MARSHALL DAY Acoustics

JACK'S MAGAZINE – TOWN PLANNING STAGE ENVIRONMENTAL NOISE ASSESSMENT

Rp 001 20191010 | 21 June 2021

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Project: **JACK'S MAGAZINE**

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1.0 INTRODUCTION

Jack's Magazine is a heritage listed site located on Magazine Way in Maribyrnong.

The various buildings on the site were constructed in 1878 and were used to provide safe storage for gunpowder and explosives. The site has been opened for tender for reoccupation whilst maintaining the heritage listed requirements. Chris McEvoy is working with the relevant authorities on a town planning submission for the site for reuse as a function venue with a focus on wedding receptions and ceremonies.

Marshall Day Acoustics Pty Ltd (MDA) has been engaged for acoustic design advice on the project and have previously undertaken an environmental noise feasibility study to inform the site (ref: *Lt 001 20191010 - Jack's Magazine - Jack's Magazine - Environmental Noise Feasibility*, dated 28 April 2020).

This report presents a town planning stage environmental noise assessment, considering the latest information at the time of preparation.

A glossary of acoustic terminology used throughout this letter is presented in Appendix A.

2.0 SITE DESCRIPTION

The Jack's Magazine site is located in a low-lying area adjacent the Maribyrnong River in Maribyrnong and is bounded by the following:

- North: Apartment buildings on La Scala Avenue to the north-west and then predominately parklands and wetlands to the north and north-east
- East: Parklands and Maribyrnong River with residential properties beyond (> 500 m)
- South: Residential properties on Ibis Place, Magazine Way and The Grand
- West: Apartment buildings on La Scala Avenue (note that there is a significant increase in elevation).

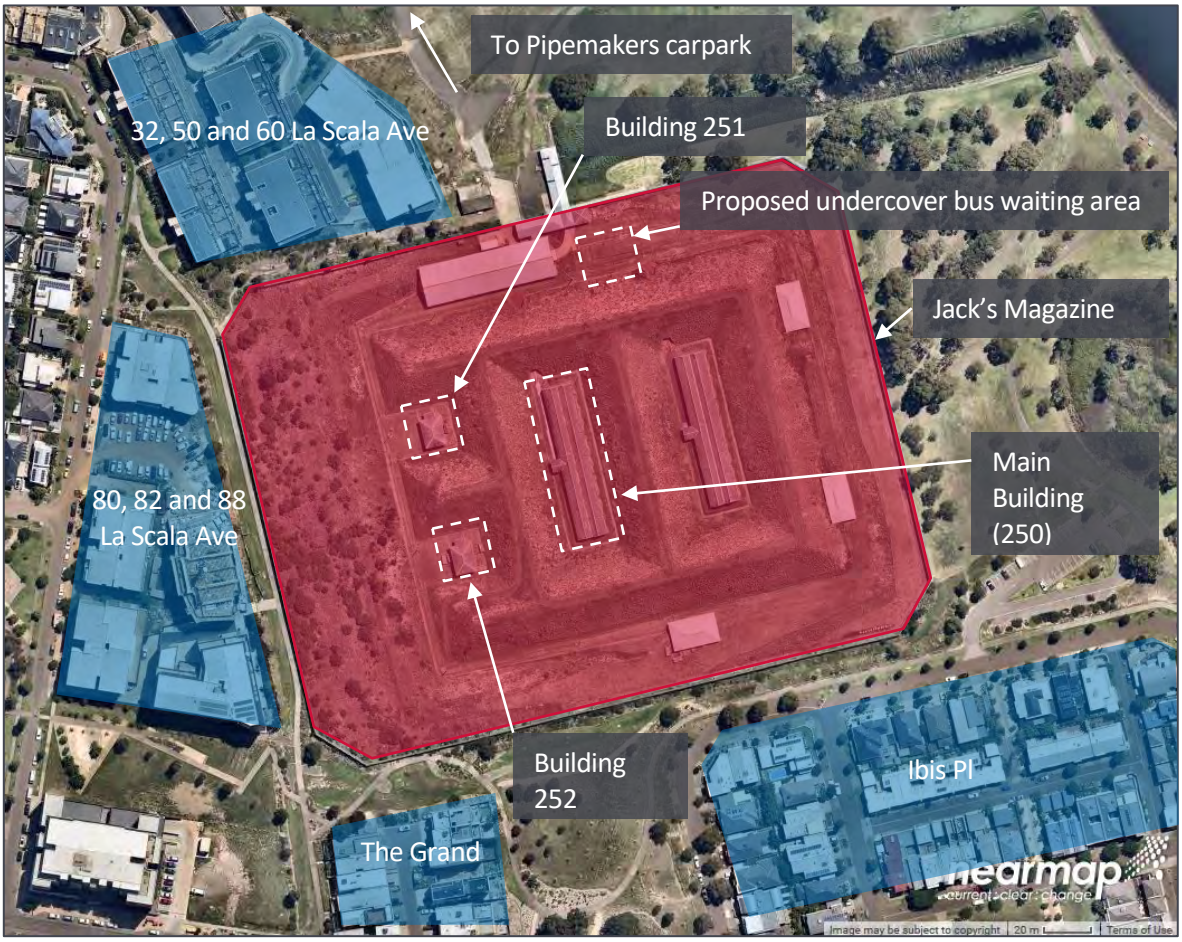
The nearest identified residential dwellings considered in the assessment are provided in Table 1.

Table 1: Nearest identified residential dwellings to subject site

Address	Distance from main building (direction)	Description
54 La Scala Avenue	90 m (NNW)	6 storey apartment building
32 La Scala Avenue	115 m (NW)	6 storey apartment building
60 La Scala Avenue	140 m (NW)	6 storey apartment building
80 La Scala Avenue	150 m (WNW)	4 storey apartment building
82 La Scala Avenue	140 m (W)	6-7 storey apartment building (under construction)
88 La Scala Avenue	140 m (W)	7 storey apartment building
32 The Grand	120 m (SW)	3 storey dwelling
3A/B Ibis Place	105 m (S)	2 storey dwelling

An aerial photograph of the subject site and surrounds is provided in Figure 1.

Figure 1: Jack's Magazine site and surrounds (Image: Nearmap)



The site is zoned Comprehensive Development Zone 3 (CDZ3) and the surrounding areas are zoned Public Park and Recreation (PPRZ) and General Residential Zone 1 (GRZ1). A planning map of the area showing the various zoning is presented in Appendix B.

3.0 DESCRIPTION OF PROPOSAL

3.1 General description

The proposal is to develop the Jack's Magazine site for use as a function centre, with a special focus on wedding ceremonies and receptions.

The venue is to cater for up to 200 patrons, with activities in various areas of the site.

With reference to the locations shown in Figure 1, wedding ceremonies may take place outside of building 251 or building 252 (not simultaneously), with the majority of patrons located outdoors. The ceremonies would take place during the day and evening periods (i.e. prior to 2200 hrs). Crowd noise will be controlled to that of respectful observance and music noise will be limited to background level music[1], for example, an acoustic guitarist.

Wedding receptions will take place inside the main building (250) and operate from the end of the ceremony through until approximately midnight. All patrons will be contained within the main building after 2200 hrs, with a small allowance for 20 patrons to be outside the building for a smoking area. Live music is proposed within the main building.

[1] Refer to Section 7.0, for the noise levels associated with background level music

After the wedding reception is complete, patrons will be guided in groups of up to 30, to the undercover bus waiting area near the entrance of the site. From here, electric buses will enter the undercover parking area and transport residents to Pipemakers carpark. The remainder of patrons will remain within the main building, until a bus is ready to collect them.

3.2 Hours of operation

The site is proposed to host functions during the following times:

- Monday to Thursday: 0800 hrs – 1700 hrs
- Friday: 0800 hrs – midnight
- Saturday: 1600 hrs – midnight.

3.3 Noise sources

The proposal includes the following sources of noise:

- Music noise:
  - background music levels externally at building 251 / 252 during the day period
  - wedding band level music internally within building 250 during the day, evening and night period.
- Patron noise:
  - low level patron noise from 200 patrons externally at building 251 / 252 during the day and evening period
  - internal patron noise for 200 patrons internally at building 250 during the day, evening and night period, at levels typically observed for wedding receptions
  - low level, smokers area noise levels for 20 patrons externally at building 250 during the day, evening and night period
  - patron noise for up to 30 patrons at the undercover bus waiting area during the night period, at levels typically observed for wedding receptions
- Mechanical equipment / vehicle movements:
  - electric bus departures and arrivals, during the day, evening and night period
  - refrigeration equipment at building 250, during the day, evening and night period
  - kitchen and toilet extract fan noise at building 250, during the day, evening and night period
  - air conditioning equipment at building 250, during the day, evening and night period.

4.0 LEGISLATION AND GUIDELINES

Note that at the time of preparing this report (June 2021), the following sections present the currently relevant planning policy framework for environmental noise from commercial, industrial and licensed premises.

As of July 2021, a new noise framework is to be introduced in Victoria, primarily contained in the Environmental Protection Regulations (the EPR) and the Noise Protocol (EPA publication 1826 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*, November 2020). These documents are still undergoing revisions.

The noise limits and assessment procedures in the EPR and the Noise Protocol remain largely the same as the outgoing policies. There are some points (such as the change of Saturday afternoon period changing from evening to day, i.e. less stringent), however this assessment is expected to be largely in compliance with the new policy, as it is currently understood.

4.1 State planning policy framework (SPPF)

Clause 13.04-1 of the SPPF relates to noise abatement and states that planning must consider as relevant the following:

- State Environment Protection Policy (Control of Music Noise from Public Premises No. N-2 (SEPP N-2)
- State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1)
- Interim Guidelines for Control of Noise from Industry in Country Victoria (Environment Protection Authority, 1989)
- A Guide to Reduction of Traffic Noise (VicRoads 2003).

Of the documents listed above, only SEPP N-1 and SEPP N-2 are relevant to this proposal.

The application of SEPP N-1, SEPP N-2 and a number of additional standards and guidelines which are also considered relevant to assessing noise from this proposal is discussed below.

4.2 Victorian legislation and guidelines

A summary of the relevant Victorian legislation and guidelines is provided in Table 2 and Appendix C for further details.

Table 2: Relevant Victorian noise legislation and guidelines

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 Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1)	SEPP N-1 defines mandatory noise limits for commercial, industrial or trade premises in the Metropolitan Region of Melbourne. The limits apply to the level of noise occurring at sensitive receivers. The noise limits are determined on the basis of land zoning and background noise levels, and are separately defined for day, evening and night periods. Refer Appendix C1 for further detail and noise limit derivation.

Document	Overview
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 C2 for further detail and noise limit derivation.
EPA Publication 1254 *Noise Control Guidelines* (EPA Guidelines)	Provides an overview of noise policies and legislation in Victoria for a range of different noise sources, and provides supplementary guidance for situations where there is no policy or legislation. Refer to Appendix C for further detail

4.3 General standards and guidelines

Other standards and guidelines reviewed as part of this noise assessment are provided in Table 3.

Table 3: General standards and guidelines

Reference	Overview
Marshall Day Acoustics patron noise assessment methodology (MDA design targets)	Noise predominantly related to voices of patrons in outdoor areas is not covered under any State Environment Protection Policy or general Victorian guideline. In lieu of an established state policy or criterion, MDA has developed a set of design targets which have been referenced as part of numerous planning applications and VCAT hearings for proposed external patron noise areas. The design targets are defined separately for day, evening and night periods and are determined on the basis of background noise levels. Refer to Appendix C6 for further detail.
NSW *Road Noise Policy* 2011 produced by the NSW Environmental Protection Agency	Strictly only applies in NSW. However, the provisions of the document are often referred to in Victoria for general guidance on potential sleep disturbance. The NSW policy notes that from the research on sleep disturbance to date it can be concluded that: *maximum internal noise levels below 50–55 dB L_{Amax} are unlikely to awaken people from sleep* *one or two noise events per night, with maximum internal noise levels of 65-70 dB L_{Amax}, are not likely to affect health and wellbeing significantly.* It is generally accepted that a partially open window provides approximately 10 dB noise reduction from outside to inside. Therefore, in accordance with the *NSW Road Noise Policy* sleep disturbance findings, we recommend that maximum noise levels from on-site activities at night should not exceed 65 dB L_{Amax} outside an openable window of existing or future residential dwellings.

4.4 Identification of noise sources and assessment method

The noise sources associated with the operation of the proposed development have been identified. Table 4 details the relevant legislation or guideline applicable for the assessment of each of the identified noise sources.

Table 4: Potential noise impacts and criteria

Potential noise impact	Source of assessment criteria	Status
Mechanical services noise (noise from heating and ventilation units, refrigeration equipment, exhaust fans etc)	SEPP N-1	Legislation - mandatory
Deliveries & waste collection	SEPP N-1	Legislation - mandatory
Deliveries & waste collection	EPA Publication 1254	Vic EPA Guidelines – best practice
Late night vehicle movements	Sleep disturbance criteria	Industry accepted guideline
Music noise (internal and external)	SEPP N-2	Legislation - mandatory
Patron noise in the absence of music	Marshall Day Acoustics proposed risk assessment	Guideline – best practice

5.0 EXISTING NOISE ENVIRONMENT

The assessment criteria applicable to the proposed development includes noise limits that are defined on the basis of background noise levels in the absence of noise associated with the operation of the subject site. Therefore, it is necessary to establish background noise levels in the vicinity of the site.

Both attended and unattended measurements have been undertaken at the site, the measurement locations and further details are presented in Appendix D.

For the purpose of the SEPP N-1 noise assessment, the background noise levels presented in Table 5 have been used.

Table 5: Measured background noise levels, dB L_{A90}

Description	Day	Evening	Night
Lowest daily average background noise level	40	35	33

For the SEPP N-2 noise assessment, a day / evening background noise level of 35 dB L_{A90} has been used, the night period octave band background noise levels used in the assessment are presented in Table 6.

Table 6: Night period octave band background noise levels, dB L_{90}

	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
Background noise level	35	30	25	24	23	21	16

The background noise levels to inform the patron noise targets have been based on the levels presented in Table 5.

6.0 SUMMARY OF APPLICABLE NOISE LIMITS / DESIGN TARGETS

This section presents the derived noise limits, based on the measured background noise levels, and the relevant criteria, further information is provided in Appendix C and Appendix D.

The SEPP N-1 noise limits are derived in Table 7.

Table 7: SEPP N-1 noise limits

Period	SEPP N-1 Zoning level	Background noise level, dB L_{A90}	SEPP N-1 limit, dB L_{eff}
Day	53	40	51
Evening	47	35	44
Night	42	33	42

The SEPP N-2 day /evening noise limit is derived in Table 8.

Table 8: SEPP N-2 day / evening noise limit

Period	Noise limit derivation
Day/evening background noise level, dB L_{A90}	35
Plus 5 dB	+ 5 dB
SEPP N-2 day/evening period noise limit, dB L_{Aeq}	40

The SEPP N-2 night period noise limits are derived in Table 9.

Table 9: SEPP N-2 derived night period noise limits

	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
Background noise level, dB L_{90}	35	30	25	24	23	21	16
+8 as per SEPP N-2	+8	+8	+8	+8	+8	+8	+8
SEPP N-2 night period noise limit, dB L_{10}	43	38	33	32	31	29	22

The patron noise targets are presented in Table 10.

Table 10: Patron noise targets, dB L_{Aeq}

Period	Background noise levels, dB L_{A90}	Patron noise target, dB L_{Aeq}
Day	40	50
Evening	35	45
Night (before midnight)	33	40

The sleep disturbance targets applicable to patrons being collected by bus at the end of the night are presented in Table 11.

Table 11: Sleep disturbance criteria

Description	Design target
Short-term maximum noise levels, dB L_{Amax}	60-65

7.0 NOISE DATA

This section presents the input noise data used in the noise modelling, which is described in Section 8.0.

7.1 Mechanical services / vehicle noise data

At this stage of the design, some indicative selections for mechanical services equipment have been made, and some have required inputs to be sourced from the MDA database. The equipment sound power levels used in the noise modelling are presented in Table 12.

Table 12: Equipment sound power data, dB L_w

Description	Source of data	Make / model	Octave Band Centre Frequency (Hz)							
			A	63	125	250	500	1000	2000	4000
Kitchen exhaust fan	Client / online	Fantech / PUE314ER	70	74	71	64	65	63	65	60
Toilet exhaust fan	Client / online	Fantech / PCE354ER	72	72	76	71	69	68	62	58
ERV	Client / online	Armcor / XCM800P3	79	66	67	74	74	76	72	68
AC outdoor unit (x4)	MDA database	Typical	78	83	85	77	74	73	68	62
Refrigeration condenser	MDA database	Typical	88	87	82	86	80	83	83	78
Electric bus[2]	Online, converted to sound power per metre	Based on electric truck	58	55	49	52	56	53	52	50

Should the ultimately installed mechanical plant or vehicles differ significantly from these items, the results of the noise modelling may vary, and noise control treatment recommendations may change.

Publicly available noise data for electric buses is limited, and measurements of the actual bus selections are recommended to verify the input noise levels. Note that the source levels presented are a sound power per metre, which is different to an overall sound power level.

[2] Source data on electric vehicles is currently difficult to obtain. For this project, electric buses have been used to minimise noise levels from bus departures at the end of the event. To account for noise from the buses, the following paper has been referenced - *Noise emission of electric and hybrid electric vehicles deliverable FOREVER*, Marie-Agnès Pallas, John Kennedy, Ian Walker, Roger Chatagnon, Michel Berengier, et al. (n° Forever WP2_D2-1-V4). [Research Report] IFSTTAR - Institut Français des Sciences et Technologies des Transports, del'Aménagement et des Réseaux. 2015, 134 p. hal-02177735, downloaded from https://hal.archives-ouvertes.fr/hal-02177735/document on 13 June 2021.

We recommend measurements of the electric buses chosen for the site are undertaken when available, to verify the noise modelling input.

7.2 Music noise data

Music noise in the proposal is limited to background level music outdoors, and typical wedding band noise levels indoors, the noise data for these sources used in the noise modelling are presented in Table 13.

Table 13: Music noise levels, dB

Description	Octave Band Centre Frequency (Hz)							
	A	63	125	250	500	1000	2000	4000
Wedding band, L_{Prev} (indoors)	97	95	95	95	90	90	90	90
Background music noise level, L_w (outdoors)	84	83	83	83	78	78	78	78

7.3 Patron noise data

The patron noise data used in the noise modelling is presented in Table 14.

Table 14: Patron noise levels, dB

Description (Area use designation)	Type	A	Octave Band Centre Frequency (Hz)						
			63	125	250	500	1000	2000	4000
Wedding ceremony - 200 Patrons outdoors (Restaurant dining[1])	L_{eq}	96	84	86	87	94	92	88	81
Wedding reception – 200 Patrons indoors (Vertical consumption)	L_{eq} / L_{prev}	91	79	81	82	89	87	83	76
Smoking area – 20 Patrons outdoors (Small smoking areas)	L_{eq}	81	69	71	72	79	77	73	66
Bus collection point – 30 Patrons outdoors (Vertical consumption)	L_{eq}	98	86	88	89	96	94	90	83
	L_{max}	107	95	97	98	105	103	99	92

Note 1: The patron noise levels allowed for at the outdoor ceremony areas reflects that of quiet conversations between audience members during the ceremony and does not account for any shouting or raised vocal effort. We recommended these levels be verified via commissioning measurements once the site is operational, to determine if appropriate, and whether outdoor ceremonies during the evening period (1800 – 2200 hours) are feasible.

8.0 ASSESSMENT METHOD

To predict noise levels to nearby neighbouring residences, the following factors have been considered:

- The amount of noise being generated within the subject site
- The distance between the sources and receivers
- The presence of obstacles such as buildings or screens that obstruct the noise path
- The ground between the source and receiver
- The presence of hard reflective surfaces that may enable additional noise paths.

A 3-Dimensional digital model of the site and surrounding built environment has been created using proprietary noise modelling software SoundPLAN (version 8.1).

The SoundPLAN digital model has been used to calculate noise levels using ISO 9613. ISO 9613 is a general environmental noise calculation standard that is 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 meteorological conditions which favour the propagation of noise.

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 assumed standard 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.

Terrain data for the site and surrounds has been sourced from publicly available Vicmap terrain data[3], provided as 1 to 5 m contours which are considered consistent with visual inspections of the site.

Several assumptions are required to undertake the noise modelling, including:

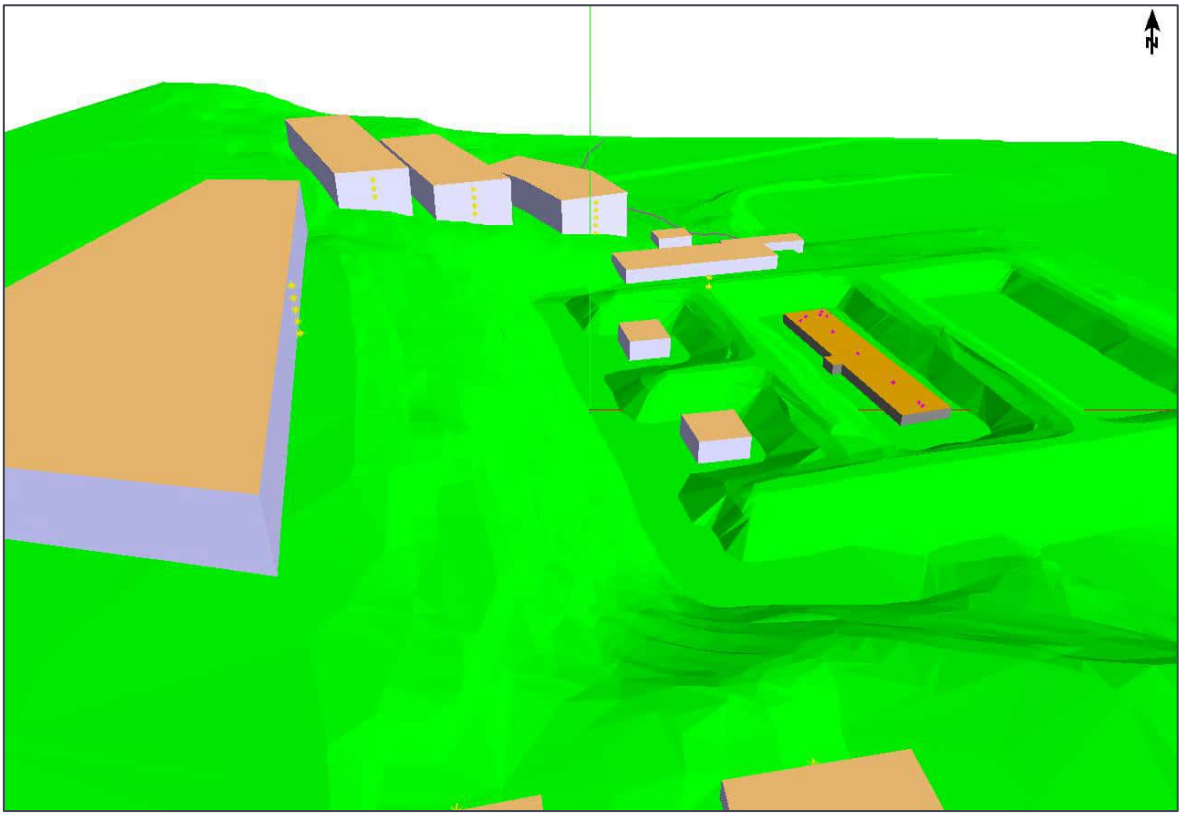
- The ground effect attenuation has been based on 50 % hard ground due to the highly vegetated nature of the terrain surrounding the source locations and between the source and the receivers
- The buildings will be relatively well sealed once the make-good works are complete, and hence there will be minimal noise leaking via gaps in framing, windows, or the ventilation system. Some small allowances have been made in the noise modelling for the provision of small openings in the building envelope, however these elements require careful consideration in the detailed design stage.

  The ceiling / roof of the main building has been modelled as minimum 150 mm thick concrete, and the walls have been modelled as minimum 100 mm thick concrete. Observations of the site suggest this is a conservative basis, as the building was constructed of heavy stonework, significantly thicker than the assumed concrete. If the acoustic performance of this element is not at least equivalent to this construction, then the contribution of this element will increase and could affect the results.
- The noise levels produced are in accordance with Section 7.0 and the operational scenarios described in Section 3.0 are accurate.

[3] http://services.land.vic.gov.au

An extract from the model is presented in Figure 2.

Figure 2: Extract from 3D digital noise model



9.0 RECOMMENDED DESIGN / MANAGERIAL MEASURES FOR NOISE CONTROL

The noise modelling assumes that the noise generated in the various areas are in line with the levels presented in Section 7.0. To achieve these levels, several appropriate managerial and design decisions will be required, as presented below.

9.1 Managerial measures

The following managerial measures require consideration:

- Outdoor patron areas:

  Signage and ushering will be required during the wedding ceremonies, in the smoking area and at the bus collection point, to limit the number of patrons and the level of noise they produce to those used for this assessment (presented in Section 7.0)

  Commissioning measurements to verify patron noise levels are recommended once the site is operational.

- Wedding ceremony / reception area music and amplified speech:

  Appropriate equipment and protocols will be required to limit the level of music and voices to the levels allowed for in this assessment (e.g. a noise limiters / commissioning measurements etc.).

9.2 Design measures

The following design measures require consideration:

- Outdoor bus collection area structure:

  This structure has been modelled with a non-reflective roof surface, due to a limitation with the noise modelling software. In practice, to reduce possible reflections from the underside of this roof to the nearby residents at 54 La Scala Avenue, the design of this roof should be such that it is angled away from theses residents, and preferably the underside lined with an absorptive material.

- Electric buses:

  Selection of appropriate electric buses requires consideration in the detailed design stage, to verify that noise levels from these vehicles is in-line with the levels used in this assessment.

  The electric buses also require consideration for the materials and construction of the shell of the bus as well, to limit noise breakout from within the bus, caused by patrons within. This assessment assumes the buses are completely enclosed, as indicated by indicative selections provided.

- Sealing of building penetrations:

  During the detailed design, appropriate attention to detail is required when treating any ventilation paths built in the walls of the structures.

  The noise modelling implements openings ≤ 0.5 m^2, however it is expected that these areas could be investigated further once a higher level of detail is known.

- Selection of equipment:

  Mechanical services equipment should be selected with consideration of the noise levels used in this assessment.

10.0 SEPP N-1 ASSESSMENT

It has been assumed that all mechanical services equipment associated with the proposal could operate during all SEPP N-1 periods. As such, assessment against the most stringent SEPP N-1 period, the night period, has been undertaken.

The predicted noise levels are presented in Table 15, the noise levels for each address represent the highest level incident on the facade of the building, which is typically at the upper floors.

Table 15: Predicted noise levels and SEPP N-1 assessment

Receiver location (Worst floor)	Predicted noise level, dB L_{Aeq}
54 La Scala Avenue	39
32 La Scala Avenue	37
60 La Scala Avenue	35
80 La Scala Avenue	35
82 La Scala Avenue	36
88 La Scala Avenue	35
32 The Grand	32
3A/B Ibis Place	23
SEPP N-1 noise limit	42
Compliance	✓

The predicted noise levels indicate that compliance with the SEPP N-1 night period noise limits can be achieved with appropriate selection and location of equipment.

The highest contributing noise source to the predicted noise levels is generally the electric bus. As discussed in Section 9.2, measurements of the buses are recommended to verify the input to the noise modelling.

11.0 SEPP N-2 ASSESSMENT

11.1 SEPP N-2 day / evening period

The predicted music noise levels during the day / evening period are presented in Table 16, the noise levels for each address represent the highest level incident on the facade of the building, which is typically at the upper floors.

Table 16: Predicted noise levels and SEPP N-2 day / evening period assessment

Receiver location (Worst floor)	Predicted noise level, dB L_{Aeq}
54 La Scala Avenue	32
32 La Scala Avenue	37
60 La Scala Avenue	37
80 La Scala Avenue	38
82 La Scala Avenue	38
88 La Scala Avenue	36
32 The Grand	31
3A/B Ibis Place	21
SEPP N-2 noise limit	40
Compliance	✓

The predicted noise levels indicate that compliance with the SEPP N-2 day and evening period noise limits can be achieved with appropriate managerial and design measures.

Generally, the largest contributors to the predicted noise levels are the externally located background music noise sources at each building.

11.2 SEPP N-2 night period

The predicted music noise levels during the night period are presented in Table 17, the noise levels for each address represent the highest level incident on the facade of the building, which is typically at the upper floors.

Table 17: Predicted noise levels and SEPP N-2 night period assessment

Receiver location (Worst floor)	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
54 La Scala Avenue	41	36	30	23	21	21	19
32 La Scala Avenue	40	35	29	22	19	17	13
60 La Scala Avenue	39	33	28	21	17	15	10
80 La Scala Avenue	39	35	29	22	19	16	11
82 La Scala Avenue	41	36	31	24	21	19	14
88 La Scala Avenue	40	35	31	26	26	26	22
32 The Grand	41	36	31	25	22	20	15
3A/B Ibis Place	40	36	29	21	15	11	6
SEPP N-2 noise limit	43	38	33	32	31	29	22
Compliance	✓	✓	✓	✓	✓	✓	✓

The predicted noise levels indicate that compliance with the SEPP N-2 night period noise limits can be achieved with appropriate managerial and design measures.

Generally, the largest contributors to the predicted noise levels are the openings in the main building, which are to be limited as far as practicable during the detailed design stage, and as guidance, should be ≤ 0.5 m^2 in area.

12.0 PATRON NOISE ASSESSMENT

The predicted patron noise levels are presented in Table 18, the noise levels for each address represent the highest level incident on the facade of the building, which is typically at the upper floors.

Table 18: Predicted noise levels and patron noise assessment

Receiver location (Worst floor)	Day / evening predicted noise level, dB L_{Aeq} (compliance)	Night predicted noise level, dB L_{Aeq}
54 La Scala Avenue	43 (✓)	40
32 La Scala Avenue	46 (+1 dB)	29
60 La Scala Avenue	45 (✓)	27
80 La Scala Avenue	46 (+1 dB)	27
82 La Scala Avenue	46 (+1 dB)	34
88 La Scala Avenue	43 (✓)	32
32 The Grand	40 (✓)	28
3A/B Ibis Place	22 (✓)	20
Patron noise target	45	40
Compliance	+1 dB above for three locations	✓

The predicted noise levels indicate that compliance with the day and evening period patron noise targets is largely achieved, and only a minor, 1 dB excess of the target is predicted at three locations.

As discussed in Appendix C6, a 1 dB excess of the target expected to result in a low risk of patron noise disturbance.

During the night period, the patron noise targets are predicted to be achieved.

During the day and evening, the highest contributing noise sources to the predicted noise levels, are the patrons standing outside during the ceremony at the outer buildings. As discussed in preceding sections, the input noise levels for this group of patrons reflects quiet conversations, and not raised voices, and hence tight managerial controls are required if evening period ceremonies are commonly occurring.

During the night period, the highest contributing noise source at the location with the highest predicted noise levels (54 La Scala Avenue) are the patrons waiting for bus collection.

Commissioning measurements of patron noise are recommended once the site is operational, to verify the inputs to the noise model.

13.0 SLEEP DISTURBANCE ASSESSMENT

The predicted sleep disturbance noise levels are presented in Table 19, the noise levels for each address represent the highest level incident on the facade of the building, which is typically at the upper floors.

Table 19: Predicted noise levels and sleep disturbance assessment

Receiver location (Worst floor)	**Night predicted noise level, dB L_{Amax}**
54 La Scala Avenue	50
32 La Scala Avenue	45
60 La Scala Avenue	43
80 La Scala Avenue	43
82 La Scala Avenue	46
88 La Scala Avenue	44
32 The Grand	41
3A/B Ibis Place	33
Sleep disturbance target	60 - 65
Compliance	✓

The predicted noise levels indicate that compliance with the sleep disturbance noise targets is achieved.

The highest contributing noise source at the location with the highest predicted noise levels (54 La Scala Avenue) are the patrons waiting for bus collection.

Commissioning measurements of patron noise are recommended once the site is operational, to verify the inputs to the noise model.

14.0 NOISE AMENITY AND ACTION PLAN

MDA do not typically prepare entire Noise Amenity and Action Plans (NAAPs) but can provide input into the acoustic measures to be included in a plan.

At this stage, a NAAP is yet to be provided to MDA for review. A NAAP generally considers off site amenity impacts due to patrons entering and existing the venue.

Items typically included in a NAAP are:

- Procedures to be undertaken by staff in the event of complaints by a member of the public, the Victoria Police, an 'authorised officer' of Council or the Victorian Commission for Gambling and Liquor Regulation
- The management and dispersal of patrons, including patrons loitering around the venue after the venue has closed
- The management of smokers and on and off-site smoking areas (particularly where liquor may not be allowed to be sold and consumed within the smoking area after a particular time)
- The management of external queues
- How the movement and exit of patrons is to be managed, particularly where there is a requirement to close different sections of the venue at different times
- Details of the provision of music including the frequency and hours of entertainment provided by live bands.

15.0 SUMMARY

Jack's Magazine is a heritage listed site located on Magazine Way in Maribyrnong.

The site has been opened for tender for reoccupation whilst maintaining the heritage listed requirements. Chris McEvoy is working with the relevant authorities on a town planning submission for the site for reuse as a function venue with a focus on wedding receptions and ceremonies.

Marshall Day Acoustics Pty Ltd (MDA) has been engaged for acoustic design advice on the project.

This report presents a town planning stage environmental noise assessment, considering the latest information at the time of preparation.

The environmental noise assessment indicates that the project can be feasibly designed and managed to largely comply with relevant noise criteria, and targets noise levels. A minor excess of the day / evening period patron noise target has been predicted, however the subjective response to this is expected to be low risk.

The proposal includes several managerial and design measures to allow for compliance, including:

- Signage and ushering during the wedding ceremonies, in the smoking area and at the bus collection point, to limit the number of patrons and the level of noise they produce to those used for this assessment (presented in Section 7.0)

  Commissioning measurements to verify patron noise levels are recommended once the site is operational, particularly for outdoor ceremonies during the evening period, if they are expected to occur

- Appropriate equipment and protocols will be required to limit the level of music and voices to the levels allowed for in this assessment (e.g. a noise limiters / commissioning measurement etc.)

- Constructing a bus collection point to keep patrons within the general Jack's Magazine compound and utilise the built form to shield the nearby apartment buildings from patron noise

- Completely enclosed, electric buses have been selected in the place of regular shuttles to minimise noise levels. Selection of appropriate electric buses requires consideration in the detailed design stage, to verify that noise levels from these vehicles is in-line with the levels used in this assessment

  Appropriate attention to detail is required when treating any ventilation paths built in the walls of the structures, and limiting the size of penetrations is an important consideration for controlling noise breakout from the main building

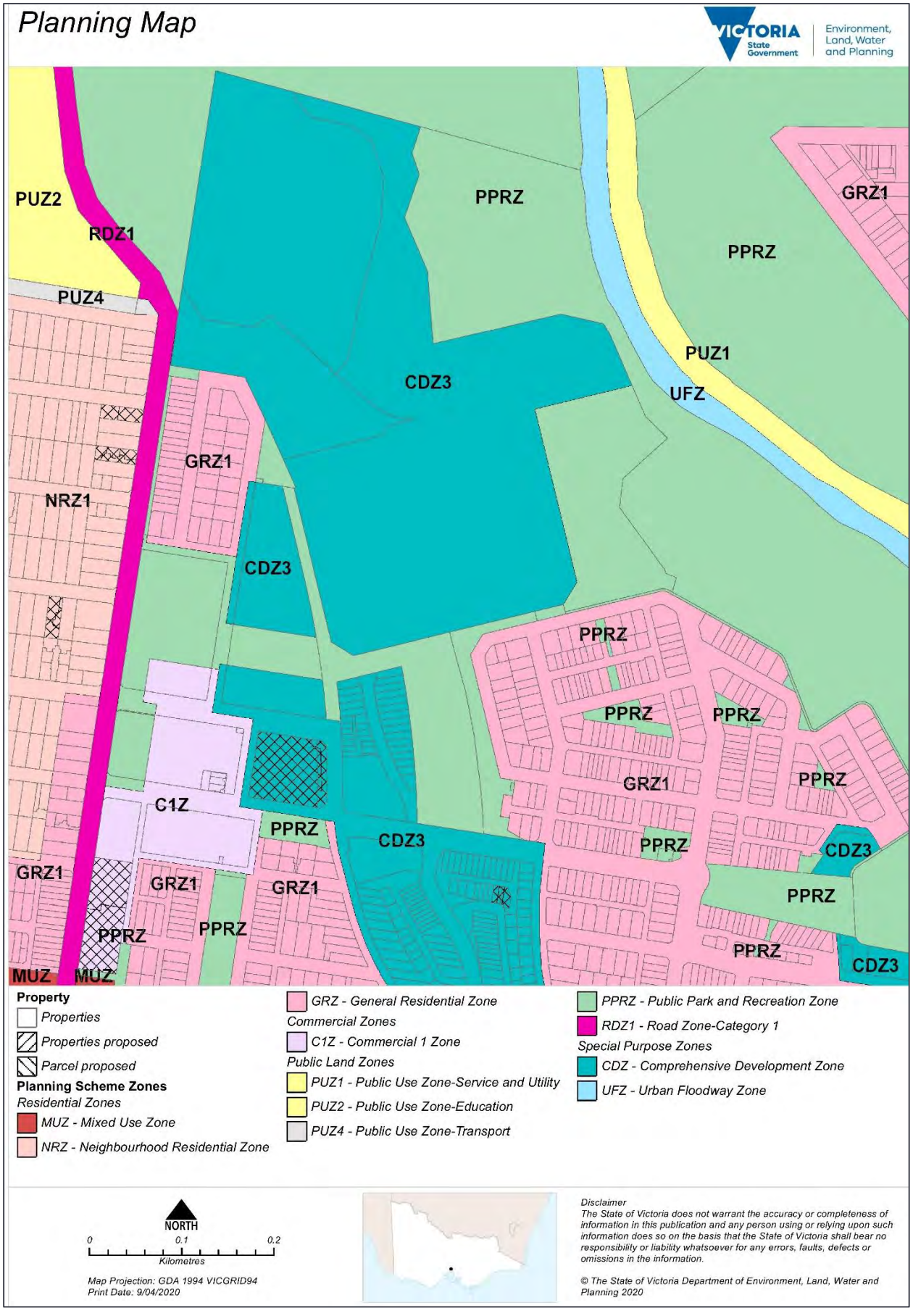
- Mechanical services equipment should be selected with consideration of the noise levels used in this assessment.

We recommend a noise amenity and action plan be prepared and reviewed by an appropriate qualified acoustic engineer.

APPENDIX A GLOSSARY OF TERMINOLOGY

Ambient noise	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
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_{Aeq}	The equivalent continuous sound level. This is commonly referred to as the average noise level and is measured in dBA.
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_{OCT10}	The noise level exceeded for 10% of the measurement period in the octave bands 63Hz-4kHz. Commonly referred to as the average maximum noise level.
L_{OCT90}	The noise level exceeded for 90% of the measurement period in the octave bands 63Hz-4kHz. Commonly referred to as the background noise level.
L_P (or SPL)	Sound Pressure Level A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 µPa RMS) and expressed in decibels.
L_w (or SWL)	Sound Power Level. The level of total sound power radiated by a sound source.
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.
R_w	Weighted Sound Reduction Index A single number rating of the sound insulation performance of a specific building element. Rw is measured in a laboratory. Rw is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to ability of a material to stop sound travelling through it.

APPENDIX B PLANNING MAP



APPENDIX C LEGISLATION AND GUIDELINES

C1 SEPP N-1

C1.1 Application

State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1) sets noise limits that apply to commercial, industrial and trade premises within the Melbourne metropolitan region. Compliance with SEPP N-1 is mandatory under section 46 of the Environment Protection Act 1970.

SEPP N-1 defines a 'commercial, industrial and trade premises' as:

> *any premises except:*
>
> *(a) residential premises as defined in section 48A of the [Environment Protection] Act;*
>
> *(b) a street or road, including every carriageway, footpath, reservation and traffic island on any street or road;*
>
> *(c) a tram, light rail or railway line not being a siding, marshalling yard or maintenance depot of any tram, light rail or railway line; and*
>
> *(d) [land situated at Luna Park, St Kilda].*
>
> *Section 48A of the Act defines residential premises as:*
>
> *any building or part of a building used as or for the purposes of a private residence or residential flat.*

C1.2 Assessment methodology

SEPP N-1 is a policy and technical document. The Policy prescribes the methodology and measurement procedure used to determine applicable noise limits and assessment of compliance.

The Policy requires that proposed commercial premises be designed to comply with SEPP N-1 noise limits. Clause 16 of the Policy states:

> *Where it is planned to develop new commercial, industrial or trade premises, the premises shall be designed so that the noise emissions do not exceed the noise limits*

Further, the occupier of commercial, industrial or trade premises has an ongoing obligation to meet the SEPP N-1 noise limits. Clause 15 of the Policy states:

> *where noise emissions from existing commercial, industrial or trade premises exceed the requirements set out in the Policy, steps shall be taken by the occupier to reduce the level of these noise emissions to, or below, the relevant Policy noise limits.*

SEPP N-1 defines a 'noise sensitive area' as an area of land within 10m outside the external walls of:

> *a dwelling or residential building*
>
> *a dormitory, ward or bedroom of a caretaker's house, hospital, hotel, institutional home, motel, reformative institution, tourist establishment or work release hostel.*

The assessment of noise from the subject site under SEPP N-1 is based on the calculation of a noise limit at a receiver position, taking into account a zoning noise level derived from the land zoning types in the surrounding area and the background noise level.

Once a noise limit is established, the noise level (L_{Aeq}) due to the commercial premises is measured or predicted. If necessary, the LAeq noise level is adjusted for noise character and duration to give the effective noise level (L_{eff}). If the Leff level exceeds the noise limit, then remedial action is required.

C1.3 Calculation of noise limits

SEPP N-1 noise limits are calculated taking into account land 'zoning types' within a 70 m and 200 m radius of a noise sensitive building. Zoning types are categorised as type 1, 2 or 3[4]. A prescribed formula is used to calculate a corresponding Zoning Level. In general, zone type designations are as follows.

- areas such as residential, rural and open space are type 1;
- areas such as commercial, business and light industry are type 2; and
- areas such as general industry and major roads are type 3.

Greater areas of type 2 and 3 land within a 200 m radius of a noise sensitive site result in higher Zoning Levels than a site with respectively larger areas of type 1 land.

The SEPP N-1 Noise Limit is equal to the 'zoning level' unless the background level at the noise sensitive site is categorised as low or high according to Clause B3 of the Policy. If the background level is low or high, the Noise Limit is calculated from a formula taking into account the Zoning Level and the Background Level.

The limits are separately defined for the day, evening and night periods. The time periods are shown in Table 20.

Table 20: SEPP N-1 time periods

Period	Day of week	Start time	End time
Day	Monday-Friday	0700 hrs	1800 hrs
	Saturday	0700 hrs	1300 hrs
Evening	Monday-Friday	1800 hrs	2200 hrs
	Saturday	1300 hrs	2200 hrs
	Sunday, Public holidays	0700 hrs	2200 hrs
Night	Monday-Sunday	2200 hrs	0700 hrs

The relevant noise limits applicable to this development are shown in Table 21.

Table 21: SEPP N-1 limits

Period	Zoning level	Background noise level, L_{A90} dB	Background relative to zoning level	SEPP N-1 limit
Day	53	40	Low	51
Evening	47	35	Low	44
Night	42	33	Neutral	42

[4] EPA Publication no.: 316a, 17 February 2000, *Designation of Types of Zones and Reservations in the Metropolitan Region Planning Schemes for the Purposes of State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* <http://www.epa.vic.gov.au/our-work/publications/publication/2000/february/316a>

C2 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 22.

Table 22: 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 derivation of SEPP N-2 music noise limits are provided in Table 23 and Table 24.

Table 23: SEPP N-2 day/evening noise limit derivation

Period	Noise limit derivation
Day/evening background noise level, L_{A90}	35 dB
Plus 5 dB	+ 5 dB
SEPP N-2 day/evening period noise limit, L_{Aeq}	40 dB

Table 24: SEPP N-2 night period noise limit derivation

	Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Background noise level range, dB L_{90}	35	30	25	24	23	21	16
Plus 8 dB	+8	+8	+8	+8	+8	+8	+8
SEPP N-2 night period noise limit, dB L_{10}	43	38	33	32	31	29	22

C3 Industrial Waste Collection

EPA (Vic) publication no.: 1254, *Noise Control Guidelines* (Guidelines) provides the following recommendations for industrial waste collections:

- Refuse bins should be located at sites that provide minimal annoyance to residential premises
- Compaction should be carried out while the vehicle is moving
- Bottles should not be broken up at the collection site
- Routes which service predominantly residential areas should be altered regularly to reduce early morning disturbances
- Noisy verbal communication between operators should be avoided where possible.

The Guidelines recommend that collections should be restricted to the following times:

One collection per week

6:30am-8pm Monday to Saturday

9am-8pm Sunday and Public Holidays

Two or more collections per week

7am-8pm Monday to Saturday

9am-8pm Sunday and Public Holidays.

C4 Deliveries

EPA (Vic) publication no.: 1254, *Noise Control Guidelines* states the following concerning store deliveries:

Where a residential area will be impacted by noise from deliveries, the deliveries should be inaudible in a habitable room of any residential premises (regardless of whether any door or window giving access to the room is open) outside the hours contained in the schedule

Schedule: Deliveries to shops, supermarkets & service stations

7am-10pm Monday to Saturday

9am-10pm Sunday and Public Holidays.

C5 Sleep Disturbance

The NSW Road Noise Policy 2011 produced by the NSW EPA, provides guidance on potential for sleep disturbance. While the Policy applies strictly only in NSW, the provisions of the document are often referred to in Victoria for general guidance on potential sleep disturbance.

The NSW policy notes that from the research on sleep disturbance to date it can be concluded that:

- *maximum internal noise levels below 50–55 dB L_{Amax} are unlikely to awaken people from sleep*
- *one or two noise events per night, with maximum internal noise levels of 65–70 dB L_{Amax}, are not likely to affect health and wellbeing significantly.*

C6 Patron Noise

Noise from voices of patrons outdoors is not covered under any State Environment Protection Policy or general Victorian guideline.

There has been extensive discussion between members of the Association of Australian Acoustical Consultants (AAAC) in regards to suitable criteria but consensus between members has not yet been reached.

In lieu of an established state policy or criterion, MDA has developed a set of design targets which have been referenced as part of numerous planning applications and VCAT hearings for proposed external patron noise areas.

The structure of the patron noise design targets is summarised in Table 25.

Table 25: Recommended design targets for night-time patron noise

Description	Design Target	Purpose
Semi-steady noise levels - L_{Aeq}	Day Period - 50 dB or background noise (L_{A90}) + 10 dB, whichever is higher Evening Period - 45 dB or background noise (L_{A90}) + 10 dB, whichever is higher Night Period - 40 dB or background noise (L_{A90}) + 5 dB, whichever is higher	Amenity protection
Short-term maximum noise levels L_{Amax}	60-65 dB	Sleep disturbance protection

For a theoretical assessment of a venue, the purpose of the proposed patron noise design targets is not to provide an absolute limit but to provide an indication of whether a venue has the potential to cause an unreasonable impact.

It is difficult to propose an absolute limit because unlike other noise sources (e.g. mechanical equipment), there is a large variation in patron noise and this variation is not always linked to the number of patrons.

The results of the analysis are interpreted as presented in Table 26.

Table 26: Interpretation of patron noise assessment results

Predicted or measured patron noise level	Interpretation
Below the design target	There is a negligible or very low risk of patron noise disturbance associated with the outdoor area.
Above the design target level by up to 2 dB	There is a low risk of patron noise disturbance associated with the outdoor area.
Above the design target level by 3 to 5 dB	There is a low to moderate risk of patron noise disturbance associated with the outdoor area. Potential investigation measures include: Proposals: Assess the proposal once it is operating, ensuring that a NAAP has been properly prepared and implemented. Depending on the results of the above investigations, it may still be necessary to adopt additional managerial controls or retrofit design-based/physical controls.
Above the design target level by 5 to 8 dB	There is a moderate to high risk of patron noise disturbance associated with the outdoor area. Potential investigation measures include additional design-based/physical controls, and/or further managerial controls.
Above the design target level more than 8 dB	There is a high to very high risk of patron noise disturbance associated with the outdoor area. Potential investigation measures include significant additional design-based/physical controls and/or significant changes to the operation.

APPENDIX D NOISE MEASUREMENTS

Both attended and unattended measurements have been undertaken at the locations shown in Figure 3, to inform the environmental noise limits for the area.

All equipment used was fitted with a weather proof windshield. The microphone for each survey was mounted at a height of approximately 1.5 m above local ground level under free-field conditions. Measurements were obtained using the 'Fast' response time and A-weighting frequency network. All equipment was checked before and after the survey and no significant calibration drifts were observed.

Figure 3: Noise monitoring locations

D1 Unattended noise monitoring

Unattended noise monitoring was undertaken at between the subject site and the apartment buildings at 54 La Scala Avenue for a period of approximately 8 days.

Noise measurements were conducted using a laboratory calibrated, ARL EL316 Type 1 noise logger (serial number:16-707-021), with a logging period set to 15 minutes. Periods of inclement weather have been excluded from the analysis.

The measured noise levels have been averaged across the relevant SEPP N-1 time periods, and the summary of results are presented in

Table 27: Summary of unattended noise monitoring, dB L_{A90}

Date	SEPP N-1 period		
	Day	Evening	Night
Tuesday, 19 January 2021	44	40	37
Wednesday, 20 January 2021	40	39	38
Thursday, 21 January 2021	40	39	39
Friday, 22 January 2021	-	-	-
Saturday, 23 January 2021	-	37	33
Sunday, 24 January 2021	-	35	36
Monday, 25 January 2021	40	37	34
Tuesday, 26 January 2021	43	-	-
Minimum	40	35	33
Average	41	38	36

D2 Attended noise measurements

Attended noise measurements were conducted at the locations shown in Figure 3, at time shortly after the venue is expected to close, to inform the SEPP N-2 night period noise limits, for the purpose of this planning stage assessment, the night period limits have been based on the lowest of these measurements, undertaken at the attended measurement #2 location.

Measurements were conducted using a laboratory calibrated, Brüel&Kjær 2250 sound level meter (serial number: 3009588).

The results of the night period attended measurements are presented in Table 28.

Table 28: Summary of night period attended measurements, dB L_{90}

	Octave Band Centre Frequency (Hz)						
Location (measurement times, hh:mm)	63	125	250	500	1000	2000	4000
Attended measurement #1 (14/01, 23:45 – midnight)	40	33	29	25	24	18	15
Attended measurement #2 (15/01, 00:06 – 00:21)	35	30	25	24	23	21	16
Attended measurement #3 (15/01, 00:35 – 00:50)	39	33	27	25	24	20	18

APPENDIX E PATRON NOISE DATA

The noise of patron areas associated with dining and licensed venues is highly variable according to a wide range of factors including:

- The type of venue
- The function of the space within the venue (i.e. seated areas for dining or standing areas with a focus on alcohol consumption)
- Total crowd numbers
- The composition of the total patron numbers in terms of demographics and group sizes
- Weather
- Alcohol consumption
- Background noise levels
- The acoustic properties of the space.

Based on the above considerations, total patron noise emissions will vary significantly between different venues. Further, for a given venue patron noise emissions will vary from day to day and hour to hour according to these types of factors.

The individual and cumulative effect of these factors cannot be precisely calculated. Accordingly, to provide a practical basis for assessing the noise from proposed external areas, a simplified method has been developed to characterise the noise emissions of four broad categories of venue type for different number of patrons. The method is based on a single representative vocal effort to characterise the range of emissions of all individuals within the crowd.

It is assumed that a portion of the crowd may be speaking at any given point in time.

In practice, the vocal effort of each individual will vary across the crowd and throughout the assessment period. The portion of the crowd will also vary. The selected values are therefore not considered exact representations of a crowd's patterns. The values have been chosen to enable a simple relationship to be formulated which provides close agreement with patron noise measurements conducted at a range of venues.

Marshall Day Acoustics and other acoustic consultants in Melbourne have measured patron noise from several different venues. These measurements indicate a large variation in the noise levels of crowds. Variations are due to a number of factors including the situational context of the crowd.

For the purpose of predicting noise levels from a venue, external patron areas are categorised according to the descriptions outlined in Table 29. Reference sound power data for one person is detailed in the 2011 Hayne paper[5].

Table 29: Patron area use categories

Area use category	Reference sound power data per one person		Area use definition
	Equivalent	Maximum	
Vertical drinking ('worst-case' crowd)	88 dB L_{AW}	104 dB L_{AW}	Standing patrons drinking and talking Focus of activity on drinking and socialising
Taverns with significant food offerings	83 dB L_{AW}	104 dB L_{AW}	Predominantly seated patrons, drinking, dining and talking Focus of activity on drinking, whilst dining and socialising
Restaurant dining	78 dB L_{AW}	98 dB L_{AW}	Seated patrons, drinking, dining and talking Focus of activity on dining and socialising
Small smoking areas (<40 patrons)	73 dB L_{AW}	98 dB L_{AW}	Patrons using area for smoking Focus of activity on smoking rather than socialising (data also includes outdoor areas with alcohol consumption)

Based on the above reference sound power data and measurements by Marshall Day Acoustics, a simplified empirical relationship to represent the total sound power level for which crowd numbers and character were varied has been derived for determining design equivalent and maximum sound power level as follows:

- Design equivalent sound power level - derived by assuming that one third of the total crowd speaks continuously over the duration of the assessment period, and each of these speakers emit a constant total sound power level over the duration of the assessment period. In practice, the actual number of individuals speaking, the sound power emitted by each individual, and the temporal characteristics of each speaker will vary considerably over the assessment period. The derived values therefore do not represent the actual percentage of patrons speaking, or the emission of each patron, but simply represent the total sound power level for the number of patrons
- Design maximum sound power level - derived by assuming that the maximum noise level occurs as a result of two (2) individuals simultaneously producing a maximum level. Smoking areas and restaurants are considered to have the same maximum sound power level characteristics, as are taverns with significant food offerings and vertical consumption crowds.

Figure 4 provides the total equivalent sound power based on patron numbers.

[5] Hayne et al 2011, 'Prediction of noise from small to medium sized crowds', in *Acoustics 2011: Breaking New Ground, Proceedings of the Annual Conference of the Australian Acoustical Society*, AAS Queensland Division 2011, Gold Coast, paper number 133.

Figure 4: Total equivalent sound power based on patron number

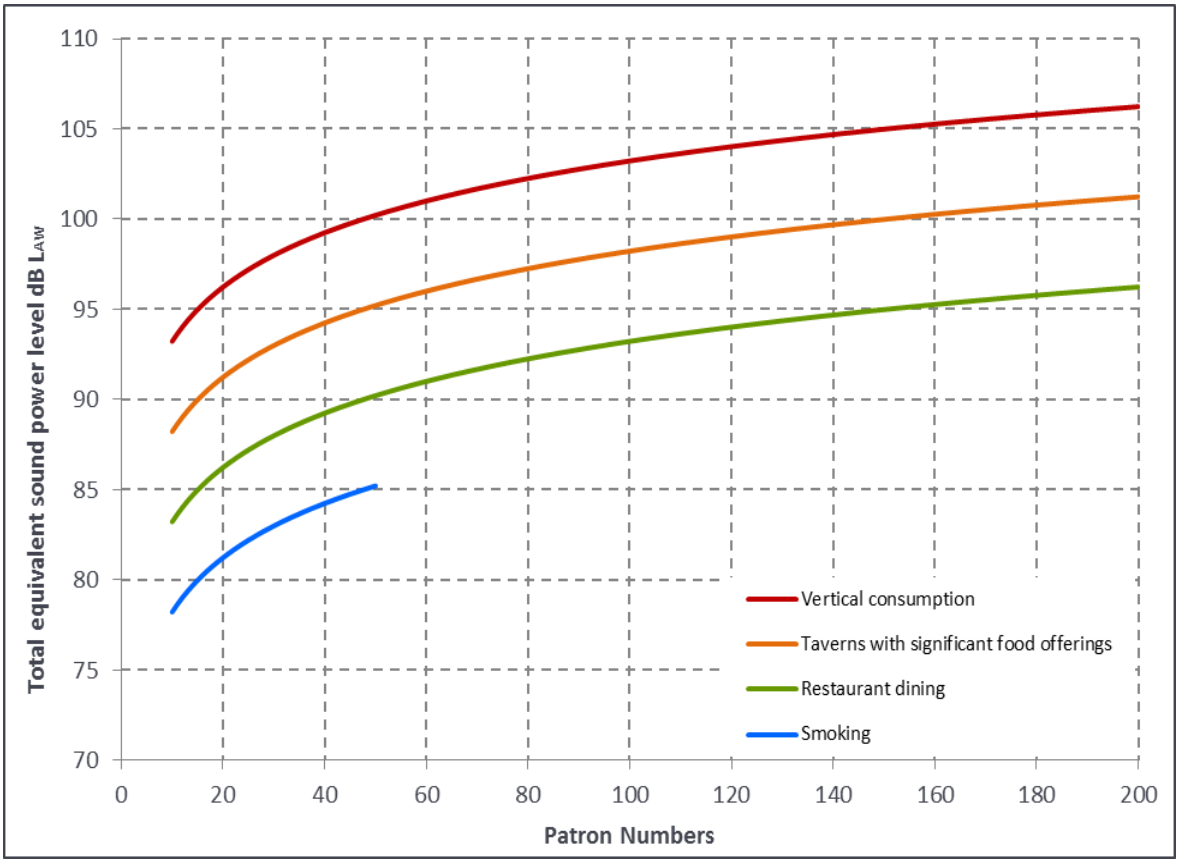


Table 30 provides the octave band spectral correction applied to the calculated patron sound power.

Table 30: Octave band spectral correction

	Octave Band Centre Frequency (Hz)						
Source	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Spectral Correction	-12	-10	-9	-2	-4	-8	-15