

# 1A GEAR AVE, MT EVELYN - CHILDCARE CENTRE

## Acoustic Report

16 August 2022



MD880-01F01 Acoustic Report (r0)

## Document details

Detail	Reference
Doc reference:	MD880-01F01 Acoustic Report (r0)
Address:	Level 1 / 3 Noyes Street, Highett VIC 3190

## Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
16.08.2022	Issued		0	A. Rizal	A. Rizal	N. Peters
File Path: M:\AssocMelbProjects\MD851-MD900\MD880 ariz 1A Gear Ave, Mt Evelyn - Childcare Centre\1 Docs\MD880-01F01 Acoustic Report (r0).docx						

### Important Disclaimers:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian/New Zealand Standard AS/NZS ISO 9001.

This document is issued subject to review and authorisation by the suitably qualified and experienced person named in the last column above. If no name appears, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

External cladding disclaimer: No claims are made and no liability is accepted in respect of any external wall and/or roof systems (eg facade / cladding materials, insulation etc) that are: (a) not compliant with or do not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes; or (b) installed, applied, specified or utilised in such a manner that is not compliant with or does not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes.

## Executive summary

Renzo Tonin & Associates has undertaken an acoustic assessment of the proposed two-storey Childcare centre development, to be located at 1A Gear Ave, Mt Evelyn, as part of the development planning application, with the following outcomes:

- Noise from children occupying the outdoor play areas is expected to comply with *AAAC Childcare Centre Noise Assessment Technical Guideline* criterion at the nearest residential receivers, with implementation of acoustic fencing specification set out in Section 7 of this report.
- Criteria for mechanical services were set out, for application in the detailed design phase of the development. The Subject Childcare Centre is considered low risk with respect to EPA Pub. 1826.
- Car park activity is expected to conform with applicable amenity criteria.
- Waste collection and delivery times were proposed with accordance with EPA Publication 1254.

With implementation of the advice set out in this acoustic report it is expected that the Subject Childcare Centre can conform with relevant criteria, and on that basis not unreasonably affect residential amenity in the area.

## Contents

Executive summary	iii
1 Introduction	1
2 Site overview	2
3 Childcare centre overview	3
4 Existing noise environment	4
5 Criteria	5
5.1 Noise emissions from outdoor play areas – AAAC Guideline	5
5.2 Noise from mechanical services - EPA Publication 1826	6
5.3 Car park noise - sleep disturbance	6
5.3.1 Representative car park noise levels	7
5.4 Deliveries to and waste collection from commercial tenancies	8
5.4.1 Deliveries	8
5.4.2 Waste collection	8
6 Noise impact assessment & recommendations	9
6.1 Noise emissions from outdoor play areas	9
6.2 Noise emissions from mechanical services	9
6.3 Noise emissions from car park	10
6.4 Deliveries to and waste collection from commercial tenancies	10
7 Acoustic specification	11
8 Conclusion	12
APPENDIX A Glossary of terminology	13

### List of tables

Table 1: Noise measurement locations	4
Table 2: AAAC guideline – outdoor play area noise criteria	5
Table 3: AAAC sound power levels for groups of 10 children playing	5
Table 4: EPA Pub. 1826 noise limits for mechanical services	6
Table 5: Sleep disturbance criteria	7
Table 6: Measured noise level peaks from car park activity	7
Table 7: Maximum test car noise level spectrum	7
Table 8: Outdoor play noise level analysis	9
Table 9: Car park noise analysis with proposed fence	10

### List of figures

Figure 1: Site overview	2
-------------------------	---



Figure 2: Acoustic fence specification –Ground Level



# 1 Introduction

Renzo Tonin & Associates [REDACTED] to undertake an acoustic assessment of a two-storey childcare centre development, to be located at 1A Gear Ave, Mt Evelyn (the Subject Site / Proposed Childcare Centre). Renzo Tonin & Associates has based its assessment of the Subject Childcare Centre on the following drawings:

- Town Planning Drawings entitled '1A Gear Ave, Mt Evelyn, VIC 3809' dated August 2022, [REDACTED]

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard/NZS ISO 9001.

Appendix A contains a glossary of acoustic terms used in this report.

## 2 Site overview

Figure 1: Site overview



### 3 Childcare centre overview

The proposed operational limits for the Subject Childcare Centre are understood to be:

- Childcare centre attendance: 96
- Hours of operation: 7:00am – 7:00pm Monday to Friday

The Subject Childcare Centre is to comprise:

- A two-storey Childcare centre building
  - 32 placements on Ground Level for 0-to-2-year-olds
  - 20 placements on Ground Level for 2-to-3-year-olds
  - 44 placements on Level 1 for 3-to-6 year-olds
- One outdoor play area at Ground Level
- A car park located on the north side of the site at Ground Level.

The Subject Childcare Centre has proposed acoustic fencing as set out in Section 7.



## 4 Existing noise environment

To quantify the existing noise levels at the Subject Site, attended noise measurements were conducted on Tuesday the 9th of August 2022. The measurement locations are shown on Figure 1 and described in Table 1 below.

**Table 1: Noise measurement locations**

ID	Location	Details
M1	1A Gear Ave, Mt Evelyn– rear of site	<ul style="list-style-type: none"> <li>i. Measurement duration: Tuesday the 9th of August 2022 between 1:00pm and 1:30pm</li> <li>ii. Measured <math>L_{90}</math>: 43 dB(A)</li> <li>iii. The microphone was set in free field conditions at a height of 1.5 metres above the natural ground level</li> <li>iv. The noise environment consisted of traffic noise from surrounding roads</li> </ul>

An NTi XL2 sound level analyser was used for the measurement campaign. The XL2 is a Class 1 instrument having accuracy suitable for field and laboratory use. The calibration of the device was checked in the field immediately before and after the measurement using a Brüel & Kjær Type 4231 calibrator; no drift in calibration was observed. The noise monitor conform with IEC 61672-1:2013 and IEC 61260-1:2014; the sound calibrator conforms with IEC 60942:2017, and; all carry manufacturers certification or NATA certification detailing Standard conformance testing within the last two years and one year respectively



## 5 Criteria

### 5.1 Noise emissions from outdoor play areas – AAAC Guideline

The *Association of Australian Acoustical Consultants – Guideline for Childcare Acoustic Assessment v3.0, September 2020* (the AAAC Guideline) sets out a recommended assessment methodology for noise impact assessments to accompany a development application for childcare centres and provides typical recommendations for the control of noise from such centres.

The AAAC guideline sets out '*background + 10 dB(A)*' and '*background + 5 dB(A)*' criteria for various scenarios for outdoor play in the context of the NSW planning environment. As applied in numerous Victorian Civil and Administrative Tribunal (VCAT) hearings, the opinion of the Victorian acoustic consulting industry is generally that the '*background + 10 dB(A)*' criterion is appropriate in a Victorian context; and '*background + 5dB(A)*' is excessively stringent for protection of residential amenity during the day period for noise from outdoor play. By way of comparison, it is common practice for members of the Victorian acoustic consulting industry to set criteria for licenced venue patron noise as '*background + 10 dB(A)*' during the day and evening.

On this basis, Table 2 presents the noise criteria for outdoor play for the Subject Childcare Centre.

**Table 2: AAAC guideline – outdoor play area noise criteria**

Background measurement location	Background noise level $L_{90}$ , dB(A) <sup>1</sup>	AAAC guideline noise limit at residential receivers $L_{eq}$ , dB(A)
M1 at 1.5 metres above ground level	43	$L_{90} + 10 = 53$

Note: 1. The minimum measured background noise level per Table 1.

The AAAC Guideline sets out representative sound power levels for children playing and these are shown in Table 3.

**Table 3: AAAC sound power levels for groups of 10 children playing**

Age group	Sound power level $L_{w,eq}$ [dB ref $10^{-12}$ watt] at frequency (Hz)							dB(A)
	63	125	250	500	1k	2k	4k	
0 to 2 years	54	60	66	72	74	71	67	78
2 to 3 years	61	67	73	79	81	78	74	85
3 to 6 years	64	70	75	81	83	80	76	87

## 5.2 Noise from mechanical services - EPA Publication 1826

Effective from 1 July 2021, EPA Publication 1826 'Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues' (EPA Pub. 1826) supersedes 'State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1', (SEPP N-1); and legislated by way of the Environment Protection Act 2017.

In the context of this assessment, EPA Pub. 1826 uses the same methods to calculate noise limits and assess noise impacts as the superseded SEPP N-1.

Noise criteria for mechanical services were calculated as presented in Table 4.

**Table 4: EPA Pub. 1826 noise limits for mechanical services**

Period	Location	Zoning level <sup>2</sup> Leq, dB(A)	Background <sup>1</sup> L90, dB(A)	Classification	Applicable limit Leq, dB(A)
Day	Nearest residential receivers	52	43	Neutral	52
Evening		46	-	Neutral	46
Night		41	-	Neutral	41

Notes: 1. The evening and night noise limit has been determined using neutral background noise methodology

Period Definitions: Day: Monday-to-Saturday (except public holidays) 7am - 6pm; Sundays and public holidays: NA  
 Evening: Monday-to-Saturday (except public holidays) 6pm - 10pm; Sundays and public holidays: 7am - 10pm  
 Night: All days 10pm - 7am

## 5.3 Car park noise - sleep disturbance

There are currently no legislated policies or guidelines in Victoria for the control or assessment of noise induced sleep disturbance or its associated health impacts. With respect to sleep disturbance, Section 5.4 of the New South Wales Office of Environment and Heritage (formally the Department of Climate Change and Water) *Road Noise Policy, March 2011*, and *NSW EPA document Environmental Criteria for Road Traffic Noise, 1999* (ECRTN) conclude that:

- *From the research on sleep disturbance to date it can be concluded that:*
  - *Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep*
  - *One or two noise events per night, with maximum internal noise levels of 65-70dB(A), are not likely to affect health and wellbeing significantly.*

When a window to a room is open (such as might be required for natural ventilation during the night), it is commonly accepted that the noise level inside the room due to external sources would be 10-to-15 dB(A) lower than the noise level outside the room. These criteria are generally accepted in Victoria where amenity may be affected due to sleep disturbance and are typically taken to apply between 10pm and 7am the following day. The established sleep disturbance criteria are presented in Table 5.



**Table 5: Sleep disturbance criteria**

Type	Period	Criterion
Maximum Noise	10pm – 7am	$L_{max}$ 50-55 dB(A) inside bedroom (or $L_{max}$ 65 dB(A) outside an open bedroom window)

### 5.3.1 Representative car park noise levels

Renzo Tonin & Associates has previously conducted extensive measurements and testing of noise from car parks. Table 6 shows the range of measured noise levels.

**Table 6: Measured noise level peaks from car park activity**

Noise source	Noise Level $L_{max}$ dB(A)
General car park activity <sup>1</sup>	49 to 63
Test car parking, 12 to 5 metres from microphone	63 to 64
Test car ignition, 5 metres from the microphone	61
Test car boot slam, 10 to 5 metres from the microphone	61 to 69
Test car door slam, 8 to 6 metres from the microphone	57 to 62

Notes: 1. Measurable noise levels from general car park activity were comprised of door slamming for the most part, at a distance of 10 to 60 metres from the microphone.

As shown in Table 6, the controlled measurements using the test car (the test car boot slam) were observed to generate higher noise levels than other car park activity. As such, noise level peaks from the test car were used for analysis detailed in this report. Table 7 presents the noise levels from the maximum test car noise event.

**Table 7: Maximum test car noise level spectrum**

Details	Noise level $L_{max}$ at frequency (Hz)							dB(A)
	63	125	250	500	1k	2k	4k	
Car boot slam, 5 metres from measurement microphone, $L_{max}$	84	72	69	63	64	62	59	69

## 5.4 Deliveries to and waste collection from commercial tenancies

EPA Victoria Publication 1254 Noise Control Guidelines provides the following guidelines to mitigate the impact of deliveries and waste collection on residential amenity.

### 5.4.1 Deliveries

EPA Victoria Publication 1254 *Noise Control Guidelines* provides the following guidelines for deliveries:

- *Schedule: Deliveries to shops, supermarkets & service stations*
    - *7 am - 10 pm Monday to Saturday*
    - *9 am - 10 pm Sundays and public holidays*
- (Outside these hours) ... deliveries should be inaudible in a habitable room of any residential premises ... regardless of whether any door or window ... is open*

### 5.4.2 Waste collection

EPA Victoria Publication 1254 *Noise Control Guidelines* provides the following guidelines for waste collection:

- *Refuse bins should be located at sites that provide minimal annoyance to residential premises.*
- *Compaction should be carried out while the vehicle is moving*
- *Noisy verbal communication between operators should be avoided where possible.*

The following times are recommended for waste collection:

- *One collection per week*
  - *6:30 am - 8 pm Monday to Saturday*
  - *9 am - 8 pm Sunday and public holidays*
- *Two or more collections per week*
  - *7 am - 8 pm Monday to Saturday*
  - *9 am - 8 pm Sunday and public holidays*

## 6 Noise impact assessment & recommendations

A CadnaA three-dimensional noise model, implementing ISO 9613 noise propagation algorithms was built, to calculate noise propagation from the Subject Childcare Centre to surrounding residential premises.

The built form of the Subject Childcare Centre and surrounding dwellings were integrated into the model. The following propagation effects were included in the predictive model:

- Mitigation of noise with distance, including geometrical spreading and air absorption
- Reflections from buildings and environment
- Barrier effects due to obstructions between noise sources and residential receivers
- Ground absorption effects
- Local topographical changes

### 6.1 Noise emissions from outdoor play areas

For the analysis, it was assumed that:

- For the 96 children permitted at the Subject Childcare Centre:
  - Child distribution as per the supplied architectural plans
  - All the children are playing outside at any given time
- Noise sensitive receivers were located within residential lot boundaries surrounding the Subject Childcare Centre; outside windows to habitable areas, or within grounds at a height of 1.5 metres.

Table 8 presents predicted noise levels from outdoor play at surrounding residential receivers with the acoustic fence shown in Section 7.

**Table 8: Outdoor play noise level analysis**

Assessment location	Predicted noise $L_{eq}$ dB(A)	AAAC guideline noise limit at residential receivers $L_{eq}$ , dB(A) <sup>1</sup>	Conformance with criteria
1 Gear Ave – habitable room façade (to south)	38	53	✓
1 Gear Ave – grounds (to south)	45	53	✓

### 6.2 Noise emissions from mechanical services

Section 5.2 sets out noise limits for mechanical services. Whilst details of mechanical plant selection and location are not typically available during the concept design / town planning phase, Renzo Tonin & Associates is able to provide commentary on the likely compliance of the Subject Site's proposed childcare centre plant with noise criteria, drawing on experience from similar projects:

- It is expected that small scale air conditioner condensers and exhaust fans will be used
  - Generally, they are located on balconies, on the rooftop or on Ground Level services area. Such units do not generally generate significant noise and are generally have a sound power level of 65 to 70 dB(A)

- The Subject Childcare Centre is proposed to be two-storey, and have fences as described in Section 7.
- As such, the built form of development is likely to provide acoustic shielding and distance shall provide noise emission reduction
- Air conditioners and exhaust fans are expected to operate during the day period only

On the above basis, it is expected that mechanical services noise from the Subject Childcare Centre will present a low risk with respect to EPA Pub. 1826. As an additional recommendation to guide the development:

- It is good practice to, as practical, locate mechanical services away from surrounding dwellings; and locate services on roof/building sides furthest away from dwellings.  
This is to maximise noise reduction provided by distance and acoustic shielding from the building.

### 6.3 Noise emissions from car park

As it is proposed that the Subject Childcare Centre operate from 7:00am weekdays, it is possible that early morning car movements may occur during the night-time period. As such, sleep disturbance criteria may be applied for car park noise, as defined in Section 5.3.

Table 9 presents predicted noise levels from car park noise.

**Table 9: Car park noise analysis with proposed fence**

Dwelling location	Predicted maximum noise level outside window, $L_{max}$ dB(A)	Does predicted noise level comply with sleep disturbance criterion? ( $L_{max}$ 65 dB(A) outside an openable bedroom window)
1 Gear Ave – to south (most affected dwelling)	31	✓

Note:

- Noise levels calculated from worst case activities documented in Table 7.
- Noise levels at other dwellings are lower than the noise levels presented above, as a result of greater distance from the car park

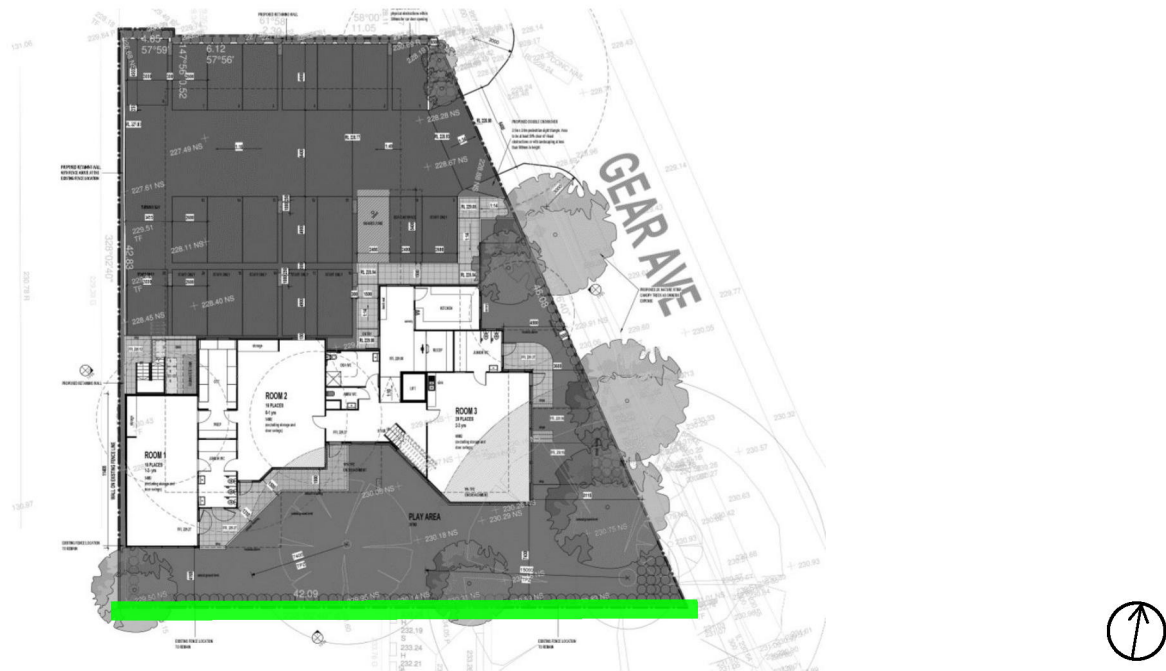
As presented in Table 9, car park activity is not expected to exceed the sleep disturbance criterion of 65dB(A) outside adjacent dwelling windows.

### 6.4 Deliveries to and waste collection from commercial tenancies

Delivery and waste collection should be conducted in accordance with EPA Publication 1254, as set out in Section 5.4.

## 7 Acoustic fence specification

Figure 2: Acoustic fence specification – Ground Level



### Acoustic fence

1. (green) The proposed acoustic fence shall be built to a minimum of 2.0 metres
2. Acoustic fences and parapets may be constructed using any of treated timber, glass, precast concrete panels, lightweight aerated concrete, transparent acrylic panels, profiled metal sheet cladding, and/or fibre cement sheeting as long the selected material (or combined skins) has a mass of at least 8kg/m<sup>2</sup>
3. Where Condition 2 is not demonstrated, the overall sound transmission loss through the material of which the fence is to be constructed shall not be less than R<sub>w</sub> 20, to be approved by a suitably qualified acoustic consultant
4. Acoustic fences and parapets shall have no gaps or holes, and shall be designed so that there is no likelihood of them occurring through natural causes or deformations which would allow noise to pass through
5. The fence must be designed and built in an acceptable manner so that noise will not pass underneath it



## 8 Conclusion

Renzo Tonin & Associates has undertaken an acoustic assessment of the proposed two-storey Childcare centre development, to be located at 1A Gear Ave, Mt Evelyn, as part of the development planning application, with the following outcomes:

- Noise from children occupying the outdoor play areas is expected to comply with *AAAC Childcare Centre Noise Assessment Technical Guideline* criterion at the nearest residential receivers, with implementation of acoustic fencing specification set out in Section 7 of this report.
- Criteria for mechanical services were set out, for application in the detailed design phase of the development. The Subject Childcare Centre is considered low risk with respect to EPA Pub. 1826.
- Car park activity is expected to conform with applicable amenity criteria.
- Waste collection and delivery times were proposed with accordance with EPA Publication 1254.

With implementation of the advice set out in this acoustic report it is expected that the Subject Childcare Centre can conform with relevant criteria, and on that basis not unreasonably affect residential amenity in the area.

## APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Assessment Point	A location at which a noise or vibration measurement is taken or estimated.
Attenuation	The reduction in the level of sound or vibration.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the LA90 noise level if measured as an overall level or an L90 noise level when measured in octave or third-octave bands.
Barrier (Noise)	A natural or constructed physical barrier which impedes the propagation of sound and includes fences, walls, earth mounds or berms and buildings.
Decibel [dB]	The units of sound measurement. The following are examples of the decibel readings of everyday sounds: 0dB The faintest sound we can hear, defined as 20 micro Pascal 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 110dB Operating a chainsaw or jackhammer 120dB Deafening
Free-field	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5m from any acoustic reflecting structures other than the ground.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Habitable Area	Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom. Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
LAeq or Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a steady sound level occurring over the same period of time. When A-weighted, this is written as the LAeq.
Lmax	The maximum sound pressure level measured over a given period. When A-weighted, this is usually written as the Lmax.
Reflection	Sound wave reflected from a solid object obscuring its path.

Rw	<p><b>Weighted Sound Reduction Index</b></p> <p>A measure of the sound insulation performance of a building element. It is measured in very controlled conditions in a laboratory.</p> <p>The term supersedes the value STC which was used in older versions of the Building Code of Australia. Rw is measured and calculated using the procedure in ISO 717-1. The related field measurement is the DnT,w.</p> <p>The higher the value the better the acoustic performance of the building element.</p>
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy by conversion to thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 pico watt.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone referenced to 20 micro Pascal.
Transmission Loss	<p>The sound level difference between one room or area and another, usually of sound transmitted through an intervening partition or wall. Also the vibration level difference between one point and another.</p> <p>For example, if the sound level on one side of a wall is 100dB and 65dB on the other side, it is said that the transmission loss of the wall is 35dB. If the transmission loss is normalised or standardised, it then becomes the Rw or R'w or DnT,w.</p>