



Acoustic Consultants Member Australian Acoustical Society

Proposed Gym Enliven Coaching Unit 12, 16-22 Cross Street, Brookvale Acoustical Assessment

REPORT R190629R0

Revision 0

Prepared for:

Enliven Coaching 16-22 Cross Street Brookvale NSW 2079

20 December 2019

PO Box 522 Wahroonga NSW 2076 P 02 9943 5057 F 02 9475 1019 mail@rodneystevensacoustics.com.au



# Proposed Gym

Unit 12, 16-22 Cross Street, Brookvale

Acoustical Assessment

#### PREPARED BY:

Rodney Stevens Acoustics Pty Ltd Telephone: 61 2 9943 5057 Facsimile 61 2 9475 1019 Email: info@rodneystevensacoustics.com.au Web: www.rodneystevensacoustics.com.au

#### DISCLAIMER

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

The information and/or report(s) prepared by Rodney Stevens Acoustics should not be reproduced, presented or reviewed except in full. Before passing on to a third party any information and/or report(s) prepared by Rodney Stevens Acoustics, the Client is to fully inform the third party of the objective and scope and any limitations and conditions, including any other relevant information which applies to the material prepared by Rodney Stevens Acoustics. It is the responsibility of any third party to confirm whether information and/or report(s) prepared for others by Rodney Stevens Acoustics are suitable for their specific objectives.

#### DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
R190629R0	Revision 0	20 December 2019	Desmond Raymond	Rodney Stevens	Rodney Stevens

# TABLE OF CONTENTS

1	INTR	ODUCTION	4				
2	PRO	JECT OVERVIEW	4				
	2.1	Proposed Development	4				
3	ASSE	ESSMENT CRITERIA	5				
	3.1	Operational Noise – NSW EPA Noise Policy for Industry	5				
4	NOIS	E ASSESSMENT	7				
	4.1	Patron Noise Assessment	7				
	4.2	Gym Equipment Noise Assessment	7				
5	RECO	OMMENDATIONS	9				
6	CON	NCLUSION 10					
Table	4-1	Operational Noise Criteria	6				
Table	5-1	Typical Sound Pressure Level of 1 Person with Normal Voice at 1m – Lp	7				
Table	5-2	Overall Patron Sound Power Level – Lw	7				
Table	5-3	Noise Assessment at Nearby Noise Sensitive Receiver	9				
Figure	2-1	Project Area and Surrounding Environment	4				
Figure	2-2	Proposed Ground Floor Plan	5				
Figure	94-1	Gym Layout	8				

(((((((

))

# 1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by Enliven Coaching to prepare a Noise Assessment for the Proposed Gym located at Unit 12, 16-22 Cross Street, Brookvale NSW.

Enliven Coaching requires a statement addressing noise emissions to accompany the Development Application (DA) for the proposal. The primary purpose of the assessment is to determine the noise impact from the operation of the Gym to the nearest sensitive receivers and where required provide in-principle design advice to achieve the requirements of acoustic amenity.

Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in Appendix C.

# 2 PROJECT OVERVIEW

### 2.1 Proposed Development

The proposed development is located at Enliven Coaching, Unit 12, 16-22 Cross Street, Brookvale. The project area and its surrounding environment are presented in Figure 2-1 below.



Figure 2-1 Project Area and Surrounding Environment

Aerial image courtesy of © 2019 nearmap Itd



The proposed Gym includes the fitout of the existing building. The proposed trading hours are:

Monday to Friday: 5am - 8pm

Saturday and Sunday: 7am - 12pm

The proposed site layouts of the development site are presented in Figure 2-1.

Figure 2-2 Proposed Ground Floor Plan



# 3 ASSESSMENT CRITERIA

3.1 Operational Noise – NSW EPA Noise Policy for Industry

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the EPA.

The EPA oversees the Noise Policy for Industry (NPFI) January 2000 which provides a framework and process for deriving noise criteria. The NPFI criteria for industrial noise sources have two (2) components:

Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and

Maintaining noise level amenity for particular land uses for residents and sensitive receivers in other land uses.



#### Intrusiveness Criterion

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level ( $L_{Aeq}$ ) of the source should not be more than 5 dB(A) above the measured Rated Background Level (RBL), over any 15 minute period.

#### Amenity Criterion

The amenity criterion is based on land use and associated activities (and their sensitivity to noise emission). The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. The criteria relate only to other industrial-type noise sources and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industrial-type noise sources, (including air-conditioning mechanical plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the criterion.

#### Area Classification

The NPfl characterises the "Urban" noise environment as an area with an acoustical environment that:

- is dominated by 'urban hum' or industrial source noise,
- where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources
- has through-traffic with characteristically heavy and continuous traffic flows during peak periods
- is near commercial districts or industrial districts
- has any combination of the above.

The area surrounding the proposed development falls under the "Urban" area classification.

#### Project Specific Noise Levels

Having defined the area type, the processed results of the unattended noise monitoring have been used to determine project specific noise criteria. The intrusive and amenity criteria for nearby residential premises are presented in Table 3-1. These criteria are nominated for the purpose of assessing potential noise impacts from the proposed development.

In this case, the ambient noise environment is not controlled by industrial noise sources and therefore the amenity criteria become equal to the Recommended Amenity Criteria for Residences in a Suburban Area (ie ANL or Acceptable Noise Level). For each assessment period, the lower (ie the more stringent) of the amenity or intrusive criteria are adopted. These are shown in bold text in Table 3-1.

	Time of Day	ANL <sup>1</sup> LAeq(15min) L	Measured	Measured	Criteria for Ne	Criteria for New Sources		
Receiver			RBL <sup>2</sup> L <sub>A90(15minute)</sub>	L <sub>Aeq</sub> Noise Level	Intrusive L <sub>Aeq(15min)</sub>	Amenity <sup>3</sup> L <sub>Aeq(15min)</sub>		
Commercial	When in use	60	-	-	-	60		

#### Table 3-1 Operational Noise Criteria

Note 1: ANL = "Acceptable Noise Level" for residences in Suburban Areas.

Note 2: RBL = "Rating Background Level".

Note 3: Assuming existing noise levels are unlikely to decrease in the future

# 4 NOISE ASSESSMENT

# 4.1 Patron Noise Assessment

The Proposed Gym can have approximately 20 patrons in the gym. Calculations of noise transmitted from Enliven Coaching have been made based on a typical patron sound power spectrum as based on the sound power levels derived from Table 16.1 in *"Handbook of Acoustical Measurements and Noise Control"* by C.M. Harris. Harris documents a typical casual male voice being 53 dBA at 1 m, a typical normal voice is 58 dBA at 1 m, a typical raised voice is 65 dBA at 1 m, a typical loud voice is 75 dBA at 1 m and shouting is 88 dBA at 1 m. Applying a standard conversion of + 8 dBA to convert sound pressure level at 1 m to a sound power level, the sound power level of a typical raised voice equates to 78 dBA.

Table 4-1 outlines the sound power spectrum of a patron talking with a raised vocal effort.

Scenario	Resultant Noise Level per Octave Band (dB)								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
1 Patron – Normal Voice	58	48	51	54	46	41	39	35	58

Table 4-1 Typical Sound Pressure Level of 1 Person with Normal Voice at 1m – Lp

This spectrum and overall noise level is believed to be a reasonable approximation of the typical scenario that could be expected from patrons using the gym.

The following operational scenario has been assumed for the purposes of this assessment:

- Approximately 20 people using the Gym

Table 4-2 Overall Patron Sound Power Level – Lw

Scenario	Resultant Noise Level per Octave Band (dB)							Overall (dBA)	
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
20 patrons	72	62	65	68	60	55	53	49	72

The 32 Hz octave band has not been assessed due to the limited availability of transmission loss (TL) data in this low (bass) frequency band. It is also very likely that even if noise emission in this low frequency octave band exceeds the noise criterion; it will be very close to, if not below, the human threshold of hearing at the receivers.

# 4.2 Gym Equipment Noise Assessment

Equipment for the gym has been selected. Of the equipment selected, operational noise with the greater acoustic impact to the surrounding sensitive receivers can be:

- Cardio: Bikes, ski and rower
- Lifting station: dumbbells, barbells dead balls
- Ropes: Skipping ropes and battle ropes



From previous assessments of gym conducted by Rodney Stevens Acoustics, a typical gym with similar equipment as Enliven Coaching Brookvale, the following noise levels can be expected:

- Cardio: Bikes, ski and rower Lw 70 dB
- Lifting station: free weights & ropes (worst case scenario of weights dropped on floor) L<sub>Amax</sub> 100 dBA
- Background music Lw 80 dB

Considering the above noise levels, the following noise impact levels have been calculated. The noise modelling scenarios take into account the following:

- Noise sources at a height of 1.5m with weight drops from 0.5m
- Acoustic matting as per Section 5 of this report
- Noise attenuation of inter-tenancy wall being Rw45
- All equipment in use at the same time
- Gym layout as per Figure 4-1 below

Figure 4-1 Gym Layout



Predictive resultant noise spectrums based on the Proposed Gym have been calculated for patron, equipment and amplified music emission at neighbouring receivers are presented in Table 5-3. The following assessment was conducted without any form of noise control other than attenuation provided by the proposed building façades.



Table 4-3	Noise Assessment at Nearby Noise Sensitive Receiver
-----------	---

Receiver	Resultant Noise Level at Sensitive Receiver (L <sub>Aeq(15min)</sub> )	Noise Criteria	Compliance (Y/N)	
Receiver located above the gym	L <sub>Aeq(15min)</sub> 45 dBA	When in use: 60 dBA	With Recommendations	
Receiver on the western adjoining premises	L <sub>Aeq(15min)</sub> 46 dBA		Yes	

The calculated noise levels show compliance to the established noise criteria for the sensitive receivers in the same premises of the building. RSA notes that external receivers will not be affected by noise emanating from the proposed gym. Noise control measures have been presented in Section 5 below to ensure future operational noise compliance.

# 5 RECOMMENDATIONS

In order to preserve acoustic amenity, the following measures are recommended to be incorporated within the Gym design:

- All external doors to have self-closing mechanism to allow for self-closing. All external doors to be full acoustic perimeter seals.
- Windows facing the residences are to have a minimum acoustic rating of Rw 30dB which could be in the form of 6.38mm laminate on acoustically sealed frames.
- The PA is to be used for background music only and to have a maximum output of 70 dB at the centre of the room. There is to be no subwoofers in operation. All speakers are to face internally.
- Signs should also be posted at exit doors reminding patrons to leave the premises in an orderly and quiet manner when leaving the Gym.
- Flooring to be as follows:
  - o Lifting platforms are 50mms thick on top of 8mm rubber
  - Aerobic flooring to be 8mm thick rubber
- Mechanical plant schedule is recommended to be reviewed at the CC stage. Any noise control measures to be reviewed at this stage.



# 6 CONCLUSION

Rodney Stevens Acoustics has conducted Noise Impact Assessment for the Proposed Gym to the Enliven Coaching located at 16-22 Cross Street, Brookvale NSW. The assessment has predicted the noise impact to the nearest premises. The noise modelling resulted in compliance to the NSW EPA Noise Policy for Industry with provisions of the noise control measures in this report.

Approved:-

O. Sterma.

Rodney Stevens - MAAS

((((((

# Appendix A – Acoustic Terminology

A-weighted pressure	sound	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz ( $1000 - 4000$ vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic ' <i>A-weighting</i> ' frequency filter is applied to the measured sound level $dB(A)$ to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).						
Ambient noise		The total noise in a given situation, inclusive of all noise source contributions i the near and far field.						
Community annoy	ance	Includes noise annoyance due to:						
		<ul> <li>character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content)</li> </ul>						
		<ul> <li>character of the environment (e.g. very quiet suburban, suburban, urban, near industry)</li> </ul>						
		<ul> <li>miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations)</li> </ul>						
		<ul> <li>human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).</li> </ul>						
Compliance		The process of checking that source noise levels meet with the noise limits in a statutory context.						
Cumulative noise	level	The total level of noise from all sources.						
Extraneous noise		Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.						
Feasible reasonable measu	and ures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:						
		<ul> <li>Noise mitigation benefits (amount of noise reduction provided, number of people protected).</li> </ul>						
		<ul> <li>Cost of mitigation (cost of mitigation versus benefit provided).</li> </ul>						
		<ul> <li>Community views (aesthetic impacts and community wishes).</li> </ul>						



	<ul> <li>Noise levels for affected land uses (existing and future levels, and changes in noise levels).</li> </ul>
Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.
Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the $10^{th}$ percentile min L <sub>A90</sub> noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa.
	The picture below indicates typical noise levels from common noise sources.





dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

SoundPowerLevelThe sound power level of a noise source is the sound energy emitted by the<br/>source. Notated as SWL, sound power levels are typically presented in dB(A).

Sound Pressure Level The level of noise, usually expressed as SPL in dB(A), as measured by a standard sound level meter with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.

Statistical noise levels Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:



#### Key descriptor

LAmax Maximum recorded noise level.



	<ul> <li>LA1 The noise level exceeded for 1% of the 15 minute interval.</li> </ul>
	<ul> <li>LA10 Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.</li> </ul>
	<ul> <li>LAeq Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.</li> </ul>
	<ul> <li>LA90 Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).</li> </ul>
Threshold	The lowest sound pressure level that produces a detectable response (in an instrument/person).
Tonality	Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dBA penalty is typically applied to noise sources with tonal characteristics.