



ENFIELD
ACOUSTICS
NOISE
VIBRATION

11-13 SPRING STREET, FITZROY

Acoustic Report for Town Planning Application

For

C/- ANTIPODEAN LAND DEVELOPMENTS PTY LTD

**ADVERTISED
PLAN**

DOC. REF: V1220-02-P ACOUSTIC REPORT (R0)
14 MAY 2026

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Enfield Acoustics Pty Ltd
ABN 15 628 634 391
Ph: +61 3 9111 0090
PO Box 920
North Melbourne, VIC 3051

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Subject	Acoustic Report for Town Planning Application
Client	c/- Antipodean Land Developments Pty Ltd
Document Reference	V1220-02-P Acoustic Report (r0)
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1 Introduction

Enfield Acoustics has been engaged by the Applicant to assess potential noise impacts relating to the proposed residential development at 11-13 Spring Street, Fitzroy (Subject Land).

The Subject Land proposal is for the following uses:

- Basement and ground floor car parking with car stackers
- Ground floor communal area
- Apartments from Level 1 up to Level 7

Based on our review of the development, our assessment will focus on the following potential noise impacts:

- Traffic noise impacts
- Surrounding commercial uses
- Base building mechanical plant
- Domestic air-conditioning
- Car park

It is noted that a previous noise assessment was undertaken by Marshall Day Acoustics in support of a previous scheme for the Subject Land (Report No. Rp 001 R08 20200828 dated 25 July 2022), hereafter referred to as the **MDA Report** – refer to Appendix A.

For the purposes of this acoustic assessment, our office will adopt (in part) the findings presented within the MDA Report.

Our assessment is based on Plans prepared by Edition Office Pty Ltd dated 13 May 2026.

2 Assessment

2.1 Planning Scheme Clause 58.04 (Noise Impacts Objectives)

With respect to road traffic noise impacts, Clause 58.04-3, Standard D16 of the Planning Scheme, requires that internal noise levels in apartment buildings meet the following:

Standard D16

Noise sources, such as mechanical plants should not be located near bedrooms of immediately adjacent existing dwellings.

The layout of new dwellings and buildings should minimise noise transmission within the site.

Noise sensitive rooms (such as living areas and bedrooms) should be located to avoid noise impacts from mechanical plants, lifts, building services, non-residential uses, car parking, communal areas and other dwellings.

New dwellings should be designed and constructed to include acoustic attenuation measures to reduce noise levels from off-site noise sources.

Buildings within a noise influence area specified in Table D5 should be designed and constructed to achieve the following noise levels:

- Not greater than 35dB(A) for bedrooms, assessed as an LAeq,8h from 10pm to 6am.
- Not greater than 40dB(A) for living areas, assessed LAeq,16h from 6am to 10pm.

Buildings, or part of a building screened from a noise source by an existing solid structure, or the natural topography of the land, do not need to meet the specified noise level requirements.

Noise levels should be assessed in unfurnished rooms with a finished floor and the windows closed.

Table D5 Noise influence area

Noise source	Noise influence area
Zone interface	
Industry	300 metres from the Industrial 1, 2 and 3 zone boundary
Roads	
Freeways, tollways and other roads carrying 40,000 Annual Average Daily Traffic Volume	300 metres from the nearest trafficable lane
Railways	
Railway servicing passengers in Victoria	80 metres from the centre of the nearest track
Railway servicing freight outside Metropolitan Melbourne	80 metres from the centre of the nearest track
Railway servicing freight in Metropolitan Melbourne	135 metres from the centre of the nearest track

Enfield Acoustics confirms that the Subject Land:

- Is not within 300m of any Industrial 1,2 or 3 zones
- Is not adjacent to any roads that carry >40,000 AADT based on Vicroads traffic data
- Is not within 80m of a rail corridor

To this end, Clause 58.04 of the planning scheme is not strictly triggered with respect to road traffic noise, industry, and railways. Regardless, to ensure the amenity of the future residents on the Subject Land, our assessment will adopt the recommended noise targets of Clause 58.04 with regards to road traffic noise as best practice, regardless of the technical application of the Clause.

It is important to note that the performance requirement of Standard D16 relates to internal noise levels only and relies on façade design and construction to mitigate noise emissions.

The target noise criteria are summarised below for clarity:

Location	Noise Target
Bedrooms <i>Between 10pm to 6am</i>	35 dB(A) L_{eq-8hr}
Living areas <i>Between 6am to 10pm</i>	40 dB(A) $L_{eq-16hr}$

A site inspection was carried out by our office on 19 November 2025 to conduct attended traffic noise measurements at the following locations:



It is noted that traffic noise emissions from Spring Street and Argyle Street were not materially elevated at the site, with only a few car passbys observed during our inspection. The main and most relevant source of traffic noise was from Nicholson Street and Johnson Street, where higher traffic volumes were observed.

To that end, the attended noise monitoring was conducted closer to Nicholson Street and Johnson Street to capture road traffic noise impacts and avoid shielding effects from nearby buildings.

Noise measurements were conducted between 5.00pm to 6.00pm, reflective of when higher traffic volumes that would occur during peak hour.

The results of our measurements are presented below:

Location	Measured Noise Level
Worst-affected facade <i>Between 10pm to 6am</i>	62 dB(A), $L_{eq-15min}$
Living areas <i>Between 6am to 10pm</i>	62 dB(A), $L_{eq-15min}$



Measurement of Johnson Street



Measurement of Nicholson Street

While the Planning Scheme considers long-term average noise emissions, our assessment considers the more onerous peak traffic noise levels, resulting in a conservative assessment. In our experience, designing to peak traffic noise levels often results in a better acoustic outcome and overall amenity for future occupants.

A correction of -4dB(A) was applied to the measured noise level to estimate 'Night' period noise levels (Refer "*A reexamination of the relationship between $L_{10(18hour)}$ noise level parameter and other road traffic noise level parameters Brown, R & Brown, H – 2016*"). We note that data from previous long-term unattended noise monitoring conducted by our office correlates well with the findings in the research paper.

Based on the measured noise levels, desktop modelling was conducted to predict incident noise levels at various locations of the development, as follows:

Period	Predicted Noise Level
<i>Between 6am to 10pm</i>	≤57 dB(A), $L_{eq-15min}$
<i>Between 10pm to 6am</i>	≤53 dB(A), $L_{eq-15min}$

Based on the predicted noise levels above, minimum forms of glazing construction can comply with the requirements of Clause 58.04, as follows:

Location	Acoustic Performance Requirement
All facades <i>Habitable rooms only</i>	<i>No requirement – glazing specification by others</i> Minimum forms of glazing construction comply with Standard D16 (e.g., 6mm glass or any double glazed construction)

All operable windows to habitable rooms must be installed with acoustic bulb seals and sliding doors must be installed with pile seals to the perimeter.

Overall, upgraded glazing is not required for the development, noting that the Subject Land is reasonably set back and well shielded from Nicholson Street and Johnson Street.

We note that no specific acoustic controls are required for the façade as standard forms of façade construction such as masonry or lightweight cladding would comfortably surpass the performance requirements of the windows and doors.

On this basis, Enfield Acoustics is satisfied that traffic noise impacts for the proposed development will comply with the requirements of Standard D16 of the planning scheme with minimum forms of glazing construction.

2.2 Surrounding Commercial Uses

In the context of the development, any sensitive use constructed on the Subject Land must ensure that external noise emissions from surrounding commercial uses are compliant with the Noise Protocol, such as not to prejudice existing uses.

The following zoning levels and noise limits presented below were established in the MDA Report using the results of long-term background noise monitoring undertaken at the site.

Period	Day of week	Time period	Zoning level, dB	Background noise level, dB L_{A90}	Noise limit, dB L_{eff}
Day	Monday-Saturday	0700-1800 hrs	59	49	59
Evening	Monday-Saturday	1800-2200 hrs	53	46	53
	Sunday, Public Holidays	0700-2200 hrs			
Night	Monday-Sunday	2200-0700 hrs	48	41	48

Our office visited the Subject Land between 3.30pm to 4.30pm on 19 November 2025 to make observations of potential noise impacts from surrounding commercial uses, noting that past observations and measurements by MDA were conducted in 2022.

Our observations are summarised below:

Meridian Sculpture

The Subject Land is situated within mixed-use zoning and is near an existing metalworks business, Meridian Sculpture, at 8 Spring Street, Fitzroy, which operates between 7.30am to 4.30pm, Monday to Friday, as advertised online. This facility was observed to be the primary source of commercial noise emissions in the Subject Land. Observed noise sources included hand tools and other sculpting equipment and processes, such as grinding and furnace operations.

The following noise levels were measured from Meridian Sculpture:

Location	Noise Level $L_{Aeq-30min}$	Noise Limit $L_{Aeq-30min}$	Compliance?
Spring Street façade	56 dB(A)	59 dB(A)	✓



Measurement of Meridian Sculpture

The results of our monitoring indicate that noise from the existing Meridian Sculpture complies with the Noise Protocol, noting that this is consistent with the results in the MDA Report, which reported a measured noise level of up to 55dB(A) L_{eq} .

Further, it is noted that the Subject Land development is technically not encroaching on Meridian Sculpture as there are existing dwellings located on at 5 Spring Street (adjacent to the Subject Land), meaning that Meridian Sculpture is already required to comply with statutory noise limits at those dwellings.

7-Eleven

The Subject Land is otherwise surrounded by various other low-intensity uses, which were not observed to generate material noise emissions above the existing ambient noise environment.

There exists a service station (7-Eleven) on the corner of Johnson Street and Nicholson Street, however, noise emissions from the general use (e.g., customer vehicles and petrol bowsers and air compressors from tyre pressure gauges) were inaudible or barely audible above the ambient background noise environment.

The Subject land development is not encroaching on 7-Eleven, as there are existing dwellings at 5 Spring Street (with balconies overlooking the service station) located closer to the 7-Eleven. As such, 7-Eleven is already required to comply with statutory noise limits at those dwellings.

Expresso Carwash

With regard to the carwash (Expresso Carwash), which was previously identified in the MDA Report as having potential to generate noise impacts, it is noted that the carwash was closed during our site inspection and could not be measured. Further, an online review indicates that the carwash appears to be closed indefinitely.



Expresso carwash (closed)

On this basis, we are satisfied that the risk of adverse noise impacts from surrounding commercial uses is low and unlikely to result in unreasonable noise impacts at the Subject Land.

2.3 Base Building Mechanical Plant

All base building mechanical plant on the Subject Land development must comply with the Noise Protocol when measured:

- within dwellings (on-site)
- at adjacent off-site dwellings

Individual domestic air-conditioning units are not assessed under the Noise Protocol.

We note that based on the type of development proposed being primarily residential, any base building services are unlikely to result in material noise impacts in practice.

Regardless, it is recommended that any base building mechanical plant is reviewed once plant specifications are known, noting that compliance with the Noise Protocol is a statutory requirement, regardless of planning controls. Such assessments are more typically undertaken during detailed design phases once plant and equipment is specified.

2.4 Domestic Air Conditioning

All outdoor AC units will need to be installed and used in compliance with the Environment Protection Regulations 2021 (Regulations), which prohibits the use of such equipment at night if it is audible within an adjoining residence.

The Plans indicate that domestic ACs will be installed on the rooftop. This is considered typical for multi-storey residential apartments and is accepted as standard practice.

In reality, AC units are sometimes used during the night period but rarely result in noise complaints. Under the Regulations, an objective assessment is not typically required in planning because all air-conditioning units emit similar types of noise and rely on prohibited use at night in the event of a noise complaint.

In effect, the proposed air conditioning equipment is no different to what already exists within dwellings surrounding the site, noting that there is nothing particularly sensitive about the proposal.

Where possible however, it is recommended that air conditioning equipment is:

- Positioned on the rooftop where possible.
- Positioned to limit line-of-sight or exposure to adjacent private open spaces or windows

Overall, the risk of adverse noise impacts from domestic air condensers is low, especially in the context of being in a developed, urban area. Regardless, all domestic plant use is controlled by the Environment Protection Regulations 2021 which is enforceable regardless of planning controls.

2.5 Car Park Assessment

The development proposes a garage roller door and car stackers on ground floor and basement floor, with the apartments proposed above.

There is little to suggest that noise from car park use in small apartment developments would occur at a frequency where adverse noise impacts could occur at both on-site and off-site dwellings.

Further, there is already a requirement for the floor/ceiling between the ground floor and first floor to comply with the *National Construction Code* (NCC), which is normally resolved at the building permit stage and are not normally matters overseen by Council or planning permits.

NCC requires an airborne sound insulation rating of $R_w + C_{tr}$ 50 between SOUs to common car park areas and is typically adequate in our experience.

Garage roller doors do not generate material on-site and/or off-site noise impacts and the proposed configuration is common throughout Victoria.

Given that the limited number of car stacker bays proposed, we do not consider this material to the assessment. Further, past measurements of similar systems infer that noise emissions will

likely be barely audible or inaudible at adjoining residents where party walls and floor/ceilings are constructed to comply with the NCC.

While the risk of adverse noise impacts is considered low, it would be prudent to apply best practice installation methods for the selected system to mitigate structure-borne noise, as follows:

- There is no rigid fastening of the stacker frame to the concrete soffit above or boundary walls, unless by resilient rubber or polyurethane pads and washers (rigid anchoring of posts to pit slabs is acceptable).
- Hydraulic pumps and/or electric motors shall be fixed to the stacker support frame only and not anchored to any boundary walls or building structure directly, unless mounted on rubber isolation pedestals with a minimum static deflection of 8mm under load.
- Any security gates provided with the system should be chain and nylon roller driven.

The highest risk of noise impacts would occur from poor maintenance, where poorly lubricated mechanisms may 'squeak' over time. This is ultimately a matter that is overseen by the owner's corporation and building management and can be easily resolved should complaints arise.

On this basis, we are satisfied that no adverse on-site and/or off-site noise impacts are expected to occur from the use of the car park.

3 Recommendations and Conclusion

Enfield Acoustics has assessed potential noise impacts from the proposed residential development at 11-13 Spring Street, Fitzroy and is satisfied that the Application can be approved.

Based on the traffic noise levels measured, we are satisfied that the development can achieve satisfactory internal noise levels (in accordance with Standard D16) with minimum forms of modern glazing construction.

Noise emissions from surrounding commercial use (Meridian Sculptures) were measured to comply with the Noise Protocol when measured at the façade of the development. No other material noise emissions were observed, noting that the carwash located west of the Subject Land is no longer operating.

With regards to noise impacts from base building and domestic plant from the Subject Land, we do not consider this to be a material risk of noise impacts, however, it is also recommended that all mechanical plant and equipment on the Subject Land be assessed once all requirements are known.

No material on-site and off-site noise impacts are expected to be generated from the car park of the Subject Land.

To this end, we are satisfied that a planning permit can be approved for the Subject Land where the recommendations in this report are adopted.

Appendix A: MDA Report

MARSHALL DAY
Acoustics



11-13 SPRING STREET & 14-16 ARGYLE STREET
AMENDED NOISE ASSESSMENT

Rp 001 R08 20200828 | 25 July 2022

Project: **11-13 SPRING STREET & 14-16 ARGYLE STREET**

Prepared for: **Antipodean Land Developments Pty Ltd
c/- Fontic Group
5a - 26 Wellington St
Collingwood VIC 3066**

Attention: **Mooney Carter**

Report No.: **Rp 001 R08 20200828**

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Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Complete	-	Update of MDA report Rp 001 R01 2014473ML dated 10/12/2014 in accordance with Condition 6 of Planning Permit	18 Nov 2020	J. Adcock	C. Delaire
Complete	01	West elevation mark-up added to Section 6.2	21 Nov 2020	J. Adcock	-
Draft	01	Amended scheme	09 Aug 2021	J. Adcock	-
Complete	02	Amended scheme	12 Aug 2021	J. Adcock	A. Bavage
Complete	03	Amended scheme	25 Feb 2022	J. Adcock	C. Delaire
Complete	04	Amended scheme	23 Mar 2022	J. Adcock	C. Delaire
Complete	05	Corrected drawing dates	26 April 2022	J. Adcock	C. Delaire
Complete	06	Updated noise survey	14 July 2022	A.Bavage	J.Adcock
Complete	07	Updated noise survey	20 July 2022	A.Bavage	J.Adcock
Complete	08	Updated noise survey	25 July 2022	A.Bavage	C. Delaire

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APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B PLANNING MAP

1.0 INTRODUCTION

A development comprising four separate 4 to 5 storey residential buildings over a common basement parking level (incorporating a car lift) is proposed to be developed at 11-13 Spring Street and 14-16 Argyle Street, Fitzroy.

The development was approved by the City of Yarra, and Condition 6 of Planning Permit PLN140486 detailed the following requirements for the control of noise:

Before the development commences, an amended Acoustic Report to the satisfaction of the Responsible Authority must be prepared by a suitably qualified acoustic engineer and must be submitted to and approved by the Responsible Authority. When approved, the amended Acoustic Report will be endorsed and will form part of this permit. The amended Acoustic Report must be generally in accordance with the Acoustic Report prepared by Marshall Day and dated 10 December 2014, but modified to included (or show, or address):

- (a) The glazing specified for residences overlooking the business be 10.38 mm thick laminated instead of float glass.*
- (b) Noise impacts from the Espresso carwash to bedroom windows which have a line of sight to the carwash or that the façade upgrade proposed for apartments facing Spring Street be adopted also.*
- (c) Lower design targets (AAAC target – 45 dBA Lmax) be adopted for noise from internal building services, including the carstacker and carpark gate.*

The Acoustic Report dated 10 December 2014¹ referenced in Condition 6 (the 2014 acoustic report) provided details of relevant criteria, site studies and recommendations for the proposed development.

Antipodean Land Developments Pty Ltd (the developer) subsequently commissioned Marshall Day Acoustics Pty Ltd (MDA) to prepare:

- an amended Acoustic Report in 2020² as specified in Condition 6 (the 2020 amended acoustic report); and
- an amended Acoustic Report in 2021³ to support an application to amend the design and approval for the project.

It is understood that the design of the project has undergone further refinement and an amendment application was approved on 23 June 2022. This document is the updated report for the current design under the amended permit.

The findings of the previous reports remain generally applicable to the development, and the 2021 Acoustic Report was updated to reflect the design changes at the time and the changes to Victorian legislation and guidelines since the previous reports were prepared.

In preparing this report, reference has been made to the architectural documentation prepared by Edition Office dated 11 July 2022.

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

¹ MDA report reference Rp 001 R01 2014473ML 11-13 Spring Street, Fitzroy – Noise Assessment dated 10 December 2014

² MDA report reference Rp 001 R01 20200828 11-13 Spring Street, Fitzroy – Amended Noise Assessment dated 21 November 2020

³ MDA report reference Rp 001 R02 20200828 11-13 Spring Street, Fitzroy – Amended Noise Assessment dated 12 August 2021

2.0 CURRENT PLANNING PERMIT

VCAT Order in relation to application P498/2022 and Planning Permit No. PLN14/0846, was issued on 23 June 2022 and an amended planning permit was subsequently issued by the Council in accordance with that order. The permit includes the following conditions:

9. Before the endorsement of plans, an amended Acoustic Report to the satisfaction of the Responsible Authority must be prepared by a suitably qualified acoustic engineer and must be submitted to and approved by the Responsible Authority. When approved, the amended Acoustic Report will be endorsed and will form part of this permit. The amended Acoustic Report must be generally in accordance with the Acoustic Report prepared by Marshall Day and dated 23 March 2022, but modified to include (or show, or address):
 - (a) An assessment of the development against a recent (ie. within the last 6 months) noise survey.
10. The provisions, recommendations and requirements of the endorsed Acoustic Report must be implemented and complied with to the satisfaction of the Responsible Authority.

In order to address the above, an updated site noise survey has been completed by MDA in July 2022 and is referenced throughout the following sections.

3.0 SITE DESCRIPTION

The proposed development site is currently occupied by a mixture of single and double-storey buildings. It is bounded by the following:

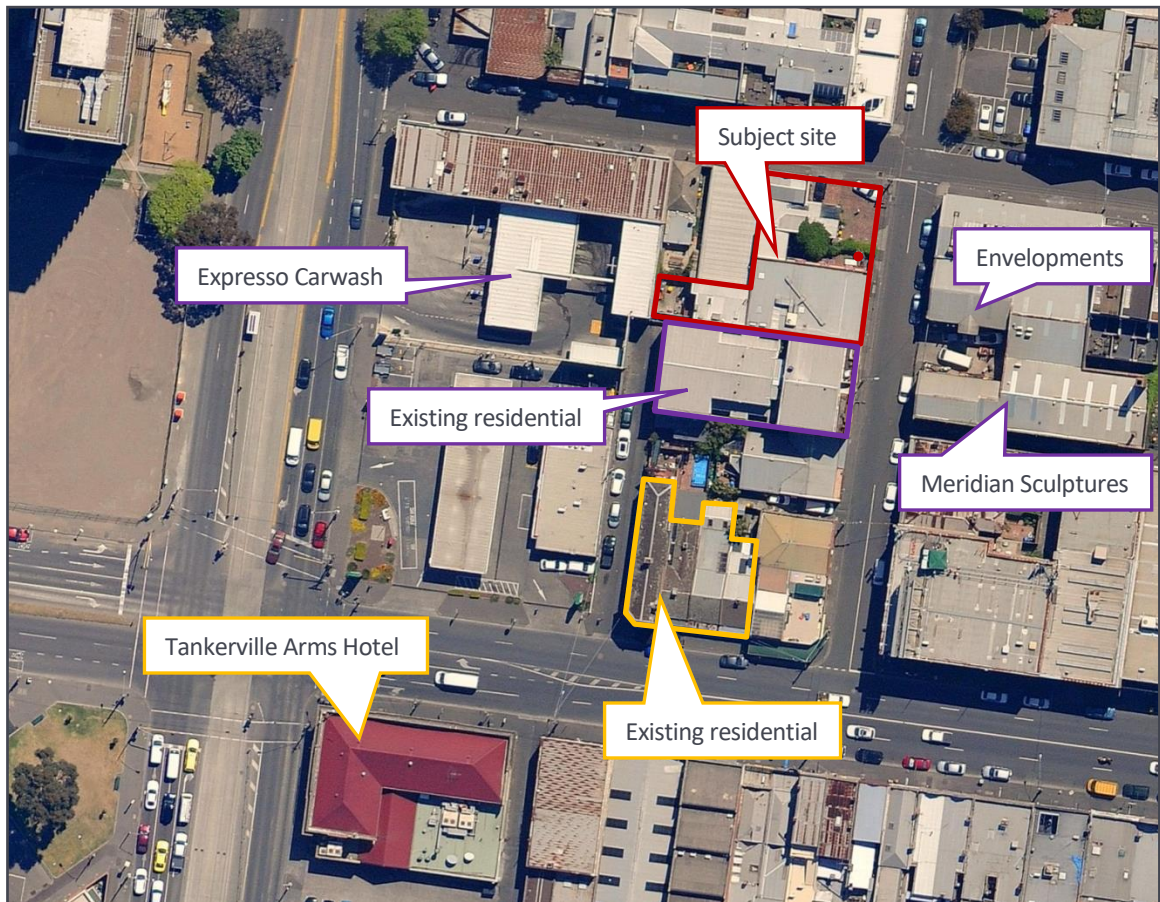
- Argyle Street to the north with residential beyond
- Spring Street to the east with commercial premises Meridian Sculptures (8 Spring Street) and Envelopments (10 Spring Street) beyond
- Residential dwellings immediately to the south with Johnston Street beyond
- Commercial uses comprising office accommodation and Espresso Carwash to the west with Nicholson Street beyond.

The nearest entertainment venue to the subject site is the Tankerville Arms Hotel located approximately 80 m to the southwest.

The subject site and the land to the north and east are zoned Mixed Use (MUZ). Land immediately to the south of the subject site is also zoned Mixed Use, with Commercial 1 Zone (C1Z, shown previously as Business 1 Zone in 2014) land along the Johnston Street interface. Land to the west of the subject site is zoned Commercial 2 Zone (C2Z, shown previously as Business 3 Zone in 2014). These zones are consistent with the zoning accounted for in the 2014 acoustic report. The current planning scheme map is provided in Appendix B.

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

Figure 1: Aerial photograph of the subject site and surrounds (courtesy: nearmap.com)



4.0 NOISE CONSIDERATIONS

The noise considerations associated with the proposed development comprise:

- Noise from commercial and industrial uses in the vicinity of the site, in terms of both the potential for the development to encroach on existing commercial operations and the suitability of noise conditions at the site for residential development
- Noise from air-conditioning plant serving individual apartments associated with the proposed development
- Noise from centralised plant associated with the proposed development, including the car lift and carpark roller door
- Potential noise from entertainment venues in the surrounding area.

The relevant Victorian legislation and assessment criteria for these noise considerations are detailed in Section 5.0.

5.0 EXISTING NOISE ENVIRONMENT

5.1 Preliminary monitoring - 2014

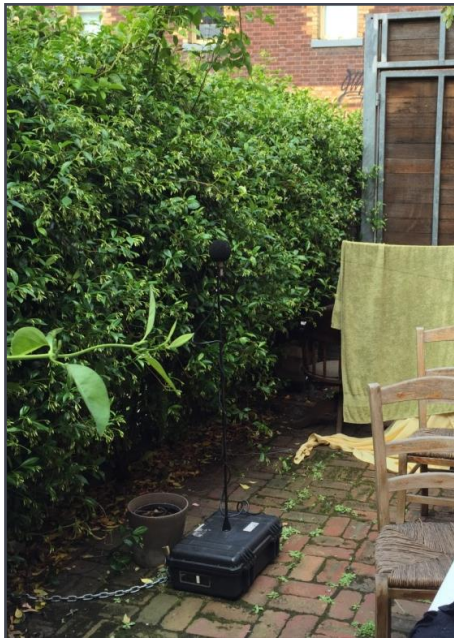
A survey of noise conditions at the site was carried out in 2014 to inform the assessment of the proposed development at the planning application stage. Ambient and background noise levels at the site were measured using a Rion NL-31 precision integrating sound level meter fitted with a proprietary windshield.

The unattended monitor was placed in the front courtyard in Spring Street to continuously measure noise levels over a period of 3 days between 28 October and 31 October 2014 (see Figure 1). The microphone was mounted on an extension pole at a height of approximately 1.5m above ground.

Measurements were obtained using the 'F' response time and A-weighting frequency network. The calibration of the equipment was checked before and after the survey and no significant calibration drifts were observed.

An image of the unattended noise monitor in-situ is provided in Figure 2.

Figure 2: Unattended noise monitor in-situ



The logging location was selected to provide a representation of typical underlying levels in the area. The specific location available for the survey was partly enclosed by fences and in proximity of reflecting surfaces. The net effect of the fence and walls are such that the measured levels are considered representative of lower noise levels in the area.

It was observed that the prevailing noise environment was dominated by distant road and tram traffic on Nicholson Street and Johnston Street. Intermittent traffic noise is associated with individual vehicle movements on Spring Street.

Repeat visits to the site indicated the noise from other commercial and industrial land uses in the immediate vicinity of the subject site was sporadic in nature; on most occasions, noise from the commercial operations was either not evident or comparable to existing ambient noise conditions. Arrangements with the operators of these premises were ultimately necessary to identify known periods of activity that would be relevant to the noise assessment (see further discussion in Section 7.0).

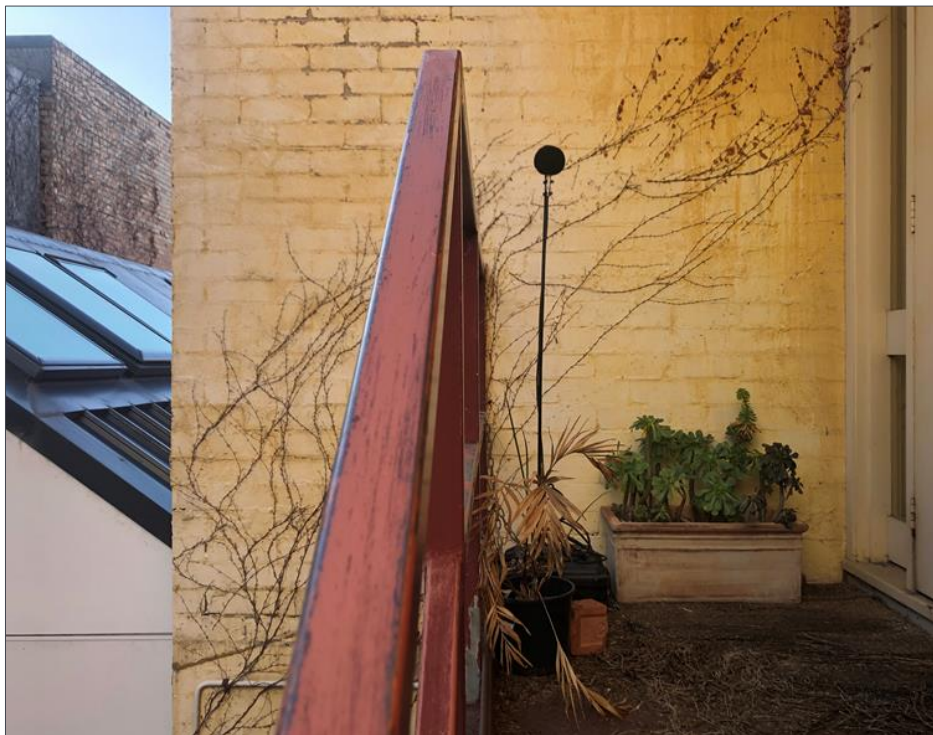
Data obtained during the noise monitoring period was used to determine noise limits at the site in accordance with *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* (SEPP N-1), the applicable policy at the time. The equivalent current document is EPA Publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (the Noise Protocol) uses an identical procedure to set noise limits (see Section 6.1).

5.2 Supplementary monitoring – 2022

In order to provide a current assessment of the existing noise environment and the address Condition 9 of the amended planning permit, further noise monitoring was undertaken by MDA at 11-13 Spring Street between 5-13 July 2022.

The assessment was completed using an ARL Type EL316 noise logger (Serial No. 16707021). The logger was placed on the rear landing of the staircase that provides access to the rear courtyard as shown in Figure 3.

Figure 3: Logger location



The lowest average measured background noise levels for each time period were as follows:

- Day: 51 dB L_{A90}
- Evening: 48 dB L_{A90}
- Night: 45 dB L_{A90}

The background noise levels were consistent with or marginally higher than the noise levels measured in the 2014 survey. This may be due to the relatively elevated nature of the logger position.

Attended measurements were also conducted by MDA on 5 July 2022 to assess noise from the car wash and on 14 July 2022 to assess noise from commercial premises to the east and have been detailed in subsequent sections of this report.

6.0 NOISE POLICY AND CRITERIA

6.1 State legislation & guidelines – overview

Environmental noise levels in Victoria are controlled and assessed via legislation and several Environment Protection Authority (EPA) publications, including a new environmental noise management framework which came into effect on 1 July 2021. The relevant legislation and publications are summarised in Table 1.

Table 1: Relevant Victorian noise legislation and guidelines

Document	Overview
<i>Environment Protection Act 2017</i> (the EP Act)	The EP Act provides the overarching legislative framework for the protection of the environment in Victoria. It establishes a general environmental duty to minimise the risks of harm to human health or the environment from pollution or waste, including noise, so far as reasonably practicable. The EP Act does not specify noise limit values but prohibits the emission of unreasonable or aggravated noise from non-residential premises. The EP Act provides general definitions of unreasonable and aggravated noise; definitions that are specific to commercial, industrial and trade premises are provided in supporting publications (see below). The EP Act also provides general definitions of unreasonable noise from residential premises. Section 93 of the EP Act provides for the creation of an environmental reference standard to be used to assess and report on environmental conditions in the whole or any part of Victoria (see below).
<i>Environment Protection Regulations 2021</i> (EP Regulations)	The objectives of the EP Regulations are to further the purposes of, and give effect to, the EP Act. Part 5.3 of the EP Regulations sets out requirements that are specific to environmental noise. It states that the prediction, measurement, assessment or analysis of noise within a noise sensitive area for the purposes of the EP Act or the EP Regulations, must be conducted in accordance with the Noise Protocol (see below). Division 2 stipulates requirements that are specific to noise emission from residential premises, including domestic equipment such as cooling and heating equipment. Divisions 3 and 4 of Part 5.3 stipulate requirements that are specific to entertainment venues and commercial, industrial and trade premises. In particular, noise from these types of venues and premises is prescribed as unreasonable if it exceeds a noise limit or alternative criterion determined in accordance with the Noise Protocol. Additional matters addressed in this Division include assessment time periods, minimum noise limit values, management of cumulative noise from multiple premises, noise sensitive areas where assessment requirements apply, definition of frequency spectrum as a prescribed factor, and a definition for aggravated noise.

Document	Overview
EPA Publication 1826.4 <i>Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues</i> dated May 2021 (Noise Protocol)	The Noise Protocol defines the method for setting the noise limits for new and existing commercial, industrial and trade premises and entertainment venues in Victoria. It also outlines the steps that must be followed to undertake an assessment (measurement or prediction) of the effective noise level within a noise sensitive area or at an alternative assessment location. A comparison between the effective noise level and the relevant noise limit or the relevant alternative assessment criterion will determine whether the noise that is emitted from the premises is prescribed as unreasonable under the EP Regulations. The noise limits for commercial, industrial and trade premises are determined on the basis of land zoning and background noise levels, and are separately designated for day, evening and night periods.
<i>Environment Reference Standard</i> dated 25 May 2021 (ERS)	The ERS is made under Section 93 of the EP Act. The ERS sets out environmental values for ambient sound that are sought to be achieved and maintained in Victoria and standards to support those values. The indicators and objectives within the standard provide a benchmark for comparing desired outcomes to the actual state of the environment and a basis for assessing actual and potential risks to the environmental values. The ERS is not a compliance standard, and the values listed within the ERS for different land uses are explicitly not noise limits nor design criteria. The primary function of the ERS is to provide assessment and reporting benchmarks for environmental values.
EPA Publication 1254.2 <i>Noise Control Guidelines</i> dated May 2021 (EPA Publication 1254)	EPA Publication 1254 provides advice for the management of noise from a range of activities and noise sources. The guidelines are primarily intended to be used by municipal officers to assist in the resolution of complaints or to avert a possible noise nuisance. Some elements of the guidelines have been prepared so that they could be incorporated into a permit condition of a development or embodied as a local law.
EPA Publication 1973 <i>Noise guideline: Assessing noise from residential equipment</i> dated May 2021 (EPA Publication 1973)	EPA Publication 1973 is for local councils' residential noise enforcement officers to use when investigating reports of excessive noise from residential properties. It sets out how to assess noise from fixed residential equipment including air conditioners for heating and cooling, heat pump hot water systems, swimming pool pumps, water pumps and ducted heating systems.
EPA Publication 1834 <i>Civil construction, building and demolition guide</i> dated November 2020 (EPA Publication 1834)	EPA Publication 1834 provides advice on a range of environmental matters including guidance and criteria for the management and assessment of noise and vibration associated with construction, building and demolition activities.

To support the application and use of the legislation and guidance summarised in Table 1, a range of Victorian EPA publications provide additional advice on matters of interpretation and technical assessment requirements. These publications include:

- EPA Publication 1996 *Noise guideline – assessing low frequency noise* dated June 2021 (EPA Publication 1996)
- EPA Publication 1997 *Technical guide: Measuring and analysing industry noise and music noise* dated June 2021 (EPA Publication 1997).

The general environmental duty (GED) established by the EP Act is a central element of the legislative framework. This is particularly relevant to any noise producers in the area surrounding the proposed development, including commercial/industrial premises and licensed venues. Under the EP Act these types of premises and venues are prohibited from emitting unreasonable noise levels. The EP Regulations then prescribe the noise assessment procedures in the Noise Protocol as the basis for determining whether the noise is prescribed to be unreasonable.

Further relevant specific information is provided in the following sections.

6.2 Noise Protocol

In accordance with the EP Act, EP Regulations and Noise Protocol, an assessment of the noise levels of from commercial/industrial noise premises and entertainment venues must be carried out in accordance with the method set out in the Noise Protocol. The Noise Protocol sets the limit values which would be used to assess these types of premises and venues at a noise sensitive location. These limits also inform whether the introduction of a new noise sensitive location could encroach on the operations of existing premises and venues.

The limits set by the Noise Protocol replace the limits which were previously set by the State Environment Protection Policies considered in the previous assessments of the development proposal. It is however noted that the process for setting limits has largely remained unchanged.

The following subsections confirm the noise limits which apply to commercial/industrial noise premises and entertainment venues. Noise levels must comply with these limits. Noise producers must also comply with the general environmental duty to take reasonable and practicable measures to minimise the risk of harm from noise (including annoyance).

6.2.1 Commercial/industrial noise premises

The Noise Protocol daytime, evening, and night-time periods, and the corresponding and the corresponding noise limits, are defined in Table 2.

The nominated background noise levels measured in 2022 are consistent with or marginally higher than the levels measured in 2014, therefore the 2014 background noise levels have been used to provide a conservative assessment. Notwithstanding this, the difference between the noise surveys would not change the calculated zoning levels and noise limits.

Table 2: Noise Protocol time periods and derived noise limits

Period	Day of week	Time period	Zoning level, dB	Background noise level, dB L_{A90}	Noise limit, dB L_{eff}
Day	Monday-Saturday	0700-1800 hrs	59	49	59
Evening	Monday-Saturday	1800-2200 hrs	53	46	53
	Sunday, Public Holidays	0700-2200 hrs			
Night	Monday-Sunday	2200-0700 hrs	48	41	48

These limits apply to existing commercial and industrial premises in the surrounding area. Accordingly, commercial activities at the premises of Meridian Sculptures, Envelopments, and Espresso Carwash are required to adhere to these noise limits that apply at the existing residential dwellings at 5 Spring Street. Following construction of the proposed development, these noise limits would also apply to the new dwellings at 11-13 Spring Street.

The limits also apply to noise from centralised mechanical plant at the proposed development. Accordingly, noise levels resulting from the operation of the car lift and carpark roller door must also be below the noise limits at the existing and proposed residential dwellings.

6.2.2 Indoor entertainment venues

The Noise Protocol limits defined for indoor entertainment venues are summarised in Table 3. Definitions of the day, evening and night period are specific to the assessment of indoor venues.

Table 3: Noise Protocol noise limits

Time period	Noise limit
Day & evening	Music noise (L_{Aeq}) not permitted to exceed background noise (L_{A90}) plus 5dB
Night	Music noise (L_{OCT10}) is not permitted to exceed the background noise level (L_{OCT90}) by more than 8dB in any octave band (63Hz-4kHz) at a noise-sensitive area

The Tankerville Arms Hotel is in the vicinity of the subject site and therefore is required to comply with the Noise Protocol noise limits at all the residential dwellings surrounding the venue, including the existing residential dwellings at 5 Spring Street. Following construction of the proposed development, these noise limits would also apply to the new dwellings at 11-13 Spring Street.

6.3 EP Act, EP Regulations and EPA Publications - residential equipment

In accordance with the EP Act and the EP Regulations, the noise of residential equipment is considered unreasonable if it:

- is a prescribed item;
- operates during prohibited times; and
- is audible in a habitable room of residential premises other than premises in which the equipment is being used.

Prescribed items include equipment such as domestic heating and cooling systems. Relevant categories of prescribed items and the corresponding prohibited times are detailed in Table 4.

Table 4: Prescribed items and prohibited hours

Item group	Prescribed items	Prohibited times
3	Heating equipment (including central heating, a hot water system or a heat pump, air conditioner or split system used for heating), a vacuum cleaner, swimming pool pump, spa pump, or a water pump (other than a pump being used to fill a header tank).	Monday to Friday: 2200 – 0700 hrs Weekends and public holidays: 2200 – 0900 hrs
4	An air conditioner, evaporative cooler or split system used for cooling	Monday to Friday: 2300 – 0700 hrs Weekends and public holidays: 2300 – 0900 hrs

Noise limits are not defined for the operation of residential equipment outside of the prohibited times. However, under the EP Act and the EP Regulations, the noise of residential equipment operating outside of the prohibited times may still be assessed as unreasonable based on a range of relevant factors and considerations that are described in the EP Act.

Further, while EPA Publication 1973 defines detailed procedures for the measurement and rating of noise levels, the publication similarly does not set numerical noise criteria for determining whether measured noise levels are unreasonable outside of prohibited hours.

6.4 Sleep disturbance

Night-time operation of the proposed car lift and carpark roller door has the potential to cause awakening reactions both within the proposed dwellings and other nearby residential dwellings in the vicinity of the subject site.

When intrusive noise reaches certain levels that are largely independent of background noise, there is a potential for disturbance of sleep and possibly awakening if these activities occur during the night period. Assessment of noise levels during the night period is normally between 2200-0700 hours.

Condition 6 (c) of the original planning permit for the development defines the applicable sleep disturbance criterion for the development as 45 dB L_{Amax} inside a bedroom, in accordance with guidance from the Association of Australasian Acoustical Consultants. The origin of the 45 dB L_{Amax} criterion is detailed in the World Health Organisation (WHO) publication *Guidelines for Community Noise* dated 2000 (the WHO guidelines). The WHO guidelines also specify that for an internal criterion of 45 dB L_{Amax} , the corresponding external noise level criterion is 60 dB L_{Amax} (accounting for the difference between external and internal noise levels with a partially open window).

6.5 City of Yarra Planning Scheme

The City of Yarra Planning Scheme addresses noise at the interface of noise sensitive and noise generating development. Specifically, Clause 22.05 *Interface Uses Policy* of the planning scheme applies to applications in areas including Mixed Use Zones and states the following objectives:

- *To enable the development of new residential uses within and close to activity centres, near industrial areas and in mixed use areas while not impeding the growth and operation of these areas as service, economic and employment nodes.*
- *To ensure that residential uses located within or near commercial centres or near industrial uses enjoy a reasonable level of amenity.*

Clause 22.05-3 of the planning scheme states the policy that is relevant to the proposed development:

- *New residential use and development in or near commercial centres and activity centres and near industrial uses includes design features and measures to minimise the impact of the normal operation of business and industrial activities on the reasonable expectation of amenity within the dwellings.*

Clause 22.05-4.1 of the planning scheme then provides the following relevant guidelines concerning dwelling design:

- *Incorporate appropriate measures to protect the residents from unreasonable noise [...]*
- *Locate noise-sensitive rooms (in particular, bedrooms) and private open space away from existing and potential noise sources, and where appropriate incorporate other measures such as acoustic fencing, landscaping and setbacks.*

6.6 Summary

Environmental noise considerations associated with the proposed development are covered by a suite of legislation, guidelines and planning requirements.

Central to the legislative framework is a general environmental duty under the EP Act to minimise the risks of harm from noise (including harm arising from annoyance) using all reasonably practical measures.

The specific guidance and references that apply to the assessment of noise considerations associated with the proposed development are summarised in Table 3.

Table 5: Noise considerations and assessment basis

Noise consideration	Assessment basis
Existing commercial and industrial premises in the surrounding area	Noise Protocol and City of Yarra Planning Scheme provisions
Existing licensed venues	Noise Protocol and City of Yarra Planning Scheme provisions
Centralised mechanical plant associated with the development, such as the car lift and roller door	Noise Protocol and sleep disturbance criteria
Residential equipment associated with individual residences, such as a residence's air-conditioning equipment	EP Act & EP Regulations – prohibited hours

7.1.2 Operational Noise Levels

A number of site inspections were carried out in 2014 to establish typical levels of noise associated with the commercial premises directly opposite the proposed development site, comprising Meridian Sculptures and Envelopments.

During three initial site inspections it was noted that activity levels around the Meridian Sculptures and Envelopments site at 8-10 Spring Street were minimal and no obvious noise sources were audible above the general noise environment in the area at the time.

Subsequent discussions with the operators of Meridian Sculptures confirmed the following:

- the business is a provider of bespoke services to artists, architects and similar industries, and fabrication activity at the site generally occurs during the period 0730-1600 hours on weekdays
- the nature of the fabrication activity is sporadic and is highly dependent on the type of active projects at any one time
- noise generating activities include:
 - operation of hand tools within the chasing workshop, such as buffers and grinders for finishing of work pieces
 - furnaces and associated ventilation equipment
 - expansion burner for treating the surface of sculptures
 - loading activities associated with deliveries (raw material and diesel for furnaces) to and from the site, including the operation of forklift
 - general waste collections
- the workshop area remains open during working hours. With the exception of the loading activities, and the use of the expansion burner, all other activities are carried out within the building envelope.

Activities within the Envelopments site were not observed to be noise intensive and it is understood that Envelopments' roller door is generally kept closed during operating hours. Loading activities from the site are sporadic in nature but would generally occur during the daytime.

Based on discussions with the operators of Meridian Sculptures and Envelopments, arrangements were made to visit the site during a period of increased activity. A measurement survey was subsequently carried out on 4 December 2014 between 1400-1530 hours.

During this time, noise generating activities observed or identified at the Meridian Sculptures site included:

- hand tools within the chasing workshop
- 1 of the 2 furnaces at the site and associated ventilation equipment
- intermittent use of an expansion burner for treating the surface of sculptures.

A summary of measurements conducted at the common boundary of 5 Spring Street and 11-13 Spring Street, opposite to the Meridian Sculptures and Envelopments site, is provided in Table 6. Due to practical constraints, the measurements were conducted near the facade of the existing building.

Table 6: Summary of measured levels at 11-13 Spring Street facade

Time	Measured total facade noise level, dB L _{Aeq}	Comments
4 December 2014 (1445-1500 hours)	59	Activities included grinding, furnace operation and intermittent operation of the folding machine at 10 Spring Street. General ambient noise influences related to traffic movements.
4 December 2014 (1515-1530 hours)	54	Ambient noise level measurement in the absence of activities at the commercial premises

The measured total noise levels include the influence of general ambient noise sources and noise reflections from the facade of the existing building at 11 Spring Street. Comparison of the measurements with the Noise Protocol noise limits therefore requires adjustment of the level to obtain the free-field (free of reflections) noise level solely attributable commercial operations. Adjustment for these effects, in accordance with the procedures of the Noise Protocol, results in a measured level of 55 dB L_{Aeq} associated with operations primarily occurring at Meridian Sculptures.

The operations that occurred for this measurement are understood to be representative of more frequent activities that may occur over the applicable 30 minute assessment period defined by the Noise Protocol. Based on the noise limits detailed in Section 6.0 for day time operations, the observed noise levels comply with the Noise Protocol noise limits applicable at both the existing and proposed residential dwellings.

In addition to the sources noted above, short term noise levels were obtained for other intermittent operations. These intermittent activities, such as opening or closure of the roller doors, or use of an expansion burner in the external courtyard, were noted to give rise to short term increases in noise levels in the range of 60-65 dB L_{Aeq}. Further consideration of these short term noise events is provided in the subsequent section.

Further measurements conducted by MDA on 14 July 2022 indicated noise levels in the order of 48-50 dB L_{Aeq} at the eastern facade of 11-13 Spring Street, during light drilling works.

On this basis, it is considered that the measurements conducted in 2014 provide a conservative approach to the assessment on the basis that they were conducted during periods of increased activity as advised by the commercial operators.

7.1.3 Recommendations

The City of Yarra Planning Scheme provisions as noted in Section 6.5 recommend the use of room layout and insulation measures to address interface issues which could result in an impact to the ongoing viability of existing commercial operations.

In this instance, the preceding sections established that the proposed residential dwellings would not constitute an additional burden of compliance for the existing commercial operations opposite the site. Further, the available observations and noise data indicates that existing operational noise levels associated with Meridian Sculptures and Envelopments are likely to comply with the Noise Protocol in the majority of instances.

Based on the assessment of encroachment and Noise Protocol considerations, and the presence of existing residential dwellings with openable windows on the Spring Street elevation, the introduction of habitable rooms and openable windows onto the Spring Street elevation does not represent an impact for existing commercial operations.

Notwithstanding the above, consideration has been given to the types of measures that could be used to offer enhanced protection for the interior amenity of the proposed dwellings. This is consistent with the general environmental duty to take reasonable measures to minimise the risks of harm as a result of noise.

Based on the measured noise levels and the types of activities at the site, the following recommendations are provided for treatment of the Spring Street facades of habitable rooms associated with the development:

- Glazed areas including windows and doors should be specified to achieve a weighted sound reduction index of 35 dB R_w or greater. This value is achievable with glazing configurations that are commonly used for upgraded sound insulation (e.g. 10-11 mm thick laminated glazing or double glazing comprising dissimilar panes at least 6 mm thick), and will provide a significant reduction in internal noise levels relative to other types of standard glazing systems (particularly given the higher frequency observed characteristics of the sound). This level of performance is also consistent with the upgraded acoustic glazing requirements referred to in the existing planning permit. The adequacy of the selected glazing should be verified (e.g. by manufacturer R_w performance data)
- Windows and doors should be hinged rather than sliding to enable a more effective acoustic seal of the window system. If a sliding system is used, an acoustically rated sealing system should be used, supported by manufacturer sound insulation performance data demonstrating that the frame and seals do not significantly degrade the sound insulation performance of the glazing system. The adequacy of the selected sliding system would require review and verification by an acoustic engineer during the detailed design of the project. Sliding door suites with acoustic performance in the order of R_w 35-38 are commercially available and would be acceptable.
- A means of regulating temperature within the habitable rooms should be provided, thus avoiding the need to open windows for cooling. Suitable examples include mechanical ventilation and/or a split system cooling unit. Any air intake or relief paths for the system should be designed and configured to not materially degrade the acoustic performance of the facade system.

7.2 Other Commercial Premises

7.2.1 Espresso Carwash

The Espresso Carwash site operates a 24-hour automated and self-service car washing facility to the west of the site. The existing residential dwellings to the rear of the property at 5 Spring Street are protected from noise from the carwash by a large acoustic wall extending the length of the Espresso Carwash rear boundary. The acoustic wall was estimated to be approximately 6 m high and would provide significant screening to the existing dwellings.

The ground floor and level 1 of the western-most section (Building 4) of the proposed development will also be significantly shielded by the existing acoustic wall at the carwash facility.

However, the second, third and fourth floor elevations may have direct line-of-sight to the carwash. The facades of habitable rooms on the exposed elevations are therefore recommended to incorporate acoustic treatments for the protection of internal amenity.

The original planning permit for the proposed development specified that the windows which may have a line of sight to the carwash are to be acoustically rated to the same standard specified for apartments facing Spring Street. This condition is consistent with Yarra Planning Scheme provisions of the Interface Uses Policy, as described in Section 6.5 of this report. It is therefore envisaged that a similar requirement would be included in an amended planning permit for the current design proposal. Accordingly, facades of habitable rooms with a line of sight to the carwash are recommended to incorporate the same measures outlined in Section 7.1.3 of this report.

- The southern facade of habitable rooms on the second, third, and fourth floors of Building 1 of the proposed development
- The western facade of habitable rooms on the second, third, and fourth floors of Building 3 of the proposed development
- The western facade of habitable rooms on the second and third floors of Building 4 of the proposed development.

Figure 5: Site layout plan illustrating the location of elevations requiring treatment



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MDA conducted near-field noise measurements at the carwash during vacuuming and washing activities on 5 July 2022. The measured noise levels were as follows:

- Carwash at 5 m: 67 dB L_{Aeq}
- Vacuum at 3 m: 57 dB L_{Aeq}

Based on the measured noise levels, our calculations confirm that the noise from the car wash will be adequately controlled at Ground and Level 1 due to screening by existing walls and structures, as previously advised.

Second, third and fourth levels will have line of site to the car wash and the above recommendations, in line with Section 7.1.3 of this report, remain appropriate.

7.2.2 Tankerville Arms Hotel

Music noise from the nearby Tankerville Arms Hotel must comply with the Noise Protocol noise limits at all nearby residential dwellings.

Music noise from the Hotel is required to comply with the noise limits at the existing residential dwellings located on Johnston Street (see Figure 1). Since these existing dwellings are significantly closer to the Hotel than the proposed development, compliance with the Noise Protocol is expected to be achieved at the proposed development by a significant margin.

7.3 Car park roller door

The car park roller door system must comply with the Noise Protocol noise limits as outlined in Table 2, and it is also recommended that it meets the sleep disturbance criteria provided in Section 6.4. Measures to achieve these criteria are to be addressed in the detailed design. In general, and consistent with the general environmental duty under the EP Act, the following good practice design recommendations are noted:

- Any operational or interlock mechanisms are recommended to operate smoothly and slowly, without significant impact noise at the extremes of travel; there must be no significant impact noise associated with the mechanism during vehicle ingress & egress
- Door and automation mechanisms are recommended to be vibration isolated from the building structure.

The operation of a typical roller door mechanism is not expected to exceed the maximum sleep disturbance noise criteria or the Noise Protocol at the nearby residences (both existing and proposed dwellings within the development). This should be confirmed by reviewing the selected mechanism and details of the installation during the detailed design stage of the development.

7.4 Car lift

A car lift is proposed to operate between Ground floor and the basement.

Noise from the car lift is not expected to impact on existing residential receivers in the vicinity of the site. However, there is potential for noise impacts to dwellings within the proposed development. Noise transmission to dwellings within the proposed development will primarily be structure-borne.

It is recommended that the car lift should be appropriately isolated to achieve a maximum noise level of NR 25 within apartment bedrooms and living spaces, during operation.

The proposed car lift is based on a “Total Rex” car parking lift, which is shown indicatively in Figure 6.

Figure 6: Car parking lift



Given the nature of the proposed car parking lift, it is expected that the recommended criteria can be readily achieved with appropriate isolation of the lift. This may include the provision of vibration isolation mounts and resilient connections between the lift and the structure.

In addition, the hydraulic should be appropriately located and isolated.

The above measures could be further developed during the Detailed Design stage of the project.

7.5 Domestic plant noise

Domestic plant noise requirements are detailed in Section 6.3.

The EP Act, EP Regulations and EPA Publication 1973 do not set noise limits to be achieved during day and evening periods, however previous EPA guidance recommended a target not greater than 5 dB above the background noise level. It is recommended that this target is adopted as an upper design level for the equipment selections and design; lower noise levels should be achieved where reasonable and practical to do so.

In addition, in accordance with the provisions of the original planning permit for the proposed development, the noise of mechanical services associated with the development should be designed to achieve an internal noise level of 45 dB L_{Amax} (refer to Section 6.4 for further details).

Specific details of the mechanical services equipment are to be assessed during the design and procurement of the mechanical services systems. However, with appropriate positioning of the condensers and the use of acoustic screening by the building, the noise requirements for condensers units are expected to be achievable.

8.0 CONCLUSION

Antipodean Land Developments Pty Ltd commissioned Marshall Day Acoustics Pty Ltd to prepare an updated Acoustic Report to accompany an amendment application for the proposed development.

Design criteria have been developed taking into consideration the suite of legislation, guidelines and planning requirements that apply to the site, including the requirements of the existing planning permit.

Consideration has been given to the potential for the development to encroach on the operations of existing commercial premises. Existing residential dwellings are situated equidistant, or closer to, the commercial activities than the proposed development in most cases. Irrespective, noise mitigation measures have been recommended for the protection of internal amenity. In accordance with the existing planning permit, this includes locations where the development may have direct line of sight to the Espresso Carwash.

Recommendations have been provided for the acoustic insulation of the following facades:

- Habitable rooms facing Spring Street (all floors)
- Habitable rooms on the second floor and above as follows:
 - The southern facade of Building 1 of the proposed development
 - The western facade of Building 3 of the proposed development
 - The western facade of Building 4 of the proposed development

With appropriate vibration isolation, noise from operation of the and car park roller door and car lift are expected to meet the Noise Protocol and sleep disturbance criteria within the development and at adjacent residential dwellings (accounting for sleep disturbance criteria as detailed in the existing planning permit).

Further to the above, the amended Planning Permit, issued in accordance with VCAT Order P498/2022, dated 23 June 2022, required that an updated site noise survey be undertaken. An updated noise survey was completed in July 2022 and has been incorporated into this report.

APPENDIX A GLOSSARY OF TERMINOLOGY

dB	<u>Decibel</u> The unit of sound level.
A-weighting	The process by which noise levels are corrected to account for the frequency response of the human ear.
Hertz (Hz)	Vibration 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. The frequency of vibration and sound is measured in hertz (Hz). Once hertz is one cycle per second. Structural Vibration is generally measured over the frequency range from 1 Hz to 500 Hz (0.5 kHz).
L_{A90}	The A-weighted noise level equalled or exceeded for 90 % of the measurement period. This is commonly referred to as the background noise level.
L_{Aeq}	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{eff}	The effective noise level of commercial or industrial noise determined in accordance with <i>State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1</i> (SEPP N-1). This is the L _{Aeq} noise level over a half-hour period, adjusted for the character of the noise. Adjustments are made for tonality, intermittency and impulsiveness.
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 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz and 4 kHz.

APPENDIX B PLANNING MAP

