MARSHALL DAY Acoustics

PIANO BAR - 294 LYGON STREET
NOISE ASSESSMENT

Rp 001 20190997 | 10 January 2020

This document has been endorsed in
accordance with Condition 6
of Planning Permit MPS/2019/594
Report - 22 Pages

Signed:

Date: 12/08/2020

For and on behalf of Moreland City Council

MARSHALL DAY Acoustics

Marshall Day Acoustics Pty Ltd
ABN: 53 470 077 191
6/448 Roberts Road
Subiaco WA 6008
Australia
T: +618 9779 9700
www.marshallday.com

Project: **PIANO BAR - 294 LYGON STREET**

Prepared for: **Bobsled Properties Pty Ltd**
Level 12, PGP Consulting
99 William Street
Melbourne VIC 3000

Attention: **Jo Didier**

Report No.: **Rp 001 20190997**

Disclaimer

Reports produced by Marshall Day Acoustics Pty Ltd are based on a specific scope, conditions and limitations, as agreed between Marshall Day Acoustics and the Client. Information and/or report(s) prepared by Marshall Day Acoustics may not be suitable for uses other than the specific project. No parties other than the Client should use any information and/or report(s) without first conferring with Marshall Day Acoustics.

The advice given herein is for acoustic purposes only. Relevant authorities and experts should be consulted with regard to compliance with regulations or requirements governing areas other than acoustics.

Copyright

The concepts and information contained in this document are the property of Marshall Day Acoustics Pty Ltd. Use or copying of this document in whole or in part without the written permission of Marshall Day Acoustics constitutes an infringement of copyright. Information shall not be assigned to a third party without prior consent.

Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Final	-	Issued to client	10/01/2019	B. Beverley	G. Lee

TABLE OF CONTENTS

1.0 INTRODUCTION

Marshall Day Acoustics Pty Ltd (MDA) have been commissioned by Bobsled Properties Pty Ltd to undertake a noise assessment for a proposed Piano Bar to be located on the ground level of an existing mixed-use building at 294 Lygon Street, Brunswick East.

This report details the findings of our noise assessment and recommends noise controls and management procedures to satisfy the requirements of Victorian music legislation.

A glossary of acoustic terms used in this report is provided in Appendix A.

2.0 SITE AND PROJECT DESCRIPTION

2.1 Site description

The location of the proposed Piano Bar is on ground level of an existing mixed-use building at 294 Lygon Street, Brunswick East.

An aerial photograph of the subject site and surrounds is provided in Figure 1 with the nearest identified noise-sensitive receivers numbered. The numbered receivers are described in Table 1.

Figure 1: Aerial photograph of subject site and surrounds (Source: Nearmap)

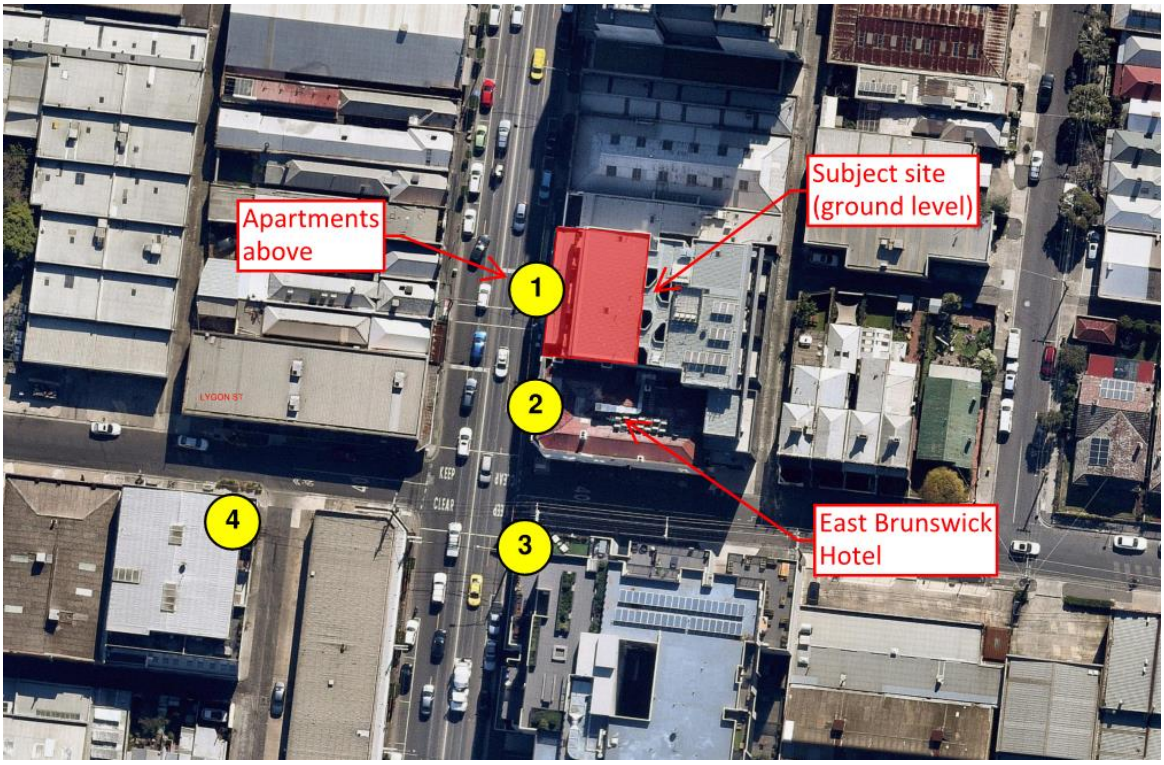


Table 1: Nearest noise-sensitive receivers

#	Address	Description
1	294 Lygon Street	Residential apartments above the proposed development (levels 1-5)
2	280 Lygon Street	East Brunswick Hotel – bar and live music venue on ground and first floor, short term hotel accommodation on second floor
3	270 Lygon Street	6-storey mixed use building with residential apartments on upper levels
4	116 Albert Street	4-storey mixed use building with residential apartments on upper levels

2.2 Project description

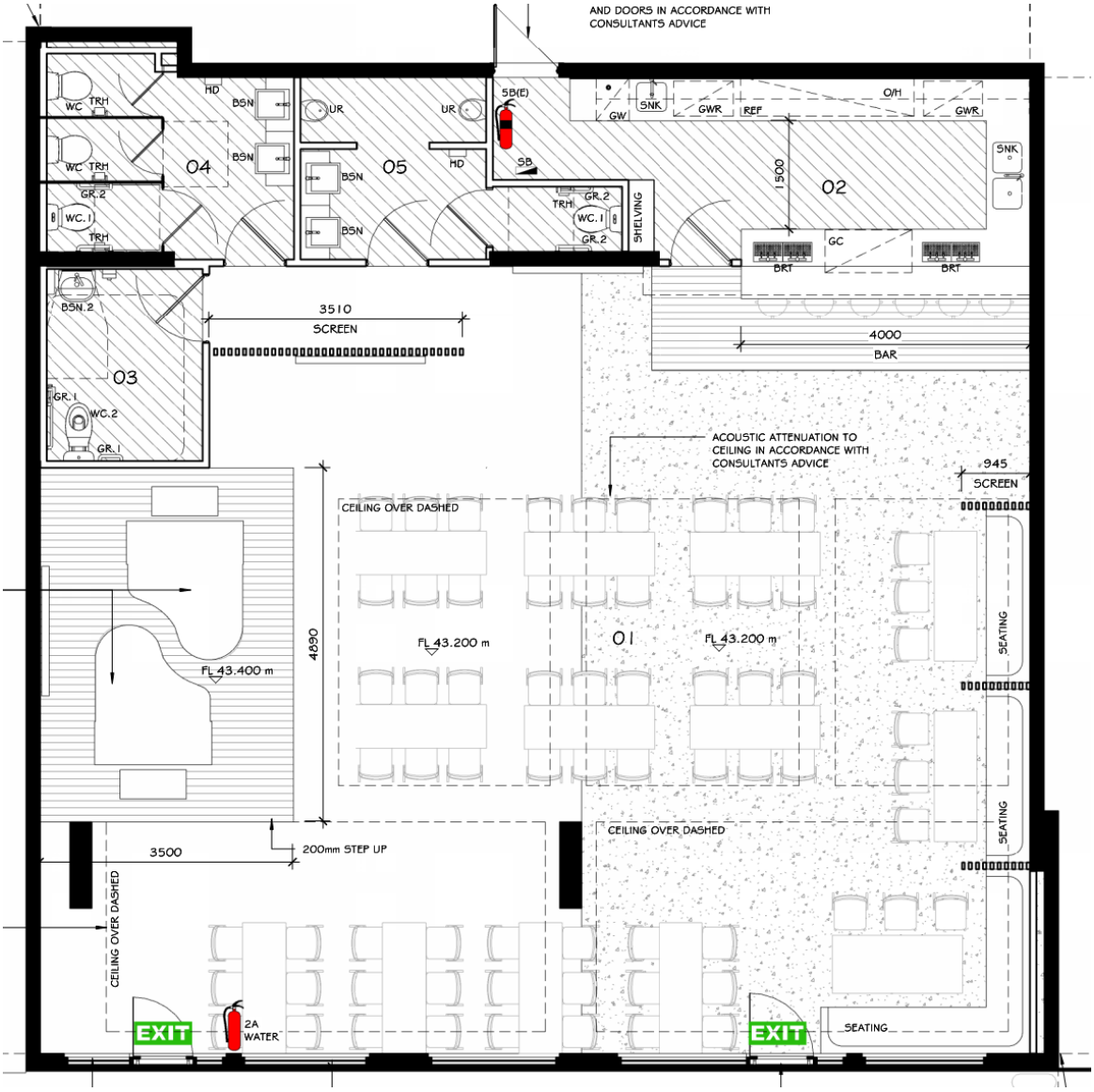
The proposed venue is a Piano Bar, with a capacity of up to 110 patrons (80 seated). It is proposed that the venue will include live music and performances that consist of background-style cabaret and duelling pianos with audience sing-a-longs.

The proposed operating hours of the venue are:

- Sun – Thu: 1100 hrs – 2300 hrs
- Fri – Sat: 1100 hrs – 0100 hrs

A floor plan of the proposed venue is shown in Figure 2.

Figure 2: Floor plan



3.0 LEGISLATION AND GUIDELINES

A range of guidelines and legislation is used in Victoria to assess and control environmental noise.

A summary of the relevant Victorian legislation applicable to music emanating from the venue is provided in Table 2. Refer to Appendix B for further details.

Table 2: Relevant Victorian noise legislation

Document	Overview
Environment Protection Act 1970 (the Act)	The Act provides the overarching legislative framework for the protection of the environment in Victoria. It establishes obligations for the control of environmental noise and applies to all types of noise sources except rail operations. The legislation does not specify noise limit values, but sets out legal requirements to comply with State environment protection policies and prescribed standards.
State Environment Protection Policy (Control of Music Noise from Public Premises) No. N-2 (SEPP N-2)	SEPP N-2 defines mandatory noise limits for music associated with public premises in the State of Victoria, including indoor and outdoor venues. The limits apply to the level of noise occurring at neighbouring sensitive receivers. Noise limits are determined on the basis of background noise levels, and are separately defined for day, evening and night periods. Refer to Appendix B for further detail and noise limit derivation.

4.0 BACKGROUND NOISE MEASUREMENTS

The assessment criteria presented in Section 5.0 include noise limits that are defined based on background noise levels obtained at a location considered representative of the nearest residential receiver. In accordance with SEPP N-2, a -2 dB adjustment has been applied to the measured results to account for reflections from surfaces close to the noise monitor.

Since some measurements were not considered representative of the nearest receiver, a conservative approach to the assessment has been adopted, which uses limits derived from the lowest measured background noise levels for relevant operating hours, including measurements obtained up until one hour after the nearby East Brunswick Hotel had closed.

Appendix C presents further details on the monitoring survey and methodology.

The results are summarised in Table 3.

Table 3: Lowest measured background levels, dB L_{A90}

	Period	
Date	**Day / evening**	**Night**
Measured background noise levels, L_{A90}	51	44

The octave band noise levels for the lowest night-time period (i.e. 44 dB L_{A90}) are provided in Table 4.

Table 4: Lowest measured night-time noise levels in octave bands, dB L_{A90}

	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Measured background noise levels, L_{90}	47	48	44	40	37	35	26

5.0 SEPP N-2 CRITERIA

The derived SEPP N-2 day and evening music noise limit is outlined in Table 5.

Table 5: SEPP N-2 derived day and evening noise limit, dB

Period	Measured background noise level, L_{A90}	SEPP N-2 limit, L_{Aeq}
Day / evening	51	56

The derived outdoor noise limits for the night period are presented in Table 6.

Table 6: SEPP N-2 derived night-time noise limits, dB

	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Measured background noise level, L_{90}	47	48	44	40	37	35	26
	+8	+8	+8	+8	+8	+8	+8
Night-time noise limit, L_{10}	55	56	52	48	45	43	34

Since background noise levels have not been measured within the habitable rooms of apartments above the venue, the noise limit used to assess potential noise impacts from sound transfer through the floor/ceiling are the SEPP N-2 base noise limits, as presented in Table 7.

Table 7: SEPP N-2 base night-time noise limits, dB

	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Base night-time noise limit, L_{10}	40	30	20	20	15	10	10

6.0 RECOMMENDATIONS

Recommendations to manage and contain music noise from the venue are provided below. The provisions are based on site observations, noise modelling predictions (as outlined in Section 7.0), and our review of the proposed venue design and available architectural documentation for the existing building.

Specifications of the existing building's facade including glazing and doors were not available at the time of this review. Assumptions regarding the likely acoustic performance of these elements have been made, which are outlined accordingly and should be confirmed as part of the detailed design.

6.1 Facade

The facade of the existing building (facing Lygon Street) includes five fixed windows and two glazed doors. The rest of the facade appears to be constructed of blockwork.

Acoustic ratings of the windows and doors are not known; however, the glass is double-glazed throughout. For this assessment, we have assumed that all fixed windows include 6/12/6[1] glazing with acoustic frames and seals to match. The assumed acoustic rating for fixed windows is R_w 33 ($R_w + C_{tr}$ 29). We recommend this be confirmed.

The doors are weak points acoustically, as they are 'door and a half' types, which inherently do not seal well, they have basic brush seals only, and they are not sealed at the base/threshold. Figure 3 shows a site photo of one of the doors.

Figure 3: Site photo showing large gap at the base of one of the doors

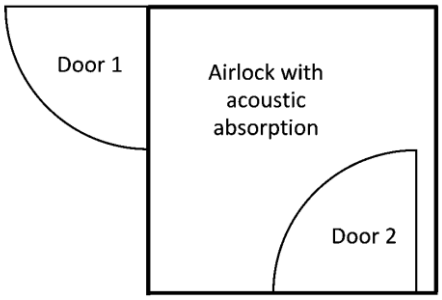
The doors will need to be upgraded and acoustically sealed to contain noise from the venue. Calculations indicate that a minimum R_w 36 rating would be required, which the installed doors are unlikely to achieve even with new seals.

Whilst this rating is possible with a single door, it would need to be a proprietary acoustic door, which could add significant cost to the project. There would also remain a risk of increased noise breakout whenever patrons enter and exit the venue, or when the doors are not properly sealed shut.

[1] 6 mm glass / 12 mm air cavity / 6 mm glass

To address this risk and reduce the need for proprietary acoustic doors, we recommend that a secondary door be included in an airlock arrangement. This concept is illustrated in Figure 4.

Figure 4: Airlock door concept sketch



Each door should be self-closing with full acoustic seals and be rated to a minimum R_w 30. Acoustic absorption should be included in the airlock to reduce noise breakout at times when both doors could be open.

The predicted noise levels in this assessment are based on attenuation through a door arrangement achieving at least R_w 36 ($R_w + C_{tr}$ 34).

6.2 Floor/ceiling above

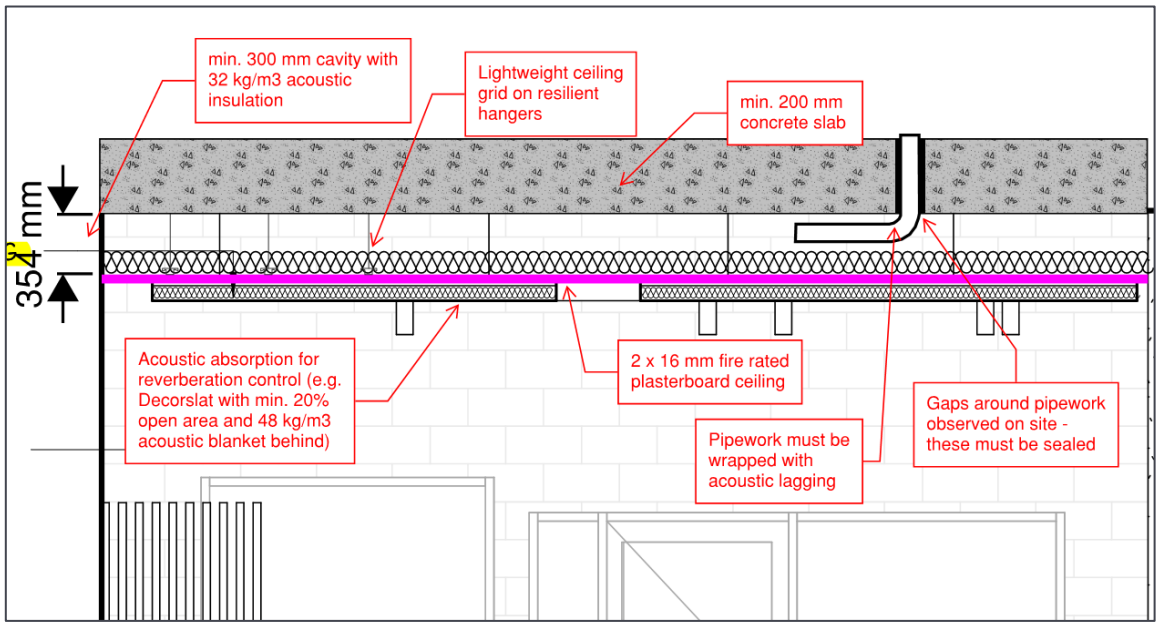
Review of the structural drawings indicates that the concrete floor slab above the tenancy is at least 200 mm thick. A resiliently mounted barrier ceiling will be required below the slab to further reduce sound transfer to the apartments above.

We recommend the following build-up throughout:

- Min. 200 mm concrete slab (existing)
- Min. 300 mm cavity below with 32 kg/m^3 acoustic insulation within
- 2 x 16 mm fire rated plasterboard ceiling mounted on lightweight ceiling grid with resilient hangers. Any penetrations to this ceiling must be acoustically sealed
- Architectural ceiling or finish below for reverberation control (see Section 6.4).

This is illustrated in Figure 5.

Figure 5: Concept sketch showing floor/ceiling requirements



The overall acoustic rating for the floor/ceiling shown above is approximately R_w 93 ($R_w + C_{tr}$ 86). This is a very high rating, which may be difficult to achieve without careful detailing and construction. Any penetrations in the barrier ceiling that are required for services and the like must be acoustically sealed to not degrade the sound insulation rating. Since quality of workmanship and potential unforeseen factors (e.g. flanking sound) can compromise high performance elements such as this, we recommend that further acoustic reviews and site supervision during construction be allowed for.

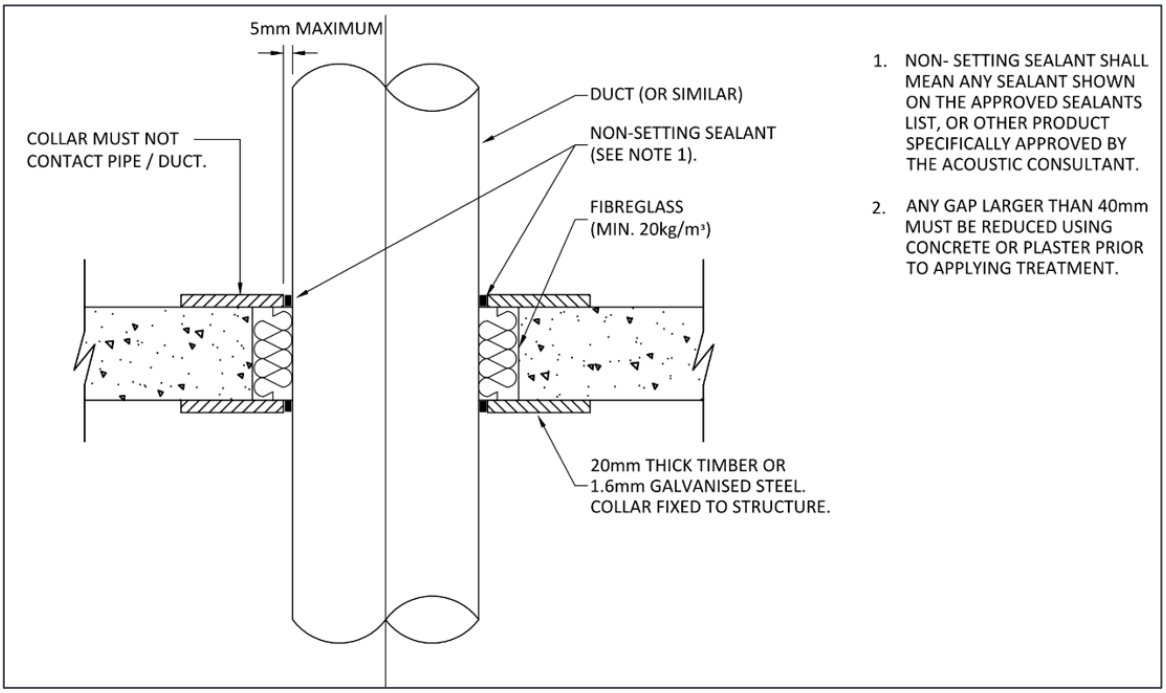
6.3 Hydraulic pipes and slab penetrations

It was observed on site that the existing level 1 floor slab has several penetrations for pipework, which have not been acoustically sealed. A site photo showing some of these is provided in Figure 6.

Figure 6: Site photo showing untreated penetrations in floor slab

It is important that all slab penetrations be acoustically sealed so that the overall acoustic performance of the concrete slab is not degraded. An example of a typical acoustic penetration detail is provided in Figure 7.

Figure 7: Example acoustic penetration detail



Additionally, there is a risk of sound transfer through the pipes themselves. For example, noise from the venue could transfer into the pipes and up into apartments above through drainpipe openings.

To reduce this risk, we recommend that all pipes be wrapped with a proprietary acoustic pipe lagging system consisting of an inner layer of 25 mm thick acoustic foam and an outer layer of mass loaded rubber, vinyl or foil with a minimum surface weight of 4 kg/m^2, such as *Soundlag 4525C* by Pyrotek Noise Control or approved equivalent. An example photo of treated pipes is provided in Figure 8.

Figure 8: Example photo showing hydraulic services pipes with acoustic lagging

6.4 Reverberation control

For the comfort of patrons, to improve music clarity and to control overall noise in the venue interior, we recommend that absorptive acoustic finishes be incorporated into the interior design. Specifications for such treatments can be determined in conjunction with the project architect.

The current fit-out design drawings (dated October 2019) show a good amount of acoustic ceiling coverage, which we understand may be a perforated or slatted type. In order to absorb sound, these ceiling types require acoustic blankets above them (recommended min. density of 48 kg/m^3) and must have an open area of approximately 20% or more.

It is important that any acoustic ceilings such as these be located below the plasterboard barrier ceiling described in Section 6.2.

Consideration should also be given to including absorptive acoustic finishes to wall surfaces to break up reflections and further reduce the reverberation time in the room.

7.0 MUSIC NOISE ASSESSMENT

7.1 Calculation method

A 3-dimensional computer model was created in the environmental noise modelling program SoundPLAN v8.1 to predict noise levels from the proposed development to the residential dwellings in the vicinity of the subject site.

Geometry data for the model has been sourced from public aerial photography, visual inspections of the area, and building heights defined on the basis of standard assumed heights per floor level. The geometries in the model are simplified representations of the built environment that have been configured to a level of detail that is appropriate for noise calculation purposes.

The SoundPLAN digital model has been used to calculate noise levels using the International Standard *ISO 9613-2: 1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613). ISO 9613 is a general environmental noise calculation standard that has been used extensively throughout Australia, New Zealand, and Europe since its publication in 1996.

The implementation of ISO 9613 within proprietary noise modelling software enables multiple sound transmission paths, including reflected and screened paths, to be accounted for in the calculated noise levels. While atmospheric effects are expected to have a negligible effect on the transmission of sound from the venue to neighbouring sensitive receiver locations, it is noted that the ISO 9613 predicts noise levels for conditions which favour the propagation of noise.

7.2 Source levels

We understand that the venue will include two pianos, which are expected to be stage pianos (keyboards), opposed to acoustic pianos. The keyboards will be amplified through a house sound system, with singers also present at times.

There are expected to be two main performance types, cabaret-style piano and more lively “duelling pianos” with audience sing-a-longs.

MDA has an extensive database of noise measurements, including data obtained in similar types of live music venues. The source levels presented in Table 8 have been used for this assessment.

Table 8: Internal music levels, dB $L_{p,rev}$

	Octave Band Centre Frequency (Hz)							
Source	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**A**
Cabaret piano	65	80	85	86	81	74	62	86
Duelling pianos with singing*	76	91	95	99	96	88	80	100

** Derived from two measurements, a piano and an adult church choir*

7.1 Predicted noise levels

Predicted noise levels based on the recommendations outlined in Section 6.0 are provided below. The levels are presented as L_{10} values for comparison with the night criteria. These were derived by applying a simplified +3 dB adjustment to the predicted L_{eq} levels.

7.1.1 Outdoor noise (facade breakout, doors closed)

The predicted music noise levels at the nearest affected noise-sensitive receivers are provided in Table 9 and Table 10.

Table 9: Predicted music noise levels – cabaret piano, dB L_{10}

	Octave Band Centre Frequency (Hz)						
Receiver	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
294 Lygon Street	22	29	35	30	20	13	<10
280 Lygon Street	21	30	39	31	20	14	<10
270 Lygon Street	16	26	33	29	19	11	<10
116 Albert Street	14	22	30	21	12	<10	<10
Night-time noise limit	**55**	**56**	**52**	**48**	**45**	**43**	**34**
Compliance?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 10: Predicted music noise levels – duelling pianos with singing, dB L_{10}

	Octave Band Centre Frequency (Hz)						
Receiver	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
294 Lygon Street	35	45	45	45	37	27	18
280 Lygon Street	36	49	49	48	41	30	24
270 Lygon Street	26	39	43	43	35	26	15
116 Albert Street	24	36	40	36	29	21	12
Night-time noise limit	**55**	**56**	**52**	**48**	**45**	**43**	**34**
Compliance?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

7.1.2 Indoor noise (transfer through floor/ceiling)

The predicted music noise levels in the level 1 apartment of 294 Lygon Street, which is located immediately above the proposed venue, are provided in Table 11. The predictions are provided for the worst-case scenario only (duelling pianos with singing).

Table 11: Predicted music noise levels – duelling pianos with singing, dB L_{10}

	Octave Band Centre Frequency (Hz)						
Receiver	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Level 1 apartment	21	23	20	12	0	0	0
Night-time noise limit	**40**	**30**	**20**	**20**	**15**	**10**	**10**
Compliance?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

7.2 Discussion

The results show that music noise can comply with the SEPP N-2 night-time noise limits. By extension, compliance with the day and evening time periods is also predicted, as long as appropriate steps are taken to reduce noise emanating from the venue (see Section 6.0). The predicted noise levels are marginally compliant in the 250 Hz and 500 Hz bands and source levels within the venue will need to be managed accordingly.

An effective means of managing music source levels can be to include a sound system limiter. We note that in this case, however, a limiter may not be very effective, as it would not control sound from patrons singing acoustically. If the assumed source levels presented in Table 8 are exceeded, further review of venue operations and noise controls may be necessary.

The assessment undertaken is based on the recommendations in Section 6.0 being implemented, as well as our outlined assumptions regarding the existing building construction. These should be confirmed during design development. Supervision during construction may be necessary for high performance building elements (e.g. the barrier ceiling).

The assessment approach is based on some conservative assumptions, most notably regarding the background noise levels used to derive the SEPP N-2 noise limits. The night-time outdoor limits, for example, are based on the lowest background noise levels measured once the East Brunswick Hotel had closed. However, during the proposed operating hours and on busier nights (e.g. Fridays and Saturdays), background noise levels at the nearest receiver are likely to be higher, particularly since the East Brunswick Hotel will also be open.

8.0 SUMMARY

A Piano Bar is proposed for the ground level of an existing mixed-use building at 294 Lygon Street, Brunswick East.

MDA has carried out a music noise assessment of the proposed development in accordance with SEPP N-2.

This assessment has been based on:

- Existing noise conditions determined from measurement surveys at the site
- Limits determined in accordance with SEPP N-2
- Detailed 3-dimensional modelling of the site and surrounding environment.

It has been demonstrated that compliance with the relevant legislation in terms of music noise (SEPP N-2) can be achieved, provided that our recommendations are incorporated into the design and operation of the venue.

APPENDIX A GLOSSARY OF ACOUSTIC TERMINOLOGY

dB	Decibel. The unit of sound level.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4000Hz (4kHz). This is roughly equal to the range of frequencies on a piano.
L_{A10}	The noise level exceeded for 10% of the measurement period, measured in dBA. This is commonly referred to as the average maximum noise level.
L_{A90}	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
L_{Aeq}	The equivalent continuous sound level. This is commonly referred to as the average noise level and is measured in dBA.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
Octave band	Sound, which can occur over a range of frequencies, may be divided into octave bands for analysis. The audible frequency range is generally divided into 7 octave bands. The octave band frequencies are 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.

APPENDIX B LEGISLATION AND GUIDELINES

B1 SEPP N-2

Music noise from entertainment venues is controlled by *State Environment Protection Policy (Control of Music Noise from Public Premises) No. N-2* (SEPP N-2). Compliance with SEPP N-2 is mandatory under section 46 of the Environment Protection Act 1970.

Clause 20 of SEPP N-2 provides that:

> *Where the level of music noise from indoor or outdoor venues exceeds the noise limit, steps shall be taken by the occupier to reduce those levels to, or below, the noise limit.*

SEPP N-2 sets noise limits that must be achieved in a 'noise sensitive area'. The Policy defines a noise sensitive area as:

> *(a) that part of the land within the apparent boundaries of any piece of land which is within a distance of 10 metres outside the external walls of any of the following buildings:*
>
> - *Dwelling (except Caretaker's House), [or] Residential Building.*
>
> *(b) that part of the land within the apparent boundaries of any piece of land on which is situated any of the following buildings which is within a distance of 10 metres outside the external walls of any dormitory, ward or bedroom of such buildings:*
>
> - *Caretaker's house, Hospital, Hotel, Institutional Home Motel, Reformative Institution, Tourist Establishment, Work Release Hostel.*

For indoor venues, SEPP N-2 sets noise limits as shown in Table 12.

Table 12: SEPP N-2 criteria (music on more than 3 nights per week)

Time period		Noise limit
Day/Evening	Saturday 1000 – 2200 hrs Sunday 1200 – 2100 hrs Other 0900 – 2200 hrs	Music noise (L_{Aeq}) not permitted to exceed background noise (L_{A90}) plus 5 dB
Night	Saturday 2200 – 1200 hrs Sunday 2100 – 0900 hrs Other 2200 – 0900 hrs	Music noise (L_{OCT10}) is not permitted to exceed the background noise level (L_{OCT90}) by more than 8 dB in any octave band (63 Hz – 4 kHz) at a noise-sensitive area

The derived SEPP N-2 day and evening music noise limit is outlined in Table 13.

Table 13: SEPP N-2 derived day and evening noise limit, dB

Period	Measured background noise level, L_{A90}	SEPP N-2 limit, L_{Aeq}
Day / evening	51	56

The derived outdoor noise limits for the night period are presented in Table 14. The limits are based on background noise levels measured between 1145 hrs Monday 11th and 0000 hrs Tuesday 12th November. This was the lowest measured background noise level for all 15 minute night-time periods including up until 1 hour after the nearby East Brunswick Hotel closes.

Table 14: SEPP N-2 derived night-time noise limits, dB

	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Measured background noise level, L_{90}	47	48	44	40	37	35	26
	+8	+8	+8	+8	+8	+8	+8
Night-time noise limit, L_{10}	55	56	52	48	45	43	34

Since background noise levels have not been measured within the habitable rooms of apartments above the venue, the noise limit used to assess potential noise impacts from sound transfer through the floor/ceiling are the SEPP N-2 base noise limits, as presented in Table 15.

Table 15: SEPP N-2 base night-time noise limits, dB

	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Base night-time noise limit, L_{10}	40	30	20	20	15	10	10

APPENDIX C BACKGROUND NOISE MEASUREMENTS

Ambient noise levels were measured using a 01dB Cube precision integrating sound level meter fitted with a windshield. Measurements were obtained using the 'F' response time and A-weighting frequency network. The equipment was checked before and after the survey and no significant drift in calibration was observed.

The meter was installed on the balcony of the East Brunswick Hotel, which is immediately next door to the balcony of the nearest noise-sensitive receiver at Level 1, 294 Lygon Street (i.e. above the proposed venue).

The microphone was mounted on a tripod at a height of approximately 1.5 m above first floor level (approximately 4.5 m above ground) with a reflecting surface (wall) nearby. In accordance with SEPP N-2, a -2 dB adjustment has been made to the measured results to estimate the free field levels.

A photograph of the monitor setup is shown in Figure 9.

Figure 9: Photograph of monitor setup

The location was considered generally representative of the nearest receiver; however, sample audio recordings obtained from the meter revealed that some periods were affected by noise from nearby activity within the East Brunswick Hotel (cleaners and patrons). Since noise from these sources is likely to be lower on the nearby receiver balcony, a conservative approach to the assessment was required, which involved deriving the day/evening noise limit based on the quietest measured 15 minute period; and deriving the night-time limits based on the lowest measured background noise level for all 15 minute night-time periods including up until 1 hour after the nearby East Brunswick Hotel had closed.

Consecutive measurements were obtained between Friday 8 and Thursday 14 November 2019. The prevailing noise environment when consultants attended the site to install and collect the equipment was dominated by road traffic noise.

Weather data information has been taken from the BOM weather station at Melbourne Olympic Park. The prevailing weather conditions during periods used to derive noise limits are not considered to have adversely affected the measurements.

Table 16 details the lowest measured noise levels obtained from the logger for each time period.

Table 16: Lowest measured background level, dB L_{A90}

	Period	
Date	**Day / evening**	**Night***
Friday, 8 November 2019	57	45
Saturday, 9 November 2019	56	48
Sunday, 10 November 2019	53	45
Monday, 11 November 2019	51	44
Tuesday, 12 November 2019	54	46
Wednesday, 13 November 2019	55	46
Thursday, 14 November 2019	52	46
Lowest measured noise level, L_{A90}	**51**	**44**

**Night-time backgrounds were obtained:*

- *Between 2300 hrs and 0000 hrs Sunday to Thursday; and*
- *Between 2300 hrs and 0200 hrs Friday to Saturday.*

The octave band noise levels for the lowest night-time period are provided in Table 17.

Table 17: Lowest measured night-time noise levels in octave bands, dB

	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Measured background noise levels, L_{90}	47	48	44	40	37	35	26

The measurement results are shown graphically in Figure 10.

Figure 10: Measurement results (facade levels – i.e. no adjustment applied)