED NOISE MONITORING RESULTS

Clemton Park
Tuesday August 26, 2008



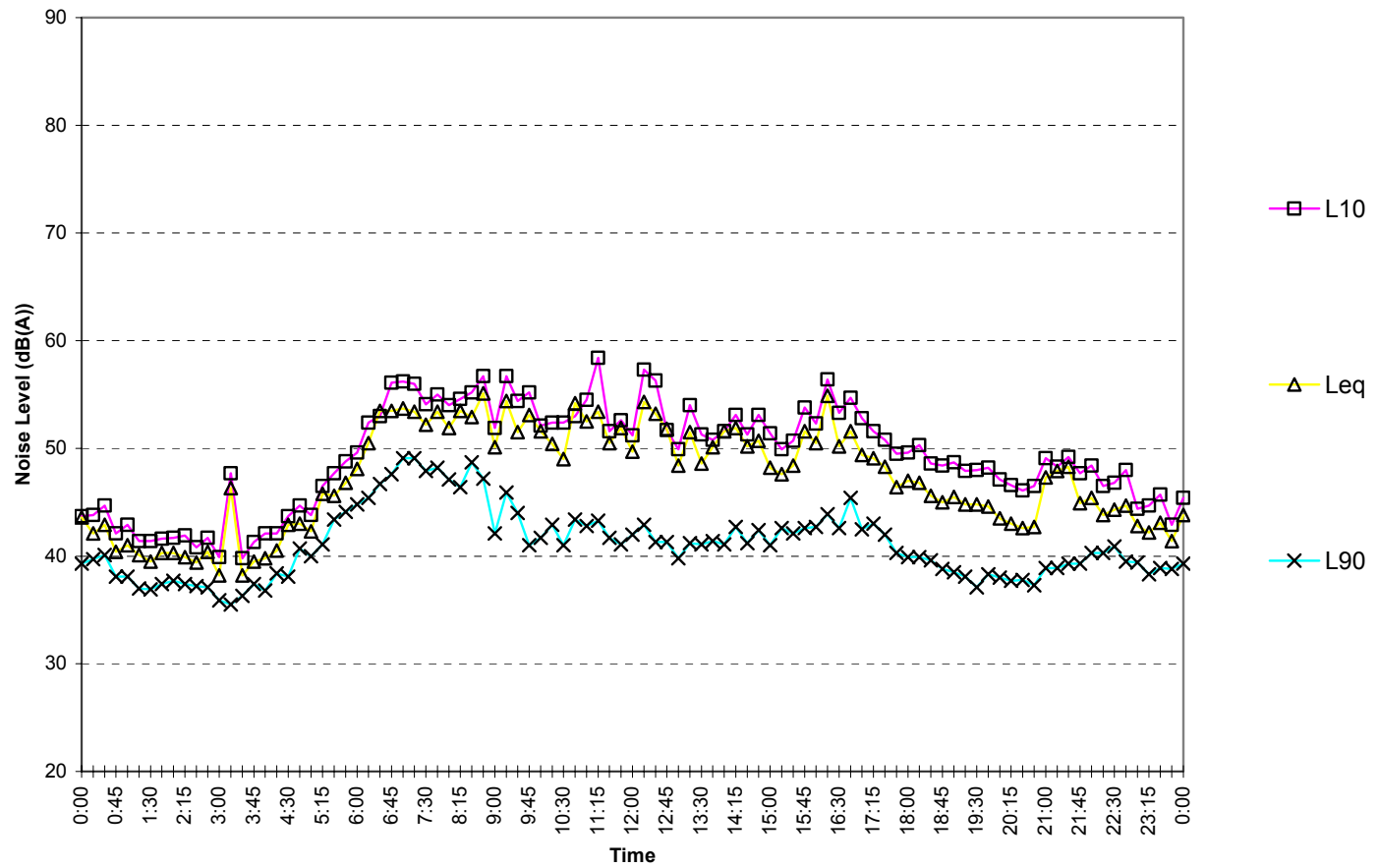
Clemton Park

Wednesday August 27, 2008



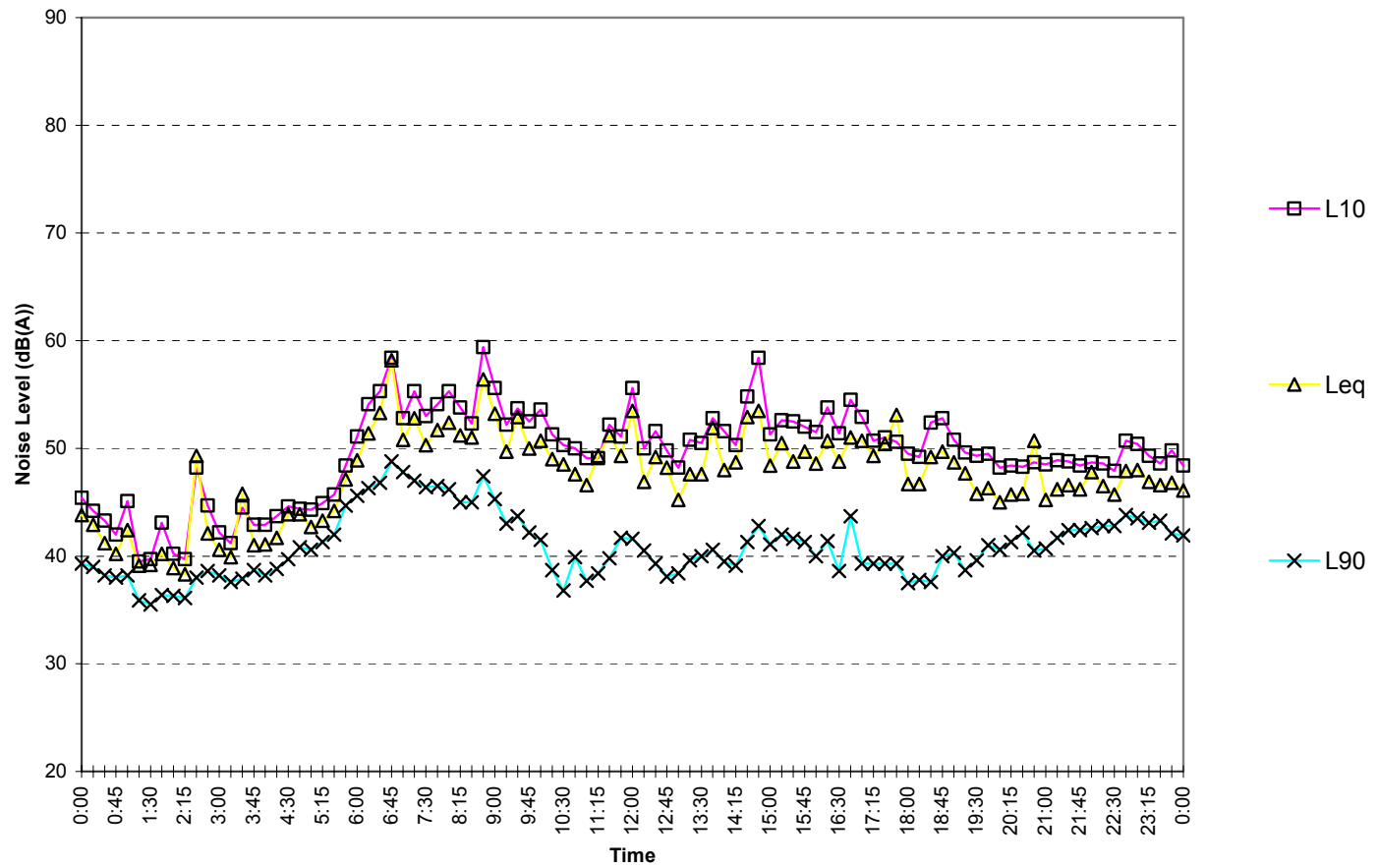
Clemton Park

Thursday August 28, 2008



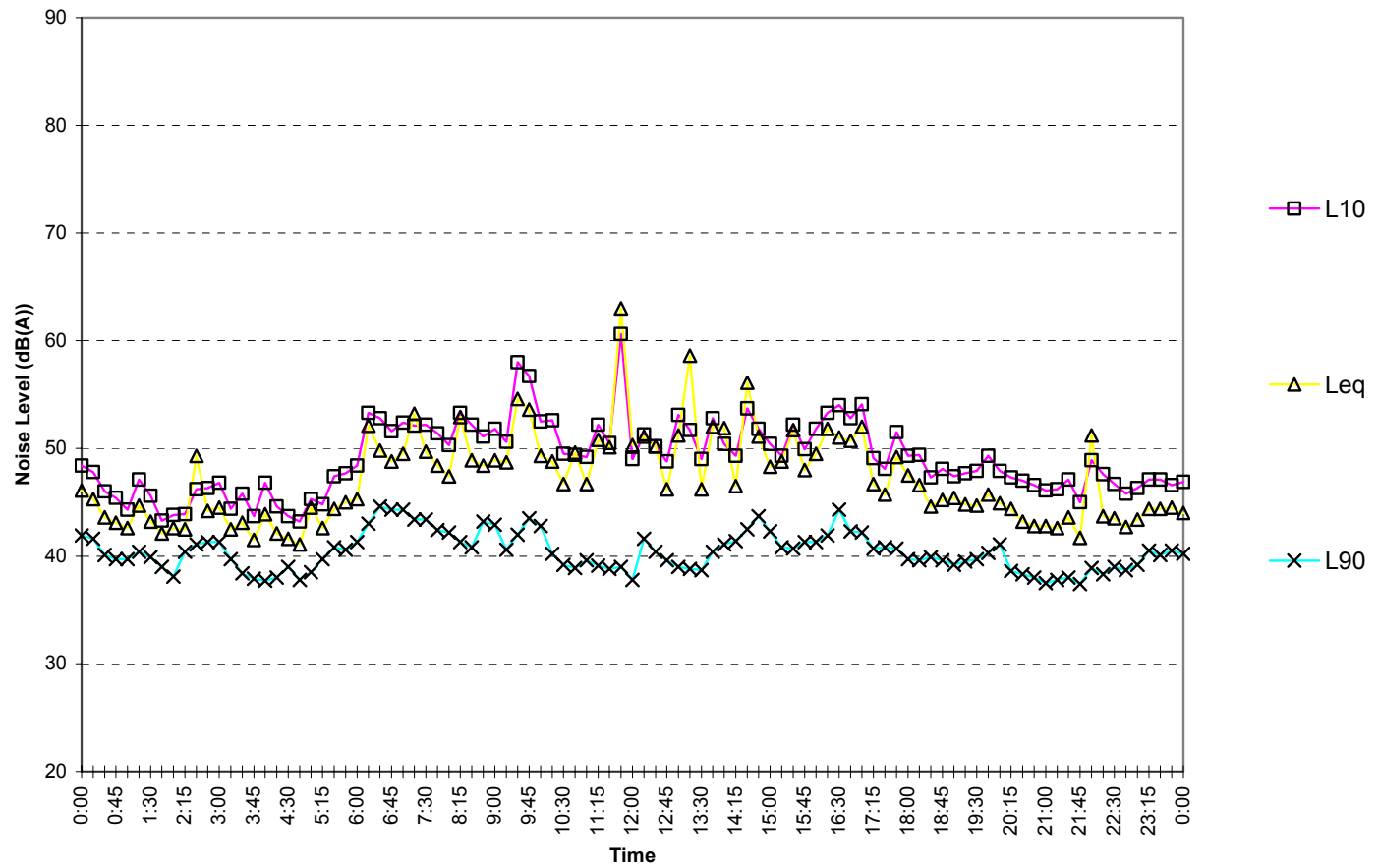
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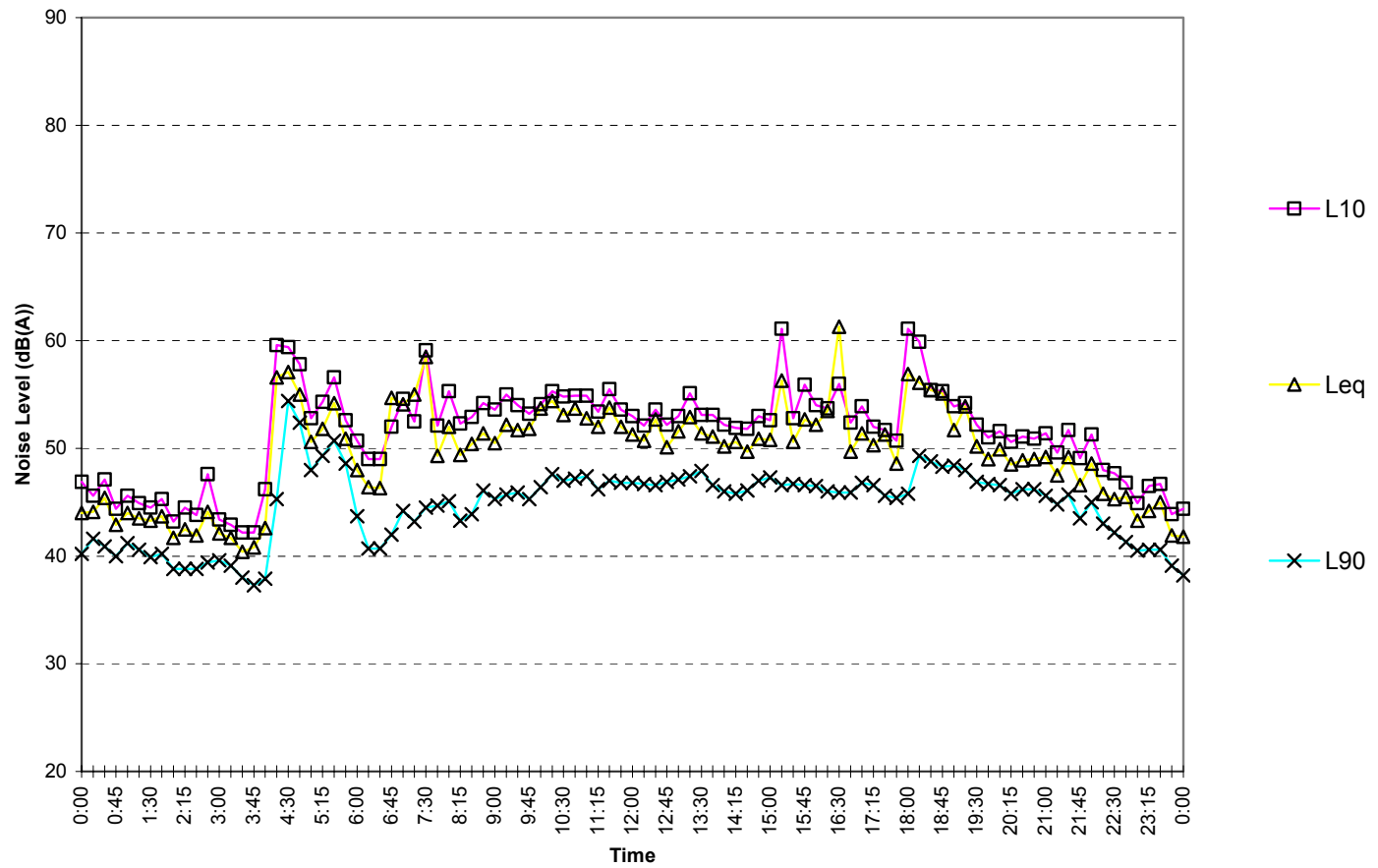
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Saturday August 30,2008



Clenton Park

Sunday August 31, 2008



Clemton Park

Monday September 1, 2008

