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**87-91 Nuwarra Road, Moorebank
– St George Community Housing

DA Stage Acoustic Assessment**

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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) has been engaged to conduct an assessment of potential noise impacts associated with the residential development to be constructed at 87-91 Nuwarra Road, Moorebank.

This document addresses noise impacts associated with the following:

- External noise impacts on the site (traffic noise impacts from Nuwarra Road);
- Noise emissions from the site (primarily mechanical plant);

This assessment has been conducted using the Smith and Tzannes architectural drawings, dated January 2018.

2 SITE DESCRIPTION

The site is located at 87-91 Nuwarra Road, Moorebank.

The proposed development consists of a five storey residential development.

The site is bounded to east by Nuwarra Road which carries moderate traffic volumes.

The nearest noise sensitive developments to the site are:

- Residences adjoining the site to the north, west and south.
- Residential houses across Nuwarra Road (to the east)

An aerial photo showing noise measurement positions and surrounding noise receivers is presented below.



Figure 1 – Aerial Photograph

3 ENVIRONMENTAL 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 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 environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

4 EXTERNAL NOISE INTRUSION ASSESSMENT

4.1 NOISE INTRUSION CRITERIA

A traffic noise intrusion assessment has been conducted with reference to the requirements of the following acoustic noise criteria/standards;

- Liverpool Council DCP 2008;
- NSW Department of Planning document '*Development near Rail Corridors and Busy Roads (Interim Guideline)*'

4.1.1 Liverpool Council DCP 2008

Acoustics is addressed in Part 3.7 section 9 of the Liverpool DCP.

Relevant development controls note that:

- Appropriate acoustic treatment must be incorporated for development on Classified Roads and
- The proposed development should comply with relevant EPA and Australian Standards acoustic criteria.

Typically, development near classified roads should be designed such that compliance with the NSW Planning Document *Developments near Rail Corridors or Busy Roads – Interim Guideline*; is achieved.

Although not a classified road, Nuwarra Road carries medium traffic volumes and would typically be assessed with reference to the NSW Planning *Developments near Rail Corridors or Busy Roads* document.

4.1.2 NSW Department of Planning's '*Development near Rail Corridors and Busy Roads (Interim Guideline)*'

Section 3.5 of the NSW Department of Planning's '*Development near Rail Corridors and Busy Roads (Interim Guideline)*' states:

"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.

- *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*
 - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*
 - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

4.1.3 Proposed Criteria

Based on the above, criteria to be used for this development are as follows:

Table 1 – Summary of Internal Noise Level Criteria

Space	Traffic Noise Intrusion Criteria
Bedroom	35dB(A) _{Leq(9hour - night)}
Living Areas	40dB(A) _{Leq(15hour - day)}

4.2 EXTERNAL NOISE MEASUREMENTS

Traffic noise levels at the site were measured using a combination of attended and long term noise monitoring.

4.2.1 Measurement Equipment

Unattended noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

Attended short term measurements of traffic noise which were undertaken by this office, to supplement the unattended noise monitoring. Measurements were conducted using a Norsonic 118 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

4.2.2 Measurement Location

The long term logger was installed adjacent to the northern boundary of 91 Nuwarra Road, as shown in the aerial photograph in section 2. The logger had a line of sight to Nuwarra Road.

The attended noise measurement was made at 91 Nuwarra Road at a position 15m from the Nuwarra Road kerb.

4.2.3 Measurement Period

Unattended noise monitoring was conducted from Wednesday, 10 to 20 November 2017.

Attended noise measurements were undertaken between the hours of 8.00 and 9.00am on 10 November 2017.

4.2.4 Results

Attended and unattended noise measurements have been summarised below.

Table 2 – Unattended Noise Monitor – Traffic Noise Measurements

Location	Time of day	Long Term Traffic Noise Level
Site – At Logger	Day	64dB(A) _{Leq(15hr - Day)}
	Night	60dB(A) _{Leq(9hr - Night)}

The following table presents the results of the unattended noise monitoring.

Table 3 – Attended Traffic Noise Measurements

Location	Time of Measurement	Measured Noise Level
91 Nuwarra Road (15m from kerb)	8am-9am (10/11/2017)	65dB(A) _{Leq}

Using the noise levels measured during attended noise measurements in addition with the day time/night time noise levels measured by the long term noise logger, the following external noise levels impacting the site were determined:

Table 4 – Measured Existing Traffic Noise Levels

Location	Summary of Measured Existing Traffic Noise Level	
	Daytime (7am-10pm) dB(A) _{Leq (15hour)}	Night time (10pm-7am) dB(A) _{Leq (9hour)}
91 Nuwarra Road (Proposed new façade line)	66dB(A) _{Leq(15hour)}	61dB(A) _{Leq(9hour)*}

4.3 RECOMMENDED CONSTRUCTIONS

Recommended acoustic treatments to the building façade are detailed below.

4.3.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives.

Minimum glazing thicknesses and acoustic performance requirements for window/glass door systems are presented below. 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.

Aluminium frames for any glass doors and windows must achieve the same R_w as the glass which is installed for that window/door.

All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. **(Mohair Seals are unacceptable).**

The recommended constructions are listed in the table below.

Table 5 – Recommended Glazing Construction

Level	Façade	Space	Recommended Construction	Acoustic Seals
All	Eastern (Nuwarra Road)	Living Rooms	10mm	Yes
		Bedrooms	6.38mm laminated	Yes
	North/South	Living Rooms	6mm	Yes
		Bedrooms	6mm	Yes
	West	Living Rooms	4mm	Yes
		Bedrooms	4mm	Yes

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 6 - Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
4mm Float	27
6mm	29
6.38mm laminated	31

10mm	33
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4.3.2 External Roof/Ceiling

Roof/ceiling construction is concrete and will not require any upgrade for acoustic purposes.

4.3.3 External Walls

Concrete or masonry external wall construction will not require any upgrade for acoustic purposes.

In the event that light weigh building elements are incorporated, minimum 75mm thick 11kg/m³ glass wool insulation should be incorporated in any external wall cavity.

5 NOISE EMISSION ASSESSMENT

Noise emissions from the site have been assessed for noise emitted from base building mechanical plant.

The noise emission from the project site are to comply with the following:

- Liverpool Council DCP 2010); and
- NSW Environmental Protection Agency document - *Industrial Noise Policy (INP)*.

5.1 BACKGROUND NOISE LEVELS

Acoustic monitoring was conducted at the site to establish the background noise levels which will be used as basis for setting noise emission requirements.

5.1.1 Measurement Equipment

Unattended noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise loggers. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

5.1.2 Measurement Location

The logger was installed adjacent to the northern boundary of 91 Nuwarra Road, as shown in the aerial photograph in section 2.

Background noise levels measured at this location are representative of background noise levels at the adjacent residential development.

5.1.3 Measurement Period

Unattended noise monitoring was conducted from Wednesday, 10 to 17 November 2017.

5.1.4 Measured Background Noise Levels

Background noise levels are established from the unattended noise monitoring conducted on site.

NSW EPA's rating background noise level assessment procedure requires determination of background noise level for each day. The Rating Background Noise level is the median of the daily background noise levels measured for the entire monitoring period.

Appendix 1 provides the results of the unattended noise monitoring. Weather affected data was excluded from the assessment.

Summarised rating background noise levels are presented below.

Table 7 -Summarised Rating Background Noise Level

Location	Time of day	Rating Background Noise Level dB(A) _{L₉₀}
Site	Day (7am-6pm)	47
	Evening (6pm-10pm)	43
	Night (10pm-7am)	37

5.2 NOISE EMISSION CRITERIA

5.2.1 Liverpool Council DCP 2008

Acoustics is addressed in Part 3.7 section 9 of the Liverpool DCP.

The DCP does not set any noise emission goals, however it requires compliance with relevant Australian Standards and EPA documents. In this case, it is the EPA Industrial Noise Policy that is the most commonly adopted acoustic guideline in the assessment of noise generated by a site.

5.2.2 NSW EPA Industrial Noise Policy (INP)

The INP provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The INP has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

5.2.2.1 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).

Table 8 – INP Intrusiveness Criteria

Receiver	Time of day	Background Noise Level dB(A) _{L₉₀}	Intrusiveness Criteria (Background + 5dB(A) _{L_{eq}(15min)})
Residential Receivers	Day	47	52
	Evening	43	48
	Night	37	42

5.2.2.2 Amenity Criterion

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

The Industrial Noise Policy sets out acceptable noise levels for various land uses. Table 2.1 on page 16 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

For the purposes of a conservative assessment, ALC will assess noise emissions in accordance with the 'suburban' category.

Table 9 – INP Amenity Criteria

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A)_{Leq(Period)}
Residential (suburban)	Day	55
	Evening	45
	Night	40

5.3 NOISE EMISSION ASSESSMENT/RECOMMENDATIONS

The primary noise source associated with the site will be mechanical plant.

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of section 5.2.

6 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed development at 87-91 Nuwarra Road, Moorebank.

Provided that the treatments set out in section 4.3 of this report are employed, internal noise levels (as a result of traffic noise impacts) will comply with the requirements below:

- Liverpool Council DCP 2008 and
- NSW Department of Planning's '*Development near Rail Corridors and Busy Roads (Interim Guideline)*'

External noise emissions criteria have been set out in this report to satisfy the requirements from the following documents;

- Liverpool Council DCP 2008 and
- NSW Department of Environment and Heritage, *Environmental Protection Agency document - Industrial Noise Policy (INP)*.

Provided that the recommendations set out in section 5.3 of the report are adopted, noise emission goals for the development will be achieved.

Please contact us should you have any further queries.

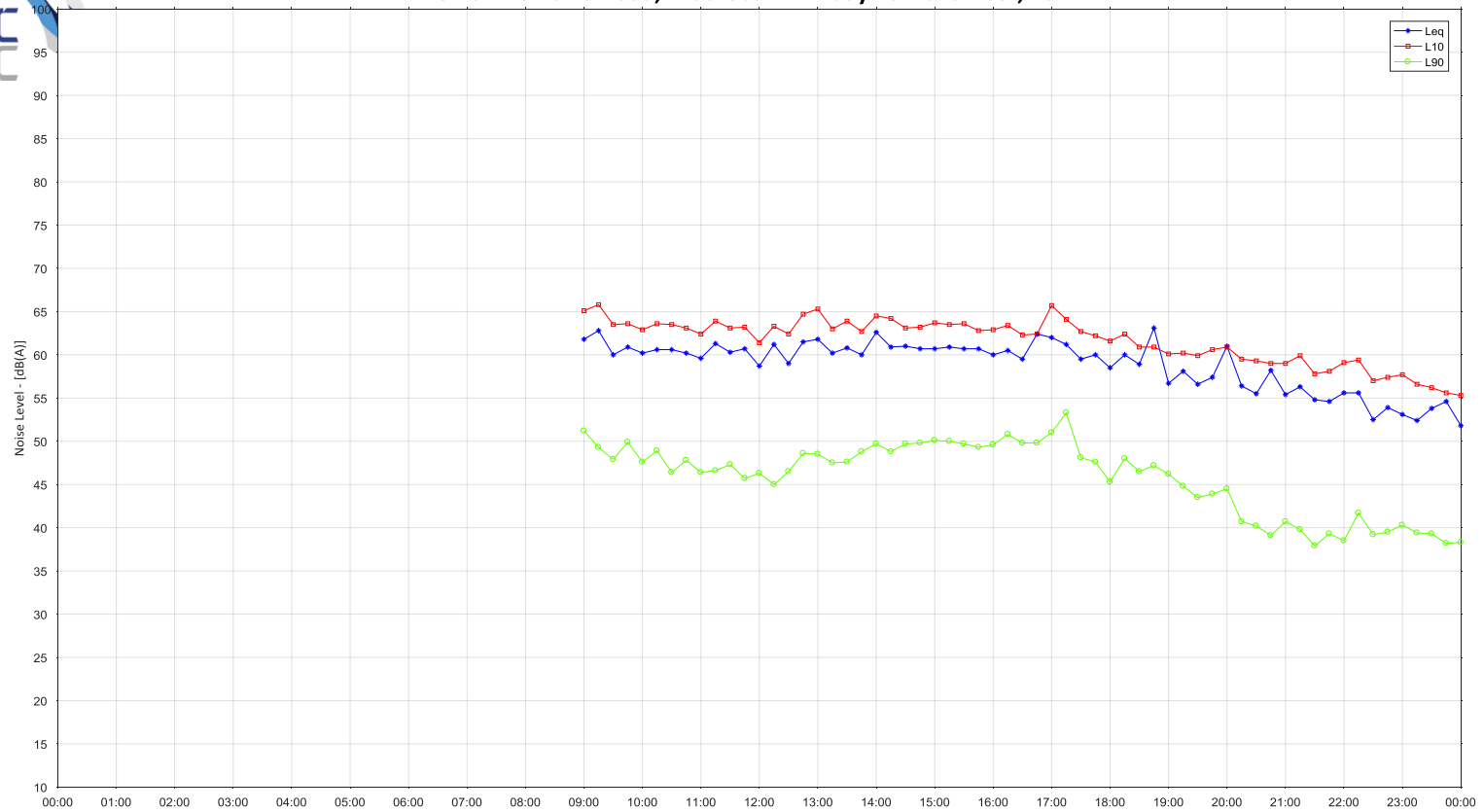
Yours faithfully,



Acoustic Logic Consultancy Pty Ltd
Thomas Taylor

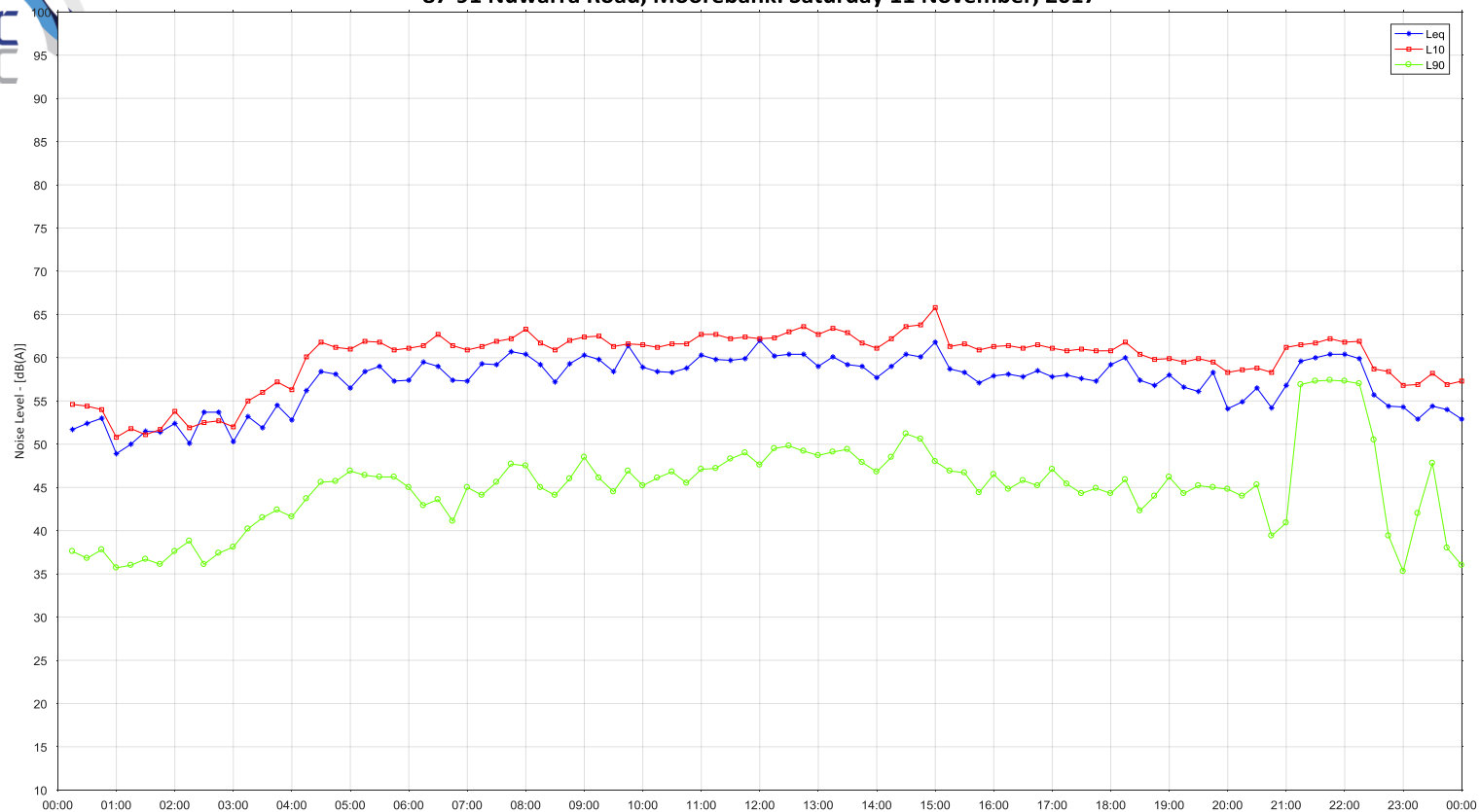
APPENDIX ONE – UNATTENDED NOISE MONITORING DATA

87-91 Nuwarra Road, Moorebank: Friday 10 November, 2017



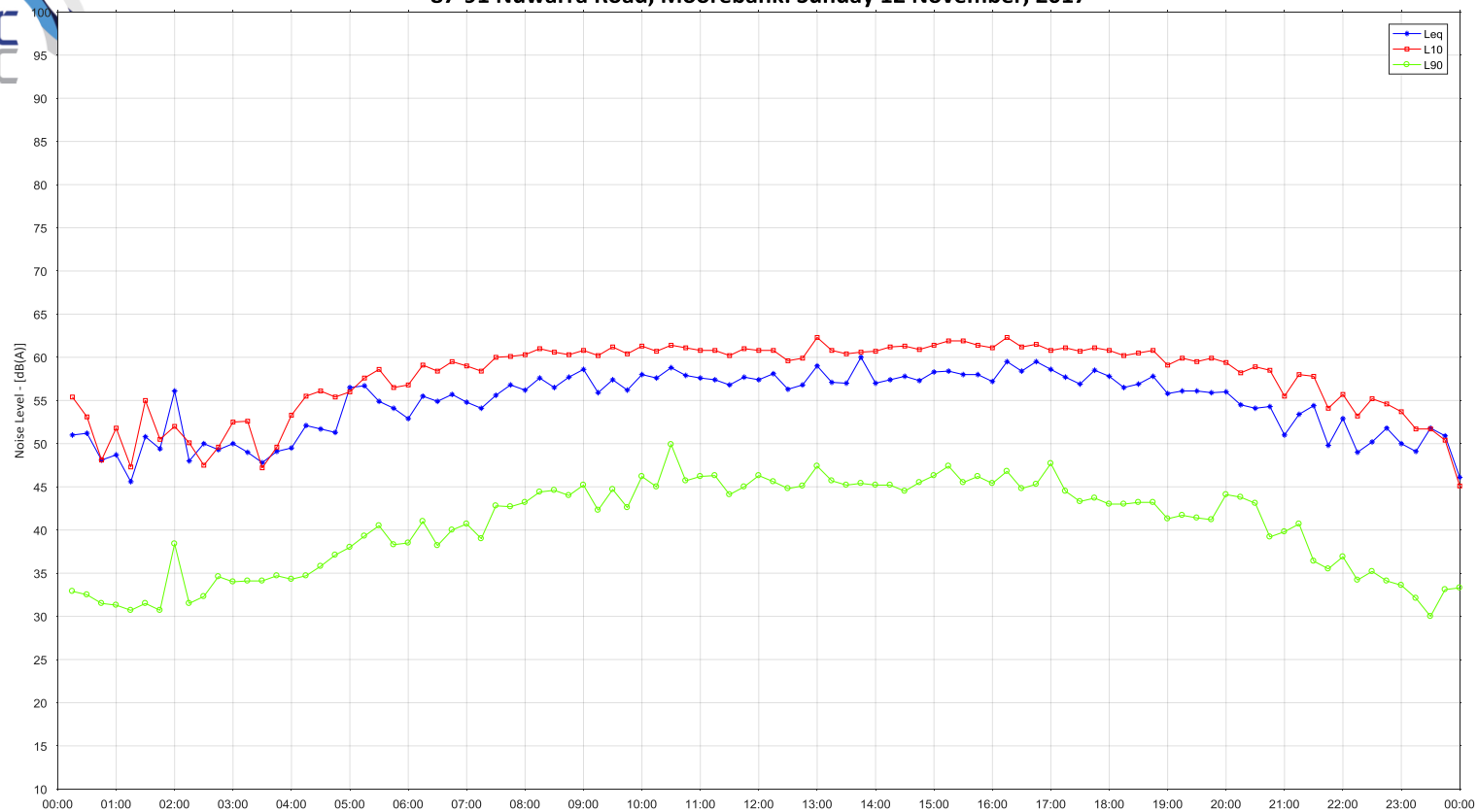


87-91 Nuwarra Road, Moorebank: Saturday 11 November, 2017



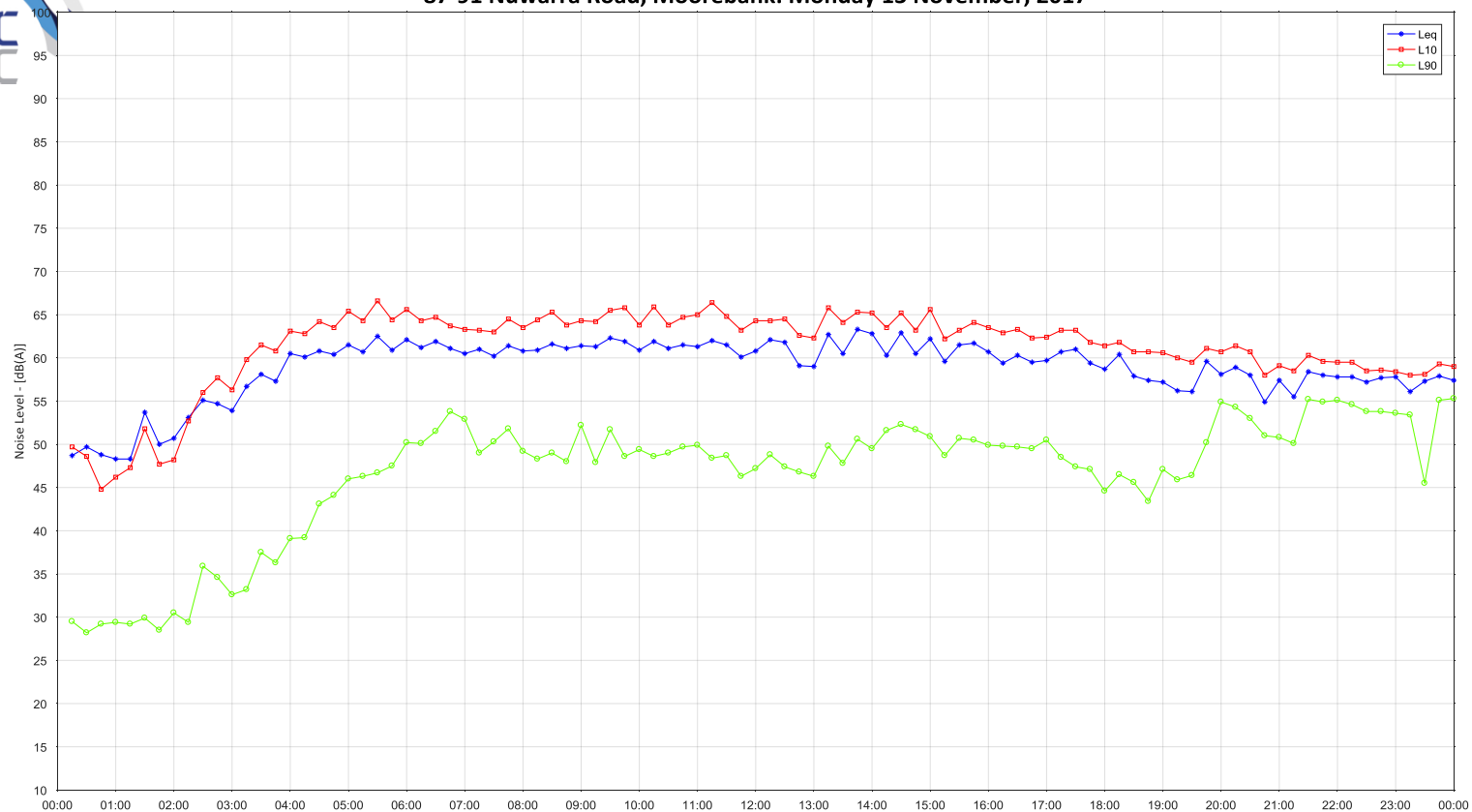


87-91 Nuwarra Road, Moorebank: Sunday 12 November, 2017



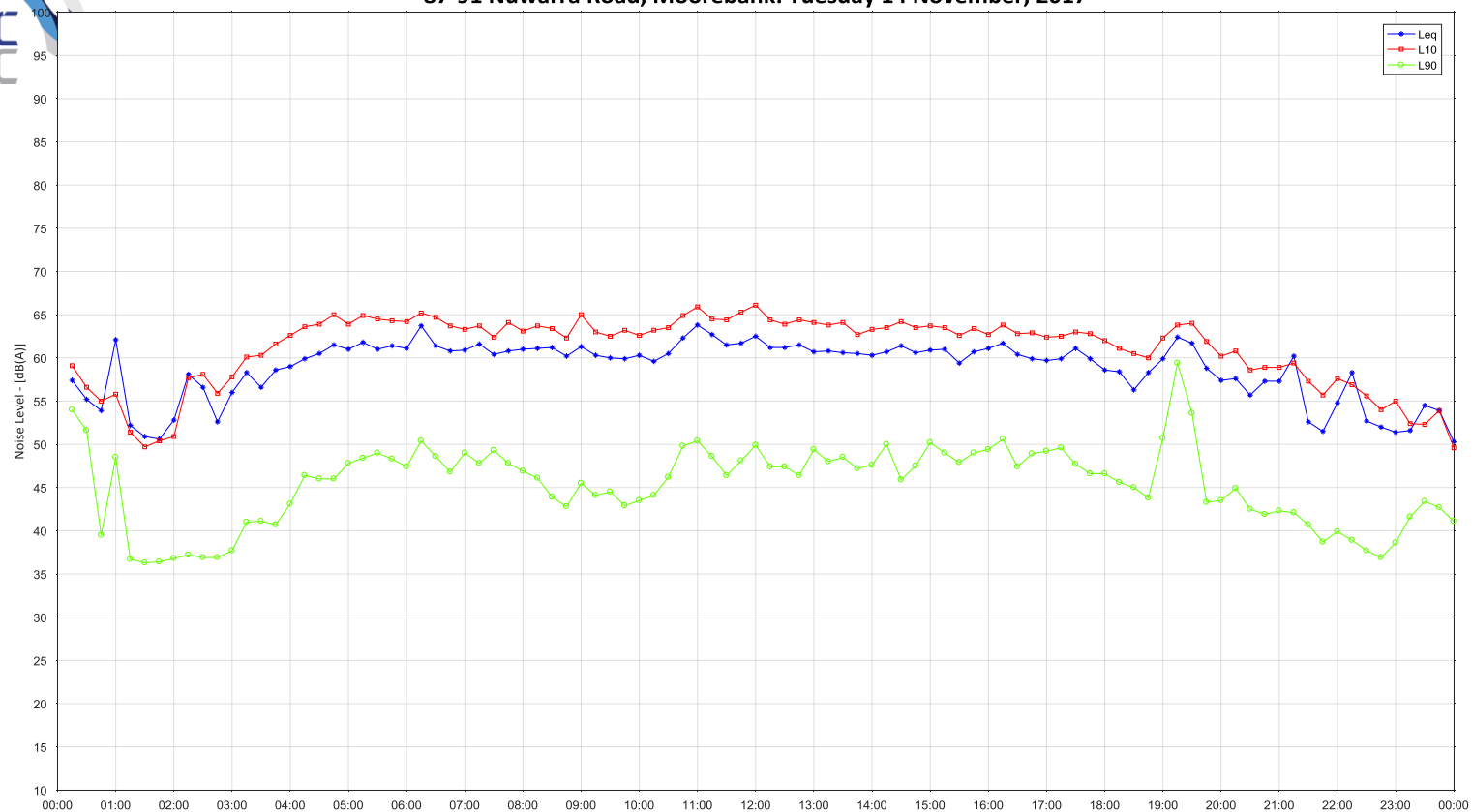


87-91 Nuwarra Road, Moorebank: Monday 13 November, 2017



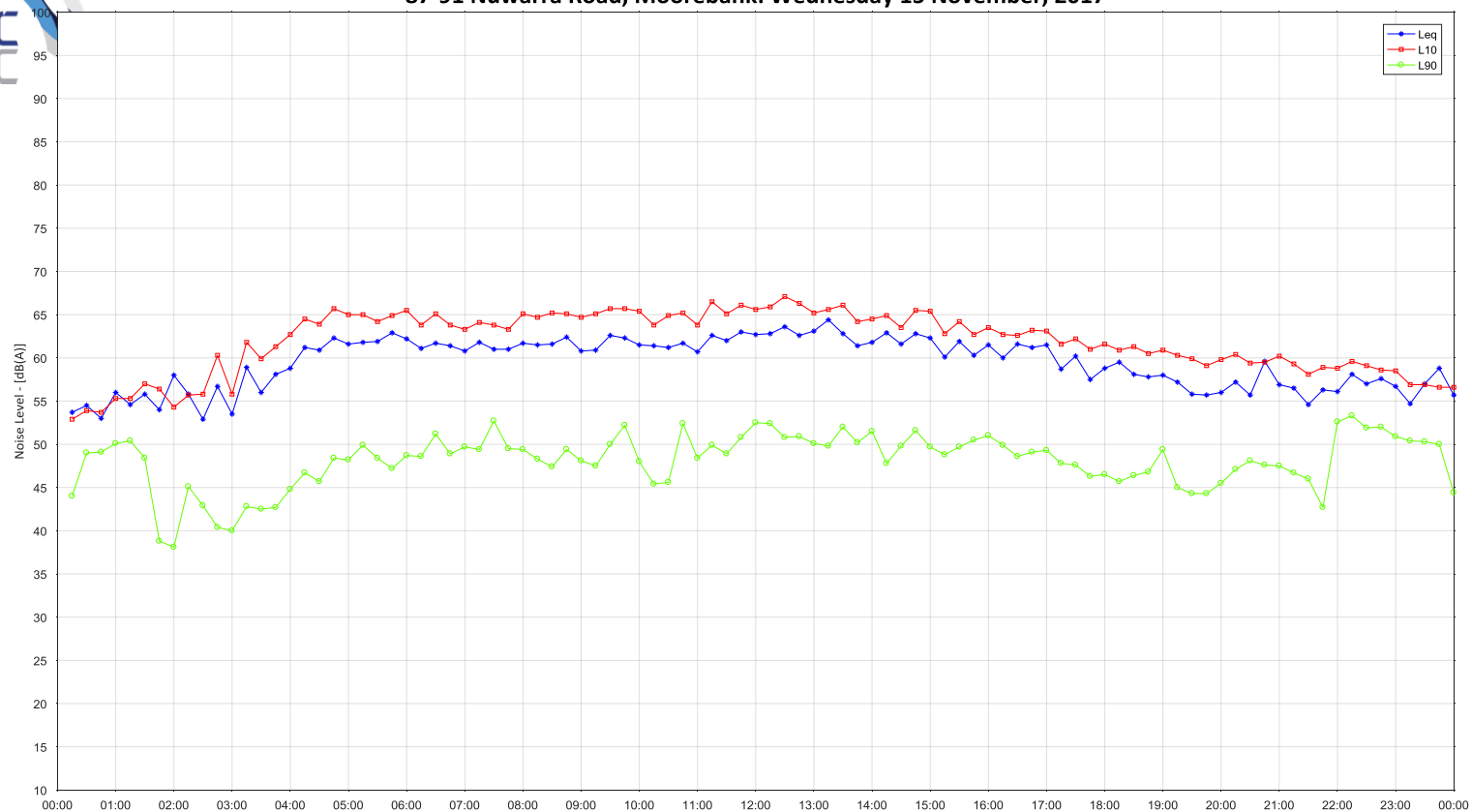


87-91 Nuwarra Road, Moorebank: Tuesday 14 November, 2017



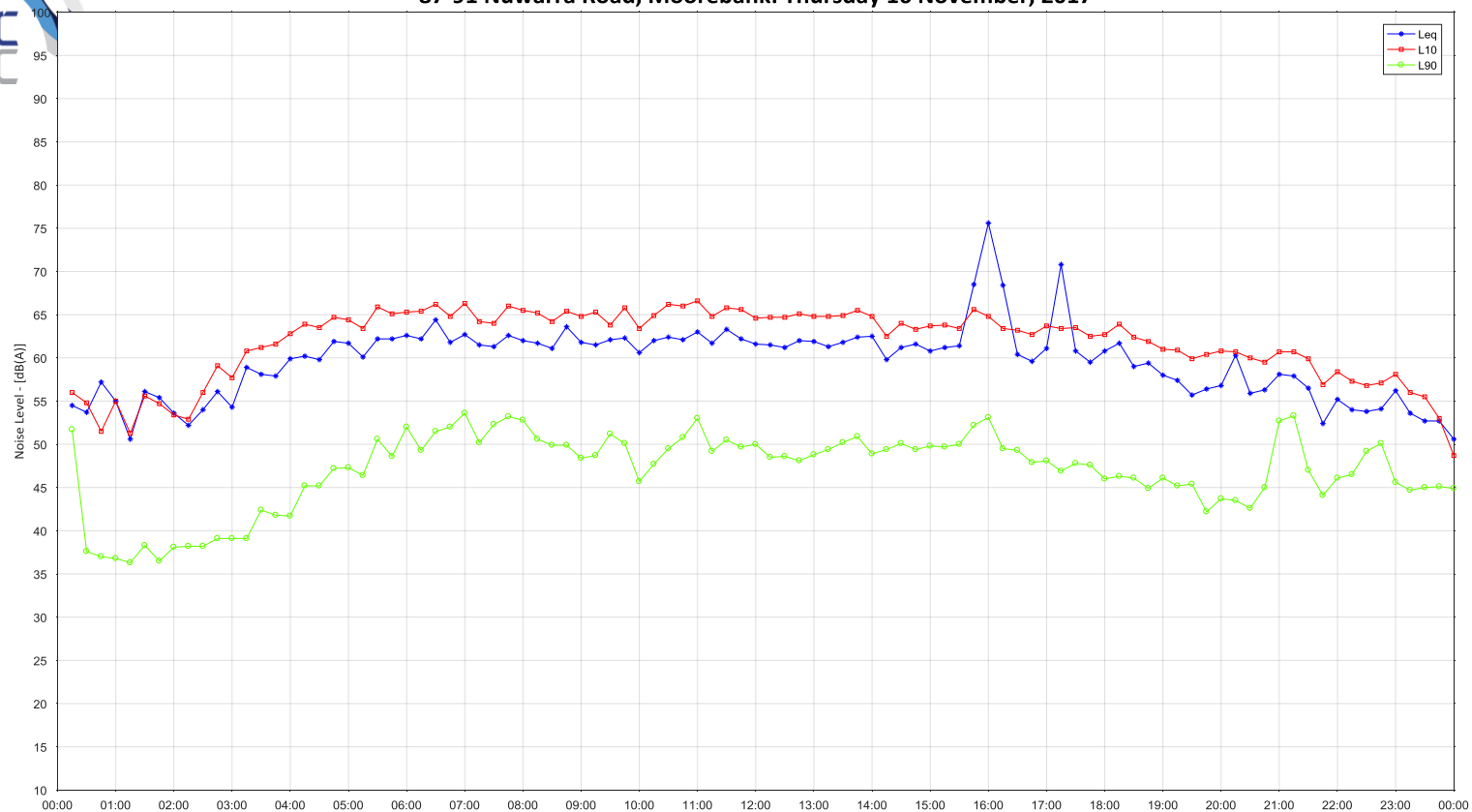


87-91 Nuwarra Road, Moorebank: Wednesday 15 November, 2017

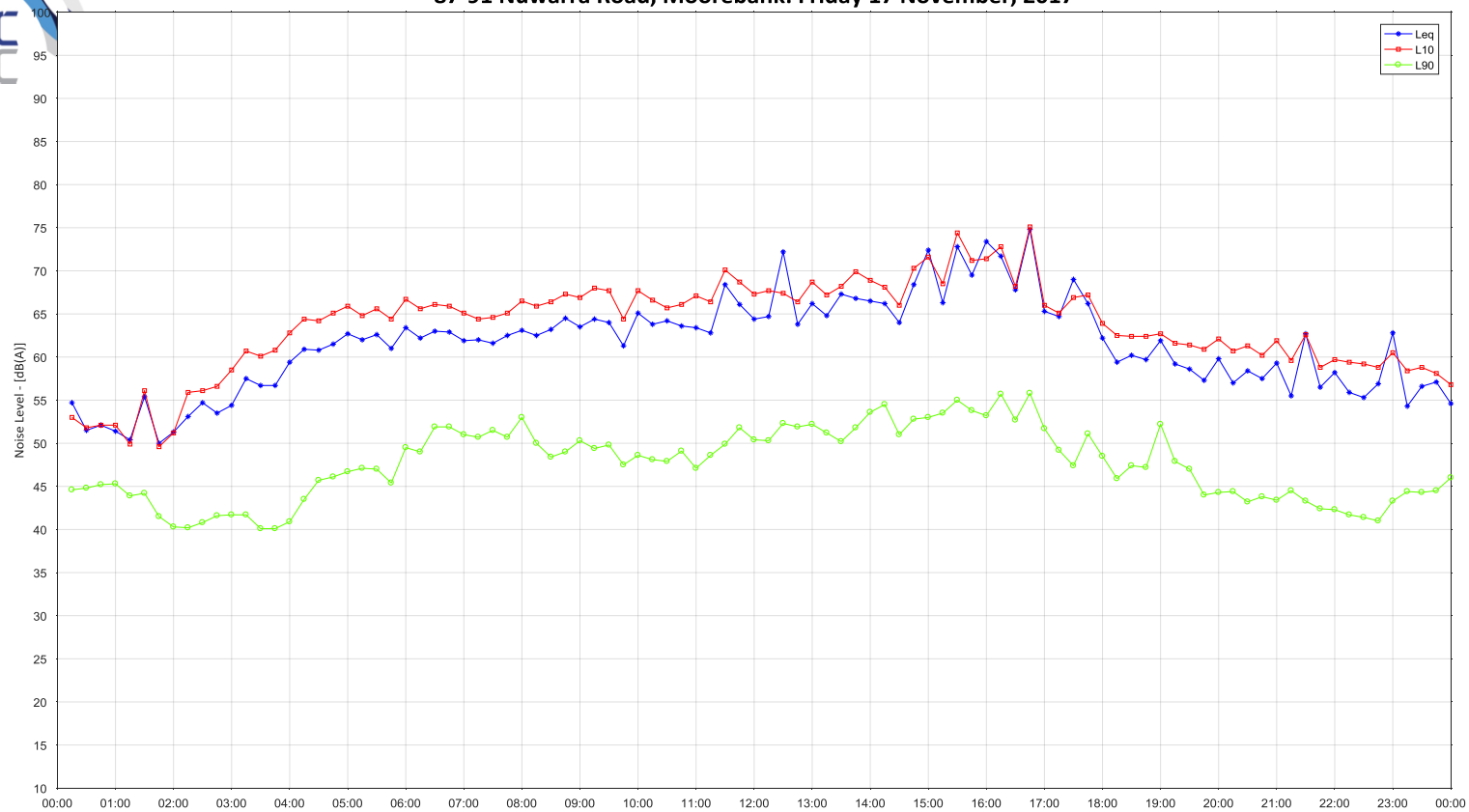




87-91 Nuwarra Road, Moorebank: Thursday 16 November, 2017

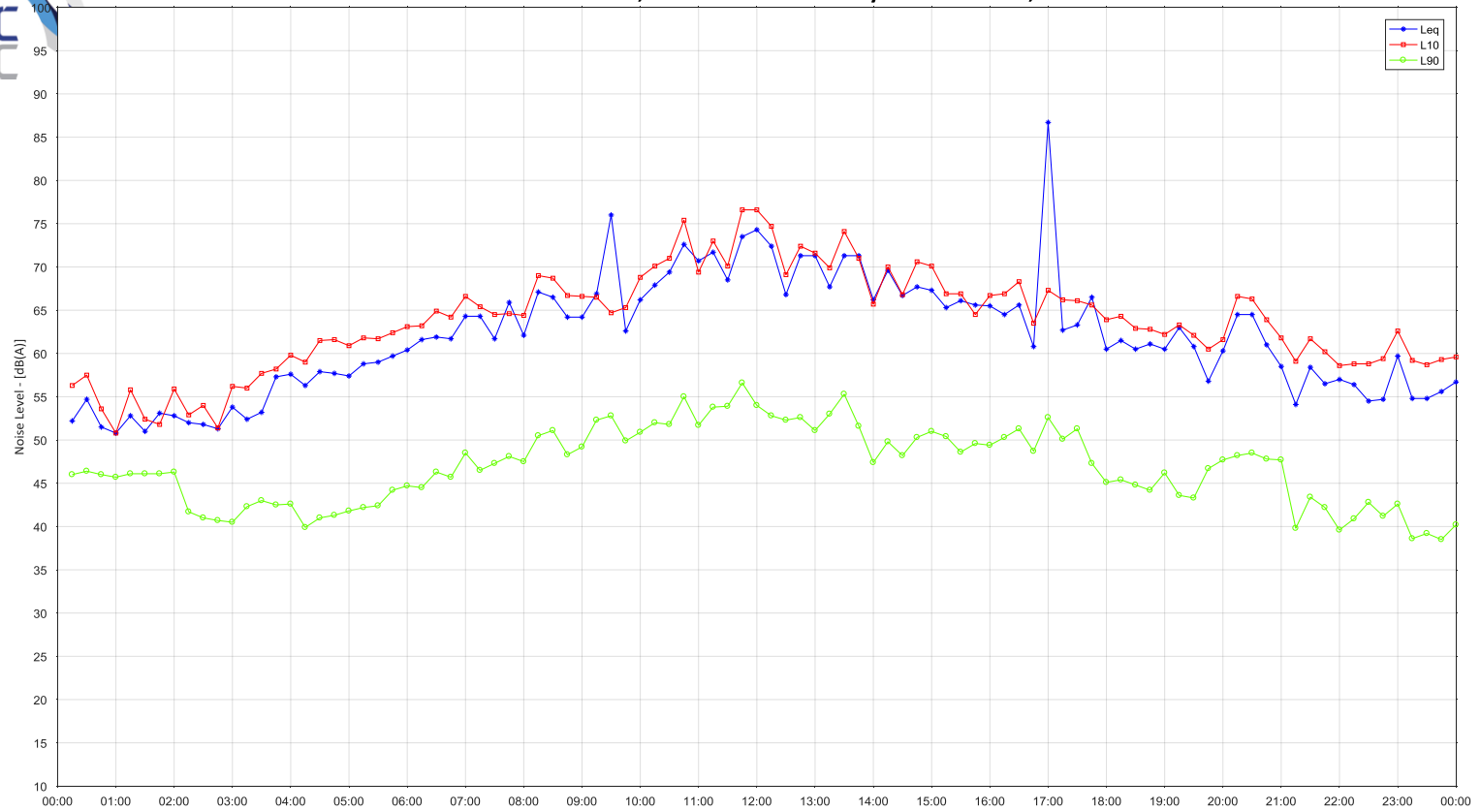


87-91 Nuwarra Road, Moorebank: Friday 17 November, 2017



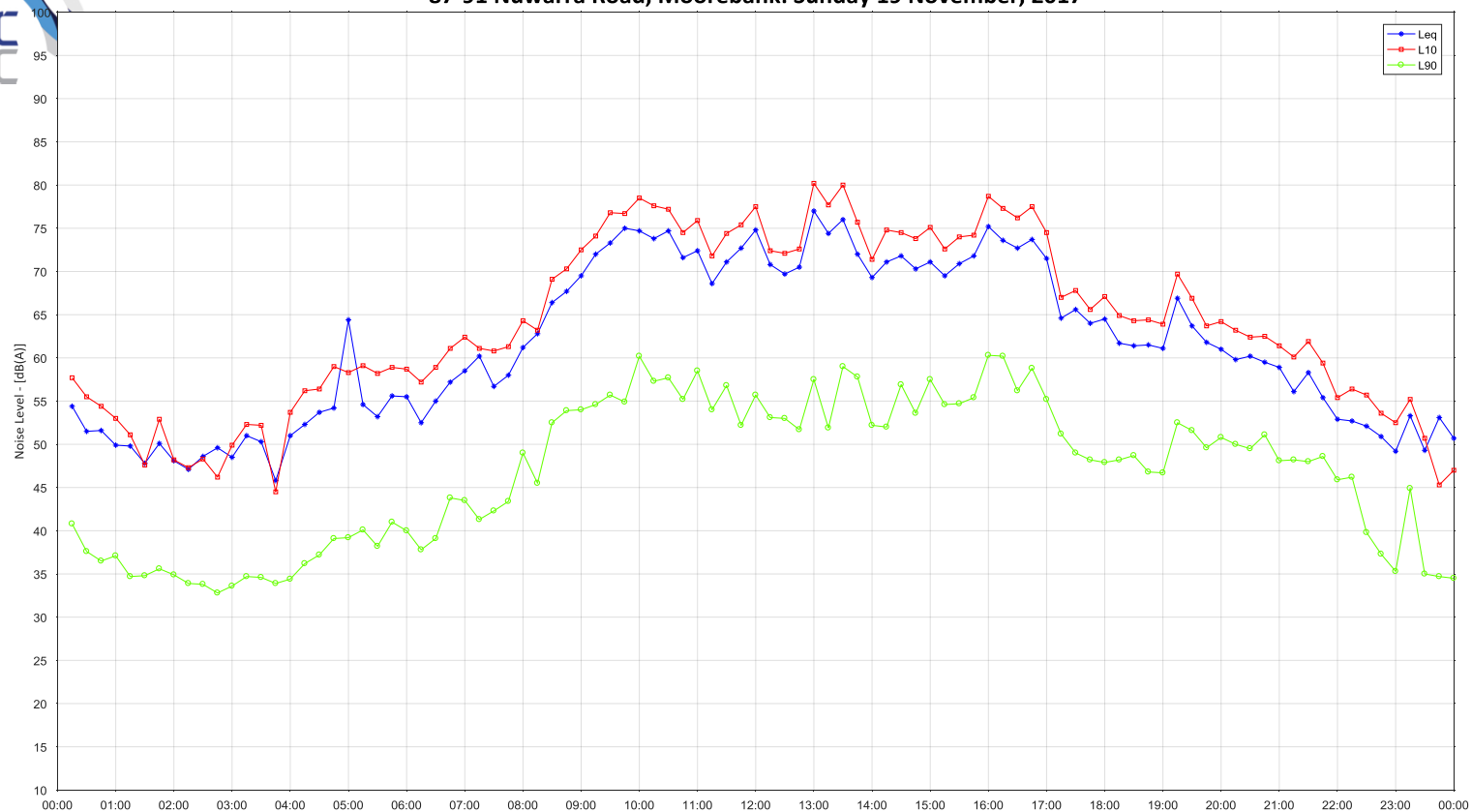


87-91 Nuwarra Road, Moorebank: Saturday 18 November, 2017





87-91 Nuwarra Road, Moorebank: Sunday 19 November, 2017





87-91 Nuwarra Road, Moorebank: Monday 20 November, 2017

