KOIKAS ACOUSTICS PTY LTD

CONSULTANTS IN NOISE & VIBRATION

ABN 12 058 524 771

Commercial 1 (Unit 27)
637 - 645 Forest Road
BEXLEY NSW 2207

Ph: (02) 9587 9702
Fax: (02) 9587 5337
E-mail: Office@KoikasAcoustics.com

ACOUSTIC REPORT

PROPOSED STUDENT ACCOMMODATION

83-123 EVELEIGH STREET, REDFERN NSW

'PRECINCT 3 – THE PEMULWUY'

Date: 7 June 2017

File Reference: 2075R20170529asPemulwuyPrecinct3_v1.docx

DOCUMENT CONTROL

Project Title	Acoustic report: Proposed student accommodation 83-123 Eveleigh Street, Redfern NSW ‘Precinct 3 – The Pemulwuy’		
Project Number	2075		
Document Reference	2075R20170529asPemulwuyPrecinct3_v1.docx		
Document Path	Z:\ACOUSTICS\ACOUSTICS 17\REPORT\Building General\2075 Pemulwuy - Precinct 3\2075R20170529asPemulwuyPrecinct3_v1.docx		
Revision	V0	31/05/2017	Report finalised, issued for checking
	Draft	31/05/2017	Draft report issued to Client and architects
	V1	07/06/2017	DA report (final) issued to Client and architects
Prepared By	Adam Semple		
Approved By	Nick Koikas		
Client	DeiCorp Constructions NSW Pty Ltd Level 3, 161 Redfern Street, Redfern NSW 2016 Attention: Greg Colbran Email: gcolbran@deicorp.com.au		

ACOUSTIC REPORT

PROPOSED STUDENT ACCOMMODATION

83-123 EVELEIGH STREET, REDFERN NSW

'PRECINCT 3 – THE PEMULWUY'

CONTENTS

TABLE OF APPENDICES

1.0 INTRODUCTION

Koikas Acoustics Pty Ltd (KA) has been commissioned by DeiCorp Constructions NSW Pty Ltd to prepare an acoustic report for the proposed development of student accommodation at 83-123 Eveleigh Street, Redfern, to be known as Precinct 3 of The Pemulwuy. The report is required as part of the Secretary's Environmental Assessment Requirements (SEAR).

The report considers relevant planning guidelines and regulations of:

- State Environmental Planning Policy (Infrastructure) 2007;
- Developments near rail corridors and busy roads, Interim guidelines (NSW DoPI, 2008);
- City of Sydney Council DCP 2012;
- NSW Industrial Noise Policy (EPA, 2000);
- Building Code of Australia 2016.

In doing so, assessed components of noise and vibration included within this report are:

- Road and rail traffic noise and vibration impacts on future occupants of the building,
- Construction noise and vibration impacts from the development site to adjoining residential property and RailCorp infrastructure,
- Preliminary mechanical plant and equipment noise emission from the site and to surrounding property, and
- Sound insulation requirements for common partitions within the development.

This report presents our results and findings and where appropriate, noise amelioration measures have been recommended that are designed to limit noise impacts to exposed premises in accordance with the nominated design goals.

Koikas Acoustics is reliant upon the accuracy of the information that has been provided at the time of conducting the assessment and any amendments or inconsistencies in the supplied data may, in turn, compromise the accuracy of our calculations and recommendations provided herein. This includes outdated or superseded architectural or mechanical drawings.

2.0 THE DEVELOPMENT

The Precinct 3 student accommodation will form part of the greater Pemulwuy mixed-use development site. 522 rooms are proposed over 22-floor levels from Upper Ground to Level 21. Common areas, a Gym, and further amenities are also included on the Lower Ground floor level.

The development site is located such that it directly adjoins a busy rail corridor, with services operating between Redfern and Central stations. Noise associated with the rail corridor can be a significant contributor to the overall environmental ambient noise level in the area, especially during peak morning and afternoon hours.

In addition to the rail traffic, road traffic associated with Gibbons Street, Regent Street and Lawson Street is also a significant contributor to the general ambient noise environment on-site.

Ensuring the building façade provides suitable insulation against the transmission of this existing ambient noise forms one component of work conducted for this assessment.

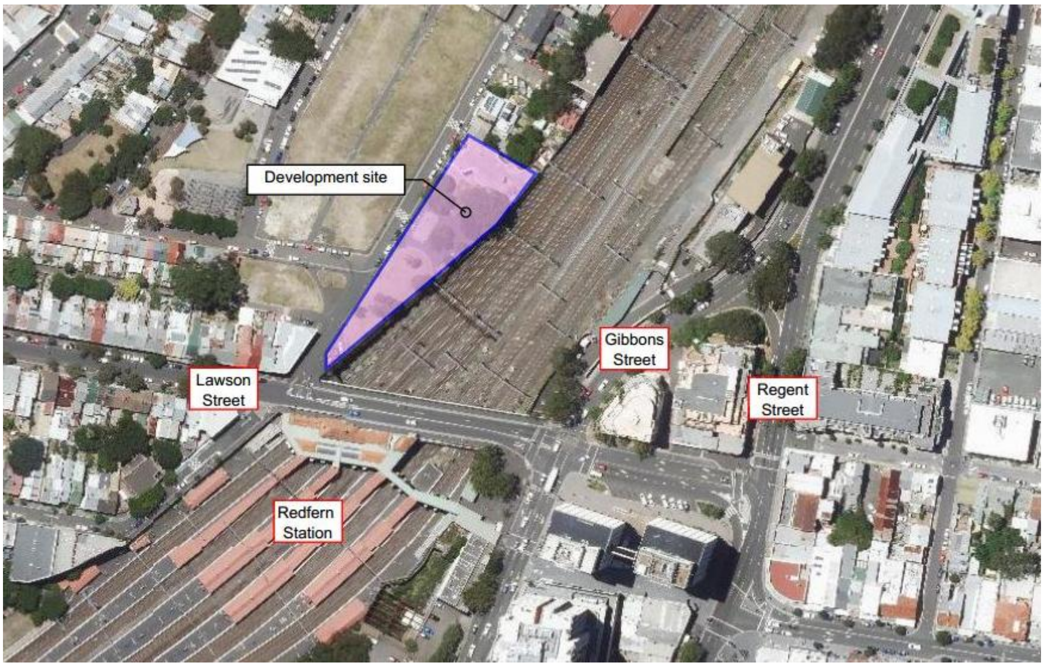


Figure 1. Aerial photo of proposed development site and surrounds. *Image courtesy of Six Maps.*

The proposed building design can be seen in the architectural drawings provided by Turner Architects, as detailed in Table 1. Preliminary mechanical design information has also been provided by JHA Engineers by way of a mark-up shown on architectural plans and supply of relevant acoustic data sheets.

Table 1. Design drawings used in the assessment				
Drawing Title	Drawing No.	Revision	Date	Job No.
Architectural				
GA Plans Roof	DA-110-001	P	2.06.2017	16107
GA Plans Lower Ground	DA-110-007	P	2.06.2017	16107
GA Plans Upper Ground	DA-110-008	P	2.06.2017	16107
GA Plans Level 01	DA-110-010	P	2.06.2017	16107
GA Plans Level 02	DA-110-020	P	2.06.2017	16107
GA Plans Level 03	DA-110-030	P	2.06.2017	16107
GA Plans Level 04, 05	DA-110-040	P	2.06.2017	16107
GA Plans Level 06	DA-110-050	P	2.06.2017	16107
GA Plans Level 07	DA-110-060	P	2.06.2017	16107
GA Plans Level 08, 09	DA-110-070	P	2.06.2017	16107
GA Plans Level 10	DA-110-080	P	2.06.2017	16107
GA Plans Level 11-14, 16	DA-110-090	P	2.06.2017	16107
GA Plans Level 15	DA-110-100	P	2.06.2017	16107
GA Plans Level 17	DA-110-110	P	2.06.2017	16107
GA Plans Level 18-20	DA-110-120	P	2.06.2017	16107
GA Plans Level 21	DA-110-130	P	2.06.2017	16107
GA Plans Level Plant	DA-110-140	P	2.06.2017	16107
GA Elevations Eveleigh Street_North Elevation	DA-250-010	P	2.06.2017	16107
GA Elevations Lawson Street_West Elevation	DA-250-020	P	2.06.2017	16107
GA Elevations Railway Line_South Elevation	DA-250-030	P	2.06.2017	16107
GA Elevations Terraces_East Elevation	DA-250-040	P	2.06.2017	16107
GA Sections Section A-A	DA-350-010	P	2.06.2017	16107
GA Sections Section B-B	DA-350-020	P	2.06.2017	16107
GA Sections Section C-C	DA-350-030	P	2.06.2017	16107
GA Sections Section D-D	DA-350-040	P	2.06.2017	16107
Materials and Finishes Eveleigh Street – North	DA-950-001	F	05.05.2017	16107
Materials and Finishes Eveleigh Street – Lobby 2nd Entry	DA-950-002	F	05.05.2017	16107
Materials and Finishes Eveleigh Street – South	DA-950-003	F	05.05.2017	16107
Materials and Finishes Main Entry & Public Domain Interface	DA-950-004	F	05.05.2017	16107
Materials and Finishes Eveleigh Street – High Levels	DA-950-005	F	05.05.2017	16107
Materials and Finishes Façade to Railway	DA-950-006	F	05.05.2017	16107

3.0 SITE MEASUREMENTS

For the purpose of establishing existing noise and vibration levels on the development site that are the result of activity occurring in the local area around the development site, a number of noise and vibration surveys were conducted.

Noise loggers were placed at three locations to measure long-term average environmental ambient noise levels and background noise levels.

A vibration logger was also left on-site for a week-long period to measure the daily and nightly vibration exposure of the site due to nearby rail movements.

Attended rail noise surveys were also conducted for the purpose of supplementing the long-term noise logger data and establishing rail-only noise levels.

3.1 NOISE LOGGING

Environmental noise logging was required to define existing ambient traffic noise levels and background noise levels.

Traffic noise levels must be known so that reasonable and acceptable façade designs can be included in the development so that indoor noise level amenity is provided for future occupants of the accommodation rooms.

Background noise levels form the basis of defining planning noise limits for mechanical plant and building use noise emission and noise generated during construction works.

Noise loggers were installed at three separate locations around the development site for the purpose of quantifying existing traffic and background noise levels. Each logger was installed for a minimum period of seven consecutive days from Friday 12th to Thursday 18th May 2017. Installed logger locations were as follows:

1. 77-85 Eveleigh Street, Redfern – on the roof of the existing building overlooking the rail corridor.
2. 77-85 Eveleigh Street, Redfern – ground level along the western site boundary fronting Eveleigh Street.

3. 106 Lawson Street, Redfern – on first-floor balcony fronting Lawson Street.

Two Svantek 977 and one BSWA 801 Type 1 precision noise loggers were used. Each logger was set to measure noise levels over 15-minute intervals, with data being constantly stored in the instrument memory. Fast time response and A-frequency weighting settings were used. Each instrument was field calibrated before and after the measurements with a NATA certified Larson Davis CAL200 acoustic calibrator. No system drift was observed.

Weather conditions over the duration of the survey were found to be acceptable and did not corrupt the noise survey data. Some short periods of extraneous noise that was identified from analysing the logger data were removed from recorded noise data.

Summary results are included in Tables 2 and 3. Detailed survey results are included in Appendix A.

Table 2. Noise logging results – OVERALL

Location	Period, T	Background noise, RBL $L_{A90, T}$ [dB]	Ambient noise $L_{Aeq, T}$ [dB]
Location 1 77-85 Eveleigh St Fronting rail corridor	Day	54	66
	Evening	52	64
	Night	46	61
Location 2 77-85 Eveleigh St Fronting Eveleigh St	Day	47	55
	Evening	46	53
	Night	41	51
Location 3 106 Lawson St Fronting Lawson St	Day	58	67
	Evening	55	66
	Night	45	61

Notes: 1. The EPA defined hours within each assessment period are DAY: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday and Public Holidays, EVENING: 6pm to 10pm, NIGHT: 10pm to 7am Monday to Saturday, 10pm to 8am Sunday and Public Holidays.

DEFINITIONS

LAeq, T: The continuous steady state sound level that represents the same amount of acoustic energy as a varying sound level over the nominated period, T.

LA90, T: The 10th percentile minimum noise level over a defined monitoring period, T. Taken as the average minimum level on an analogue sound level meter.

Table 3. 1/1 octave band road/rail traffic noise levels [dB]

Description	Noise metric	1/1 octave band centre frequency [Hz]									Total
		31.5	63	125	250	500	1000	2000	4000	8000	
Location 1 77-85 Eveleigh St	LAeq 15hr	30	42	51	58	59	60	58	56	53	66
	LAeq 9hr	26	37	46	54	54	55	53	52	47	61
Location 2 77-85 Eveleigh St	LAeq 15hr	28	39	43	45	48	50	49	44	36	55
	LAeq 9hr	23	35	37	41	43	46	44	41	35	51
Location 3 106 Lawson St	LAeq 15hr	37	46	50	56	59	62	60	56	48	67
	LAeq 9hr	31	40	45	50	53	57	55	51	42	61

The CoS DCP 2012 adopts an indoor traffic noise level assessment criteria based on maximum hourly noise levels during the day and night periods. Maximum 1-hour daytime and night-time LAeq traffic noise levels are typically 2-3dB higher than the 15 hour and 9-hour noise levels shown above.

3.2 RAIL VIBRATION LOGGING

The human annoyance response to intermittent vibration events, such as for rail pass-bys, is assessed in relation to the cumulative effect over daytime and night-time periods, ie. 15 hours daytime between 7am and 10pm, and 9-hour night-time between 10pm and 7am. The assessed quantity is the Vibration Dose Value (VDV).

A measurement of the existing level of vibration due to rail pass-bys was recorded on a Vibrock 901 vibration logger that was installed for the week-long period from Friday 12th May to Thursday 18th May 2017. The vibration logger was installed on the ground level concrete slab of the vacant premises at 77-85 Eveleigh Street, in the north-east corner of the building.

Maximum vibration levels recorded over the week-long survey were found to be:

- VDV (day) 0.038m/s$^{1.75}$
- VDV (night) 0.032m/s$^{1.75}$

3.3 ATTENDED RAIL NOISE LEVELS

To supplement the noise logger data that included measurements of rail noise levels, additional attended rail noise surveys were conducted between 11.50am and 12.20pm on Thursday 11th May 2017.

Measurements of rail noise were taken on the roof of 77-85 Eveleigh Street, Redfern. The meter was placed so it had an unobstructed view of passing rail traffic. A Type 1 precision NTi Audio XL2 sound level meter was used for the survey. The instrument was field calibrated before and after the measurements with a Larson Davis CAL200 acoustic calibrator. No system drift was recorded.

A summary of the measured rail noise levels is given in Table 4.

Table 4. Rail traffic noise levels from attended survey [dB]

Event	SEL rail noise level	LAeq rail noise level									
		1/1 octave band centre frequency [Hz]									Total
		31.5	63	125	250	500	1000	2000	4000	8000	
1	80	33	46	52	57	61	59	58	54	45	66
2	73	28	41	47	53	55	55	52	47	38	60
3	77	25	39	53	57	57	57	55	51	42	63
4	79	27	39	51	58	58	59	57	55	47	65
5	80	26	39	50	57	60	61	59	58	55	67
6	82	28	41	50	59	60	60	60	61	57	68
7	84	36	47	53	61	61	64	61	61	54	69
8	80	32	47	51	57	60	64	58	55	49	67
9	78	27	45	49	56	56	60	55	51	39	64
10	80	30	45	51	62	59	63	59	56	47	68
11	82	26	42	52	57	60	62	58	53	42	66
12	83	33	48	53	59	61	62	59	57	51	67

The above noise data was used, in combination with the unattended noise logger data, to prepare a calibration model of the site and surrounding road and rail noise sources. The calibration model was used to accurately define source-specific sound power levels such that resulting calculations of future noise intrusion could be conducted to the highest possible degree of accuracy.

4.0 ROAD AND RAIL TRAFFIC NOISE AND VIBRATION

4.1 APPLICABLE NOISE CRITERIA

4.1.1 ISEPP and NSW DoPI guidelines

With the development site being located adjacent to a rail corridor and in the vicinity of classified roads, the *State Environmental Planning Policy (Infrastructure) 2007 (hereafter referred to as ISEPP)* and the *NSW Department of Planning and Infrastructure, Development near rail corridors and busy roads – Interim Guidelines (hereafter referred to as NSW DoPI guidelines)* require that indoor noise level amenity is considered for future occupants of the building. Noise level amenity is achieved by ensuring the construction is sufficiently insulated against the transmission of traffic noise that indoor noise levels are within recommended levels stated within the above-mentioned publications.

Clauses 87 and 102 of the ISEPP applies indoor noise criteria for residential developments exposed to high levels of traffic noise. ISEPP is administered under the *Environmental Planning and Assessment Act 1979*.

Further planning guidelines are included within the NSW DoPI guidelines, which support the design targets of the ISEPP.

The NSW DoPI guidelines require that appropriate measures need to be taken to ensure that the following indoor noise levels are not exceeded:

- L_{Aeq} 35 dB to bedrooms between 10pm and 7am, and
- L_{Aeq} 40 dB to anywhere else in the premises (other than a garage, kitchen, bathroom or hallway) at any time.

The levels stated within this condition are comparable to ISEPP requirements. Where windows and/or doors are opened sufficiently to provide natural ventilation, the NSW DoPI guidelines state that the indoor noise levels must not exceed the indoor criteria by more than 10dB.

Table 5. ISEPP and NSW DoPI design criteria for internal spaces

Description	Area	Period	LAeq (Period)]dB]
Windows and doors **closed**	Bedrooms	10pm to 7am	35
	Living areas	24 hours	40
Windows & doors **open** (natural ventilation)	Bedrooms	10pm to 7am	45
	Living areas	24 hours	50
Notes 1.	Assessment period for bedrooms taken as the 9 hour period between 10pm and 7am. Assessment period for living areas taken as the 15 hour period between 7am and 10pm.		

4.1.2 City of Sydney DCP 2012

Section 4.2.3.1 of the CoS DCP 2012 'Acoustic Privacy' recommends that repeatable maximum 1-hour internal noise levels for residential buildings and serviced apartments should not exceed:

- For closed windows and doors:
    - 35dB for bedrooms (10pm to 7am), and
    - 45dB for living areas (24 hours).
- For open windows and doors:
    - 45dB for bedrooms (10pm to 7am), and
    - 55dB for living areas (24 hours).

Where open windows and doors cannot be used to achieve natural ventilation for indoor areas, the recommended indoor design sound level including noise associated with mechanical ventilation is:

- 38dB for bedrooms (10pm to 7am), and
- 48dB for living areas (24 hours).

4.2 APPLICABLE VIBRATION CRITERIA

Rail vibration impacts are assessed as a VDV, which accumulates the total vibration energy over separate day (7am-10pm) and night (10pm-7am) periods. *Assessing Vibration: A Technical Guideline (DEC, 2006)* recommends acceptable VDV's for intermittent vibration caused by rail pass-bys of 0.2m/s$^{1.75}$ daytime and 0.13m/s$^{1.75}$ night-time for residences. Vibration exposure below these values equates to a low probability of adverse comment from building occupants.

4.3 NOISE IMPACT ASSESSMENT

Calculating the resulting level of noise that is transmitted through a façade and into a room is dependent upon the external façade noise level, the sound insulation performance of the building façade (inclusive of all building components), and the level of acoustic absorption that is present within the subject room.

A calibrated CadnaA noise model was used to predict external façade traffic noise levels. The highest façade traffic noise levels at the building are predicted to be $L_{Aeq\ 15\ hour}$ 66dB / $L_{Aeq\ 9\ hour}$ 61dB along the eastern façade fronting the rail corridor. Reduced noise exposure along the sides of the building will result from the limited field of view of traffic. The least noise-exposed façade of the building fronts Eveleigh Street where the subject building provides significant acoustic shielding.

As stated previously within this report, the maximum 1 hour day and night L_{Aeq} noise levels are typically 2-3dB higher than the 15-hour and 9-hour levels. The calculations conducted for this assessment have allowed for suitable tolerances so that both the $L_{Aeq\ 15hr/9hr}$ levels and $L_{Aeq\ 1hr\ day/night}$ levels can achieve both the ISEPP/NSW DoPI and CoS DCP 2012 acoustic requirements.

4.3.1 External walls

External walls of pre-cast concrete panels, minimum 150mm thickness will provide sufficient sound insulation.

4.3.2 Ceiling/roof

150mm thick concrete slab ceiling/roof construction will provide sufficient sound insulation.

4.3.3 Windows and doors

The following are minimum recommended glass systems and glazing thicknesses predicted to achieve acoustic compliance. Other systems may be considered, provided that their performance is verified by a consulting acoustical engineer.

- All residential and corridor windows facing Eveleigh St or the internal courtyard may be 4mm monolithic glass windows/doors in aluminium frames with Q-lon or the approved equivalent seals. The installed window/door system inclusive of framing and seals must achieve an Rw of no less than 24.

- All glass windows to the 5-bed cluster rooms at the north and south ends of the development must be 6.38mm laminated glass windows in aluminium frames with Q-lon or other approved compression type acoustic seals. The installed window system inclusive of framing and seals must achieve an Rw of no less than 32.
- Windows to all Type B twin rooms facing north on floor levels 8 to 21 are to be 6.38mm laminated glass windows in aluminium frames with Q-lon or other approved compression type acoustic seals. The installed window system inclusive of framing and seals must achieve an Rw of no less than 32.
- Except where otherwise specified above, residential unit and corridor windows on the eastern façade of the building fronting the rail corridor, on floor levels Upper Ground to Level 16, are to be 6mm monolithic glass windows in aluminium frames with Q-lon or other approved compression type acoustic seals. The installed window system inclusive of framing and seals must achieve an Rw of no less than 26-28.

  From floor levels 17 to 21, only 5mm monolithic glass is required, with the installed system inclusive of framing and seals being able to achieve an Rw of no less than 27.
- Meeting Room windows on the Upper Ground level and all Entry Lounge windows (Upper Ground and Level 01) are to be 6mm monolithic glass windows in aluminium frames with Q-lon or other approved compression type acoustic seals. The installed window system inclusive of framing and seals must achieve an Rw of no less than 26-28.

In addition to the minimum glass recommendation, the installed window/glazed door systems should comply with Notes 1 to 5 below.

Notes
1. Recommendation based on typical aluminium framed sliding windows/doors with no weep holes in the frame.
2. Window frames should be tightly fitted to the external wall minimising any air gaps. Any air gaps present should be packed with timber and appropriate acrylic sealant such as Knauf Bindex (or approved equivalent).
3. All open-able windows and glazed door systems should be air tight when closed.
4. Q-lon type seals or the equivalent should be fitted along the perimeter of all glazing systems to minimise air gaps. If the windows/doors are not designed to be air-tight when closed, the total noise attenuation performance of the walls and the ceiling/roof system will be reduced.
5. Recommended glass systems have been calculated based on current architectural drawings as established within this report.

KA note that the recommendations provided in this report relate solely to acoustic performance. No consideration has been given to other factors such as safety, thermal or energy efficiency, that are outside the scope of this report, and may render the above recommended glazing as non-compliant with other standards or guidelines. It is, therefore, the responsibility of the client to ensure all glazed windows and sliding doors installed on-site will meet all building design requirements.

4.3.4 Ventilation

In some cases where external traffic noise levels are high, it is not a viable option to naturally ventilate rooms through the opening of windows and/or doors. This is due to the level of traffic noise being transmitted through the open doors resulting in a breach of the applied noise criterion.

As a general rule, where windows or doors are opened sufficiently to provide natural ventilation to a room, the indoor noise level is 10dB below the outside noise level. Therefore, a window or sliding door to a room may be opened to provide natural ventilation where the outdoor noise level does not exceed 10dB above the "Windows open" criteria as detailed within this report.

For this development, the following residential areas are not suitable for natural ventilation. In these cases, windows and doors will need to be closed in order to achieve the acoustic criteria.

- Twin 'Type A' units and Studio 'Type A' units with only windows fronting the rail corridor;
- Twin 'Type B' units facing north from floor level 8 to 21;
- Access Studio 'Type B' facing south from floor level 18 to 21.

For the above-mentioned rooms, the design of the ventilation must be such that windows and doors may be kept closed. Suitable options could be to incorporate a component of fresh air into a ducted air conditioning system or to install a small wall-mounted ventilator such as the Acoustica Aeropac. Alternate ventilation options may be considered through consultation with suitably qualified ventilation and acoustic consultants.

Noise from the ventilation system should not exceed L_{Aeq} 35dB in the rooms so that the combined noise level of traffic and ventilation equipment does not exceed the CoS guidelines of L_{Aeq} 38dB.

5.0 CONSTRUCTION NOISE AND VIBRATION PLAN OF MANAGEMENT

The Construction Noise and Vibration Management Plan has been prepared in order to address any potential noise and vibration impacts on surrounding sensitive residential property, and the adjoining rail infrastructure.

The nearest affected residential property is located at 75 Eveleigh Street, Redfern. This site directly adjoins the northern boundary of the development site.

In terms of rail infrastructure, noise levels are to be assessed at Redfern Station which is deemed to be the nearest noise sensitive component of rail infrastructure. Vibration impacts on rail infrastructure that may arise during demolition and excavation are to be assessed at the nearest rail line to the subject site's eastern boundary. The rail line is separated from the development boundary by as little as 3 metres in some areas.

5.1 DESIGN OBJECTIVE/CRITERIA

5.1.1 NSW Interim Construction Noise Guidelines

The NSW Interim Construction Noise Guideline (ICNG) was prepared by the Department of Environment, Climate Change and Water in 2009. The aim of the ICNG is to provide a framework for managing construction noise by way of involving and cooperating with all parties involved in or affected by construction noise.

The ICNG aim to achieve these goals through:

1. Identifying sensitive land uses affected by construction
2. Identifying hours for the proposed construction work
3. Identifying noise impacts at affected sensitive land uses
4. Applying best work practices to minimise noise impacts

Where high levels of construction noise are likely to affect surrounding sensitive land uses, community involvement and communication between parties is required to determine best practice strategies to minimise the effect of construction noise.

Two main assessment methods are detailed within the ICNG to assess noise at residences, being the Qualitative Assessment, predominantly for small scale works where any affected receiver may be exposed to construction noise for a period of less than three (3) weeks, and the Quantitative Assessment, for larger scale works where any affected receiver may experience noise impacts for greater than three (3) weeks.

Based on the scale of the proposed development, adjoining premises will be subjected to construction noise impacts for longer than three (3) weeks, therefore, the Quantitative Assessment method has been considered in this report.

The Quantitative Assessment method considers noise management levels that determine if an affected premise is within a 'Noise Affected' level, or above and classified as 'Highly Noise Affected'. The Noise Affected level as defined in the ICNG is defined as the point at which there may be some community reaction to noise. This corresponds to a level at 10dB above the existing Rating Background Level (as defined in the NSW Industrial Noise Policy). The Highly Noise Affected level is 75dB(A) at which there may be strong community reaction to noise. Figure 2 is an excerpt from the ICNG relating to the noise management levels.

For commercial premises, such as an office or retail outlets, the ICNG defines external criteria of $L_{Aeq\ 15\ minutes}$ of 70dB.

Both the Noise Affected and Highly Noise Affected levels defined above relate to work during standard hours, being:

- 7am to 6pm Monday to Friday and
- 8am to 1pm Saturday with
- No work allowed on Sundays or public holidays.

We note that the standard working hours of the ICNG differ from those stated within the City's construction noise code. It is the view of KA that the ICNG standard hours should apply for this site.

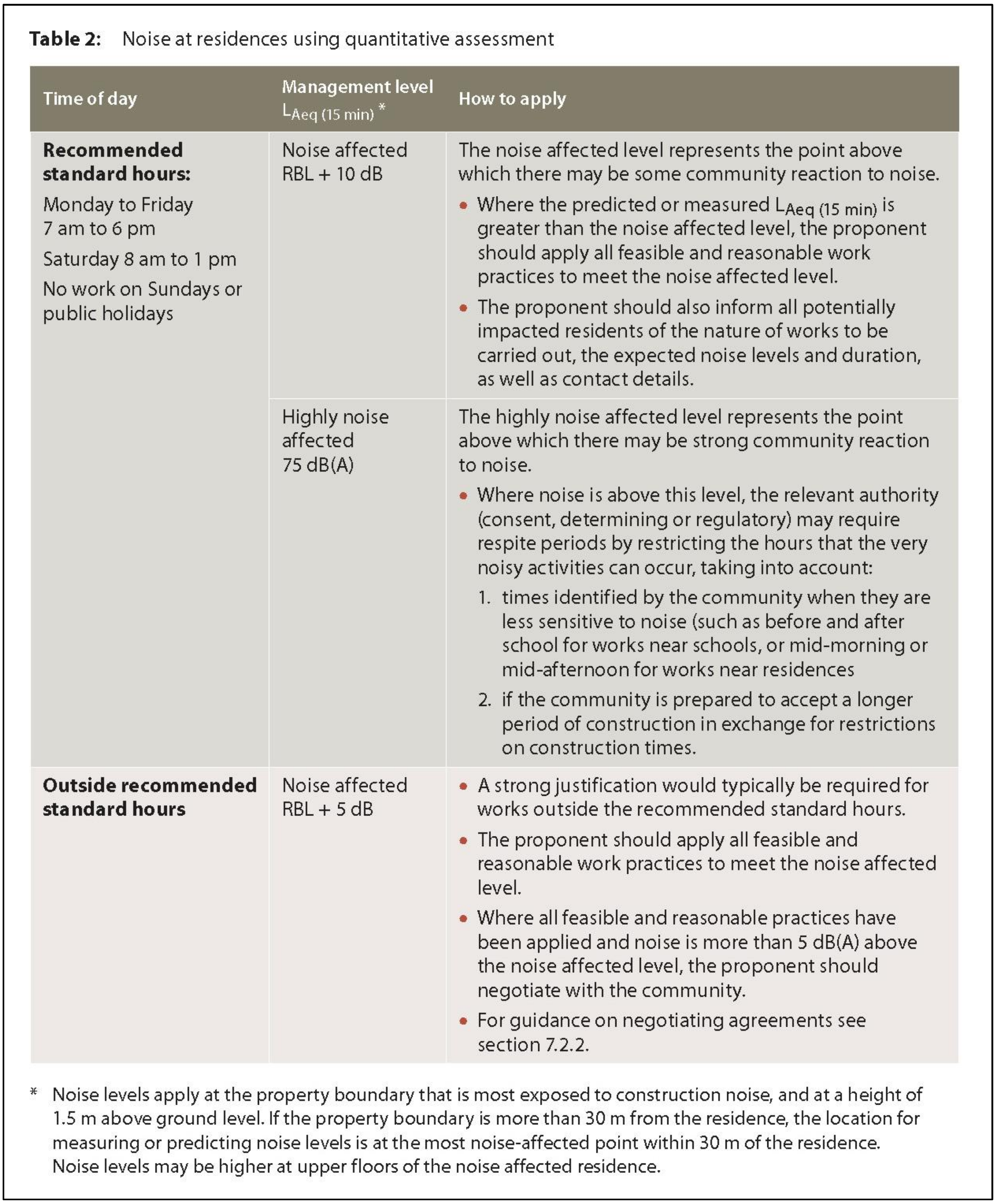


Table 2: Noise at residences using quantitative assessment

Time of day	Management level $L_{Aeq\,(15\,min)}$ *	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq\,(15\,min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Figure 2. NSW Interim Construction Noise Guidelines – Table 2

5.1.2 AS2436-2010

AS2436-2010 provides guidance on implementing noise and vibration control strategies for construction, demolition and maintenance sites as well as providing guidance for the preparation of management plans. Like the ICNG, the standard considers two (2) main methods of assessment by considering a qualitative approach or a more detailed quantitative approach.

The qualitative assessment is primarily used for small-scale building works that are not likely to be significant relative to the existing environment. A more detailed assessment is recommended where larger scale works are proposed that may have a significant impact on the surrounding environment. This supports the assessment approach of the ICNG.

5.1.3 City of Sydney Construction Noise Code

In accordance with the CoS construction noise code, a noise management plan must:

- Identify nearby noise sensitive receivers.
- Quantify the existing background noise level on-site at potentially affected receivers
- Advise on the proposed plant and equipment to be used during demolition, excavation and construction work.
- Predict the level of construction noise likely to impact on identified sensitive receivers in accordance with the City's construction noise code.
- State any exceedances above the construction noise criteria
- Identify potential noise control measures to be incorporated into the management of construction activities.

The construction noise code considers standard working hours of between 7am and 7pm Monday to Friday and 7am to 5pm on Saturday. During standard hours from 7am to 8am a criterion of Background + 5 applies. From 8am to 7pm (Mon-Fri) and 8am to 5pm (Sat) a criterion of Background + 5 + 5 may apply as determined on a site basis. The criterion of Background + 10 is comparable to the Noise Affected level which is considered in the ICNG, however, the City's construction noise code considers noise with an $L_{A\ av\ max\ (15\ minutes)}$ descriptor, whereas the ICNG applies the $L_{Aeq\ (15\ minutes)}$ descriptor.

The average maximum level is generally considered equivalent to the L_{A10} level, or the level that is exceeded 10% of a designated monitoring period. In our experience, we have found the L_{A10} level is typically 3dB higher than the L_{Aeq} measured over the same period for intermittent type noise events and approximately similar for constant noise sources. Therefore, in our opinion, the City's construction noise code is more stringent compared to the current NSW DECCW criteria for construction sites.

5.1.4 Construction Vibration Criteria

Construction vibration is addressed within the ICNG, where Section 4.4 of the ICNG states that "Human comfort vibration from construction works, including continuous, intermittent or impulsive vibration from construction, but excluding blasting, is to be assessed in accordance with Section 2.5 'Short-term works' in *Assessing Vibration – a technical guideline (DEC 2006)*".

Section 2.5 of the DEC vibration guideline considers the application of management strategies for premises exposed to vibration for a duration of approximately one week. As construction activities on-site will exceed a cumulative period of one week, the criteria for intermittent vibration detailed in Table 2.4, Section 2.4 of the document has been adopted.

Table 2.4 of the DEC vibration standard has been sourced from *British Standard 6472-1992 Evaluation of human exposure to vibration in buildings (1Hz to 80Hz)*. The referenced table nominates preferred and maximum vibration dose values (VDV) that correlate with human annoyance at receiver sites of different classifications such as residential, education facilities etc.

Table 6. Acceptable vibration dose value for intermittent vibration (m/s$^{1.75}$), BS6472:1992

Location	**Daytime**		**Night-time**	
	Preferred values	Maximum values	Preferred values	Maximum values
Critical areas	0.1	0.2	0.1	0.2
Residences	**0.2**	**0.4**	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

Construction is to occur during standard hours. The criterion for the daytime at residential premises therefore applies.

A more critical assessment of vibration impacts may be related to structural damage to surrounding buildings. It is expected that the geotechnical engineer will specify a peak particle velocity limit not to be exceeded at the site boundary. Where this is not available, a guide to applicable structural damage criteria can be taken from *British Standard 7385-2:1993* and/or *German Standard DIN4150-3*.

BS7385-2:1993 recommends a maximum peak component particle velocity when measured at the base of the building of:

- 50mm/s for reinforced or framed structures – Industrial and heavy commercial buildings.
- 15mm/s for unreinforced or light framed structures – Residential or light commercial type buildings.

German standard DIN4150-3 recommends a maximum peak particle velocity when measured at the base of the building of:

- 20mm/s for industrial and heavy commercial buildings.
- 5mm/s for residential type buildings.

5.2 NOMINATED DESIGN CRITERIA

For work during standard hours as defined in both the City's construction noise code and the NSW government ICNG, the applicable criterion would be as follows:

Table 7. Nominated assessment criteria, [dB]

Assessment location	Assessed period	CoS noise criteria [LA av max 15 min]		EPA ICNG Noise Affected level [LAeq 15 min]		EPA ICNG Highly Noise Affected level [LAeq 15 min]
		75 Eveleigh St	Redfern Station	75 Eveleigh St	Redfern Station	
Site boundary	7am – 8am	85 [2]	85 [2]	n/a	n/a	n/a
Site boundary	Standard hours [1]	85 [2]	85 [2]			
Nominated Affected Occupancy	7am – 8am	52-59 [3]	n/a	57-64 [3]	70	75
Nominated Affected Occupancy	Standard hours	57-64 [3]	n/a			
NOTES	1. Standard hours refers to those nominated within the City of Sydney construction noise code and the NSW ICNG. Refer to Section 4.1.1 and 4.1.3 of this report for further details. 2. Maximum allowable appliance noise level at construction site boundary, however, where the construction site shares a boundary with a noise-affected occupancy, the Nominated Affected Occupancy noise criteria applies. 3. A criteria range is provided as the background noise level differs between the Eveleigh St side of the residence to the rail corridor side of the residence.					

Further to the City of Sydney construction noise code requirements, noise levels are not to exceed the $L_{A\ av\ max\ (15\ min)}$ noise level as specified in Schedule 1 of the code for all construction equipment.

In terms of acceptable vibration limits, the following peak particle velocity limits should not be exceeded at any nearby residential dwelling or rail infrastructure to avoid structural damage:

- 15mm/s peak particle velocity at nearby residential dwellings
- 20mm/s peak particle velocity at nearby rail infrastructure

5.3 SOURCE LEVELS

5.3.1 Noise

Typical demolition, excavation, and construction equipment used on-site during each phase of the development could be as follows:

Demolition

- Hand tools
- Power tools (circular saws, angle grinders, cordless drills etc.)
- Excavator
  - Rock breaking
  - Rock saw cutting
  - Loading trucks
- Bogie trucks for removal of material

Excavation

- Piling rig
- Excavator
  - Rock breaking
  - Rock saw cutting
  - Loading trucks
- Bogie trucks for removal of material

Construction

- Concrete pumps
- Electrical tower crane
- Power tools (circular saws, angle grinders, cordless drills etc.)
- Small rigid 8-metre delivery trucks
- Cement mixers
- Concrete cutters

In terms of noise emanating from typical construction activity, levels range depending on the process or sources involved. A brief summary of typical noise levels associated with the advised construction plant is included below and has been sourced from the *Department for Environment, Food and Rural Affairs (DEFRA – UK) Update of Noise Database for Prediction of Noise on Construction and open Sites, December 2004*.

Table 8. Construction activity typical sound levels, [dB]

Equipment	DEFRA reference noise level – LAeq at 10m	LA av max at 10m (DEFRA LAeq + 3)	LA av max at 7m	CoS Appliance Group Schedule 1
Circular saw	84	87	89	85
Angle grinder	80	83	85	85
Trucks	74	77	79	90
20 tonne excavator	71	74	76	85
Rock breaking	90	93	95	n/a
Rock saw cutting	87	90	92	n/a
Excavator loading truck	79	82	84	85
Concrete pump	75	78	80	80
22 tonne tower crane	76	79	81	80
Concrete truck	67	70	72	90
Concrete cutting	87	90	92	80

Notes

1. L ave max at a distance of 7 metres has been calculated from the reference L ave max at 10m by considering that the propagation of sound under typical site conditions equates to a change in level of 4dB per doubling/halving of distance.

2. Highlighted values are predicted to exceed the maximum allowable appliance noise levels in accordance with Schedule 1 of the City's construction noise code. Actual noise levels for specific equipment used on-site may differ from the typical noise levels contained within this table.

5.4 CALCULATED CONSTRUCTION NOISE LEVELS

The level of noise predicted at a specific receiver location is governed by the source noise level, the distance between the source and receiver, and the presence of any screening objects along the propagation path. The location of any particular sound source within the construction site is not always at a fixed point and, therefore, the distance between a noise source and receiver location can vary.

KA have considered each identified noise source from Table 8 (above) at two specific locations within the development site:

Location 1: 5 metres from the northern boundary shared with the residential dwelling at 75 Eveleigh Street (See Figure 3).

Location 2: 70 metres from Redfern Station to the location of construction equipment within development site (See Figure 4).

Construction noise levels may at times be higher or lower depending on the precise location of the noise source within the construction site relative to the receiver location.

Figure 3. Assessment location of construction sources relative to adjacent residential receiver

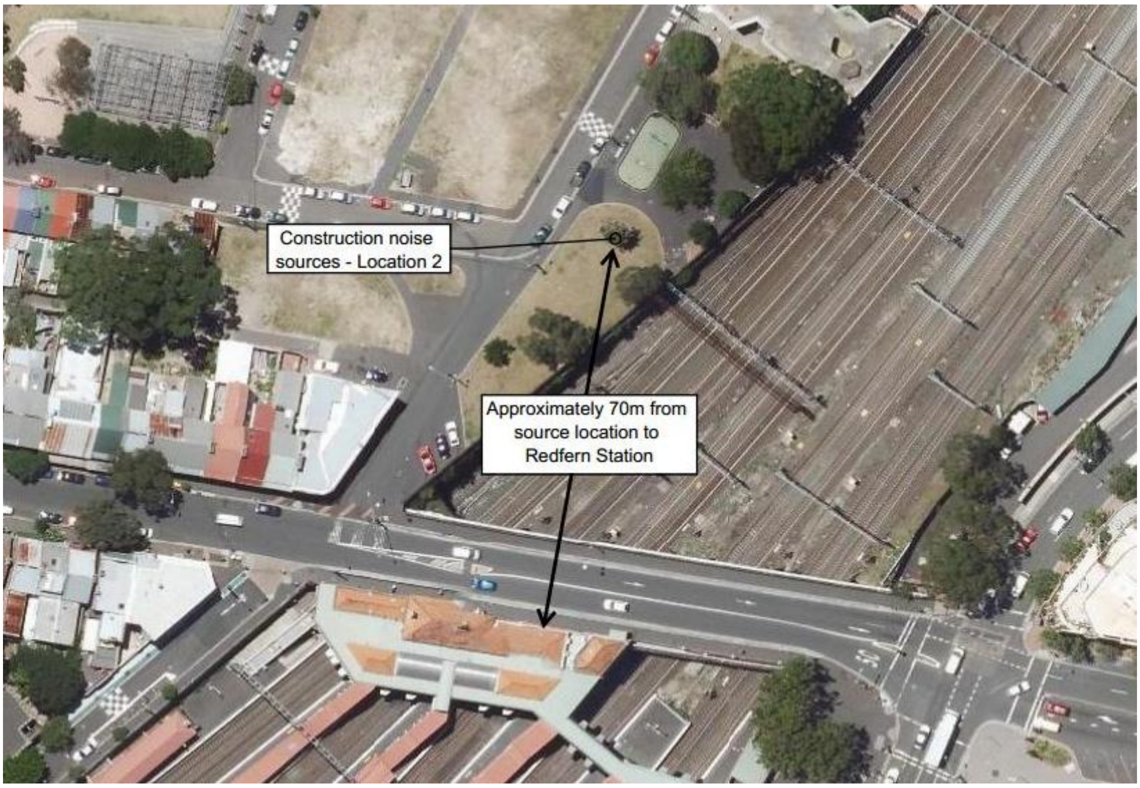


Figure 4. Assessment location of construction sources relative to Redfern Station

5.4.1 Appliance Noise Levels: City of Sydney Criteria

Estimated average maximum noise levels from construction equipment at a distance of 7 metres are included in Table 8, along with the associated noise limit based on the categorised group in which each piece of equipment is classified. Potential exceedances have been noted and may require further analysis or testing to verify compliance with the operating criteria.

5.4.2 Site Boundary Noise Limits: City of Sydney Criteria

With excavation and demolition works occurring at or near the site boundaries, the noise limit of $L_{av\ max}$ 85dB(A) will at times be exceeded. This is an inherent consequence of the nature of construction work, especially where excavation, rock breaking, and concrete sawing must occur. Where excavation is occurring at a distance of 1m from a site boundary, noise levels may range from 90-95dB(A) for an excavator and up to 108dB(A) or more for rock breaking.

Screening of certain work practices is a viable noise control solution to minimise noise at the site boundary from activities that are relatively stationary in nature such as for hammering. However, when the source moves between locations, the screening device must also move to remain effective. Typical noise reduction that can be achieved by screening is included within Table 9.

5.4.3 Noise at Nominated Affected Occupancy: City of Sydney / ICNG Criteria

The level of construction noise predicted to surrounding noise sensitive development will vary depending on the location of noise generating sources within the site. At times, when machinery is located close to site boundaries of adjoining property there will be a greater noise impact. Similarly, where construction noise sources are located away from site boundaries and/or are shielded from surrounding receivers, the noise impact may be less.

Receiver locations for assessing construction noise levels have been considered as follows:

- R1: 75 Eveleigh Street, Redfern
- R2: Redfern Train Station

Table 9. Estimated construction noise levels to surrounding receivers [dB]

Equipment	Noise assessment receiver location			
	Receiver location – R1		Receiver location – R2	
	LAeq 15 mins	LA10 15 mins	LAeq 15 mins	LA10 15 mins
Circular saw	88	91	73	76
Angle grinder	84	87	69	72
Trucks	78	81	63	66
20 tonne excavator	75	78	60	63
Rock breaking	94	97	79	82
Rock saw cutting	91	94	76	79
Excavator loading truck	83	86	68	71
Concrete pump	79	82	64	67
22 tonne tower crane	80	83	65	68
Concrete truck	71	74	56	59
Concrete cutting	91	94	76	79
Notes 1.	The predicted construction noise levels contained above are estimates only due to the large variance in noise level generated by comparable plant performing similar tasks on different construction sites. Where complaints arise it may be necessary to survey noise being generated on-site to determine the actual working noise levels.			

Noise from construction is predicted to exceed the City of Sydney construction noise code and the Noise Affected level of the ICNG at adjoining residential premises. This is due to the proximity of the adjoining residences and commercial properties in relation to the assessment site and the typical nature of noise associated with construction equipment.

It should be noted that the predicted levels consider construction noise levels being constant over a 15 minute assessment period with the equipment operating at maximum capacity. Therefore, calculated noise levels above should be considered as conservative. Given typical respite periods, we could reasonably expect construction noise levels to be up to 3 to 5dB lower than predicted.

5.5 CONSTRUCTION VIBRATION LEVELS

With no basement levels in the proposed building design, the requirement for excavation and earthworks is limited.

In this case, the highest anticipated vibration levels will result from rock breaking or other impulsive-type works required to break-up and clear the existing concrete structures on the subject site, and for any required earthworks (depending on the local geology).

The proximate location of the adjoining residential building at 75 Eveleigh Street and the nearby rail corridor will mean that alternative work practices to rock breaking will be required along the northern and eastern boundaries of the development site. Concrete sawing is an alternative to rock breaking that generates far less vibration and should be used for removal of the existing concrete structure along the affected boundaries.

A guide to safe work distances for typical vibration generating construction works is given in Table 2 of the *Construction Noise and Vibration Guideline (RMS, 2016)*.

Table 10. Reproduced Table 2 from RMS construction noise and vibration guide

Plant item	Rating / Description	Minimum working distance	
		Cosmetic damage (BS7385)	Human response (Assessing vibration: A technical guideline)
Vibratory roller	< 50kN (Typically 1-2 tonnes)	5m	15m to 20m
	< 100kN (Typically 2-4 tonnes)	6m	20m
	< 200kN (Typically 4-6 tonnes)	12m	40m
	< 300kN (Typically 7-13 tonnes)	15m	100m
	> 300kN (Typically 13-18 tonnes)	20m	100m
	> 300kN (> 18 tonnes)	25m	100m
Small hydraulic hammer	300kg – 5 to 12t excavator	2m	7m
Medium Hydraulic Hammer	900kg – 12 to 18t excavator	7m	23m
Large Hydraulic Hammer	1600kg – 18 to 34t excavator	22m	73m
Vibratory Pile Driver	Sheet piles	2m to 20m	20m
Pile Boring	≤ 800mm	2m (nominal)	4m
Jackhammer	Hand held	1m (nominal)	2m

5.6 NOISE & VIBRATION CONTROLS

Both the City of Sydney and NSW Department of Environment, Climate Change and Water (DECCW) recognise that there is a need to balance the existing noise amenity of residents along with the necessity to continue growth within the region. The fundamental principle involved with the development and success of each noise policy is maintaining open and free channels of communications between developers and residents alike.

The purpose of construction noise policies is to limit the noise exposure for premises surrounding construction sites by applying all reasonable and feasible noise mitigation measures where construction noise exceeds the nominated criterion. Where a construction site directly adjoins further noise sensitive properties, construction noise levels will generally exceed any adopted criterion. In this case, construction noise levels are predicted to exceed the adopted noise criterion by up to 30dB.

Minimising the impact of noise from construction sites to surrounding land uses can be achieved through treatment of the noise sources themselves, treating noise along its propagation path and/or by consulting with the community and scheduling noise intensive works during less noise sensitive times of the day. Consideration needs to be given to each source in identifying the most practical and efficient noise controls where treatment is necessary.

Table C3 in AS2436-2010 states the relevant effectiveness of various types of noise control measures typically employed on construction sites.

Table 11. AS2436-2010 Table C3 – Relative effectiveness of various forms of noise control

Control by	Nominal noise reduction possible, in total A-weighted sound pressure level LpA [dB]
Distance	Approximately 6 for each doubling of distance
Screening	Normally 5 to 10 maximum 15
Enclosure	Normally 15 to 25 maximum 50
Silencing	Normally 5 to 10 maximum 20

For this project, the following noise and vibration controls could be implemented to help maintain suitable noise and vibration amenity for surrounding land uses:

- The use of moveable screens for specific work practices could achieve the noise reductions of Table 8. The screens would have to be moveable where noise sources are not stationary within the construction site.
- Providing an acoustic type hoarding along the site boundary will also lower noise levels, however, the benefit would only be realised by residents on the ground floor level of adjoining buildings.
- Exhaust silencers could be considered to motorised plant and equipment such as the excavators. Silenced plant and equipment could lower noise emission from the exhaust system by 5 to 10dB.

- Undertake construction works during standard hours as defined in the ICNG.
- Use appropriately sized plant and equipment.
- Identify when high noise generating activities are likely to take place and conducting this work during times of least noise sensitivity as agreed through community consultation. Having open lines of communication with residents and appropriate scheduling of works on construction sites are processes recommended in both the City's construction noise code and the NSW ICNG.
- To minimise vibration from the rock breaker it is recommended that a hydraulic hammer attachment with a pointed 'cone' type hammer is used in-lieu of a flat 'block' type hammer.
- The minimum work distances as tabled within this report should be observed at all times, especially regarding structural damage guidelines.
- Continuous vibration monitoring surveys are recommended during demolition and excavation to ensure vibration levels do not reach a point where the structural integrity of surrounding buildings and rail infrastructure is compromised. Vibration monitors can be set to measure either the peak particle velocity or r.m.s. acceleration at the site boundary where a design vibration limit is specified by the Geotech engineer or as a Vibration Dose Value within adjoining residential buildings. Measuring vibration within adjoining residential or commercial building will require significant cooperation from the tenants/occupants.
- Progress noise monitoring could also be conducted during construction works to provide feedback to site managers as to the level of noise being emitted from the site.

5.7 COMPLAINTS HANDLING

A site contact and phone number should be distributed to all surrounding premises and displayed on the site noticeboard for any complaints arising due to noise and/or vibration generated during construction works. The site should have clear complaints handling procedure and staff who are well-versed in the complaints handling process.

A register of all complaints should be kept on-site and be readily available. Details within the complaints register should include, but not be limited to:

- Date and time of complaint,
- Person receiving complaint,
- Complainant phone number,
- Site contact who the complaint was referred to for action,
- Description of the complaint,

- Action to be taken,
- Time frame for action to be implemented.

All complaints should be given a fair hearing and adequately investigated. This may involve scheduling a relevant consultant to substantiate or refute any received complaint, and/or verifying any remedial action taken by the site manager by way of on-site testing.

6.0 PRELIMINARY MECHANICAL PLANT NOISE ASSESSMENT

6.1 NOISE CRITERIA

6.1.1 NSW Industrial Noise Policy

Noise associated with mechanical plant and equipment is generally assessed in relation to the guidelines set out in the NSW Industrial Noise Policy (EPA, 2000). The Industrial Noise Policy considers an Intrusive and Amenity criteria.

The Intrusive criterion sets an upper limit on the short-term intrusive nature of a noise and is assessed in relation to the existing ambient background level, where the $L_{Aeq\ 15\ minute}$ must not exceed the background level by more than 5dB.

The Amenity criterion limits the cumulative impact of multiple noise sources to pre-established planning levels for specific land use classifications. The Amenity criterion considers the total noise exposure $L_{Aeq\ Period}$ over each assessment period (day/evening/night).

In areas where the prevailing background level is low, the Intrusive criterion generally establishes the upper noise limit for a particular assessment site.

KA have established EPA INP planning levels/criteria at the nearest affected residential property (75 Eveleigh Street) and for potentially affected residential occupancies within the subject development.

Table 12. Summary of INP criteria

Location	Period	RBL, dB(A)	Intrusive Criterion	Measured Leq, dB(A)	Meets the high traffic noise condition	Recommended amenity noise levels (urban)	Amenity Criterion
Eveleigh St	Day	47	52	55	No	60	60
	Evening	46	51	53	No	50	50
	Night	41	46	51	No	45	45
Units fronting rail corridor	Day	54	59	68	No	60	60
	Evening	52	57	64	Yes	50	54
	Night	46	51	61	Yes	45	51

A standard amenity noise level criteria of 65dB(A) is applied to all surrounding commercial premises during business hours.

6.2 EQUIPMENT AND ASSOCIATED SOUND LEVELS

Preliminary mechanical services design information has been provided to KA by JHA Engineers for the purpose of providing some in-principle acoustic recommendations at the design stage of the project.

81 Daikin VRV type air conditioning condenser units are provided within four dedicated plant rooms. 8 of the condensers are located in the Level 02 Plant Room, 14 of the condensers are located in the Level 07 Plant Room, 45 of the condensers are located in the Level 17 Plant Room, and 14 of the condensers are located in the Plant Room located on the 'Plant' level.

In addition to the air conditioning specification, one Loading Dock exhaust fan is shown in the Level 02 Plant Room, and one Laundry exhaust fan is shown on the upper roof of the building.

Two Lobby Relief and three Stair Pressurisation fans are also shown, however, these fans will only operate in 'Fire Mode' in the case of a fire emergency or for periodic testing.

The mark-up plans and indicative design systems do not cover the full scope of the development and are subject to change at the detailed design stage.

A summary of the equipment sound levels is given in Table 13.

Table 13. Summary of mechanical plant noise levels

Equipment selection	Make/Model	Descriptor	Noise level, [dBA]	Location
Loading Dock exhaust fan	Fantech	Lw (in –duct)	94	Level 02 Plant Room
Laundry exhaust fan	Fantech	Lw (in –duct)	96	Roof
Residential air conditioning	Daikin VRV IV	Lw	78	Multiple Plant Rooms
Stair pressurisation fan	Fantech	Lw (in –duct)	96	Level 08, 17, Roof
Lobby relief fan	Fantech	Lw (in –duct)	96	Level 08, Roof

6.3 CALCULATIONS

6.3.1 VRV Condenser units

Preliminary calculations have been conducted to determine the expected average internal noise levels within each Plant Room. These calculations consider in general that all wall, floor, and ceiling surfaces are concrete and that a section of the walls will be fitted with ventilation louvres.

A summary of these calculations follows in Table 14.

Table 14. Preliminary calculations of mechanical plant noise in Plant Rooms

Location	Equipment	General wall, floor, ceiling surfaces	Approx. surface area of ventilation louvres	Estimated indoor VRV condenser noise level
Level 02 Plant Room	8 VRV condensers	Concrete	10	82
Level 07 Plant Room	14 VRV condensers	Concrete	20	82
Level 17 Plant Room	45 VRV condensers	Concrete	40	85
Roof Plant Room	14 VRV condensers	Concrete	20	82

The estimated indoor VRV condenser noise level within each Plant Room are such that we would expect that during night-time hours, and with all condensers operating simultaneously, noise levels could potentially exceed the INP planning levels.

Acoustic treatment options that may be considered for this site include one or more of the following:

- Installing absorption within each Plant Room to control the reverberant component of noise.
- Applying the night-quiet function to each condenser unit. The night-quiet function is designed to lower the operating sound level of the condensers during specific times of the night period.
- Considering acoustic-type louvres to replace standard ventilation/weather louvres.

It is the professional opinion of KA that one or more of the above noise treatment options would sufficiently lower noise emission from the condenser units to a level that complies with the INP. The specific requirements should be determined by a detailed mechanical plant noise impact assessment at the detailed design stage.

6.3.2 Exhaust fans

Noise emission levels from the exhaust fans cannot be calculated to any respectable degree of accuracy based on current available information. Without knowing specific installation details we are unable to determine respective propagation losses within the ventilation system and components, and thus cannot determine a resulting receiver noise level.

However, there is generally significant scope to applying noise control measures throughout a ducted ventilation system through the use of passive noise attenuators such as internal duct lining, plenum chambers, and acoustic silencers.

It is the professional opinion of KA that one or more of the above noise treatment options could be reasonably applied in the ventilation system to treat any identified acoustic compliance issues, however, this should be determined by a detailed mechanical plant noise impact assessment at the detailed design stage.

7.0 SOUND INSULATION REQUIREMENTS OF COMMON PARTITIONS

7.1 SOUND INSULATION CRITERIA

7.1.1 Building Code of Australia 2016

In unit-type development where two or more sole-occupancy units share a common wall or floor partition, there is the potential for noise to transmit through the partition from one space to another. Noise can transmit either directly through the partition, referred to as airborne noise, or via vibration that propagates through a solid structure and re-radiates as noise within an adjoining space, referred to as impact noise.

The *Building Code of Australia* (BCA) is included in Volumes 1 and 2 of the *National Construction Code 2016* (NCC 2016). Part F5 of the BCA provides the minimum design requirements for sound insulation in Class 2, 3, and 9A buildings.

A wall or floor partition is considered to satisfy the BCA Performance Requirements where it is shown to either:

- Have a laboratory tested acoustic rating that meets or exceeds the *Deemed-to-Satisfy* provisions of F5.4 to F5.7;
- Complies with Specification F5.2, or
- Is tested on-site to achieve the minimum acoustic performance as defined within *Verification Methods* FV5.1 and FV5.2.

The performance requirements applying to this specific development are summarised below:

Table 15. BCA acoustic design requirements

Partition	Detail	Airborne sound	Impact sound
Floor	Separating SOU's, or a SOU from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or part of a different classification	Rw + Ctr ≥ 50	Ln,w ≤ 62
Wall *See notes 1 and 2*	Separating SOU's	Rw + Ctr ≥ 50	Not applicable
	Separating a habitable room (other than a kitchen) in one SOU from a bathroom, sanitary compartment, laundry, kitchen in another SOU	Rw + Ctr ≥ 50	Discontinuous construction
	Separating a SOU from a plant room or lift shaft	Rw ≥ 50	Discontinuous construction
	Separating a SOU from a stairway, public corridor, public lobby or the like, or part of a different classification	Rw ≥ 50	Not applicable
Door	Located in a wall separating a SOU from a stairway, public corridor, public lobby or the like	Rw ≥ 30	Not applicable
Services	Duct, soil, waste or water supply pipes located in a wall or floor cavity and serves or passes through more than one SOU (including a storm water pipe)	Rw + Ctr ≥ 40 (habitable) Rw + Ctr ≥ 25 (other)	Not applicable
Pumps	A flexible coupling must be used at the point of connection between the service's pipes in a building and any circulating or another pump.		
Notes 1.	Where a wall is to achieve a sound insulation rating and has a floor above, the wall must continue to either the underside of the floor or to the ceiling which has a comparable sound insulation rating to the wall.		
2.	Where a wall is to achieve a sound insulation rating and has a roof above, the wall must continue to either the underside of the roof or to the ceiling which has a comparable sound insulation rating to the wall.		

7.1.2 City of Sydney DCP 2012

Further to the mandatory sound insulation requirements specified in the BCA, Section 4.2.3.11 of the CoS Council DCP 2012 recommends that all floors are to achieve an $L_{nT,w}$ of less than or equal to 55 where that floor separates a habitable room in one sole occupancy unit from:

- A habitable room, bathroom, toilet, laundry, or kitchen in another sole occupancy unit, or
- From common areas such as a plant room, stairway, public corridor, hallway and the like.

The City's sound insulation guideline for floors is more stringent than the BCA requirements, therefore, where the City's acoustic guideline is complied with, it is implied that the floor also complies with the BCA.

7.2 PARTITION SYSTEM GUIDE

7.2.1 Walls

A standard wall type detail provided by Turner Architects shows that the proposed partition walls will be constructed as follows:

- 13mm plasterboard;
- 28mm furring channel with cavity insulation;
- 75mm Hebel Powerpanel;
- 35mm air gap. Air gap may increase to match column widths;
- 64mm steel stud framing with cavity insulation, and
- 13mm plasterboard.

The Hebel Design and Installation Guide recommends that 50mm Bradford Acoustigard 11 of 50mm Martini Prime insulation is installed between the 28mm furring channels and that 75mm Bradford Acousticgard 11 or 75mm Martini prime insulation is installed between the studs. This recommendation is based off an acoustical opinion, therefore, the acceptability of the wall performance post-construction would need to be certified by an acoustical expert or its acoustical performance would need to be verified by on-site compliance testing.

However, laboratory test results are available for the above Hebel wall system with the following insulation specifications:

1. 50mm thick S4 polyester insulation is positioned within the furring channel cavity, and
2. 102mm thick R2 glasswool insulation is positioned between the studs.

Should the above insulation be installed within the partition walls, then the wall would be deemed-to-comply with the BCA requirements by way of having laboratory test results confirm compliance. In this situation, post-construction compliance testing would not be necessary.

All partition walls must be installed in accordance with the relevant manufacturer specifications outlined in the Design and Installation Guide, and any other pertinent installation guidelines issued by the manufacturer.

7.2.2 Floors

The following recommendations are provided so that the BCA and CoS Council's acoustic rating requirements for floors can be achieved.

Table 16. Floor system recommendations

	System 1	System 2
Floor covering	Selected tiles	Selected tiles
Additional layers	n/a	n/a
Underlay	Regupol 4515 (3mm), OR A1 Rubber Acoustamat 3mm, OR Damtec Standard 2-4mm, OR other approved products.	Regupol 4515 (3mm), OR A1 Rubber Acoustamat 3mm, OR Damtec Standard 2-4mm, OR other approved products.
Floor slab	200mm concrete	200mm concrete
Ceiling cavity (Note 5)	100mm	300mm
Cavity insulation	n/a	n/a
Ceiling material	10mm Superchek or 13mm Soundchek	13mm plasterboard
	System 3	**System 4**
Floor covering	Laminate flooring	Carpet
Additional layers	n/a	n/a
Underlay	Regupol 4515 (3mm), OR A1 Rubber Acoustamat 3mm, OR Damtec Standard 2-4mm, OR other approved products.	Carpet underlay
Floor slab	200mm concrete	200mm concrete
Ceiling cavity (Note 1)	100mm	100mm
Cavity insulation	n/a	n/a
Ceiling material	10mm Superchek or 13mm Soundchek	13mm plasterboard

Notes
1. Suspended ceiling to be light steel grid type system such as Rondo Key-lock or similar.

The above floor systems have been assessed to comply with the BCA and Cos Council airborne and impact sound insulation requirements. The 'for construction' floor systems should be re-assessed at the detailed design stage where they differ from the systems identified above.

The impact isolation requirements and floor system recommendations are applicable to external balconies that are situated above internal areas of another SOU below.

Hard floor coverings such as tiles should not make contact with any walls or joinery such as kitchen benches, cupboards etc. During installation of hard floor coverings, temporary spacers of 5-10mm should be used to isolate the floor covering from walls and/or joinery with the resulting gaps filled with a suitable mastic type sealant or off-cut of rubber underlay material.

Alternative floor/ceiling systems could be considered provided that the acoustic performance is tested or assessed by a consulting acoustical engineer to be compliant with the sound insulation performance requirements of the BCA.

It is common for comparable floor/ceiling system designs to achieve different acoustic insulation and isolation ratings between buildings. This can be due to the quality of construction work, attention to detail in sealing any penetrations, and the emergence of flanking sound transmission paths within a building between the sub base, and wall junctions. For this reason, one cannot categorically state that any partition will achieve a specific acoustic rating without conducting in-situ testing. Therefore, it is our recommendation that in-situ testing is conducted on a representative, fully installed floor/ceiling (for all floor coverings – tiles, carpet) to ensure adequate acoustic insulation and isolation is achieved, prior to installing all floors throughout the building.

7.2.3 Timber entry doors

Where an entry door is incorporated into a wall the separates a tenancy from a common area such as the Lobby/Foyer, that door must achieve an acoustic rating of no less than R_w 30. A suitable door system to achieve this would be 40mm solid core timber door with Raven type RP10/RP10si door frame/perimeter seals and RP8si door bottom seals.

Alternate systems could be considered pending approval from a consulting acoustical engineer.

7.2.4 Soil, waste, water supply pipes

Where a duct, soil, waste or water supply pipe is located within a wall or ceiling cavity and serves or passes through one or more SOU's, the following separation details may be used to comply with the required acoustic rating:

Table 17. Proposed cavity wall/floor services partition systems

Option	Rating achieved	Documented source	System detail
1	Rw + Ctr 25	CSR Red Book, KA opinion	2 layers of 10mm plasterboard
2	Rw + Ctr 25	CSR Red Book	75mm glass wool in cavity, 10mm Aquachek
3	Rw + Ctr 25	CSR Red Book	75mm glass wool in cavity, 10mm Superchek
4	Rw + Ctr 40	CSR Red Book	75mm glasswool in cavity, Acoustilag 45, 10mm Superchek
5	Rw + Ctr 40	Pyrotech Soundlag 4525C brochure	R1.5 cavity insulation, Soundlag 4525C, 10mm plasterboard

Notes:

1. The acoustic lagging material may be excluded by using Rehau Raupiano Plus pipe system.
2. All installations are to be in accordance with relevant manufacturers' specifications and requirements.
3. Incorporating downlights into ceilings will impact on the acoustic rating of the partition system. Consultation should be made with an acoustic consultant in the event of downlights being proposed in the ceiling. The CSR Red Book provides some guidance on downlights being installed in a services partition system.

The BCA further qualifies the acoustic requirements of services partitions with the following:

- Services must not be chased into concrete or masonry elements,
- An access door or panel must be firmly fixed so as to overlap the frame or rebate the frame by not less than 10mm and be fitted with proper sealing gasket along all edges and constructed of:
  - Wood, particle board or block board not less than 38mm thick; or
  - Compressed fibre reinforced cement sheeting not less than 9mm thick; or
  - Other suitable material with a mass per unit area not less than 24kg/m^2.
- A water supply pipe must only be installed in the cavity of discontinuous construction, and in the case of a pipe that serves only one SOU, must not be fixed to the wall leaf on the side adjoining any other SOU and have a clearance not less than 10mm to the other wall leaf.

7.2.5 Sound isolation of pumps

A flexible coupling must be used at the point of connection between the service's pipes in a building and any circulation or another pump.

8.0 CONCLUSION

KA was commissioned to prepare an acoustic report that assesses the proposed development application for new student accommodation within Precinct 3 of the Pemulwuy site in Eveleigh Street, Redfern. The acoustic report contains in-principle design advice with regard to:

- Road and rail traffic noise impacts on future occupants of the subject development;
- Construction noise and vibration impacts on surrounding residents and rail infrastructure;
- Mechanical plant noise emission from the development and its anticipated effect on surrounding land uses, and
- Achieving acceptable sound insulation performance for common partition elements within the proposed development such that adequate acoustic amenity is achieved within the building.

In preparing this report and coming to the subsequent conclusions and recommendations, KA has referenced the Secretary's Environmental Assessment Requirements (SEAR), and in doing so has followed relevant assessment guidelines, protocols, and acoustic design objectives outlined in planning documents, such as:

- State Environmental Planning Policy (Infrastructure) 2007;
- Developments near rail corridors and busy roads, Interim guidelines (NSW DoPI, 2008);
- City of Sydney Council DCP 2012;
- NSW Industrial Noise Policy (EPA, 2000);
- Building Code of Australia 2016.

Establishing the existing noise and vibration levels present on-site was a critical component of the assessment, and formed the basis for defining applicable planning noise levels for construction noise impacts and mechanical noise emission, and preparing a calibrated noise model of the site to predicted traffic noise levels at the future building facades.

Three noise loggers were installed to survey the existing environmental noise conditions in the local area. The loggers were installed in specific locations deemed to be suitable for the purpose of each survey, be that for establishing existing background noise levels, or to measure existing traffic noise levels. A summary of measured ambient noise levels is included within Table 2 of this report and detailed logger graphs are attached in Appendix A.

A computer model was created to predict noise levels at the future building facades that result from nearby traffic corridors. The predicted façade noise levels were used in noise intrusion calculations that could certify the proposed building design in terms of its sound insulation performance and providing noise level amenity to indoor areas of the development.

Acoustic prediction software was also used to assess the sound insulation performance of the proposed floor/ceiling assemblies, and to provide recommendations on suitable acoustic underlay treatments to prevent the transmission of impact generated noise.

General acoustic calculation algorithms were used to predict mechanical plant noise emission and construction equipment noise levels.

A summary of the conclusions and recommendations reached in this report are as follows:

- Road and rail traffic noise levels can be satisfactorily reduced such that indoor noise levels are acceptable in accordance with ISEPP requirements and CoS Council guidelines, provided that suitable thickness and types of glass windows are installed. The windows should be well sealed into the frames with Q-lon or other approved acoustic seals.
- A number of units, predominantly those exposed to the rail corridor, will be required to keep windows closed in order to meet the indoor design noise levels. Suitable ventilation must be provided such that windows may be kept closed.
- Rail vibration levels have been measured and found to comply with human comfort levels.
- Noise levels from construction equipment will at times exceed Councils and the ICNG criteria. A combination of construction hoardings, moveable noise screens, appropriately sized plant and equipment, and community consultation should be employed to minimise the impact of construction noise on local residents.
- Construction vibration has been considered by recommending general safe work distances for typical construction plant and equipment. A further recommendation for restrictions on rock breaking is also included within this report, suggesting that alternatives to rock

breaking should be considered in the vicinity of the northern and eastern boundaries of the development site.

- Continuous construction vibration monitoring is recommended along the northern residential boundary and the eastern boundary shared with the rail corridor. Vibration monitoring is recommended to ensure that any generated vibration is not of a level deemed to potentially result in damage to surrounding structures or infrastructure.
- Mechanical plant noise emission from the plant rooms have the potential to exceed INP planning levels at affected units within the subject development. A further detailed assessment should be conducted at the detailed design stage. Where noise treatment is found to be required, suitable options may include installing absorption within the plant rooms, installing acoustic louvres in-lieu of standard weather louvres for ventilating the plant rooms, and/or ensuring the night-quiet operation function of the condensers is set for night-time hours.
- The proposed wall and floor/ceiling partitions are expected to comply with the BCA requirements and CoS Council guidelines. Further design advice is also provided for other components of the building such as unit entry doors, services pipes that are located with ceiling or wall cavities, and for insulating pumps etc.

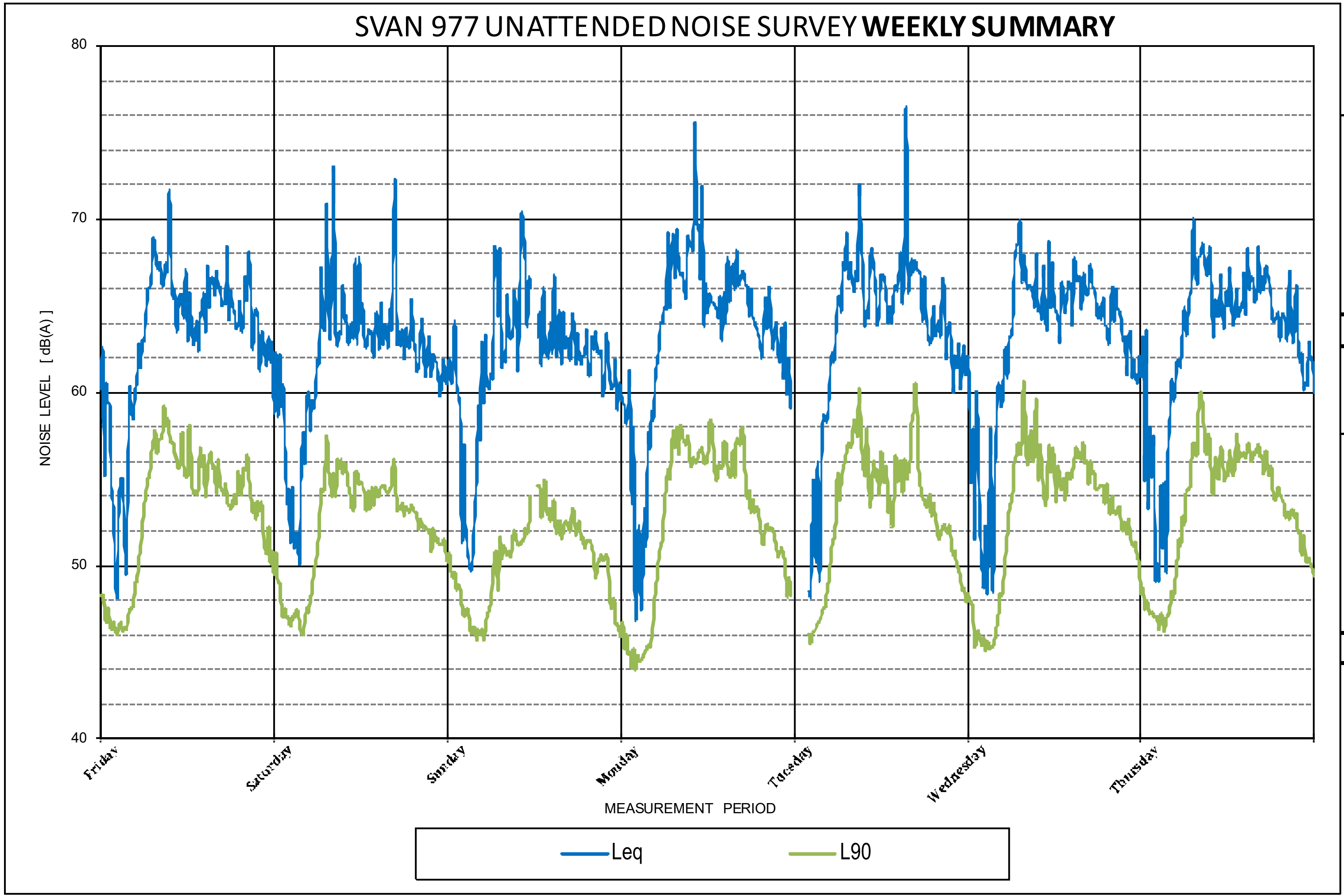
This report concludes that the proposed design of the Precinct 3 student accommodation will accord with the SEAR provided that the respective acoustic control measures as recommended in this report are implemented. Where additional detailed assessment is recommended at the detailed design stage, these report/s should be provided prior to construction.

APPENDIX A

APPENDIX A

APPENDIX A

WEEKLY SUMMARY **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **PERIOD:** 12th to the 18th May 2017



Sundays and Public Holidays the hours change to 0800

SUMMARY OF AMBIENT LEVELS

	L90 Daytime	*L90* Evening	*L90* Nighttime
Day 1	54	53	46
Day 2	53	52	47
Day 3	51	50	46
Day 4	55	51	45
Day 5	54	52	46
Day 6	54	52	45
Day 7	55	53	47
RBL	**54**	**52**	**46**

	Leq Daytime	*Leq* Evening	*Leq* Nighttime
Day 1	66	65	61
Day 2	66	63	60
Day 3	65	62	62
Day 4	68	64	61
Day 5	68	64	61
Day 6	66	64	61
Day 7	66	64	61
Average	**66**	**64**	**61**

SUMMARY OF TRAFFIC LEVELS

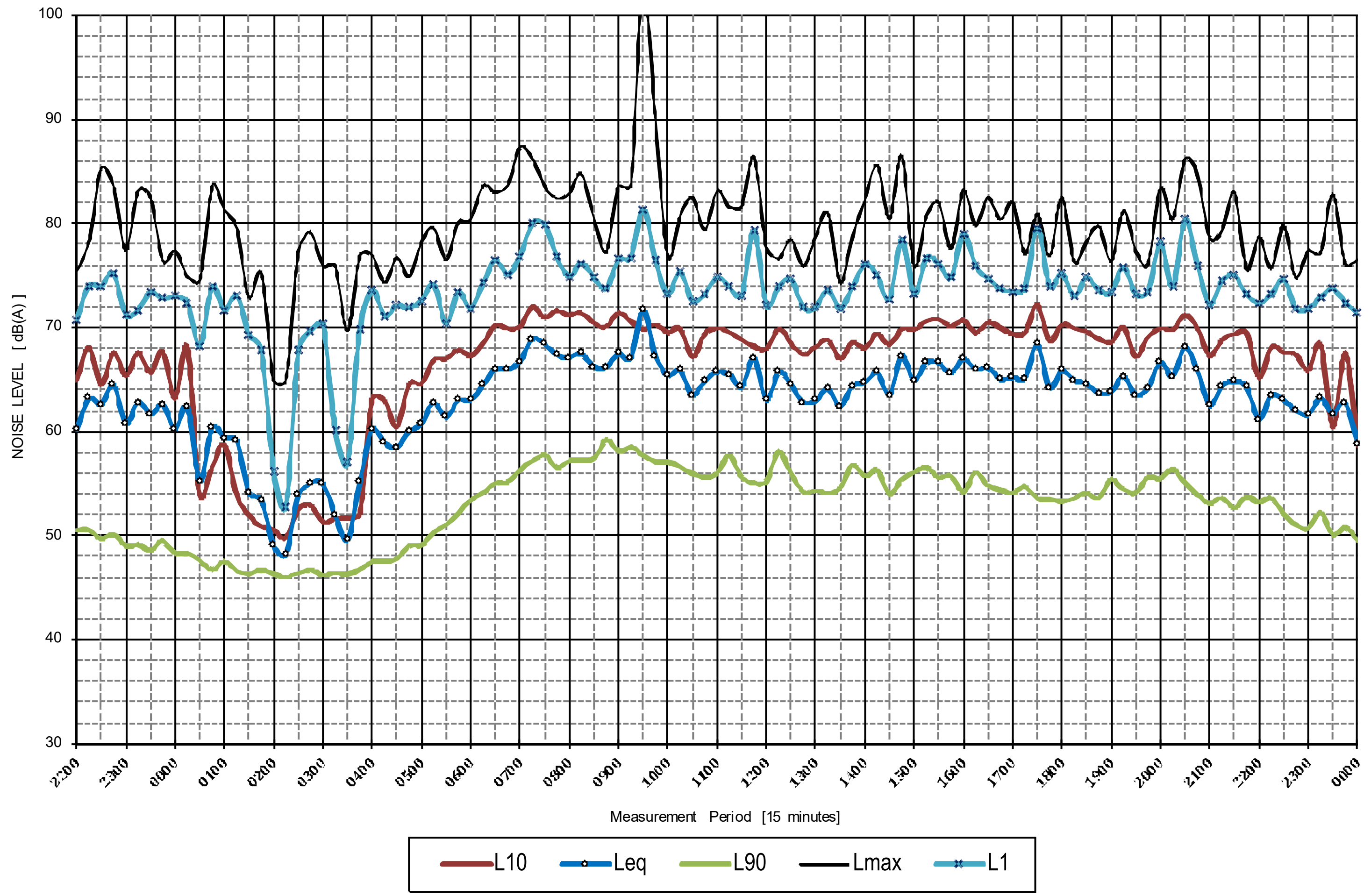
Leq 15 hrs	0700-2200	66	dB(A)
Leq 9 hrs	2200-0700	61	dB(A)
max Leq 1 hr	0700-2200	68	dB(A)
max Leq 1 hr	2200-0700	63	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual 7 day average - [Lmax - Leq ≥ 15] 27

WEEKKLY SUMMARY	**Period**		**Frequency [Hz]**									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	21.2	32.8	40.2	45.3	47.5	49.5	47.2	40.8	29.6	54.1
10% min L90 Evening	6:00 PM	10:00 PM	19.0	30.0	37.6	43.4	45.0	47.7	44.2	36.6	26.7	51.8
10% min L90 Night	10:00 PM	7:00 AM	11.3	23.4	31.4	39.6	40.4	40.9	36.4	28.6	21.7	45.9
10% min L90 Period	7:00 AM	10:00 PM	19.7	30.9	38.7	43.9	45.6	48.0	44.5	38.0	27.4	52.3
10% min L90 Period	10:00 PM	7:00 AM	11.3	23.5	31.4	39.3	40.4	40.9	36.4	28.9	21.5	45.9
Leq 15 hours	7:00 AM	10:00 PM	29.8	42.0	50.8	57.9	59.3	60.3	58.4	56.4	52.5	66.0
Leq 9 hours	10:00 PM	7:00 AM	25.7	37.0	46.2	53.6	54.3	55.1	53.2	52.4	46.6	61.1
Max Leq 1 hour Day	7:00 AM	10:00 PM	30.6	43.3	51.7	59.1	61.2	62.3	60.4	58.0	52.7	67.8
Max Leq 1 hour Night	10:00 PM	7:00 AM	28.0	39.2	48.6	55.7	56.2	56.9	55.1	53.6	47.8	63.0

KOIKAS ACOUSTICS PTY LTD

DAY 1 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **DATE:** Friday, 12 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	54	dB(A)
L90 Evening	1800-2200	53	dB(A)
L90 Nighttime	2200-0700	46	dB(A)
Leq Daytime	0700-1800	66	dB(A)
Leq Evening	1800-2200	65	dB(A)
Leq Nighttime	2200-0700	61	dB(A)

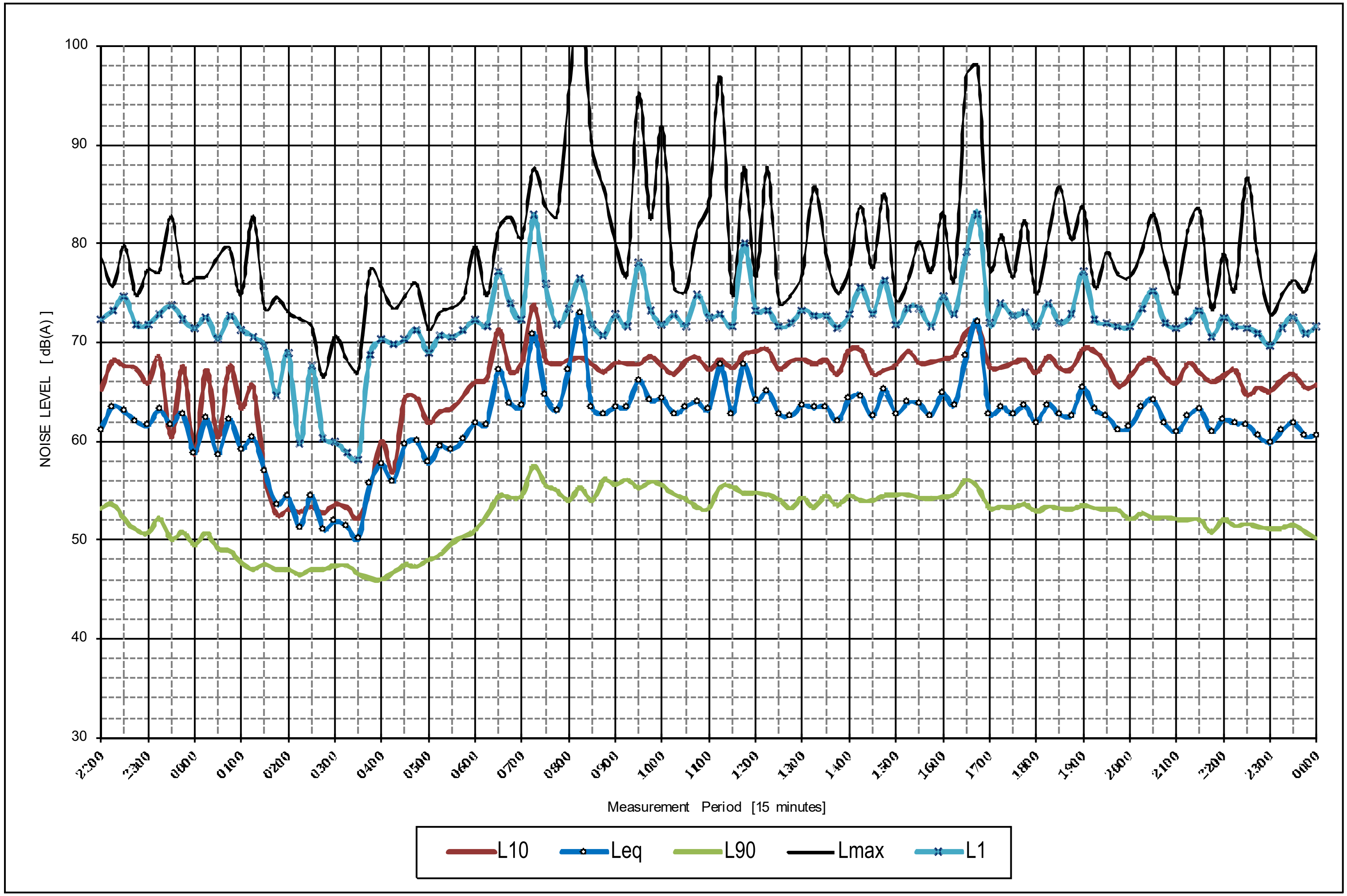
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	66	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	68	dB(A)
max Leq 1 hour	2200-0700	63	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			33

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	22	33	40	45	47	49	47	42	30	54
10% min L90 Evening	6:00 PM	10:00 PM	20	31	38	44	46	49	46	41	31	53
10% min L90 Night	10:00 PM	7:00 AM	11	24	32	40	41	41	36	28	21	46
10% min L90 Period	7:00 AM	10:00 PM	21	32	39	45	46	49	47	41	31	54
10% min L90 Period	10:00 PM	7:00 AM	11	24	32	40	41	41	36	28	21	46
Leq 15 hours	7:00 AM	10:00 PM	30	43	51	58	59	60	58	57	51	66
Leq 9 hours	10:00 PM	7:00 AM	25	37	46	54	54	55	53	52	46	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	31	45	52	59	62	62	60	59	52	68
Max Leq 1 hour Night	10:00 PM	7:00 AM	27	39	48	56	56	57	55	53	48	63

KOIKAS ACOUSTICS PTY LTD

DAY 2 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **DATE:** Saturday, 13 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	53	dB(A)
L90 Evening	1800-2200	52	dB(A)
L90 Nighttime	2200-0700	47	dB(A)
Leq Daytime	0700-1800	66	dB(A)
Leq Evening	1800-2200	63	dB(A)
Leq Nighttime	2200-0700	60	dB(A)

TRAFFIC & MISC. NOISE METRICS

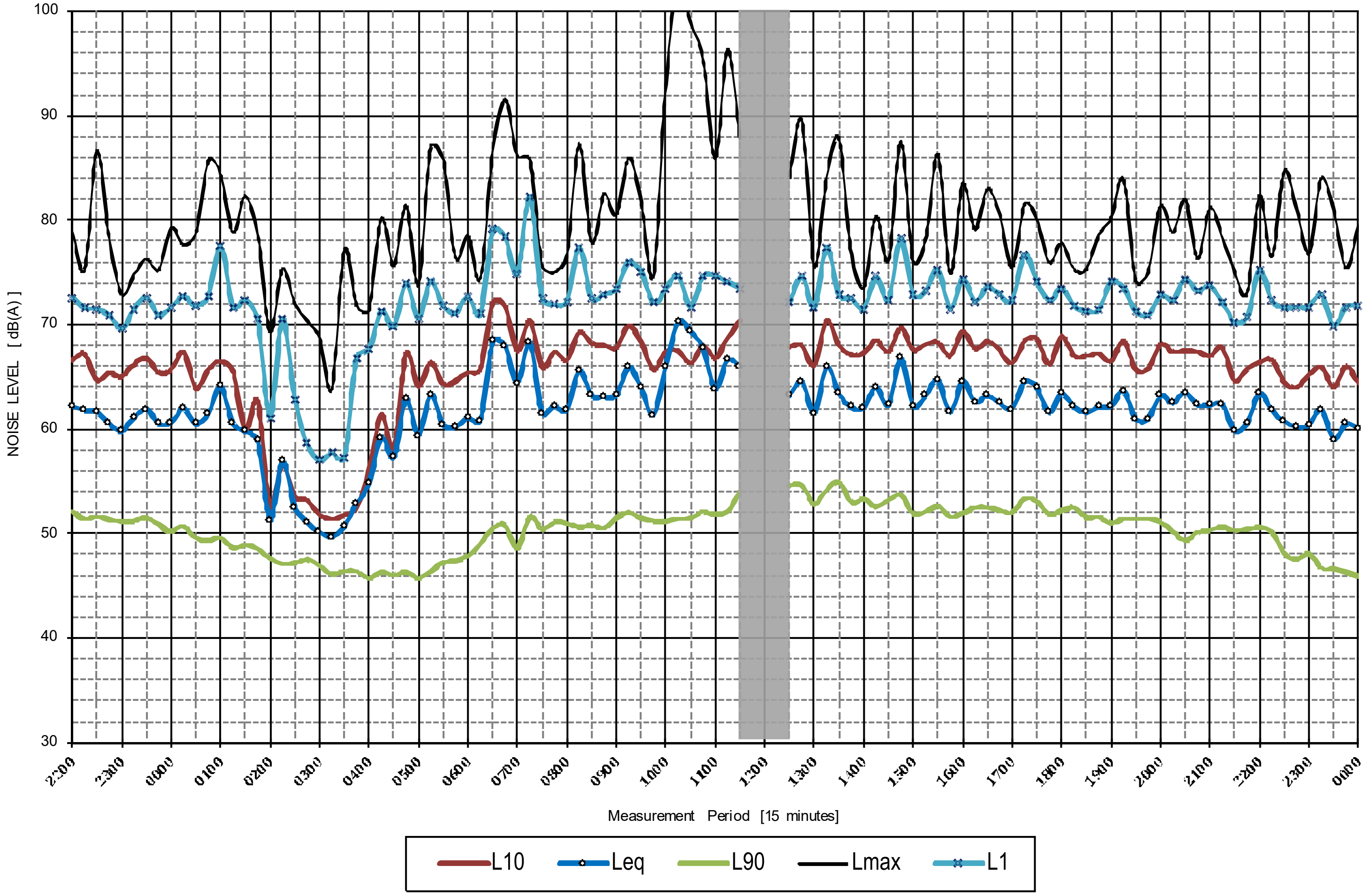
Leq 15 hours	0700-2200	65	dB(A)
Leq 9 hours	2200-0700	60	dB(A)
max Leq 1 hour	0700-2200	68	dB(A)
max Leq 1 hour	2200-0700	63	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]	25

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	21	32	39	45	46	49	46	40	30	53
10% min L90 Evening	6:00 PM	10:00 PM	19	30	37	43	45	48	44	41	29	52
10% min L90 Night	10:00 PM	7:00 AM	11	22	31	40	41	42	39	33	22	47
10% min L90 Period	7:00 AM	10:00 PM	20	31	37	44	45	48	45	41	29	52
10% min L90 Period	10:00 PM	7:00 AM	11	22	31	39	40	42	39	33	22	47
Leq 15 hours	7:00 AM	10:00 PM	28	41	50	57	59	59	58	55	49	65
Leq 9 hours	10:00 PM	7:00 AM	25	37	46	53	54	55	53	52	46	60
Max Leq 1 hour Day	7:00 AM	10:00 PM	31	44	52	60	62	62	61	57	51	68
Max Leq 1 hour Night	10:00 PM	7:00 AM	27	39	48	55	56	56	54	52	46	63

KOIKAS ACOUSTICS PTY LTD

DAY 3 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **DATE:** Sunday, 14 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0800-1800	51	dB(A)
L90 Evening	1800-2200	50	dB(A)
L90 Nighttime	2200-0800	46	dB(A)
Leq Daytime	0800-1800	65	dB(A)
Leq Evening	1800-2200	62	dB(A)
Leq Nighttime	2200-0800	62	dB(A)

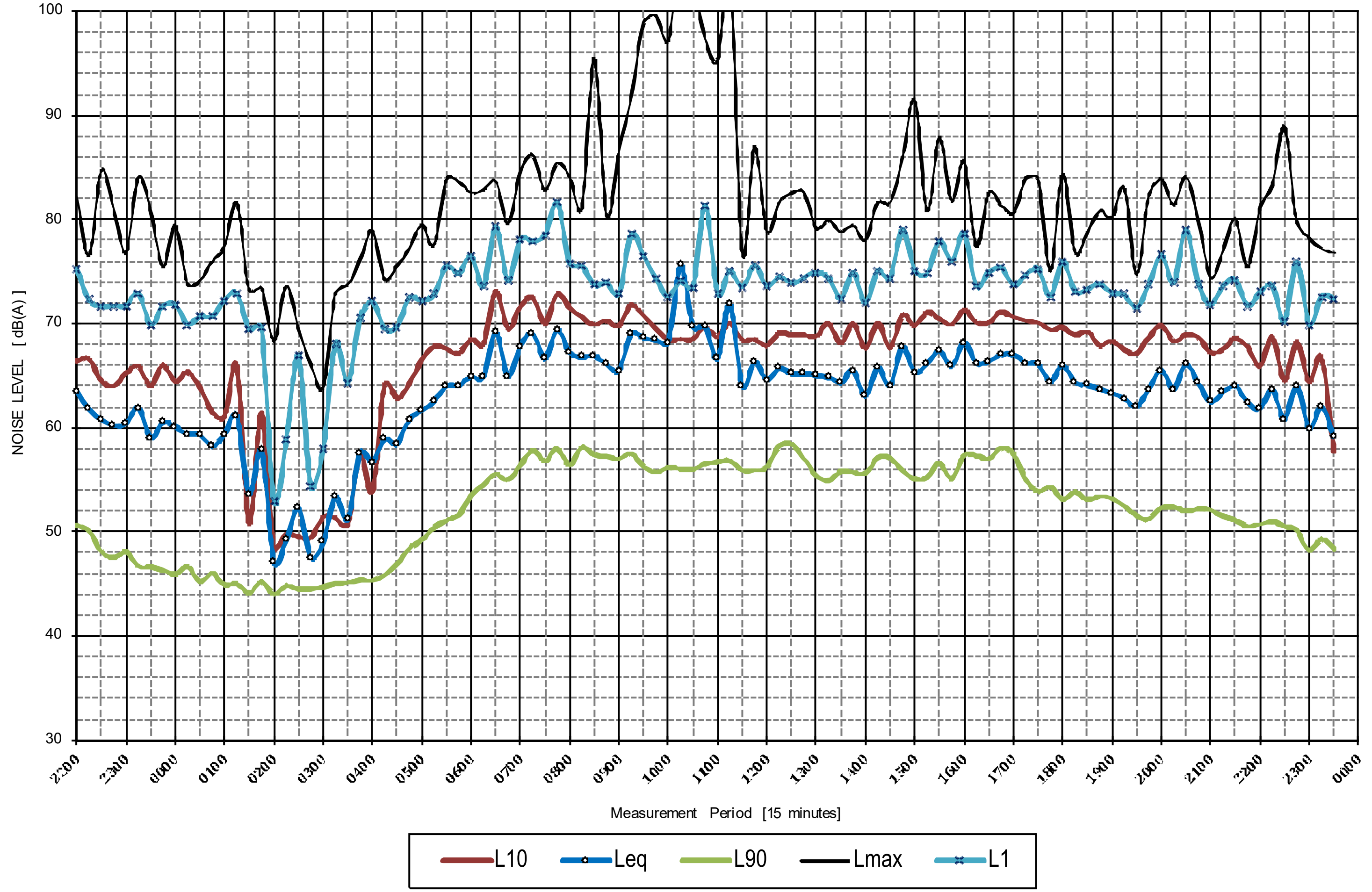
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	64	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	66	dB(A)
max Leq 1 hour	2200-0700	62	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			28

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	8:00 AM	6:00 PM	19	29	36	43	44	47	44	38	26	51
10% min L90 Evening	6:00 PM	10:00 PM	17	28	35	42	43	46	43	35	25	50
10% min L90 Night	10:00 PM	8:00 AM	16	25	31	39	40	42	38	33	22	46
10% min L90 Period	7:00 AM	10:00 PM	19	30	35	42	43	46	43	36	25	50
10% min L90 Period	10:00 PM	7:00 AM	15	24	31	38	40	42	38	34	22	46
Leq 15 hours	7:00 AM	10:00 PM	28	40	49	56	57	59	57	54	47	64
Leq 9 hours	10:00 PM	7:00 AM	26	36	45	53	54	55	53	54	48	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	26	39	47	56	58	62	59	54	47	66
Max Leq 1 hour Night	7:00 AM	10:00 PM	26	37	46	54	55	56	54	52	45	62

KOIKAS ACOUSTICS PTY LTD

DAY 4 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **DATE:** Monday, 15 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	55	dB(A)
L90 Evening	1800-2200	51	dB(A)
L90 Nighttime	2200-0700	45	dB(A)
Leq Daytime	0700-1800	68	dB(A)
Leq Evening	1800-2200	64	dB(A)
Leq Nighttime	2200-0700	61	dB(A)

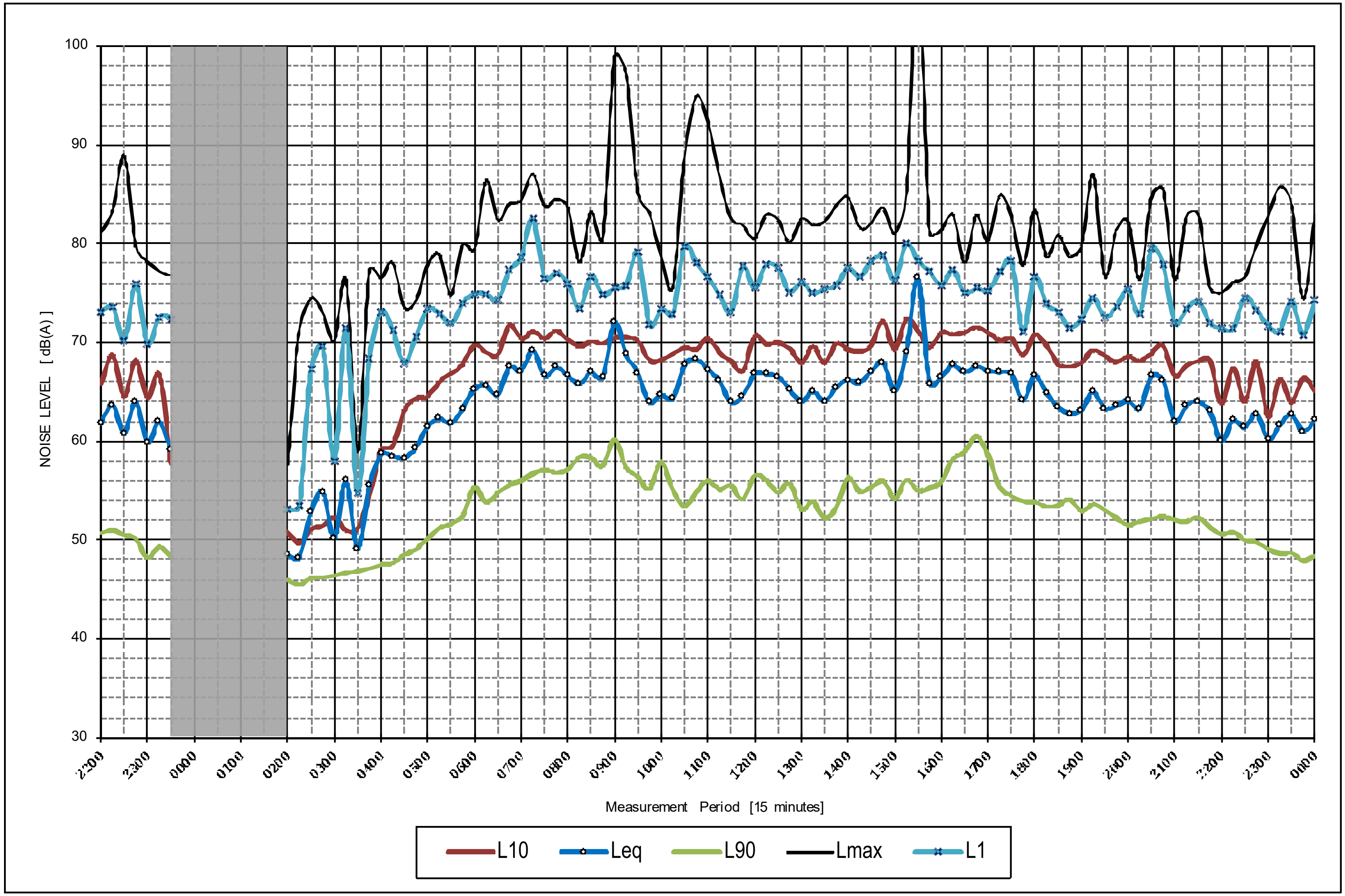
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	67	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	69	dB(A)
max Leq 1 hour	2200-0700	64	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]		29	

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	21	33	40	46	48	51	48	43	34	55
10% min L90 Evening	6:00 PM	10:00 PM	19	31	38	43	45	47	43	35	24	51
10% min L90 Night	10:00 PM	7:00 AM	10	23	31	39	39	39	35	29	22	45
10% min L90 Period	7:00 AM	10:00 PM	20	32	39	44	46	48	44	36	25	52
10% min L90 Period	10:00 PM	7:00 AM	10	23	31	38	39	39	35	29	22	45
Leq 15 hours	7:00 AM	10:00 PM	30	43	51	58	61	62	59	57	53	67
Leq 9 hours	10:00 PM	7:00 AM	25	37	46	54	54	55	53	53	47	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	30	43	51	59	62	64	61	58	52	69
Max Leq 1 hour Night	10:00 PM	7:00 AM	27	40	49	55	56	57	56	55	50	64

KOIKAS ACOUSTICS PTY LTD

DAY 5 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **DATE:** Tuesday, 16 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	54	dB(A)
L90 Evening	1800-2200	52	dB(A)
L90 Nighttime	2200-0700	46	dB(A)
Leq Daytime	0700-1800	68	dB(A)
Leq Evening	1800-2200	64	dB(A)
Leq Nighttime	2200-0700	61	dB(A)

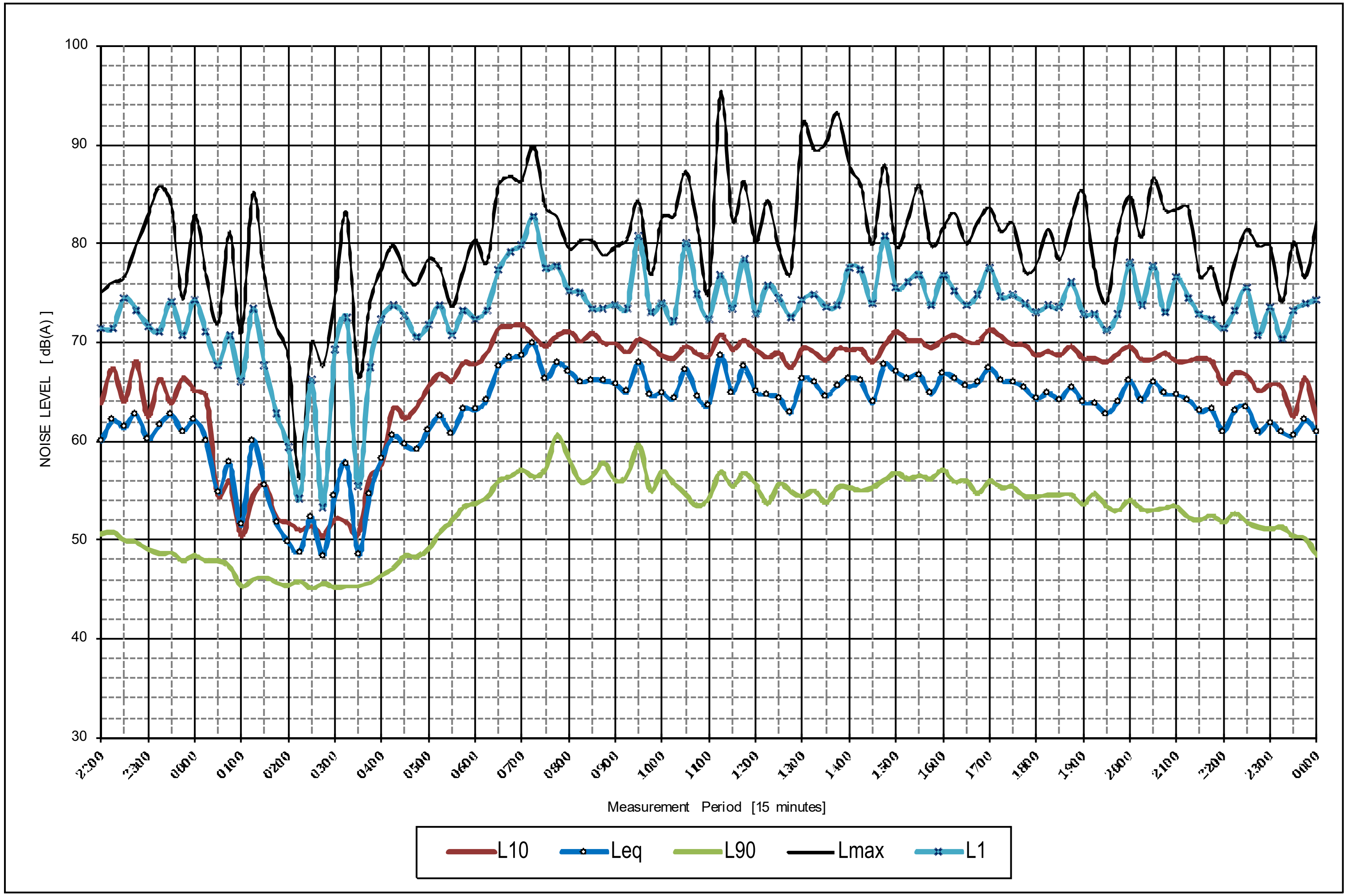
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	67	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	69	dB(A)
max Leq 1 hour	2200-0700	64	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			22

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	21	33	40	45	47	49	47	40	28	54
10% min L90 Evening	6:00 PM	10:00 PM	19	30	38	43	45	48	44	35	25	52
10% min L90 Night	10:00 PM	7:00 AM	11	23	32	40	40	41	36	28	22	46
10% min L90 Period	7:00 AM	10:00 PM	19	30	38	44	46	48	44	36	26	52
10% min L90 Period	10:00 PM	7:00 AM	11	23	32	40	40	41	36	28	22	46
Leq 15 hours	7:00 AM	10:00 PM	30	42	51	58	60	61	59	58	56	67
Leq 9 hours	10:00 PM	7:00 AM	27	38	47	54	55	56	54	52	47	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	31	44	52	59	62	63	62	60	55	69
Max Leq 1 hour Night	10:00 PM	7:00 AM	30	40	50	57	57	57	56	56	49	64

KOIKAS ACOUSTICS PTY LTD

DAY 6 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **DATE:** Wednesday, 17 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	54	dB(A)
L90 Evening	1800-2200	52	dB(A)
L90 Nighttime	2200-0700	45	dB(A)
Leq Daytime	0700-1800	66	dB(A)
Leq Evening	1800-2200	64	dB(A)
Leq Nighttime	2200-0700	61	dB(A)

TRAFFIC & MISC. NOISE METRICS

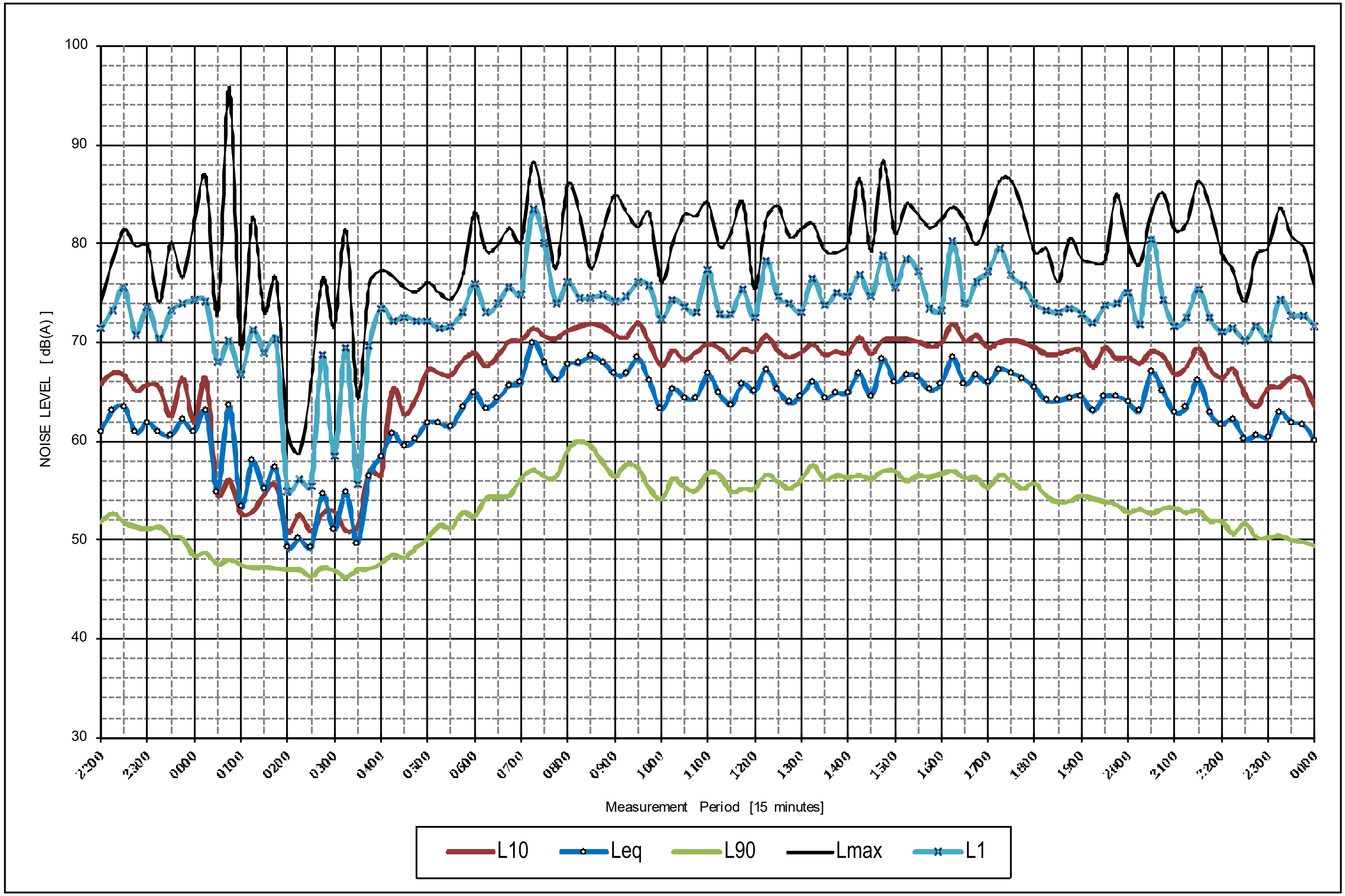
Leq 15 hours	0700-2200	66	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	67	dB(A)
max Leq 1 hour	2200-0700	62	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15] 29

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	22	33	40	46	48	50	47	41	29	54
10% min L90 Evening	6:00 PM	10:00 PM	19	30	37	44	46	48	45	37	27	52
10% min L90 Night	10:00 PM	7:00 AM	11	23	31	38	40	41	36	27	19	45
10% min L90 Period	7:00 AM	10:00 PM	20	31	39	45	47	49	46	38	27	53
10% min L90 Period	10:00 PM	7:00 AM	11	23	31	38	40	41	36	27	19	45
Leq 15 hours	7:00 AM	10:00 PM	31	43	51	58	59	60	58	56	53	66
Leq 9 hours	10:00 PM	7:00 AM	26	37	46	54	54	55	53	53	47	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	31	44	52	59	60	60	59	57	53	67
Max Leq 1 hour Night	10:00 PM	7:00 AM	27	38	48	55	56	56	54	52	47	62

KOIKAS ACOUSTICS PTY LTD

DAY 7 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern - Facing rail corridor **DATE:** Thursday, 18 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	55	dB(A)
L90 Evening	1800-2200	53	dB(A)
L90 Nighttime	2200-0700	47	dB(A)
Leq Daytime	0700-1800	66	dB(A)
Leq Evening	1800-2200	64	dB(A)
Leq Nighttime	2200-0700	61	dB(A)

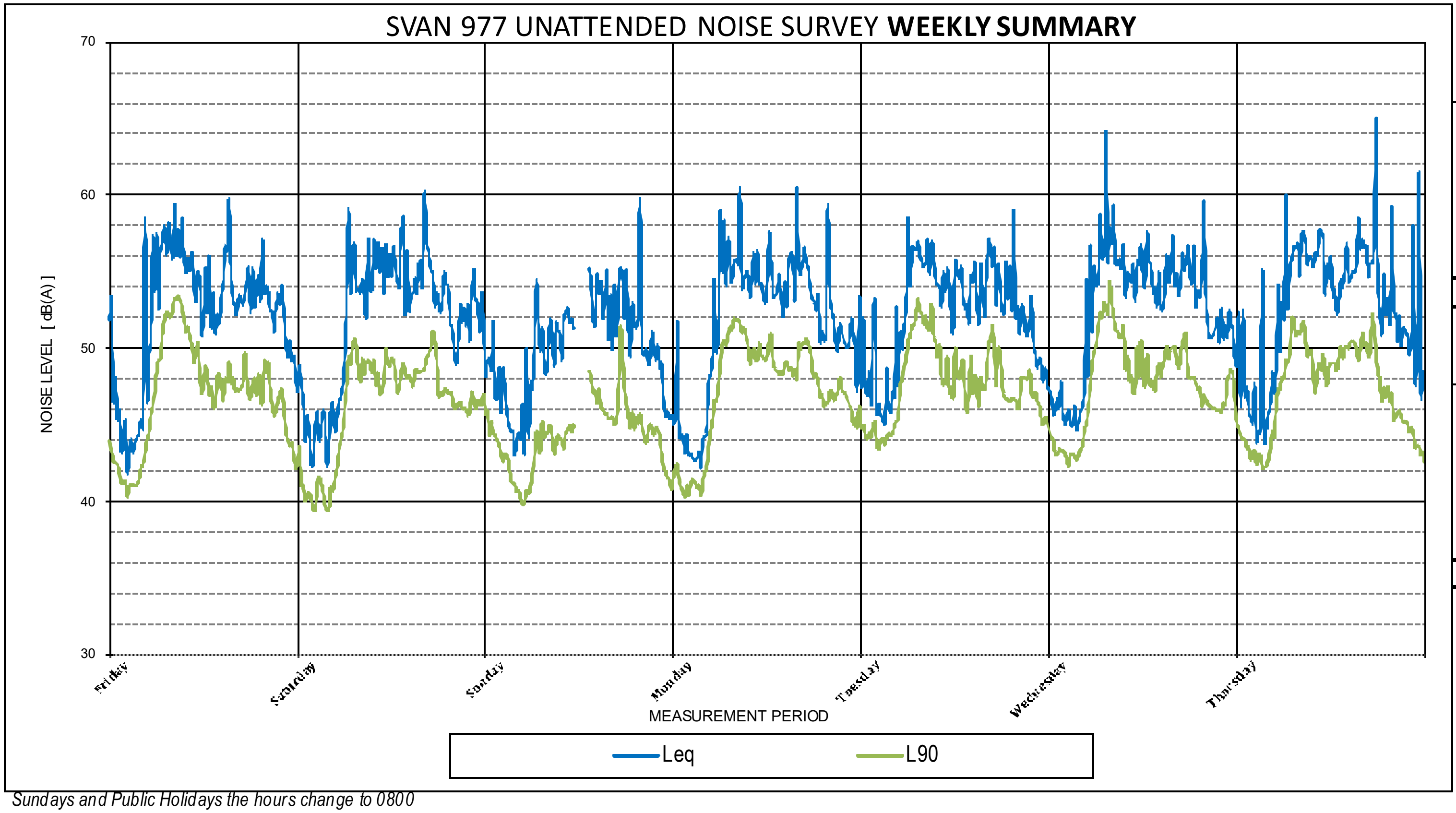
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	66	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	68	dB(A)
max Leq 1 hour	2200-0700	63	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			25

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	22	34	41	46	49	51	48	42	33	55
10% min L90 Evening	6:00 PM	10:00 PM	19	30	38	43	46	49	45	41	30	53
10% min L90 Night	10:00 PM	7:00 AM	11	23	32	40	41	42	38	29	20	47
10% min L90 Period	7:00 AM	10:00 PM	20	31	39	44	46	49	46	42	30	53
10% min L90 Period	10:00 PM	7:00 AM	12	23	32	40	41	42	38	29	20	47
Leq 15 hours	7:00 AM	10:00 PM	30	42	52	58	59	60	59	57	53	66
Leq 9 hours	10:00 PM	7:00 AM	26	37	46	54	54	55	53	50	45	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	31	44	53	59	60	61	60	59	54	68
Max Leq 1 hour Night	10:00 PM	7:00 AM	28	39	49	56	57	57	55	52	47	63

KOIKAS ACOUSTICS PTY LTD

WEEKLY SUMMARY **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **PERIOD:** 12th to the 18th May 2017



Sundays and Public Holidays the hours change to 0800

SUMMARY OF AMBIENT LEVELS

	L90 Daytime	***L90*** Evening	***L90*** Nighttime
Day 1	47	46	41
Day 2	47	46	40
Day 3	44	44	40
Day 4	48	46	41
Day 5	47	46	44
Day 6	48	46	43
Day 7	48	45	42
RBL	**47**	**46**	**41**

	Leq Daytime	***Leq*** Evening	***Leq*** Nighttime
Day 1	55	54	51
Day 2	55	52	49
Day 3	53	53	50
Day 4	55	53	50
Day 5	55	54	52
Day 6	56	54	51
Day 7	57	53	51
Average	**55**	**53**	**51**

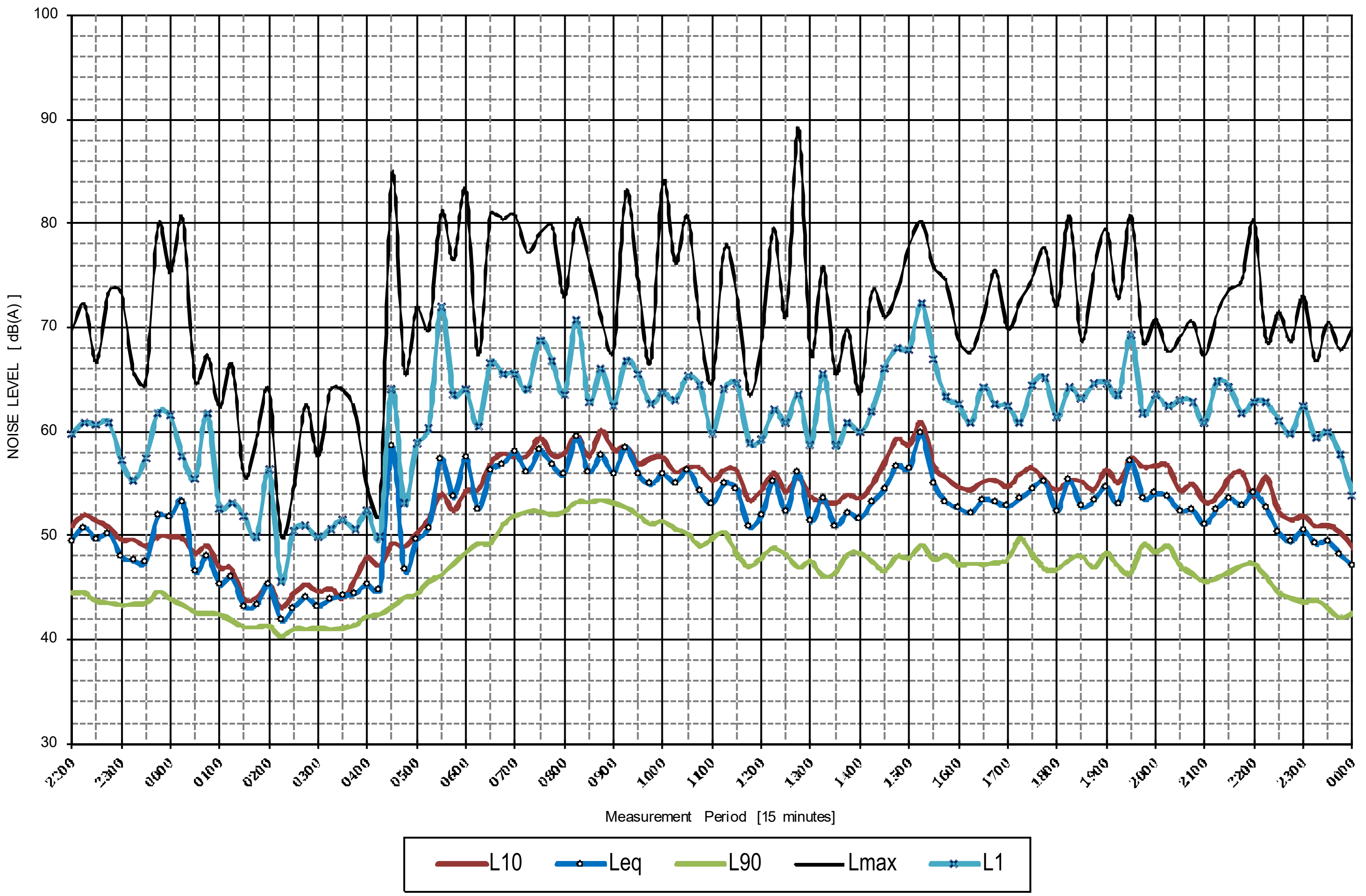
SUMMARY OF TRAFFIC LEVELS

Leq 15 hrs	0700-2200	55	dB(A)
Leq 9 hrs	2200-0700	51	dB(A)
max Leq 1 hr	0700-2200	57	dB(A)
max Leq 1 hr	2200-0700	54	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual 7 day average - [Lmax - Leq ≥ 15]	26

WEEKKLY SUMMARY	**Period**		**Frequency [Hz]**									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	19	31	34	38	41	43	40	31	20	47
10% min L90 Evening	6:00 PM	10:00 PM	17	28	31	37	40	42	38	26	17	46
10% min L90 Night	10:00 PM	7:00 AM	8	22	27	33	36	37	32	21	15	41
10% min L90 Period	7:00 AM	10:00 PM	18	29	32	37	40	42	38	27	18	46
10% min L90 Period	10:00 PM	7:00 AM	8	22	27	33	36	37	32	20	15	41
Leq 15 hours	7:00 AM	10:00 PM	28	39	43	45	48	50	49	44	36	55
Leq 9 hours	10:00 PM	7:00 AM	23	35	37	41	43	46	44	41	35	51
Max Leq 1 hour Day	7:00 AM	10:00 PM	29	41	44	47	50	51	50	45	37	57
Max Leq 1 hour Night	10:00 PM	7:00 AM	26	38	41	44	46	48	47	46	37	54

DAY 1 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **DATE:** Friday, 12 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	47	dB(A)
L90 Evening	1800-2200	46	dB(A)
L90 Nighttime	2200-0700	41	dB(A)
Leq Daytime	0700-1800	55	dB(A)
Leq Evening	1800-2200	54	dB(A)
Leq Nighttime	2200-0700	51	dB(A)

TRAFFIC & MISC. NOISE METRICS

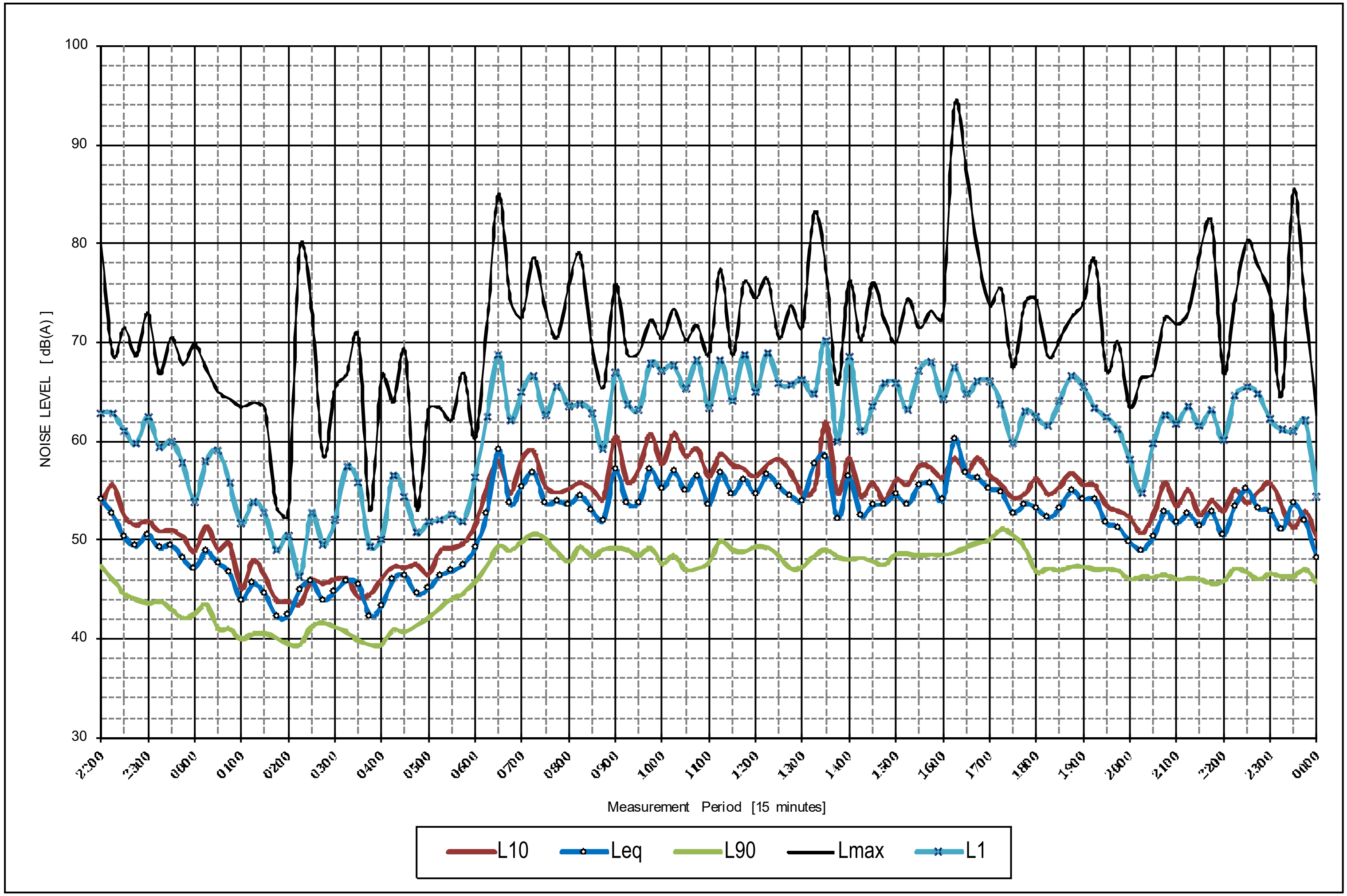
Leq 15 hours	0700-2200	55	dB(A)
Leq 9 hours	2200-0700	51	dB(A)
max Leq 1 hour	0700-2200	57	dB(A)
max Leq 1 hour	2200-0700	55	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15] 29

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	20	31	33	37	40	43	40	31	20	47
10% min L90 Evening	6:00 PM	10:00 PM	18	28	31	36	39	42	39	30	21	46
10% min L90 Night	10:00 PM	7:00 AM	8	22	27	33	36	37	31	20	15	41
10% min L90 Period	7:00 AM	10:00 PM	19	29	32	36	40	42	39	31	21	46
10% min L90 Period	10:00 PM	7:00 AM	8	22	27	33	36	37	31	20	15	41
Leq 15 hours	7:00 AM	10:00 PM	28	40	44	46	48	49	48	45	37	55
Leq 9 hours	10:00 PM	7:00 AM	23	36	39	42	44	46	45	43	36	51
Max Leq 1 hour Day	7:00 AM	10:00 PM	31	43	45	48	50	52	50	47	39	57
Max Leq 1 hour Night	10:00 PM	7:00 AM	28	38	41	44	46	49	48	48	39	55

KOIKAS ACOUSTICS PTY LTD

DAY 2 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **DATE:** Saturday, 13 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	47	dB(A)
L90 Evening	1800-2200	46	dB(A)
L90 Nighttime	2200-0700	40	dB(A)
Leq Daytime	0700-1800	55	dB(A)
Leq Evening	1800-2200	52	dB(A)
Leq Nighttime	2200-0700	49	dB(A)

TRAFFIC & MISC. NOISE METRICS

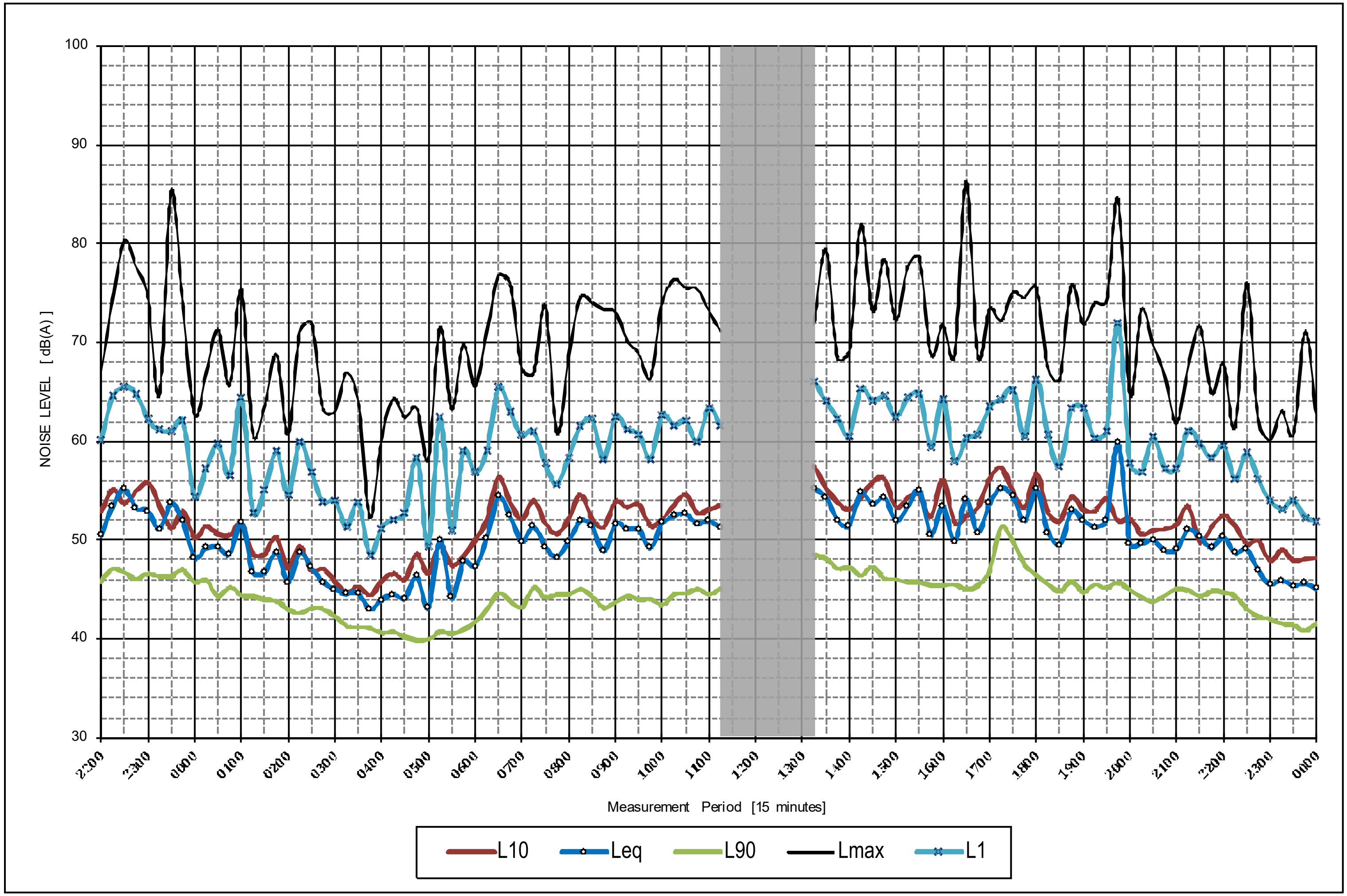
Leq 15 hours	0700-2200	55	dB(A)
Leq 9 hours	2200-0700	49	dB(A)
max Leq 1 hour	0700-2200	56	dB(A)
max Leq 1 hour	2200-0700	51	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15] 30

Descritpor	Period Start	End	Frequency [Hz] 31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min L90 Daytime	7:00 AM	6:00 PM	19	30	33	38	41	43	40	31	20	47
10% min L90 Evening	6:00 PM	10:00 PM	16	29	31	37	40	42	38	26	18	46
10% min L90 Night	10:00 PM	7:00 AM	7	19	23	31	33	36	32	22	16	40
10% min L90 Period	7:00 AM	10:00 PM	17	29	32	37	40	42	38	27	18	46
10% min L90 Period	10:00 PM	7:00 AM	8	19	23	30	33	36	32	22	16	40
Leq 15 hours	7:00 AM	10:00 PM	27	38	43	46	48	49	48	42	34	55
Leq 9 hours	10:00 PM	7:00 AM	21	33	36	38	41	44	43	42	38	49
Max Leq 1 hour Day	7:00 AM	10:00 PM	28	39	44	47	50	51	49	42	33	56
Max Leq 1 hour Night	10:00 PM	7:00 AM	23	34	37	39	42	44	43	42	35	51

KOIKAS ACOUSTICS PTY LTD

DAY 3 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **DATE:** Sunday, 14 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0800-1800	44	dB(A)
L90 Evening	1800-2200	44	dB(A)
L90 Nighttime	2200-0800	40	dB(A)
Leq Daytime	0800-1800	53	dB(A)
Leq Evening	1800-2200	53	dB(A)
Leq Nighttime	2200-0800	50	dB(A)

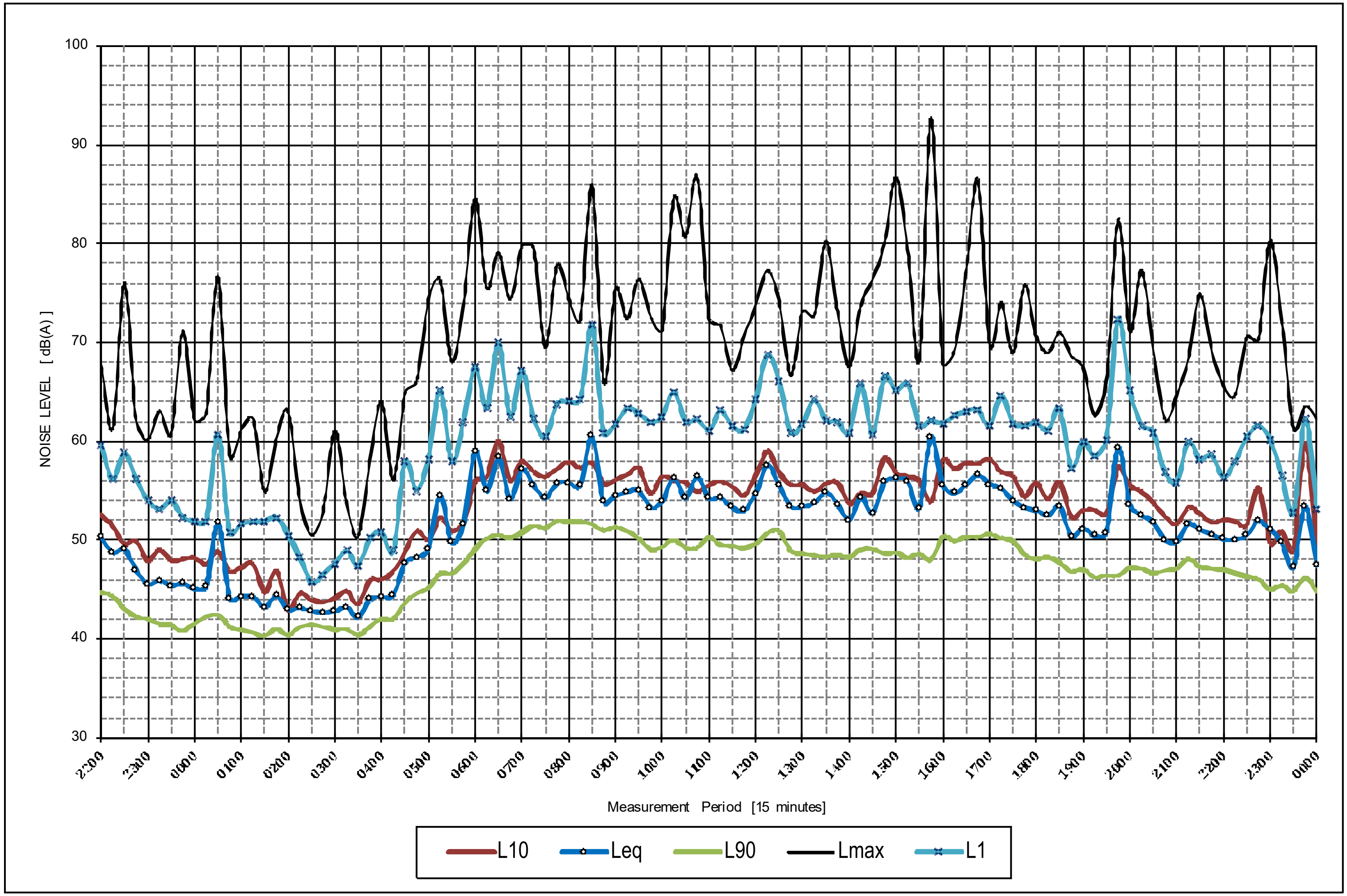
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	52	dB(A)
Leq 9 hours	2200-0700	50	dB(A)
max Leq 1 hour	0700-2200	55	dB(A)
max Leq 1 hour	2200-0700	53	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			30

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	8:00 AM	6:00 PM	17	27	30	34	37	40	37	27	18	44
10% min L90 Evening	6:00 PM	10:00 PM	15	27	31	35	38	40	36	27	22	44
10% min L90 Night	10:00 PM	8:00 AM	13	23	25	32	35	36	31	21	16	40
10% min L90 Period	7:00 AM	10:00 PM	16	27	30	35	37	40	36	27	19	44
10% min L90 Period	10:00 PM	7:00 AM	12	23	25	32	35	37	32	20	14	40
Leq 15 hours	7:00 AM	10:00 PM	26	37	40	42	45	47	46	43	36	52
Leq 9 hours	10:00 PM	7:00 AM	25	33	36	40	42	45	43	40	33	50
Max Leq 1 hour Day	7:00 AM	10:00 PM	27	38	41	44	47	49	49	44	38	55
Max Leq 1 hour Night	7:00 AM	10:00 PM	25	33	36	40	44	48	46	41	32	53

KOIKAS ACOUSTICS PTY LTD

DAY 4 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **DATE:** Monday, 15 May 2017



AMBIENT NOISE METRICS

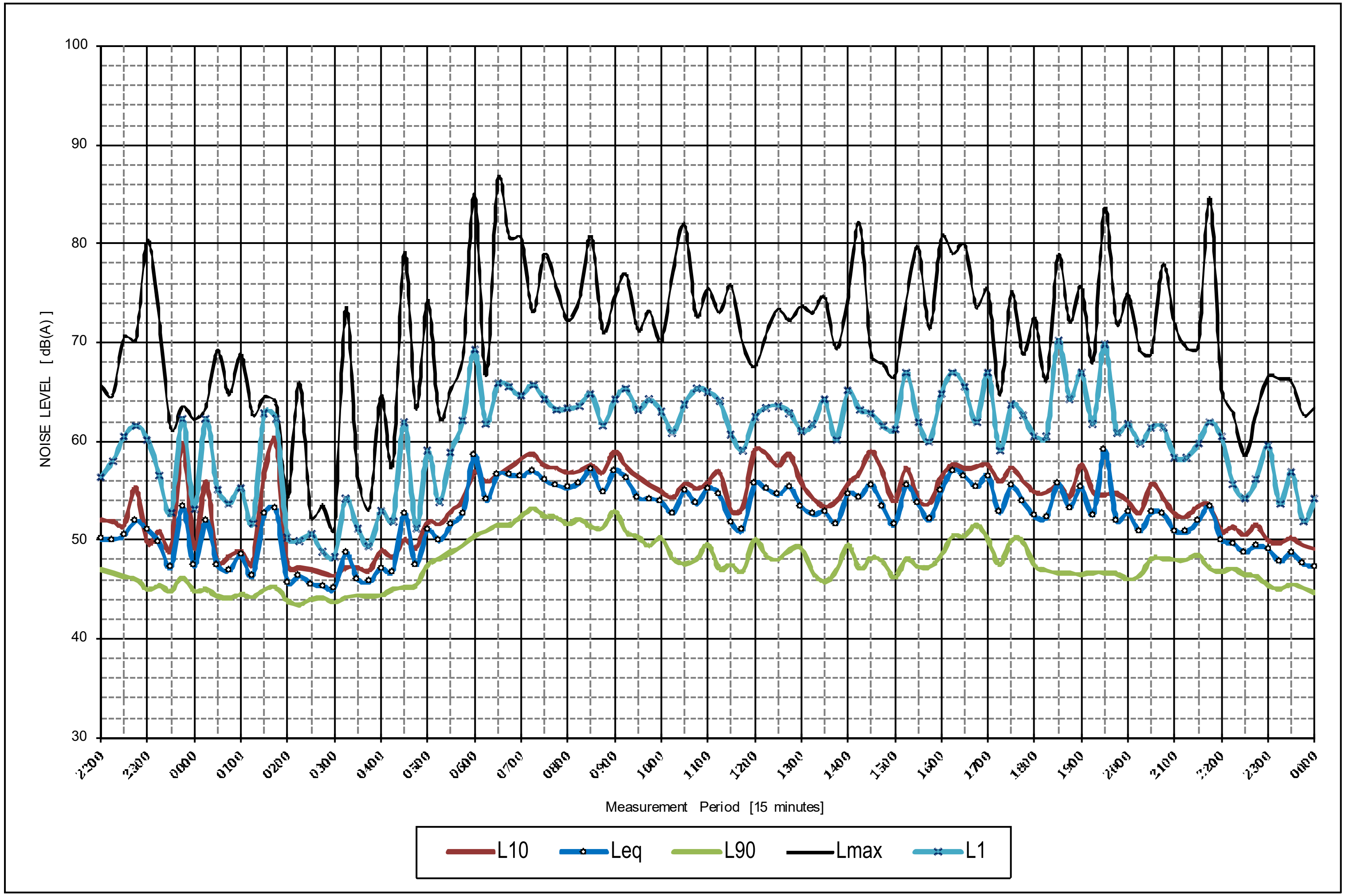
Descriptor	Period	Level	Units
L90 Daytime	0700-1800	48	dB(A)
L90 Evening	1800-2200	46	dB(A)
L90 Nighttime	2200-0700	41	dB(A)
Leq Daytime	0700-1800	55	dB(A)
Leq Evening	1800-2200	53	dB(A)
Leq Nighttime	2200-0700	50	dB(A)

TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	55	dB(A)
Leq 9 hours	2200-0700	50	dB(A)
max Leq 1 hour	0700-2200	57	dB(A)
max Leq 1 hour	2200-0700	54	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			25

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	19	31	35	39	42	44	41	33	23	48
10% min L90 Evening	6:00 PM	10:00 PM	18	30	33	38	41	42	37	25	16	46
10% min L90 Night	10:00 PM	7:00 AM	8	21	26	32	35	37	31	21	16	41
10% min L90 Period	7:00 AM	10:00 PM	19	30	34	38	41	43	38	25	17	47
10% min L90 Period	10:00 PM	7:00 AM	8	21	26	32	35	37	31	21	16	41
Leq 15 hours	7:00 AM	10:00 PM	28	40	43	45	48	50	48	44	35	55
Leq 9 hours	10:00 PM	7:00 AM	23	36	38	40	42	45	43	42	35	50
Max Leq 1 hour Day	7:00 AM	10:00 PM	29	42	45	48	50	52	50	46	36	57
Max Leq 1 hour Night	10:00 PM	7:00 AM	27	40	43	44	46	48	46	47	39	54

DAY 5 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **DATE:** Tuesday, 16 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	47	dB(A)
L90 Evening	1800-2200	46	dB(A)
L90 Nighttime	2200-0700	44	dB(A)
Leq Daytime	0700-1800	55	dB(A)
Leq Evening	1800-2200	54	dB(A)
Leq Nighttime	2200-0700	52	dB(A)

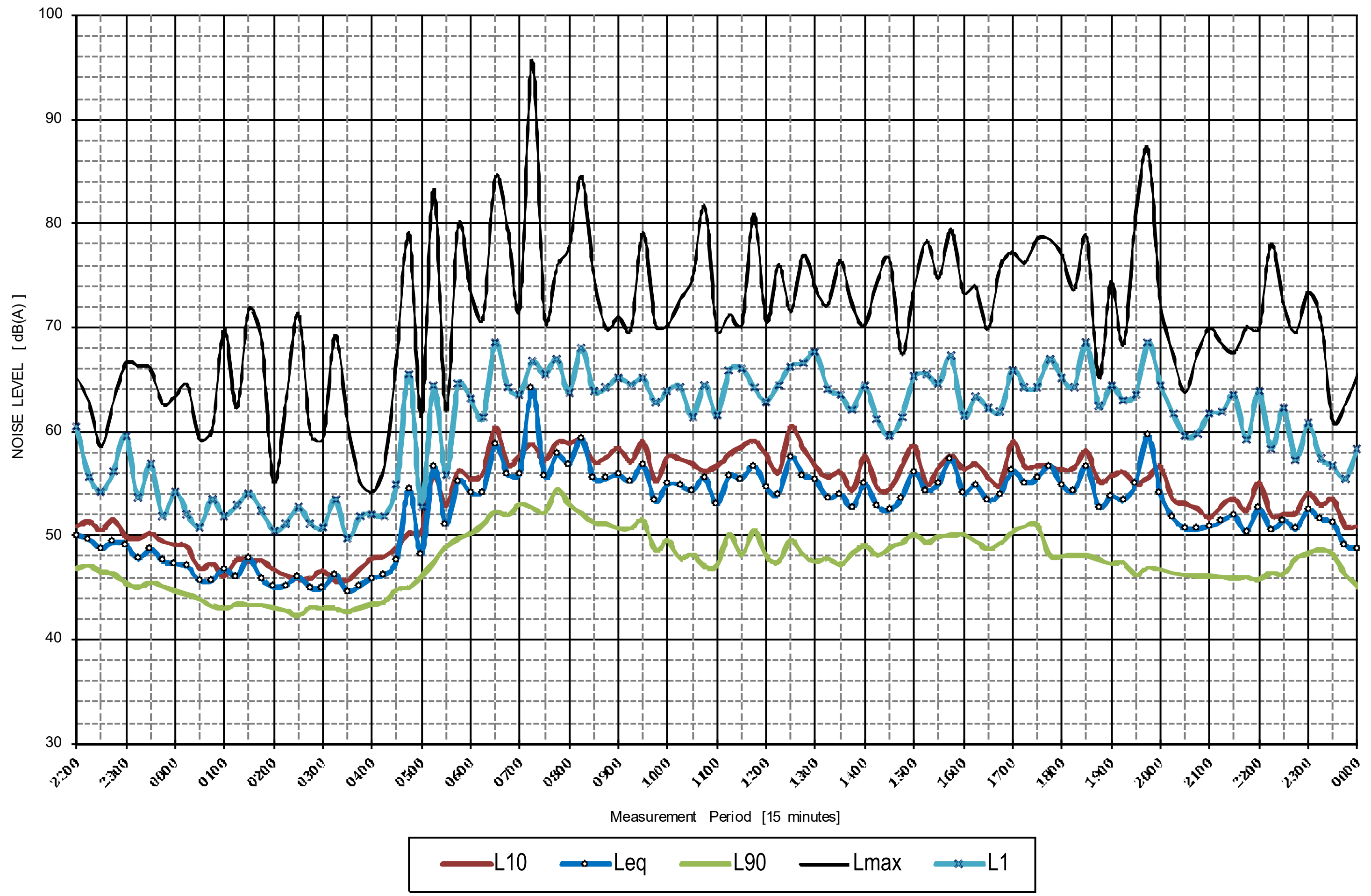
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	55	dB(A)
Leq 9 hours	2200-0700	52	dB(A)
max Leq 1 hour	0700-2200	56	dB(A)
max Leq 1 hour	2200-0700	54	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]		19	

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	19	31	34	37	40	43	39	29	18	47
10% min L90 Evening	6:00 PM	10:00 PM	18	29	33	37	40	42	38	26	17	46
10% min L90 Night	10:00 PM	7:00 AM	11	23	29	35	39	40	34	21	15	44
10% min L90 Period	7:00 AM	10:00 PM	19	30	34	37	40	42	39	28	18	47
10% min L90 Period	10:00 PM	7:00 AM	12	24	29	35	39	40	34	21	15	44
Leq 15 hours	7:00 AM	10:00 PM	28	40	43	45	48	50	48	43	37	55
Leq 9 hours	10:00 PM	7:00 AM	24	35	38	42	44	46	44	41	35	51
Max Leq 1 hour Day	7:00 AM	10:00 PM	29	41	44	46	49	51	49	44	36	56
Max Leq 1 hour Night	10:00 PM	7:00 AM	25	36	39	43	46	48	47	47	38	54

KOIKAS ACOUSTICS PTY LTD

DAY 6 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **DATE:** Wednesday, 17 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	48	dB(A)
L90 Evening	1800-2200	46	dB(A)
L90 Nighttime	2200-0700	43	dB(A)
Leq Daytime	0700-1800	56	dB(A)
Leq Evening	1800-2200	54	dB(A)
Leq Nighttime	2200-0700	51	dB(A)

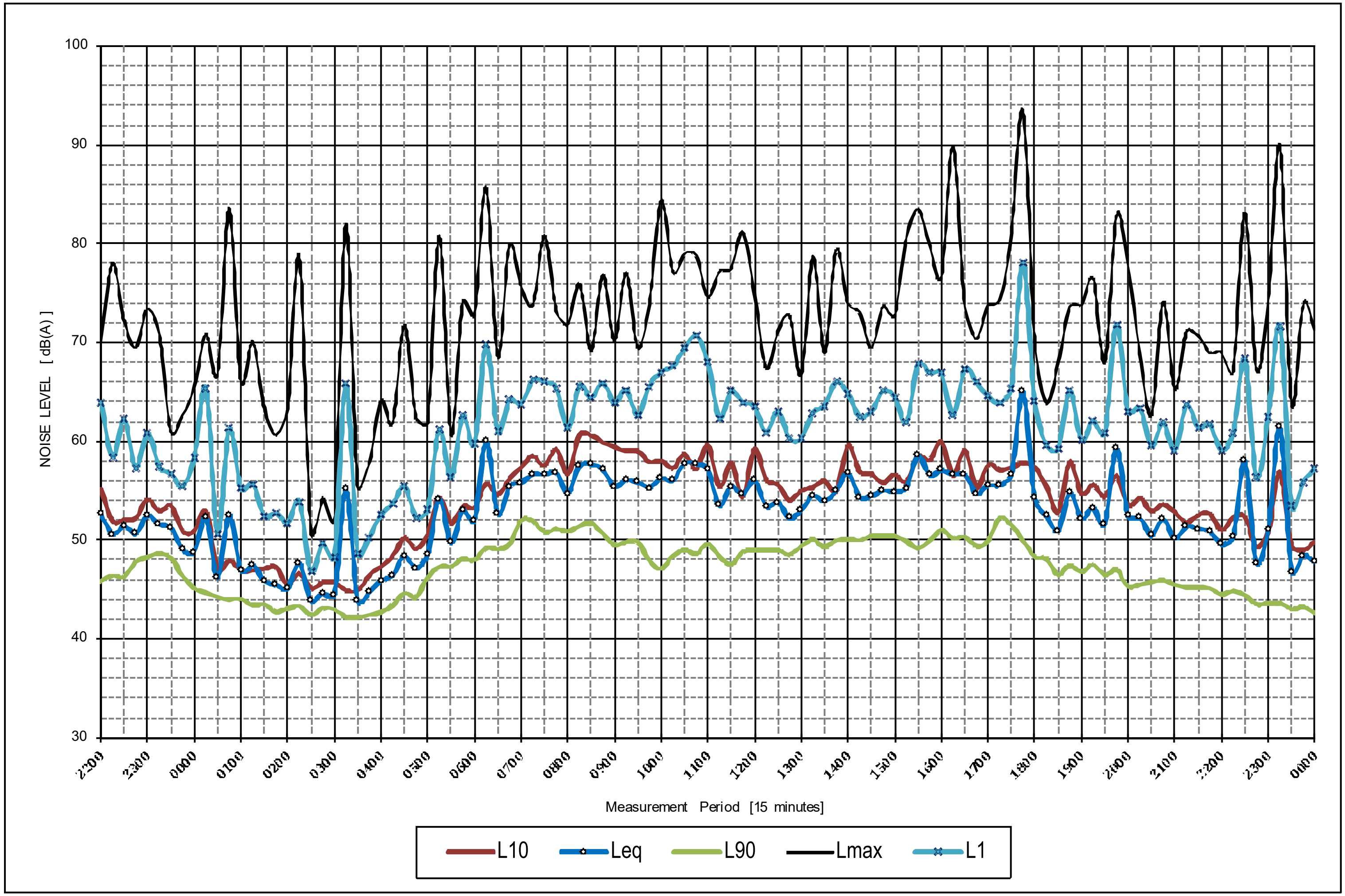
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	56	dB(A)
Leq 9 hours	2200-0700	51	dB(A)
max Leq 1 hour	0700-2200	57	dB(A)
max Leq 1 hour	2200-0700	54	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]		23	

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	20	31	34	38	41	44	40	30	19	48
10% min L90 Evening	6:00 PM	10:00 PM	17	28	31	37	40	42	38	25	17	46
10% min L90 Night	10:00 PM	7:00 AM	9	22	27	34	38	39	33	20	15	43
10% min L90 Period	7:00 AM	10:00 PM	18	28	32	37	40	42	38	26	17	46
10% min L90 Period	10:00 PM	7:00 AM	9	22	27	34	38	39	33	20	14	43
Leq 15 hours	7:00 AM	10:00 PM	28	40	43	45	48	50	50	44	37	56
Leq 9 hours	10:00 PM	7:00 AM	23	34	37	41	44	46	44	41	34	51
Max Leq 1 hour Day	7:00 AM	10:00 PM	29	41	43	46	49	52	50	44	35	57
Max Leq 1 hour Night	10:00 PM	7:00 AM	25	37	40	44	47	49	47	43	35	54

KOIKAS ACOUSTICS PTY LTD

DAY 7 **LOGGER LOCATION:** 77-85 Eveleigh St, Redfern **DATE:** Thursday, 18 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	48	dB(A)
L90 Evening	1800-2200	45	dB(A)
L90 Nighttime	2200-0700	42	dB(A)
Leq Daytime	0700-1800	57	dB(A)
Leq Evening	1800-2200	53	dB(A)
Leq Nighttime	2200-0700	51	dB(A)

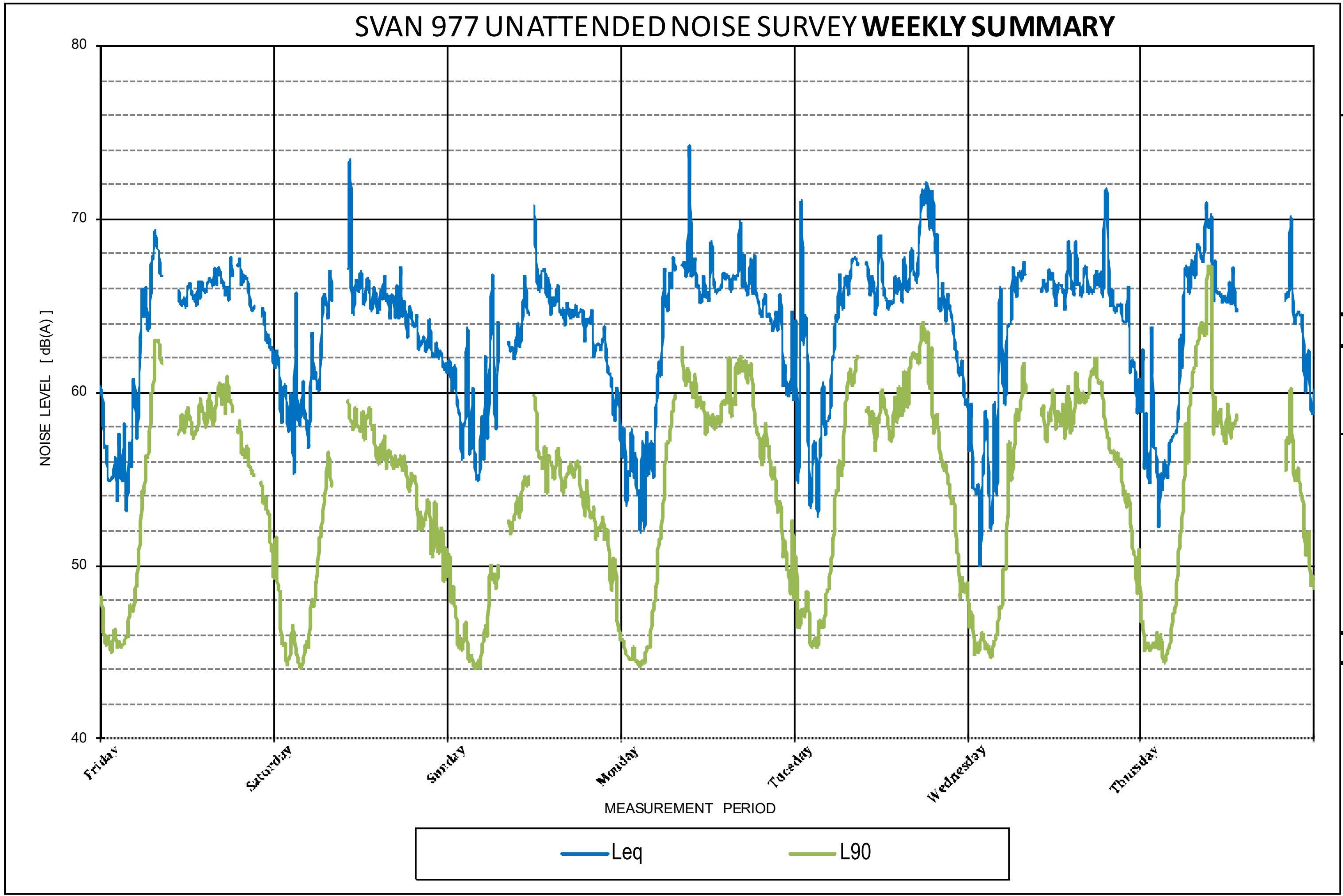
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	56	dB(A)
Leq 9 hours	2200-0700	51	dB(A)
max Leq 1 hour	0700-2200	57	dB(A)
max Leq 1 hour	2200-0700	52	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			27

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	19	32	35	39	42	44	41	32	20	48
10% min L90 Evening	6:00 PM	10:00 PM	16	27	31	36	39	42	37	26	17	45
10% min L90 Night	10:00 PM	7:00 AM	8	22	27	34	37	38	33	20	15	42
10% min L90 Period	7:00 AM	10:00 PM	17	28	31	36	39	42	38	26	17	46
10% min L90 Period	10:00 PM	7:00 AM	8	22	27	34	37	39	33	20	14	42
Leq 15 hours	7:00 AM	10:00 PM	28	40	43	46	48	51	50	44	35	56
Leq 9 hours	10:00 PM	7:00 AM	22	35	37	41	44	46	44	41	32	51
Max Leq 1 hour Day	7:00 AM	10:00 PM	29	41	44	47	50	52	50	45	35	57
Max Leq 1 hour Night	10:00 PM	7:00 AM	24	37	39	43	46	47	45	39	31	52

KOIKAS ACOUSTICS PTY LTD

WEEKLY SUMMARY **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **PERIOD:** 12th to the 18th May 2017



Sundays and Public Holidays the hours change to 0800

SUMMARY OF AMBIENT LEVELS

	L90 Daytime	*L90* Evening	*L90* Nighttime
Day 1	58	55	45
Day 2	55	52	44
Day 3	53	52	45
Day 4	58	55	45
Day 5	58	55	46
Day 6	58	55	45
Day 7	58	55	45
RBL	**58**	**55**	**45**

	Leq Daytime	*Leq* Evening	*Leq* Nighttime
Day 1	66	66	60
Day 2	66	64	62
Day 3	65	64	61
Day 4	67	65	60
Day 5	67	69	62
Day 6	66	67	61
Day 7	67	66	61
Average	**67**	**66**	**61**

SUMMARY OF TRAFFIC LEVELS

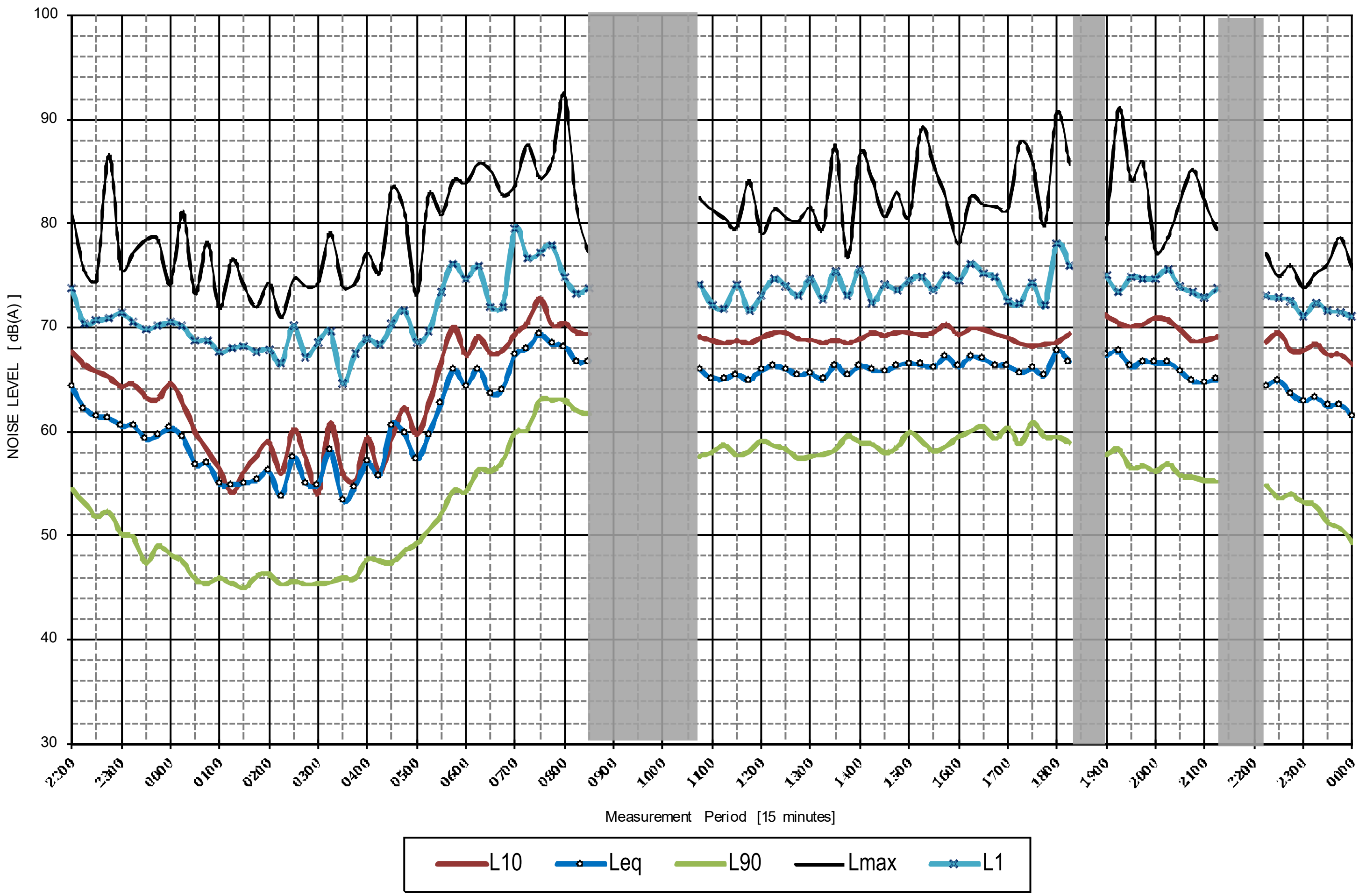
Leq 15 hrs	0700-2200	67	dB(A)
Leq 9 hrs	2200-0700	61	dB(A)
max Leq 1 hr	0700-2200	67	dB(A)
max Leq 1 hr	2200-0700	63	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual 7 day average - [Lmax - Leq ≥ 15] 31

WEEKKLY SUMMARY **Descritpor**	**Period** **Start**	 **End**	**Frequency [Hz]** **31.5**	 **63**	 **125**	 **250**	 **500**	 **1000**	 **2000**	 **4000**	 **8000**	 **Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	27	35	41	48	52	53	51	46	34	58
10% min L90 Evening	6:00 PM	10:00 PM	25	33	37	45	49	50	48	42	30	55
10% min L90 Night	10:00 PM	7:00 AM	16	23	30	35	39	41	37	28	16	45
10% min L90 Period	7:00 AM	10:00 PM	26	34	39	46	50	52	50	43	32	56
10% min L90 Period	10:00 PM	7:00 AM	16	23	30	35	39	41	37	28	16	45
Leq 15 hours	7:00 AM	10:00 PM	37	46	50	56	59	62	60	56	48	67
Leq 9 hours	10:00 PM	7:00 AM	31	40	45	50	53	57	55	51	42	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	37	46	50	56	60	63	61	57	48	67
Max Leq 1 hour Night	10:00 PM	7:00 AM	32	41	47	53	56	59	58	53	45	63

KOIKAS ACOUSTICS PTY LTD

DAY 1 **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **DATE:** Friday, 12 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	58	dB(A)
L90 Evening	1800-2200	55	dB(A)
L90 Nighttime	2200-0700	45	dB(A)
Leq Daytime	0700-1800	66	dB(A)
Leq Evening	1800-2200	66	dB(A)
Leq Nighttime	2200-0700	60	dB(A)

TRAFFIC & MISC. NOISE METRICS

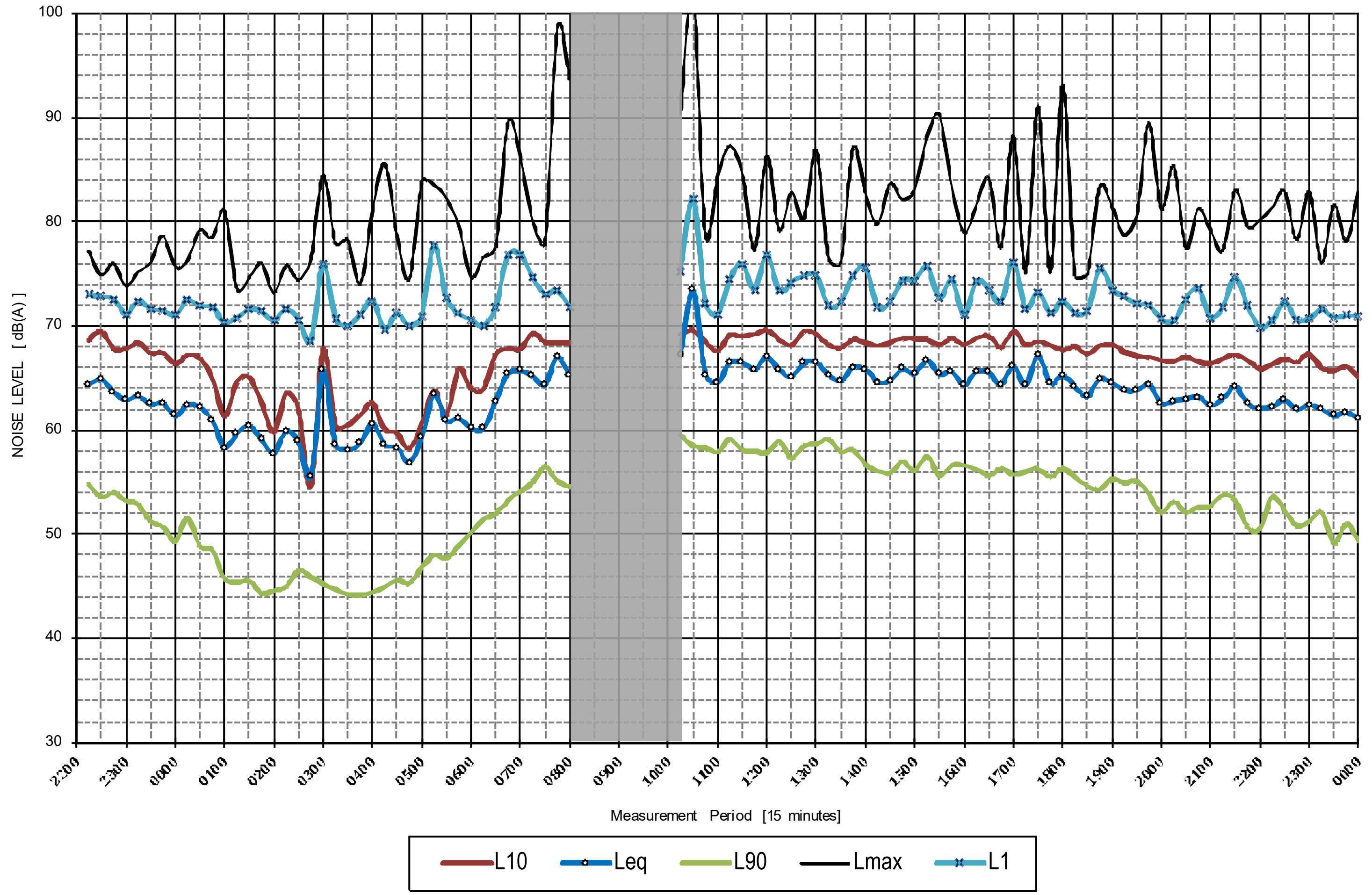
Leq 15 hours	0700-2200	66	dB(A)
Leq 9 hours	2200-0700	60	dB(A)
max Leq 1 hour	0700-2200	67	dB(A)
max Leq 1 hour	2200-0700	64	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]	33

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	27	35	41	48	52	53	51	46	35	58
10% min L90 Evening	6:00 PM	10:00 PM	24	33	38	44	49	51	49	45	34	55
10% min L90 Night	10:00 PM	7:00 AM	16	23	31	37	40	41	37	28	16	45
10% min L90 Period	7:00 AM	10:00 PM	26	34	39	46	50	52	50	46	35	56
10% min L90 Period	10:00 PM	7:00 AM	16	23	31	37	40	41	37	28	16	45
Leq 15 hours	7:00 AM	10:00 PM	37	46	50	55	59	62	61	57	49	66
Leq 9 hours	10:00 PM	7:00 AM	30	40	44	49	52	56	55	50	41	60
Max Leq 1 hour Day	7:00 AM	10:00 PM	37	46	50	56	59	62	62	59	50	67
Max Leq 1 hour Night	10:00 PM	7:00 AM	33	43	48	53	56	59	58	54	45	64

KOIKAS ACOUSTICS PTY LTD

DAY 2 **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **DATE:** Saturday, 13 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	55	dB(A)
L90 Evening	1800-2200	52	dB(A)
L90 Nighttime	2200-0700	44	dB(A)
Leq Daytime	0700-1800	66	dB(A)
Leq Evening	1800-2200	64	dB(A)
Leq Nighttime	2200-0700	62	dB(A)

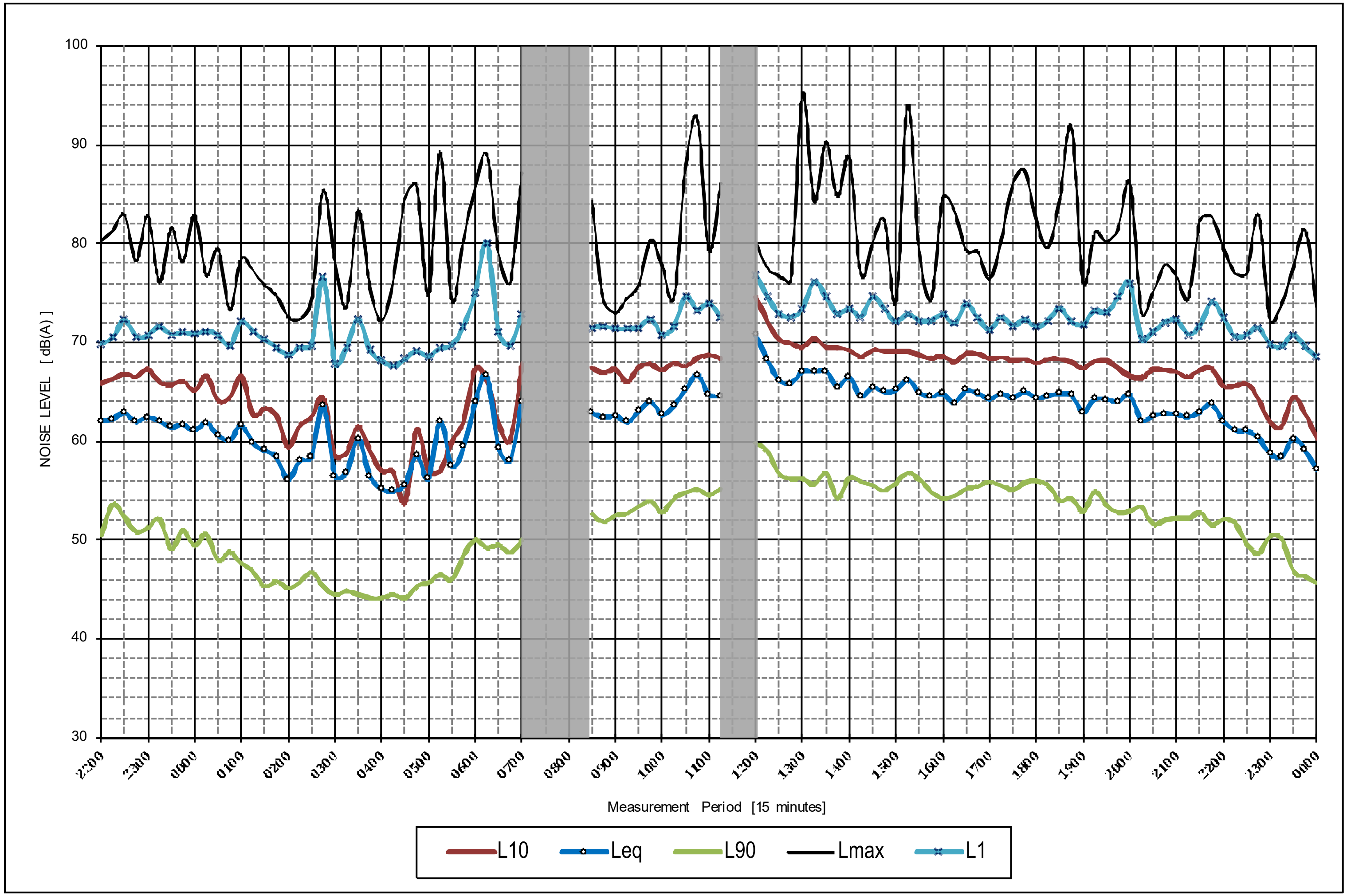
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	66	dB(A)
Leq 9 hours	2200-0700	62	dB(A)
max Leq 1 hour	0700-2200	67	dB(A)
max Leq 1 hour	2200-0700	63	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]		23	

Descritpor	Period Start	End	Frequency [Hz] 31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min L90 Daytime	7:00 AM	6:00 PM	25	33	39	46	49	51	49	43	32	55
10% min L90 Evening	6:00 PM	10:00 PM	22	31	36	43	46	48	45	39	28	52
10% min L90 Night	10:00 PM	7:00 AM	14	21	26	33	38	41	38	30	17	44
10% min L90 Period	7:00 AM	10:00 PM	23	32	37	44	47	49	46	39	28	53
10% min L90 Period	10:00 PM	7:00 AM	14	21	26	33	38	41	38	30	17	44
Leq 15 hours	7:00 AM	10:00 PM	35	45	49	55	57	62	59	54	47	66
Leq 9 hours	10:00 PM	7:00 AM	29	37	42	49	53	57	56	52	45	62
Max Leq 1 hour Day	7:00 AM	10:00 PM	37	46	49	56	59	62	60	55	47	67
Max Leq 1 hour Night	10:00 PM	7:00 AM	31	38	42	49	54	59	58	54	46	63

KOIKAS ACOUSTICS PTY LTD

DAY 3 **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **DATE:** Sunday, 14 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0800-1800	53	dB(A)
L90 Evening	1800-2200	52	dB(A)
L90 Nighttime	2200-0800	45	dB(A)
Leq Daytime	0800-1800	65	dB(A)
Leq Evening	1800-2200	64	dB(A)
Leq Nighttime	2200-0800	61	dB(A)

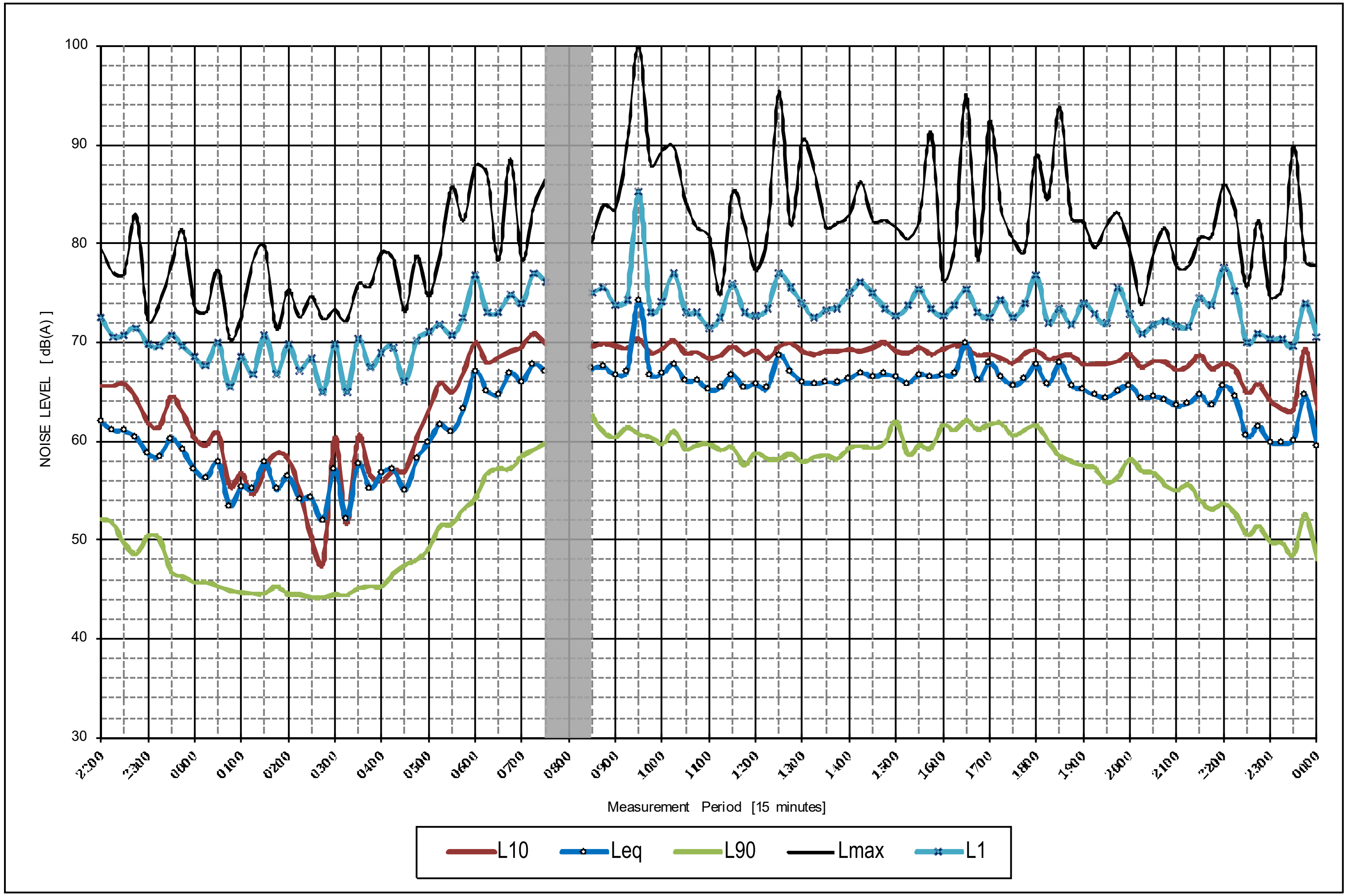
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	65	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	67	dB(A)
max Leq 1 hour	2200-0700	62	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]		32	

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	8:00 AM	6:00 PM	23	31	37	43	46	48	46	40	28	53
10% min L90 Evening	6:00 PM	10:00 PM	23	30	37	43	46	48	45	37	25	52
10% min L90 Night	10:00 PM	8:00 AM	17	24	27	34	38	41	37	29	16	45
10% min L90 Period	7:00 AM	10:00 PM	23	30	37	43	46	48	45	38	26	52
10% min L90 Period	10:00 PM	7:00 AM	16	23	27	34	38	41	37	29	17	45
Leq 15 hours	7:00 AM	10:00 PM	34	43	48	53	56	61	59	56	47	65
Leq 9 hours	10:00 PM	7:00 AM	29	38	43	49	52	57	55	49	42	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	35	42	46	53	57	62	61	59	50	67
Max Leq 1 hour Night	7:00 AM	10:00 PM	31	38	43	50	54	59	56	51	43	62

KOIKAS ACOUSTICS PTY LTD

DAY 4 **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **DATE:** Monday, 15 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	58	dB(A)
L90 Evening	1800-2200	55	dB(A)
L90 Nighttime	2200-0700	45	dB(A)
Leq Daytime	0700-1800	67	dB(A)
Leq Evening	1800-2200	65	dB(A)
Leq Nighttime	2200-0700	60	dB(A)

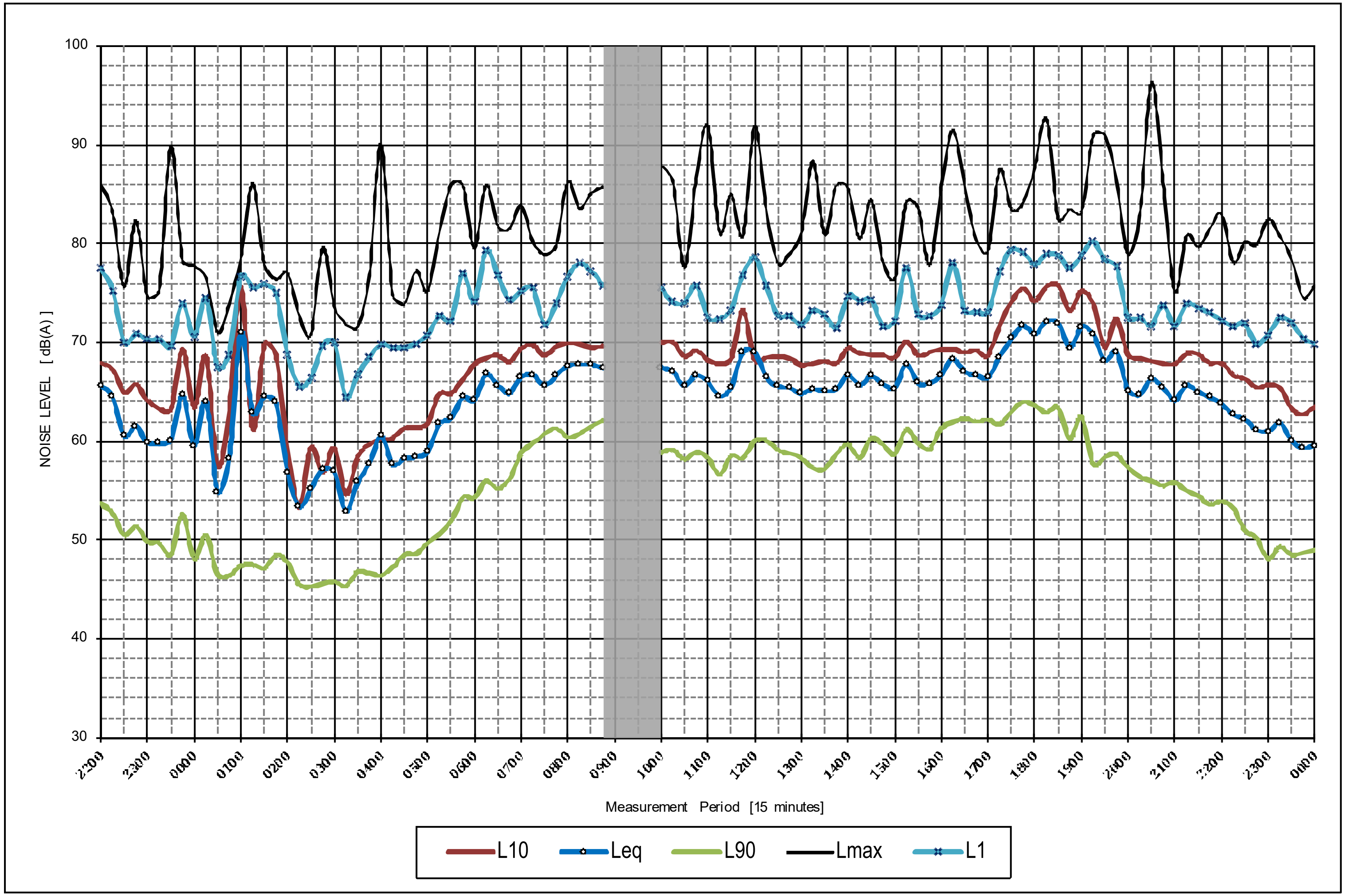
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	67	dB(A)
Leq 9 hours	2200-0700	60	dB(A)
max Leq 1 hour	0700-2200	68	dB(A)
max Leq 1 hour	2200-0700	63	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			33

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	27	36	42	48	52	54	52	46	35	58
10% min L90 Evening	6:00 PM	10:00 PM	27	33	40	46	49	50	47	41	29	55
10% min L90 Night	10:00 PM	7:00 AM	16	22	30	35	39	40	37	28	16	45
10% min L90 Period	7:00 AM	10:00 PM	28	34	41	47	50	51	49	43	32	56
10% min L90 Period	10:00 PM	7:00 AM	16	22	30	35	39	40	37	28	16	45
Leq 15 hours	7:00 AM	10:00 PM	37	45	50	56	59	63	61	56	47	67
Leq 9 hours	10:00 PM	7:00 AM	31	40	44	49	52	56	55	49	41	60
Max Leq 1 hour Day	7:00 AM	10:00 PM	38	46	51	57	60	63	62	57	48	68
Max Leq 1 hour Night	10:00 PM	7:00 AM	35	43	47	53	56	59	58	53	44	63

KOIKAS ACOUSTICS PTY LTD

DAY 5 **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **DATE:** Tuesday, 16 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	58	dB(A)
L90 Evening	1800-2200	55	dB(A)
L90 Nighttime	2200-0700	46	dB(A)
Leq Daytime	0700-1800	67	dB(A)
Leq Evening	1800-2200	69	dB(A)
Leq Nighttime	2200-0700	62	dB(A)

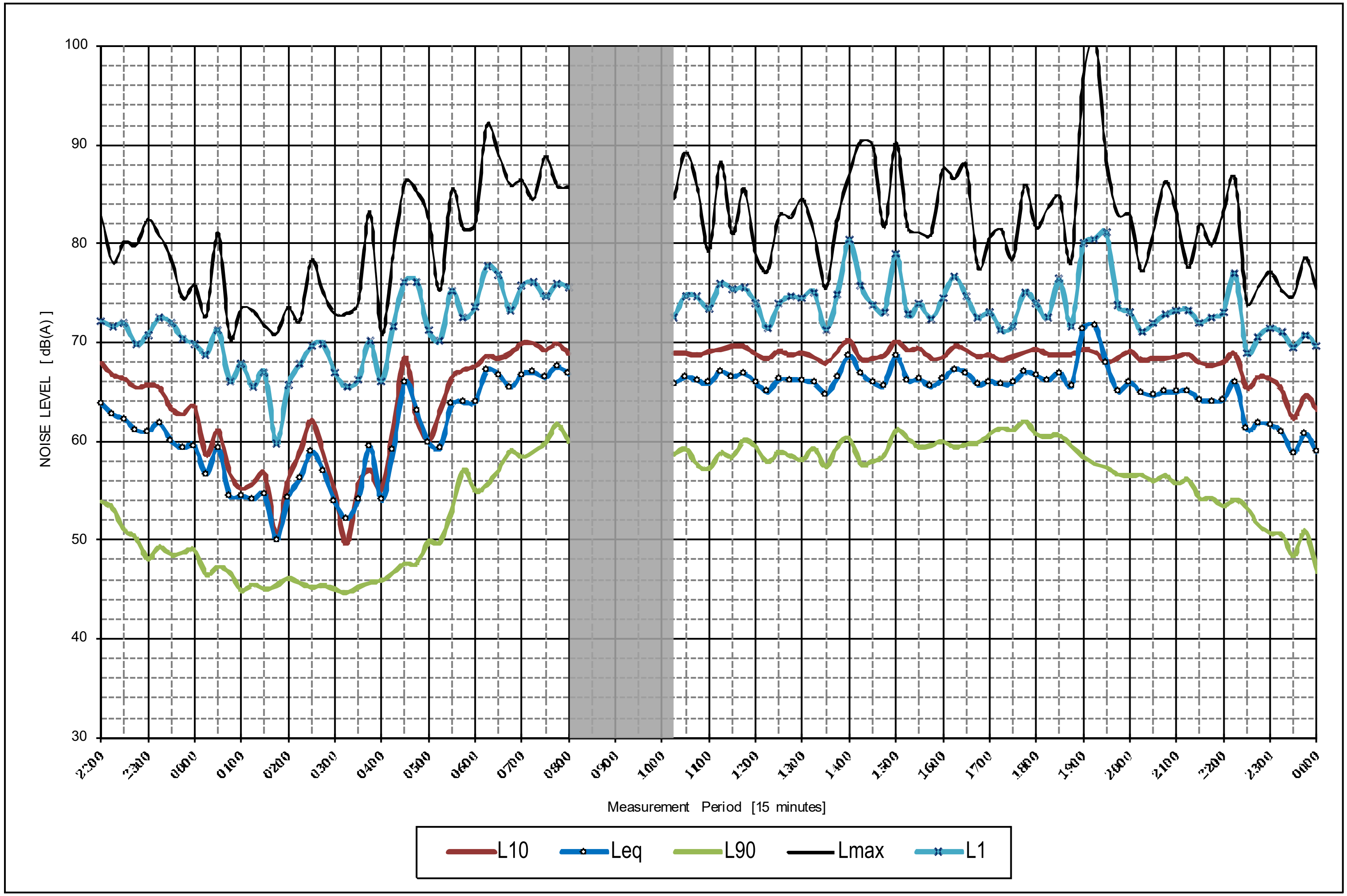
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	68	dB(A)
Leq 9 hours	2200-0700	62	dB(A)
max Leq 1 hour	0700-2200	70	dB(A)
max Leq 1 hour	2200-0700	66	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]		30	

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	27	35	41	48	52	54	52	46	34	58
10% min L90 Evening	6:00 PM	10:00 PM	26	33	39	45	48	50	48	42	30	55
10% min L90 Night	10:00 PM	7:00 AM	18	24	31	37	40	41	37	28	16	46
10% min L90 Period	7:00 AM	10:00 PM	26	34	39	47	50	52	50	43	31	56
10% min L90 Period	10:00 PM	7:00 AM	18	24	31	37	40	41	37	28	16	46
Leq 15 hours	7:00 AM	10:00 PM	37	46	51	57	61	63	61	56	47	68
Leq 9 hours	10:00 PM	7:00 AM	30	40	48	53	56	58	56	51	43	63
Max Leq 1 hour Day	7:00 AM	10:00 PM	38	46	51	58	65	67	63	57	47	70
Max Leq 1 hour Night	10:00 PM	7:00 AM	31	41	51	56	59	61	60	55	45	66

KOIKAS ACOUSTICS PTY LTD

DAY 6 **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **DATE:** Wednesday, 17 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	58	dB(A)
L90 Evening	1800-2200	55	dB(A)
L90 Nighttime	2200-0700	45	dB(A)
Leq Daytime	0700-1800	66	dB(A)
Leq Evening	1800-2200	67	dB(A)
Leq Nighttime	2200-0700	61	dB(A)

TRAFFIC & MISC. NOISE METRICS

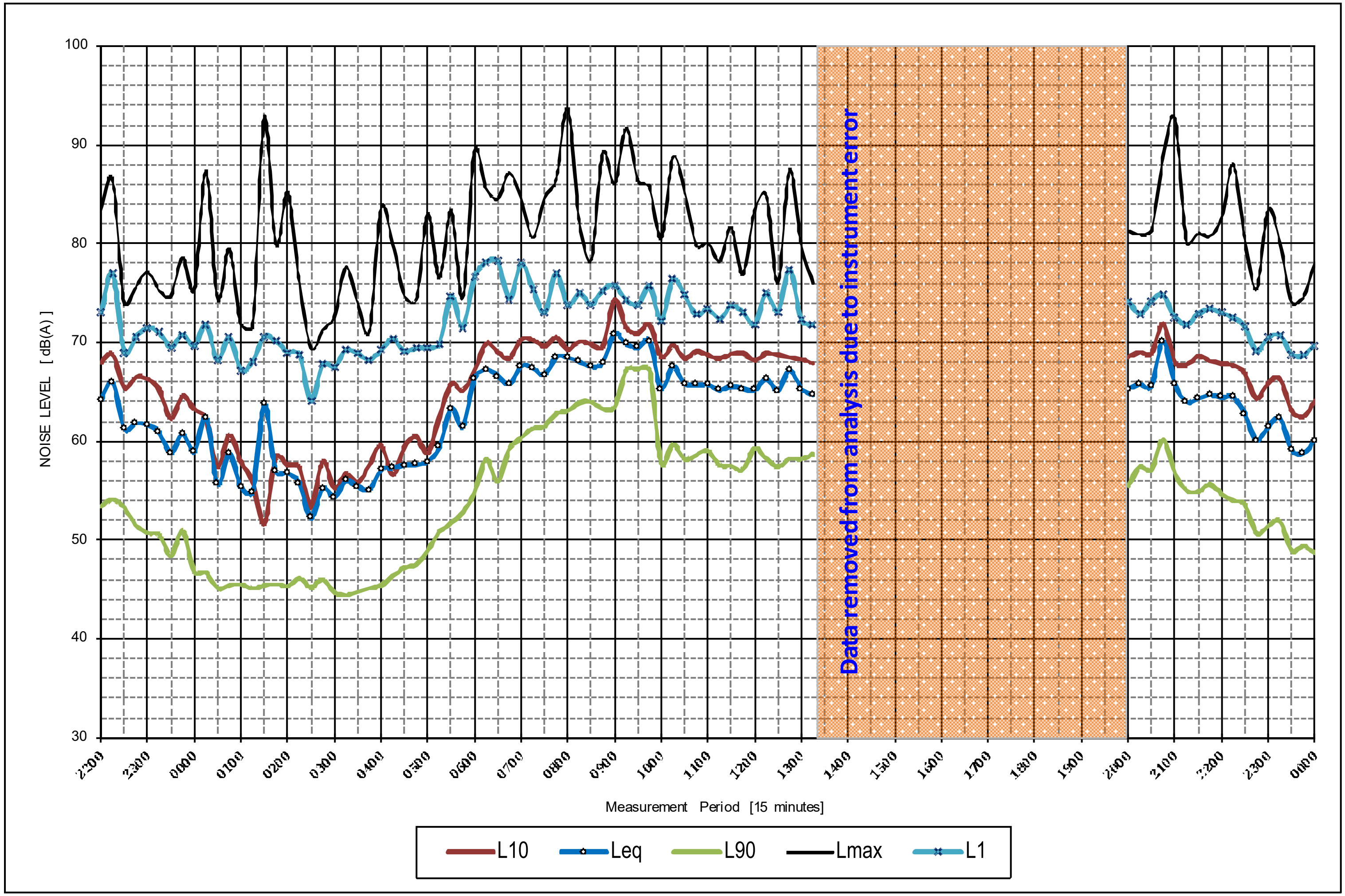
Leq 15 hours	0700-2200	67	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	67	dB(A)
max Leq 1 hour	2200-0700	63	dB(A)

Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15] 36

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	28	36	41	48	52	53	52	46	34	58
10% min L90 Evening	6:00 PM	10:00 PM	25	33	37	45	49	51	49	42	31	55
10% min L90 Night	10:00 PM	7:00 AM	15	23	30	35	39	41	37	28	16	45
10% min L90 Period	7:00 AM	10:00 PM	26	34	39	46	50	52	50	44	33	57
10% min L90 Period	10:00 PM	7:00 AM	15	23	30	35	39	41	37	28	16	45
Leq 15 hours	7:00 AM	10:00 PM	37	47	50	56	58	63	61	55	47	67
Leq 9 hours	10:00 PM	7:00 AM	32	41	45	50	53	57	56	51	43	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	37	47	51	56	59	63	61	56	47	67
Max Leq 1 hour Night	10:00 PM	7:00 AM	33	43	46	52	55	59	57	52	44	63

KOIKAS ACOUSTICS PTY LTD

DAY 7 **LOGGER LOCATION:** 106 Lawson St, Redfern - 1st floor balcony **DATE:** Thursday, 18 May 2017



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
L90 Daytime	0700-1800	58	dB(A)
L90 Evening	1800-2200	55	dB(A)
L90 Nighttime	2200-0700	45	dB(A)
Leq Daytime	0700-1800	67	dB(A)
Leq Evening	1800-2200	66	dB(A)
Leq Nighttime	2200-0700	61	dB(A)

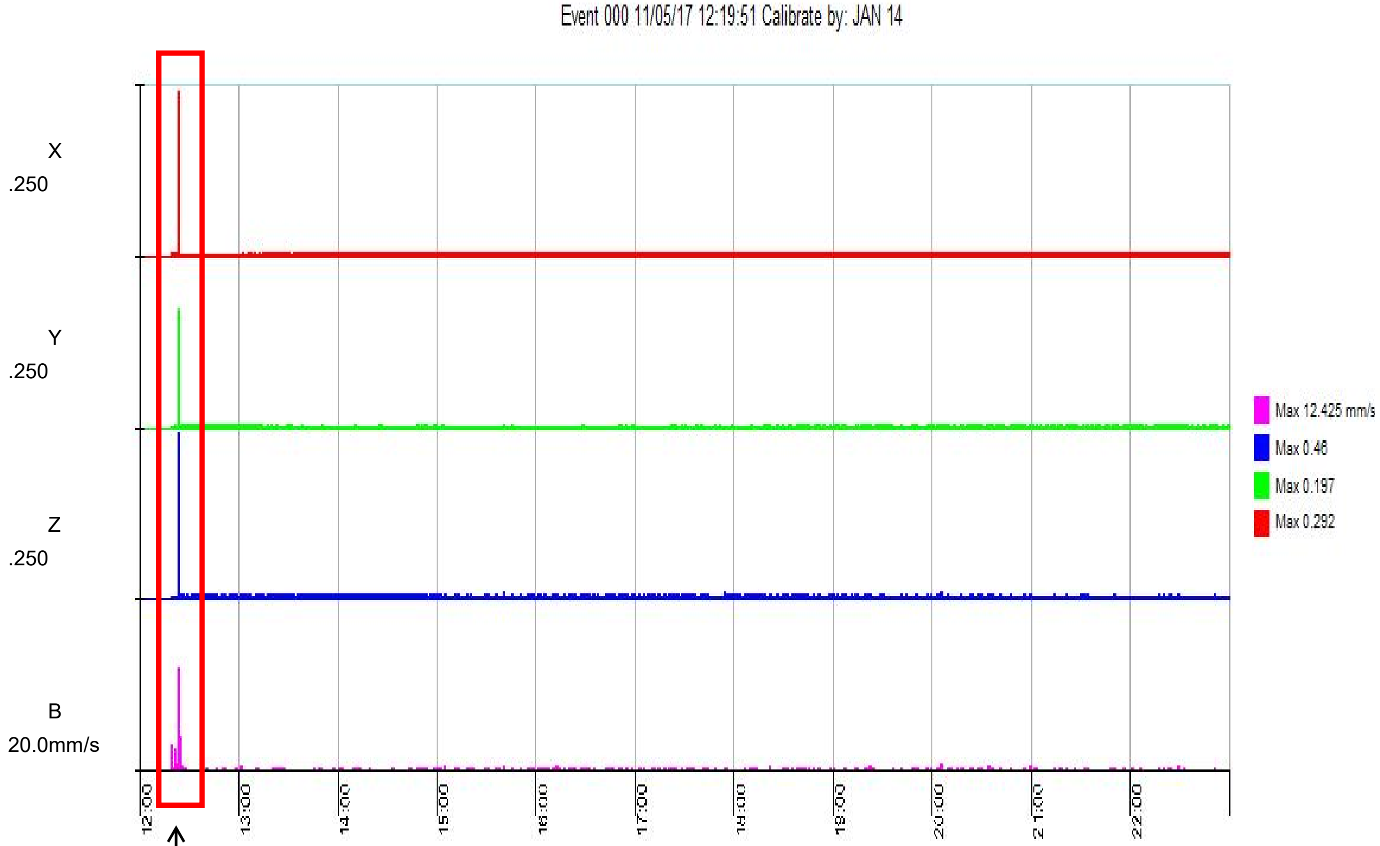
TRAFFIC & MISC. NOISE METRICS

Leq 15 hours	0700-2200	67	dB(A)
Leq 9 hours	2200-0700	61	dB(A)
max Leq 1 hour	0700-2200	69	dB(A)
max Leq 1 hour	2200-0700	64	dB(A)
Maximum noise events as defined in the Environmental Noise Management Manual [Lmax - Leq ≥ 15]			32

	Period		Frequency [Hz]									
Descriptor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min L90 Daytime	7:00 AM	6:00 PM	26	35	41	48	51	53	51	46	34	58
10% min L90 Evening	6:00 PM	10:00 PM	25	33	37	45	49	51	49	42	31	55
10% min L90 Night	10:00 PM	7:00 AM	14	23	29	36	39	41	37	28	16	45
10% min L90 Period	7:00 AM	10:00 PM	26	34	38	46	49	52	50	44	32	56
10% min L90 Period	10:00 PM	7:00 AM	14	23	29	36	39	41	37	28	16	45
Leq 15 hours	7:00 AM	10:00 PM	38	47	51	58	59	62	61	57	48	67
Leq 9 hours	10:00 PM	7:00 AM	31	41	44	51	54	57	55	50	42	61
Max Leq 1 hour Day	7:00 AM	10:00 PM	42	49	52	61	61	64	63	59	50	69
Max Leq 1 hour Night	10:00 PM	7:00 AM	33	42	46	54	56	59	58	53	45	64

KOIKAS ACOUSTICS PTY LTD

Thursday 11th May 2017 - Daytime hours



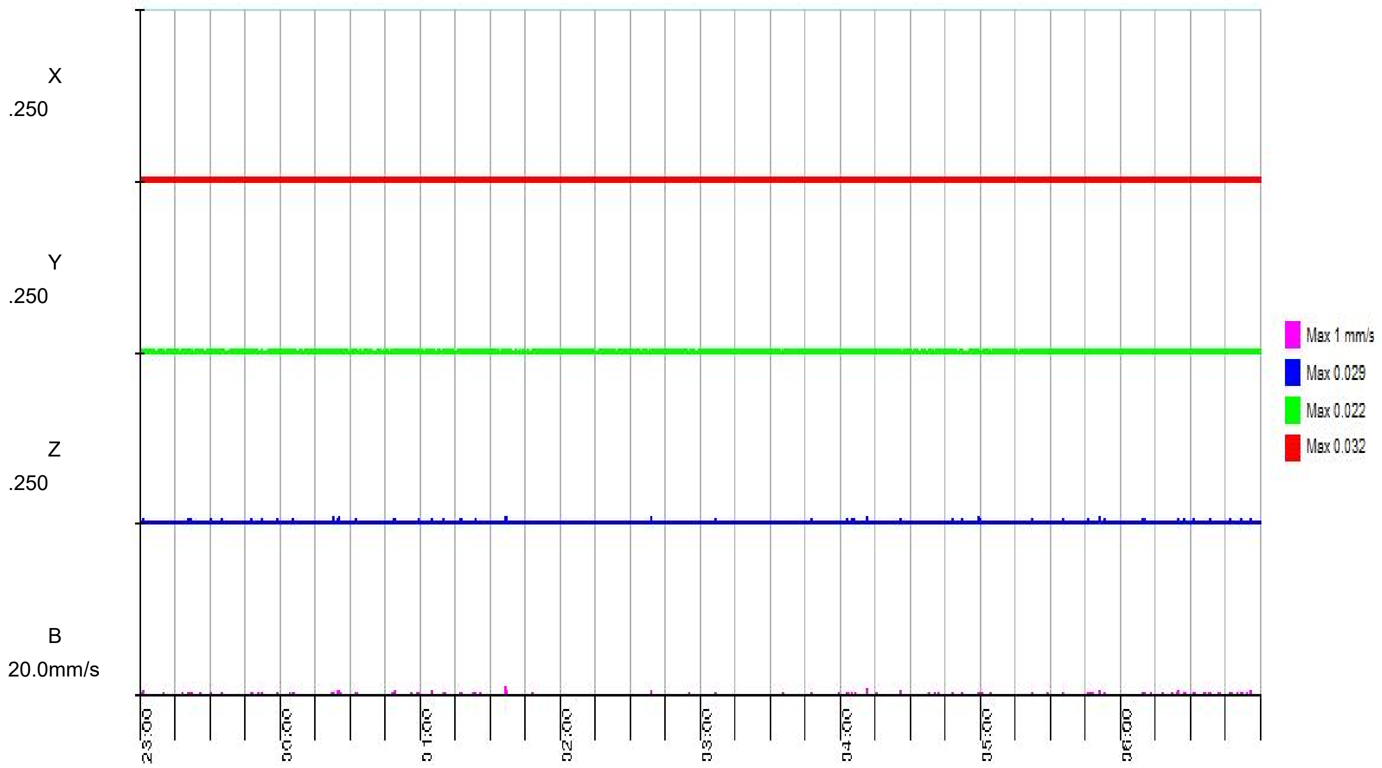
Ev 000 VDV	X	Y	Z	X	Y	Z
		16 Hour				
	.292	.197	.460			
		1 Hour			Total	
Hour 1	.292	.197	.460	.264	.178	.416
Hour 2	.018	.013	.021	.264	.178	.416
Hour 3	.019	.013	.020	.264	.178	.416
Hour 4	.019	.012	.019	.264	.178	.416
Hour 5	.019	.012	.020	.264	.178	.416
Hour 6	.019	.013	.020	.264	.178	.416
Hour 7	.019	.013	.020	.264	.178	.416
Hour 8	.019	.013	.019	.264	.178	.416
Hour 9	.019	.013	.019	.264	.178	.416
Hour 10	.019	.013	.018	.264	.178	.416
Hour 11	.018	.013	.017	.264	.178	.416

Ev 000 Cont	Max	Bank B Time	Date
Event	12.4mm/s	12:24:31	11/05/17
Hour 1	12.4mm/s	12:24:31	11/05/17
Hour 2	.400mm/s	13:01:51	11/05/17
Hour 3	.350mm/s	14:51:31	11/05/17
Hour 4	.625mm/s	15:40:41	11/05/17
Hour 5	.425mm/s	16:12:21	11/05/17
Hour 6	.325mm/s	17:03:51	11/05/17
Hour 7	.575mm/s	18:21:21	11/05/17
Hour 8	.400mm/s	19:22:51	11/05/17
Hour 9	.825mm/s	20:05:11	11/05/17
Hour 10	.375mm/s	21:33:11	11/05/17
Hour 11	.550mm/s	22:29:31	11/05/17

Vibration due to installation. Concrete screws.

Thursday 11th to Friday 12th May 2017 - Night-time hours

Event 001 11/05/17 23:00:00 Calibrate by: JAN 14

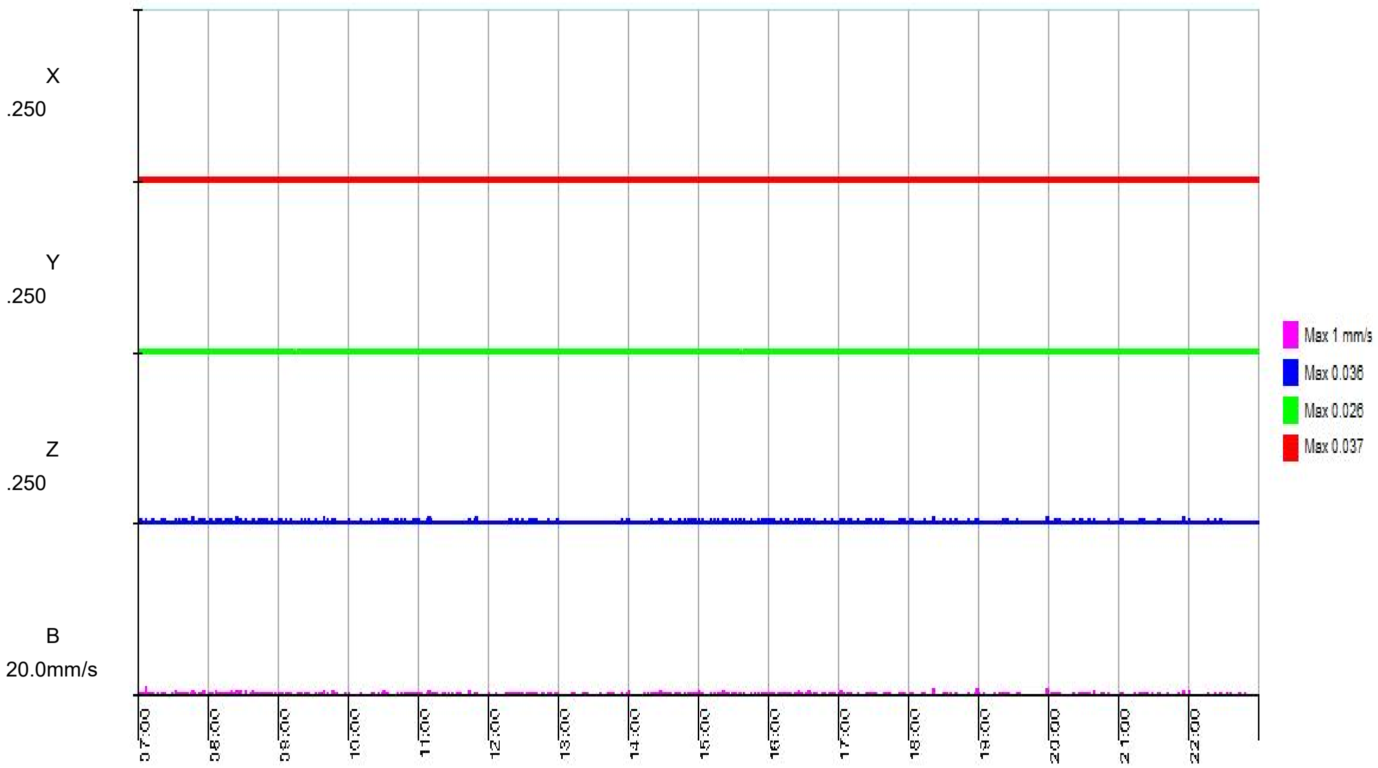


Ev 001	X	Y	Z	X	Y	Z
VDV						
		8 Hour				
	.032	.022	.029			
		1 Hour			Total	
Hour 1	.019	.013	.017	.019	.013	.017
Hour 2	.019	.013	.017	.022	.015	.021
Hour 3	.019	.013	.018	.025	.017	.023
Hour 4	.019	.013	.016	.027	.018	.024
Hour 5	.018	.013	.015	.028	.019	.025
Hour 6	.018	.013	.018	.029	.020	.027
Hour 7	.018	.013	.017	.030	.021	.028
Hour 8	.018	.013	.017	.032	.022	.029

Ev 001		Bank B	
Cont	Max	Time	Date
Event	1.00mm/s	01:37:00	12/05/17
Hour 1	.400mm/s	23:01:10	11/05/17
Hour 2	.625mm/s	00:25:10	12/05/17
Hour 3	1.00mm/s	01:37:00	12/05/17
Hour 4	.575mm/s	02:39:10	12/05/17
Hour 5	.275mm/s	03:47:50	12/05/17
Hour 6	.775mm/s	04:11:50	12/05/17
Hour 7	.475mm/s	05:51:20	12/05/17
Hour 8	.450mm/s	06:55:50	12/05/17

Friday 12th May 2017 - Daytime hours

Event 002 12/05/17 07:00:00 Calibrate by: JAN 14

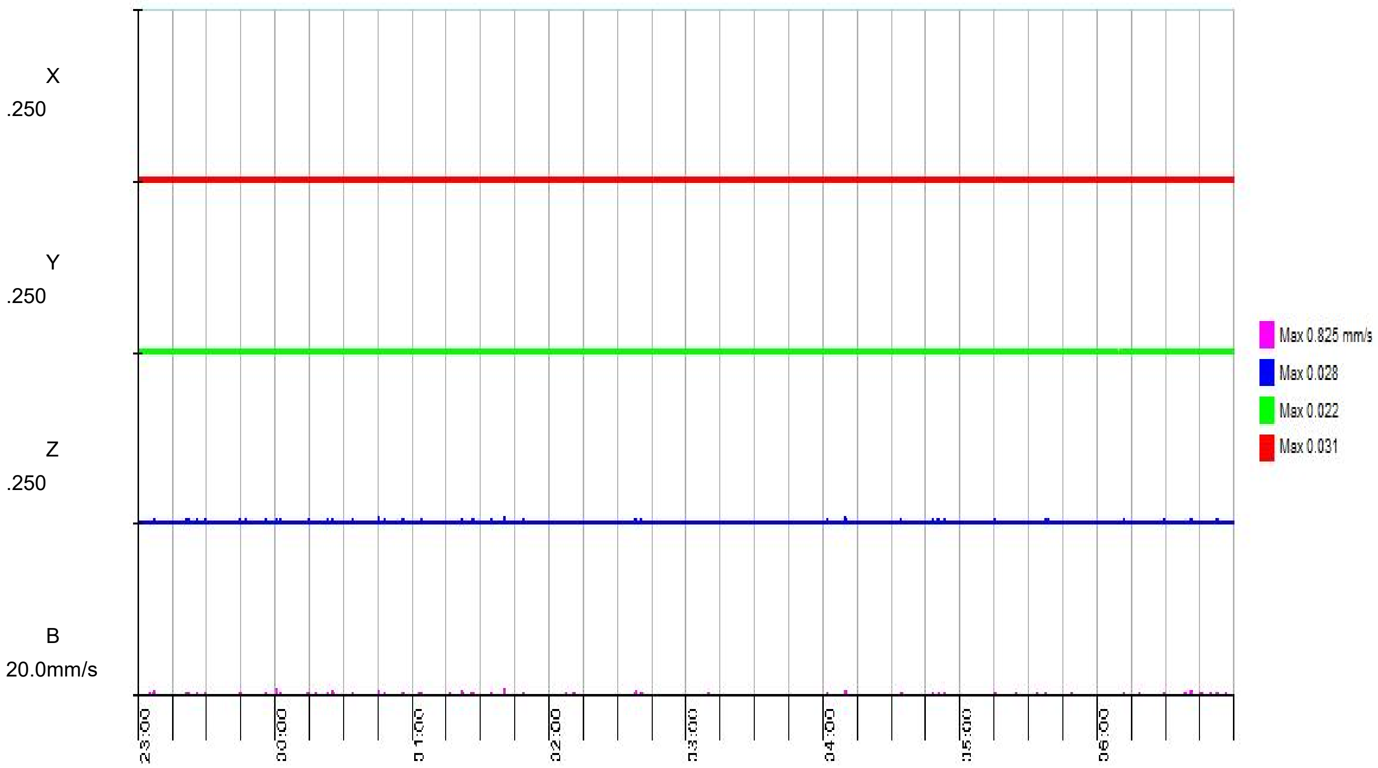


Ev 002	X	Y	Z	X	Y	Z
VDV						
		16 Hour				
	.037	.026	.036			
		1 Hour			Total	
Hour 1	.018	.013	.018	.018	.013	.018
Hour 2	.018	.013	.018	.021	.015	.022
Hour 3	.018	.013	.018	.024	.017	.024
Hour 4	.018	.013	.017	.026	.018	.026
Hour 5	.018	.013	.018	.027	.019	.027
Hour 6	.018	.013	.017	.029	.020	.028
Hour 7	.018	.013	.016	.030	.021	.029
Hour 8	.018	.013	.017	.031	.022	.030
Hour 9	.018	.013	.018	.032	.023	.031
Hour 10	.018	.013	.018	.033	.023	.032
Hour 11	.018	.013	.017	.034	.024	.033
Hour 12	.018	.013	.018	.034	.024	.034
Hour 13	.018	.013	.017	.035	.025	.034
Hour 14	.018	.013	.018	.036	.025	.035
Hour 15	.018	.013	.017	.036	.026	.035
Hour 16	.018	.013	.017	.037	.026	.036

Ev 002 Cont	Max	Bank B Time	Date
Event	1.00mm/s	07:06:30	12/05/17
Hour 1	1.00mm/s	07:06:30	12/05/17
Hour 2	.575mm/s	08:31:50	12/05/17
Hour 3	.550mm/s	09:39:20	12/05/17
Hour 4	.425mm/s	10:31:10	12/05/17
Hour 5	.650mm/s	11:10:30	12/05/17
Hour 6	.375mm/s	12:58:50	12/05/17
Hour 7	.300mm/s	13:54:30	12/05/17
Hour 8	.675mm/s	14:00:50	12/05/17
Hour 9	.525mm/s	15:01:30	12/05/17
Hour 10	.475mm/s	16:35:40	12/05/17
Hour 11	.400mm/s	17:02:30	12/05/17
Hour 12	.875mm/s	18:22:10	12/05/17
Hour 13	.775mm/s	19:59:30	12/05/17
Hour 14	.425mm/s	20:39:40	12/05/17
Hour 15	.475mm/s	21:56:40	12/05/17
Hour 16	.400mm/s	22:00:20	12/05/17

Friday 12th to Saturday 13th May 2017 - Night-time hours

Event 003 12/05/17 23:00:00 Calibrate by: JAN 14

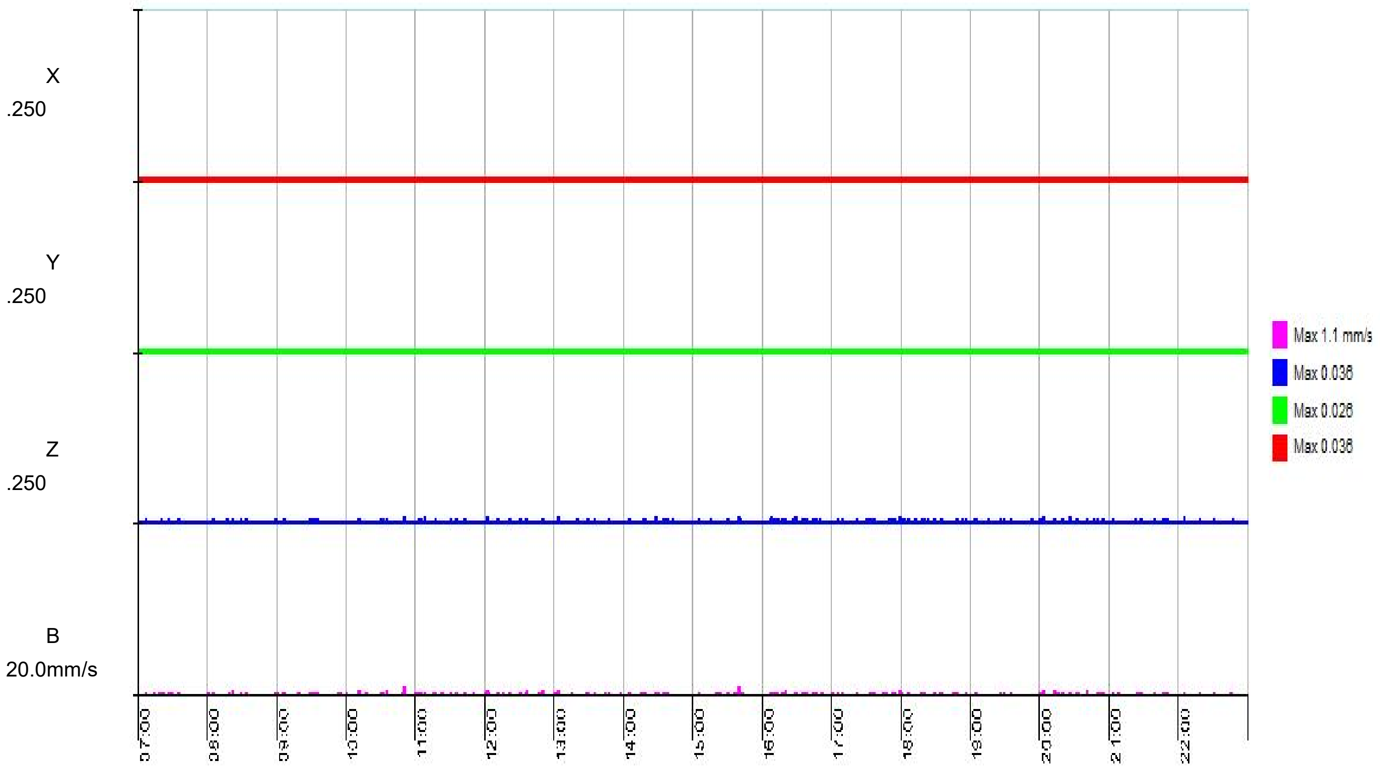


Ev 003 VDV	X	Y	Z	X	Y	Z
		8 Hour				
	.031	.022	.028			
		1 Hour			Total	
Hour 1	.018	.013	.017	.018	.013	.017
Hour 2	.018	.013	.018	.022	.015	.021
Hour 3	.018	.013	.018	.024	.017	.023
Hour 4	.018	.013	.016	.026	.018	.024
Hour 5	.018	.013	.015	.028	.019	.025
Hour 6	.018	.013	.017	.029	.020	.026
Hour 7	.018	.013	.016	.030	.021	.027
Hour 8	.018	.013	.017	.031	.022	.028

Ev 003 Cont	Max	Bank B Time	Date
Event	.825mm/s	00:00:40	13/05/17
Hour 1	.500mm/s	23:07:30	12/05/17
Hour 2	.825mm/s	00:00:40	13/05/17
Hour 3	.825mm/s	01:40:50	13/05/17
Hour 4	.425mm/s	02:38:10	13/05/17
Hour 5	.175mm/s	03:09:40	13/05/17
Hour 6	.550mm/s	04:10:00	13/05/17
Hour 7	.375mm/s	05:38:00	13/05/17
Hour 8	.475mm/s	06:41:00	13/05/17

Saturday 13th May 2017 - Daytime hours

Event 004 13/05/17 07:00:00 Calibrate by: JAN 14

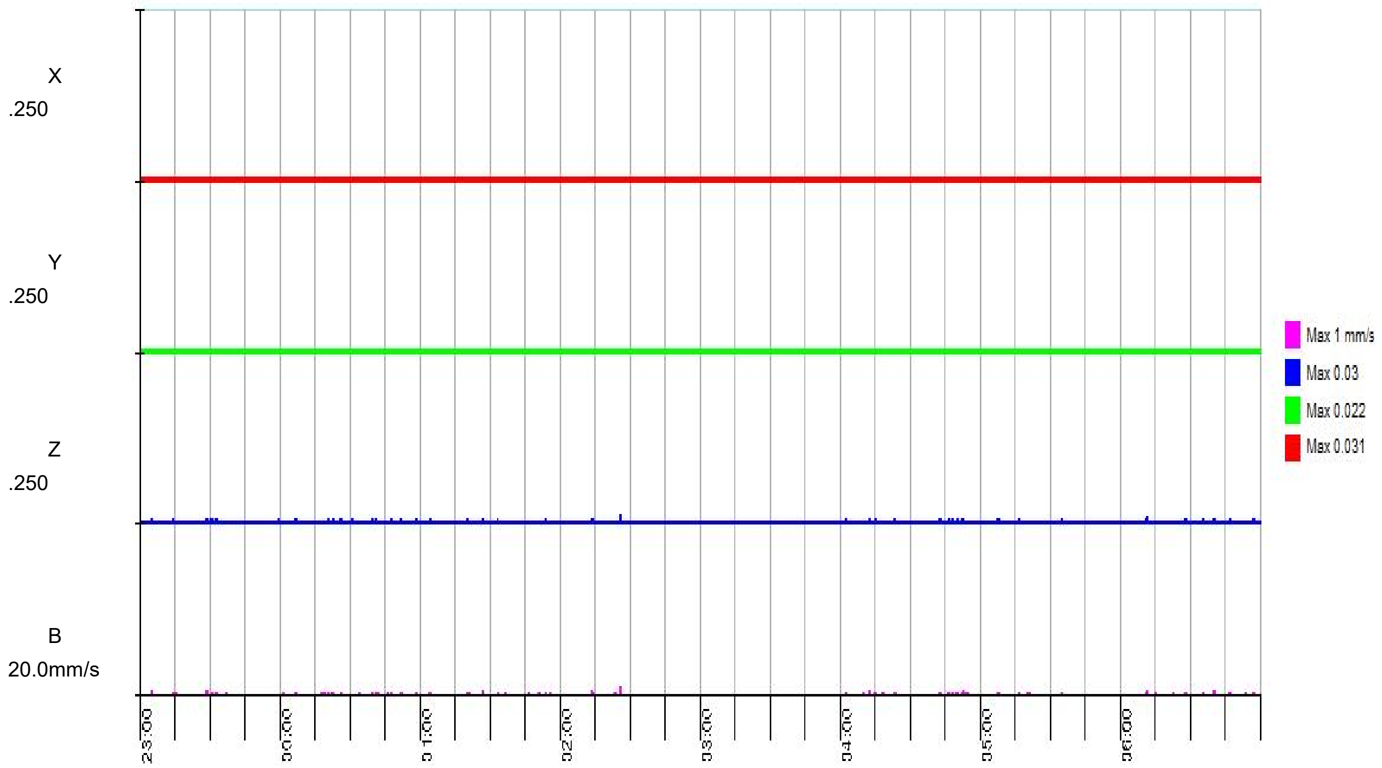


Ev 004 VDV	X	Y	Z	X	Y	Z
		16 Hour				
	.036	.026	.036			
		1 Hour			Total	
Hour 1	.017	.013	.016	.017	.013	.016
Hour 2	.017	.013	.016	.021	.015	.019
Hour 3	.017	.013	.016	.023	.017	.022
Hour 4	.017	.013	.017	.025	.018	.024
Hour 5	.017	.013	.017	.026	.019	.025
Hour 6	.017	.013	.018	.028	.020	.027
Hour 7	.018	.013	.018	.029	.021	.028
Hour 8	.018	.013	.018	.030	.022	.029
Hour 9	.018	.013	.019	.031	.023	.030
Hour 10	.018	.013	.020	.032	.023	.032
Hour 11	.018	.013	.019	.032	.024	.033
Hour 12	.018	.013	.018	.033	.024	.034
Hour 13	.018	.013	.018	.034	.025	.034
Hour 14	.018	.013	.019	.034	.025	.035
Hour 15	.017	.013	.018	.035	.026	.036
Hour 16	.017	.013	.018	.036	.026	.036

Ev 004 Cont	Max	Bank B Time	Date
Event	1.10mm/s	15:39:20	13/05/17
Hour 1	.375mm/s	07:34:40	13/05/17
Hour 2	.450mm/s	08:22:20	13/05/17
Hour 3	.350mm/s	09:54:00	13/05/17
Hour 4	.975mm/s	10:50:10	13/05/17
Hour 5	.375mm/s	11:04:50	13/05/17
Hour 6	.625mm/s	12:36:10	13/05/17
Hour 7	.550mm/s	13:04:00	13/05/17
Hour 8	.350mm/s	14:27:20	13/05/17
Hour 9	1.10mm/s	15:39:20	13/05/17
Hour 10	.450mm/s	16:20:40	13/05/17
Hour 11	.475mm/s	18:00:00	13/05/17
Hour 12	.325mm/s	18:00:10	13/05/17
Hour 13	.350mm/s	19:29:30	13/05/17
Hour 14	.525mm/s	20:42:00	13/05/17
Hour 15	.350mm/s	21:40:20	13/05/17
Hour 16	.375mm/s	22:05:40	13/05/17

Saturday 13th to Sunday 14th May 2017 - Night-time hours

Event 005 13/05/17 23:00:00 Calibrate by: JAN 14

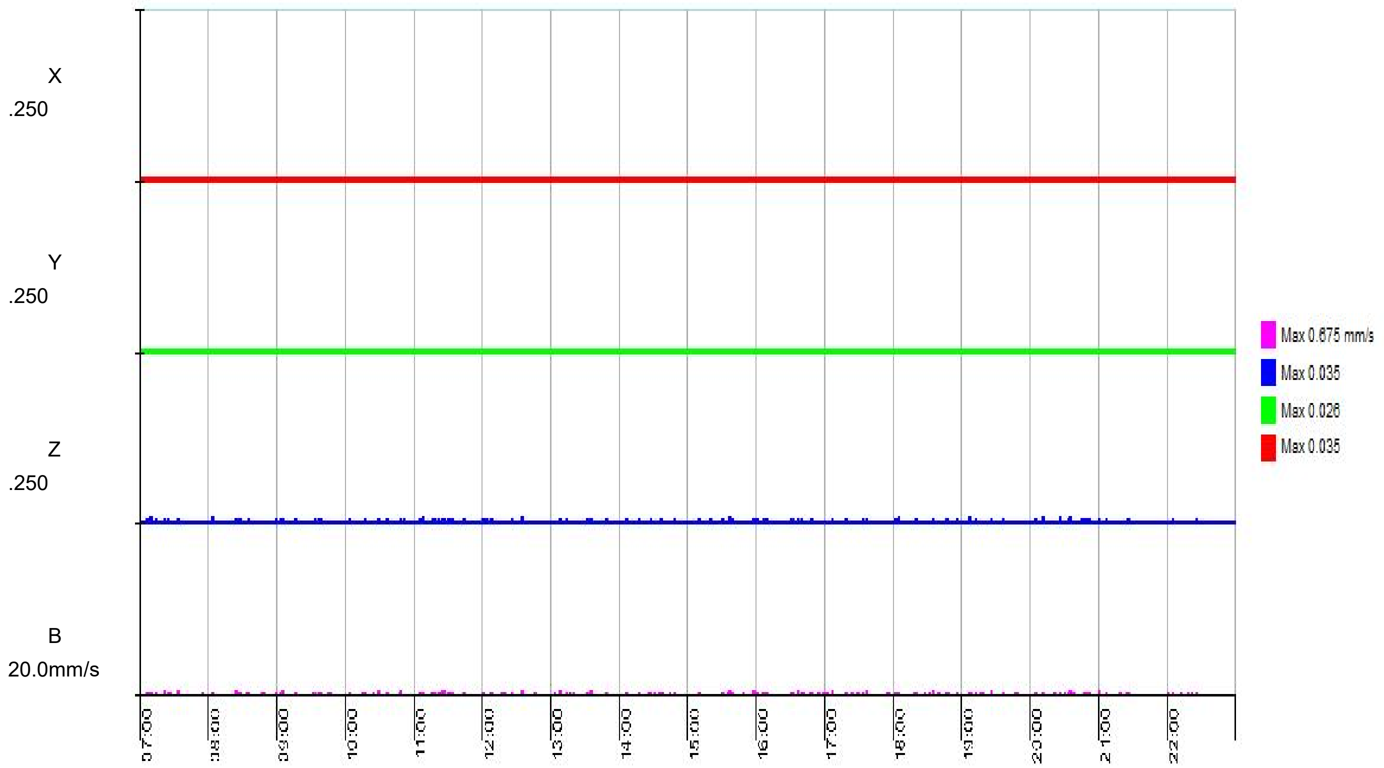


Ev 005 VDV	X	Y	Z	X	Y	Z
		8 Hour				
	.031	.022	.030			
		1 Hour			Total	
Hour 1	.018	.013	.018	.018	.013	.018
Hour 2	.018	.013	.018	.022	.015	.022
Hour 3	.018	.013	.018	.024	.017	.024
Hour 4	.018	.013	.019	.026	.018	.026
Hour 5	.018	.013	.017	.028	.020	.027
Hour 6	.018	.013	.018	.029	.020	.028
Hour 7	.018	.013	.017	.030	.021	.029
Hour 8	.018	.013	.017	.031	.022	.030

Ev 005 Cont	Max	Bank B Time	Date
Event	1.00mm/s	02:25:50	14/05/17
Hour 1	.450mm/s	23:28:40	13/05/17
Hour 2	.375mm/s	00:39:50	14/05/17
Hour 3	.475mm/s	01:26:50	14/05/17
Hour 4	1.00mm/s	02:25:50	14/05/17
Hour 5	.150mm/s	03:15:10	14/05/17
Hour 6	.450mm/s	04:52:40	14/05/17
Hour 7	.375mm/s	05:16:40	14/05/17
Hour 8	.575mm/s	06:40:40	14/05/17

Sunday 14th May 2017 - Daytime hours

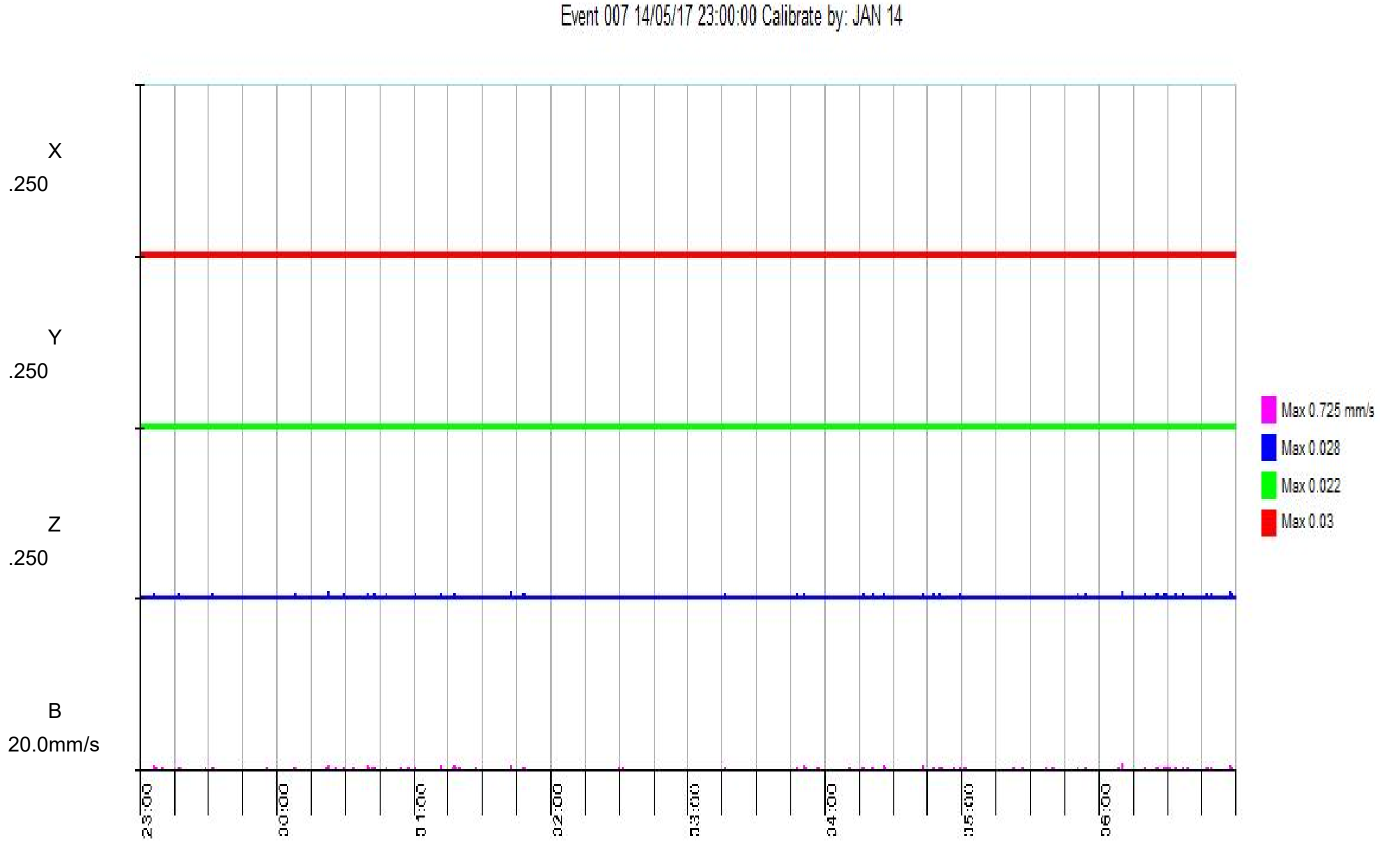
Event 006 14/05/17 07:00:00 Calibrate by: JAN 14



Ev 006 VDV	X	Y	Z	X	Y	Z
		16 Hour				
	.035	.026	.035			
		1 Hour			Total	
Hour 1	.017	.013	.017	.017	.013	.017
Hour 2	.017	.013	.017	.021	.015	.021
Hour 3	.017	.013	.017	.023	.017	.023
Hour 4	.017	.013	.017	.025	.018	.024
Hour 5	.017	.013	.018	.026	.019	.026
Hour 6	.017	.013	.018	.027	.020	.028
Hour 7	.017	.013	.018	.028	.021	.029
Hour 8	.017	.013	.017	.029	.022	.030
Hour 9	.017	.013	.018	.030	.023	.031
Hour 10	.017	.013	.018	.031	.023	.032
Hour 11	.017	.013	.017	.032	.024	.032
Hour 12	.017	.013	.018	.032	.024	.033
Hour 13	.017	.013	.017	.033	.025	.034
Hour 14	.017	.013	.018	.034	.025	.034
Hour 15	.017	.013	.016	.034	.026	.035
Hour 16	.017	.013	.016	.035	.026	.035

Ev 006 Cont	Max	Bank B Time	Date
Event	.675mm/s	15:36:50	14/05/17
Hour 1	.450mm/s	07:21:20	14/05/17
Hour 2	.425mm/s	08:25:20	14/05/17
Hour 3	.425mm/s	09:05:50	14/05/17
Hour 4	.500mm/s	10:48:20	14/05/17
Hour 5	.400mm/s	11:25:30	14/05/17
Hour 6	.425mm/s	12:35:30	14/05/17
Hour 7	.475mm/s	13:35:00	14/05/17
Hour 8	.350mm/s	14:17:50	14/05/17
Hour 9	.675mm/s	15:36:50	14/05/17
Hour 10	.475mm/s	16:37:30	14/05/17
Hour 11	.475mm/s	17:36:30	14/05/17
Hour 12	.450mm/s	18:35:40	14/05/17
Hour 13	.425mm/s	19:26:30	14/05/17
Hour 14	.525mm/s	20:34:40	14/05/17
Hour 15	.450mm/s	21:00:20	14/05/17
Hour 16	.250mm/s	22:27:00	14/05/17

Sunday 14th to Monday 15th May 2017 - Night-time hours

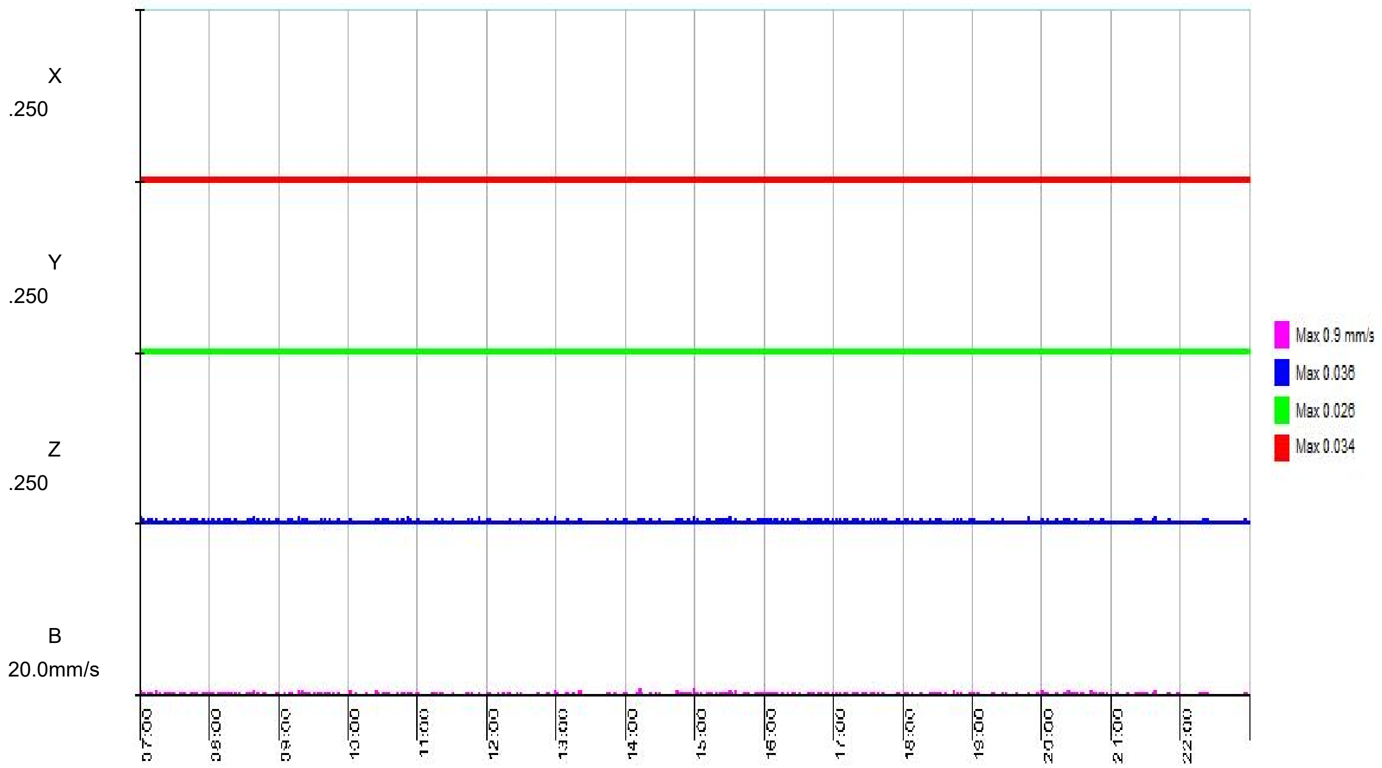


Ev 007 VDV	X	Y	Z	X	Y	Z
		8 Hour				
	.030	.022	.028			
		1 Hour			Total	
Hour 1	.018	.013	.016	.018	.013	.016
Hour 2	.018	.013	.017	.021	.015	.020
Hour 3	.018	.013	.018	.023	.017	.022
Hour 4	.017	.013	.015	.025	.018	.024
Hour 5	.017	.013	.016	.026	.020	.025
Hour 6	.017	.013	.016	.028	.020	.026
Hour 7	.017	.013	.016	.029	.021	.027
Hour 8	.017	.013	.018	.030	.022	.028

Ev 007 Cont	Max	Bank B Time	Date
Event	.725mm/s	06:10:30	15/05/17
Hour 1	.400mm/s	23:06:30	14/05/17
Hour 2	.475mm/s	00:22:50	15/05/17
Hour 3	.550mm/s	01:42:40	15/05/17
Hour 4	.175mm/s	02:29:40	15/05/17
Hour 5	.475mm/s	03:50:50	15/05/17
Hour 6	.575mm/s	04:26:00	15/05/17
Hour 7	.375mm/s	05:40:10	15/05/17
Hour 8	.725mm/s	06:10:30	15/05/17

Monday 15th May 2017 - Daytime hours

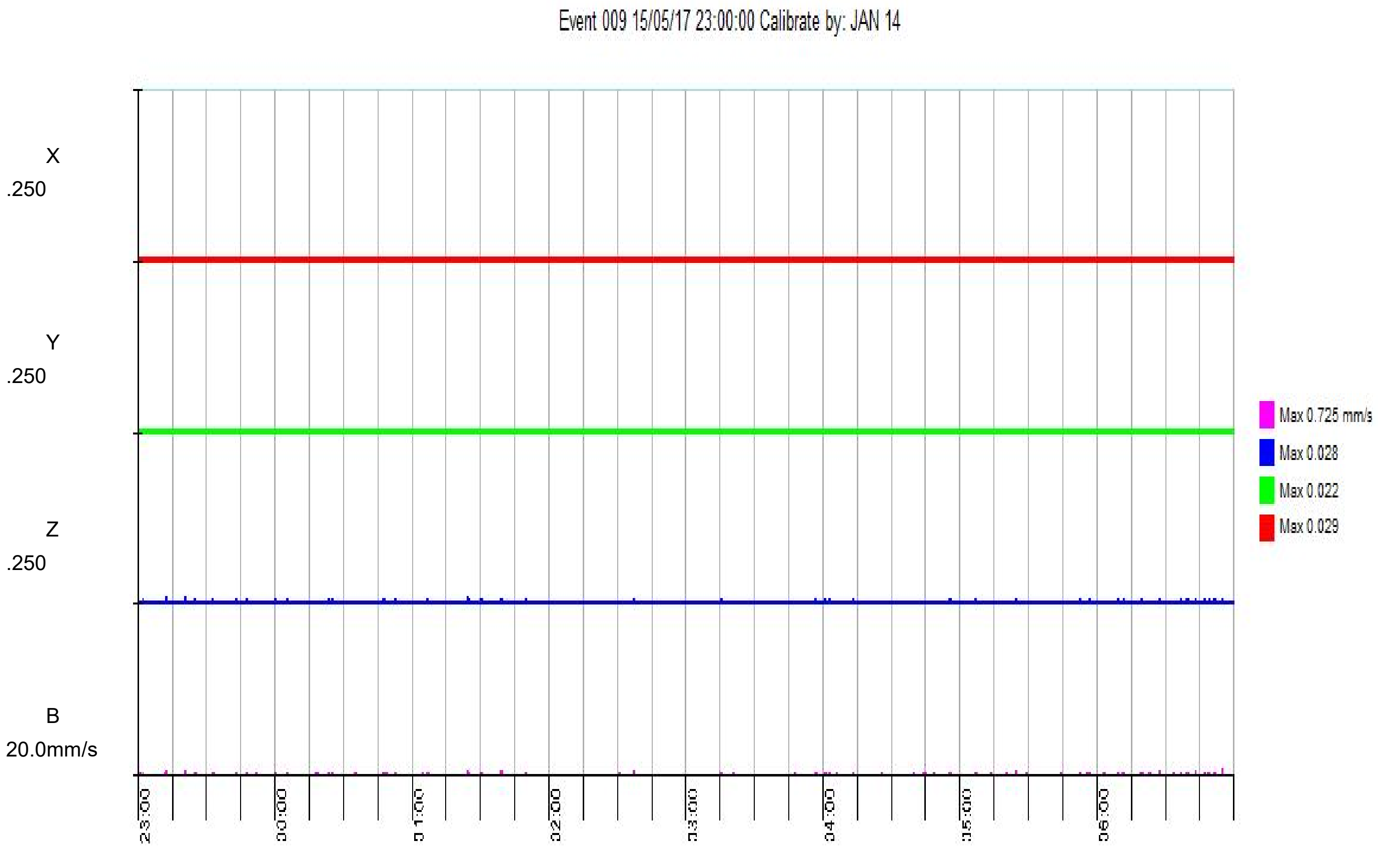
Event 008 15/05/17 07:00:00 Calibrate by: JAN 14



Ev 008	X	Y	Z	X	Y	Z
VDV						
		16 Hour				
	.034	.026	.036			
		1 Hour			Total	
Hour 1	.017	.013	.018	.017	.013	.018
Hour 2	.017	.013	.019	.020	.015	.022
Hour 3	.017	.013	.018	.022	.017	.024
Hour 4	.017	.013	.018	.024	.018	.026
Hour 5	.017	.013	.017	.025	.020	.027
Hour 6	.017	.013	.018	.027	.020	.028
Hour 7	.017	.013	.017	.028	.021	.029
Hour 8	.017	.013	.018	.029	.022	.030
Hour 9	.017	.013	.019	.030	.023	.031
Hour 10	.017	.013	.019	.030	.023	.032
Hour 11	.017	.013	.019	.031	.024	.033
Hour 12	.017	.013	.018	.032	.024	.034
Hour 13	.017	.013	.017	.032	.025	.035
Hour 14	.017	.013	.018	.033	.025	.035
Hour 15	.017	.013	.017	.034	.026	.036
Hour 16	.017	.013	.016	.034	.026	.036

Ev 008		Bank B	
Cont	Max	Time	Date
Event	.900mm/s	14:12:50	15/05/17
Hour 1	.700mm/s	07:01:10	15/05/17
Hour 2	.625mm/s	08:37:50	15/05/17
Hour 3	.500mm/s	09:17:20	15/05/17
Hour 4	.650mm/s	10:02:00	15/05/17
Hour 5	.350mm/s	11:52:50	15/05/17
Hour 6	.625mm/s	12:59:50	15/05/17
Hour 7	.575mm/s	13:21:10	15/05/17
Hour 8	.900mm/s	14:12:50	15/05/17
Hour 9	.600mm/s	15:34:50	15/05/17
Hour 10	.375mm/s	16:20:50	15/05/17
Hour 11	.375mm/s	17:25:00	15/05/17
Hour 12	.400mm/s	18:44:00	15/05/17
Hour 13	.350mm/s	19:49:20	15/05/17
Hour 14	.475mm/s	20:00:50	15/05/17
Hour 15	.450mm/s	21:38:00	15/05/17
Hour 16	.325mm/s	22:56:50	15/05/17

Monday 15th to Tuesday 16th May 2017 - Night-time hours

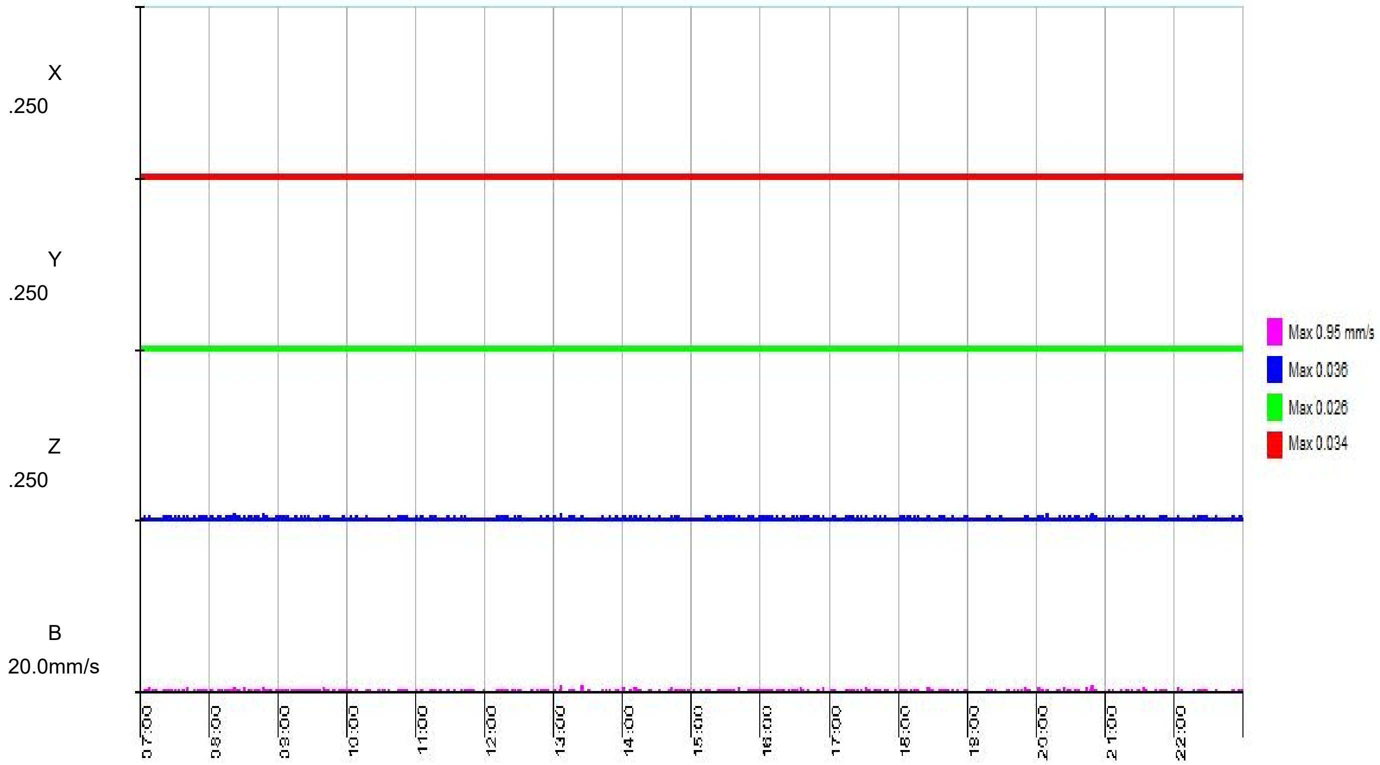

Event 009 15/05/17 23:00:00 Calibrate by: JAN 14

Ev 009	X	Y	Z	X	Y	Z
VDV						
		8 Hour				
	.029	.022	.028			
		1 Hour			Total	
Hour 1	.017	.013	.017	.017	.013	.017
Hour 2	.017	.013	.016	.020	.015	.020
Hour 3	.017	.013	.017	.022	.017	.022
Hour 4	.017	.013	.016	.024	.018	.023
Hour 5	.017	.013	.015	.026	.020	.025
Hour 6	.017	.013	.016	.027	.020	.026
Hour 7	.017	.013	.016	.028	.021	.027
Hour 8	.017	.013	.018	.029	.022	.028

Ev 009		Bank B	
Cont	Max	Time	Date
Event	.725mm/s	06:54:50	16/05/17
Hour 1	.550mm/s	23:12:10	15/05/17
Hour 2	.325mm/s	00:23:40	16/05/17
Hour 3	.525mm/s	01:24:30	16/05/17
Hour 4	.525mm/s	02:37:10	16/05/17
Hour 5	.350mm/s	03:56:50	16/05/17
Hour 6	.325mm/s	04:06:20	16/05/17
Hour 7	.425mm/s	05:24:50	16/05/17
Hour 8	.725mm/s	06:54:50	16/05/17

Tuesday 16th May 2017 - Daytime hours

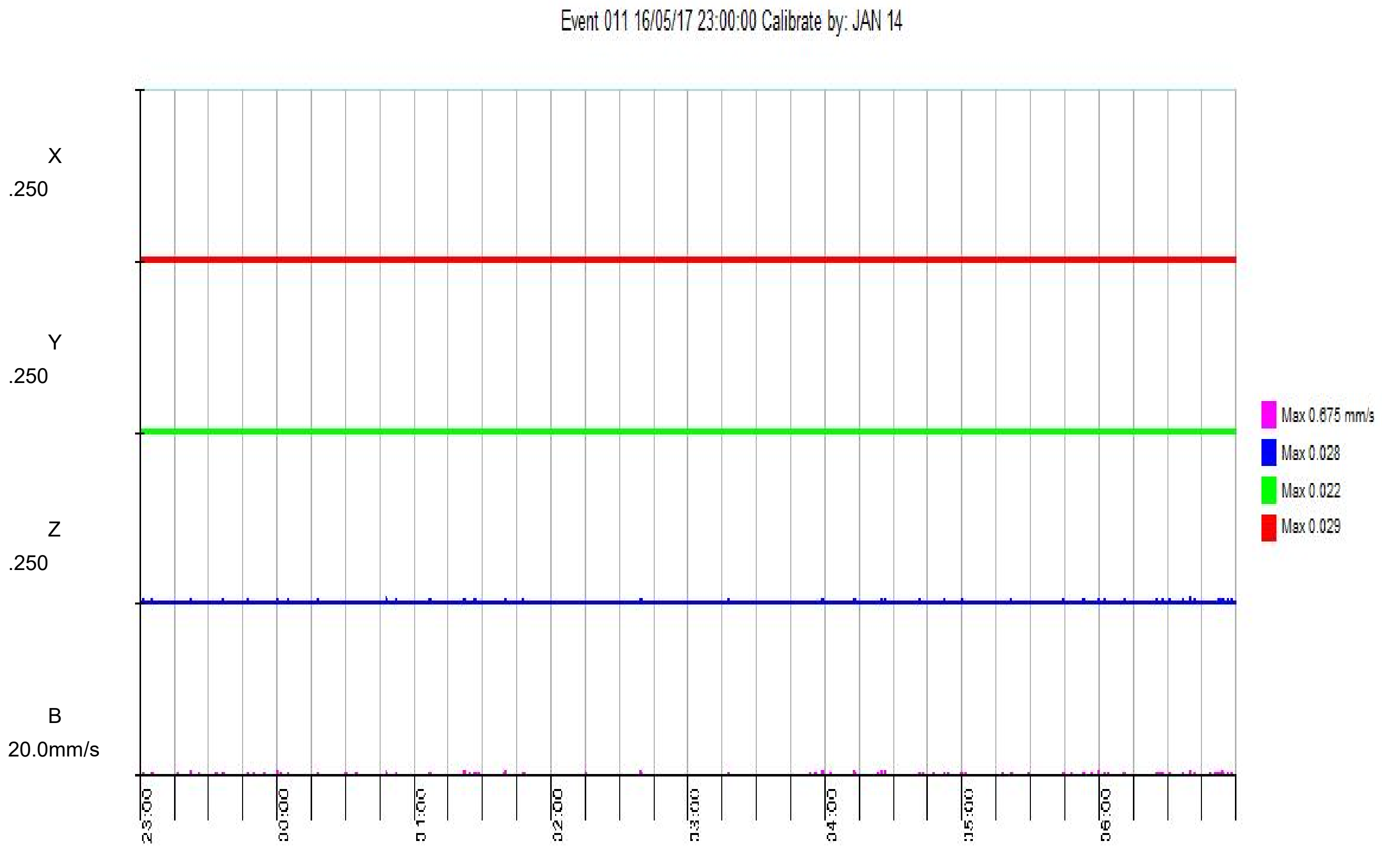
Event 010 16/05/17 07:00:00 Calibrate by: JAN 14



Ev 010 VDV	X	Y	Z	X	Y	Z
		16 Hour				
	.034	.026	.036			
		1 Hour			Total	
Hour 1	.017	.013	.018	.017	.013	.018
Hour 2	.017	.013	.019	.020	.015	.022
Hour 3	.017	.013	.017	.022	.017	.024
Hour 4	.017	.013	.017	.024	.018	.025
Hour 5	.017	.013	.017	.025	.020	.026
Hour 6	.017	.013	.017	.026	.020	.028
Hour 7	.017	.013	.018	.028	.021	.029
Hour 8	.017	.013	.018	.029	.022	.030
Hour 9	.017	.013	.018	.029	.023	.031
Hour 10	.017	.013	.019	.030	.023	.032
Hour 11	.017	.013	.018	.031	.024	.033
Hour 12	.017	.013	.018	.032	.024	.033
Hour 13	.017	.013	.016	.032	.025	.034
Hour 14	.017	.013	.018	.033	.025	.035
Hour 15	.017	.013	.017	.034	.026	.035
Hour 16	.017	.013	.016	.034	.026	.036

Ev 010 Cont	Max	Bank B Time	Date
Event	.950mm/s	13:07:10	16/05/17
Hour 1	.400mm/s	07:08:20	16/05/17
Hour 2	.450mm/s	08:22:30	16/05/17
Hour 3	.400mm/s	09:40:10	16/05/17
Hour 4	.375mm/s	10:48:50	16/05/17
Hour 5	.375mm/s	11:13:10	16/05/17
Hour 6	.375mm/s	12:11:20	16/05/17
Hour 7	.950mm/s	13:07:10	16/05/17
Hour 8	.675mm/s	14:10:50	16/05/17
Hour 9	.525mm/s	15:41:40	16/05/17
Hour 10	.550mm/s	16:55:00	16/05/17
Hour 11	.500mm/s	17:31:50	16/05/17
Hour 12	.575mm/s	18:26:40	16/05/17
Hour 13	.550mm/s	19:50:30	16/05/17
Hour 14	.725mm/s	20:49:00	16/05/17
Hour 15	.525mm/s	21:33:50	16/05/17
Hour 16	.500mm/s	22:03:10	16/05/17

Tuesday 16th to Wednesday 17th May 2017 - Night-time hours



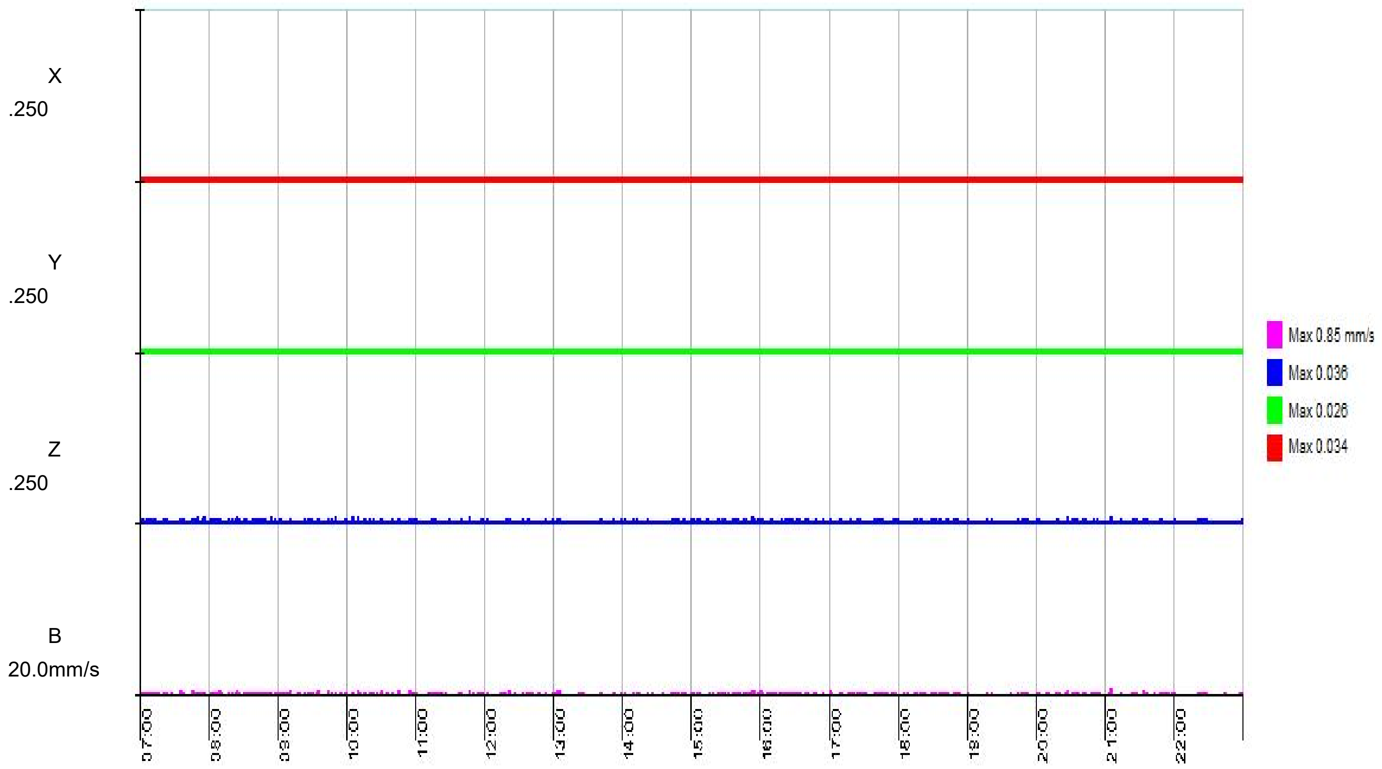
Event 011 16/05/17 23:00:00 Calibrate by: JAN 14

Ev 011 VDV	X	Y	Z	X	Y	Z
		8 Hour				
	.029	.022	.028			
		1 Hour			Total	
Hour 1	.017	.013	.016	.017	.013	.016
Hour 2	.017	.013	.017	.020	.015	.020
Hour 3	.017	.013	.016	.022	.017	.022
Hour 4	.017	.013	.015	.024	.018	.023
Hour 5	.017	.013	.016	.025	.020	.024
Hour 6	.017	.013	.016	.027	.020	.026
Hour 7	.017	.013	.016	.028	.021	.027
Hour 8	.017	.013	.018	.029	.022	.028

Ev 011 Cont	Max	Bank B Time	Date
Event	.675mm/s	00:48:00	17/05/17
Hour 1	.425mm/s	23:22:20	16/05/17
Hour 2	.675mm/s	00:48:00	17/05/17
Hour 3	.450mm/s	01:22:00	17/05/17
Hour 4	.450mm/s	02:39:30	17/05/17
Hour 5	.600mm/s	03:59:10	17/05/17
Hour 6	.475mm/s	04:13:00	17/05/17
Hour 7	.525mm/s	05:59:50	17/05/17
Hour 8	.575mm/s	06:40:00	17/05/17

Wednesday 17th May 2017 - Daytime hours

Event 012 17/05/17 07:00:00 Calibrate by: JAN 14

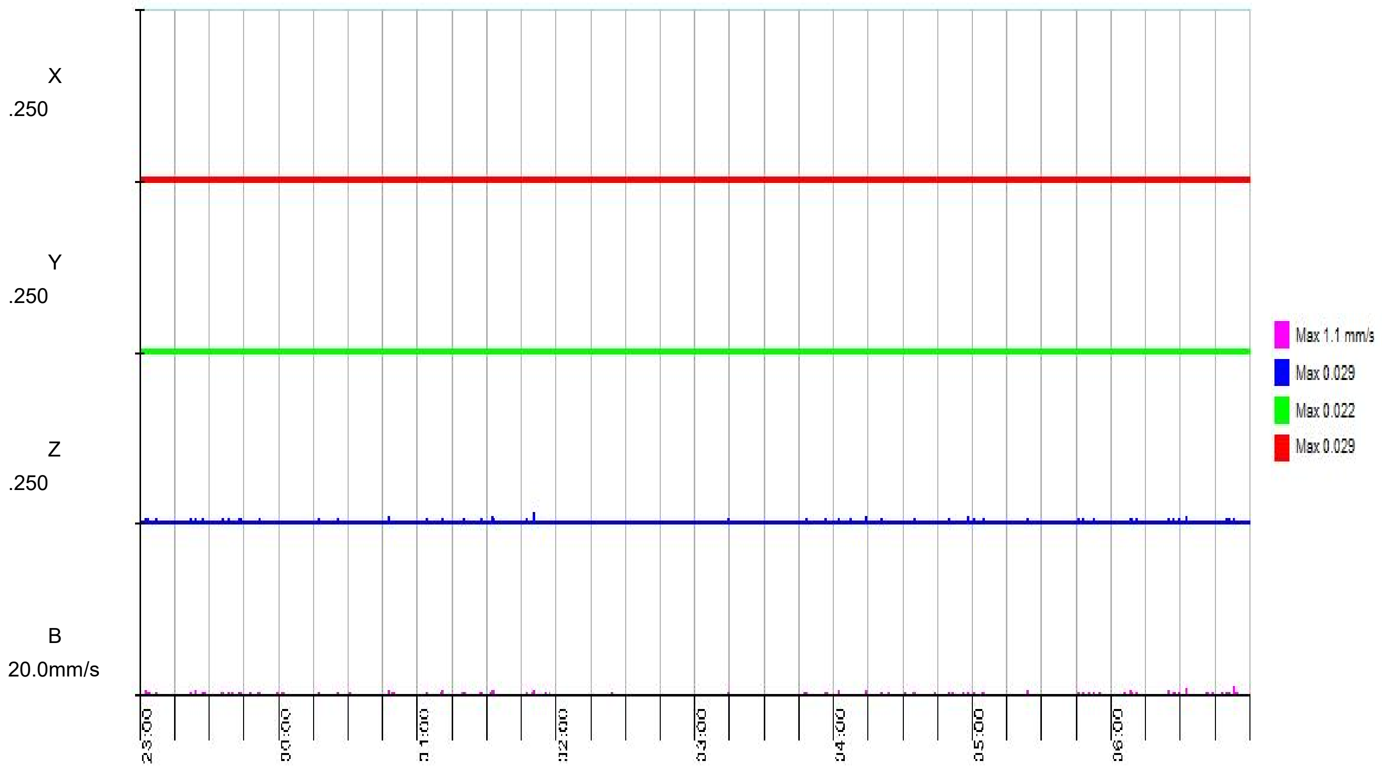


Ev 012 VDV	X	Y	Z	X	Y	Z
		16 Hour				
	.034	.026	.036			
		1 Hour			Total	
Hour 1	.016	.013	.019	.016	.013	.019
Hour 2	.016	.013	.019	.020	.015	.023
Hour 3	.016	.013	.018	.022	.017	.025
Hour 4	.016	.013	.018	.023	.018	.026
Hour 5	.017	.013	.017	.025	.020	.028
Hour 6	.017	.013	.016	.026	.021	.028
Hour 7	.017	.013	.017	.027	.021	.029
Hour 8	.017	.013	.017	.028	.022	.030
Hour 9	.017	.013	.018	.029	.023	.031
Hour 10	.017	.013	.018	.030	.023	.032
Hour 11	.017	.013	.017	.031	.024	.033
Hour 12	.017	.013	.017	.031	.024	.033
Hour 13	.017	.013	.017	.032	.025	.034
Hour 14	.017	.013	.018	.033	.025	.035
Hour 15	.017	.013	.018	.033	.026	.035
Hour 16	.017	.013	.017	.034	.026	.036

Ev 012 Cont	Max	Bank B Time	Date
Event	.850mm/s	21:04:40	17/05/17
Hour 1	.400mm/s	07:35:30	17/05/17
Hour 2	.475mm/s	08:24:10	17/05/17
Hour 3	.525mm/s	09:35:20	17/05/17
Hour 4	.675mm/s	10:10:30	17/05/17
Hour 5	.400mm/s	11:48:00	17/05/17
Hour 6	.400mm/s	12:22:20	17/05/17
Hour 7	.500mm/s	13:04:30	17/05/17
Hour 8	.325mm/s	14:02:10	17/05/17
Hour 9	.425mm/s	15:55:00	17/05/17
Hour 10	.475mm/s	16:00:20	17/05/17
Hour 11	.475mm/s	17:01:20	17/05/17
Hour 12	.375mm/s	18:36:10	17/05/17
Hour 13	.350mm/s	19:49:30	17/05/17
Hour 14	.525mm/s	20:27:10	17/05/17
Hour 15	.850mm/s	21:04:40	17/05/17
Hour 16	.350mm/s	22:58:40	17/05/17

Wednesday 17th to Thursday 18th May 2017 - Night-time hours

Event 013 17/05/17 23:00:00 Calibrate by: JAN 14

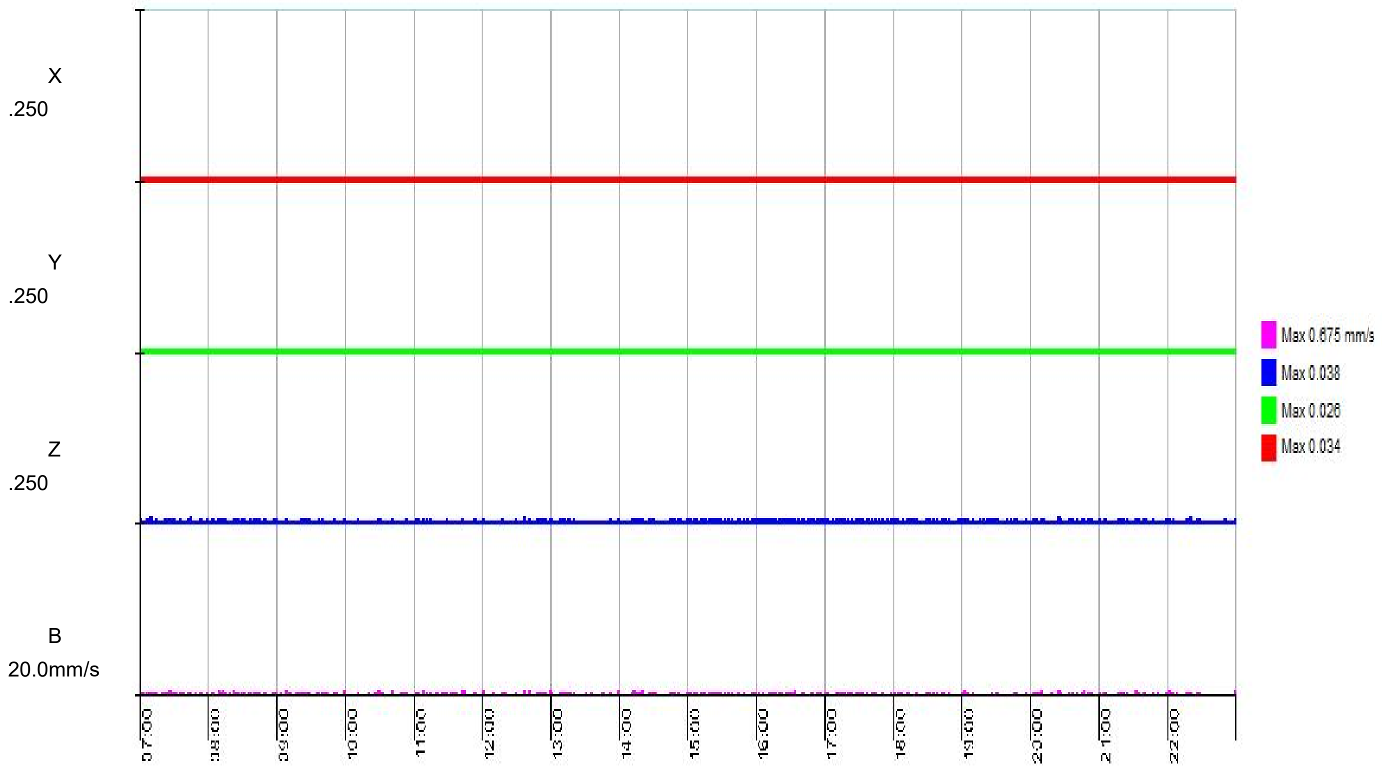


Ev 013 VDV	X	Y	Z	X	Y	Z
		8 Hour				
	.029	.022	.029			
		1 Hour			Total	
Hour 1	.017	.013	.017	.017	.013	.017
Hour 2	.017	.013	.017	.020	.015	.020
Hour 3	.017	.013	.020	.022	.017	.024
Hour 4	.017	.013	.015	.024	.018	.025
Hour 5	.017	.013	.015	.025	.020	.026
Hour 6	.017	.013	.018	.027	.020	.027
Hour 7	.017	.013	.016	.028	.021	.028
Hour 8	.017	.013	.018	.029	.022	.029

Ev 013 Cont	Max	Bank B Time	Date
Event	1.10mm/s	06:53:30	18/05/17
Hour 1	.525mm/s	23:02:20	17/05/17
Hour 2	.525mm/s	00:47:40	18/05/17
Hour 3	.625mm/s	01:32:30	18/05/17
Hour 4	.300mm/s	02:24:10	18/05/17
Hour 5	.325mm/s	03:48:20	18/05/17
Hour 6	.425mm/s	04:14:10	18/05/17
Hour 7	.475mm/s	05:24:00	18/05/17
Hour 8	1.10mm/s	06:53:30	18/05/17

Thursday 18th May 2017 - Daytime hours

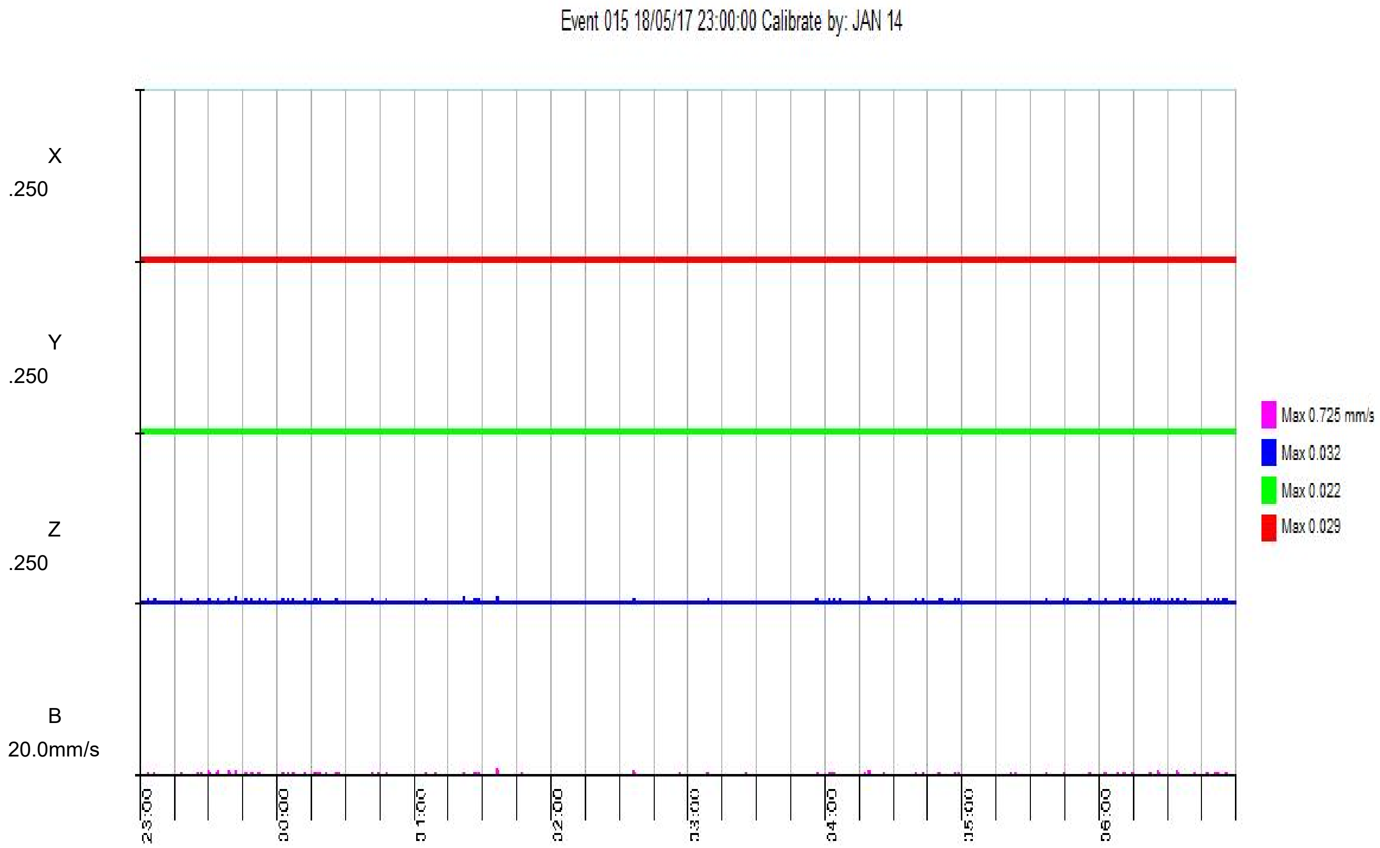
Event 014 18/05/17 07:00:00 Calibrate by: JAN 14



Ev 014 VDV	X	Y	Z	X	Y	Z
		16 Hour				
	.034	.026	.038			
		1 Hour			Total	
Hour 1	.016	.013	.019	.016	.013	.019
Hour 2	.016	.013	.018	.020	.015	.022
Hour 3	.016	.013	.017	.022	.017	.024
Hour 4	.016	.013	.017	.023	.018	.025
Hour 5	.016	.013	.017	.025	.020	.027
Hour 6	.017	.013	.018	.026	.020	.028
Hour 7	.017	.013	.018	.027	.021	.029
Hour 8	.017	.013	.019	.028	.022	.031
Hour 9	.017	.013	.020	.029	.023	.032
Hour 10	.017	.013	.020	.030	.023	.033
Hour 11	.017	.013	.019	.031	.024	.034
Hour 12	.017	.013	.019	.031	.024	.035
Hour 13	.017	.013	.019	.032	.025	.036
Hour 14	.017	.013	.020	.033	.025	.037
Hour 15	.017	.013	.019	.033	.026	.037
Hour 16	.017	.013	.019	.034	.026	.038

Ev 014 Cont	Max	Bank B Time	Date
Event	.675mm/s	21:31:50	18/05/17
Hour 1	.575mm/s	07:26:30	18/05/17
Hour 2	.500mm/s	08:09:40	18/05/17
Hour 3	.425mm/s	09:08:10	18/05/17
Hour 4	.500mm/s	10:30:00	18/05/17
Hour 5	.625mm/s	11:08:40	18/05/17
Hour 6	.550mm/s	12:36:10	18/05/17
Hour 7	.600mm/s	13:59:40	18/05/17
Hour 8	.500mm/s	14:13:10	18/05/17
Hour 9	.350mm/s	15:21:00	18/05/17
Hour 10	.450mm/s	16:34:10	18/05/17
Hour 11	.375mm/s	17:13:30	18/05/17
Hour 12	.325mm/s	18:00:30	18/05/17
Hour 13	.400mm/s	19:02:10	18/05/17
Hour 14	.500mm/s	20:24:20	18/05/17
Hour 15	.675mm/s	21:31:50	18/05/17
Hour 16	.550mm/s	22:59:30	18/05/17

Thursday 18th to Friday 19th May 2017 - Night-time hours

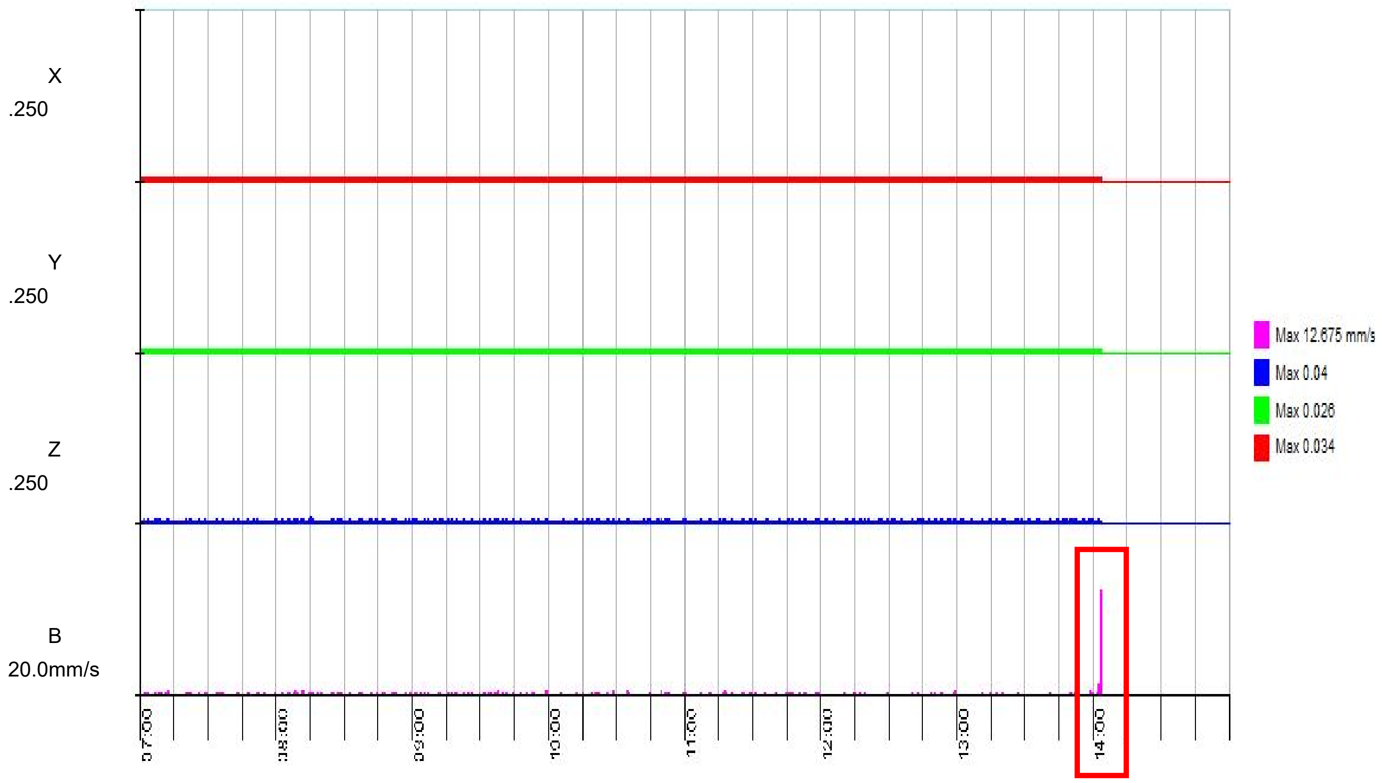


Ev 015 VDV	X	Y	Z	X	Y	Z
		8 Hour				
	.029	.022	.032			
		1 Hour			Total	
Hour 1	.017	.013	.019	.017	.013	.019
Hour 2	.017	.013	.019	.020	.015	.023
Hour 3	.017	.013	.020	.022	.017	.025
Hour 4	.017	.013	.018	.024	.018	.027
Hour 5	.017	.013	.018	.025	.020	.028
Hour 6	.017	.013	.019	.027	.020	.030
Hour 7	.017	.013	.018	.028	.021	.031
Hour 8	.017	.013	.019	.029	.022	.032

Ev 015 Cont	Max	Bank B Time	Date
Event	.725mm/s	01:36:30	19/05/17
Hour 1	.500mm/s	23:34:10	18/05/17
Hour 2	.375mm/s	00:04:50	19/05/17
Hour 3	.725mm/s	01:36:30	19/05/17
Hour 4	.525mm/s	02:36:30	19/05/17
Hour 5	.225mm/s	03:08:40	19/05/17
Hour 6	.550mm/s	04:19:40	19/05/17
Hour 7	.300mm/s	05:56:10	19/05/17
Hour 8	.450mm/s	06:34:30	19/05/17

Friday 19th May 2017 - Daytime hours

Event 016 19/05/17 07:00:00 Calibrate by: JAN 14



Ev 016 VDV	X	Y	Z	X	Y	Z
		16 Hour				
	.034	.026	.040			
		1 Hour			Total	
Hour 1	.017	.013	.019	.017	.013	.019
Hour 2	.017	.013	.020	.020	.015	.024
Hour 3	.017	.013	.020	.022	.017	.026
Hour 4	.017	.013	.019	.024	.018	.028
Hour 5	.017	.013	.019	.025	.020	.030
Hour 6	.017	.013	.020	.026	.020	.031
Hour 7	.017	.013	.020	.027	.021	.032
Hour 8	.017	.013	.019	.027	.021	.032

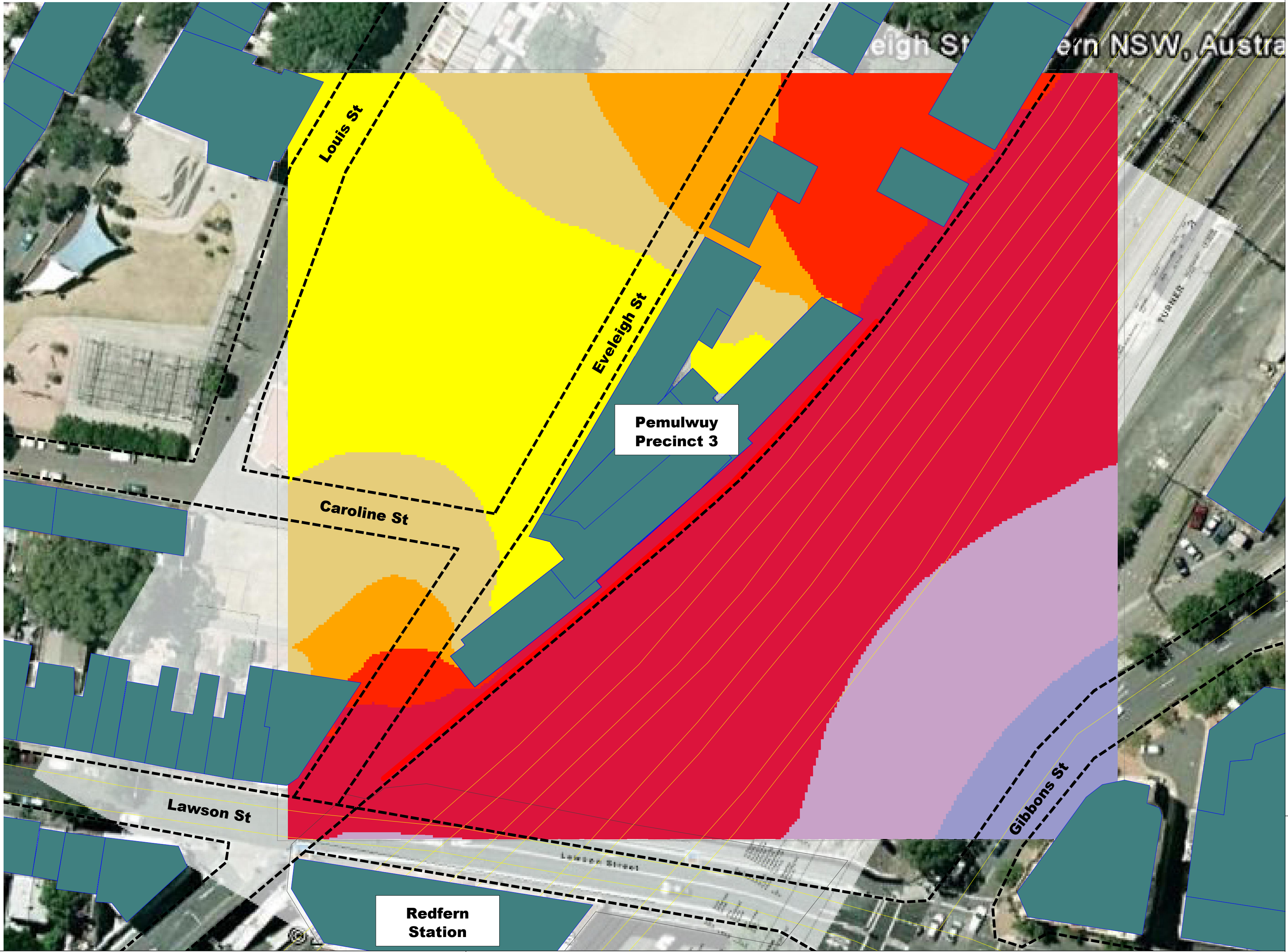
Ev 016 Cont	Max	Bank B Time	Date
Event	12.7mm/s	14:03:40	19/05/17
Hour 1	.625mm/s	07:12:20	19/05/17
Hour 2	.400mm/s	08:08:10	19/05/17
Hour 3	.525mm/s	09:59:00	19/05/17
Hour 4	.450mm/s	10:35:00	19/05/17
Hour 5	.450mm/s	11:17:50	19/05/17
Hour 6	.400mm/s	12:59:10	19/05/17
Hour 7	.575mm/s	13:58:50	19/05/17
Hour 8	12.7mm/s	14:03:40	19/05/17

Vibration due to logger pick-up.

APPENDIX B

APPENDIX B

APPENDIX B



**** NOISE SOURCES ****

~ Rail noise

~ Road traffic noise

NOTES:

1. Noise levels shown are LAeq 15hr

2. Night-time LAeq 9hr noise levels approx. 5dB lower

3. LAeq 1hr noise levels 2-3dB higher

4. Noise contours correspond to the height of Level 02

PRINT DATE: 1.06.2017

VERSION: P3 - traffic - v1

—	Line Source
▬	Building
▬	Barrier
☐	Bridge
○—○	Contour Line
⊗	Receiver
☐	Calculation Area

🟩	35.0 <= ... < 40.0
🟩	40.0 <= ... < 45.0
🟨	45.0 <= ... < 50.0
🟫	50.0 <= ... < 55.0
🟧	55.0 <= ... < 60.0
🟥	60.0 <= ... < 65.0
🟥	65.0 <= ... < 70.0
🟪	70.0 <= ... < 75.0
🟪	75.0 <= ... < 80.0
🟦	80.0 <= ... < 85.0
🟦	85.0 <= ... < 90.0
⬛	90.0 <= ... < 95.0
⬛	95.0 <= ... < 100.0
⬛	100.0 <= ...

KOIKAS ACOUSTICS PTY LTD
CONSULTANTS IN NOISE & VIBRATION
ABN 12 058 524 771 Commercial 1 (Unit 27), 637 - 645 Forest Road, Bexley 2207
E- mail Nick@KoikasAcoustics.com F (02) 9587 5337 P (02) 9587 9702

JOB NUMBER: 2705
CLIENT: DeiCorp
SITE ADDRESS: 83-123 Eveleigh St, Redfern
ASSESSED TO: See acoustic report
LIMITING CRITERIA: See acoustic report

APPENDIX C

A
P
P
E
N
D
I
X

C

APPENDIX C

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *2075*
Client *DeiCorp*
Site *Pemulwuy Precinct 3*
Room *Unit Type B - north facing - L8 to L21 (glass façade)*

ROOM DATA
Height= 2.6 m Depth= 8.5 m
Width= 3 m VOL= 55.4 m3

		63	125	250	500	1k	2k	4k	8k	Area
	Bedroom, timber floor, furnished (RT60, sec)	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.38
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	36	46	52	54	54	52	50	41	60
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	15.6
STL 2										
STL 3										
STL 4										
	Noise through Component 1	5	9	15	16	7	-2	-11	-26	20
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**8**	**11**	**16**	**16**	**9**	**6**	**5**	**5**	**20**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	33	44	51	52	52	51	48	39	58
STL 1	*6.38mm laminated glass with Q-lon seals*	*18*	*22*	*25*	*30*	*34*	*29*	*40*	*44*	7.8
STL 2										
STL 3										
STL 4										
	Noise through Component 1	17	24	28	23	18	22	9	-5	31
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**18**	**25**	**28**	**23**	**18**	**23**	**10**	**5**	**31**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

	Noise Transmission Through Each Façade LAeq,Period [dB]								
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	8	11	16	16	9	6	5	5	20
Façade 2	18	25	28	23	18	23	10	5	31
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**18**	**25**	**28**	**24**	**19**	**23**	**12**	**9**	**32**

KOIKAS ACOUSTICS PTY LTD

TRAFFIC NOISE INTRUSION CALCULATIONS

Job	*2075*
Client	*DeiCorp*
Site	*Pemulwuy Precinct 3*
Room	*Unit Type A - fronting rail corridor - sleeping area*

ROOM DATA

Height=	2.6 m	Depth=	6.5 m
Width=	3.5 m	VOL=	59.2 m3

		63	125	250	500	1k	2k	4k	8k	Area
	Bedroom, timber floor, furnished (RT60, sec)	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.38
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	39	48	55	56	57	55	53	45	63
STL 1	*150 mm thick concrete*	36	42	41	42	50	58	65	70	5.2
STL 2	*6mm monolithic glass with Q-lon seals*	20	25	29	25	26	26	33	36	3.9
STL 3										
STL 4										
	Noise through Component 1	3	6	13	13	5	-4	-13	-27	17
	Noise through Component 2	18	22	25	28	28	27	18	6	34
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**18**	**22**	**25**	**29**	**28**	**27**	**18**	**8**	**34**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

Noise Transmission Through Each Façade LAeq,Period [dB]

Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	18	22	25	29	28	27	18	8	34
Façade 2	0	0	0	0	0	0	0	0	0
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**19**	**22**	**25**	**29**	**28**	**27**	**18**	**10**	**34**

KOIKAS ACOUSTICS PTY LTD

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *2075*
Client *DeiCorp*
Site *Pemulwuy Precinct 3*
Room *Unit Type A - fronting rail corridor - sleeping area*

ROOM DATA

Height=	2.6 m	Depth=	6.5 m
Width=	3.5 m	VOL=	59.2 m3

		63	125	250	500	1k	2k	4k	8k	Area
	Bedroom, timber floor, furnished (RT60, sec)	*0.5*	*0.5*	*0.4*	*0.4*	*0.3*	*0.3*	*0.3*	*0.3*	*0.38*
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	37	46	53	54	55	53	51	43	61
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	5.2
STL 2	*6mm monolithic glass with Q-lon seals*	*20*	*25*	*29*	*25*	*26*	*26*	*33*	*36*	3.9
STL 3										
STL 4										
	Noise through Component 1	1	4	11	11	3	-6	-15	-29	15
	Noise through Component 2	16	20	22	26	26	25	16	4	32
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**16**	**20**	**23**	**27**	**26**	**25**	**16**	**6**	**32**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

Noise Transmission Through Each Façade LAeq,Period [dB]

Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	16	20	23	27	26	25	16	6	32
Façade 2	0	0	0	0	0	0	0	0	0
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**16**	**20**	**23**	**27**	**27**	**25**	**16**	**9**	**32**

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *2075*
Client *DeiCorp*
Site *Pemulwuy Precinct 3*
Room *common area for 5 bed cluster (rail façade) - UG to L6*

ROOM DATA

Height=	2.6 m	Depth=	8 m
Width=	3.5 m	VOL=	72.8 m3

		63	125	250	500	1k	2k	4k	8k	Area
	KLD, timber and tile floor, furnished (RT60, sec)	*0.6*	*0.6*	*0.6*	*0.7*	*0.7*	*0.7*	*0.6*	*0.6*	*0.64*
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	42	51	58	59	60	58	56	48	66
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	7.8
STL 2	*6.38mm laminated glass with Q-lon seals*	*18*	*22*	*25*	*30*	*34*	*29*	*40*	*44*	5.2
STL 3										
STL 4										
	Noise through Component 1	8	11	19	20	13	3	-7	-20	23
	Noise through Component 2	24	30	34	30	27	30	17	4	38
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**24**	**30**	**34**	**30**	**27**	**30**	**17**	**7**	**38**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	38	46	52	53	54	51	49	41	59
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	23.4
STL 2										
STL 3										
STL 4										
	Noise through Component 1	9	11	18	18	12	1	-9	-22	22
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**10**	**12**	**18**	**19**	**12**	**6**	**5**	**5**	**22**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]	27	33	38	42	46	43	40	30	50
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	4.4
STL 2	*4mm monolithic glass with Q-lon seals*	*15*	*19*	*23*	*24*	*27*	*29*	*26*	*31*	2.1
STL 3										
STL 4										
	Noise through Component 1	-10	-9	-3	0	-4	-15	-25	-41	3
	Noise through Component 2	8	10	11	15	16	11	10	-5	21
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**9**	**11**	**12**	**15**	**16**	**12**	**11**	**4**	**21**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

Noise Transmission Through Each Façade LAeq,Period [dB]

Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	24	30	34	30	27	30	17	7	38
Façade 2	10	12	18	19	12	6	5	5	22
Façade 3	9	11	12	15	16	12	11	4	21
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**24**	**30**	**34**	**31**	**27**	**30**	**18**	**10**	**38**

KOIKAS ACOUSTICS PTY LTD

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *2075*
Client *DeiCorp*
Site *Pemulwuy Precinct 3*
Room *common area for 5 bed cluster (south end) - L2 to L12*

ROOM DATA

Height=	2.6 m	Depth=	7 m
Width=	3.5 m	VOL=	63.7 m3

		63	125	250	500	1k	2k	4k	8k	Area
	KLD, timber and tile floor, furnished (RT60, sec)	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.64
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	28	33	39	42	45	44	38	26	50
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	9.1
STL 2										
STL 3										
STL 4										
	Noise through Component 1	-5	-6	1	4	-1	-10	-24	-41	7
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**5**	**5**	**6**	**7**	**6**	**5**	**5**	**5**	**9**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	39	44	51	53	56	54	50	40	60
STL 1	*6.38mm laminated glass with Q-lon seals*	*18*	*22*	*25*	*30*	*34*	*29*	*40*	*44*	18.2
STL 2										
STL 3										
STL 4										
	Noise through Component 1	27	29	33	30	29	32	17	2	38
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**27**	**29**	**33**	**30**	**29**	**32**	**17**	**7**	**38**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]	42	50	57	58	60	58	55	46	65
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	9.1
STL 2										
STL 3										
STL 4										
	Noise through Component 1	9	11	19	20	14	4	-7	-21	24
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**10**	**12**	**20**	**20**	**15**	**7**	**5**	**5**	**24**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

Noise Transmission Through Each Façade LAeq,Period [dB]

Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	5	5	6	7	6	5	5	5	9
Façade 2	27	29	33	30	29	32	17	7	38
Façade 3	10	12	20	20	15	7	5	5	24
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**27**	**29**	**33**	**31**	**29**	**32**	**17**	**11**	**38**

KOIKAS ACOUSTICS PTY LTD

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *2075*
Client *DeiCorp*
Site *Pemulwuy Precinct 3*
Room *common area for 5 bed cluster (south end) - L13 to L16*

ROOM DATA

Height=	2.6 m	Depth=	7 m
Width=	3.5 m	VOL=	63.7 m3

	63	125	250	500	1k	2k	4k	8k	Area
KLD, timber and tile floor, furnished (RT60, sec)	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.64
EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	30	35	40	43	46	44	39	26	50
STL 1 *150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	9.1
STL 2									
STL 3									
STL 4									
Noise through Component 1	-3	-4	2	5	0	-10	-23	-41	8
Noise through Component 2	0	0	0	0	0	0	0	0	0
Noise through Component 3	0	0	0	0	0	0	0	0	0
Noise through Component 4	0	0	0	0	0	0	0	0	0
NOISE THROUGH FAÇADE 1	**5**	**5**	**7**	**8**	**6**	**5**	**5**	**5**	**10**
EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	37	42	48	50	53	50	46	36	57
STL 1 *6mm monolithic glass with Q-lon seals*	*20*	*25*	*29*	*25*	*26*	*26*	*33*	*36*	18.2
STL 2									
STL 3									
STL 4									
Noise through Component 1	23	23	26	32	35	31	20	6	38
Noise through Component 2	0	0	0	0	0	0	0	0	0
Noise through Component 3	0	0	0	0	0	0	0	0	0
Noise through Component 4	0	0	0	0	0	0	0	0	0
NOISE THROUGH FAÇADE 2	**23**	**23**	**26**	**32**	**35**	**31**	**20**	**9**	**38**
EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]	40	49	56	57	58	56	53	43	63
STL 1 *150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	9.1
STL 2									
STL 3									
STL 4									
Noise through Component 1	7	10	18	19	12	2	-9	-24	23
Noise through Component 2	0	0	0	0	0	0	0	0	0
Noise through Component 3	0	0	0	0	0	0	0	0	0
Noise through Component 4	0	0	0	0	0	0	0	0	0
NOISE THROUGH FAÇADE 3	**9**	**11**	**19**	**19**	**13**	**7**	**5**	**5**	**23**
EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1									
STL 2									
STL 3									
STL 4									
Noise through Component 1	0	0	0	0	0	0	0	0	0
Noise through Component 2	0	0	0	0	0	0	0	0	0
Noise through Component 3	0	0	0	0	0	0	0	0	0
Noise through Component 4	0	0	0	0	0	0	0	0	0
NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

Noise Transmission Through Each Façade LAeq,Period [dB]

Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	5	5	7	8	6	5	5	5	10
Façade 2	23	23	26	32	35	31	20	9	38
Façade 3	9	11	19	19	13	7	5	5	23
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**23**	**24**	**27**	**32**	**35**	**31**	**20**	**11**	**38**

KOIKAS ACOUSTICS PTY LTD

TRAFFIC NOISE INTRUSION CALCULATIONS

Job	*2075*
Client	*DeiCorp*
Site	*Pemulwuy Precinct 3*
Room	*Unit Type B - north facing - L8 to L21 (glass façade)*

ROOM DATA

Height=	2.6	m	Depth=	8.5	m
Width=	3	m	VOL=	55.4	m3

		63	125	250	500	1k	2k	4k	8k	Area
	Bedroom, timber floor, furnished (RT60, sec)	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.38
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	38	48	54	56	56	54	52	43	62
STL 1	*150 mm thick concrete*	*36*	*42*	*41*	*42*	*50*	*58*	*65*	*70*	15.6
STL 2										
STL 3										
STL 4										
	Noise through Component 1	7	11	17	18	9	0	-9	-24	22
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**9**	**12**	**18**	**18**	**11**	**6**	**5**	**5**	**22**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	35	46	53	54	54	53	50	41	60
STL 1	*6.38mm laminated glass with Q-lon seals*	*18*	*22*	*25*	*30*	*34*	*29*	*40*	*44*	7.8
STL 2										
STL 3										
STL 4										
	Noise through Component 1	19	26	30	25	20	24	11	-3	33
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**20**	**26**	**30**	**25**	**20**	**24**	**12**	**5**	**33**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

Noise Transmission Through Each Façade LAeq,Period [dB]

Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	9	12	18	18	11	6	5	5	22
Façade 2	20	26	30	25	20	24	12	5	33
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**20**	**27**	**30**	**26**	**21**	**25**	**13**	**9**	**34**