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Macquarie Park Village

Noise Impact Assessment

DOCUMENT CONTROL REGISTER

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TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic Consultancy Pty Ltd has been engaged to conduct an acoustic assessment for the purpose of assessing the potential impacts on the acoustic amenity of the proposed Macquarie Park Village development, North Ryde for both external and internal noise sources as part of the Planning Application submission. The current proposal is for 593 apartments with associated parking. The noise sources investigated are as follows:

- Environmental noise impact on the future site, including surrounding traffic noise from surrounding roadways.
- Noise emissions associated with traffic generated from the site.
- Noise emissions from the site including mechanical plant noise to surrounding receivers.

Environmental noise will be covered first as it will potentially impact the future development. Unattended and 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 noise generated from the development to surrounding properties. At this early stage no detailed design has been conducted for mechanical plant as is standard at DA/PA stage. This cursory study will set the goal assessment criteria applicable to the project based on the Department of the Environment and Climate Change (DECC) requirements, other council and relevant statutory/regulatory requirements.

1.1 SITE DESCRIPTION

Figure 1 below illustrates the location of the Macquarie Park Village development, North Ryde and the location of noise monitoring and measurements.

Figure 1 – Site Location and Measurement Positions

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

- The development is affected by environmental noise predominantly from traffic noise from Epping Road which carries high volumes of traffic.
- Herring Road to the south east carries medium traffic volumes.
- Other surrounding boundaries are neighboured by existing residential buildings.

It is anticipated that the future acoustic environment impacting the proposed Macquarie Park Village development will not be altered significantly acoustically.

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

2 EXISTING ACOUSTIC ENVIRONMENT

Environmental noise impacting the site is a result of traffic noise from the surrounding perimeter roadways.

2.1 TOPOGRAPHY

The topography of the site and surrounding land of the proposed development has a small slop across the site (approximately 10m) and is continued on the surrounding areas, the acoustic assessment has taken this topography into account.

3 ACOUSTIC SURVEY

As part of this assessment an acoustic survey of the proposed Macquarie Park Village development site has been conducted.

The acoustic survey included attended and unattended noise logging which is detailed in this section of the report.

3.1 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 ATTENDED NOISE MEASUREMENTS

Attended noise level measurements conducted as part of this assessment are detailed in this section of the report.

3.2.1 Measurement Equipment

Attended noise measurements were obtained using a CEL-593 Type 1 Sound Level Analyser, set to A-weighted fast response. The sound level meter was calibrated before and after the measurements using a RION NC-73 Sound Level Calibrator. No significant drift was recorded.

3.2.2 Measurement Period

Noise monitoring was conducted at the locations detailed in Figure 1 in Section 2 above during the following period:

1. Peak afternoon conditions between 4.30pm and 6pm on the 28th of October, 2010.

3.3 UNATTENDED NOISE MONITORING

Unattended noise monitoring conducted as part of this assessment is detailed in this section of the report. The results of unattended noise logging are included in Appendix A.

3.3.1 Unattended Monitoring Period

Unattended noise monitoring was conducted at the site during the period of 19th to 29th November 2010 in order to measure the existing background and traffic noise levels at the site.

The noise level monitors were located at the following locations:

1. Location 1 – To the rear of the site on ground level at the property boundary. This logger will be used predominantly for background noise levels.

2. Location 2 – At the property boundary facing Epping Road approximately 8m from the side of the road. Noise levels recorded by this logger will be used to assess traffic noise impacting the site as well as existing background noise levels.

3.3.2 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. Periods of adverse weather conditions during the during the measurement period have not be used in this assessment.

3.4 RESULTS OF THE ACOUSTIC SURVEY

An acoustic survey was undertaken at the proposed Macquarie Park Village development, North Ryde development site in order to determine the existing acoustic environment. 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.

3.4.1 Existing Background Noise Levels

Background noise levels during day time are dominated by general vehicular traffic movements. The NSW Department of Environment and Climate Change (DECC) Industrial Noise Policy (INP) 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 INP 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))
Location 1 – Rear of the Site	Background $L_{90,15min}$	44	42	34
Location 2 – Epping Road	Background $L_{90,15min}$	48	46	40

In addition to the background levels obtained at the unattended monitoring position presented above, attended noise monitoring was conducted at 2 locations around the perimeter of the subject site as detailed in Figure 1 of Section 1 above. The results of the attended noise measurements are presented in Table 2 below.

Table 2 – Measured Attended Environmental Noise Levels

Location	Time Period	Measured Noise level dB(A) $L_{eq\ (15\ min)}$
Location 1 – Epping Road	Peak Afternoon Period 3.30pm to 6pm	66
Location 2 – Herring Road	Peak Afternoon Period 3.30pm to 6pm	64

4 NOISE EMISSION LIMITS – NOISE GENERATED ON THE SITE

The Department of Environment and Climate Change (DECC) Industrial Noise Policy provides guidelines for assessing noise impacts from development sites. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The DECC's Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion. In addition, the DECC 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 Environmental Criteria for Road Traffic Noise (ECRTN).

4.1 DECC INTRUSIVENESS CRITERION

The DECC 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 DECC AMENITY CRITERION

The DECC 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 DECC'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 of the INP 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 3 – 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 DECC INP 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 Day Time 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 4 – 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}
Location 1 – Rear of the site	48	44	55	49
Location 2 – Epping Road	66	48	55	53
Location 3 – Herring Road	63	47	55	52

4.4.2 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 5 –Measured L_{eq} & L_{90} Noise Levels and Criteria - Evening Period

Location	Measured Leq Noise Level dB(A)	Measured L90 Noise Level dB(A)	Amenity Criterion dB(A) L_{eq}	Intrusiveness Criterion dB(A) L_{eq}
Location 1 – Rear of the site	45	42	45	47
Location 2 – Epping Road	64	46	45	51
Location 3 – Herring Road	62	45	45	50

4.4.3 Night Time 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 L_1 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 6 –Measured L_{eq} & L_{90} Noise Levels and Criteria - Night Time Period

Location	Measured Leq Noise Level dB(A)	Measured L90 Noise Level dB(A)	Amenity Criterion dB(A) L_{eq}	Intrusiveness Criterion dB(A) L_{eq}	Night time Sleep Disturbance dB(A) $L1$ (1 Min)
Location 1 – Rear of the site	40	34	40	39	49
Location 2 – Epping Road	61	40	40	45	55
Location 3 – Herring Road	56	38	40	43	53

4.5 RESULTING NOISE LEVEL CRITERIA

The criteria for the various monitoring locations have been considered and assessed for the surrounding receivers. Table 7 below details the noise level criterion for properties 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 7 – Noise Objectives for Surrounding Receivers

Location	Day time 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))
Properties on Epping Road	53	45	40	55
Properties on Herring Road	52	45	40	53
Neighbouring Properties to the rear of the Site	49	45	39	49

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.

4.6 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 DECC ECRTN. Criteria applicable to the development are detailed below. If existing noise levels exceed those in Table 8 a 2 dB increase in noise is allowed.

The proposed development includes the use of a carpark and future roadways to the north east and northwest of the site which will be assessed against the criteria detailed in the table below.

Table 8 - 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 and unattended traffic noise levels measurements were conducted at a number of locations surrounding the development including locations as detailed in the table below. The resulting noise levels have been used to generate the resulting noise level criterion for additional traffic movements which been used in this assessment.

Table 9 - Criteria for Traffic Generation

Location	Criteria for Acceptable Traffic Noise Level dB(A) $L_{eq\ (1hr)}$	
	Day (7am to 10pm)	Night (10pm to 7am)
Epping Road	66*	63
Herring Road	64*	58
New roadways on the perimeter of the site	55	50

*Based on evening noise levels obtained at the site.
Note: Noise levels calculated to potentially worst affected residential facades from results of on site testing.

5 ADDITIONAL TRAFFIC NOISE GENERATION ASSESSMENT

The proposed development includes carpark and additional roadways to the perimeter of the site. Access to the future carparks will be via a number of entry and exits with the primary access via Herring Road. The future roadways on the perimeter of the site will open on Epping Road to the southwest of the site (subject to future development of adjoining site) and on Herring Road to the northeast of the site.

Potential noise impacts from traffic movements generated by the development on public roads have been assessed for residents surrounding the site and future tenancies within the development, including the potential for noise impact generated from the proposed additional roadways on the perimeter of the site. The assessment is based on the maximum traffic flow periods using FHWA and CORTN traffic noise prediction models and noise level measurements conducted at the site and presented in this report.

5.1 ADDITIONAL TRAFFIC NOISE ON LOCAL STREETS

Traffic noise generated by the proposed development was assessed using current and predicted traffic flows provided by Traffix.

The predicted worst case noise increases on each of the streets surrounding the development are summarised in the table on the following page.

The provided traffic movements of the future perimeter roadways from Traffix include the following:

1. Up to 155 vehicle movements per hour during a worst case period, which has been used as the basis for day and night time periods and:

2. 1600 vehicle movements per day and any section of the future roadways.

Table 10 – Calculated Noise Associated with Traffic Generation

Roadway	Time Period	Criteria for Acceptable Traffic Noise Level dB(A) $L_{eq\ (1hr)}$	Calculated Future Traffic Noise $L_{eq\ (1\ hr)}$	Compliance
Epping Road	Day (7am to 10pm)	66	No Increase in traffic noise	Yes
	Night (10pm to 7am)	63	No Increase in traffic noise	Yes
Herring Road	Day (7am to 10pm)	64	No Increase in traffic noise	Yes
	Night (10pm to 7am)	58	No Increase in traffic noise	Yes
Future Perimeter Roadways	Day (7am to 10pm)	55	Up to 49	Yes
	Night (10pm to 7am)	50	Up to 49	Yes

Note: All calculations were conducted using FHWA traffic modelling.

The investigation into noise associated with additional traffic movements revealed that any increased traffic flows will cause either no noise increase to existing roadways or compliance with INP criteria for increased traffic volumes on surrounding roadways and would not adversely impact on the acoustic amenity of surrounding residential receivers.

6 INTERNAL ENVIRONMENTAL ACOUSTIC OBJECTIVES

As the development is located adjacent to Epping Road which carries more that 40,000 vehicles in any given day compliance with the NSW State Environmental Planning Policy is required.

6.1 INTERNAL NOISE LEVEL CRIERIA

Condition 102 of the NSW State Environmental Planning Infrastructure policy states:

"(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) a building for residential use,

(b) a place of public worship,

(c) a hospital,

(d) an educational establishment or child care centre.

(2) Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.

(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

(a) in any bedroom in the building--35 dB(A) at any time between 10 pm and 7 am,

(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)--40 dB(A) at any time"

6.2 TRAFFIC NOISE OBJECTIVES

Based on the NSW State Environmental Planning Policy Infrastructure requirements detailed above internal noise level criteria are detailed in the table below. Detailed noise levels are in compliance with the recommended internal noise levels of the Australian Standards AS2107:2000 and AS3671-1989.

Table 11 – Internal Traffic Noise Level Objectives

Room Type	Time Period	Internal Noise Level criteria
Bedroom	10pm to 7am	35 dB(A) $L_{Aeq\ (9\ hour)}$
Living Area	Any time	40 dB(A) $L_{Aeq\ (24\ hour)}$

6.3 COMPLIANCE WITH INTERNAL NOISE LEVELS

Experience with similar projects indicates that compliance with internal noise level criteria detailed in this section of the report is both possible and practical. The external façade of the future development will be acoustically treated where necessary to ensure internal noise levels comply with specified noise levels.

Acoustic treatment will include the upgrading of glazing and other façade elements based on noise level measurements conducted at the site. Typically the required upgraded glazing for acoustics will include 6.38mm laminated or 10.38mm laminated glazing.

Masonry and other high mass elements of the façade will not require additional acoustic treatments. Light weight wall constructions will include acoustic insulation and the like to ensure internal noise level criteria are achieved.

6.4 TYPICAL SELECTIONS

As part of this assessment an assessment of internal noise levels within future apartments has been conducted and typical façade constructions selected which would be required to comply with criteria detailed in this report.

The following constructions are typical constrictions only, details of window to be used will be provided as part of the Constriction Certificate.

Table 12 – Typical Glazing Requirements

Location	Room	Glazing Requirements	Acoustic Seals
Epping Road Façade	Bedrooms	10.38mm laminated	Yes
	Living rooms	10.38mm laminated	Yes
Herring Road Façade	Bedrooms	10.38mm laminated	Yes
	Living rooms	10.38mm laminated	Yes
Northwest Façade	Bedrooms	10.38mm laminated	Yes
	Living rooms	6.38mm laminated	Yes
All Other Facades	Bedrooms	6.38mm laminated	Yes
	Living rooms	6.38mm laminated	Yes

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 to all units not listed in the table may be 6mm thick, float or toughened glass for windows and doors.

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 Table 13 for all rooms.

Table 13 - Minimum STC of Glazing

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
6.38mm laminated	Yes	30
10.38mm laminated	Yes	35

6.5 INTERIM GUIDELINES FOR DEVELOPMENT NEAR RAIL CORRIDORS

As the development is not located with 60m of a railway corridor no additional acoustic assessment of noise or vibration impact from train passbys is required.

7 MECHANICAL PLANT TREATMENTS

As detailed plant selections have not been conducted at this time a detailed acoustic assessment of noise impact can not be conducted which is typically of DA/PA stage.

A detailed mechanical noise assessment will be conducted once plant selections and services drawings have been finalised as part of the construction documentation to ensure noise levels comply with the criteria detailed in this report. Details will be provided as part of the CC submission of the project.

Based on experience with similar development acoustic treatments are both possible and practical using acoustic treatments such as lining of ductwork, acoustic silences, variable speed controllers, time switches, acoustic screens etc. General requirements for a number of potential plant items on the site are expanded on below.

7.1 CHILLERS / AIR HANDLING UNITS

Units can be located on roof tops with an acoustic screen or in basement areas, with acoustic treatment to intake and exhaust as necessary.

These units would predominantly operate during the day, with the potential to operate with extended hours. Acoustic treatment to these units may be required to ameliorate noise impact to the surrounding residents and to comply with the criteria specified in this report and verified at CC stage.

7.2 SUPPLY / EXHAUST FANS

Supply and exhaust fans may be located within the underground plant rooms or in rooftop plant areas. These units typically emit high noise levels and require acoustic treatment such as silencers and internal lined ductwork. Silencer requirements would be determined once fan selections have been completed at CC stage.

7.3 CONDENSER UNITS

Condensing units typically emit relatively low noise levels and with careful selection, it is possible that no further acoustic treatment would be necessary.

7.4 MINOR PLANT

Other minor plant items, such as bathroom or kitchen exhaust fans, will be required. These items typically emit relatively low noise levels and may require minimal acoustic treatment of a standard nature., such as internally lining of ductwork.

8 FUTURE RETAIL/COMMERICIAL TENANCIES

Design of any future retail and commercial areas within the Macquarie Park Village development including a café will be developed to minimise the acoustic impact to existing and future residential properties.

The acoustic treatments and controls will be developed once final layouts and activities to be conducted are know and may include the following:

- Locating seating below awnings and overhangs to limit noise impact to residence above.
- Numbers of seats within the courtyard will be limited such that large numbers should not congregate in the courtyard.
- Locating external areas including balconies, courtyards, terraces and the like in a location such than noise transmission is minimised.
- Limit deliveries and waste removal to day time hours
- Incorporate acoustic treatments and controls to café areas as appropriate. It is noted that noise associated with future restaurants and cafes will be assessed once tenancy uses are finalised.
- No playing of recorded music externally to tenancies.

It is noted that management of these uses are located within Stage 2 of the development which will be subject to detailed design and a DA to Ryde Council at a later time. Therefore, detailed assessment will be conducted at this time.

9 CONSTRUCTION NOISE AND VIBRATION

A construction noise and vibration plan has been prepared and is provided under a separate cover. The noise and vibration plan has been developed in conjunction with the following:

- Australian Standard AS2436:1981 “Guide to noise control on construction, maintenance and demolition sites
- Department of Environment Climate Change and Water - Construction Noise Guideline

The detailed construction noise and vibration management plan will be provided as part of the CC submission once a construction (including demolition, excavation and construction) programs and required activities methodologies have been developed.

10 CONCLUSION

This report provides the results of Environmental Noise Study for the proposed Macquarie Park Village development, North Ryde. Noise at the site has been measured and noise goals have been set in accordance with the requirements of the relevant statutory/regulatory authorities including Local Council and the Department of Environment and Climate Change.

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

Additionally in principal treatments have been provided to ensure internal noise levels from surrounding noise sources (namely Epping Road) comply with the requirements of the NSW State Environmental Planning policy.

Based on the assessment Stage 1 of the proposed development will comply with all relevant noise and vibration criteria.

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

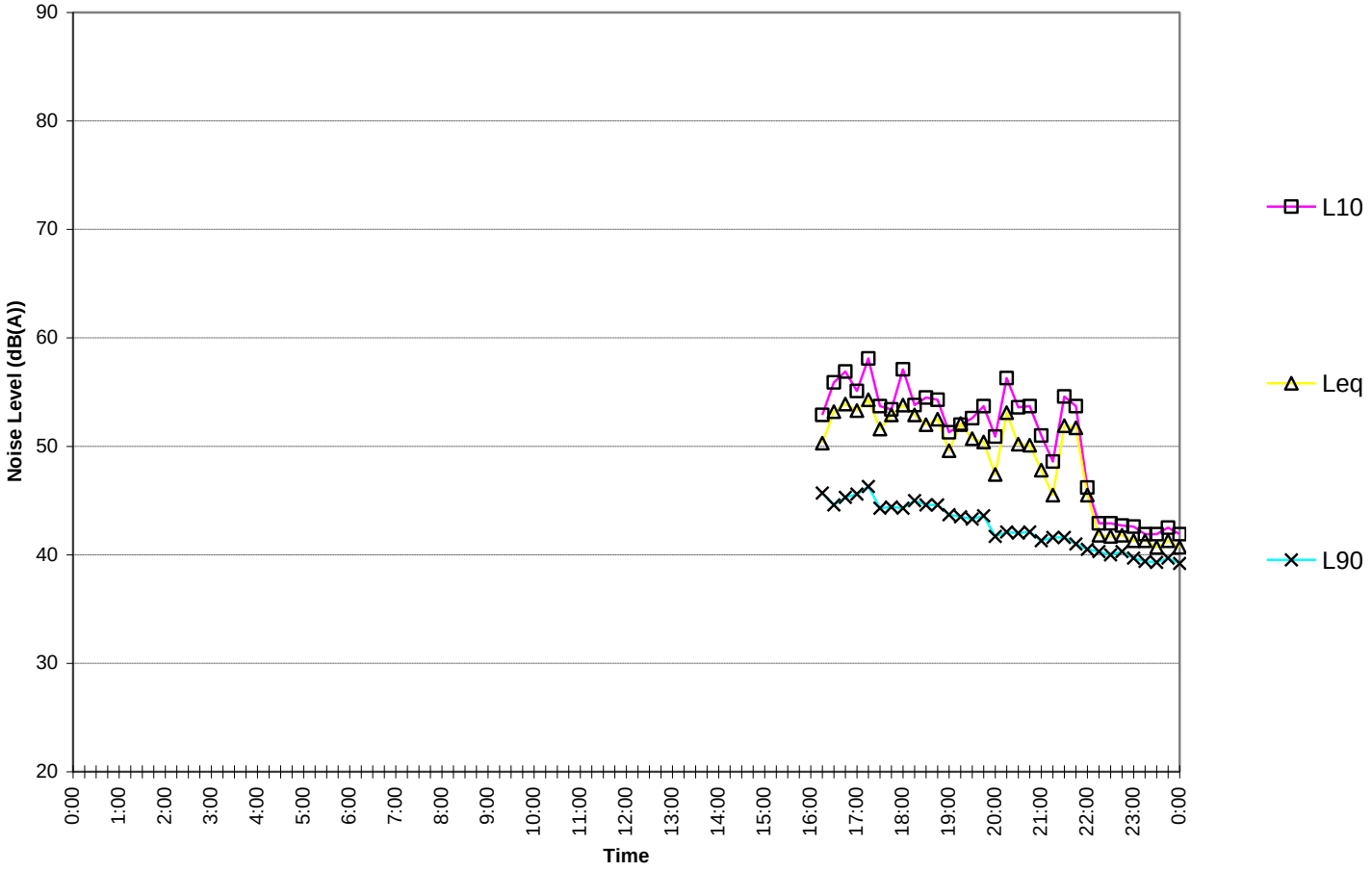
Report prepared by,

ACOUSTIC LOGIC CONSULTANCY PTY LTD
Ben White

APPENDIX A
UNATTENDED NOISE MONITORING RESULTS

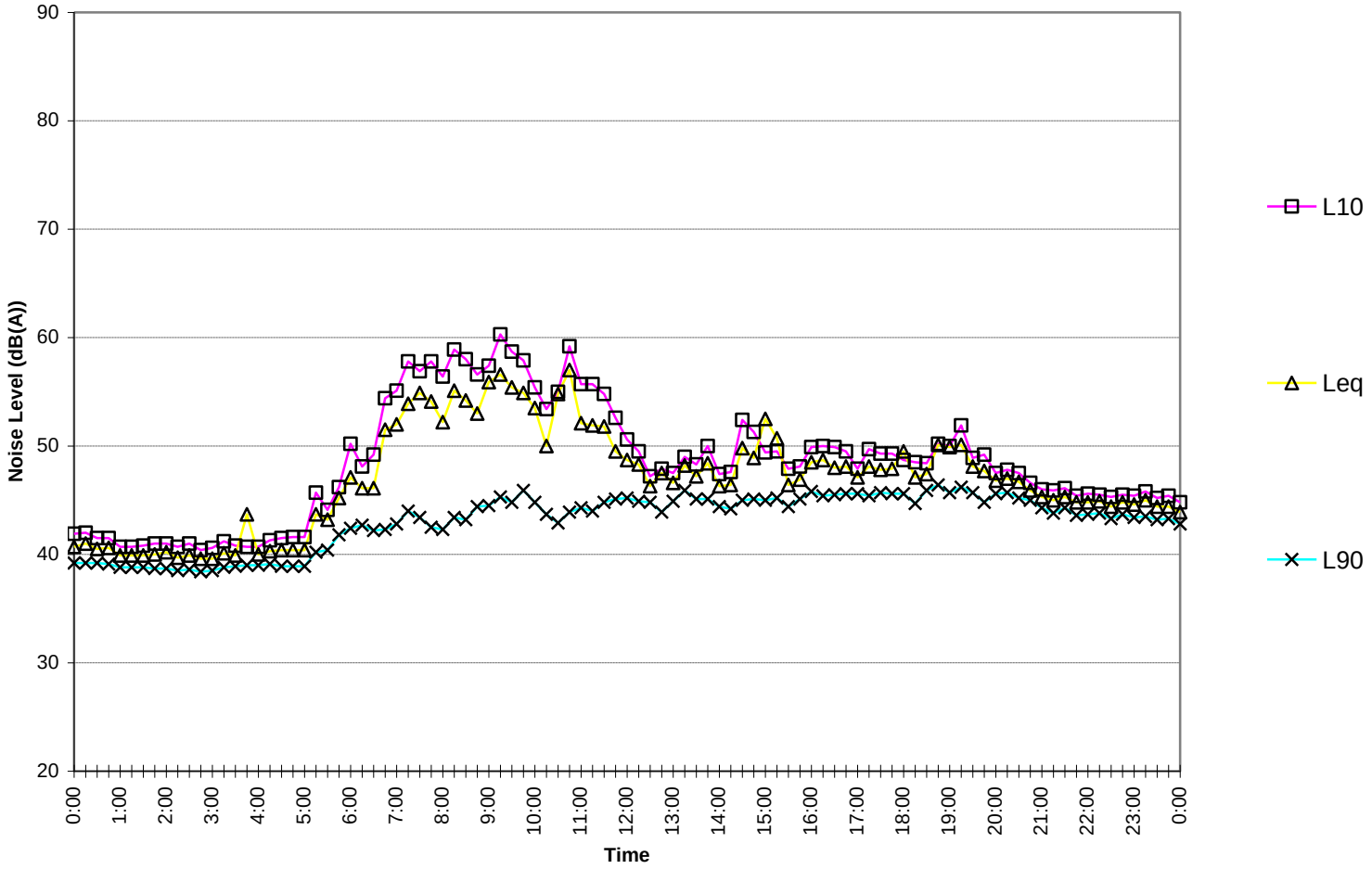
Location 1 - Rear of the Site

Friday November 19,2010



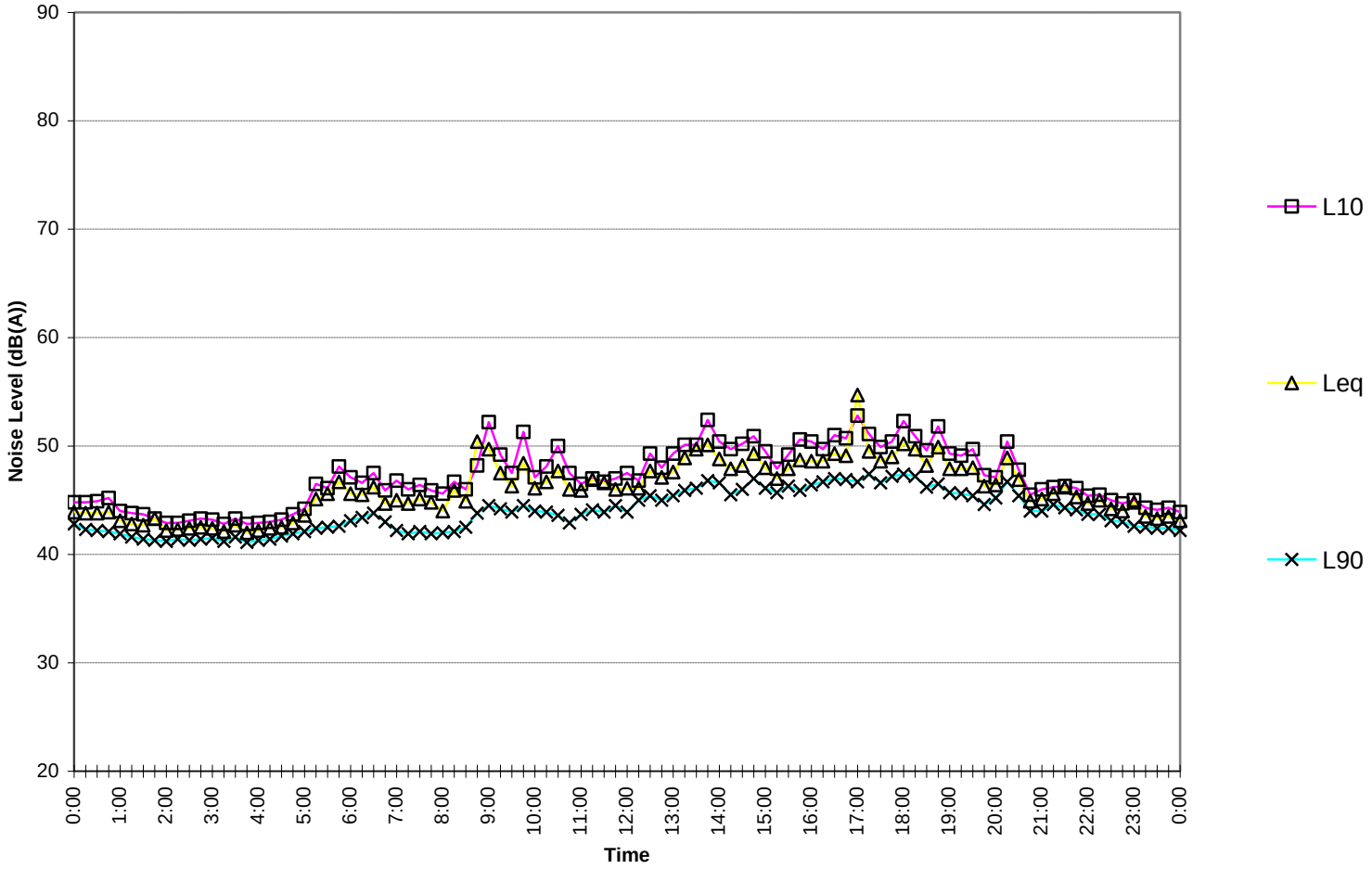
Location 1 - Rear of the Site

Saturday November 20,2010



Location 1 - Rear of the Site

Sunday November 21,2010



Location 1 - Rear of the Site

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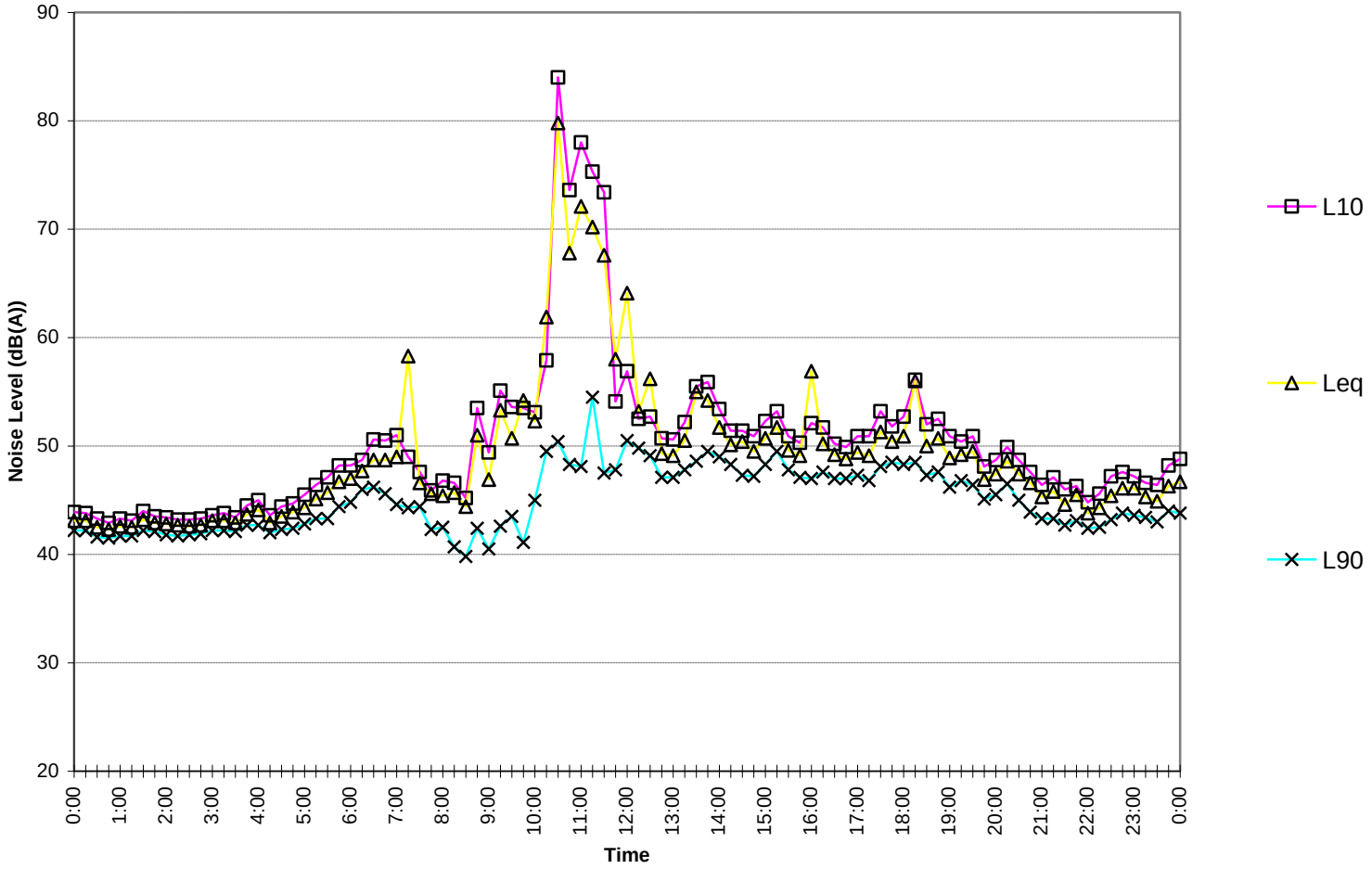

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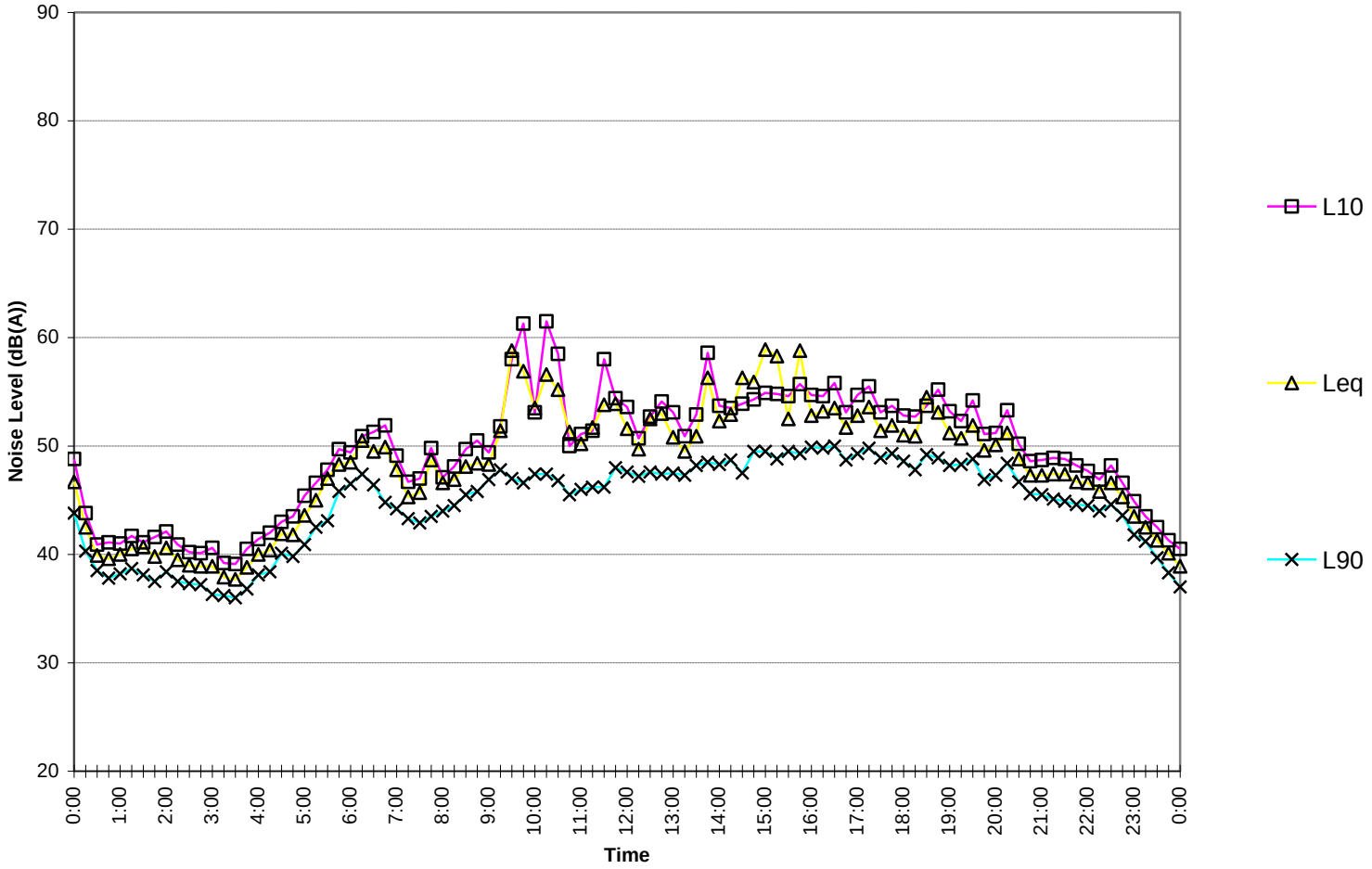
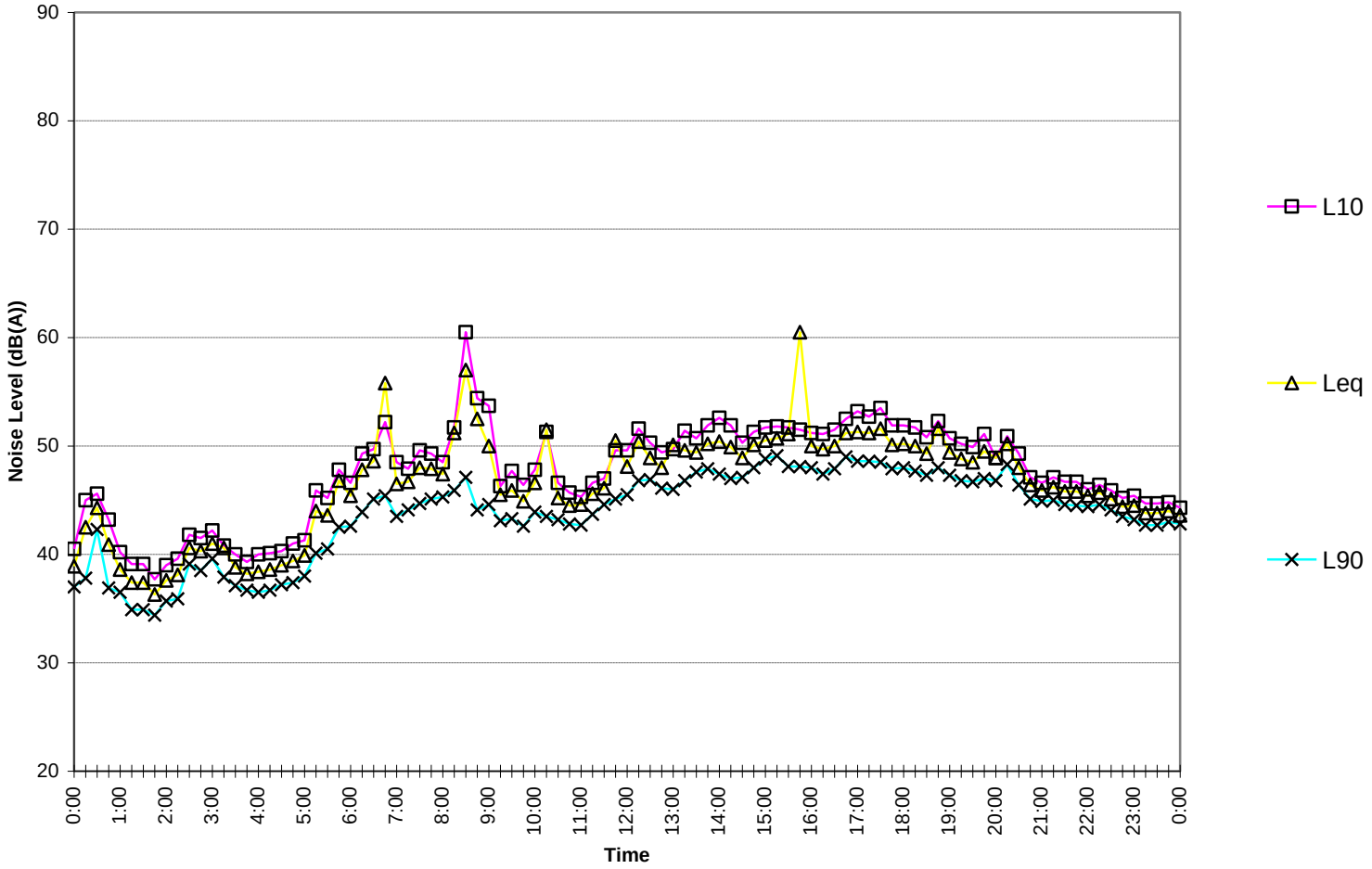


Location 1 - Rear of the Site

Wednesday November 24,2010



Location 1 - Rear of the Site

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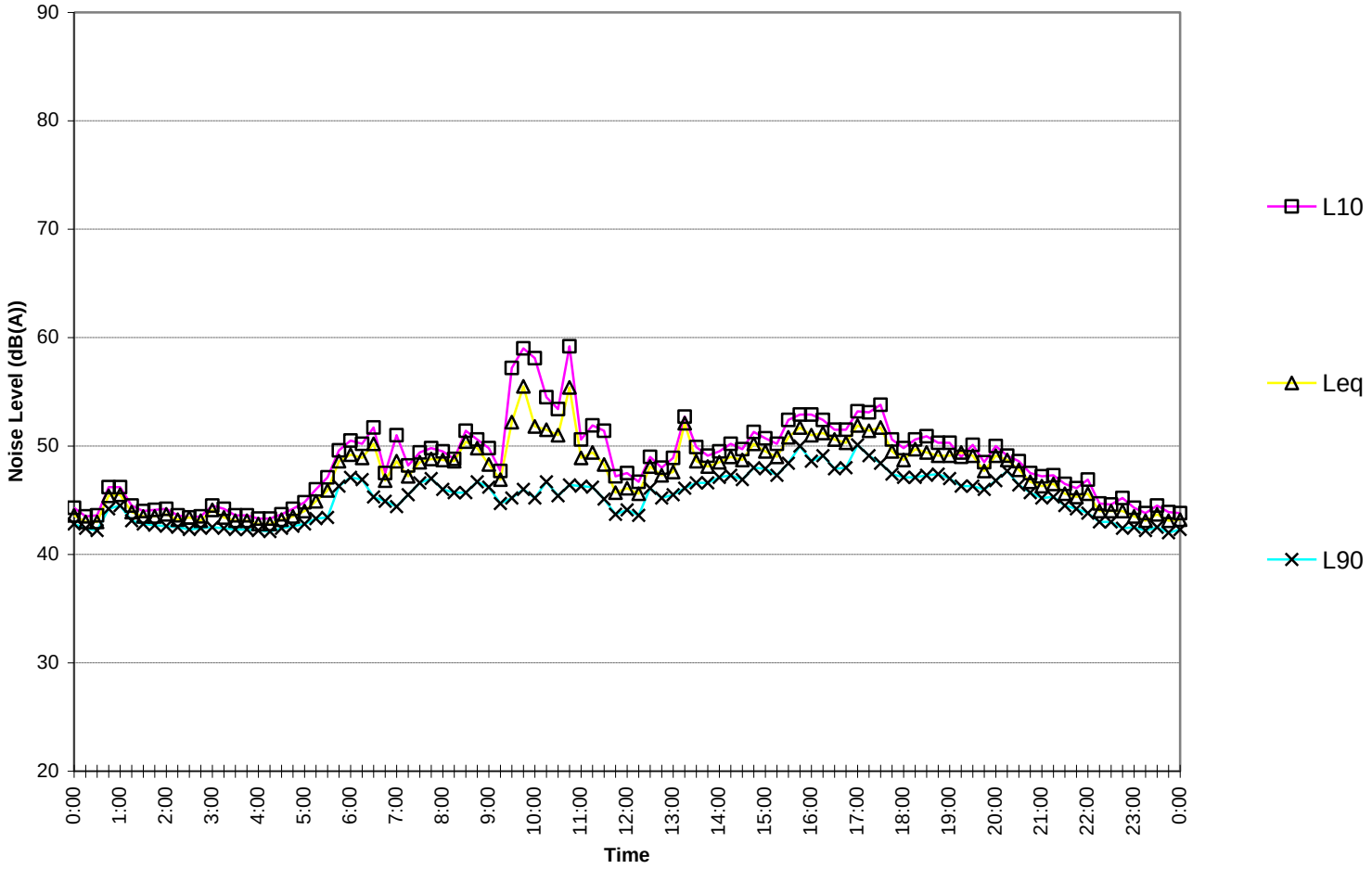
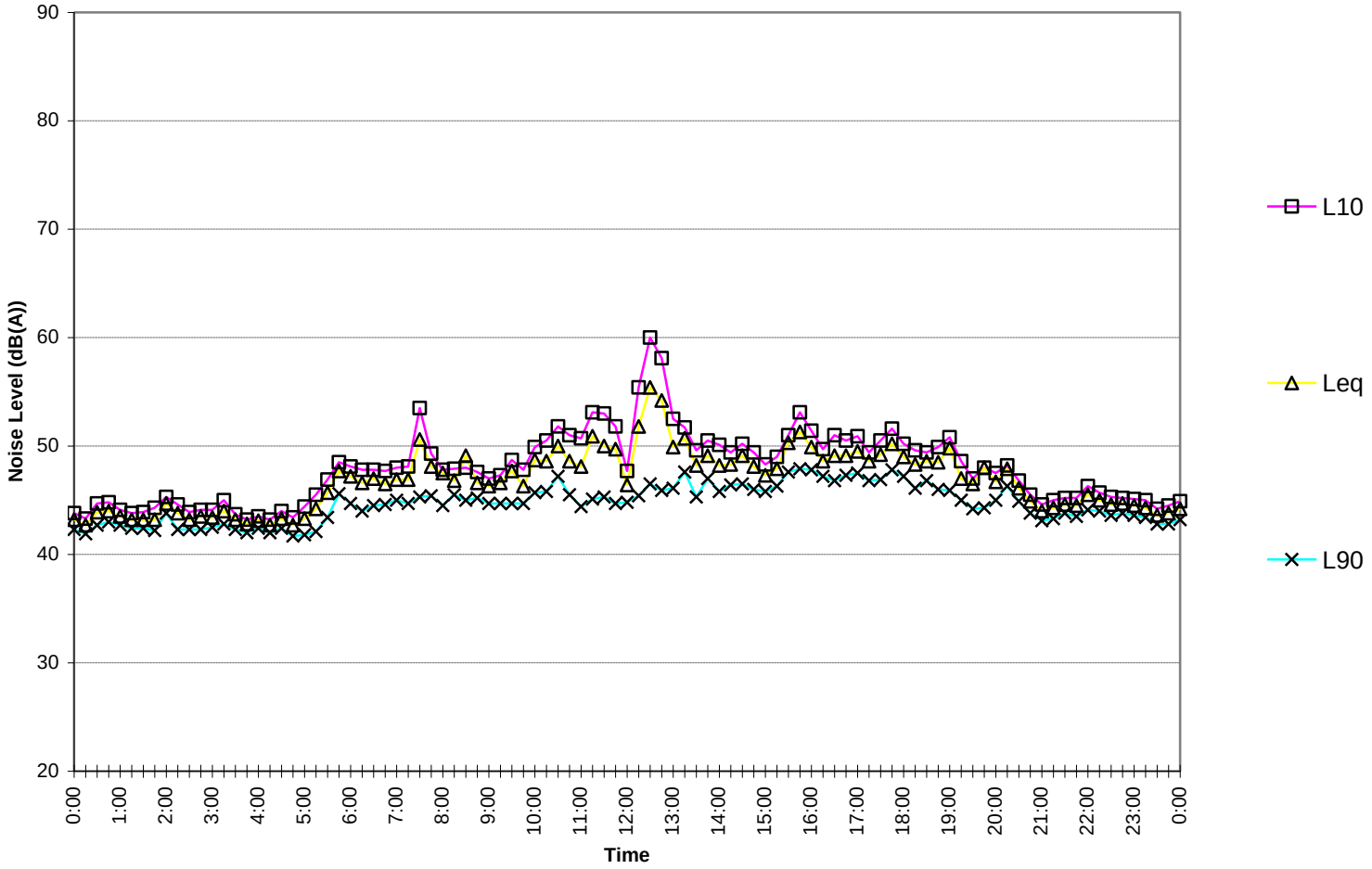


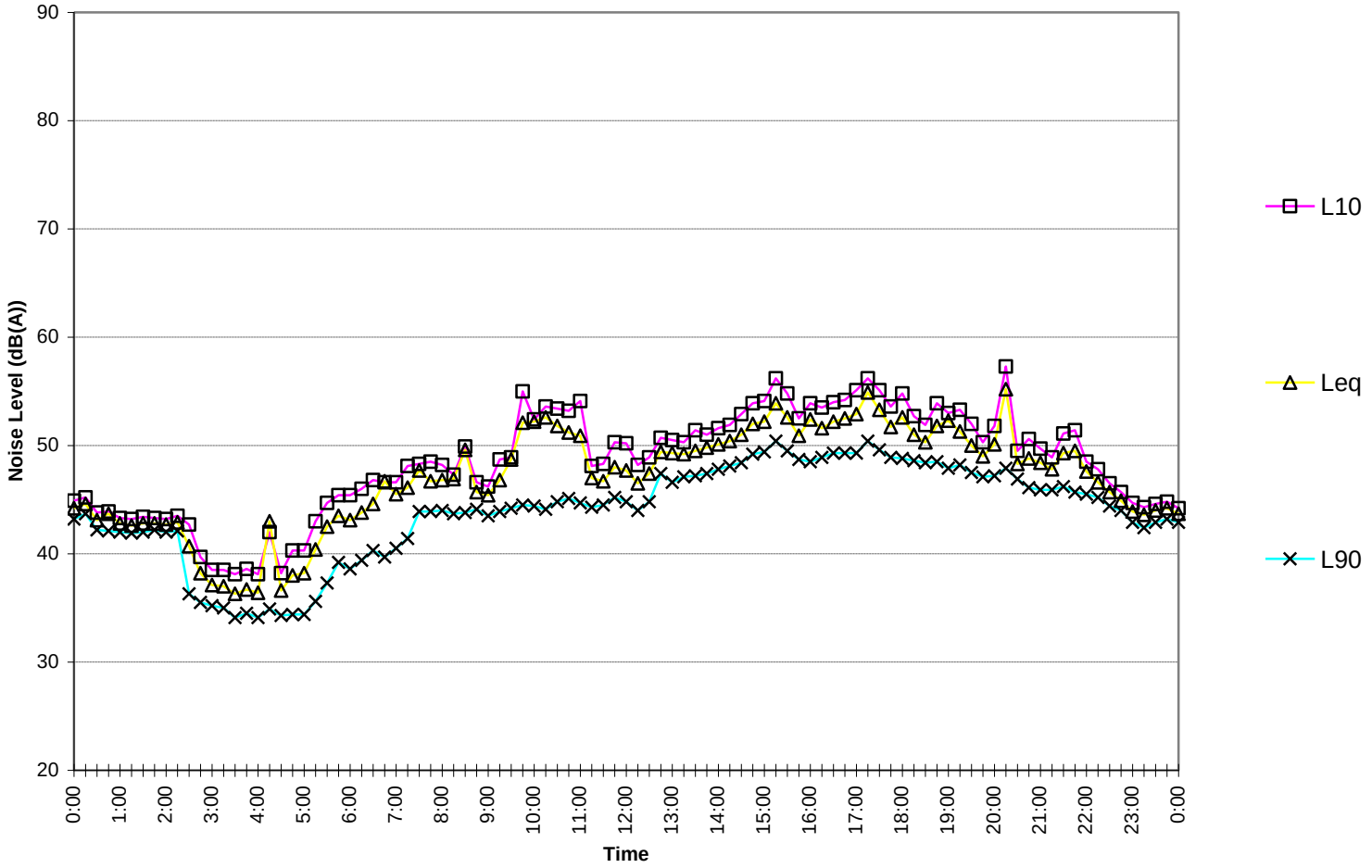
Location 1 - Rear of the Site

Friday November 26,2010



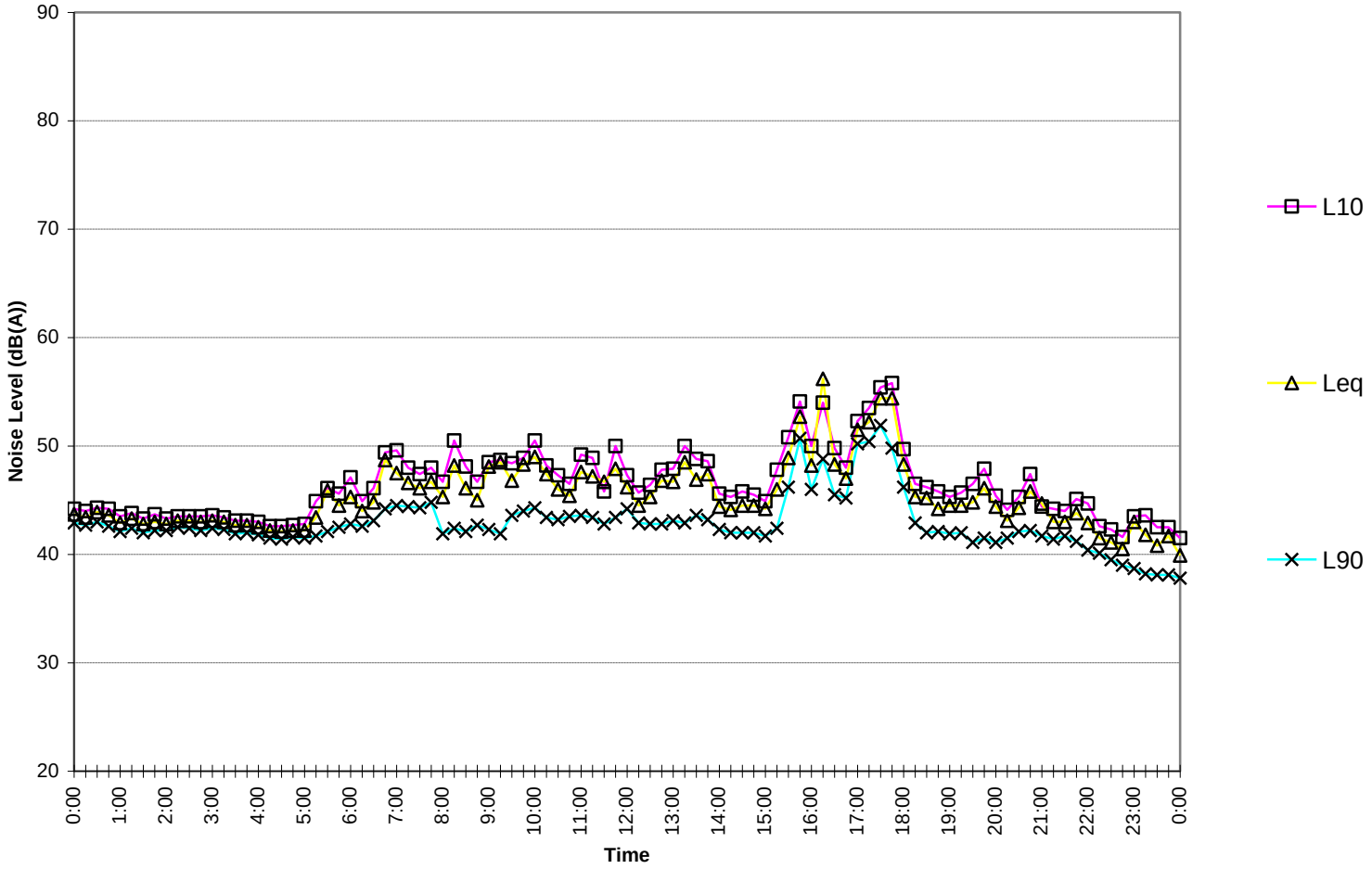
Location 1 - Rear of the Site

Saturday November 27,2010



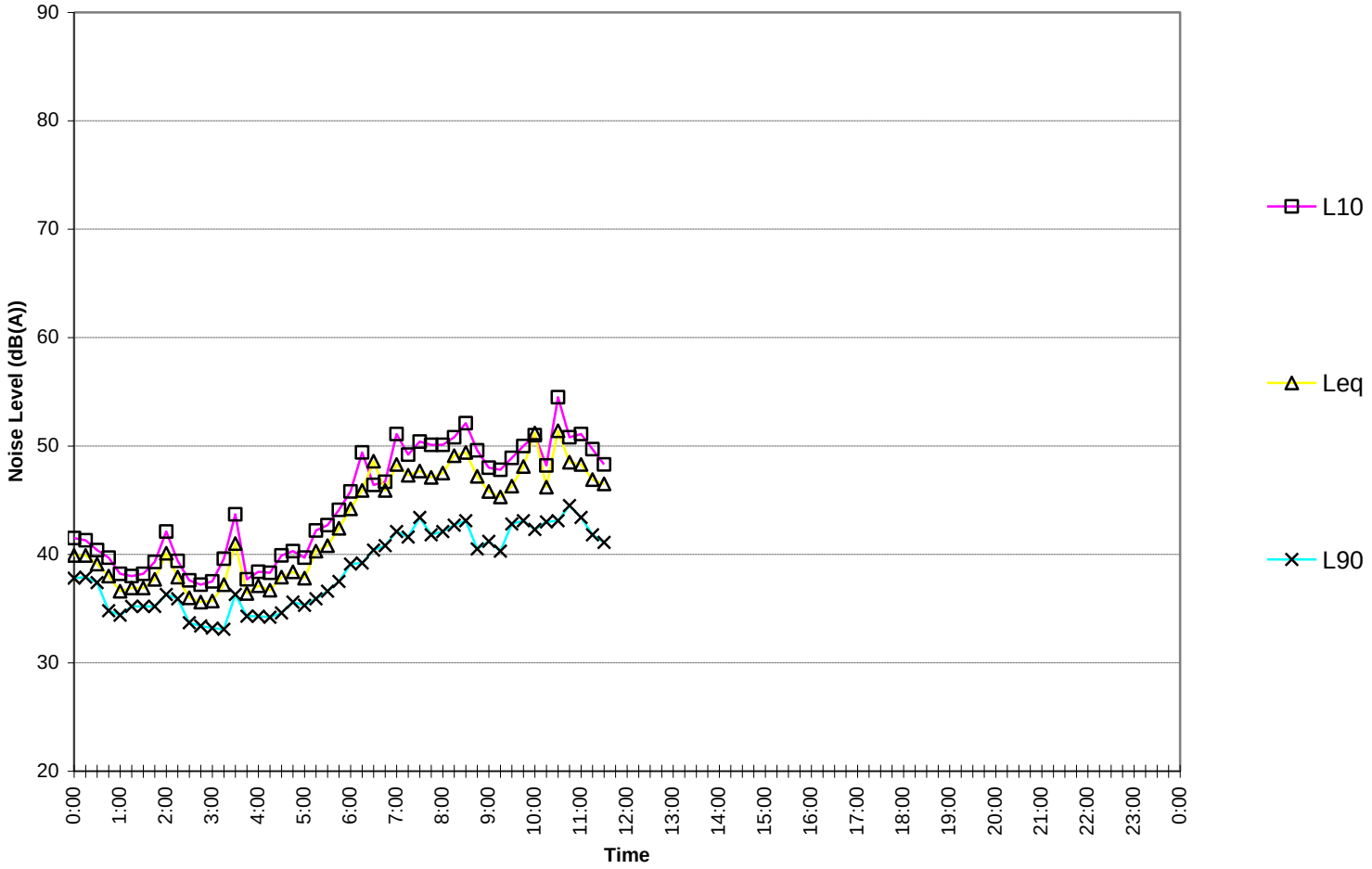
Location 1 - Rear of the Site

Sunday November 28,2010



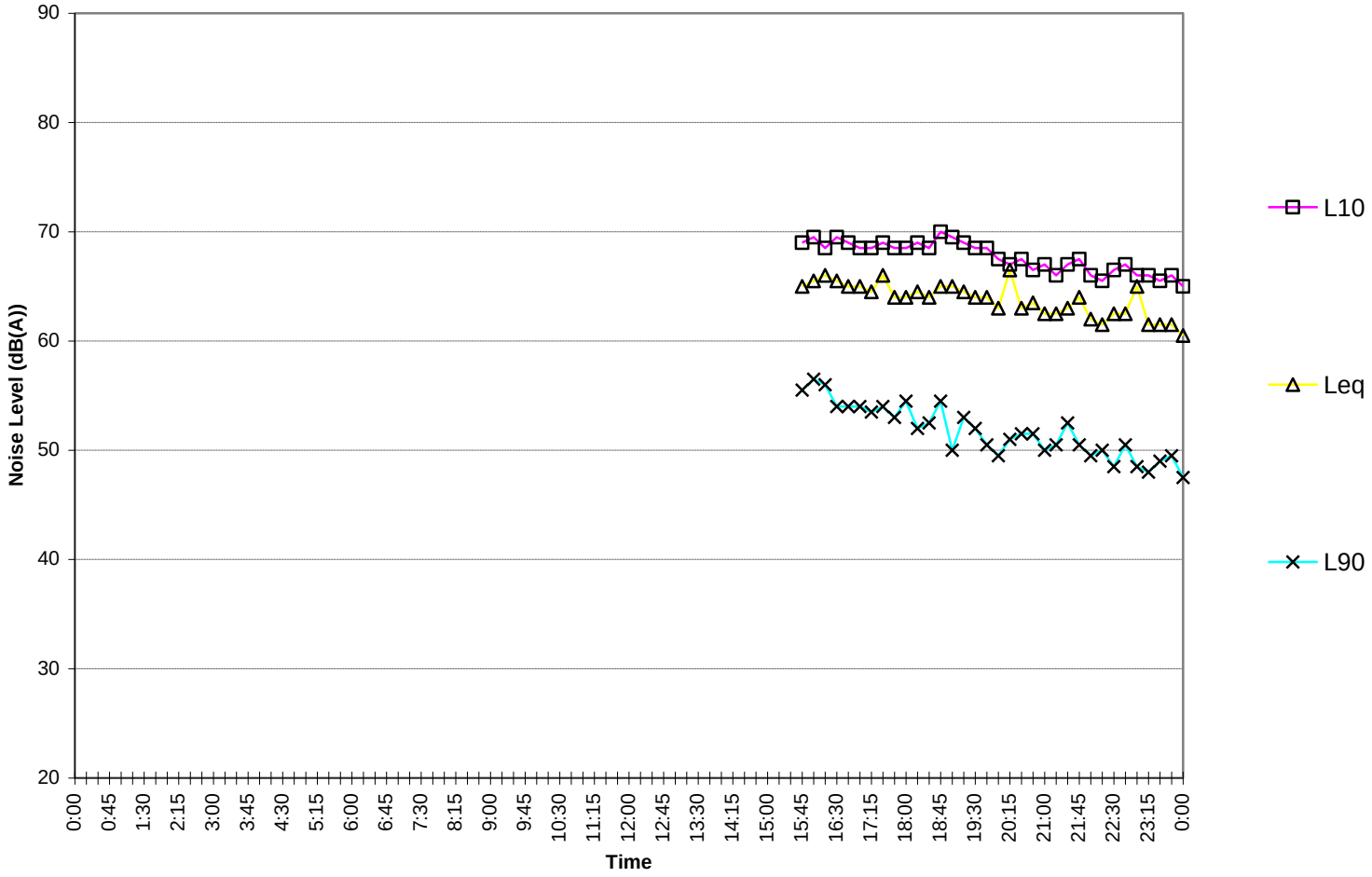
Location 1 - Rear of the Site

Monday November 29,2010



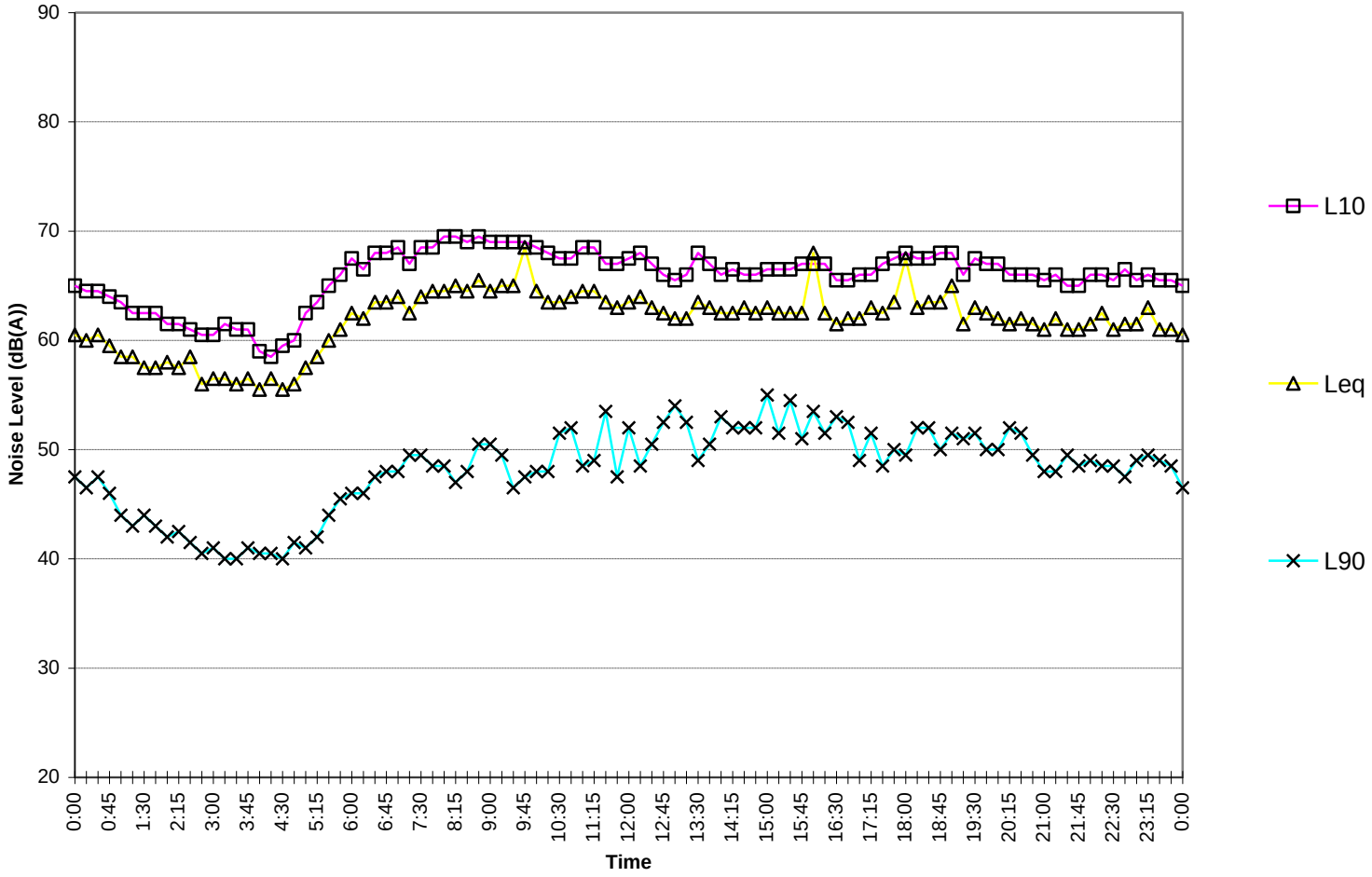
Location 2-Epping Road Boundary

Friday November 19,2010



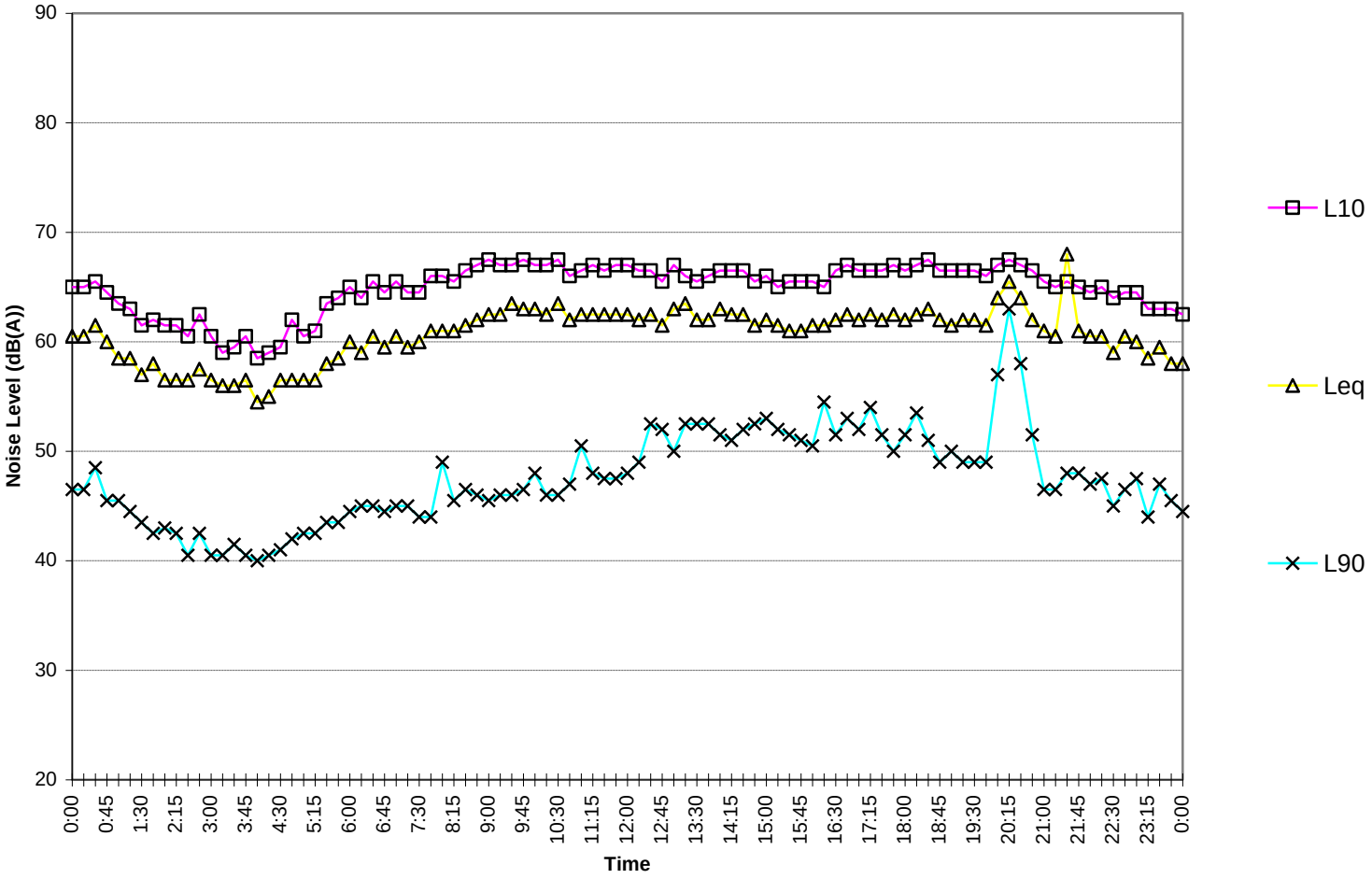
Location 2-Epping Road Boundary

Saturday November 20,2010



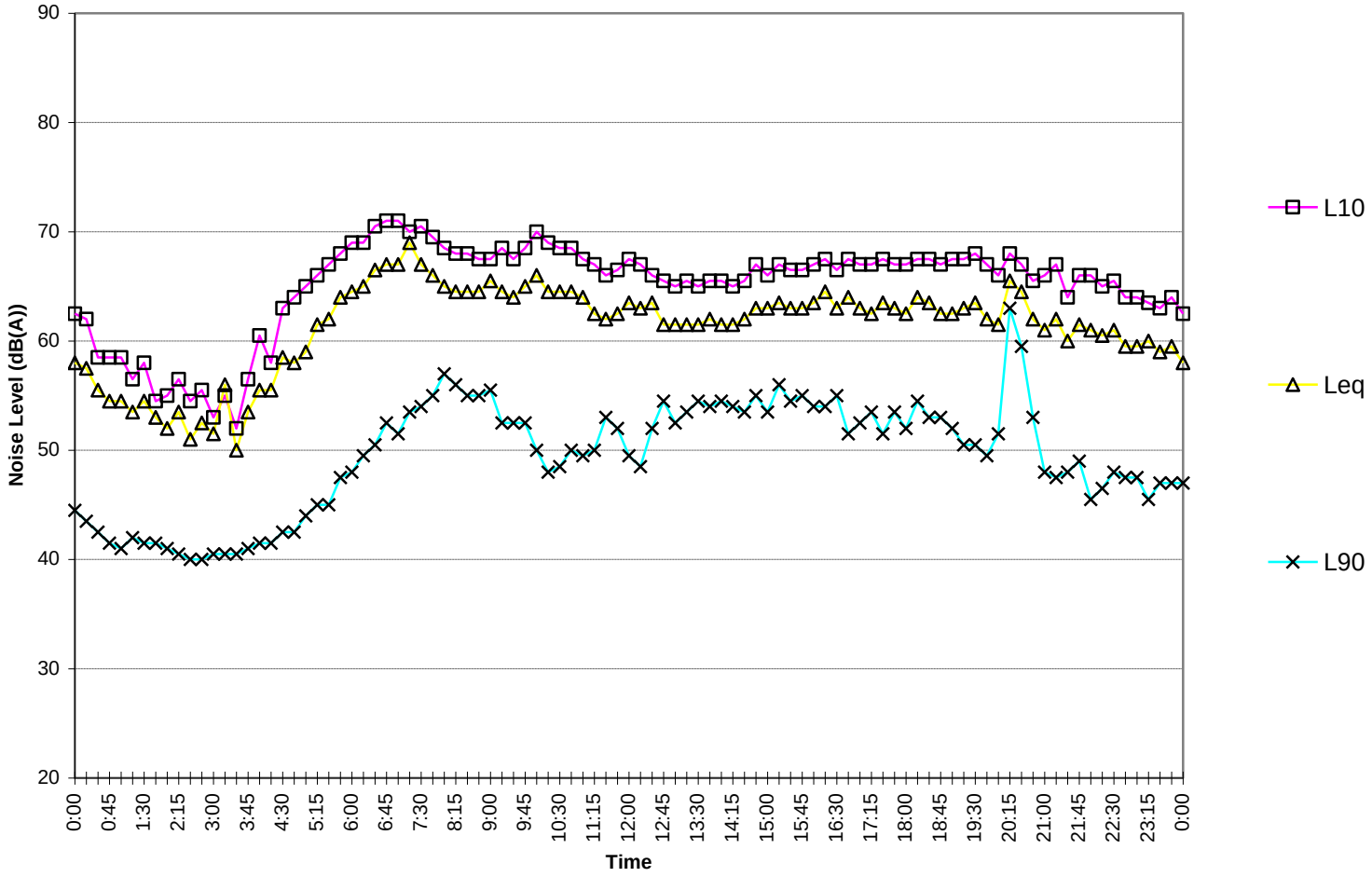
Location 2-Epping Road Boundary

Sunday November 21,2010



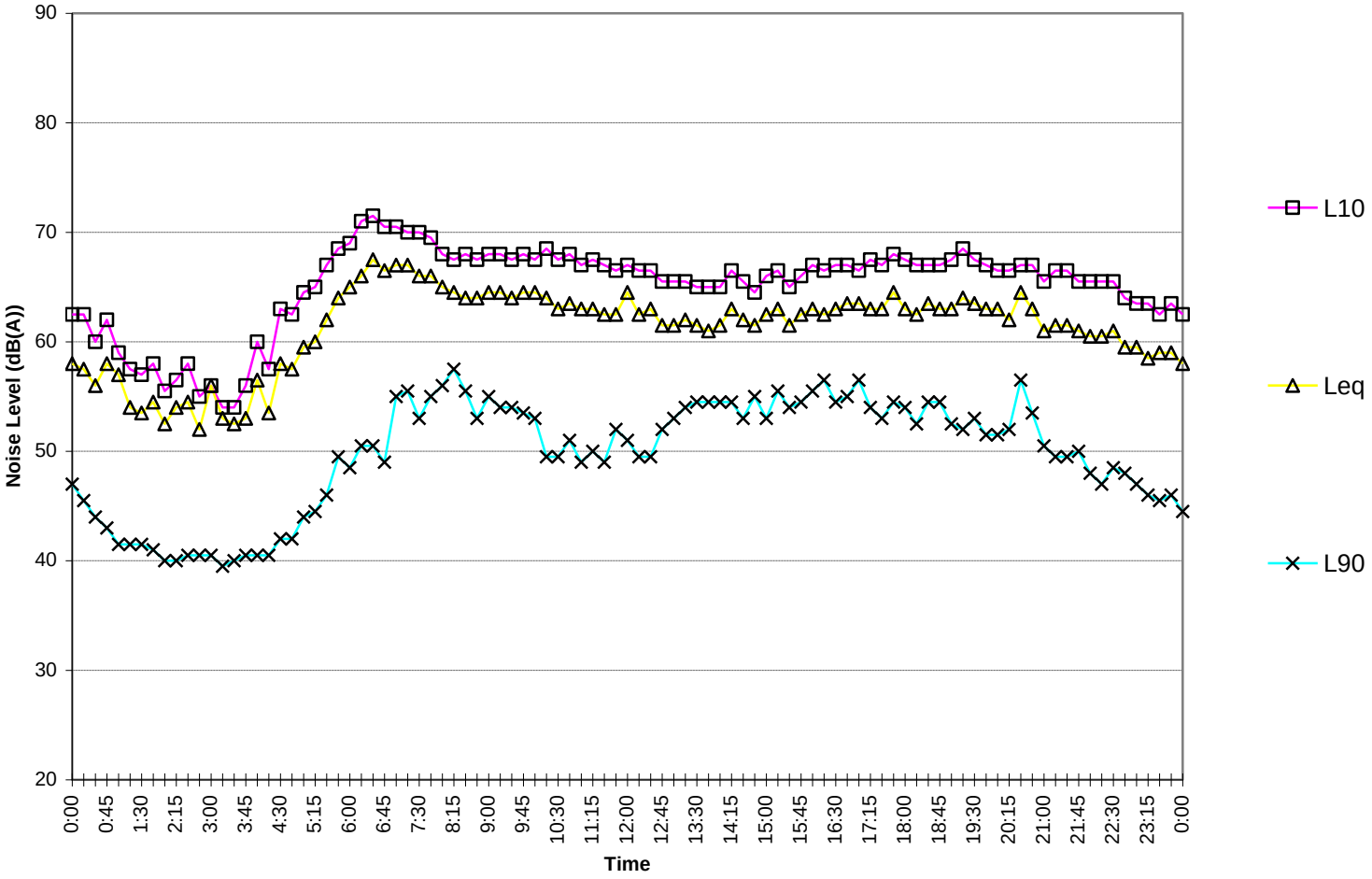
Location 2-Epping Road Boundary

Monday November 22,2010



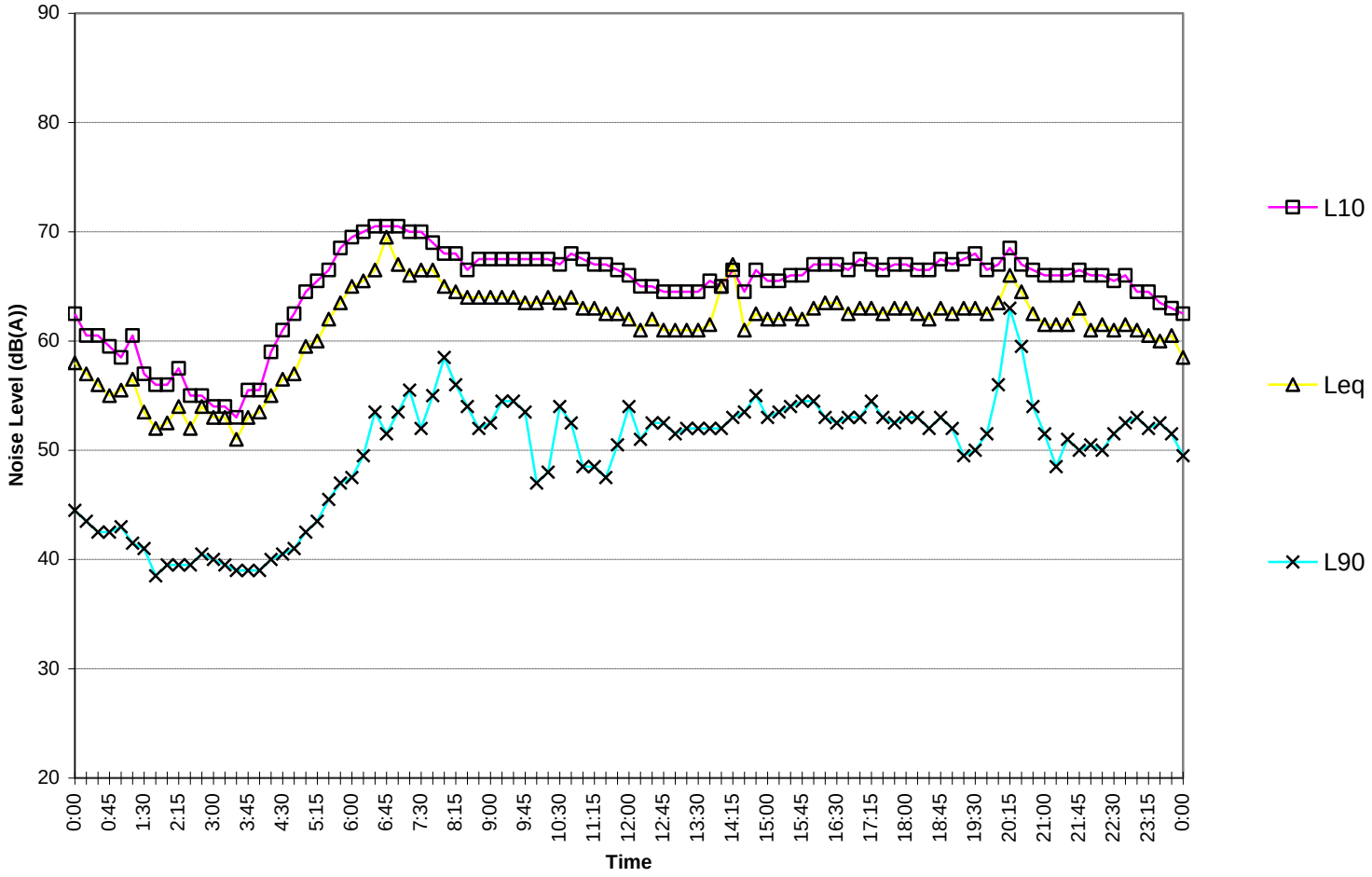
Location 2-Epping Road Boundary

Tuesday November 23,2010



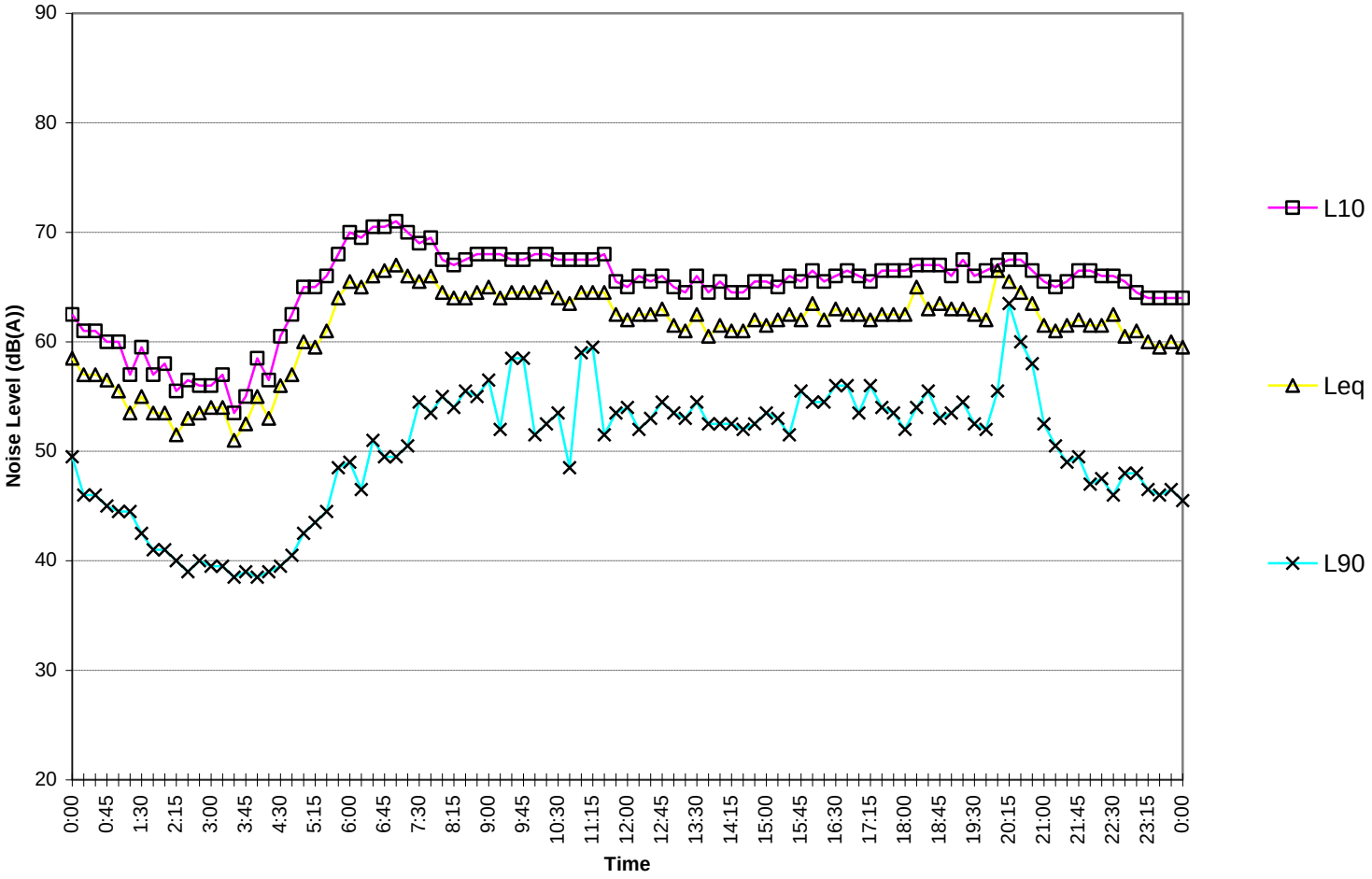
Location 2-Epping Road Boundary

Wednesday November 24,2010



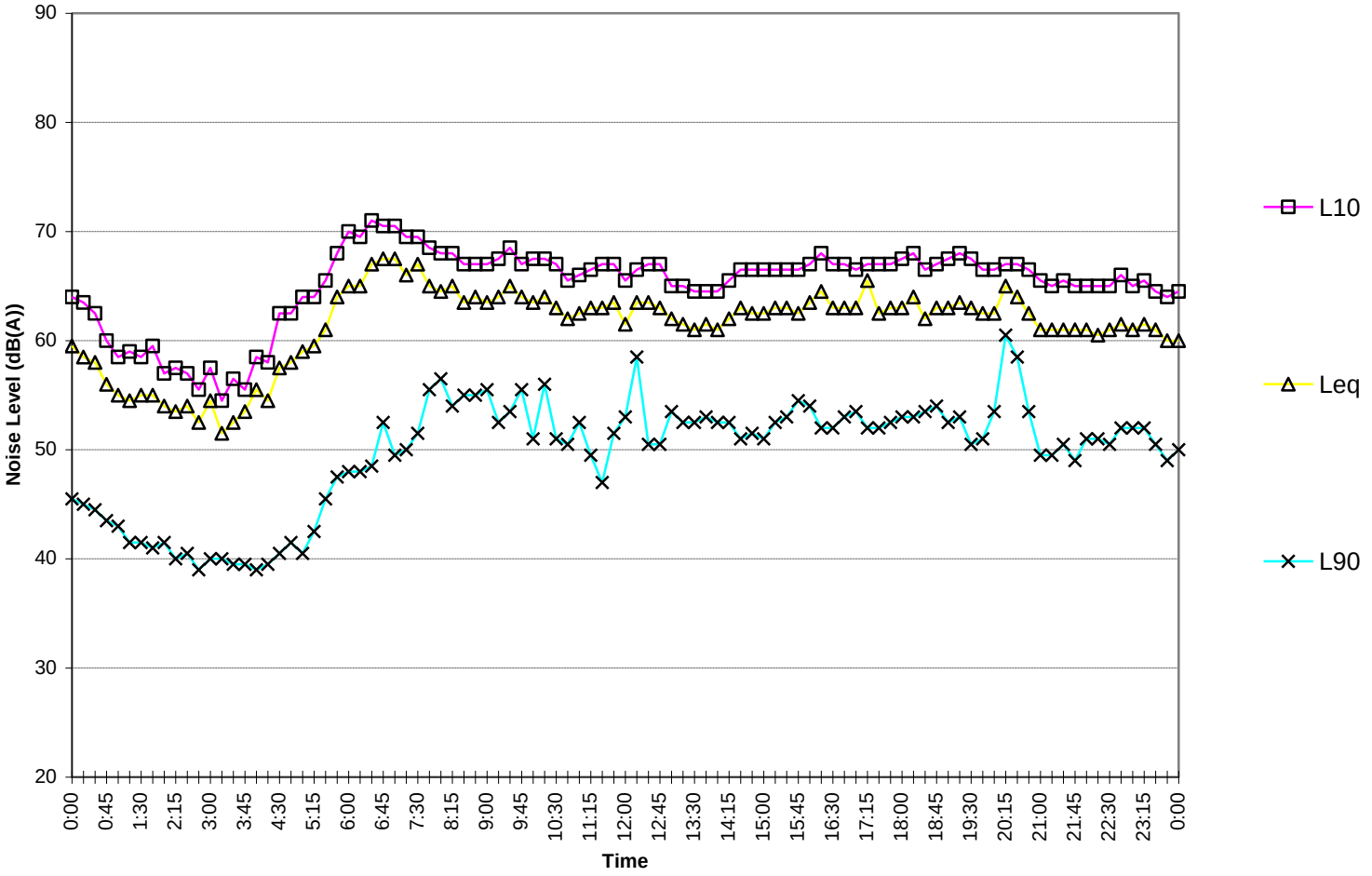
Location 2-Epping Road Boundary

Thursday November 25,2010



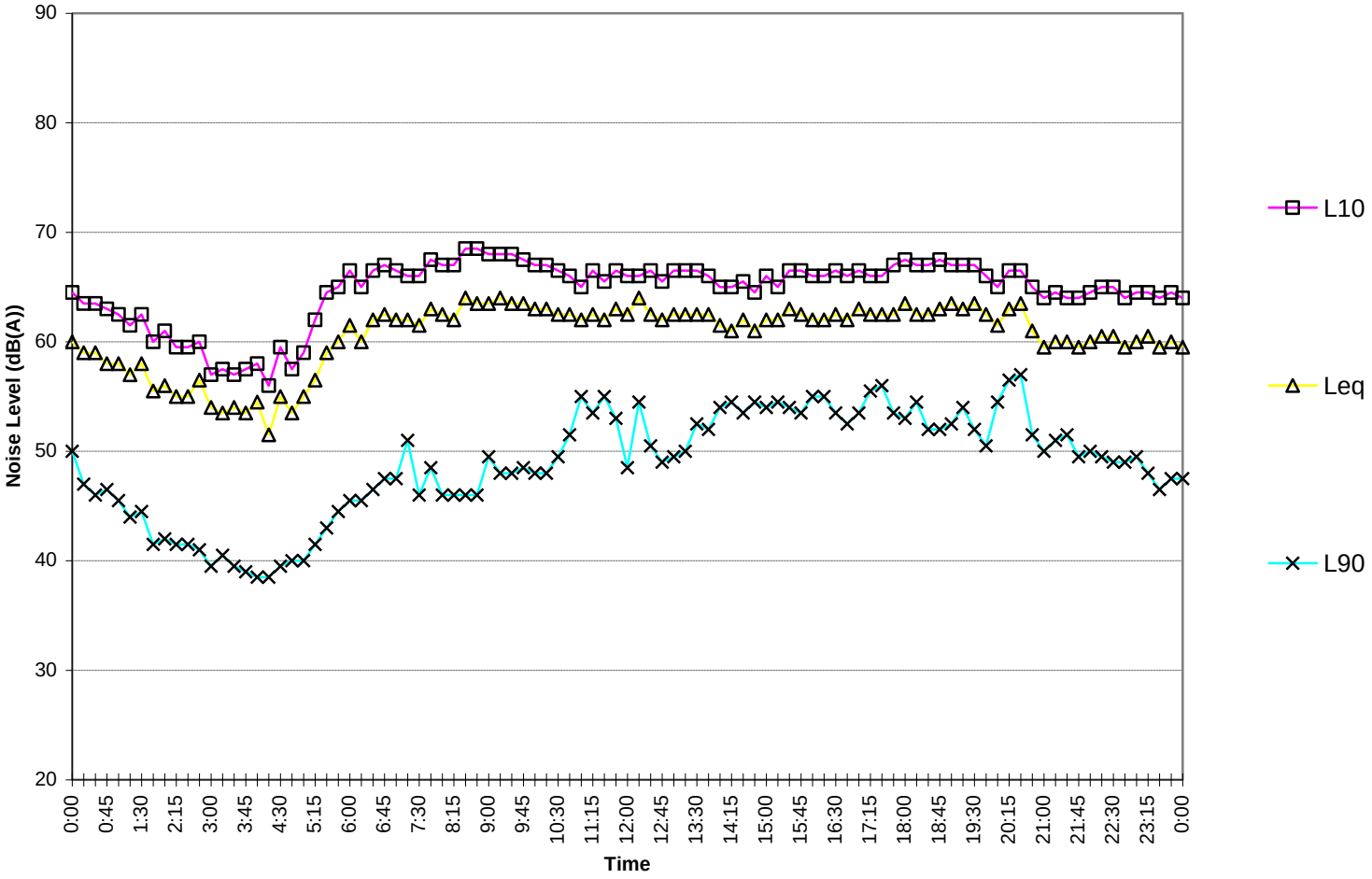
Location 2-Epping Road Boundary

Friday November 26,2010



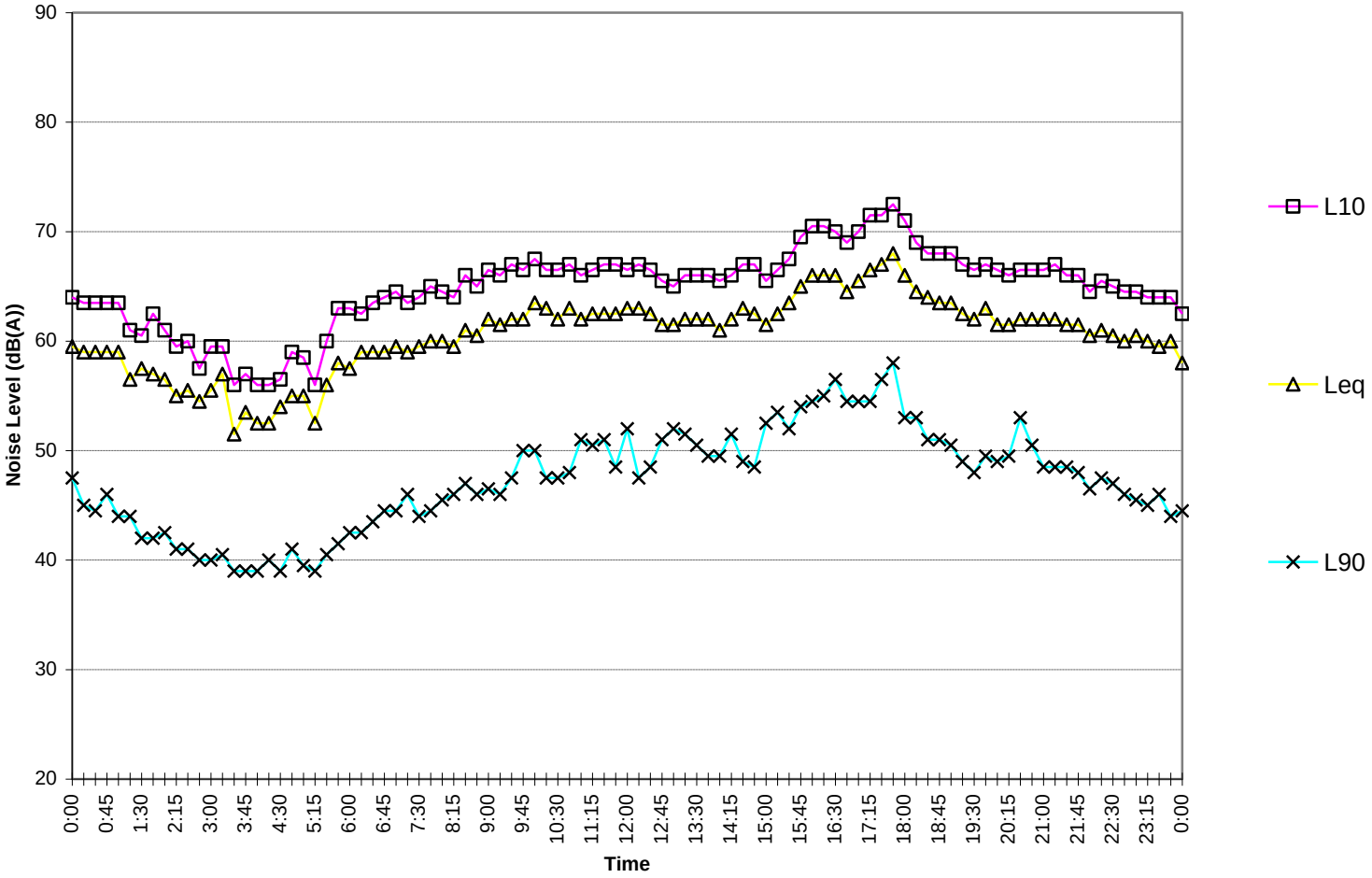
Location 2-Epping Road Boundary

Saturday November 27,2010



Location 2-Epping Road Boundary

Sunday November 28,2010



Location 2-Epping Road Boundary

Monday November 29,2010