161 SUSSEX STREET REDEVELOPMENT

EXECUTIVE LOUNGE AND BAR - ACOUSTIC ASSESSMENT FOR DEVELOPMENT APPLICATION

Issued

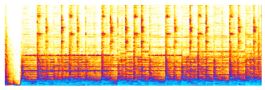
3 June 2015

acoustic studio

abn 76 106 325 982
address Unit 27, 43-53 Bridge Road, Stanmore NSW 2048 Australia
Tel (+61) 2 9557 6421
email mail@acousticstudio.com.au

Contact for this Report

Jason Cameron
jason.cameron@acousticstudio.com.au



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abn 76 106 325 982
address Unit 27, 43-53 Bridge Road, Stanmore NSW 2048 Australia
tel (+61) 2 9557 6421
email mail@acousticstudio.com.au

Proj & Code	161 Sussex Street Redevelopment	GLI-2221
Doc Title	Executive Lounge and Bar - Acoustic Assessment for Development Application	
Ref	20150603 GLI2221.0017.Rep.docx	
Date	3 June 2015	Revision: ISSUE 1
Author(s)	Jason Cameron & Jorge Reverter	

Circulation	**Organisation**	**Location**	**Delivered Via**
Alissan Serra	Savills	Sydney	Aconex
Shelani Perera	Cox Architects	Sydney	Aconex

Attachment(s)	As listed in the Table of Contents

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Executive Summary

The Four Points by Sheraton Hotel at 161 Sussex Street in the CBD, Sydney, is undergoing approved redevelopment to include convention spaces, new / upgraded Back of house (BOH) facilities, refurbishment of Front of house (FOH), and the construction of a 25 storey tower adjacent to the existing hotel.

On the northern rooftop of the existing Hotel building, a two level Executive Lounge and Bar is proposed. This document contains the findings from an acoustic assessment carried out for the Development Application (DA) for the proposed executive lounge and bar.

There are noise sensitive receivers surrounding the site, particularly commercial / office buildings plus some multi-unit residential buildings.

Acoustic Studio has carried out unattended noise level measurements at the site to determine the noise criteria plus assess the background noise levels.

The noise assessment is based on relevant standards and guidelines and the recommendations from these references are used to set the noise assessment criteria for the development.

As part of the assessment, consideration is given to:

1) Noise break-out from patrons to noise sensitive receivers
2) Plantroom noise break-out to noise sensitive receivers

The assessment has determined that the proposal complies with the requirements of the relevant standards and guidelines.

The operational noise levels of the patrons and plant have been predicted at the boundary locations of the most affected receivers. The noise assessment shows that there will be no adverse noise impact at the nearest residential or commercial receivers as a result of the proposal.

1 Introduction

Acoustic Studio has been engaged by GL Investments Mgmt Pty Ltd to provide acoustic engineering services for the Executive Lounge and Bar of the redevelopment project at 161 Sussex St, Sydney.

An acoustic assessment has been carried out and is detailed in this report along with the findings and recommendations. It has been prepared as part of the Development Application to be submitted to the City of Sydney Council.

The objectives of this acoustic assessment are to:

- Identify noise sensitive receivers that will potentially be affected from the operation of the proposal.
- Carry out noise surveys to determine existing ambient and background noise levels at the nearest noise sensitive receivers that surround the site.
- Establish the appropriate noise criteria in accordance with Council requirements and other relevant standards and guidelines for the following issues:
    - Noise break-out from patrons to noise sensitive receivers
    - Plantroom noise break-out to noise sensitive receivers
- Carry out an acoustic assessment to determine whether the relevant criteria can be achieved and, where applicable, comment on acoustic measures required to achieve compliance with the relevant criteria.

This document presents the findings from the assessment.

2 Description of Proposal

The Four Points by Sheraton Hotel (The Hotel) at 161 Sussex Street in the CBD, Sydney, is undergoing approved redevelopment to include the following:

- External and internal demolition works, including demolition of the existing through-site link to Darling Harbour.
- Extension of the podium over the Western Distributor for Convention Spaces.
- Construction of a 25-storey tower adjacent to the existing hotel, comprising new hotel rooms and suites in the lower 14 levels, and commercial levels for the top 9 levels, with 2 plant levels at level 16 and Roof level 26.
- New / upgraded Back of House (BOH) facilities.
- Refurbishment of Front of House (FOH) areas.

Figure 1: Four Points Hotel (red) and surroundings, proposed area for the Convention Spaces (green), proposed new tower building (blue) and Executive Lounge and Bar (purple)

The Client is proposing a two level Executive Lounge and Bar on Level 11 of the existing Hotel's northern rooftop.

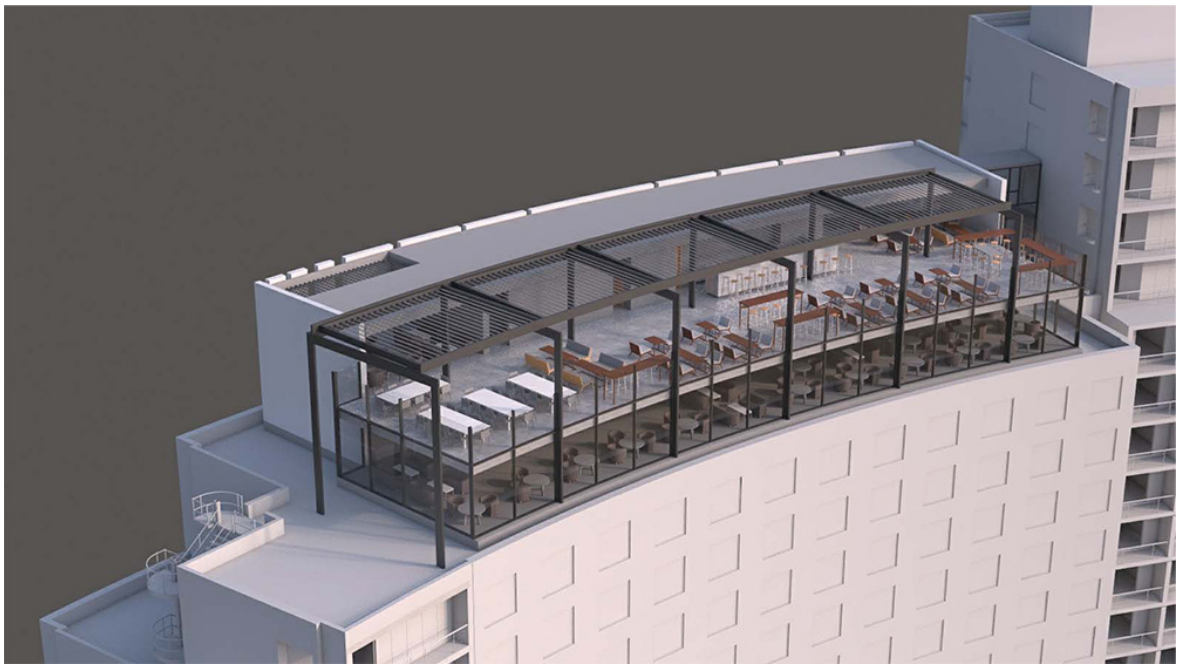


Figure 2: 3D view of the Executive Lounge (level 11) and Bar (level 12)

2.1 Operating Hours and Capacity

The proposed operating hours for the Executive Lounge and Bar are:

- Monday to Sunday: 5.00am to 5.00am

The proposed capacity for the Executive Lounge and Bar are:

- Level 11 – Lounge: 200 people
- Level 12 – Bar: 200 people

2.2 Site Details

The site is located within an urban environment characterised by medium to high levels of activity throughout the day, and during the evening / night at the weekend.

There is a continuous flow of traffic during the day and night along the A4 Western Distributor (western boundary). Other surrounding streets / roads including Sussex St (eastern boundary) and King St overpass connection (northern boundary), have a continuous flow during weekday day-time and during the evening and night-time on weekends.

A mix of commercial and residential buildings exist around the site. Existing neighbouring buildings – not associated with the Hotel – that surround the site include:

- Residential (not associated with the Hotel):
    - Residential properties located to the east of the proposed Project, at high-rise apartment buildings sited along Kent Street between numbers 355 and 365.
    - Residential properties located to the north of the proposed Project, at medium and high-rise apartment buildings sited along King Street between numbers 18 and 43.
    - Residential properties located to the north-west of the Project and across King Street flyover at the Medina apartment-hotel building on 55 Shelley Street.
- Retail and commercial (not associated with the Hotel)
    - Retail and restaurants located to the west of the proposed Project, along Cockle Bay Wharf entertainment precinct, including Helm Bar and Sydney Aquarium Wildlife World.
    - Commercial high-rise office buildings along Sussex Street to the east of the proposed Project.
    - Commercial high-rise office buildings to the south of the proposed Project, including Darling Towers.
    - Cockle Bay Wharf promenade

Figure 3 shows the land use of the surroundings, and the distances to the closest sensitive receivers. Green shading represents residential buildings, with the closest being the 355-365 Kent Street. Red shading are commercial / office buildings, with the closest being 160 Sussex St to the east at 35 meters.

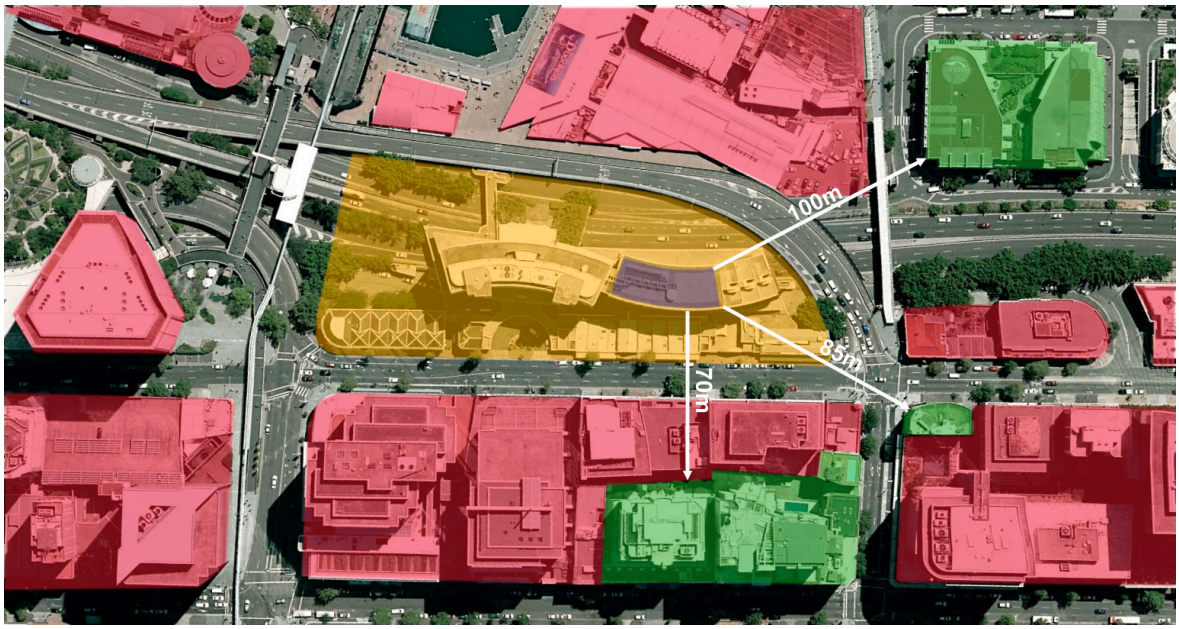


Figure 3: Surroundings with land uses and distances to closest sensitive receivers and Executive Lounge and Bar footprint (purple shadow)

The following acoustic issues are addressed as part of the noise impact assessment:

- Noise break-out to the environment from new plant serving the executive lounge and bar. Closest receivers are: 355-365 Kent Street building and 16 King Street building (70 and 85 meters respectively).
- The potential impact of patrons noise break-out to the closest noise sensitive receivers, being 16 King Street and 55 Shelley Street (85 and 100 meters respectively).

3 Existing Noise Environment

3.1 General Noise Survey Details

A survey of the existing noise environment around the proposed location was conducted with an unattended noise monitor used to continuously record the noise levels on the site. Long-term noise monitoring was carried out from Monday 17th to Wednesday 26th March 2014 to establish the typical range of ambient and background noise levels of the site and surrounds.

Unattended long-term noise monitoring was carried out with an RTA Technology Environmental Noise Logger Type 02 (Serial number 038). The logger recorded L_{A1}, L_{A10}, L_{A90} and L_{Aeq} noise parameters at 15-minute intervals for the 9 day measurement period. The calibration of the noise logger was checked before and after use and no variation in levels was noted.

A windshield was used to protect the microphone of the noise logger. The data affected by adverse weather conditions were excluded from measurements, in accordance with the NSW INP. The logger microphone was mounted 1.5 metres above ground at Level 11, in the north-eastern corner of the existing Hotel rooftop.

Operator attended short-term monitoring was also carried out on Wednesday 26th March 2014 in the night-time / early morning hours in order to confirm the validity of the long-term data across the site and to observe background and ambient noise levels at key surrounding residential receivers during the night-time / early morning period applicable to this noise impact assessment.

Short-term measurements were made with a Brüel & Kjær Hand-held Analyser Type 2250 (Serial Number 2446899). The calibration of the analyser was checked before and after the survey and no variation in level occurred.

A windshield was used to protect the microphone of the analyser. Weather conditions were calm and dry during the attended noise survey.

Laura Lapena and Anthony Cano of Acoustic Studio Pty Ltd carried out the surveys, in accordance with the method of measurement described in the *AS/NZS 1055:1997 'Description and measurement of environmental noise', parts 1 and 2*.

The long and short-term noise monitoring locations are shown in Figure 4 below.

Figure 4: Noise monitoring locations in Hotel's Level 11 rooftop

3.2 Unattended Noise Monitoring Results

The long-term monitoring position was a secure location at the north-eastern corner of the existing Hotel's Level 11 rooftop. The noise logger was installed in the free field (i.e. away from reflective surfaces). This location was found to be representative of the ambient and background noise environment around the site.

The detailed results of the long-term noise-monitoring al Location L1 are shown graphically in Appendix A. Weather pattern were monitored during the survey period and were typically calm and dry during the unattended noise survey. Graphs in Appendix A show (highlighted in grey) the times where logged data is likely to be affected by rain, wind or other extraneous noises.

The logged data show the background noise level of the area - used to establish the limiting criteria based on the ambient traffic noise levels impacting the site.

The background noise level is defined as the sound level exceeded 90% of the time, and is designated as the L_{90}. The ambient traffic noise level impacting on the site is referred to as the equivalent continuous sound level (L_{eq}). This parameter is commonly used to describe a time varying noise such as traffic noise.

The background noise levels have been established in general accordance with the methodology described in the NSW INP, i.e. the 10^{th} percentile background sound level for each period for each day of the ambient noise survey. The median of these levels is then presented as the background sound level for each assessment period.

As stated in the INP, any data likely to be affected by rain, wind or other extraneous noises have been excluded from the calculations.

These background noise levels are shown in Table 1, together with the L_{Aeq} ambient noise levels measured for each period.

Location	*L_{90} Background Noise Levels, dB(A)*			*L_{eq} Ambient Noise Levels, dB(A)*		
	Day 7am-6pm	*Evening 6pm-10pm*	*Night 10pm-7am*	*Day 7am-6pm*	*Evening 6pm-10pm*	*Night 10pm-7am*
L1 – North-Eastern corner of Level 11 rooftop	64	62	56	66	65	62

Table 1: Long-term background and ambient noise levels measured at north-eastern corner of the existing Hotel Level 11 rooftop

From observations during our site visit, it is noted that both ambient and background noise levels around the Level 11 rooftop are currently dominated by:

- Traffic noise from Western Distributor, King Street flyover and surrounding CBD streets during daytime and evening periods.
- Mechanical plant noise from rooftop plant on top of surrounding buildings not associated with the Hotel, particularly coming from the north and eastern sides of the Hotel site, plus general urban hum.

3.3 Attended Noise Monitoring Results

Attended short-term noise monitoring was carried out to obtain representative octave band noise levels of the site and surrounds. Three short-term noise monitoring locations were chosen as representative of the site and surrounds as follows:

- Location S1. Adjacent to the noise logger location.
- Location S2. Western side facing the Western Distributor.
- Location S3. South-eastern side behind the Level 11 bar.

All locations were at approximately 1.5 meters from the rooftop edge. Measurements were undertaken in the free field – i.e. more than 3 meters away from any building façade.

This monitoring location is considered to be representative of current background and ambient noise levels at the location of the Executive Lounge and Bar proposed.

The existing ambient noise levels were dominated by intermittent traffic noise from the Western Distributor and, to a lesser degree, mechanical plant noise from nearby buildings. It is noted that Location S2 is the most affected by intermittent

traffic noise from the Western Distributor, while Location S3 has the less influence from mechanical plant noise coming from commercial high-rise building to the north.

A summary of the results of the short-term background noise monitoring around the existing site are shown in Table 2.

Location	*Time*	*Parameter*	*Sound Pressure Level, dB re 20μPa*								
			Overall dB(A)	*Octave Band Centre Frequency, Hz*							
				31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
L1	*03:15*	$L_{A90,15min}$	**57**	57	56	56	53	53	53	48	40	29
		$L_{Aeq,15min}$	**58**	59	59	58	55	55	54	50	42	31
		$L_{A10,15min}$	**59**	61	61	60	56	56	56	52	43	32
L2	*03:30*	$L_{A90,15min}$	**58**	59	58	56	56	54	54	50	41	29
		$L_{Aeq,15min}$	**60**	61	60	58	57	55	56	52	43	31
		$L_{A10,15min}$	**61**	63	62	59	59	57	58	54	44	32
L3	*03:45*	$L_{A90,15min}$	**54**	58	56	54	51	51	50	46	37	26
		$L_{Aeq,15min}$	**55**	60	59	56	53	52	52	47	39	28
		$L_{A10,15min}$	**56**	62	62	58	55	54	53	48	40	29

Table 2: Summary of short-term background and ambient noise levels measured at Level 11 rooftop of the existing Hotel

4 Acoustic Design Criteria

The following sections provide a summary of the acoustic design requirements and criteria for the project in accordance with the relevant standards and guidelines.

4.1 Relevant Standards and Guidelines

The following standards and guidelines are considered relevant to the project and have been referenced in developing the project noise criteria:

- Protection of the Environmental Operations (POEO) Act 1997.
- NSW Office of Liquor Gaming and Racing (OLGR).
- City of Sydney (CoS) Standard Conditions of Development Consent (SCDC) 2012.
- NSW OEH Industrial Noise Policy (INP).
- NSW OEH Industrial Noise Policy (INP) Application Notes (Sleep Disturbance).

4.2 Protection of the Environment Operations Act (POEO) 1997

The Protection of the Environment Operations (POEO) Act 1997 defines "Offensive Noise" as follows:

"…

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations. …"

The definition provided by the POEO is generally focused around a subjective assessment. Acoustic Studio recommends that a suitable objective criterion for assessing offensive noise at residential receivers before midnight is "*Background + 5dB*". After midnight, "*Background + 0dB*" is suitable, plus the noise should be inaudible within any habitable areas. These criteria have previously been supported by environmental officers for other similar projects and, therefore, will be adopted for this assessment.

It is noted that the COS/OLGR criteria for a licensed premise is the most stringent criteria when compared with the POEO criteria as it considers octave bands. Therefore, compliance with the licensed premise criteria will also ensure that the POEO noise criteria will be met.

4.3 NSW Office Liquor Gaming and Racing (OLGR)

It is generally accepted that any venue with music should be assessed using a "*Background + 5dB*" octave band criteria for operations up to midnight and "*Background + 0dB*" after midnight. The council criteria are also essentially the same as that used by the Office of Liquor, Gaming & Racing (OLGR) for licensed premises.

The noise limits set out in the OLGR's 'Standard Noise Condition' are as follows:

> *"The $L_{A10}^{(*)}$ noise level emitted from the licensed premises shall not exceed the background noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) by more than 5dB between 7.00am and 12.00 midnight at the boundary of any affected residence.*
>
> *The L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between 12.00 midnight and 7.00am at the boundary of any affected residence.*
>
> *Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12.00 midnight and 7.00am.*
>
> *Interior noise levels which still exceed safe hearing levels, are in no way supported or condoned by the NSW Office of Liquor, Gaming and Racing.*
>
> *This is a minimum standard. In some instances the Board may specify a time earlier than midnight in respect of the above condition.*
>
> *$^{(*)}$ For the purposes of this condition, the L_{A10} can be taken as the average maximum deflection of the noise emission from the licensed premises."*

The noise level criteria based on the COS-SCDC are shown in Table 4 for the most critical evening and night-time periods.

Parameter	*Sound Pressure Level, dB re 20μPa*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
$L_{A90,15min}$ *between midnight and 7am*	**54**	58	56	54	51	51	50	46	37	26

Table 3: Determination of COS-SCDC specific noise levels criteria for the sensitive receivers in night-time

It is noted that the COS/OLGR criteria for a licensed premise is the most stringent criteria when compared to the COS "general" criteria, considering the distances to the nearest noise sensitive receivers. Therefore, compliance with the licensed premise criteria will also ensure that the COS noise criteria will be met.

4.4 City of Sydney Standard Conditions of Development Consent (CoS-SCDC)

The COS-SCDC provides the following criteria which are considered to be relevant to noise emissions from the executive lounge and bar:

Licensed Premises

The COS-SCDC outlines noise criteria specific to the operation of a licenced premise. This criteria is adopted from the Office of Liquor, Gaming and Racing (OLGR) L_{A10} criteria, which considers noise impacts across individual octave bands and is defined as follows:

"...(61) NOISE – ENTERTAINMENT USES

(a) The $L_{A10,15minute}$ noise level emitted from the use must not exceed the background noise level ($L_{A90,15miinute}$) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 5dB between the hours of 7.00am and 12.00 midnight when assessed at the boundary of any affected residence.

(b) The $L_{A10,15minute}$ noise level emitted from the use must not exceed the background noise level ($L_{A90,15minute}$) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) between the hours of 12.00 midnight and 7.00am when assessed at the boundary of any affected residence.

(c) Notwithstanding compliance with (a) and (b) above, the noise from the use when assessed as an $L_{A10,15minute}$ enters any residential use through an internal transmission path is not to exceed the existing internal $L_{A90,15minute}$

(from external sources excluding the use) in any Octave Band Centre Frequency (31.5Hz to 8kHz inclusive) when assessed within the habitable room at between the hours of 7.00am to 12.00 midnight. Where the $L_{A90,15minute}$ noise level is below the threshold of hearing (T_f) at any Octave Band Centre Frequency as defined in Table 1 of International Standard ISO 266:2003 – Normal Equal-Loudness-Level Contours, then the value of T_f corresponding to that Octave Band Centre Frequency shall be used instead.

(d) Notwithstanding compliance with (a), (b) and (c) above, the noise from the use must not be audible within any habitable room in any residential use between the hours of 12.00 midnight and 7.00am regardless of transmission path.

(e) The $L_{A10,15minute}$ noise level emitted from the use must not exceed the background noise level ($L_{A90,15minute}$) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 3dB when assessed indoors at any affected commercial premises.

"…(62) NOISE – GENERAL

General criteria

1) The emission of noise associated with the use of the premises including the cumulative operation of any mechanical plant, equipment and air conditioning shall comply with the following:

(a) The $L_{Aeq,15min}$ noise level emitted from the use must not exceed the project specific noise level for that receiver as determined in accordance with the NSW EPA Industrial Noise Policy and relevant requirements of Australian Standard AS 1055.1:1997 Acoustics – Description and measurement of environmental noise.

(b) Project specific noise levels shall be determined by establishing the existing environmental noise levels, in complete accordance with the assessment $L_{A90,15min}$ / rating $L_{A90,15min}$ process to be in accordance with the requirements for noise monitoring listed in the NSW EPA Industrial Noise Policy and relevant of Australian Standard AS 1055.1:1997 Description and measurement of environmental noise.

(c) Modifying factors in Table 4.1 of the NSW EPA Industrial Noise Policy are applicable.

2) A cumulative $L_{Aeq,15min}$ noise level emitted from the use consistent with the operation of any mechanical plant, equipment and air conditioning must not exceed the $L_{A90,15min}$ noise level by more than 3 dB in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) when assessed inside any

habitable room of any affected residence or noise sensitive commercial receiver provided that;

(a) Where the $L_{A90,15min}$ noise level is below the threshold of hearing (T_f) at any Octave Band Centre Frequency as defined in Table 1 of International Standard ISO 226:2003 – Normal Equal-Loudness-Level contours, then the value of T_f corresponding to that Octave Band Centre Frequency shall be used instead.

(b) The $L_{Aeq,15min}$ noise level and the $L_{A90,15min}$ noise level shall both be measured with all external doors and windows of the affected residence closed.

(c) The relevant background noise level ($L_{A90,15min}$) is taken to mean the day, evening or night rating background noise level determined in complete accordance with the methodology outlined in the NSW EPA Industrial Noise Policy and Australian Standard AS 1055.1:1997 Acoustics – Description and measurement of environmental noise.

(d) Background noise shall be established in the absence of all noise emitted from the use but with the ventilation equipment normally servicing the affected residence operating. Background noise measurements are to be representative of the environmental noise levels at the affected location.

(e) Modifying factors in Table 4.1 of the NSW EPA Industrial Noise Policy are applicable. Internal noise measurements are not to be corrected for duration.

The noise level criteria based on the COS-SCDC are shown in Table 3 for the night-time period.

It is noted that the COS/OLGR criteria for a licensed premise is the most stringent criteria when compared to the COS “general” criteria, considering the distances to the nearest noise sensitive receivers. Therefore, compliance with the licensed premise criteria will also ensure that the COS “general” noise criteria will be met.

4.5 NSW OEH Industrial Noise Policy (INP)

The NSW OEH (previously EPA) Industrial Noise Policy 2000 of the NSW Department of Environmental and Heritage is specifically aimed at assessing noise from industrial noise sources scheduled under the Protection of the Environmental Operations (POEO) Act 1997.

An assessment carried out in accordance with the requirements of the Policy must:

- Identify any beneficial or adverse noise impacts that might result in the surrounding community.
- Describe any noise mitigation measures and strategies that will be necessary to protect the acoustic amenity of the area.
- Describe the methods by which compliance with the acoustic criteria can determined after the facility is operational.

The assessment is carried out by comparing the new predicted intrusive noise level against the criterion based on the pre-existing background noise level.

Where the intrusive noise is greater than the pre-existing background noise level, the potential exists for disturbance and annoyance. However, the impact is considered marginal if the difference between the pre-existing background noise level and the intrusive noise is 5 dB(A) or less. This concept has resulted in the commonly used criterion of "*background noise level + 5dB*" – applicable between 7.00 am and midnight.

Often the criterion becomes more stringent after midnight, recognising the increased sensitivity of this late night period in residential neighbourhoods. This has resulted in the commonly used criterion of "*background noise level + 0dB*" between midnight and 7.00 am.

These noise level limits are assessed at the boundary of the neighbouring residential properties.

Appendix B contains an extended NSW INP analysis and the derivation of the environmental noise break-out limits shown in Table 4.

Indicative Noise Amenity Area	*Period*	*Intrusiveness Criterion dB(A) SPL*	*Amenity Criterion dB(A) SPL*
Residential	Day	69	56
	Evening	68	55
	Night	61	52

Table 4: Determination of project specific noise levels for the site

4.6 NSW INP Application Notes – Sleep Disturbance

Some short-duration noises that occur at night may comply with the criteria described above, and yet be undesirable because of the sleep arousal effect, particularly between the hours of 10.00pm and 7.00am.

Sleep arousal is a function of both the noise level and the duration of the noise. Not all people are affected to the same degree by noise, and at different times, a person will be more or less affected by the same noise. Even though a person is not actually awoken by a noise, one's rest may be significantly disturbed by noise that occurs while one is asleep.

The NSW INP application notes consider potential for sleep disturbance for residential receivers from noise during night periods between 10.00pm and 7.00am, which states the following:

"...OEH reviewed research on sleep disturbance in the NSW Environmental Criteria for Road Traffic Noise (ECRTN) (EPA, 1999). This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance.

From the research, OEH recognised that current sleep disturbance criterion of an $L_{A1,1minute}$ not exceeding the $L_{A90,15minute}$ by more than 15 dB(A) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, OEH will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required.

The detailed analysis should cover the maximum noise level or $L_{A1,1minute}$, that is, the extent to which the maximum noise level exceeds the background level and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the appendices to the ECRTN. Other factors that may be important in assessing the extent of impacts on sleep include:

- *how often high noise events will occur*
- *time of day (normally between 10:00pm and 7:00am)*
- *whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).*

The $L_{A1,1minute}$ descriptor is meant to represent a maximum noise level measured under 'fast' time response. OEH will accept analysis based on either $L_{A1,1minute}$ or L_{AMax}..."

Based on the measured noise levels detailed in Section 3 and the sleep disturbance assessment methodology outlined above, Table 5 details the corresponding project specific sleep disturbance criteria. Note that the criteria have been determined using the background noise level (L_{A90}) value at the relevant time period, for residential receivers.

Location	*Receiver type*	*Background noise level L_{A90} dBA*	*Sleep Disturbance Criteria L_{Amax} = L_{A90} + 15 dBA*
L1	Residential (urban)	52	67

Table 5: INP project specific sleep disturbance criteria for external noise emissions from proposed Executive Lounge and Bar

It is noted that the criteria outlined above must be achieved external to the bedroom window of the nearest sensitive residential receiver, as opposed to the receiver boundary – which is applied for most other criteria.

5 Assessment and Recommendations

Noise break-out from the Executive Lounge and Bar has the potential to impact on neighbouring receivers. Based on information provided by the proponent, the Executive Lounge and Bar has been assessed with consideration of the following.

5.1 Operational Noise Levels

5.1.1 Indoor Patrons – L_{10} COS/OLGR Assessment

It is assumed that the vocal effort of patrons communicating inside the Executive Lounge and Bar will generally be "normal" speech. The assessment has generally assumed the following:

- Male patrons talking "normally" voice to provide a worst-case scenario.
- With a full Executive Lounge and Bar accommodating 400 patrons (i.e. 200 patrons on each level) we have considered that for every two patrons only one person will be speaking at any given time with a "normal" voice (i.e. 200 people speaking with "normal" voice).
- We have assessed independently the two levels (100 patrons talking simultaneously on each level). Level 11 is fully enclosed and Level 12 has a terrace for approximately half of the floor area.

The L_{A10} noise source spectra (at 1 m) of 100 patrons talking simultaneous are shown below in Table 6.

Description	*Sound Pressure Level, dB re 20µPa*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
L_{A10} of 100 guests talking "normally" at 1 m	**78**	58	61	66	76	78	72	67	64	58

Table 6: Octave band sound pressure levels likely to be generated by patrons inside or outdoors the Executive Lounge and Bar

5.1.2 Outdoor Patrons - L_{10} COS/OLGR and L_{Amax} Sleep Arousal Assessments

For the assessment of the outdoor patrons communicating outside the Executive Lounge and Bar, it is assumed the same conditions as the section above. Therefore, the L_{A10} noise source spectra of 100 patrons talking simultaneous is shown in Table 6.

For the sleep arousal assessment, it is assumed that Level 12 is the main contributor as people will be outdoors. The L_{Amax} sound level for patrons is assumed to be approximately 5 dB higher than the L_{A10} level (i.e. the L_{Amax} from 100 patrons talking in the outdoor area would be approximately 83 dB(A)) [1].

5.1.3 Plantrooms

For mechanical plant and equipment, preliminary selections for the equipment and associated noise data are shown in the following table.

Parameter	*Sound Power Level, dB re 1^{-12}W*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
L_W AHU ASH-41	**76**	---[2]	80	82	76	70	70	68	66	59
L_W AHU ASH-27	**79**	---[2]	74	77	78	74	74	72	69	62
L_W KEF	**92**	---[2]	82	87	84	88	89	85	80	73

Table 7: Octave band sound power level generated by Executive Lounge and Bar plantroom equipment

5.1.4 Background Music

We understand that amplified music at any time within the Executive Lounge and Bar will be limited to background music. There is no intent to have live music or a DJ.

On this basis, we have assumed that typical L_{A10} music noise levels within the Executive Lounge and Bar will be approximately 10 dB below the noise levels from patrons speaking normally.

Therefore, if compliance is achieved for noise levels from patrons speaking, then compliance will also be achieved for amplified background music.

[1] Based on 100 outdoor patrons talking outside with “normal” voices.

[2] At this DA stage, 31.5Hz noise data is not available from the supplier.

5.2 Assessment Methodology

The acoustic assessment has considered the following:

- Executive Lounge and Bar plus Plantrooms have been considered as 24-7 operation. Therefore, the assessment has considered the following worst case criteria for the relevant noise receivers:
    - Patrons noise criteria summarised in Section 4.3 and 4.4
    - Mechanical plant noise criteria summarised in Section 4.5
    - Sleep arousal criteria summarised in Section 4.6
- Noise levels have been considered as continuous over a 15-minute assessment period to provide a worst-case scenario.
- Operational noise levels are based on information provided in Section 5.1.
- Where relevant, noise predictions at the nearest receiver boundaries consider the cumulative noise contribution from all noise sources occurring simultaneously, including background music.
- The assessment considers the Executive Lounge and Bar at full capacity with 400 patrons.
- Level 11 is totally enclosed and 100 patrons will be talking simultaneously.
- Level 12 has a terrace for approximately half of the floor area and 100 patrons will be talking simultaneously.
- The contribution of all noise in a diffuse reverberant field breaking out through the weakest building envelope construction of the proposed Executive Lounge and Bar. The following construction has been considered as the weakest building element:
    - Glazing façade – a minimum 10.38mm toughened glass.
    - Mechanical plant rooms louvres.
    - Terrace at Level 12.
- Distance attenuation, building reflections and directivity.
- Lowest measured background noise levels have been used to provide a worst-case scenario.

5.3 Noise Assessment

5.3.1 Receiver at 55 Shelley Street

The following sections detail the predicted noise levels at 55 Shelley Street receivers associated with the operation of the proposed Executive Lounge and Bar for the following worst-case scenarios:

- Table 8: Level 11 Indoors patrons – glazed façade
- Table 9: Level 12 Outdoor patrons
- Table 10: Cumulative effect of indoor patrons and outdoor patrons

Table 8 and Table 9 indicate that the COS/OLGR criteria (midnight to 7.00am) are met for all scenarios at all octave bands. Table 10 presents the cumulative effect of both scenarios. It is noted that predictions are based on background noise criteria for the worst-case scenario (lowest measured existing background noise level) and the source noise levels are also assumed to be a worst-case scenario (i.e. noisiest likely). The assessment, therefore, represents a worst-case scenario and shows that all operational scenarios are expected to comply with all criteria at this residential receiver at all times.

Table 11 presents the predicted noise levels for the sleep arousal assessment, which are assessed against the criteria, outlined in Section 4.6.

Calculation	*Sound Pressure Level, dB re 20µPa*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
L_{10} of 100 patrons talking "normally" at 1m – Level 11	**78**	58	61	66	76	78	72	67	64	58
Increase in reverberant level		3	3	3	3	3	3	3	3	3
Correction to free-field via glazing façade		-6	-6	-6	-6	-6	-6	-6	-6	-6
Building attenuation / reflections / directivity		-10	-10	-11	-13	-15	-18	-19	-20	-22
Distance (100 m) attenuation		-40	-40	-40	-40	-40	-40	-40	-40	-40
Resulting level at residential boundary	**19**	**5**	**8**	**12**	**20**	**20**	**11**	**5**	**< 5**	**< 5**
COS Criteria (midnight to 7am)	**54**	58	56	54	51	51	50	46	37	26
Complies?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 8: COS/OLGR noise assessment – Executive Lounge and Bar indoor patrons noise break-out to the 55 Shelley Street sensitive receivers

Calculation	*Sound Pressure Level, dB re 20μPa*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
L_{10} of 100 patrons talking "normally" at 1m – Level 12	**78**	58	61	66	76	78	72	67	64	58
Increase in reverberant level		0	0	0	0	0	0	0	0	0
Correction to free-field via glazing façade		0	0	0	0	0	0	0	0	0
Building attenuation / reflections / directivity		4	4	4	4	4	4	4	4	4
Distance (100 m) attenuation		-40	-40	-40	-40	-40	-40	-40	-40	-40
Resulting level at residential boundary	**42**	**22**	**25**	**30**	**40**	**42**	**36**	**31**	**28**	**22**
COS Criteria (midnight to 7am)	**54**	58	56	54	51	51	50	46	37	26
Complies?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 9: COS/OLGR noise assessment – Executive Lounge and Bar outdoor patrons noise break-out to the 55 Shelley Street sensitive receivers

Resulting level at residential boundary	*Sound Pressure Level, dB re 20μPa*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
Resulting level patrons indoors – Level 11 (refer Table 8)	**19**	5	8	12	20	20	11	5	< 5	< 5
Resulting level patrons outdoors – Level 12 (refer Table 9)	**42**	22	25	30	40	42	36	31	28	22
Resulting level at residential boundary	**42**	**22**	**25**	**30**	**40**	**42**	**36**	**31**	**28**	**22**
COS Criteria (midnight to 7am)	**54**	58	56	54	51	51	50	46	37	26
Complies?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 10: COS/OLGR noise assessment – Executive Lounge and Bar patrons cumulative noise break-out to the 55 Shelley Street sensitive receivers

As noted previously, the sleep arousal assessment considers that only Level 12 patrons will contribute to the noise impact – outdoor terrace.

Calculation	*Noise Level dB(A) SPL*
L_{Amax} of 100 patrons talking with "normal" voices @ 1m – Level 12	83
Building attenuation / reflections / directivity, dB	4
Distance attenuation (100m)	-40
Resulting level at residential receiver	**47**
NSW INP Criteria (midnight to 7.00am)	**67**
Complies?	**Yes**

Table 11: Sleep arousal noise assessment at 55 Shelley Street sensitive receivers from outside patrons

5.3.2 Receiver at 355-365 Kent Street

The following sections detail the predicted noise levels at 355-365 Kent Street receivers associated with the operation of the proposed Executive Lounge and Bar for the following worst-case scenarios:

- Table 12: Mechanical plant Level 11
- Table 13: Mechanical plant Level 12
- Table 14: Mechanical plant roof – Kitchen Exhaust Fan (KEF)
- Table 15: Cumulative effect of mechanical plant

Mechanical plant associated with the operation of the proposed Executive Lounge and Bar should be controlled to ensure external noise emissions are not intrusive and do not impact on the amenity of the nearest residential receivers.

There is no patron noise assessment provided for this receiver as it will be totally screened/shielded from the patron areas. All tables indicate that the NSW INP criteria (midnight to 7.00am) are met for all mechanical plant. It is noted that predictions are based on background noise criteria for the worst-case scenario (lowest measured existing background noise level) and the source noise levels are also assumed to be a worst-case scenario (i.e. noisiest likely). The assessment, therefore, represents a worst-case scenario and shows that all operational scenarios are expected to comply with all criteria at this residential receiver at all times.

Calculation	*Noise Level dB(A) SPL*
L_p AHU ASH-41 @ 1m	71
Building attenuation / reflections / directivity, dB	-7
Distance attenuation (70m)	-37
Resulting level at residential receiver	**27**
NSW INP Criteria (midnight to 7.00am)	**52**
Complies?	Yes

Table 13: NSW INP noise assessment – Executive Lounge and Bar Level 11 mechanical plant room noise break-out to the 355-365 Kent Street sensitive receivers

Calculation	*Noise Level dB(A) SPL*
L_p AHU ASH-27 @ 1m	74
Building attenuation / reflections / directivity, dB	-7
Distance attenuation (70m)	-37
Resulting level at residential receiver	**30**
NSW INP Criteria (midnight to 7.00am)	**52**
Complies?	Yes

Table 14: NSW INP noise assessment – Executive Lounge and Bar Level 12 mechanical plant room noise break-out to the 355-365 Kent Street sensitive receivers

Calculation	*Noise Level dB(A) SPL*
L_p KEF @ 1m	87
Building attenuation / reflections / directivity, dB	-11[3]
Distance attenuation (70m)	-37
Resulting level at residential receiver	**39**
NSW INP Criteria (midnight to 7.00am)	**52**
Complies?	Yes

Table 15: NSW INP noise assessment – Executive Lounge and Bar roof top mechanical plant room noise break-out to the 355-365 Kent Street sensitive receivers

[3] Allowance for an attenuator on the Kitchen Exhaust Fan (approximately 1 meter length)

Calculation	*Noise Level dB(A) SPL*
Resulting level L11 plantroom (refer Table 11)	27
Resulting level L12 plantroom (refer Table 12)	30
Resulting level rooftop plantroom (refer Table 13)	39
Resulting level at residential boundary receiver	**39**
NSW INP Criteria (midnight to 7.00am)	**52**
Complies?	Yes

Table 16: NSW INP noise assessment – Executive Lounge and Bar mechanical plant room cumulative noise break-out to the 355-365 Kent Street sensitive receivers

5.3.3 Receiver at 18 King Street

The following sections detail the predicted noise levels at 18 King Street receivers associated with the operation of the proposed Executive Lounge and Bar for the following worst-case scenarios:

- Table 17: Level 11 Indoors patrons – glazed façade
- Table 18: Level 12 Outdoor patrons
- Table 19: Mechanical plant
- Table 20: Cumulative effect of indoor and outdoor patrons plus mechanical plant

Table 17, Table 18 and Table 19 indicate that the COS/OLGR criteria (midnight to 7.00am) are met for all scenarios at all octave bands. Table 20 presents the cumulative effect of both scenarios. It is noted that predictions are based on background noise criteria for the worst-case scenario (lowest measured existing background noise level) and the source noise levels are also assumed to be a worst-case scenario (i.e. noisiest likely). The assessment, therefore, represents a worst-case scenario and shows that all operational scenarios are expected to comply with all criteria at this residential receiver at all times.

Table 21 presents the predicted noise levels for the sleep arousal assessment, which are assessed against the criteria, outlined in Section 4.6.

Calculation	Sound Pressure Level, dB re 20μPa									
	Overall dB(A)	Octave Band Centre Frequency, Hz								
		31.5	63	125	250	500	1k	2k	4k	8k
L_{10} of 100 patrons talking "normally" at 1m – Level 11	**78**	58	61	66	76	78	72	67	64	58
Increase in reverberant level		3	3	3	3	3	3	3	3	3
Correction to free-field via glazing façade		-6	-6	-6	-6	-6	-6	-6	-6	-6
Building attenuation / reflections / directivity		-10	-10	-11	-13	-15	-18	-19	-20	-22
Distance (85 m) attenuation		-39	-39	-39	-39	-39	-39	-39	-39	-39
Resulting level at residential boundary	**20**	**6**	**9**	**13**	**21**	**21**	**12**	**6**	**< 5**	**< 5**
COS Criteria (midnight to 7am)	**54**	58	56	54	51	51	50	46	37	26
Complies?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 17: COS/OLGR noise assessment – Executive Lounge and Bar indoor patrons noise break-out to the 18 King Street sensitive receivers

Calculation	Sound Pressure Level, dB re 20μPa									
	Overall dB(A)	Octave Band Centre Frequency, Hz								
		31.5	63	125	250	500	1k	2k	4k	8k
L_{10} of 100 patrons talking "normally" at 1m – Level 12	**78**	58	61	66	76	78	72	67	64	58
Increase in reverberant level		0	0	0	0	0	0	0	0	0
Correction to free-field via glazing façade		0	0	0	0	0	0	0	0	0
Building attenuation / reflections / directivity		4	4	4	4	4	4	4	4	4
Distance (85 m) attenuation		-39	-39	-39	-39	-39	-39	-39	-39	-39
Resulting level at residential boundary	**43**	**23**	**26**	**31**	**41**	**43**	**37**	**32**	**29**	**23**
COS Criteria (midnight to 7am)	**54**	58	56	54	51	51	50	46	37	26
Complies?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 18: COS/OLGR noise assessment – Executive Lounge and Bar outdoor patrons noise break-out to the 18 King Street sensitive receivers

Calculation	*Noise Level dB(A) SPL*
L11 plantroom	71
L12 plantroom	74
Rooftop plantroom	87
Building attenuation / reflections / directivity for L11 and L12	-7
Building attenuation / reflections / directivity for rooftop	-11
Distance attenuation (85m)	-39
Resulting level L11	25
Resulting level L12	28
Resulting level rooftop	30
Resulting level at residential receiver boundary	**33**
NSW INP Criteria (midnight to 7.00am)	**52**
Complies?	Yes

Table 19: NSW INP noise assessment – Executive Lounge and Bar mechanical plant room cumulative noise break-out to the 18 King Street sensitive receivers

Resulting level at residential boundary	*Sound Pressure Level, dB re 20μPa*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
Resulting level patrons indoors (refer Table 17)	**20**	6	9	13	21	21	12	6	< 5	< 5
Resulting level patrons outdoors (refer Table 18)	**43**	23	26	31	41	43	37	32	29	23
Resulting level mechanical plant (refer Table 19)	**33**									
Resulting level at residential boundary	**43**	**23**	**26**	**31**	**41**	**43**	**37**	**32**	**29**	**23**
COS Criteria (midnight to 7am)	**54**	58	56	54	51	51	50	46	37	26
Complies?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 20: Noise assessment – Executive Lounge and Bar patrons and mechanical plant cumulative noise break-out to the 18 King Street sensitive receivers

Calculation	*Noise Level dB(A) SPL*
L_{Amax} of 100 patrons talking with "normal" voices @ 1m	83
Building attenuation / reflections / directivity, dB	4
Distance attenuation (85m)	-39
Resulting level at residential receiver	**48**
NSW INP Criteria (midnight to 7.00am)	**67**
Complies?	**Yes**

Table 11: Sleep arousal noise assessment at 18 King Street sensitive receivers from outside patrons

6 Summary and Conclusions

A noise assessment has been carried out for the proposed Executive Lounge and Bar for the Four Points Hotel at 161 Sussex Street, Sydney.

External noise emissions associated with the operation of the Executive Lounge and Bar have been assessed. The assessment has adopted methodology from relevant guidelines to assess particular noise sources and impacts as follows:

- Executive Lounge and Bar noise break-out from patrons and music – City of Sydney (COS) and Office Liquor, Gaming and Racing (OLGR) octave band noise criteria (midnight to 7.00am).
- Executive Lounge and Bar noise break-out from mechanical plant – NSW INP (midnight to 7.00am).
- Sleep arousal resulting from outdoor patron noise – NSW INP sleep arousal criterion (10.00pm to 7.00am).

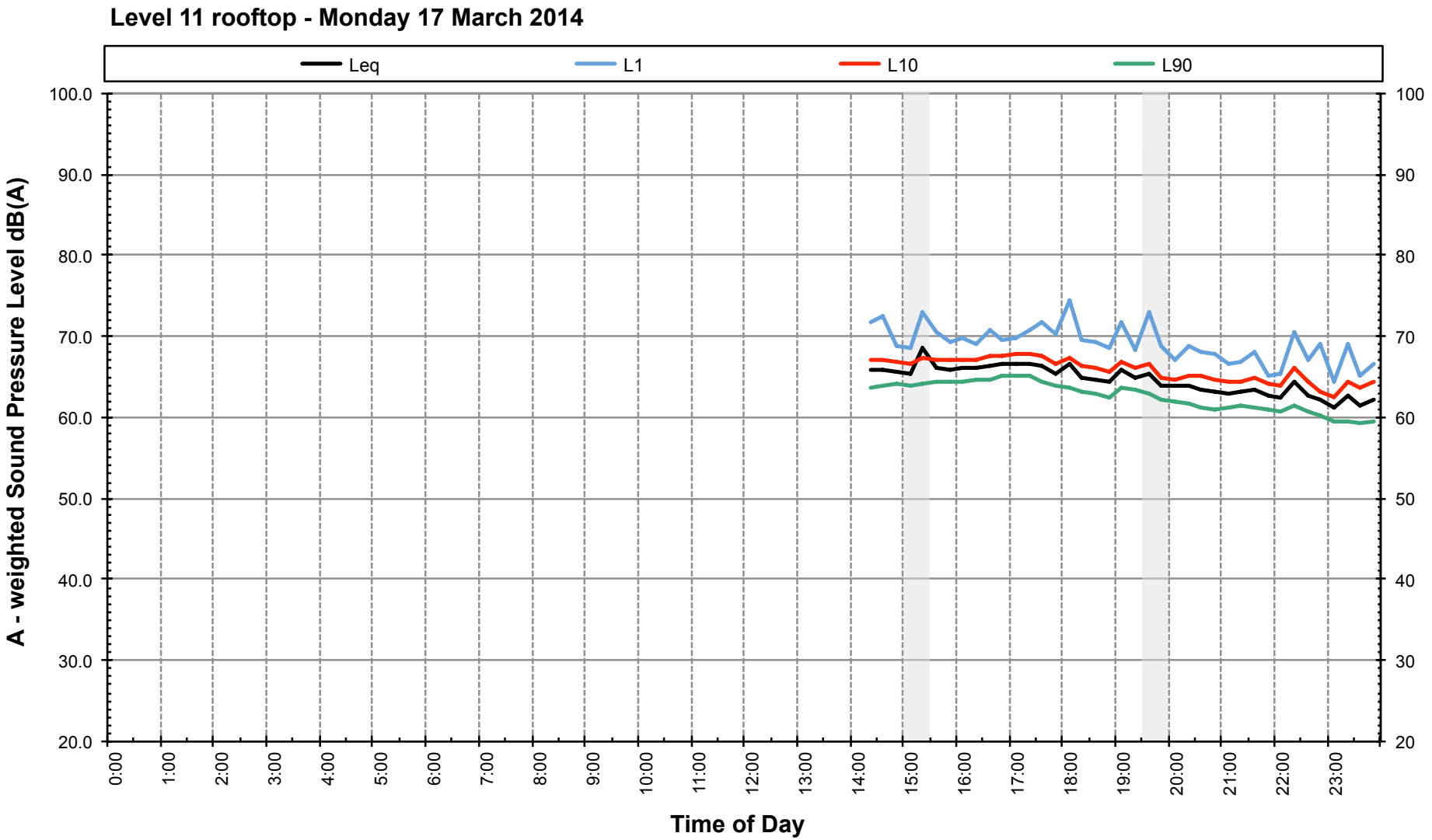
Long-term and short-term measurements have been carried out to establish typical octave band frequency spectra of the existing background noise levels at the residential boundaries of the nearest affected residential premises (required by the COS and OLGR assessment procedure).

Source noise levels and spectra have been based on the reasonable assumption that 1 in 2 patrons in the Executive Lounge and Bar could be talking simultaneously at any given time. Background music has been also considered.

The noise impacts have been predicted at the most sensitive boundary positions – 55 Shelley Street, 355-365 Kent Street and 18 King Street – taking into account distance attenuation, building reflections and directivity. These calculations show that all the relevant criteria (COS, OLGR and NSW INP) for patron, music and mechanical plant noise emissions will be met.

Provided the acoustic issues outlined in this report are addressed in the design and the recommendations are correctly implemented, the proposed Executive Lounge and Bar is expected to comply with the City of Sydney Council requirements and relevant standards and guidelines, and will have no adverse noise impact at the nearest affected receivers.

Appendix A: Long-term Noise Monitoring Results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Leq
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L90
A - weighted Sound Pressure Level dB(A)
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11:00
12:00
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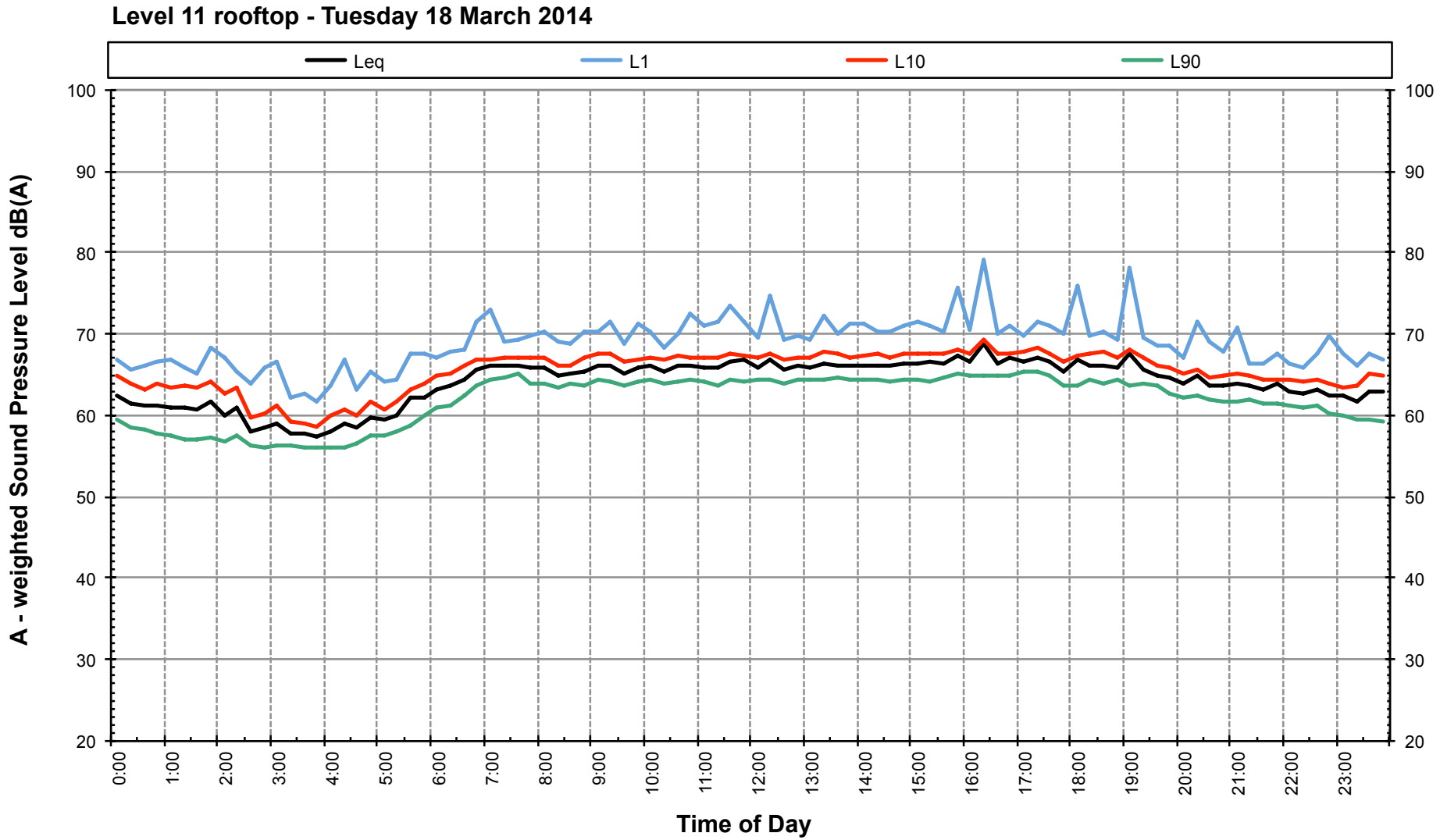
22:00
23:00
Time of Day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L10
L90
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20
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2:00
3:00
4:00
5:00
6:00
7:00
8:00
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10:00
11:00
12:00
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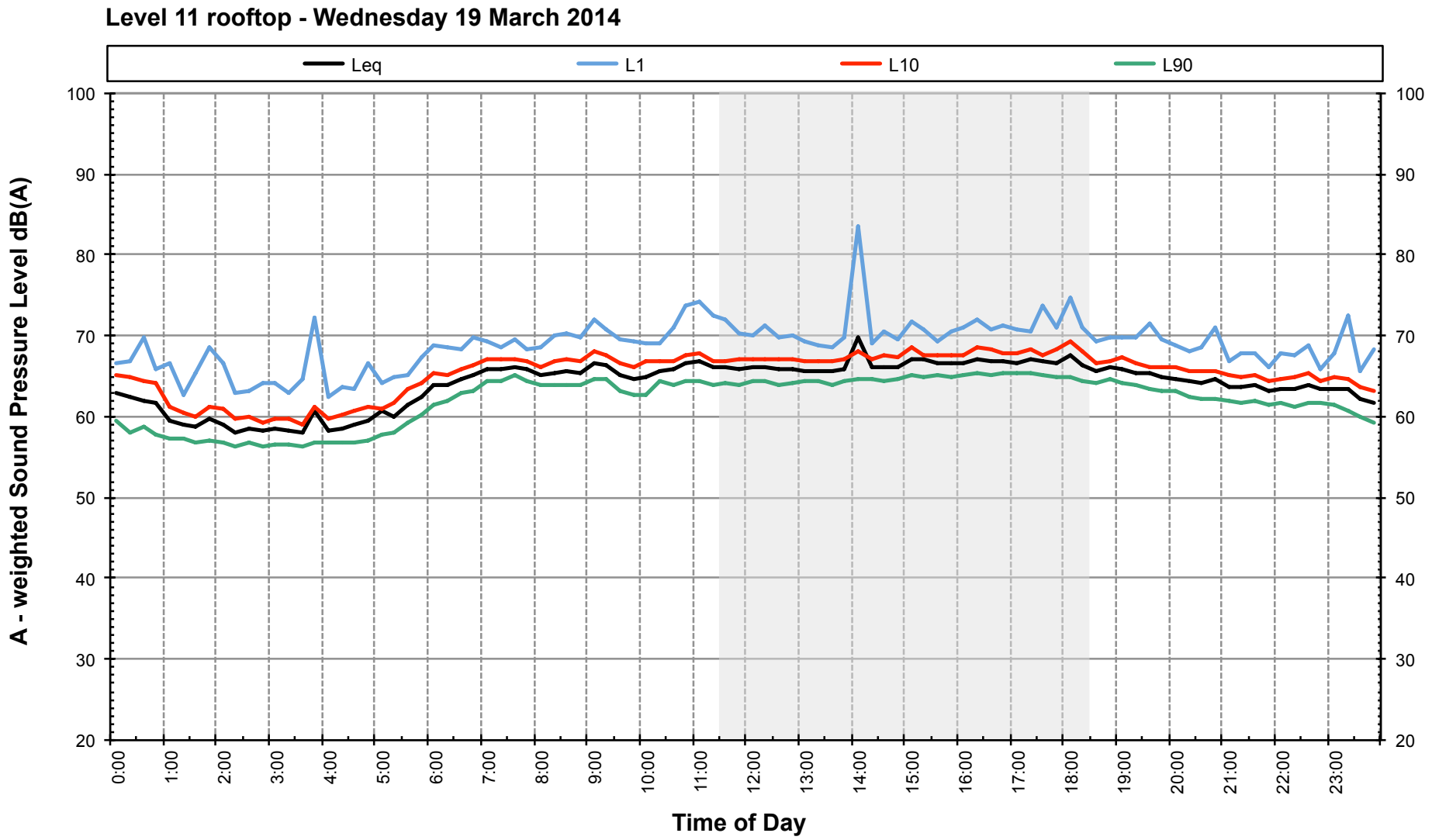
Time of Day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L10
L90
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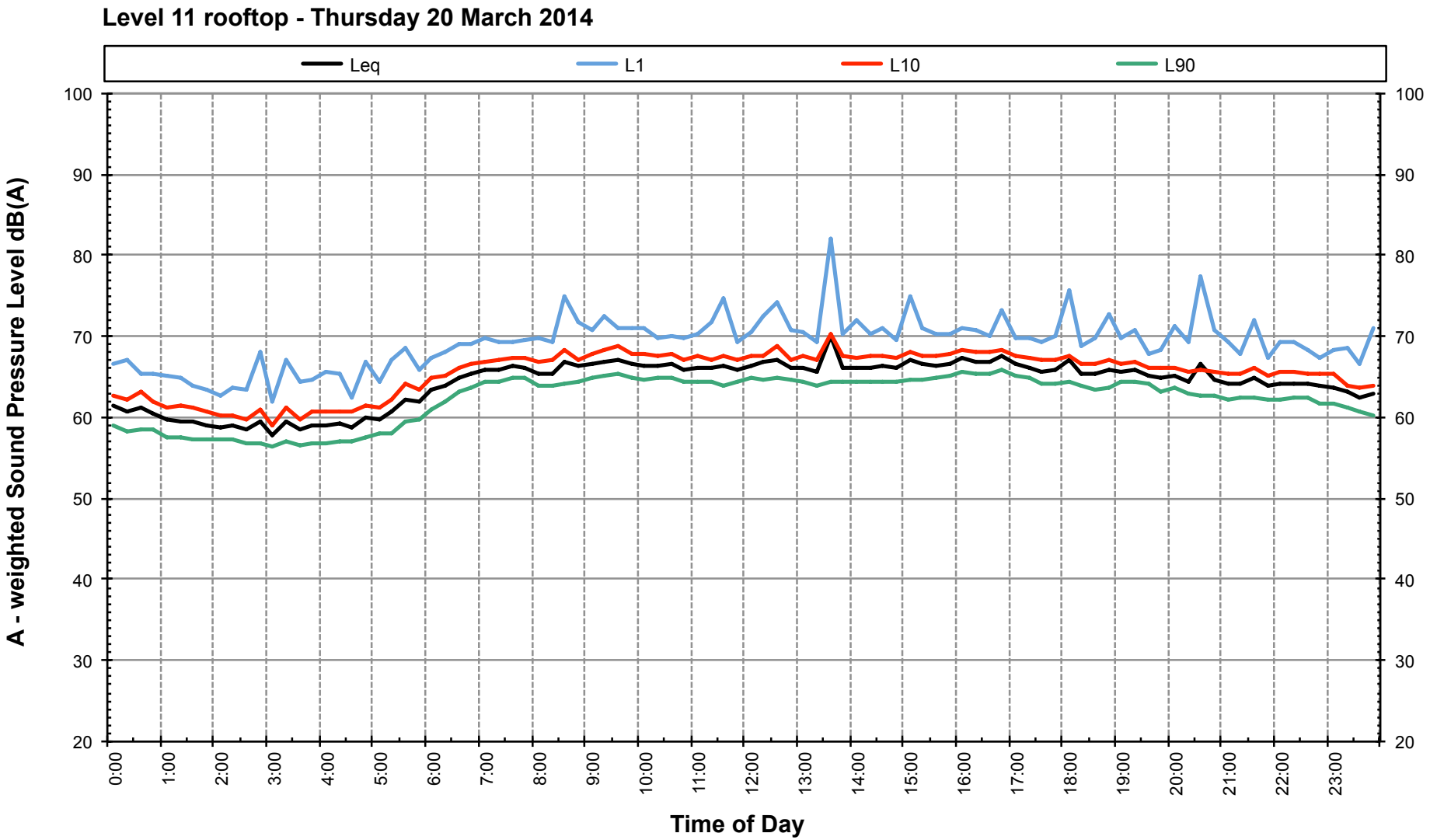
Time of Day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L10
L90
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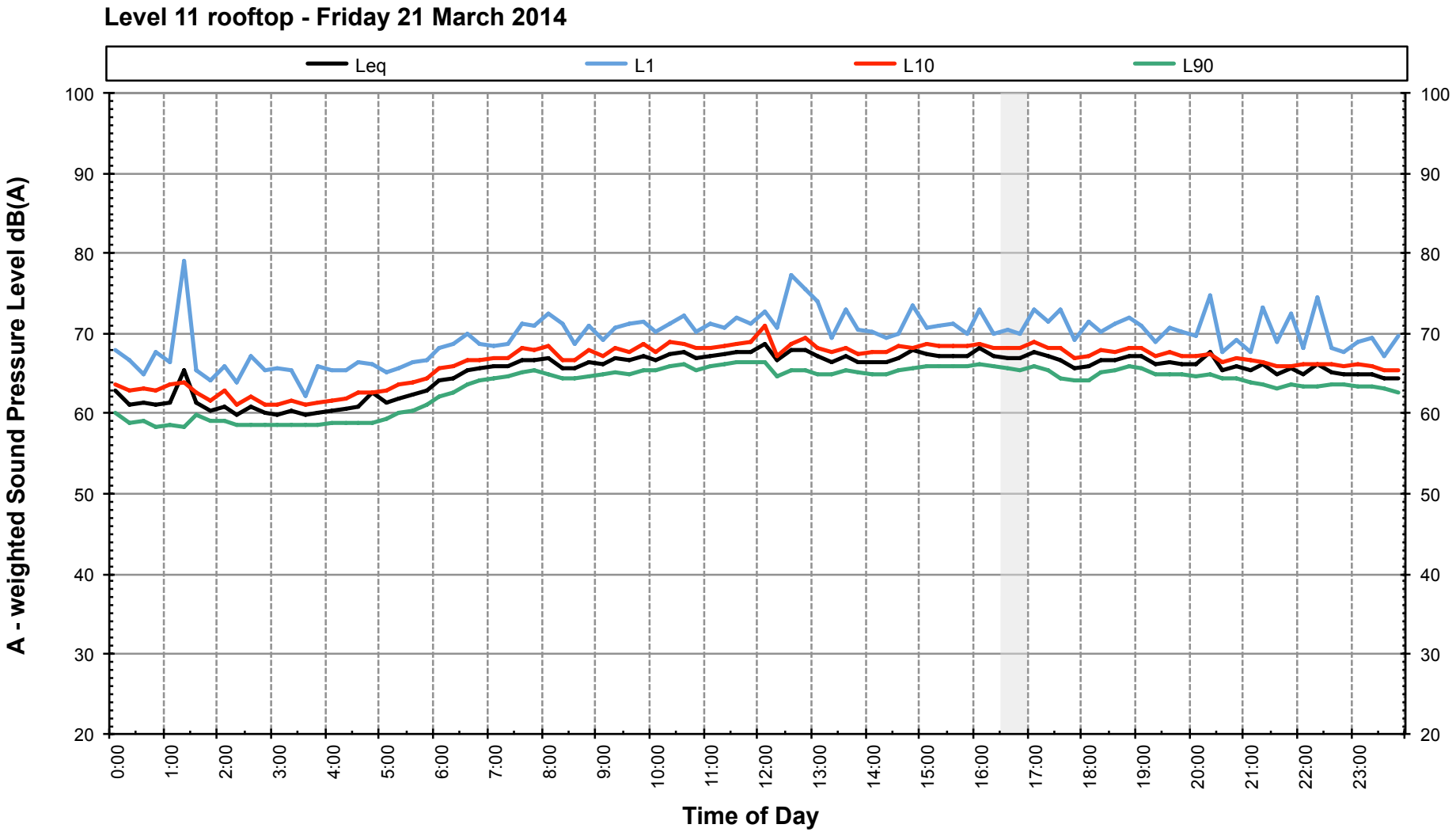
Time of Day


Level 11 rooftop - Friday 21 March 2014
Leq
L1
L10
L90
A - weighted Sound Pressure Level dB(A)
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70
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20
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2:00
3:00
4:00
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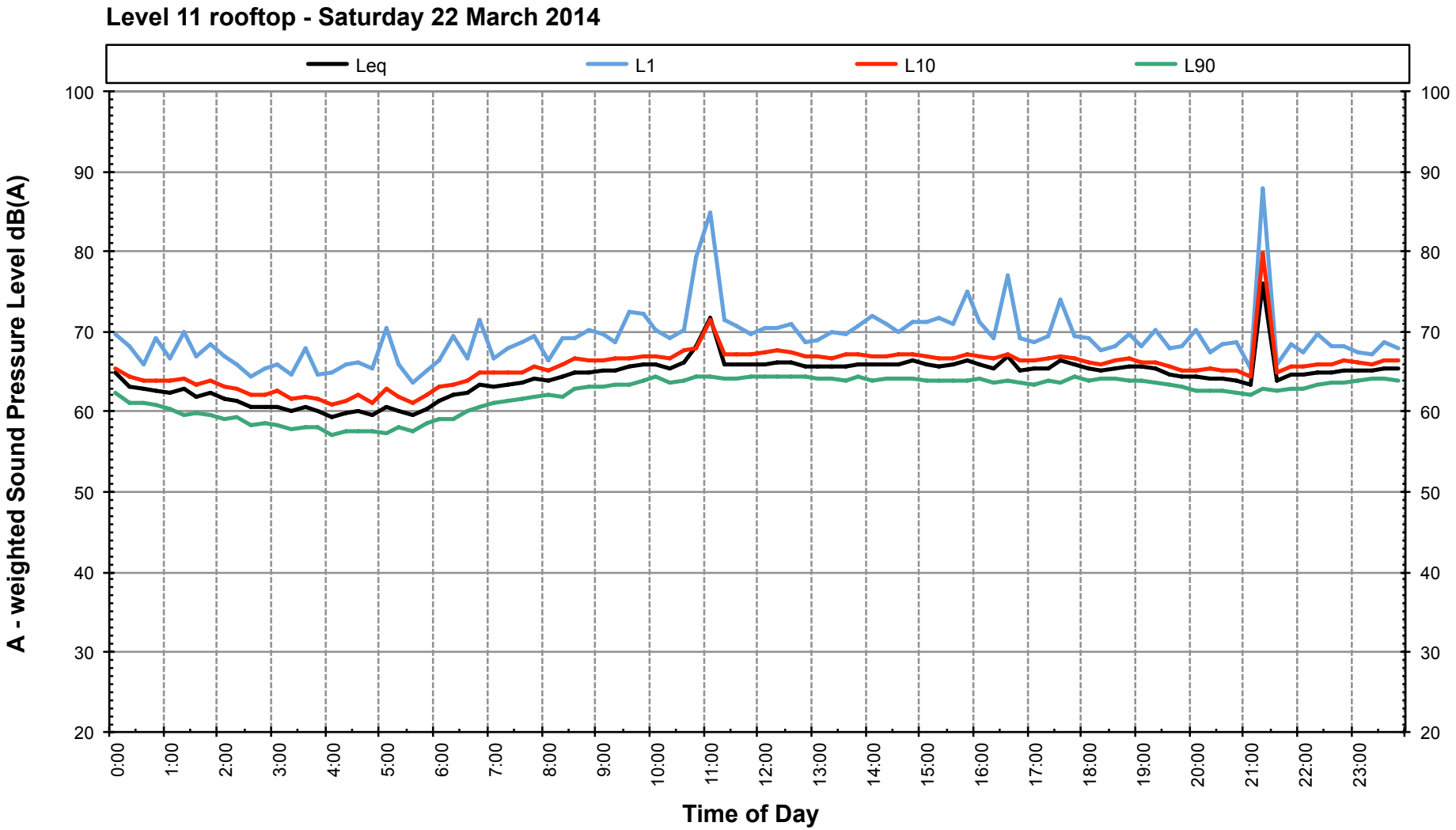
Time of Day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L10
L90
A - weighted Sound Pressure Level dB(A)
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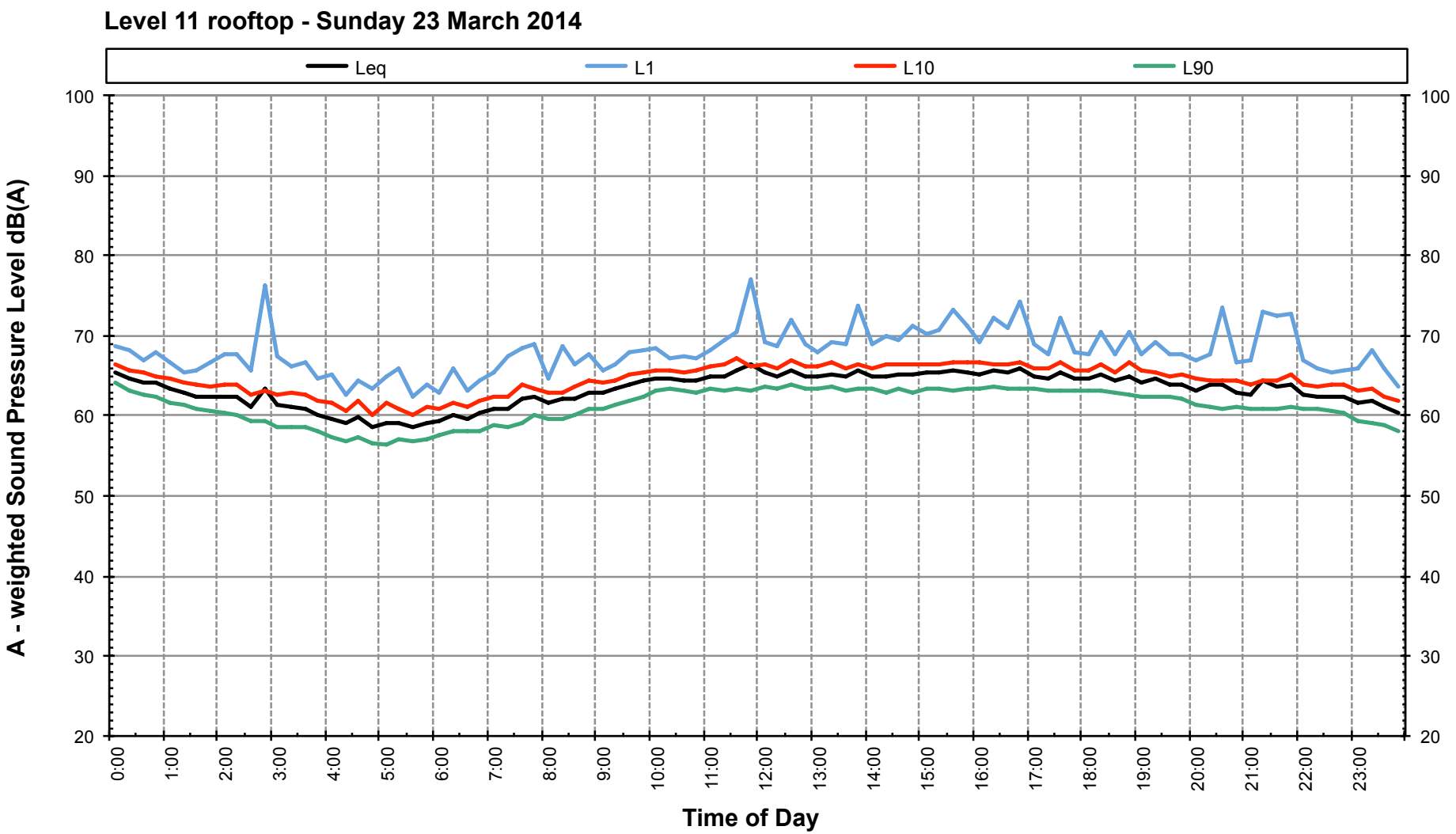
Time of Day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L90
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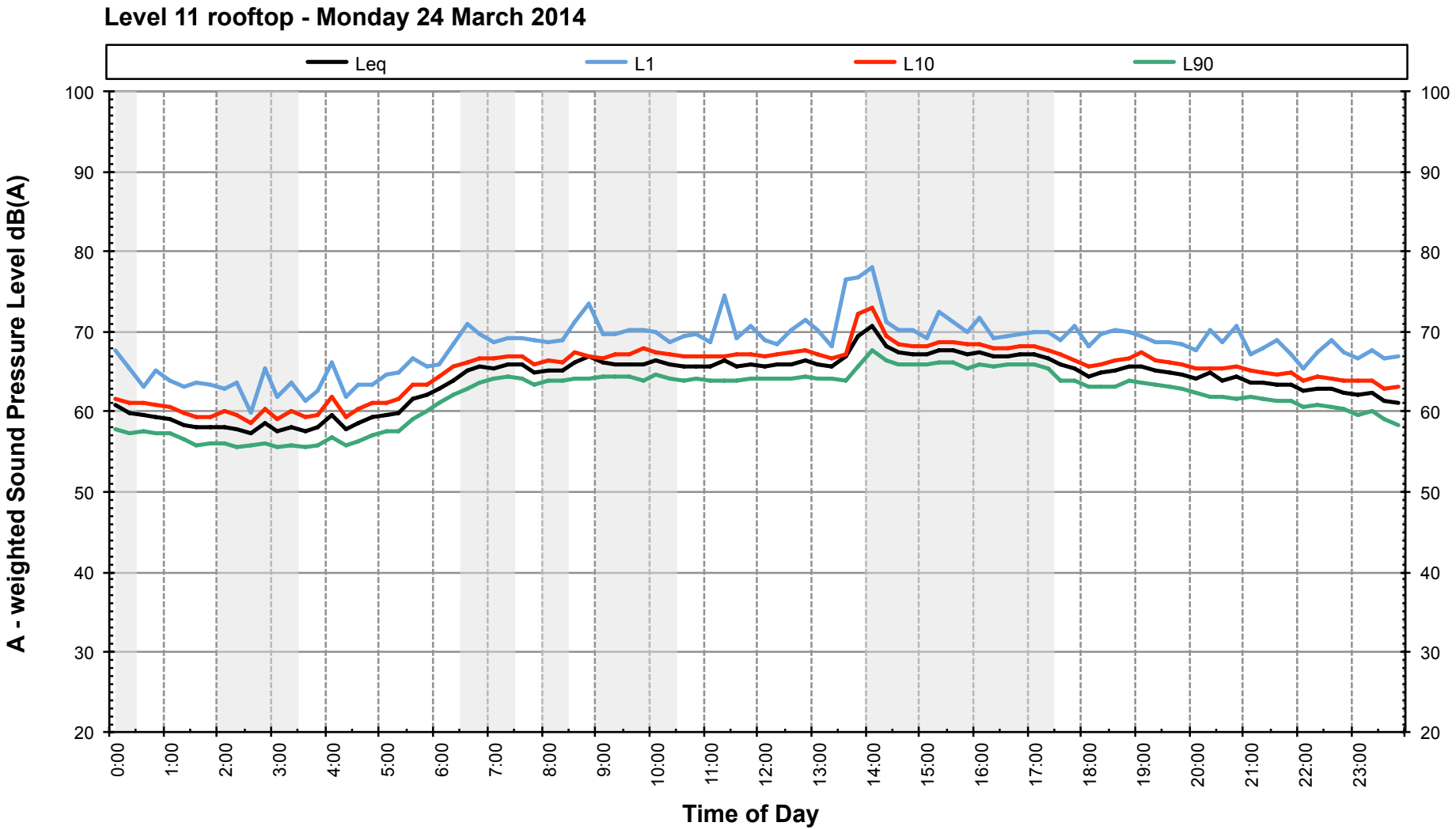
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L10
L90
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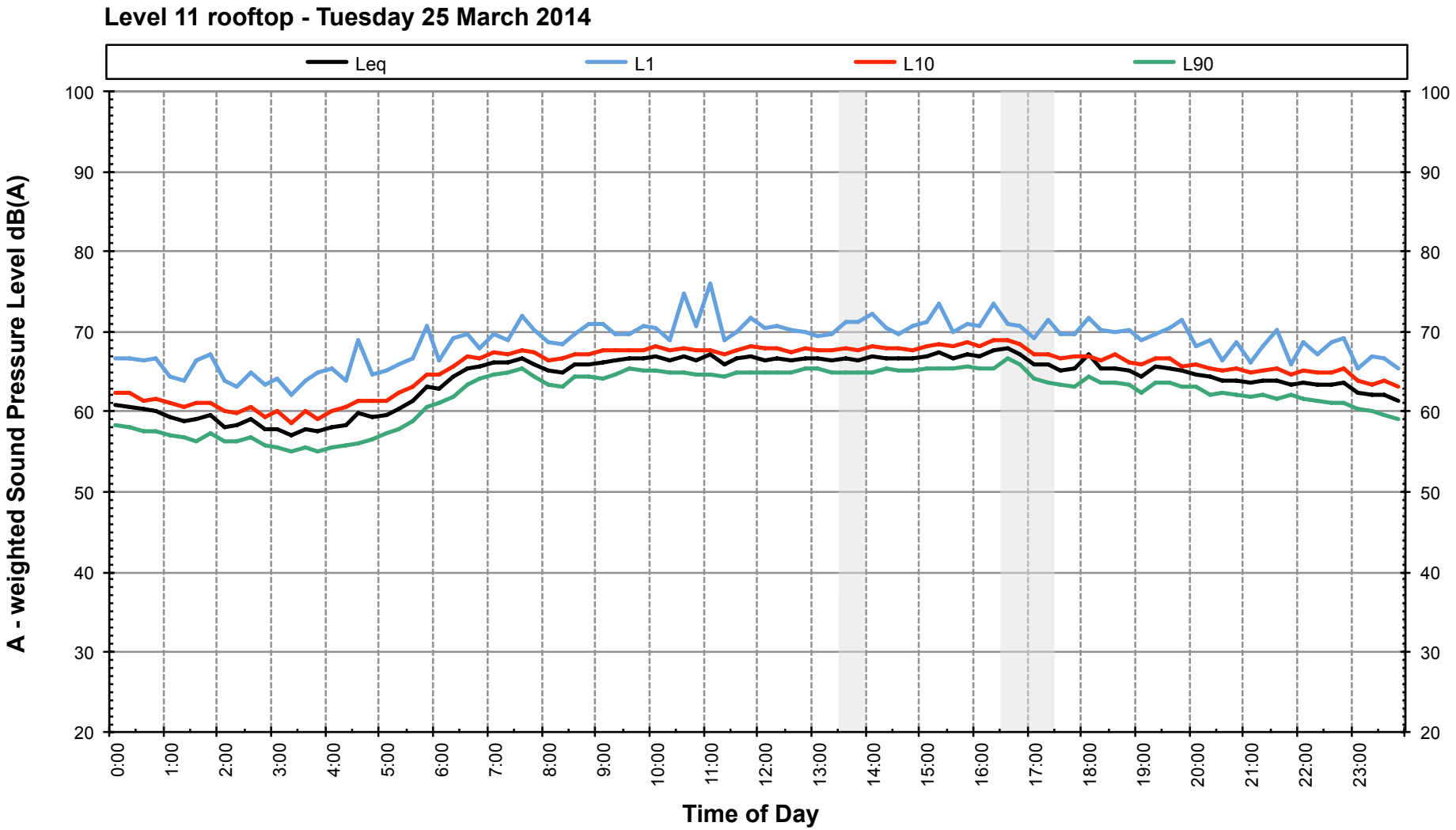
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L90
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17:00
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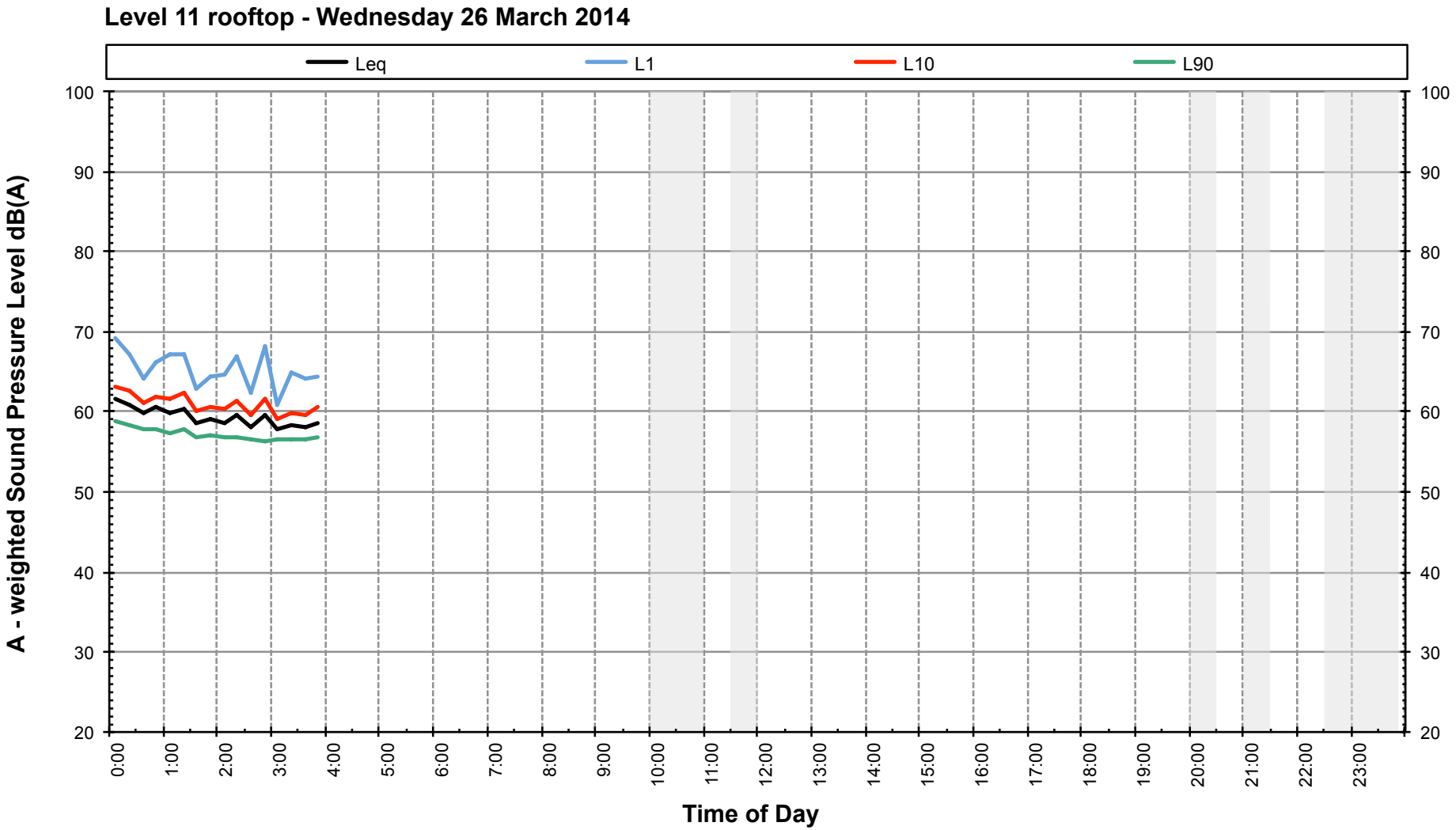
22:00
23:00
Time of Day


Level 11 rooftop - Wednesday 26 March 2014
Leq
L1
L10
L90
A - weighted Sound Pressure Level dB(A)
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
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Time of Day

Appendix B: Derivation of Environmental Noise Break-out Limits

The main source of noise break-out from the Executive Lounge and Bar to the environment will be plant and equipment noise from new plant servicing the building plus noise from the patrons.

The environmental noise impact of the Executive Lounge and Bar has been assessed in accordance with the OEH/EPA NSW Industrial Noise Policy (NSW INP).

The NSW INP sets two separate noise criteria to meet environmental noise objectives: one to account for intrusive noise and the other to protect the amenity of particular land uses. Both are used to derive the project specific noise level.

Assessing intrusiveness

The intrusiveness criterion essentially means that the equivalent continuous noise level of the source should not be more than 5 dB above the measured existing background noise level.

Assessing amenity

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate to industrial-type noise, including plant. The existing noise level from industry (or plant) is measured – if it approaches the criterion value, then the noise levels from new plant need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion.

The cumulative effect of noise from all industrial or plant sources is considered in assessing impact.

Project specific noise level

For the Executive Lounge and Bar, the more stringent of the intrusive and the amenity criteria sets the project specific noise level.

The derivation of the project specific noise level is provided below.

B.1 Existing Background and Ambient Noise Levels

The rating background level (RBL) has been determined from $L_{A90,15min}$ measured during the long-term noise survey in accordance with the methodology prescribed in NSW INP. Data affected by adverse weather conditions was removed for the analysis procedure. This data are shaded on the graphs in Appendix A.

Three time periods are considered:

- Day - 7am to 6pm
- Evening - 6pm to 10pm
- Night - 10pm to 7am

The calculated RBL's and measured ambient noise levels are shown below in Table B1.

Location	*L_{90} RBL Background Noise Levels, dB(A)*			*L_{eq} Ambient Noise Levels, dB(A)*		
	Day 7am-6pm	*Evening 6pm-10pm*	*Night 10pm-7am*	*Day 7am-6pm*	*Evening 6pm-10pm*	*Night 10pm-7am*
L1 – West-southern corner in L11 rooftop	64	62	56	66	65	62

Table B1 : Long-term background and ambient noise levels measured around Level 11 rooftop site

B.2 Determination of intrusiveness criterion

The intrusiveness criterion is defined as:

$$L_{Aeq,15minute} \leq \text{rating background level plus 5}$$

The intrusiveness criterion has been determined from the RBL's presented in Table B1 for each period (rounded to the nearest dB).

- Day Intrusiveness criterion of 64 + 5 = **69 dB(A)**
- Evening Intrusiveness criterion of 63 + 5 = **68 dB(A)**
- Night Intrusiveness criterion of 55 + 5 = **61 dB(A)**

B.3 Determination of amenity criterion

To limit continuing increases in noise levels, the maximum ambient noise levels within an area from industrial noise sources should not normally exceed the acceptable noise levels appropriate for the type of area (e.g. the acceptable noise level in rural area would be less than that in an urban or industrial area).

Recommended L_{Aeq} noise levels from industrial noise sources within NSW INP

The Acceptable Noise Levels (ANL's) for each land use type under consideration (as detailed in Table 2.1. of the NSW Industrial Noise Policy) are given in Table B2 below.

The nearest residential receivers to the project are considered to be in a Noise Amenity Area characterised by the NSW Industrial Noise Policy as Urban.

Indicative Noise Amenity Area	*Period*	*Recommended $L_{Aeq,period}$ Noise Level (ANL)*	
		Acceptable	*Recommended Maximum*
Residential	Day	60	65
	Evening	50	55
	Night	45	50

Table B2 : Recommended L_{Aeq} noise levels from industrial noise sources at residential receivers

Amenity criterion

The amenity criterion is determined from the relationship of the existing L_{Aeq} noise level and the Acceptable Noise Levels (ANL's) for each land use type under consideration using Table 2.2 of the NSW Industrial Noise Policy. This process is summarised below in Table B3 for the closest residential receivers to the site.

Indicative Noise Amenity Area	*Period*	*Existing L_{Aeq}*	*ANL*	*Adjustment*	*Amenity Criterion*
Residential	Day	66	60	Existing L_{Aeq} minus 10	56
	Evening	65	50	Existing L_{Aeq} minus 10	55
	Night	62	45	Existing L_{Aeq} minus 10	52

Table B3 : Determination of amenity criterion for residential receivers

B.4 Project specific noise level

The Project Specific Noise Level is defined as the lower of the intrusiveness and the amenity criteria. On this basis, the Project Specific Noise Levels (PNLs) are shown in Table B4 below (PNLs shown shaded).

Indicative Noise Amenity Area	*Period*	*Intrusiveness Criterion*	*Amenity Criterion*
Residential	Day	69	56
	Evening	68	55
	Night	61	52

Table B4 : Determination of project specific noise levels for the site