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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed residential development to be located at 5 Rynan Avenue, Edmondson Park.

This document presents the assessment of traffic noise impacting the development from Camden Valley Way to the north of the site.

ALC have utilised the following documents and regulations in the assessment of noise emanating from the development

- Liverpool City Council;
- NSW Industrial Noise Policy (INP);
- State Environmental Planning Policy (Infrastructure) 2007.
- Australian and New Zealand AS/NZS 2107:2000 '*Recommended design sound levels and reverberation times for building interiors*'.

ALC confirms that the development can comply with all of the aforementioned authorities and standards on the proviso that the acoustic treatments nominated in this report are adopted.

This assessment has been conducted using the architectural drawings submitted to ALC by Joshua Farkash and Associates Pty Ltd.

2 SITE PROPOSAL

The subject site is located on the corner of Camden Valley Way and Rynan Avenue, Edmondson Park. It is proposed to construct a five-storey apartment block.

The site is bounded by the following:

- Camden Valley Way to the north;
- Rynan Avenue to the east;
- Residential dwellings to the south.
- Residential dwellings to the west (currently under construction);

Camden Valley Way carries high traffic volumes, more than 40,000 daily vehicles according to RMS Traffic Volumes Maps published in November 2008.

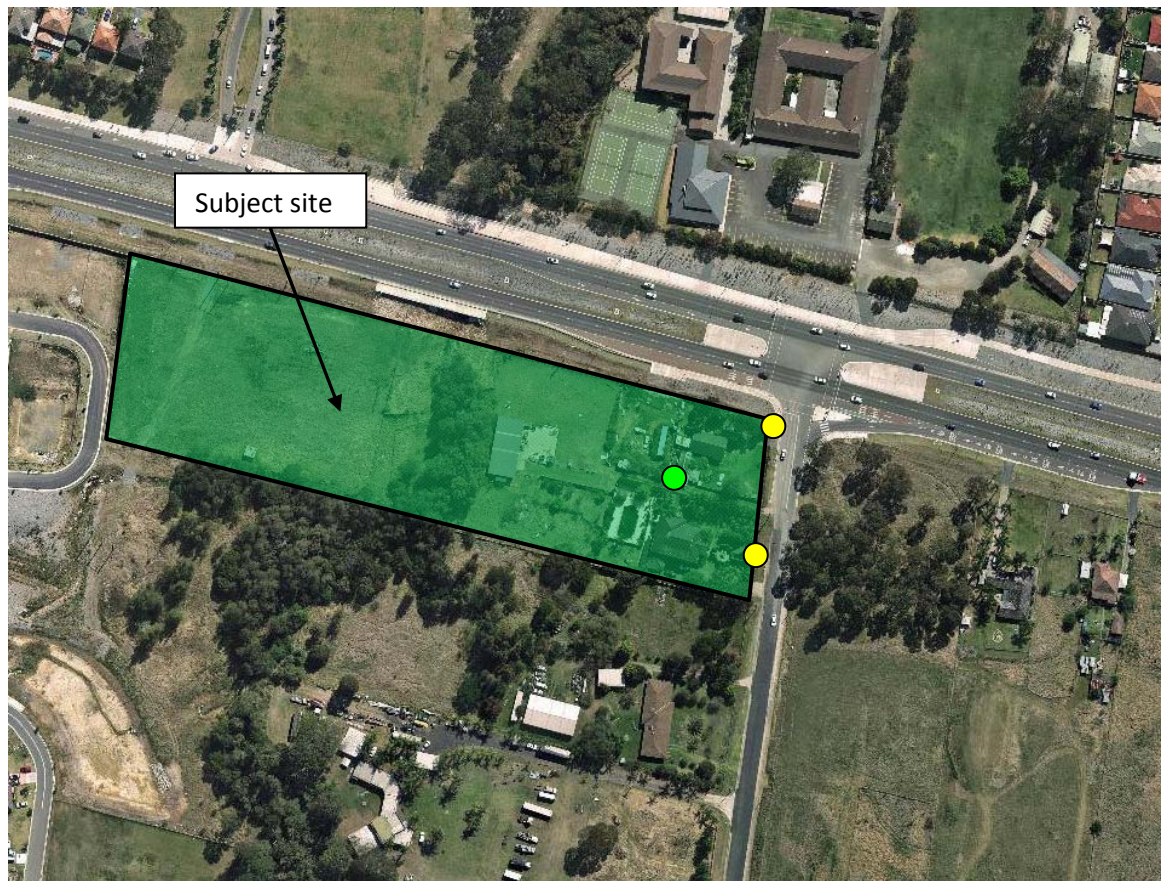


Figure 1: Site Survey and Monitoring Location

- Unattended noise measurement location
- Attended noise measurement location
- Subject site

3 EXISTING ACOUSTIC ENVIRONMENT

The existing acoustic environment is categorised by high traffic noise levels from Camden Valley Way.

3.1 NOISE DESCRIPTORS

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

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

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement 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 measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

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

4 TRAFFIC NOISE CRITERIA

Traffic noise criteria has been assessed in accordance with the requirements of Liverpool City Council and the NSW State Environmental Planning Policy (SEPP Infrastructure) 2007.

4.1 LIVERPOOL CITY COUNCIL

4.1.1 Liverpool City Council Development Control Plan 2008 (Part 1)

Liverpool City Council Development Control Plan 2008 states the following with regards to traffic noise:

1. *"Noise attenuation measures should be incorporated into building design to ensure acoustic privacy between on-site and adjoining buildings.*
2. *buildings having frontage to a classified road or a railway and impacted upon by rail or traffic related noises must incorporate the appropriate noise and vibration mitigation measures into the design in terms of the site layout, building materials and design, orientation of the buildings and location of sleeping and recreation areas.*
3. *The proposed buildings must comply with the environment protection authority criteria and the current relevant Australian Standards for noise and vibration and quality assurance."*

4.1.2 Liverpool City Council Development Control Plan 2008 – Land Subdivision and Development in Edmondson Park (Part 2.11)

"10.2 - Lots backing onto Camden Valley Way and the Rail Corridor

Background

As a number of properties will back onto Camden Valley Way and the South Western Rail Link (SWIRL) corridor, the presentation of the back of the lot to the public domain and the travelling public, as well as the amenity of the lot resident, is important to the overall quality of the precinct.

As part of the detailed design for the SWIRL and in accordance with the Conditions of Consent, the Transport Infrastructure Development Corporation (TIC) will investigate all reasonable and feasible noise mitigation options for existing and planned future receivers.

Objectives

- a) To ensure that a high quality, low maintenance, solid and consistent rear boundary treatment to lots backing onto Camden Valley Way and the rail corridor.*
- b) To minimise the noise impacts to lots backing onto Camden Valley Way and the rail corridor.*
- c) To provide security and privacy to the rear of lots backing onto Camden Valley Way and the rail corridor.*
- d) To encourage a high quality architectural treatment to the rear façade of the property as visible to the public domain and travelling public.*

Controls

1. Lots are to have a minimum depth of 30m.
2. An 8m minimum setback is required from the back of the lot to the rear, or side, façade of the dwelling.
3. Architecturally the rear façade of the building (and side façade if visible from the public domain) are to be articulated and modulated to reduce the bulk of the dwelling and to add visual interest.
4. Internal dwelling layouts should be designed to minimise noise in living and sleeping areas.
5. Double glazed windows are to be used on the rear façade of the dwelling to minimise noise impacts.
6. With doors and windows either open or closed, the following *Lea* internal noise levels shall not be exceeded:
 7. Sleeping Areas *Lea* (9hour, Night) 35dB, and
 8. Living areas *Lea* (15 hour, Day) 40dB.
9. Where naturally ventilated (windows open) conditions cannot be achieved, due to noise levels, mechanical ventilation or air-conditioning systems are to be provided compliant with AS1668 and the Building Code of Australia."

4.2 STATE ENVIRONMENTAL PLANNING POLICY (SEPP INFRASTRUCTURE) 2007

Clause 102 of the NSW SEPP for road traffic noise stipulates,

"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,

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 L_{Aeq} levels are not exceeded:

- (a) in any bedroom in the building – 35 dB(A) at any time between 10 pm and 7am,*
- (b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time."*

4.3 PROJECT ACOUSTIC OBJECTIVES

The requirements of the SEPP Infrastructure will be stricter than Liverpool City Council. On this basis, the project traffic noise intrusion requirements are detailed below.

Table 1 – Traffic Noise Objectives

Internal Area	Traffic Noise Level dB(A) L_{Aeq} 15 hour	Traffic Noise Level dB(A) L_{Aeq} 9 hour
Bedroom	40	35
Living Area	40	40

5 TRAFFIC NOISE ASSESSMENT

Unattended long term monitoring was conducted by this office, to measure the existing ambient noise environment at the site. The unattended noise monitor was installed approximately 50 metres from the curb as shown in Figure 1. Monitoring was conducted using an Acoustic Research Laboratories noise monitor set to A-weighted fast response. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted. The noise logging was conducted between the 18th June and the 26th June 2014.

Unattended noise logging data is attached in Appendix 1.

Attended short term measurements of traffic noise was also undertaken by this office, to supplement the unattended noise monitoring. These measurements were undertaken on the 18th June 2014 between 11.00 am and 11.30am. Measurements were conducted using a Norsonic 140 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.

The traffic noise levels listed in the table below, were determined based on the unattended logging data and attended noise measurements. In determination of acoustic treatments, the measured levels are adjusted for distance and orientation.

Table 2 – Measured Existing Traffic Noise Levels

Location	Measured Traffic Noise Level	
	Daytime (7am-10pm) dB(A) L_{Aeq} (15 hour)	Night time (10pm-7am) dB(A) L_{Aeq} (9 hour)
Camden Valley Way intersection (25m from the road)	66 dB(A) L_{Aeq} (15 hour)	62 dB(A) L_{Aeq} (9 hour)
Rynan Avenue (80m from Camden Valley Way)	63dB(A) L_{Aeq} (15 hour)	59 dB(A) L_{Aeq} (9 hour)

6 RECOMMENDED CONSTRUCTIONS

Traffic noise intrusion into the proposed development was assessed using the measured external noise levels reported above as a basis.

Calculations were performed taking into account the orientation of windows, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

Internal noise levels will primarily be as a result of noise transfer through the windows and doors as these are relatively light building elements that offer less resistance to the transmission of sound. Noise transfer through the masonry elements will not be significant and need not be considered further.

The constructions necessary to achieve the noise levels are detailed below. The predicted noise levels have been based on the expected level and spectral characteristics of the external noise, the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

6.1 GLAZED WINDOWS AND DOORS

The following constructions are recommended to comply with the traffic noise objectives stated in Section 4. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria listed 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. Glazing to bedrooms or living areas not nominated in the following table are to be minimum 4mm float with acoustic seals.

Table 3 - Recommended Glazing Constructions – Building A

Façade	Room	Glazing	Seals
Facing Camden Valley Way (north) Includes: -north facing windows on east and west facades. -west/east facing windows for living rooms in corner units	Bedrooms	10.38mm laminated	Yes
	Living rooms	10mm float	Yes
Rynan Avenue (East)	Bedrooms	6.38mm laminated	Yes
	Living rooms	6mm float	Yes
Western façade	Bedrooms	6.38mm laminated	Yes
	Living rooms	6mm float	Yes

Façade	Room	Glazing	Seals
Southern façade	Bedrooms	4mm float	Yes
	Living rooms	4mm float	Yes

Table 4 - Recommended Glazing Constructions – Buildings B and C

Façade	Room	Glazing	Seals
Facing Camden Valley Way (north) Includes: -north facing windows on east and west facades. -west/east facing windows for living rooms in corner units	Bedrooms	6.38mm laminated	Yes
	Living rooms	6mm float	Yes
Rynan Avenue (East)	Bedrooms	6mm float	Yes
	Living rooms	6mm float	Yes
Western façade	Bedrooms	6mm float	Yes
	Living rooms	6mm float	Yes
Southern façade	Bedrooms	4mm float	Yes
	Living rooms	4mm float	Yes

The proposed glazing thickness will satisfy all acoustic requirements of Section 4. 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.

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 4 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 all these windows are assumed as aluminium awning windows and mohair seals in windows and doors are not acceptable where acoustic seals are required.

Table 5 - Minimum STC of Glazing

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
4mm float	Yes	27
6mm float	Yes	29
6.38mm Laminated	Yes	31
10mm float	Yes	33

6.2 ENTRY DOORS

Entry doors are to be minimum 40mm solid core construction. Acoustic seals equal to Raven RP10 are to be fitted to the head and jamb and RP38 semi or fully mortised to the door threshold.

6.3 ROOF/CEILING

6.3.1 Heavy masonry

Where roof is to be of concrete construction it will not require any additional acoustic treatments.

6.3.2 Metal sheet roof

Penetrations in ceilings (such as for light fittings etc.) must be sealed gap free with a flexible sealant. Any ventilation openings in the ceilings over habitable spaces will need to be acoustically treated to maintain the acoustic performance of the ceiling construction.

The recommended roof/ceiling construction is shown in Figure 2.

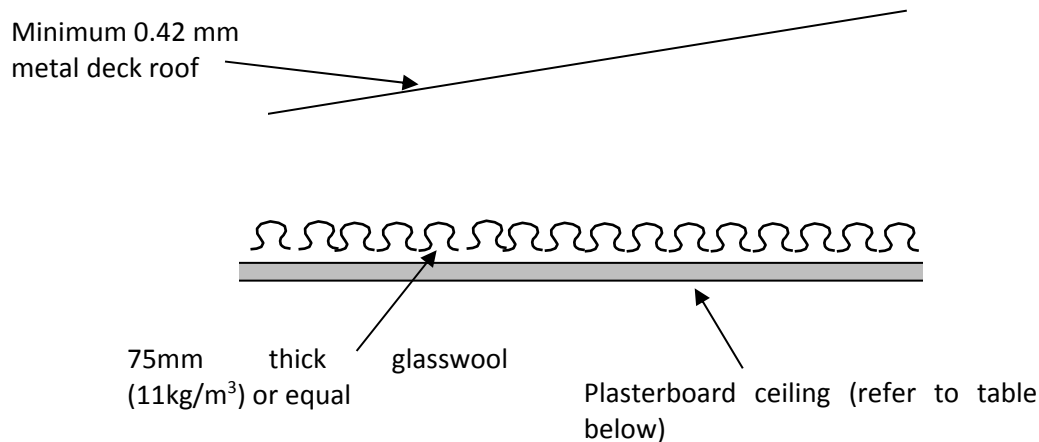


Figure 2 – Roof / Ceiling Construction

Table 6 –Roof/Ceiling Construction

Building	Room	Ceiling Construction
Building A	Bedrooms	1 layer of 13mm plasterboard
	Living Rooms	1 layer of 13mm plasterboard
Buildings B and C	Bedrooms	1 layer of 10mm plasterboard
	Living Rooms	1 layer of 10mm plasterboard

6.4 EXTERNAL WALLS

External walls are to be composed of concrete or masonry elements and will not require acoustic treatment.

6.5 MECHANICAL VENTILATION

To comply with the SEPP requirements, all external windows and doors must be closed. An alternate outside air source may be required in accordance with AS 1668.2.

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

7 NOISE EMISSION ANALYSIS

Noise emissions from the site should be assessed to ensure that the amenity of nearby land users are not adversely affected.

Potential noise sources which should be assessed are expected to be generated by mechanical plant, typically air-conditioning and car park exhaust fans.

Noise emission criteria will be determined based on the following documents:

- Liverpool City Council DCP
- NSW EPA Industrial Noise Policy (INP)
- Protection of Environmental Operation Act Regulation

7.1 BACKGROUND NOISE MONITORING

The same unattended noise monitoring was used to record background noise levels. The measured background noise level are presented below.

Table 7 - Measured Background Noise Levels

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))
Minimum Repeatable Background L _{90,15min}	46	46	35

7.2 NOISE EMISSION OBJECTIVES

Noise emissions from the development will have to achieve the following requirements.

7.2.1 Liverpool City Council DCP

Liverpool City Council has no specific criteria in its DCP. Therefore INP acoustic requirements will apply to the development.

7.2.2 NSW EPA Industrial Noise Policy

The NSW EPA Industrial Noise Policy, has two criteria which need to be satisfied namely Intrusiveness and Amenity. These are described below:

- *Intrusiveness Criteria* - This 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.
- *Amenity Criteria* - This guideline is intended to limit the absolute noise level from all “industrial” noise sources such as mechanical plant 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.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

7.2.2.1 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 do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 7.1. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 8 – Intrusiveness Noise Emission Goals

Location	Period/Time	Intrusiveness Noise Emission Goal dB(A) $L_{eq}(15min)$
Nearby Residences	Day (7am-6pm)	46
	Evening(6pm-10pm)	46
	Night(10pm-7am)	35

7.2.2.2 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 NSW EPA 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 areas. They are rural, suburban, urban and urban/industrial interface. This site is categorised by suburban receivers.

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.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

Table 9 – Amenity Noise Emission Goals

Location	Period/Time	Amenity Noise Emission Goal dB(A) $L_{eq}(\text{Period})$
Nearby Residences – Urban Receiver	Day (7am-6pm)	60
	Evening(6pm-10pm)	50
	Night(10pm-7am)	45

7.2.2.3 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.

7.2.3 Protection of the Environmental Operation Act Regulation 2008

Protection of the Environmental Operations regulation limits the noise levels associated within the operation of domestic air conditioning criteria during night time periods which is presented below:

Protection of the Environmental Operations (Noise Control) Regulation 2000-Sect 52

52 Air Conditioners

(1) A person must not cause or permit an air conditioner to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of whether any door or window to that room is open):

- (a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or*
- (b) before 7 am or after 10 pm on any other day.*

7.2.4 Resultant Project Noise Emission Criteria

Based on the requirements stated in the sections above, Table 10 provides a summary of the assessment criteria applicable to the future residential development at the project site. The assessment criteria are also based on the ambient noise monitoring conducted at the site.

Table 10 – Environmental Noise Emission Criteria

Time Period	Assessment Background Noise Level dB(A) _{L₉₀}	Amenity Criteria dB(A) _{L_{eq}}	Intrusiveness Criteria Background + 5 dB(A) _{L_{eq}(15min)}	EPA Criteria for Residential Condensers	EPA Criteria for Sleep Disturbance dB(A) _{L₁(1minute)}
Day	46	60	51	N/A	N/A
Evening	46	50	51	N/A	N/A
Night	35	45	40	Inaudible within neighbouring premises	50

7.2.5 Road Traffic Noise Impacts

NSW EPA Road Noise Policy provides a guideline detailing criteria addressing road noise impacts. For land use developments with the potential to create additional traffic the development should comply with the requirements for new developments detailed in the Road Noise Policy guidelines. Increased noise levels on Ryman Avenue will be assessed against the “local” road acoustic criteria.

Noise levels generated by traffic should not exceed the noise levels set out in the table below when measured at a nearby property.

Table 11 - NSW Road Noise Policy – Criteria for Residential Land Uses, Local Roads

Type of Development	Criteria	
	Day (7am–10pm) dB(A)	Night (10pm–7am) dB(A)
6. Existing residences affected by additional traffic on existing local roads generated by land use developments	LA _{eq} (1hr) 55 External	LA _{eq} (1hr) 50 External

7.3 NOISE EMISSION ASSESSMENT

7.3.1 Road Traffic Noise Impacts

Vehicular access to and from the site will be via Rynan Avenue which is a local road servicing already existing residential premises.

This assessment has been based on the following assumptions:

- Up to 132 additional cars (numbers of car park spaces) can be expected in or out of the development at peak hour.
- Calculations are based on cars having a sound power level of 94dB(A)_{Leq} when driving on a public road (approximately 50-60km/hour).
- The most exposed residential façade will be the western façade of the residential property located at 1882 Camden Valley Way, located approximately 80m from Rynan Avenue.
- Predicted noise levels have been façade-corrected as requested in the NSW Road Noise Policy guideline.

Predicted noise levels are detailed in the table below:

Table 12 – Additional Traffic Predicted Noise Levels at Peak hours

Receiver Location	Predicted Noise Levels	Criteria LA _{eq(1hr)} External	Complies
Most affected residential façade	Up to 41	55	Yes

7.3.2 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 services plant to the closest residential receiver should comply with the noise emission criteria in Section 7.2.

8 CONCLUSION

This report presents the assessment of noise impacts associated with the proposed residential development to be located at 5 Rynan Avenue, Edmondson Park.

ALC confirm that acoustic treatments have been formulated to ensure that internal noise levels comply with the requirements of the State Environmental Planning Policy (SEPP) Infrastructure 2007 and Liverpool City Council.

Additional road traffic noise impacts generated by the proposed development have been assessed and were found to comply with

Mechanical plant servicing the development should be assessed at construction certificate stage to ensure compliance with the noise emission requirements detailed in section 7.2.

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

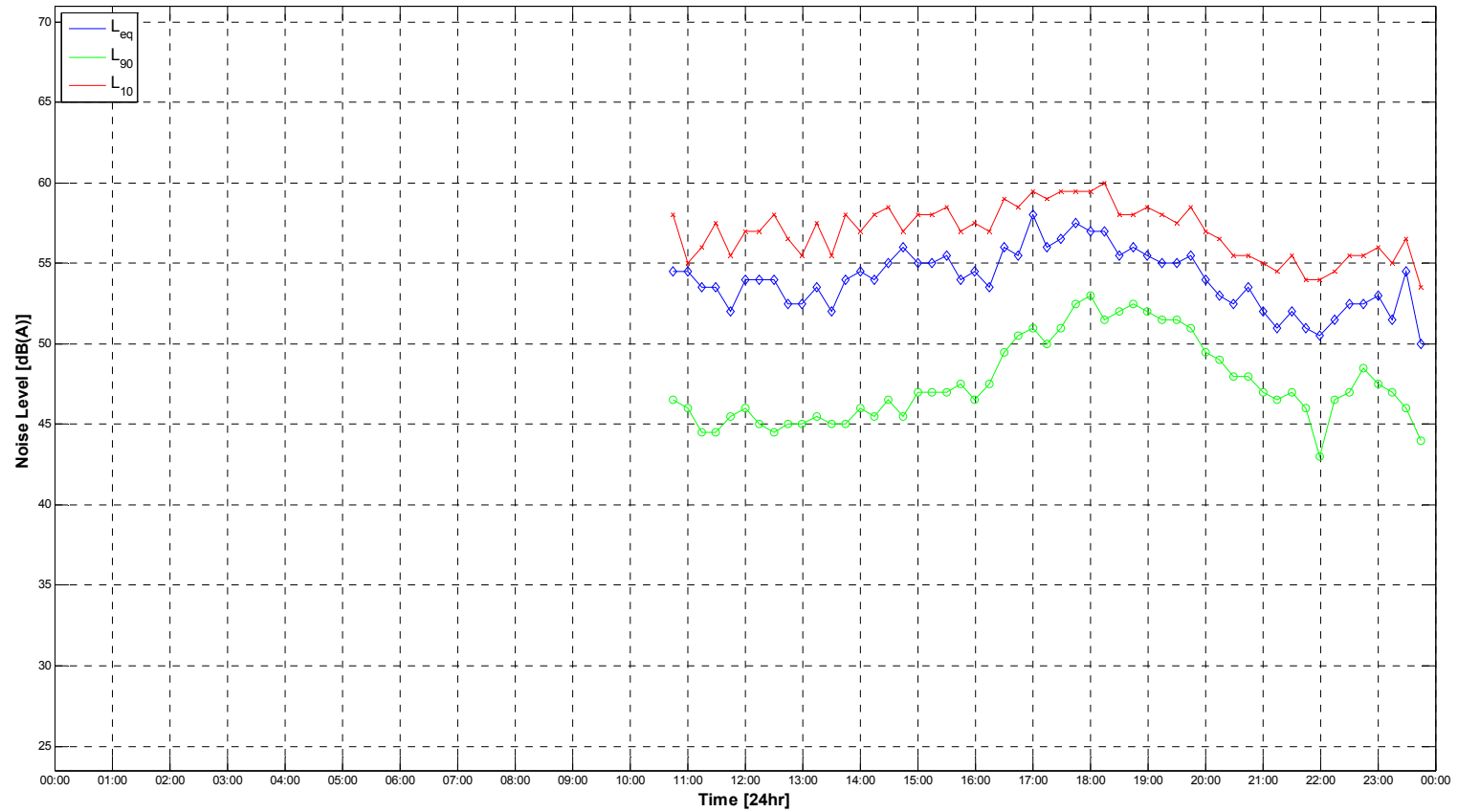
Yours faithfully,

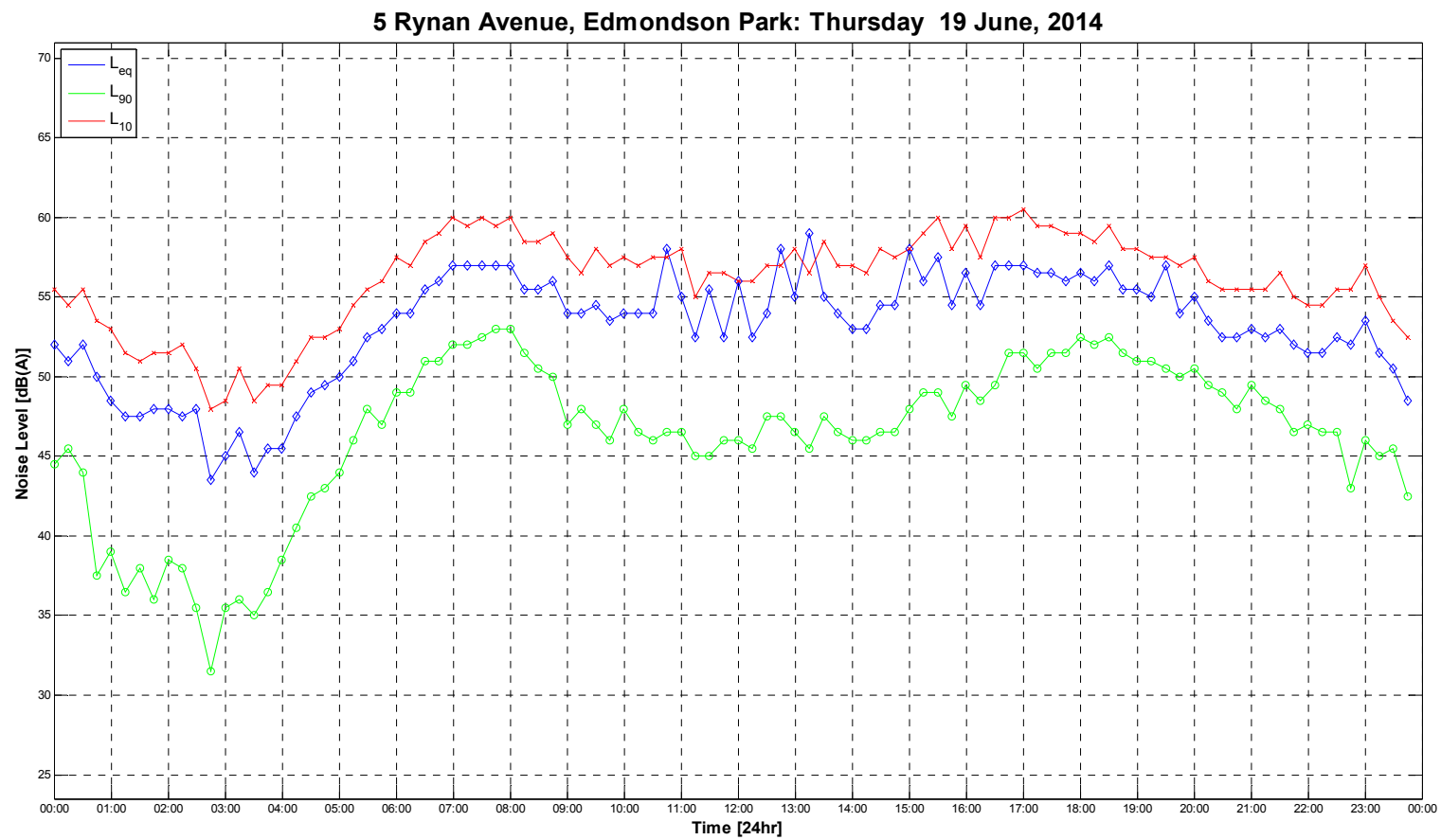


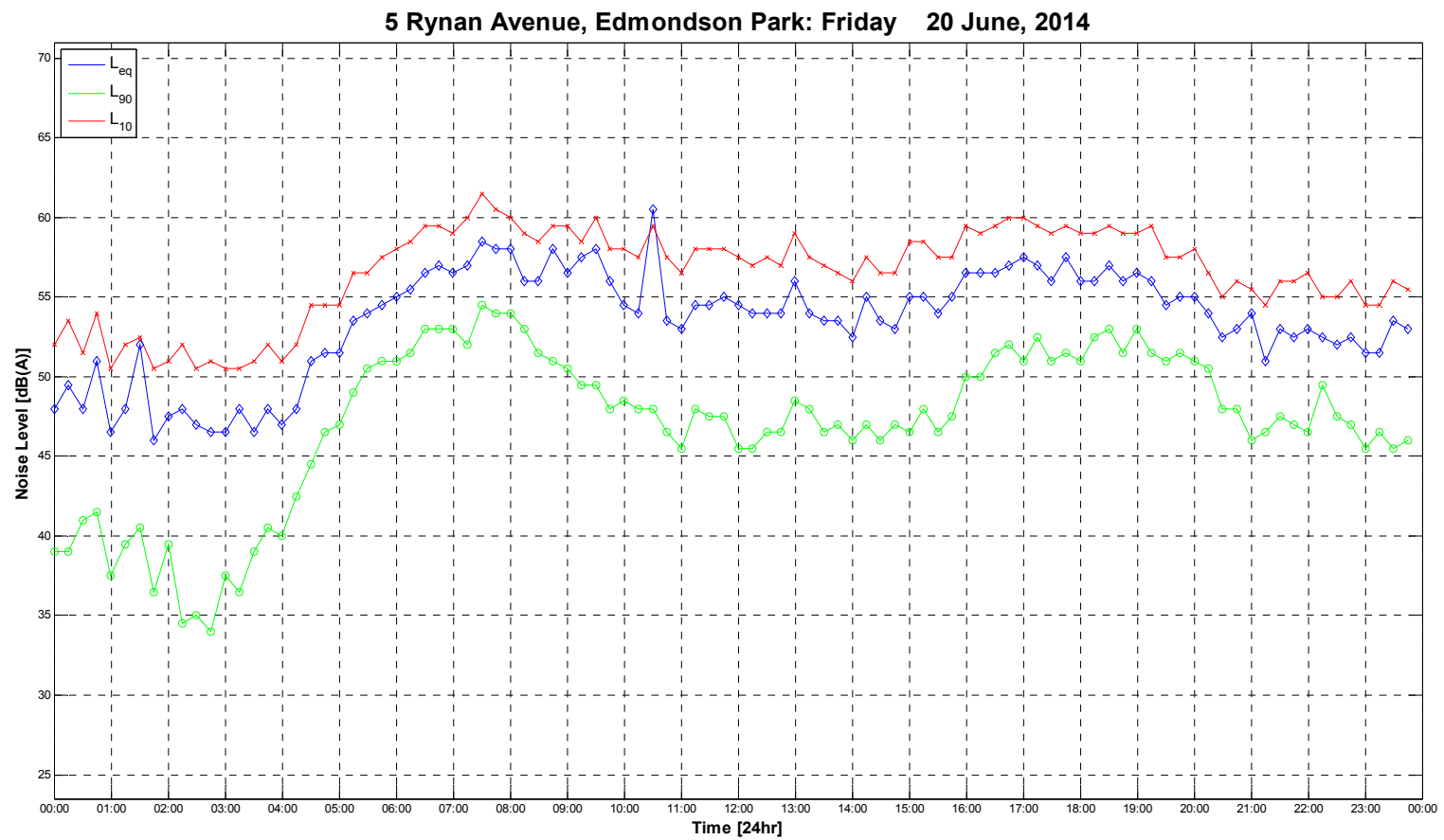
Acoustic Logic Consultancy Pty Ltd
Remi Larmandieu

APPENDIX 1
UNATTENDED NOISE DATA
5 RYNAN AVENUE, EDMONDSON PARK

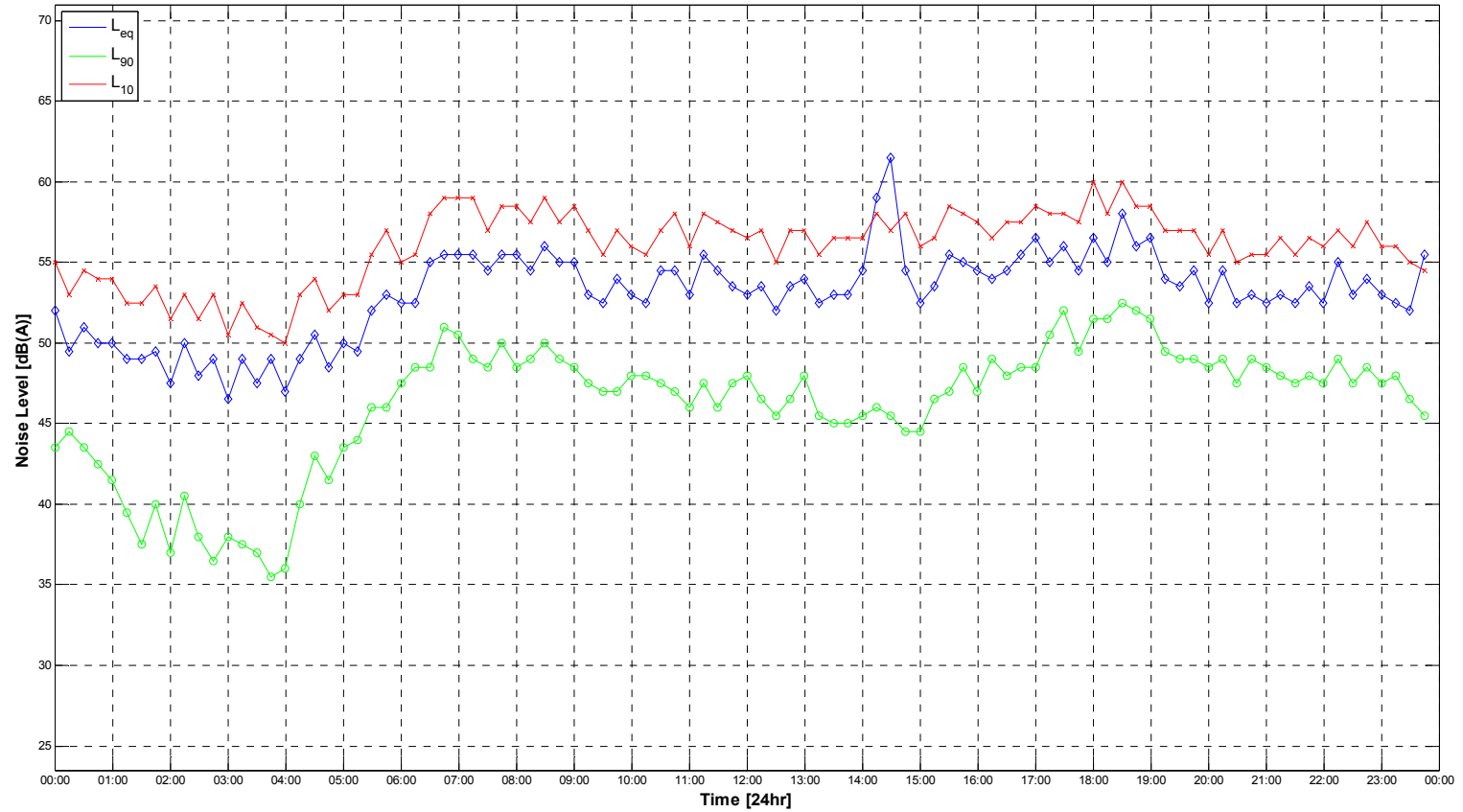
5 Rynan Avenue, Edmondson Park: Wednesday 18 June, 2014

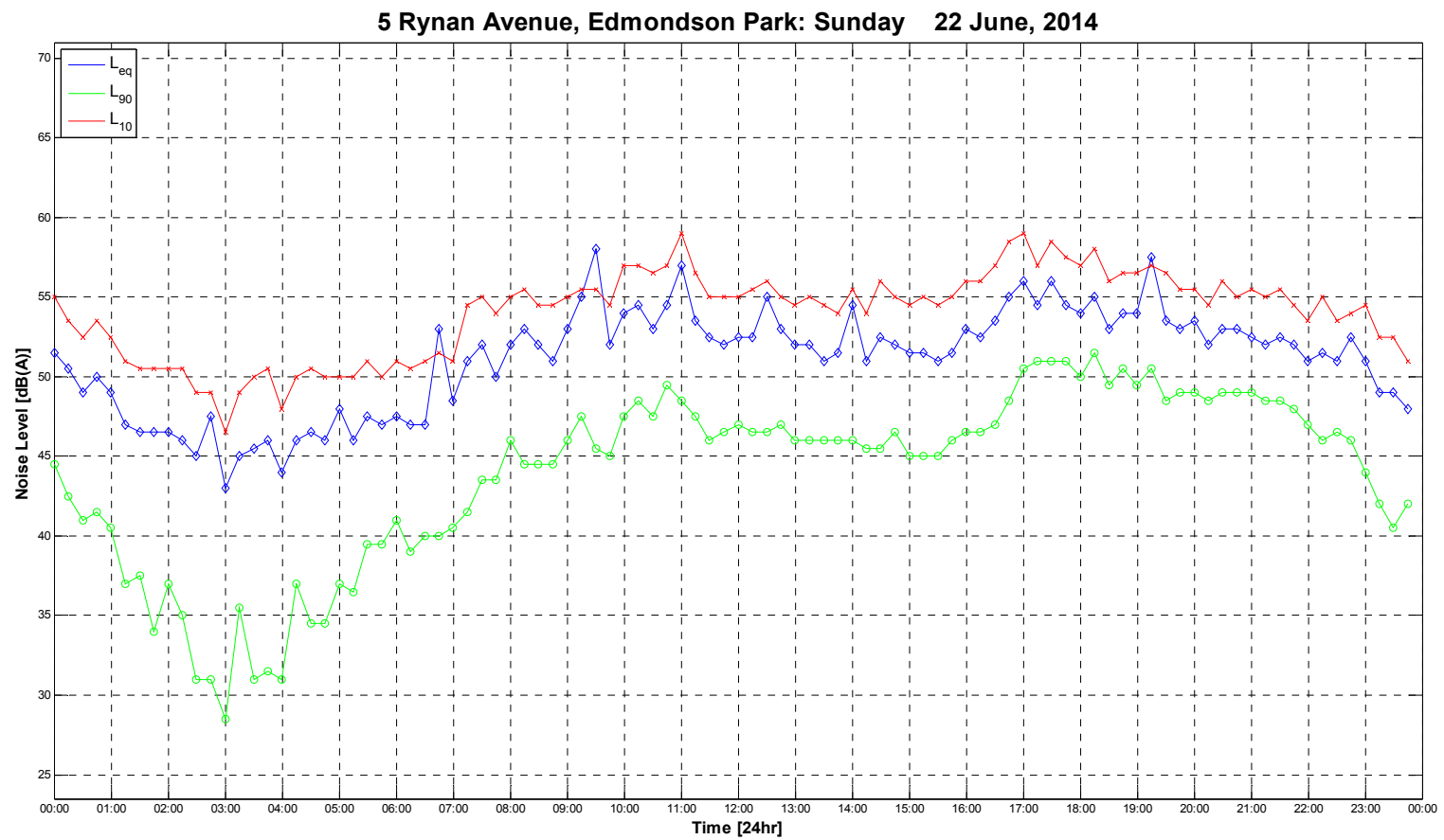


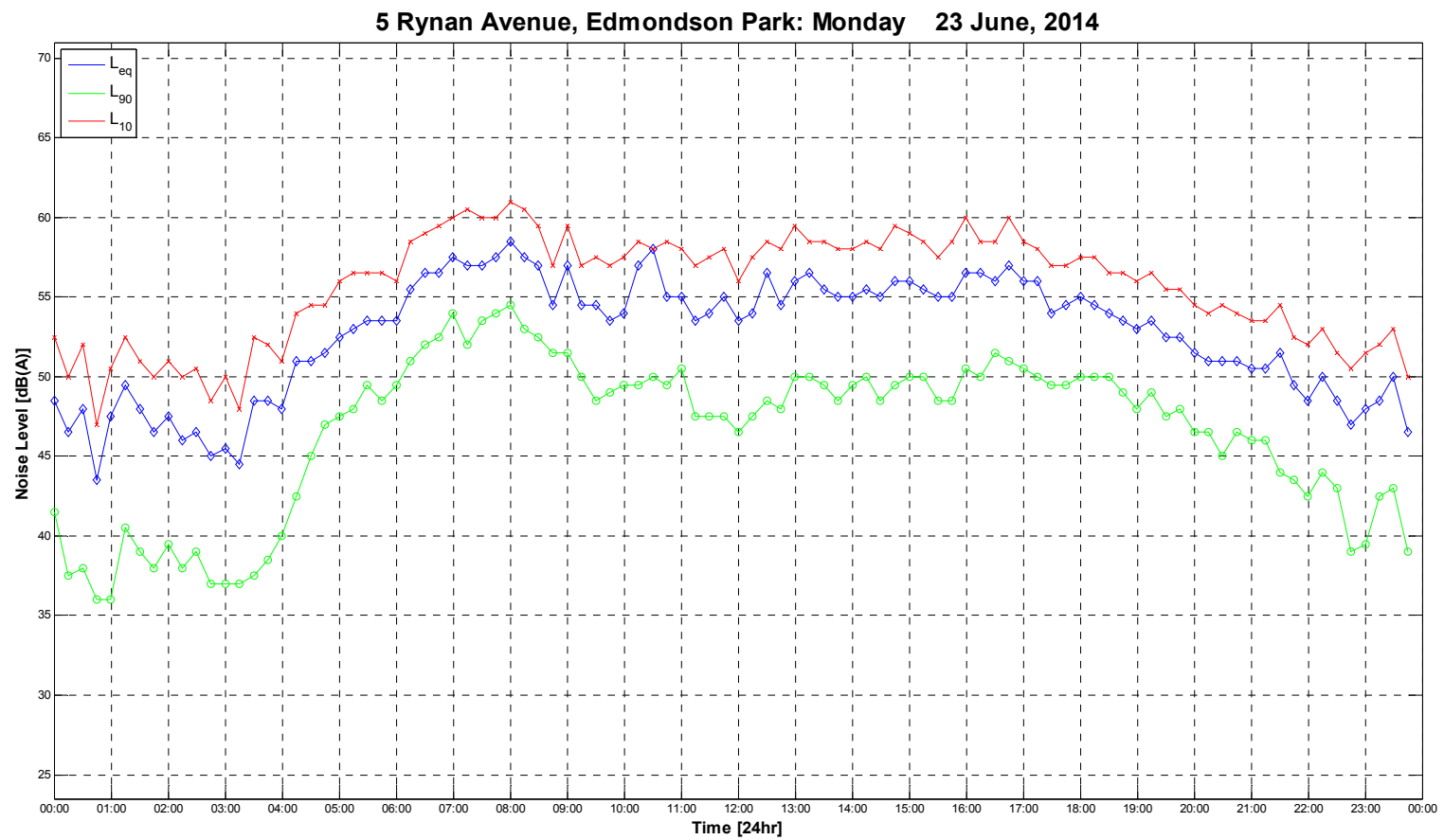


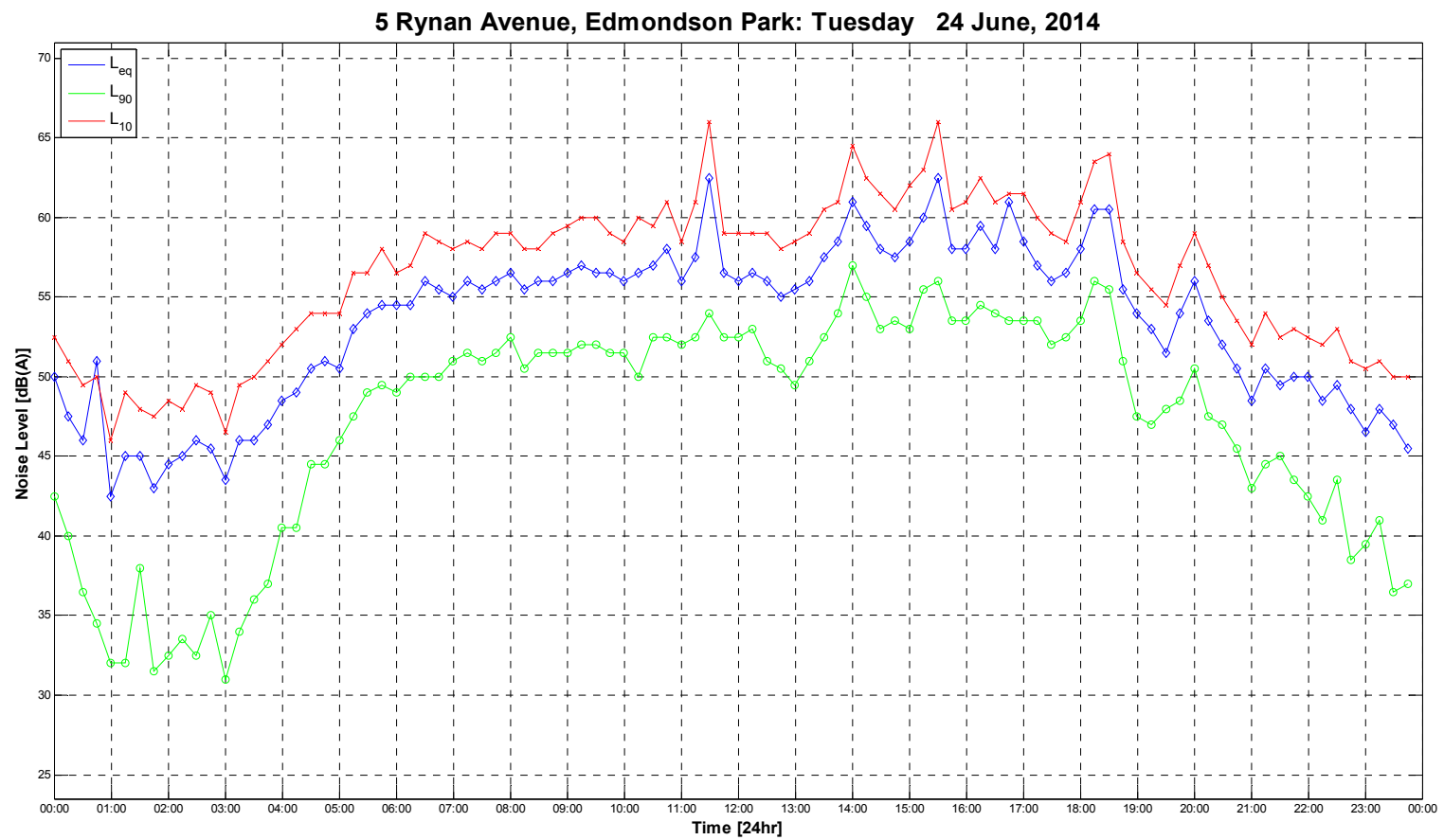


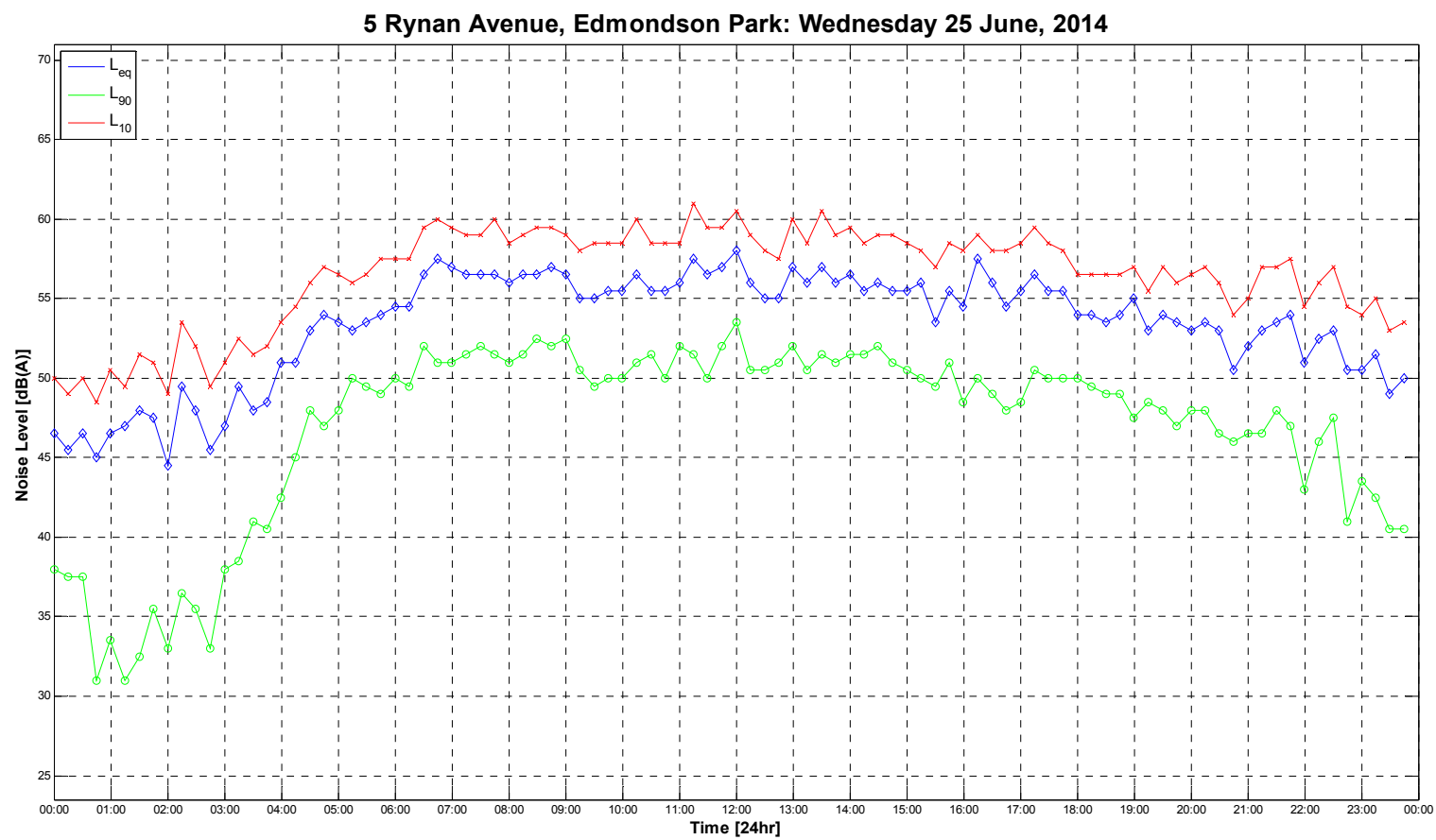
5 Ryman Avenue, Edmondson Park: Saturday 21 June, 2014











5 Ryman Avenue, Edmondson Park: Thursday 26 June, 2014

