23-27 Marshall Street, Bankstown

DA Acoustic Assessment

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1 INTRODUCTION

This report presents our environmental noise assessment for the proposed residential development at 23-27 Marshall Street, Bankstown. The major noise issues related to the proposed development are below:

- External noise intrusion into the proposed development shall comply with the requirements of Bankstown Council DCP and Australian Standard AS2107:2000.
- Noise emission from the plant service proposed site shall comply with the requirements of NSW EPA Industrial Noise Policy.

This assessment has been based on architectural drawings provided by Zhinar Architects, for detailed information please see Table 1 below.

Table 1 – Architectural Drawing Information

Drawing Number	Drawing Title	Date	Revision
00	Cover Sheet	Nov 15	DA-A
01	Urban Context		
02	Site Analysis		
03	Basement		
04	Ground Floor		
05	First Floor		
06	Second Floor		
07	Third Floor		
08	Roof Plan		
09	Elevations		
10	Elevations 1		
11	Street Elevation		
12	Sections		
13	Material Schedule		
14	Material Schedule 1		
15	Solar Study		
16	Shadow Diagrams – March		
17	Shadow Diagrams – June		
18	Shadow Diagrams – September		
19	Area Calculation		

2 SITE DESCRIPTION

The proposed site is located at 23-27 Marshall Street, Bankstown. The site is bounded existing residential housing to the north, east of the project site is Marshall Avenue carries a low volume of traffic. South is De Will Street which carries a low volume of traffic and to the west is existing multi storey residential apartments.

The proposed site consists of one basement levels of parking and residential living ground thru three.

Detailed site map and noise measurement locations refer to Figure below.

Figure 1 Site Map and Noise Measurement Locations
Sourced from – www.google.com.au

3 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 at 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; like traffic noise.

4 TRAFFIC NOISE INTRUSION ASSESSMENT

This section of the report details the acoustic assessment of traffic noise intrusion to the proposed development.

4.1 ACOUSTIC CRITERIA

4.1.1 Bankstown DCP Part D2 (2005)

Section 8.6 of the Bankstown DCP Part D2 directly addresses noise intrusion for buildings adjoining major roads. The DCP States the following;

> *"Where an allotment adjoins an arterial road, a development must ensure the siting and design of any dwellings:*
>
> *a) Comply with AS3671 – Acoustics – Road Traffic Noise Intrusion;"*

Please Note: We note that the roads surrounding the proposed site are not classified as *"arterial roads"* the criteria in section 8.6 of the DCP does not apply. In the absence of any other type of noise criteria ALC recommends the adoption of the standard to this project.

4.1.2 AS3671 – Acoustics – Road Traffic Noise Intrusion

AS3671 documents the process of calculating internal noise levels based on external traffic noise. AS3671 refers to AS2107 – Recommended design levels and reverberation times for building interiors, for actual allowable internal levels.

4.1.3 Australian Standard 2107-2000

AS2107-2000: Recommended design sound levels and reverberation times for building interiors specifies allowable internal noise levels for internal spaces within residential and commercial buildings. Table 1, in section 5 of AS2107-2000, gives the following maximum internal noise levels for commercial buildings and residential buildings near major roads;

Table 2 – Recommended Design Sound Level

Space /Activity Type	Recommended Maximum Design Sound Level dB(A)Leq
Living Areas	45
Sleeping Areas	40

4.1.4 Summary of Project Acoustic Objectives

The following table shows the internal noise objectives which will be adopted for this project for the different spaces found in the development.

Table 3 – Summary of Project Acoustic Objective

Space	Criteria
Bedroom	35dB(A) L_{eq}
Other Habitable Spaces	40dB(A) L_{eq}

4.2 TRAFFIC NOISE MEASUREMENTS

External noise levels in the area have been recorded by this office using long term unattended noise monitoring equipment and attended short-term attended measurements.

4.2.1 Attended Traffic Noise Measurements

Attended measurements of peak hour traffic noise were conducted around the site between 4:30pm to 5:30pm on 21st October 2015. Attended noise 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 Rion NC-73 calibrator. No significant drift was noted.

The traffic noise levels listed in the below, were determined based on attended measurements. In determination of acoustic treatments, the measured level is adjusted for distance and orientation.

Table 4 - Attended Traffic Noise Measurements

Location	Time of Day	Measured Noise Level
Marshall Road (Proposed Site) (Refer to Figure 1) @ 4m distance from carriage way	4:30pm – 5:00pm	59 dB(A) L_{eq}
De Witt Street (Proposed Site) (Refer to Figure 1) @ 4m distance from carriage way	5:00pm – 9:30pm	58 dB(A) L_{eq}

4.2.2 Unattended Traffic Noise Measurements

Unattended traffic noise measurements have been carried out by setting up a noise logger in the rear of the proposed site from the 19th of October 2015 until 26th October 2015. Detailed location refer to Figure 1.

Equipment used consisted of an 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 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.

Detailed measurement results have been summarised in Table 5 below.

Table 5 - Unattended Traffic Noise measurements at rear of Site

Location	Time of Day	Traffic Noise Measured
23-27 Marshall Street, Bankstown	Day	54dB(A) $L_{Aeq(15\ Hour)}$
	Night	45dB(A) $L_{Aeq(9\ Hour)}$

4.3 EVALUATION OF NOISE INTRUSION

Internal noise levels will primarily be as a result of noise transfer through the windows and doors and roof, as these are relatively light building elements that offer less resistance to the transmission of sound.

The predicted noise levels through the windows, doors and roof are discussed below. The predicted noise levels have been based on the measured 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.

Calculations were performed taking into account the orientation of windows, barrier effects (where applicable), the total area of glazing, facade transmission loss and the likely room sound absorption characteristics. In this way the likely interior noise levels can be predicted. In all cases, the selected glazing type (refer to Appendix B – Glazing Mark Up) reduces internal noise levels to within the nominated criteria for the various space types.

4.3.1 Recommended Glazing

Please Refer to Appendix B – Glazing Mark Up for recommended glazing assemblies for this project to achieve the internal traffic noise requirements. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**).

The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement.

In addition to meeting the minimum glazing thickness requirements given, the design of the window mullions, perimeter seals and the installation of the windows/doors in the building openings shall not reduce the STC rating of the glazing assembly listed in Table 6 below the values nominated in Appendix B – Glazing Mark Up. **Note that mohair type seals will not be acceptable for the windows requiring acoustic seals.**

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum listed STC requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

Please note: All calculations have been done on the assumption that habitable spaces have a hard floor finish and bedrooms have carpet.

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

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
4mm Float	Yes	27
5mm Float	Yes	28
6.38mm Laminate	Yes	33

4.3.2 External Doors

Any glass door should be constructed using glazing thickness set out in Appendix B – Glazing Mark Up. Full perimeter acoustic seals around the doors are required. It will be acoustically acceptable if thicker glazing is required for structural or comfort purposes, the glazing recommended in Appendix B – Glazing Mark Up is a minimum requirement.

4.3.3 Roof / Ceiling Construction

External roof will be constructed of concrete and will not require upgrading.

4.3.4 External Walls

External walls composed of masonry elements will not require acoustic upgrading.

4.3.5 Mechanical Ventilation

With respect to natural ventilation of the dwelling, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

- *"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (ie – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

Habitable rooms on **all façades** of the development will be able to achieve the internal noise goals with windows open.

5 EXTERNAL NOISE EMISSION

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:

- Noise generated by mechanical plant (typically air-conditioning).

The nearest potentially affected noise receivers are:

- Residential receivers to the immediate east and west of the proposed site.

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

- NSW EPA Industrial Noise Policy
- Protection of Environmental Operation Act Regulation 2000

5.1 BACKGROUND NOISE MONITORING

Background noise levels for the site were obtained using an unattended noise logger.

The unattended monitoring was conducted using an Acoustic Research Laboratory's noise logger. The logger was set to A-weighted fast response and was programmed to store 15-minute statistical noise levels throughout the monitoring period. 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 unattended measurement was conducted from the 5th of June 2015 to the 15th June 2015. Refer to the aerial photo in Figure 1 for the noise monitor location.

The measured background noise levels are summarised in Table 7 below.

Table 7 - Measured Background Noise Levels

Location	Day Noise Level 7am to 6pm dB(A) $L_{90(11hour)}$	Evening Noise Level 6pm to 10pm dB(A) $L_{90(4hour)}$	Night Noise Level 10pm to 7am dB(A) $L_{90(9hour)}$
23-27 Marshall Street, Bankstown	42	40	33

5.2 NOISE EMISSION OBJECTIVES

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

5.2.1 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.

5.2.1.1 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 5.1. Noise emissions from the site should comply with the noise levels presented in Table 8 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 (North of Proposed Site)	Day (7am-6pm)	50
	Evening (6pm-10pm)	48
	Night (10pm-7am)	41

5.2.1.2 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) $L_{eq(Period)}$
Nearby Residences – Suburban Receiver	Day (7am-6pm)	55
	Evening(6pm-10pm)	45
	Night(10pm-7am)	40

5.2.2 Protection of the Environmental Operation Act Regulation 2000

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.

5.2.3 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 proposed site. The assessment criteria are also based on the background noise monitoring data conducted at the proposed development location.

Table 10 - Environmental Noise Emission Criteria

Time Period	Assessment Background Noise Level dB(A)L_{90}	Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria Background + 5 dB(A) L_{eq}(15min)	EPA Criteria for Sleep Disturbance dB(A) L_{eq}(15min)
Day	42	55	47	N/A
Evening	40	45	45	N/A
Night	33	40	38	48

5.3 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 plant to the closest residential receiver should comply with the noise emission criteria in Section 5.2 of this report.

6 CONCLUSION

This report provides the results of our assessment of noise impacts on the amenity of future tenants within the proposed residential development at 23-27 Marshall Street, Bankstown.

Provided that the treatments set out in section 4.3 of this report are employed, internal noise levels shall comply with the requirements below:

- Bankstown Council DCP.
- Australian Standard AS3671.
- Australian Standard AS2107.

External noise emissions criteria have been setup in this report to satisfy the requirements from NSW EPA Industrial Noise Policy, detailed acoustic controls measures for the plant service the proposed development will be determined at CC stage.

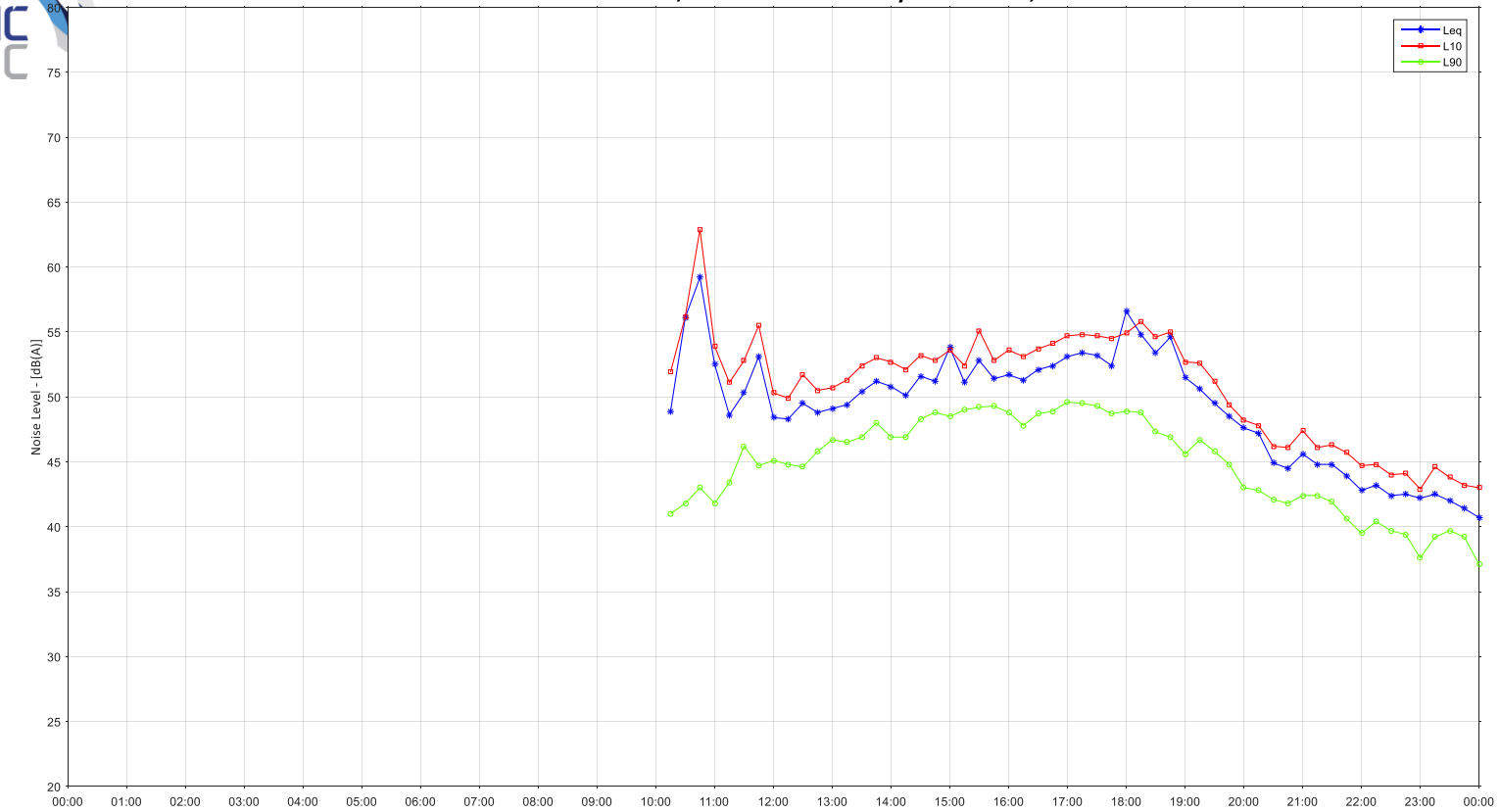
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

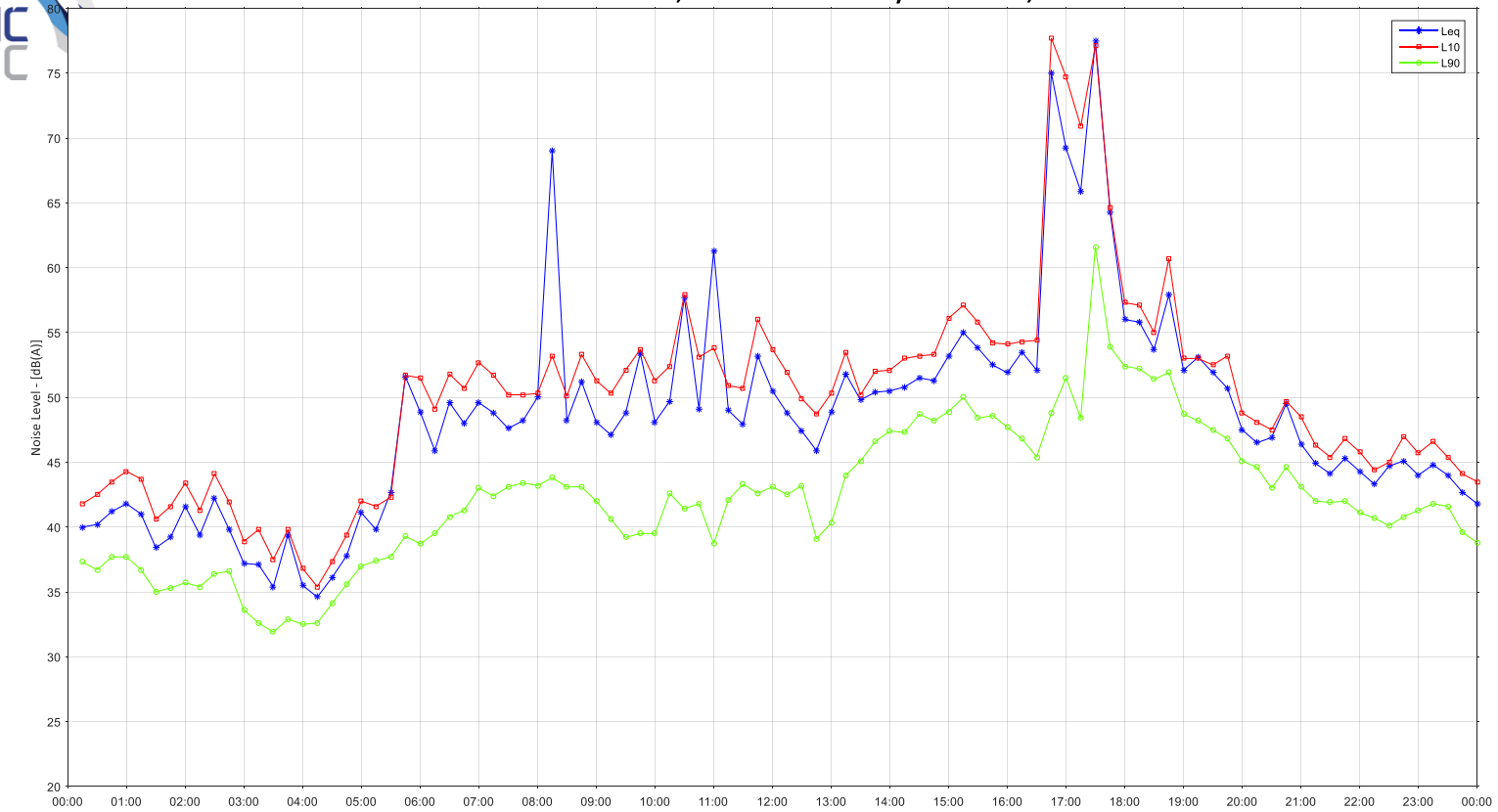
Acoustic Logic Consultancy Pty Ltd
Matthew Furlong

APPENDIX A – NOISE MONITOR DATA

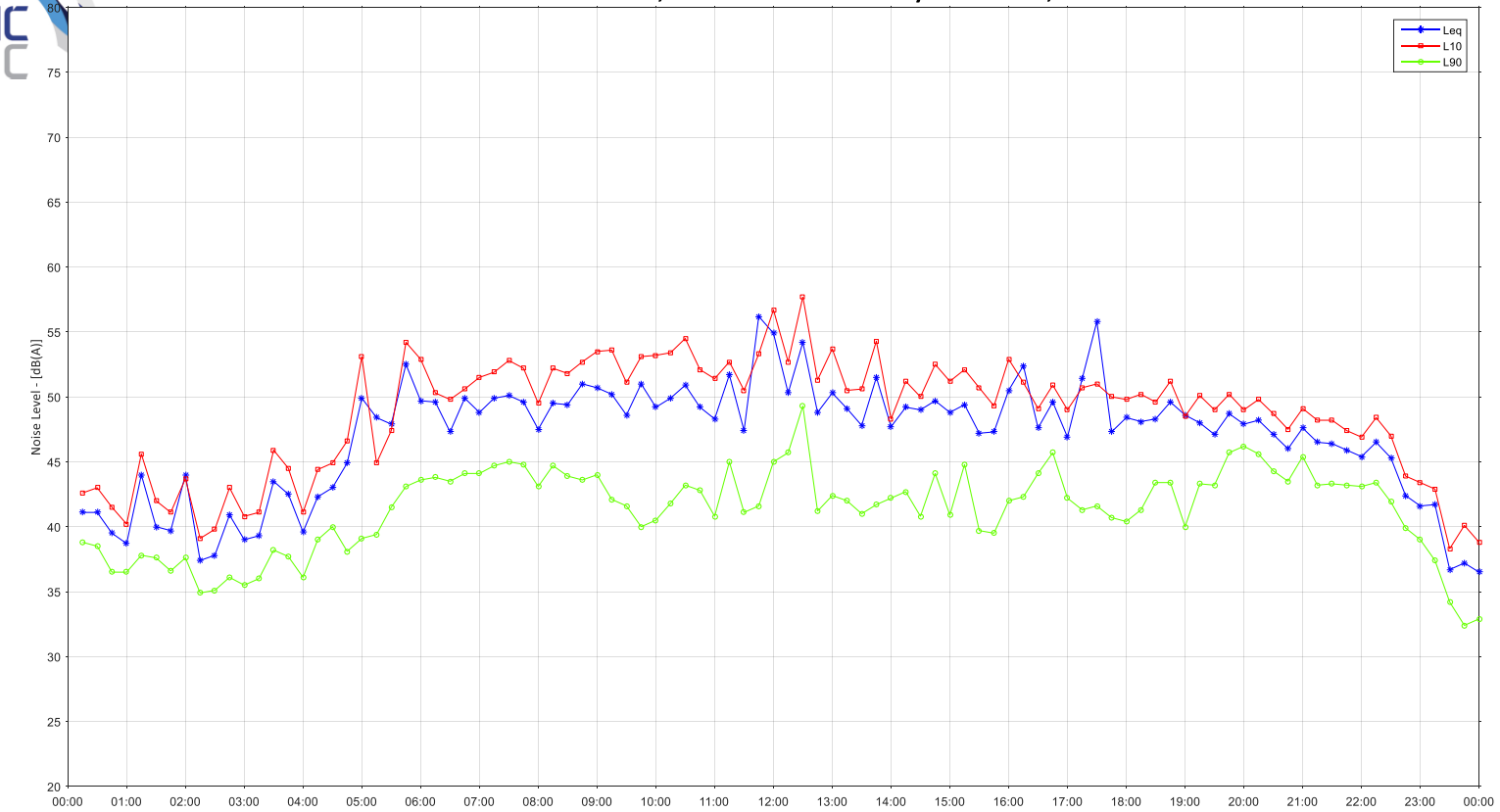
23-27 Marshall Street, Bankstown: Monday 19 October, 2015



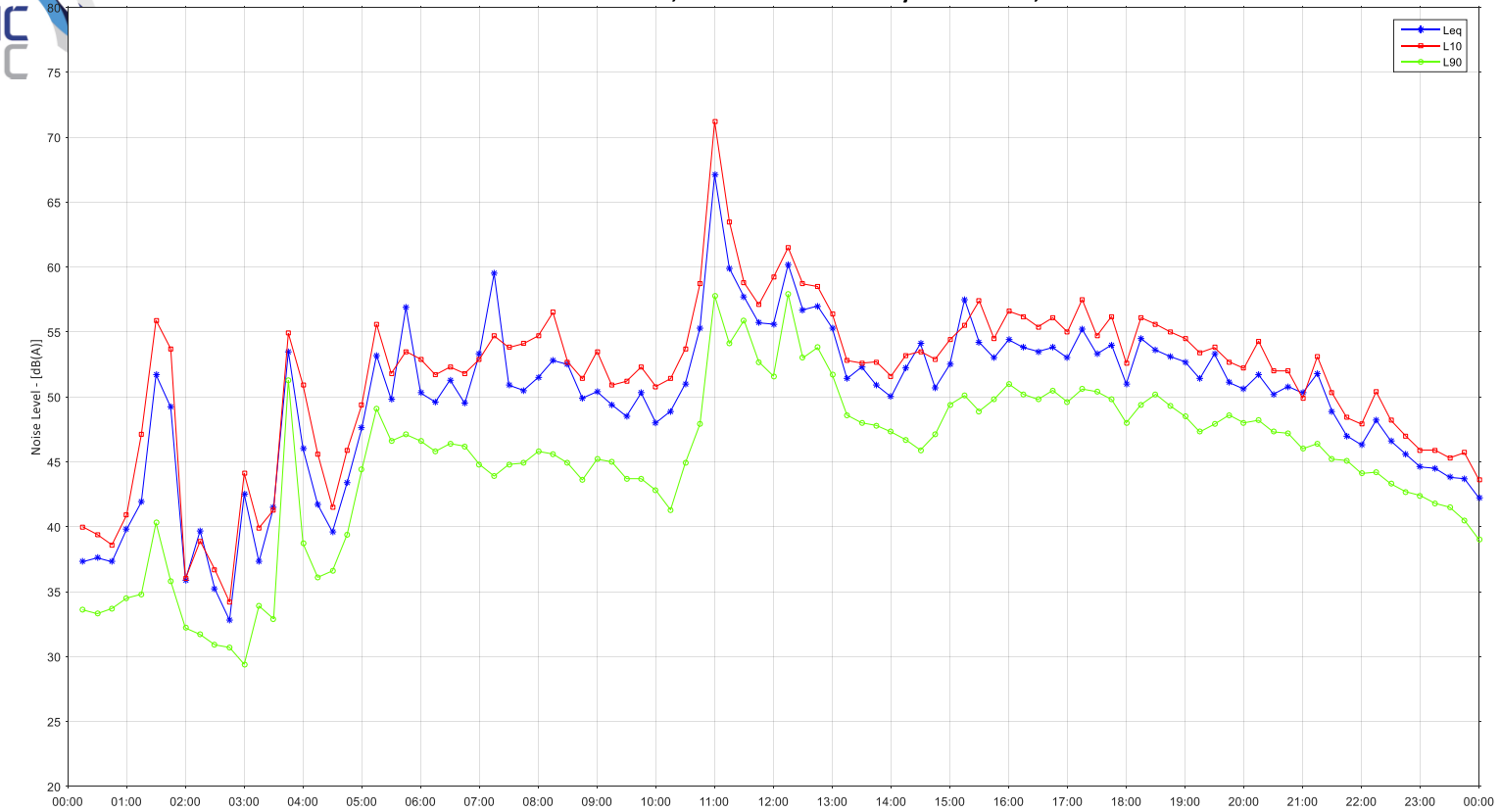
23-27 Marshall Street, Bankstown: Tuesday 20 October, 2015



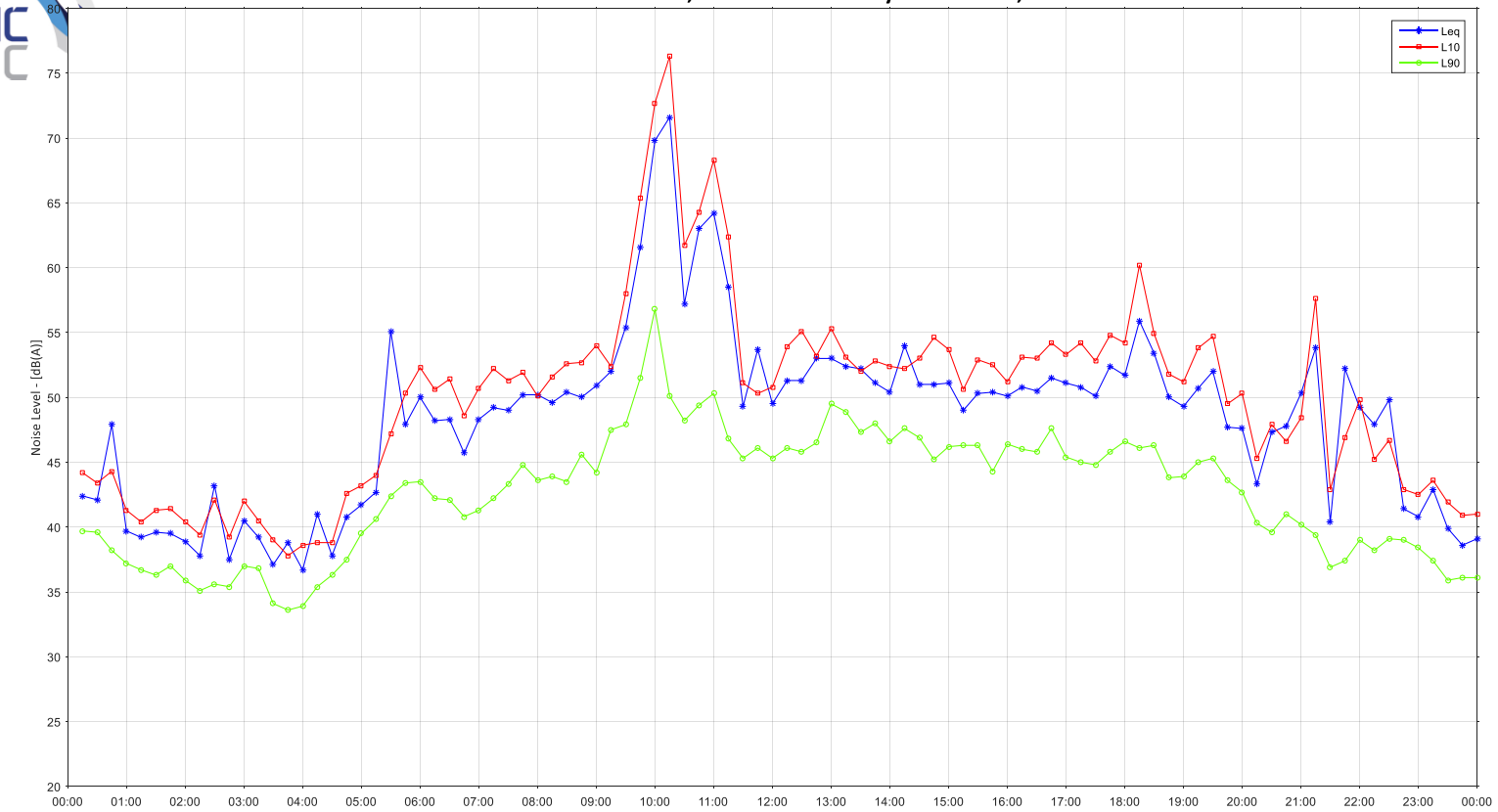
23-27 Marshall Street, Bankstown: Wednesday 21 October, 2015



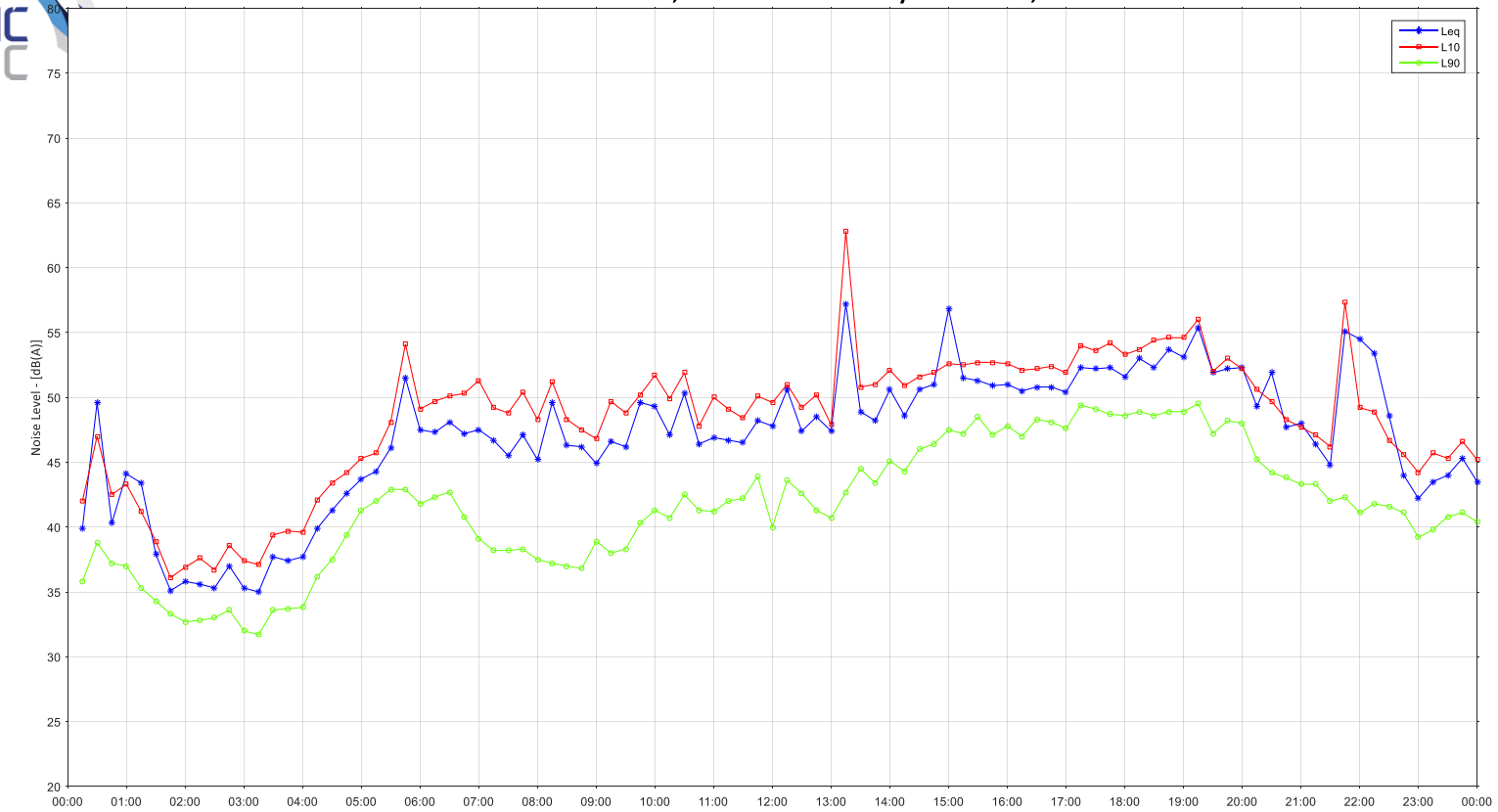
23-27 Marshall Street, Bankstown: Thursday 22 October, 2015



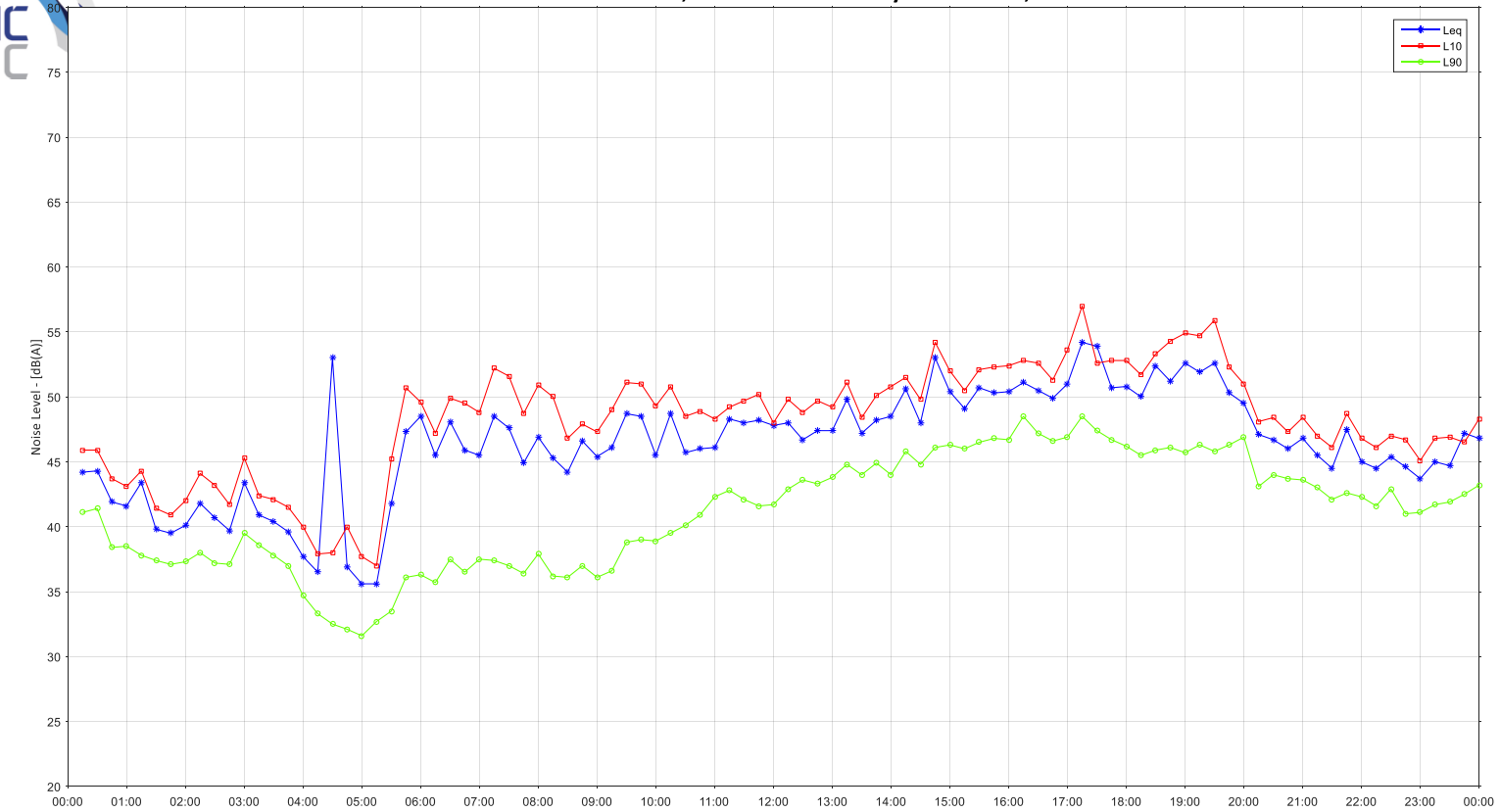
23-27 Marshall Street, Bankstown: Friday 23 October, 2015



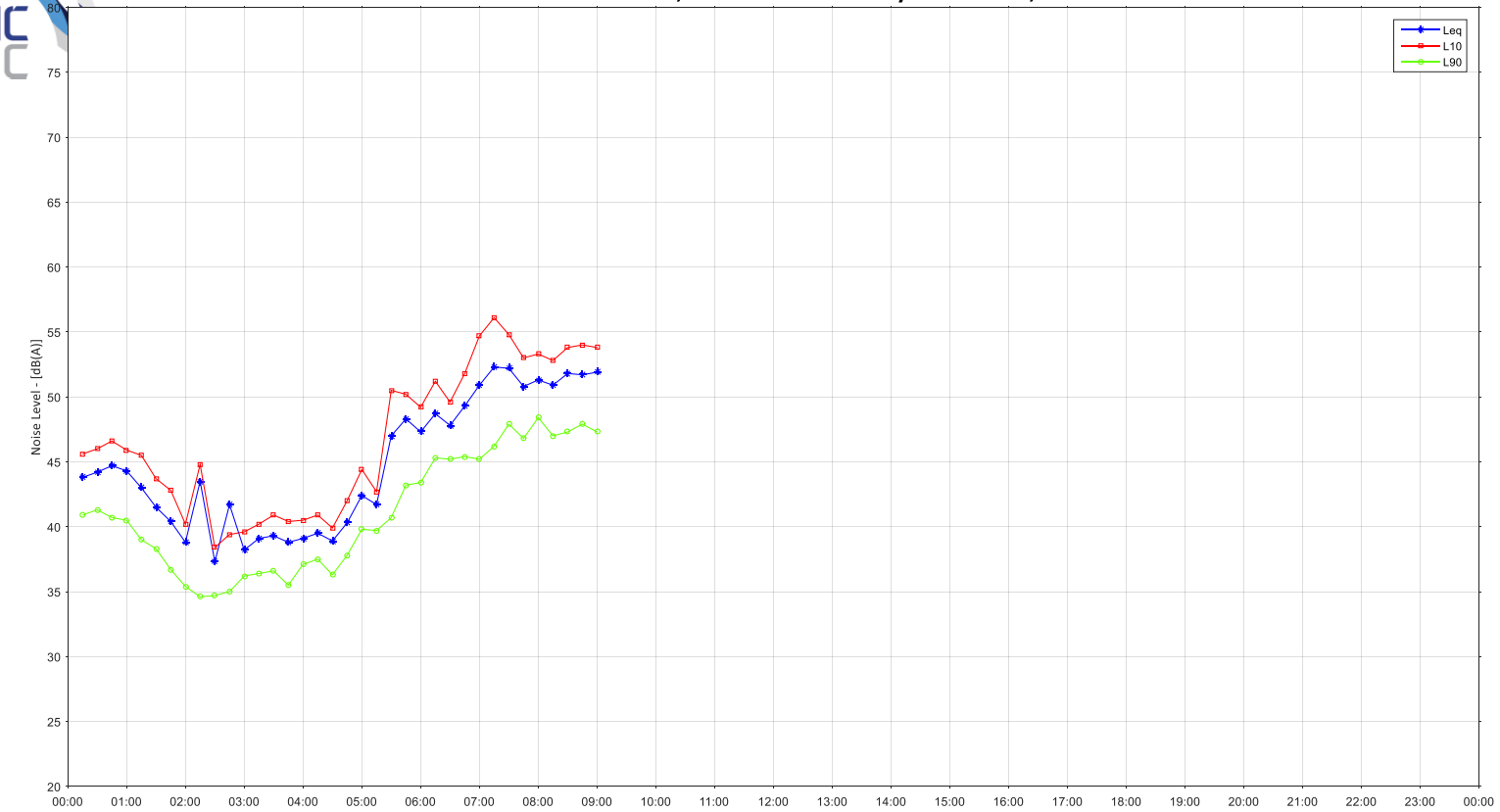
23-27 Marshall Street, Bankstown: Saturday 24 October, 2015



23-27 Marshall Street, Bankstown: Sunday 25 October, 2015



23-27 Marshall Street, Bankstown: Monday 26 October, 2015



APPENDIX B – GLAZING MARK UP

4mm Float
5mm Float
6.38mm Laminate

MARSHALL STREET

99° 1' 40" 40.215m
279° 1' 40" 38.710m
9° 7' 20" 45.720m
189° 5' 40" 44.195m
233° 59' 40" 2.160m

UNIT 1 2 BEDROOM 74.90 m²
UNIT 2 2 BEDROOM 74.90 m²
UNIT 3 2 BEDROOM 76.82 m²
UNIT 4 2 BEDROOM 75.51 m²
UNIT 5 2 BEDROOM 90.16 m²
UNIT 6 1 BEDROOM 56.50 m²
UNIT 7 1 BEDROOM 52.88 m²
UNIT 8 1 BEDROOM 53.12 m²
FOYER ground floor 55.77 m²
GFA 651.69 m²
SITE AREA 1 837.86 m²
SUBSTATION IF REQUIRED
EXHAUST AIR
SERVICES CUPBOARD
TEMPORARY BIN LOCATION
MAILBOXES & SIGNAGE
ENTRY
DEMOLISHED DRIVEWAY
BASEMENT BELOW
SETBACK 6.000
SETBACK 6.009
RAMP 1:14
LANDSCAPE deep soil 252.83 m²
COMMUNAL OPEN SPACE
deep soil 27.71 m²
deep soil 19.85 m²
deep soil 32.62 m²
deep soil 10.42 m²

64
DP 5754

1
NO.22-24
THREE STOREY
BRICK UNIT
DEVELOPMENT
TILED ROOF

1 Ground Floor
Scale: 1:100 @ A1
1:200 @ A3

DA-A	ISSUED FOR DEVELOPMENT APPLICATION	NOV 15	MR	IC
ISSUE	AMENDMENT	DATE	DRAWN	CHECKED

Print Date: Monday, 23 November 2015 6:28 PM

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NORTH

PROJECT STATUS: Development Application

Zhinar Zhinar Architects Pty Ltd

SHEET TITLE: Ground Floor

DESIGNED: IC | DRAWN: MR | COMMENCED: OCT 2015 | SCALE: AS NOTED | PRINT: A1 SHEET

L.G.A: Bankstown Council

zhinar ARCHITECTS
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PH: (+61 2) 8893 8888 WEB: www.zhinar.com.au

PROJECT: Residential Flat Building
23-27 Marshall Street,
Bankstown NSW 2200

JOB No.: 08446 DA-A:04

ISSUE: A

4mm Float

5mm Float

6.38mm Laminate

1 First Floor
Scale: 1:100 @ A1
1:200 @ A3

2 Post-adaptable Bathroom Plans (Typical) + Standard bed Template
Scale: 1:50 @ A1
1:100 @ A3

DA-A	ISSUED FOR DEVELOPMENT APPLICATION	NOV 15	MR	IC
ISSUE	AMENDMENT	DATE	DRAWN	CHECKED

Print Date: Monday, 23 November 2015 6:29 PM

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NORTH

PROJECT STATUS:
Development Application

Zhinar Zhinar Architects Pty Ltd

SHEET TITLE:
First Floor

DESIGNED: IC
DRAWN: MR
COMMENCED: OCT 2015
SCALE: AS NOTED
PRINT: A1 SHEET

L.G.A: Bankstown Council

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PROJECT:
Residential Flat Building
23-27 Marshall Street,
Bankstown NSW 2200

JOB No.: 08446 DA-A:05

ISSUE: A

1 Second Floor
Scale: 1:100 @ A1
1:200 @ A3

DA-A	ISSUED FOR DEVELOPMENT APPLICATION	NOV 15	MR	IC
ISSUE	AMENDMENT	DATE	DRAWN	CHECKED

Print Date: Monday, 23 November 2015 6:29 PM

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NORTH

PROJECT STATUS:
Development Application

Zhinar Zhinar Architects Pty Ltd

SHEET TITLE:
Second Floor

DESIGNED: IC
DRAWN: MR
COMMENCED: OCT 2015
SCALE: AS NOTED
PRINT: A1 SHEET

L.G.A.: Bankstown Council

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PROJECT:
Residential Flat Building
23-27 Marshall Street,
Bankstown NSW 2200

JOB No.: 08446 DA-A:06

ISSUE: A

1 Third Floor
Scale: 1:100 @ A1
1:200 @ A3

DA-A	ISSUED FOR DEVELOPMENT APPLICATION	NOV 15	MR	IC
ISSUE	AMENDMENT	DATE	DRAWN	CHECKED

Print Date: Monday, 23 November 2015 6:29 PM

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GENERAL NOTES:
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NORTH

PROJECT STATUS:
Development Application

Zhinar Zhinar Architects Pty Ltd

SHEET TITLE:
Third Floor

DESIGNED: IC
DRAWN: MR
COMMENCED: OCT 2015
SCALE: AS NOTED
PRINT: A1 SHEET

L.G.A: Bankstown Council

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PROJECT:
Residential Flat Building
23-27 Marshall Street,
Bankstown NSW 2200

JOB No.: 08446 DA-A:07

ISSUE: A