



REPORT R190629R0

Revision 3

Extension of Trading Hours
Enliven Coaching
Unit 12, 16 - 22 Cross Street, Brookvale
Acoustic Assessment

PREPARED FOR:

Enliven Coaching

16-22 Cross Street Brookvale, NSW 2079

31 October 2022



Extension of Trading Hours

Unit 12, 16 - 22 Cross Street, Brookvale

Acoustic Assessment

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TABLE OF CONTENTS

1	INTRODUCTION	4
2	PROJECT OVERVIEW	4
2.1	Proposed Development	4
3	BASELINE NOISE SURVEY	5
3.1	Unattended Noise Monitoring	5
3.2	Data Processing	6
3.2.1	Noise Emission (Noise Policy for Industry)	6
4	ASSESSMENT CRITERIA	6
4.1	Operational Noise – NSW EPA Noise Policy for Industry	6
4.1.1	Intrusiveness Criterion	6
4.1.2	Amenity Criterion	6
4.1.3	Area Classification	7
4.1.4	Project Specific Noise Levels	7
4.2	Sleep Disturbance	8
4.3	EPA Vibration Guideline	8
5	NOISE ASSESSMENT	9
5.1	Patron Noise Assessment	10
5.2	Gym Equipment Noise Assessment	11
6	RECOMMENDATIONS	12
7	CONCLUSION	13
Table 3-1	Measured Baseline Noise Levels Corresponding to Defined NPfl Periods	6
Table 4-1	Operational Noise Criteria	7
Table 5-1	Typical Sound Pressure Level of 1 Person with Normal Voice at 1m – Lp	11
Table 5-2	Overall Patron Sound Power Level – L _w	11
Table 5-3	Noise Assessment at Nearby Noise Sensitive Receiver	12
Figure 2-1	Project Area and Surrounding Environment	4
Figure 2-2	Current Ground Floor Plan	5



1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by Enliven Coaching to prepare a Noise Impact Assessment for the extension of hours of the 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 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.

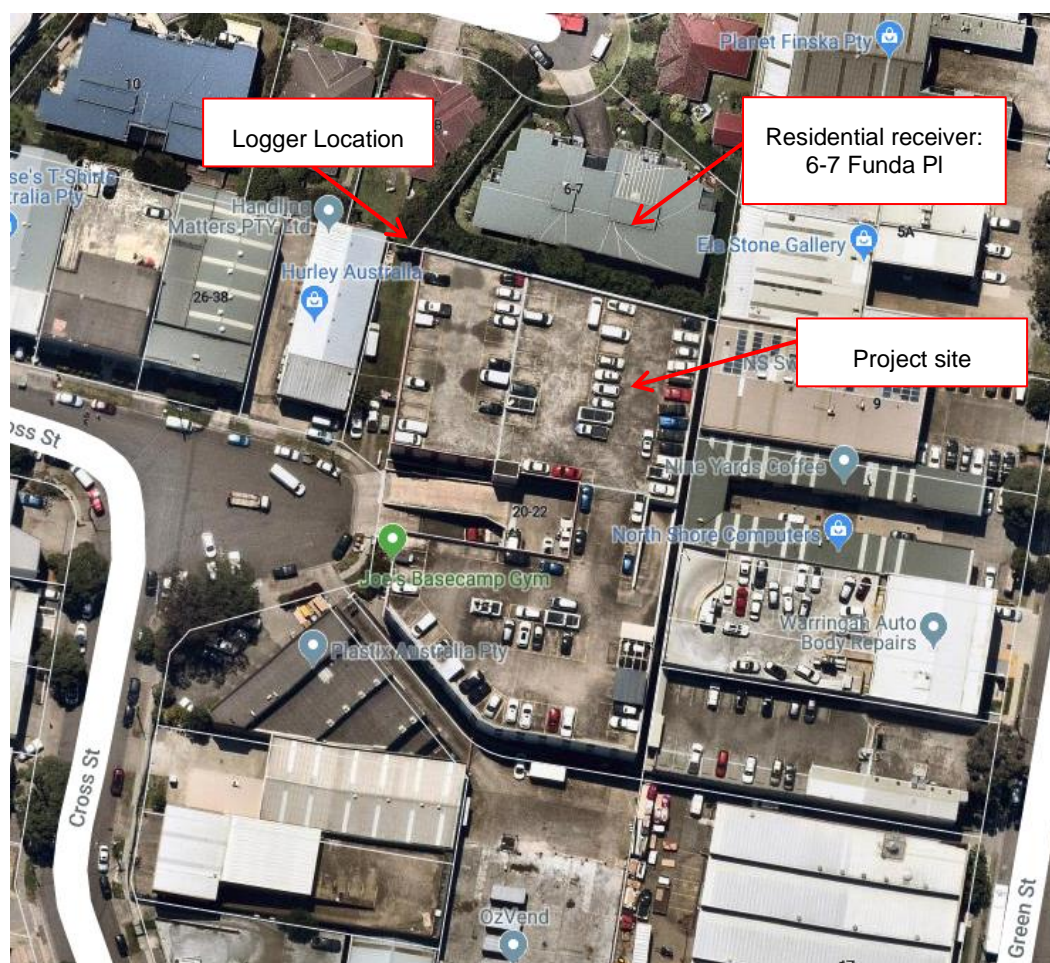
Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in Appendix C.

2 PROJECT OVERVIEW

2.1 Proposed Development

The development site 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 Ltd



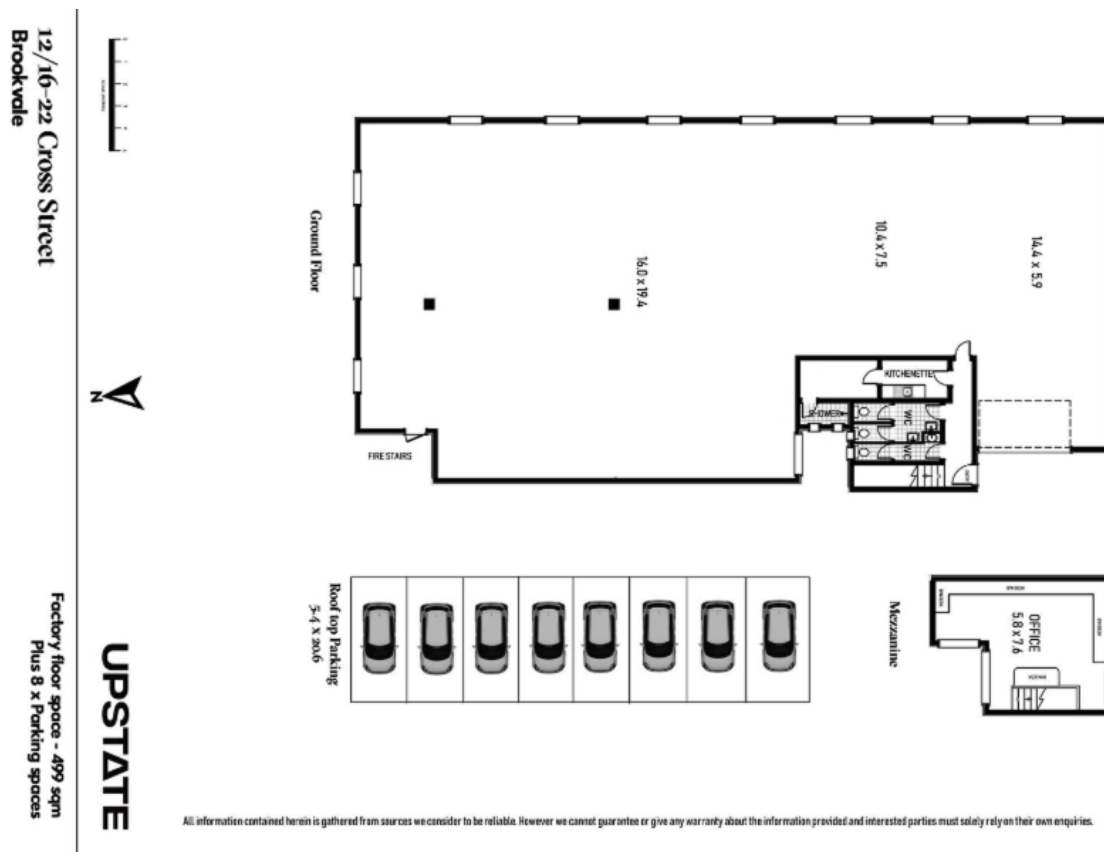
The proposal is for the extension of trading hours as following:

Monday to Friday: 5:30am - 7:00am & 6:00pm - 8:00pm

Saturday: 7:00 am to midday

The current site layout of the development is presented in Figure 2-1.

Figure 2-2 Current Ground Floor Plan



3 BASELINE NOISE SURVEY

3.1 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area unattended noise monitoring was conducted between the dates of 29th July to 4th August 2020 at the logging location shown in Figure 2-1.

Logger location was selected with consideration to other noise sources which may influence readings, security issues for noise monitoring equipment and gaining permission for access from residents and landowners.

Instrumentation for the survey comprised of a RION NL-42 environmental noise logger (serial number 710677) fitted with microphone windshields. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. Measured data has been filtered to remove data measured during adverse weather conditions upon consultation with historical weather reports provided by the Bureau of Meteorology (BOM).



The logger determines L_{A1} , L_{A10} , L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1} , L_{A10} , L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary for definitions in Appendix A). Detailed results at the monitoring location are presented in graphical format in Appendix B. The graphs show measured values of L_{A1} , L_{A10} , L_{A90} and L_{Aeq} for each 15-minute monitoring period

3.2 Data Processing

3.2.1 Noise Emission (Noise Policy for Industry)

In order to assess noise emission from the gym, the data obtained from the noise logger has been processed in accordance with the procedures contained in the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPfI, 2017) to establish representative noise levels that can be expected in the residential vicinity of the site. The monitored baseline noise levels are detailed in Table 3-1.

Table 3-1 Measured Baseline Noise Levels Corresponding to Defined NPfI Periods

Location	Measurement Descriptor	Measured Noise Level – dB(A) re 20 μ Pa		
		Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night time (shoulder period) 5am – 7am
Logger location	L_{Aeq}	52	46	49
	RBL (Background)	43	39	43

Notes: All values expressed as dB(A) and rounded to nearest 1 dB(A);
 L_{Aeq} 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.
 L_{A90} Noise level present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

4 ASSESSMENT CRITERIA

4.1 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.

4.1.1 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.

4.1.2 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.

4.1.3 Area Classification

The NPfI 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.

4.1.4 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 4-1. 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 Urban 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 4-1.

Table 4-1 Operational Noise Criteria

Receiver	Time of Day	ANL ¹ L _{Aeq} (15min)	Measured RBL ² L _{A90} (15minute)	Measured L _{Aeq} Noise Level	Criteria for New Sources	
					Intrusive L _{Aeq} (15min)	Amenity ³ L _{Aeq} (15min)
Residential	Day	60	43	52	48	63
	Evening	50	39	46	44	53
	Shoulder period (5am- 7am)	45	43	49	48	48
	Shoulder period (6pm- 8pm)	50	40	46	45	53
Commercial	When in use	60	-	-	-	60

Note 1: ANL = “Acceptable Noise Level” for residences in Urban Areas.

Note 2: RBL = “Rating Background Level”.

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

4.2 Sleep Disturbance

The NSW EPA Noise Policy for Industry (NPfI) provides a guidance for sleep disturbance or sleep arousal assessment. The NPfI states the following:

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Where the subject development/premises night-time noise levels at a residential location exceed:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment should be undertaken. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy

Other factors that may be important in assessing the extent of impacts on sleep include:

- how often high noise events will occur*
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development*
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)*
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.*

Maximum noise level event assessments should be based on the LAFmax descriptor on an event basis under 'fast' time response.

The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels

4.3 EPA Vibration Guideline

In February 2006, the NSW Environment Protection Authority (EPA) introduced its “Assessing vibration: a technical guideline”. This document is based on guidelines contained in British Standard (BS) 6472-1992, “Evaluation of human exposure to vibration in buildings (1–80 Hz)”.

The EPA document contains guidelines for “continuous and impulsive vibration” and also for “intermittent vibration” and was to be considered interim until the revision of BS 6472-1992. The document does not contain criteria per se, but rather, ranges of levels of “preferred values” of vibration, below which “a low probability of adverse comment” can be expected.

BS 6472 was subsequently revised in 2008. BS 6472-1:2008: “Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting” focuses on Vibration Dose Values (VDVs) which allow assessment of impulsive and intermittent vibration.

Whilst the previous (1992) version of BS 6472 contained the same criteria for human exposure to continuous vibration as AS 2670, the revised version focuses on the use of VDVs which allow an assessment of the severity of impulsive and intermittent vibration to be carried out.

It is recommended that an assessment in terms of intermittent vibration (VDVs) is appropriate as each F45 Gym's training/workout session, which occurs for a period of approximately 45 minutes to an hour, may potentially have more than three vibration events.

BS 6472-1:2008 nominates criteria for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants. The "low probability of adverse comment" level for residential buildings is:

- **0.2 to 0.4 m/s^{1.75}** (Vibration Dose Value)

BS 6472-1:2008 goes on to state:

These values represent the best judgement currently available and may be used for both vertical and horizontal vibration, provided that they are correctly weighted. It is inevitable that the criteria have to be presented as ranges rather than discrete values. This stems largely from the widely differing susceptibility to vibration evident among members of the population, but also from their differing expectations of the vibration environment. Parallel effects can also exert some influence. Because there is a range of values for each category, it is clear that the judgement can never be precise.

5 NOISE ASSESSMENT

The proposal is for the extension of hours for the currently operating gym. The breakdown of the extension of hours and the corresponding activities being proposed are as follows:

- 5:30am to 7:00am:
 - Monday, Wednesday & Friday will have strength training class that will include:
 - 45-minute duration
 - Body weight exercises
 - Bench press all on rigs
 - Kettle ball and free weights used only under supervision
 - No deadlifts
 - No medicine balls
 - Background music set at L_p 65dBA at the centre of the gym
 - Tuesday, Thursday & Saturday (7am to midday) will have cardio classes that will include:
 - 30-minute duration
 - Machine based exercises including ski machines, rowers and stationary bikes
 - Body weight exercises including running, jumping, push ups, squats, sit ups and pull ups
 - Skipping
 - Background music set at L_p 65dBA at the centre of the gym

- 6:00 pm to 8:00 pm
 - Tuesday and Thursday will have strength training class that will include:
 - 45-minute duration
 - Body weight exercises
 - Bench press all on rigs
 - Kettle ball and free weights used only under supervision
 - No deadlifts
 - No medicine balls
 - Background music set at L_p 65dBA at the centre of the gym
 - Monday, Wednesday and Friday will have cardio classes that will include:
 - 45-minute duration
 - Body weight exercises
 - Bench press all on rigs
 - Kettle ball and free weights used only under supervision
 - No deadlifts
 - No medicine balls
 - Background music set at L_p 65dBA at the centre of the gym

The above activities will operate within a class style environment and with a personal trainer (PT).

The extension of hours will have a maximum of 20 members in the classes with 2 staff members.

5.1 Patron Noise Assessment

The classes 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 73 dBA.

Table 5-1 outlines the sound power spectrum of a patron talking with a raised vocal effort.



Table 5-1 Typical Sound Pressure Level of 1 Person with Normal Voice at 1m – L_p

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

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 5-2 Overall Patron Sound Power Level – L_w

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.

5.2 Gym Equipment Noise Assessment

RSA has conducted noise measurements of the equipment that will be operational during the extension of hours. The measurements have been conducted at the boundary of the site with the equipment in use. The sound power level and the corresponding equipment is presented below:

- Cardio: Bikes, ski and rower – L_w 70 dB
- Lifting station: free weights (10kg dumbbell weight drop) & ropes (worst case scenario of weights dropped on floor) – L_{Amax} 100 dBA
- Background music – L_p 65 dBA at the centre of the gym

Considering the above noise levels, the following noise impact levels have been calculated. The noise modelling scenarios consider 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 R_w 45
- Northern windows treated with acoustic blinds comprising an acoustic rating of R_w28 and has light blackout properties.

- All equipment in use at the same time
- Current flooring being 50mm rubber floor on top of 15mm rubber

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 5-3 Noise Assessment at Nearby Noise Sensitive Receiver

Receiver	Resultant Noise Level at Sensitive Receiver (L _{Aeq} (15min))	Noise Criteria	Compliance (Y/N)
Receiver on the western adjoining premises	L _{Aeq} (15min) 46 dBA	When in use: 60 dBA	Yes
Residential receiver: 6-7 Funda Pl	L _{Aeq} (15min) 34 dBA	Morning shoulder: 48 dBA Evening shoulder: 44 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 6 below to ensure future operational noise compliance.

6 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.
- Acoustic curtains on the northern window to be closed during the morning and evening class.
- The PA is to be used for background music only and to have a maximum output of 65 dB at the centre of the room. All speakers are to face internally. PA system is to have an electronic limiter with a maximum output of 65 dBA SPL during the morning and evening shoulder period
- Signs should also be posted at exit doors reminding patrons to leave the premises in an orderly and quiet manner when leaving the Gym.
- Roller door to be closed during the extended hours
- Maximum of 20 patrons inside the premises
- Flooring to be as follows:
 - Lifting platforms are 50mms thick on top of 15mm rubber
 - Aerobic flooring to be 8mm thick rubber



- Rooftop car park is not to be utilised during the 5am-7am trading hours. It is understood that the rooftop car park is for the use of the entire commercial complex. The patrons of the gym will only be using the carpark during the daytime and evening periods

7 CONCLUSION

Rodney Stevens Acoustics has conducted Noise Impact Assessment for the proposed extended trading hours to the Enliven Coaching located at 16 - 22 Cross Street, Brookvale NSW. The assessment has predicted 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: -

Rodney Stevens - MAAS



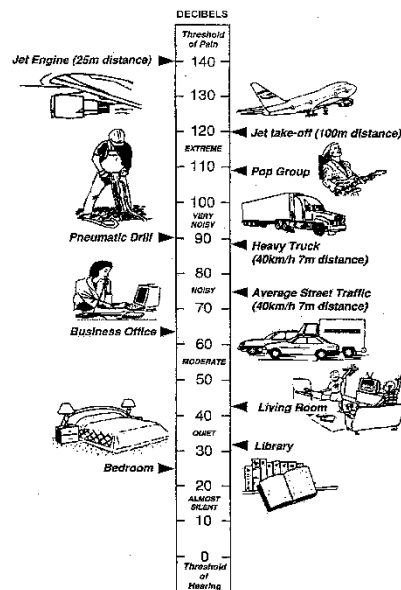
Appendix A – Acoustic Terminology

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 <i>dB(A)</i> 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 in the near and far field.
Community annoyance		<p>Includes noise annoyance due to:</p> <ul style="list-style-type: none">▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content)▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry)▪ miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations)▪ human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
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 and reasonable measures		<p>Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, considering the following factors:</p> <ul style="list-style-type: none">▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected).▪ Cost of mitigation (cost of mitigation versus benefit provided).▪ Community views (aesthetic impacts and community wishes).



- Noise levels for affected land uses (existing and future levels, and changes in noise levels).

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_{A90} 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)	<p>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 2×10^{-5} Pa.</p> <p>The picture below indicates typical noise levels from common noise sources.</p>



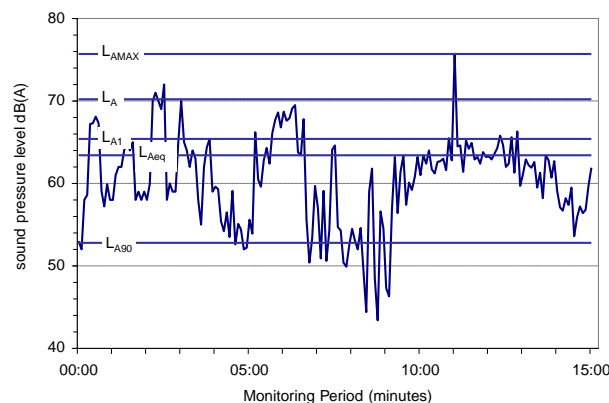
dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound Power Level (SWL) The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in $dB(A)$.

Sound Pressure Level (SPL) 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

- **LAmx** Maximum recorded noise level.



- LA1 Noise level exceeded for 1% of the 15 minute interval.
- LA10 Noise level present for 10% of the 15-minute interval. Commonly referred to the average maximum noise level.
- 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.
- LA90 Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

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.