RODNEY STEVENS ACOUSTICS
Acoustic Consultants
Member Australian Acoustical Society

REPORT 190328R1

Revision 0

Noise Impact Assessment

Proposed Retail and Commercial Development

The Emporium

6 The Corso and 46-48, 50 East Esplanade, Manly NSW 2095

PREPARED FOR:
Aspiring Properties Pty Ltd
151 Darley Road
Manly NSW 2095

4 September 2019

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PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
190328R1	Revision 0	4 September 2019	Thomas Carney	Rodney Stevens	Rodney Stevens

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1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (here forth referred to as RSA) has been engaged by Aspiring Properties Pty Ltd to prepare a mechanical noise impact assessment for the proposed commercial development at 6 The Corso and 46-48, 50 East Esplanade, Manly NSW 2095.

This report details the results of an ambient noise survey and establishes the noise criteria for mechanical plant for the development.

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

2 PROPOSED DEVELOPMENT

2.1 Development Site

The proposed retail and commercial development is to be located at The Emporium, 6 The Corso and 46-48, 50 East Esplanade, Manly NSW 2095. The development site is bounded by adjoining receivers to the north, south, east and west.

Figure 2-1 shows an aerial image of the site area and the surrounding environment.

Figure 2-1 Site Location

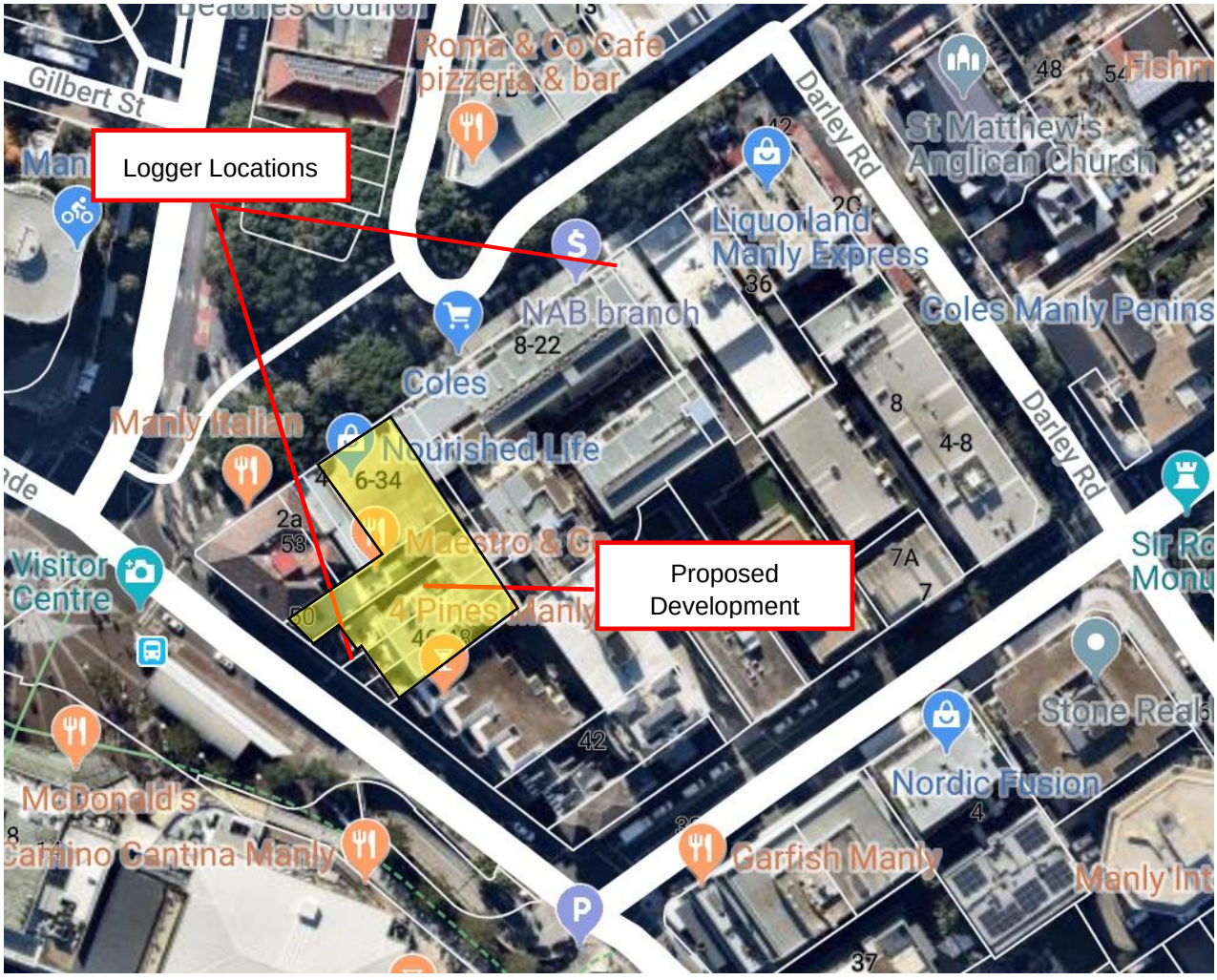


Image Courtesy of Google Maps © 2019.

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 Tuesday 16th July and Tuesday 23rd July 2019 at the logging location shown in Figure 2-1**.**

Logger locations were 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 184112) and a NGARA environmental noise logger (serial number 8780EA) fitted with microphone windshields. Calibration of the loggers were 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 proposed commercial development, the data obtained from the noise loggers 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 µPa		
		Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
46-48 The Esplanade	L_{Aeq}	69	66	63
	RBL (Background)	59	59	56
The Corso	L_{Aeq}	62	60	59
	RBL (Background)	54	50	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 NOISE GUIDELINES AND CRITERIA

Northern Beaches Council utilises the criteria from Manly DCP 2013, Part 3, Section 3.9.3 states:

3.9.3 Noise from Mechanical Plant

External mechanical plant systems (for pools, air conditioning and the like) must be acoustically enclosed and located centrally and away from neighbours living areas of neighbouring properties and side and rear boundaries.

See also paragraph 3.4.2.4 *Acoustical Privacy*.

Note: Excessive noise from the operation of mechanical plant such as air conditioning units, swimming pool pumps, and ventilation and refrigeration systems can disturb residents, disrupt sleep, interfere with normal daily activities or significantly impact on people's health.

4.1 Operational Noise Project Trigger Noise Levels

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) October 2017 which provides a framework and process for deriving project trigger noise level. The NPfI project noise levels 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 Noise Levels

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness noise level essentially means that the equivalent continuous noise level (LAeq) 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 Noise Levels

The amenity noise level 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 noise levels 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 project trigger noise level 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 project trigger noise level.

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 Trigger Noise Levels

Having defined the area type, the processed results of the attended noise monitoring have been used to determine project specific project trigger noise level. The intrusive and amenity project trigger noise level for nearby residential premises are presented in Table 4-1. These project trigger noise levels 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 project amenity noise level are assigned as per Table 2.2 of the NPfI (Recommended Amenity Noise Levels). For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive project trigger noise level are adopted. These are shown in bold text in Table 4-1.

Table 4-1 Operational Project Trigger Noise Levels

Receiver	Time of Day	ANL [1] $L_{Aeq(15min)}$	Measured		Project Trigger Noise Levels	
			RBL [2] $L_{A90(15min)}$	Existing $L_{Aeq(Period)}$	Intrusive $L_{Aeq(15min)}$	Amenity $L_{Aeq(15min)}$
Residential	Day	60	54	62	**59**	63
	Evening	50	50	60	55	**53**
	Night	45	43	59	48	**48**
Commercial	When in use					**65**

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

Note 2: RBL = “Rating Background Level”.

5 MECHANICAL NOISE IMPACT

Precise mechanical plant equipment has not been determined at this stage of development. It is understood that most external plant items will be located on the roof. Sensible selection of mechanical plant equipment and design of the plant space will ensure compliance with regulatory criteria which has been established in Table 4-1.

For mechanical plant operating during the night time period the accumulative level that the plant can achieve at the nearest boundary is **48 dB(A)**.

6 RECOMMENDATIONS

Whilst the mechanical plant is not yet known, the following is recommended to ensure compliance with regulatory criteria under all circumstances at all times:

- Items of mechanical plant should be located within a dedicated roof mounted plant room; or
- Items of mechanical plant should be screened using acoustic screening with a minimum NRC rating of 0.8.

Final selection of plant, plant rooms or acoustic screening should be approved by a qualified acoustic consultant at Construction Certificate stage.

7 CONCLUSION

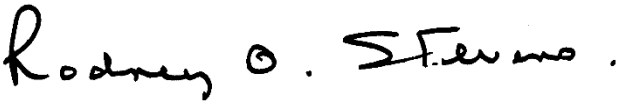
A noise impact assessment has been conducted in relation to the operation of the proposed mechanical plant servicing the proposed development at 6 The Corso and 46-48, 50 East Esplanade, Manly NSW.

This assessment has been conducted and appropriate noise emission criteria have been established in accordance with Northern Beaches Council's requirements.

Recommendations in this report can ensure that under the most conservative operating scenarios and the implementation of the recommendations, operational noise emission from the proposed mechanical plant will achieve the established criteria at neighbouring residences.

A detailed mechanical plant analysis should be conducted by a qualified acoustic consultant at Construction Certificate stage when final plant selection is detailed.

Approved:-



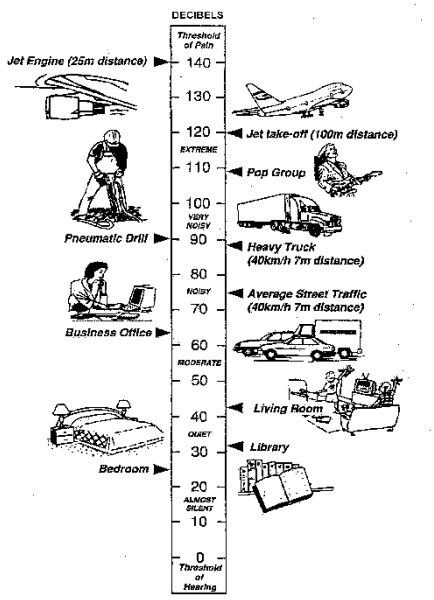
Rodney Stevens

Manager/Principal

Appendix A Acoustic Terminology

A-weighted sound pressure	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 '*A-weighting*' 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 in the near and far field.
Community annoyance	Includes noise annoyance due to: ▪ 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	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: ▪ 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)	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.

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)*.

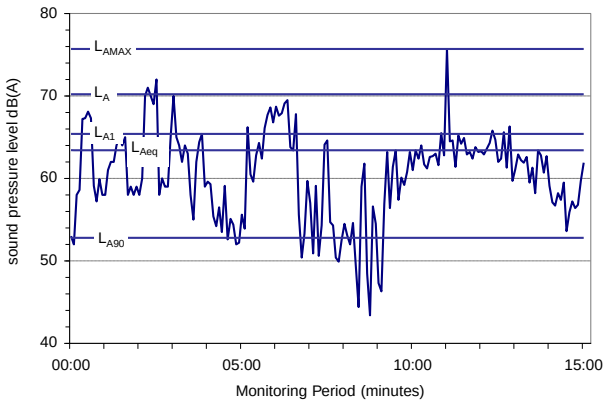
Sound Pressure Level (SPL)

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.

Statistic 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 descriptors:

L_{Amax} Maximum recorded noise level.

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.

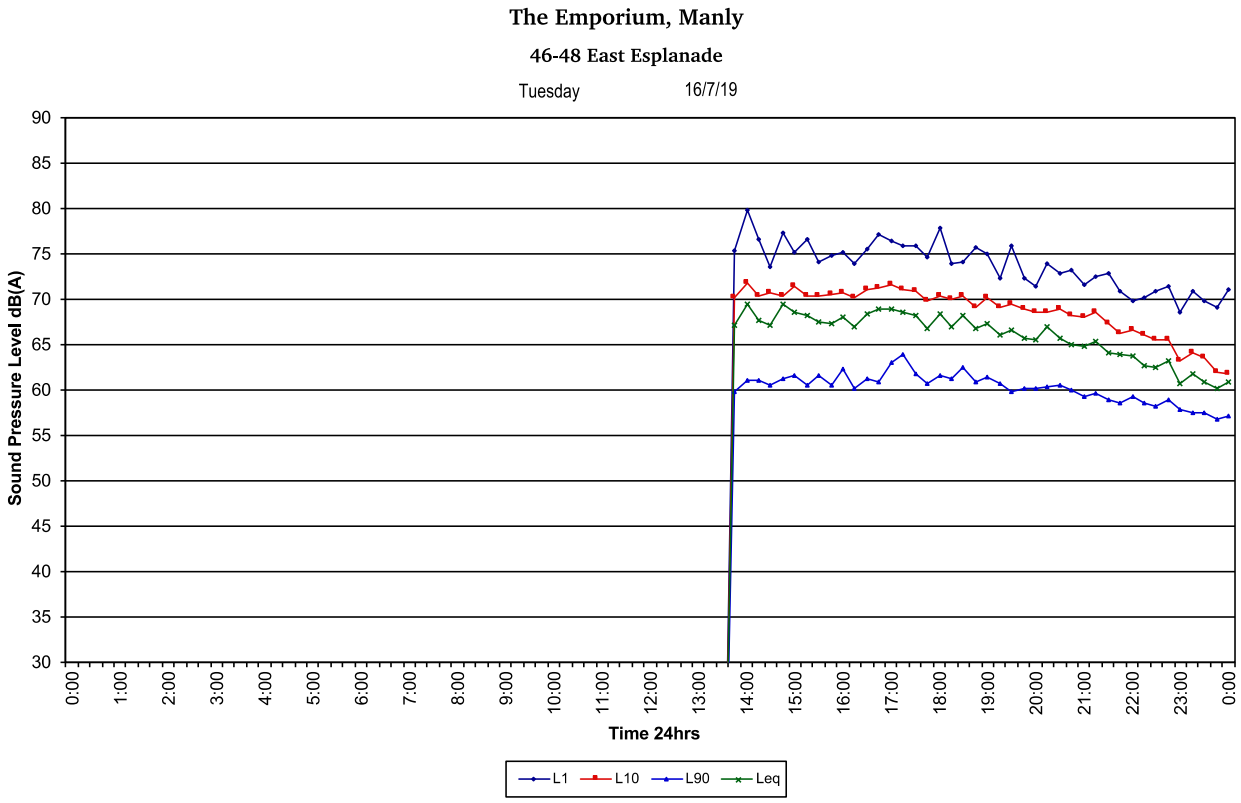
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

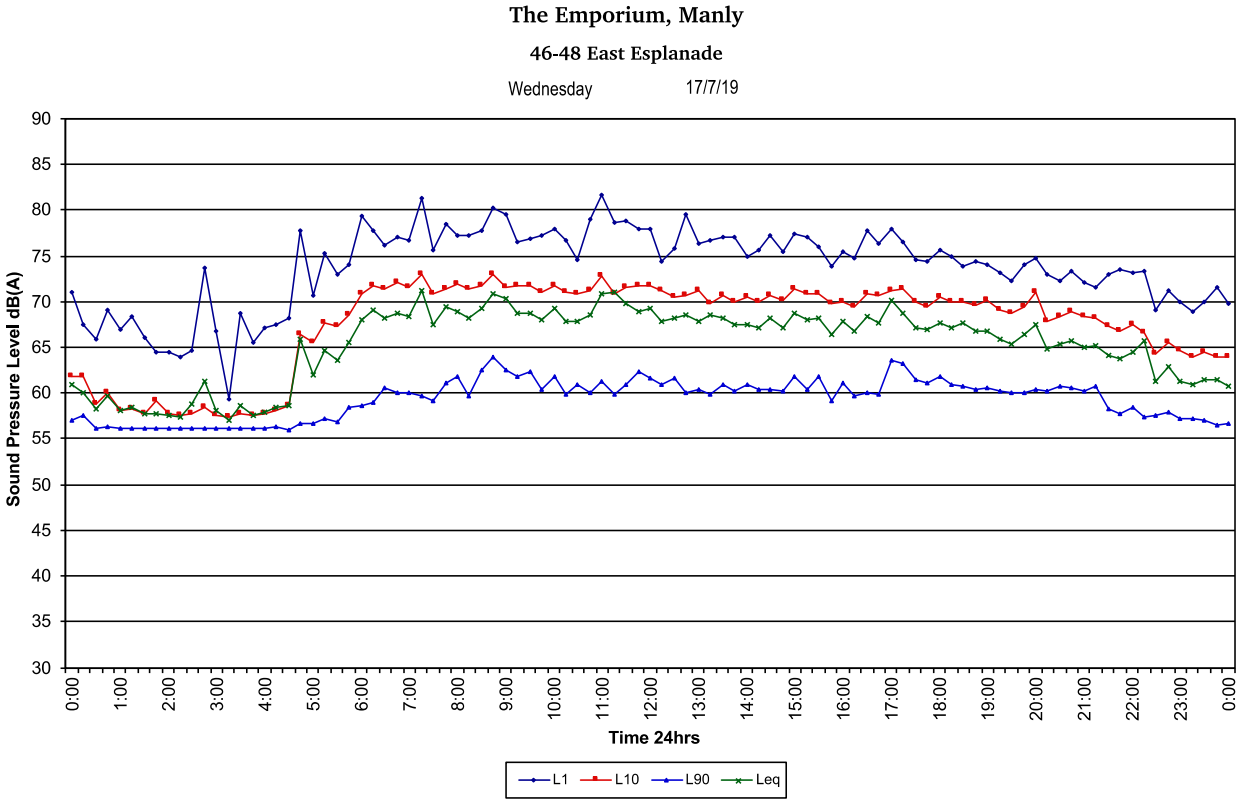
L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

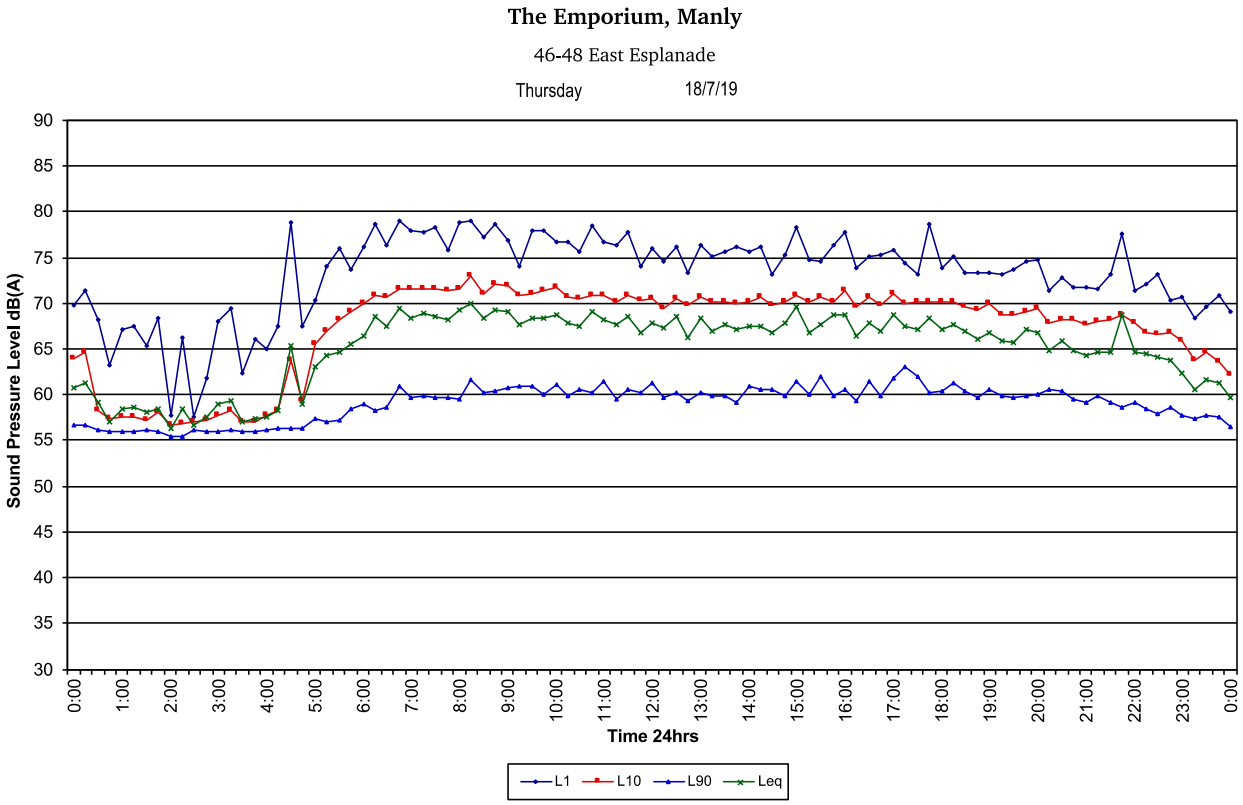
Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

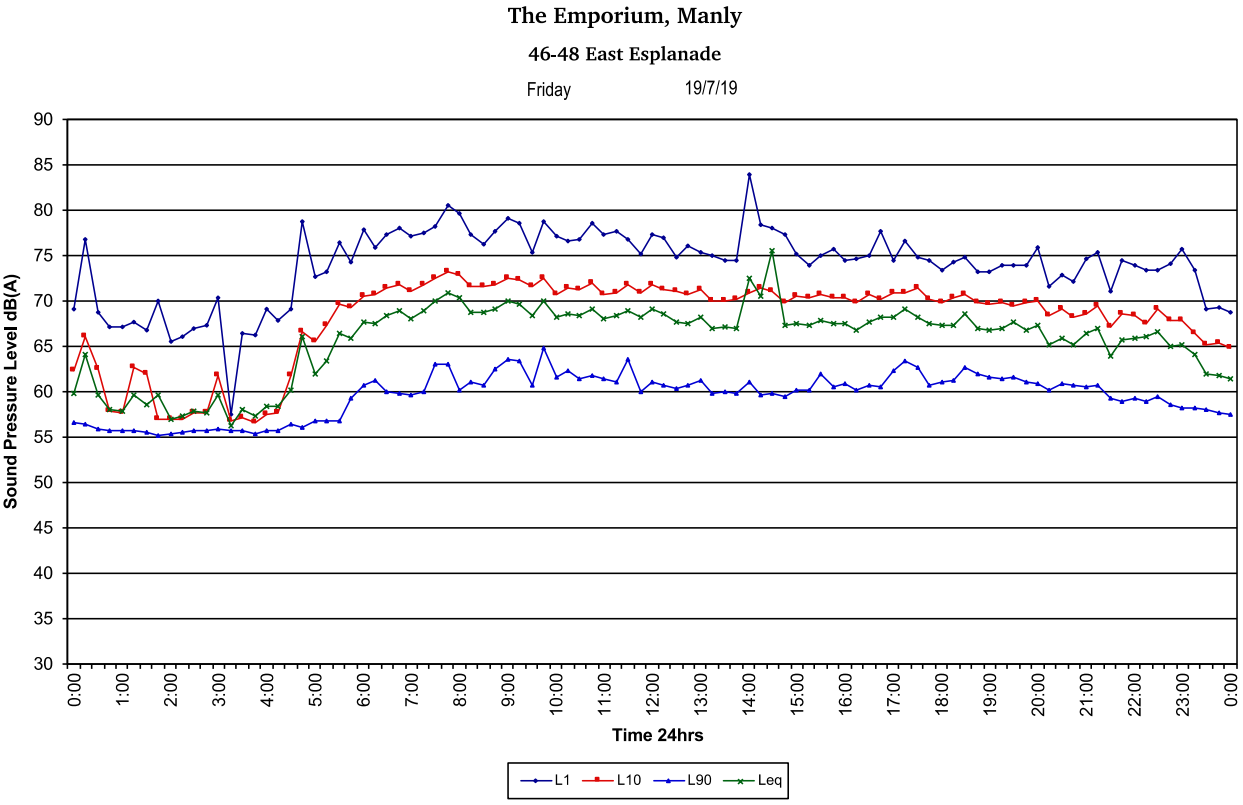
Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

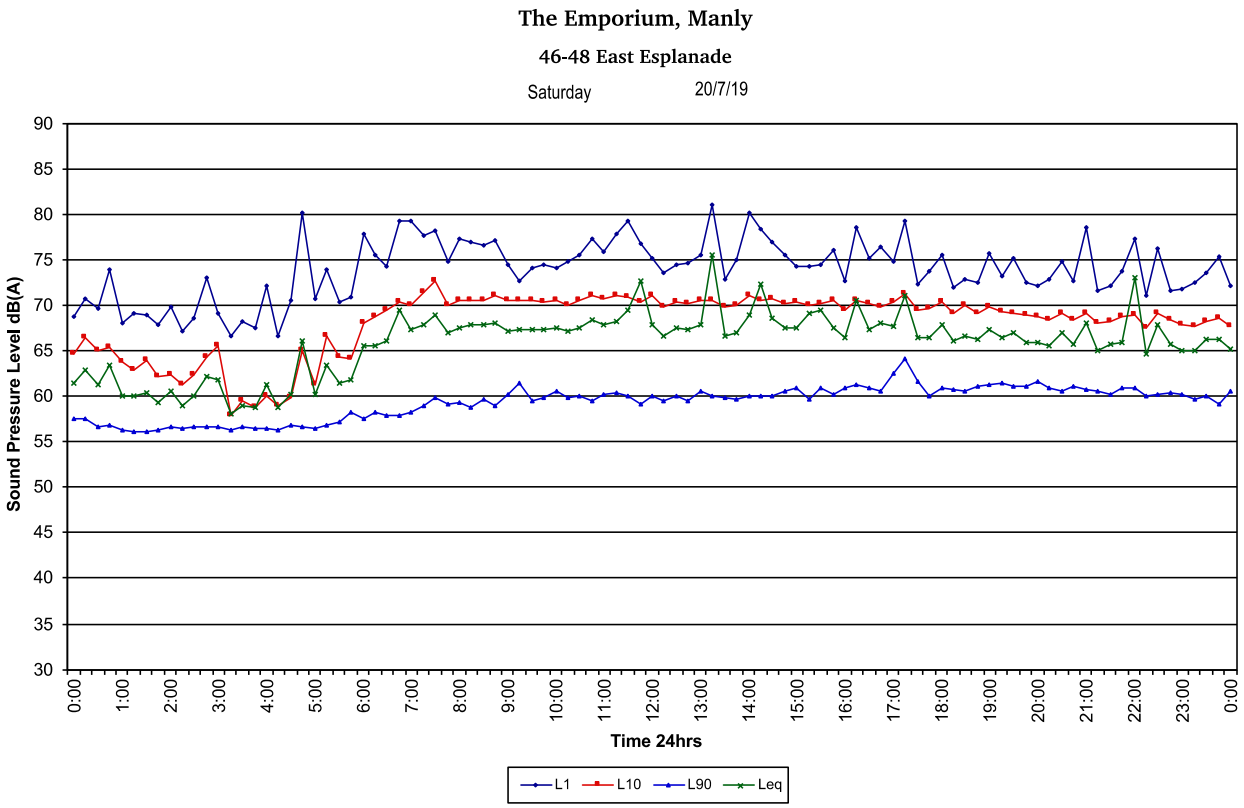
Appendix B Logger Graphs

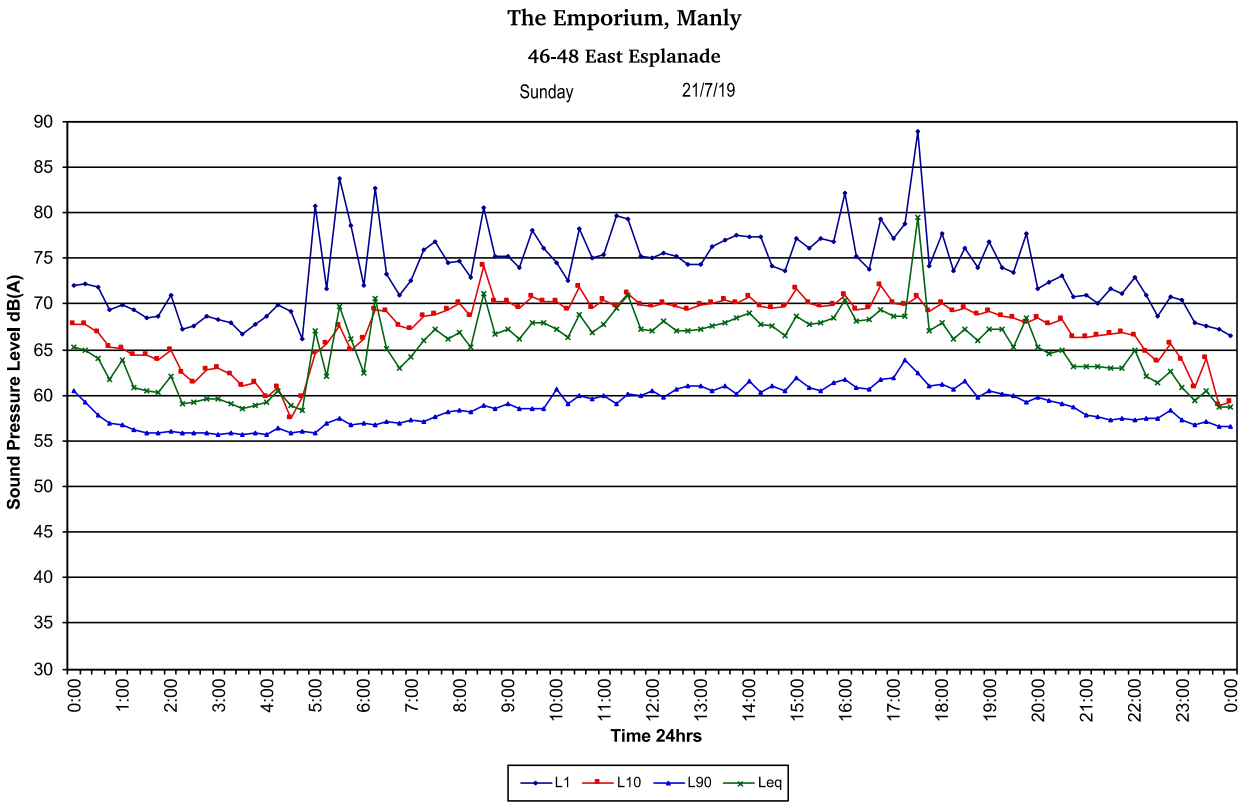





The Emporium, Manly
46-48 East Esplanade
Thursday 18/7/19
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


The Emporium, Manly
46-48 East Esplanade
Friday 19/7/19
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


The Emporium, Manly
46-48 East Esplanade
Saturday 20/7/19
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


The Emporium, Manly
46-48 East Esplanade
Sunday 21/7/19
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
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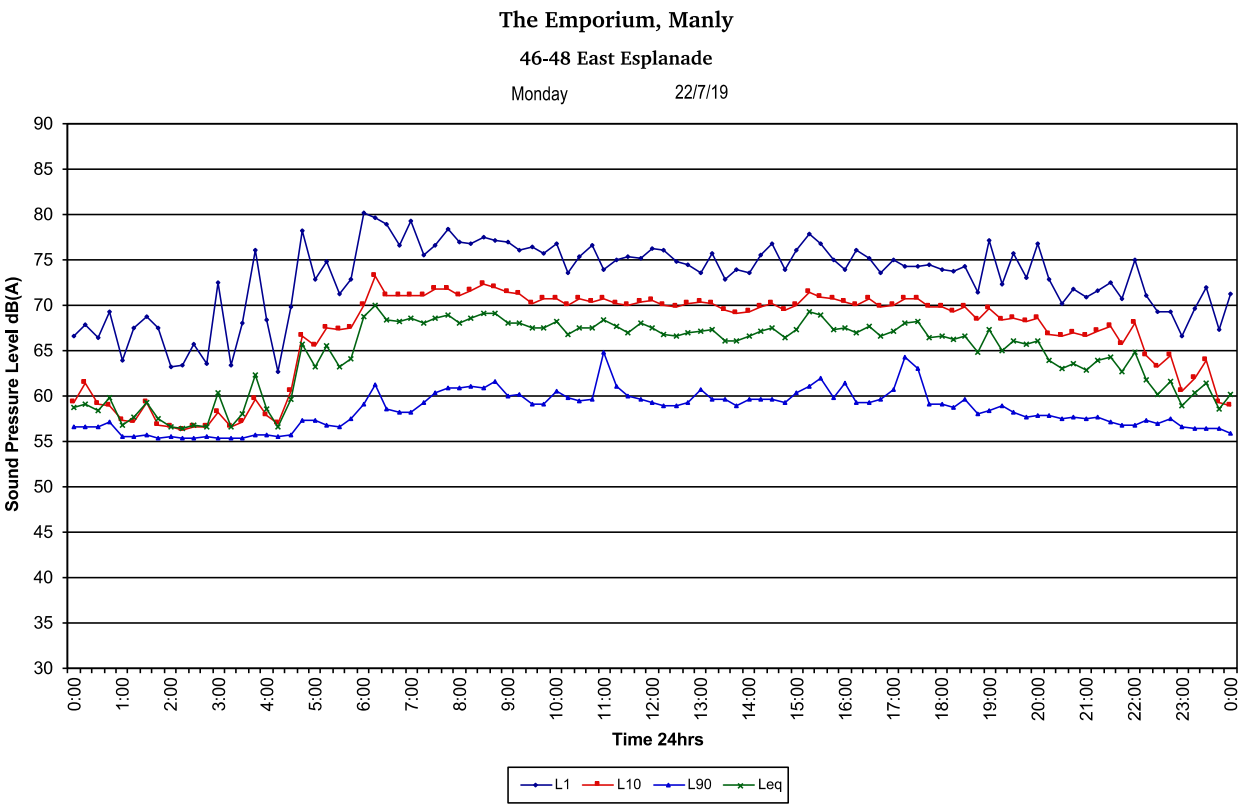
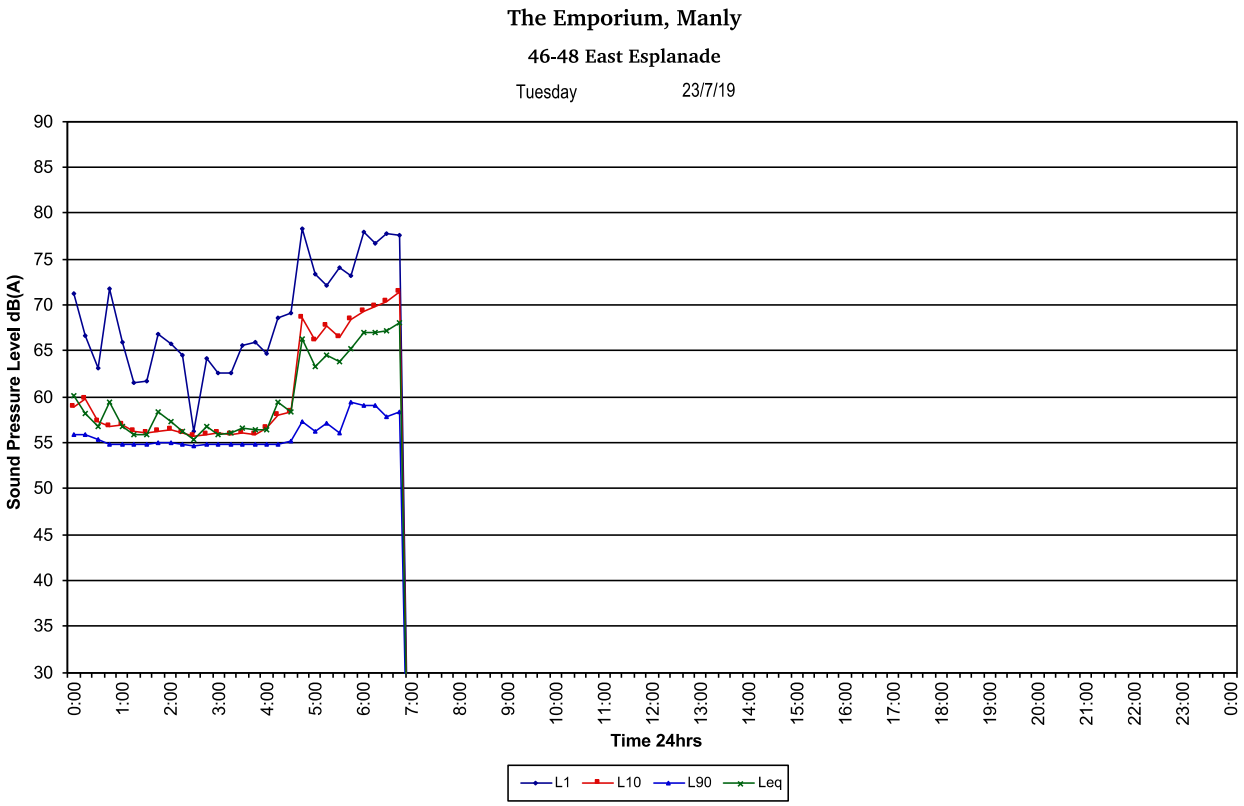
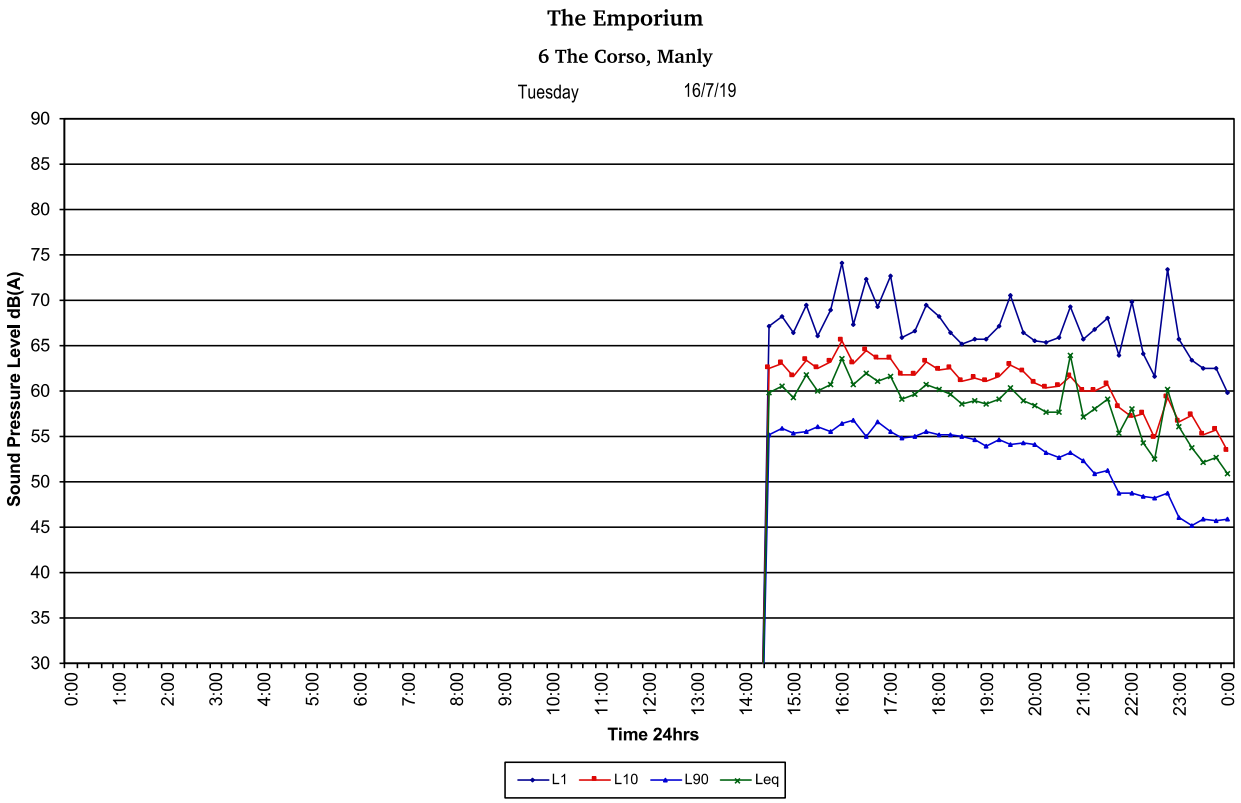
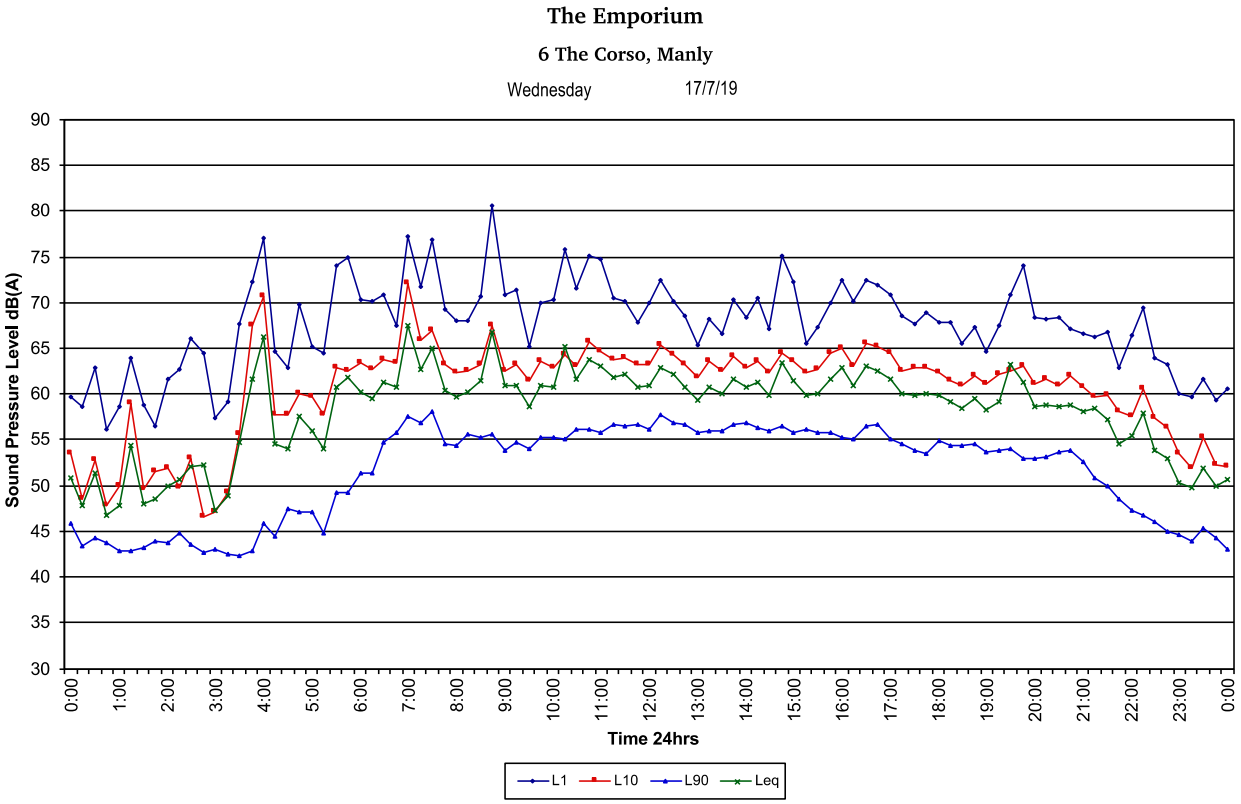
Time 24hrs
L1
L10
L90
Leq


The Emporium, Manly
46-48 East Esplanade
Monday 22/7/19
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


The Emporium, Manly
46-48 East Esplanade
Tuesday 23/7/19
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq

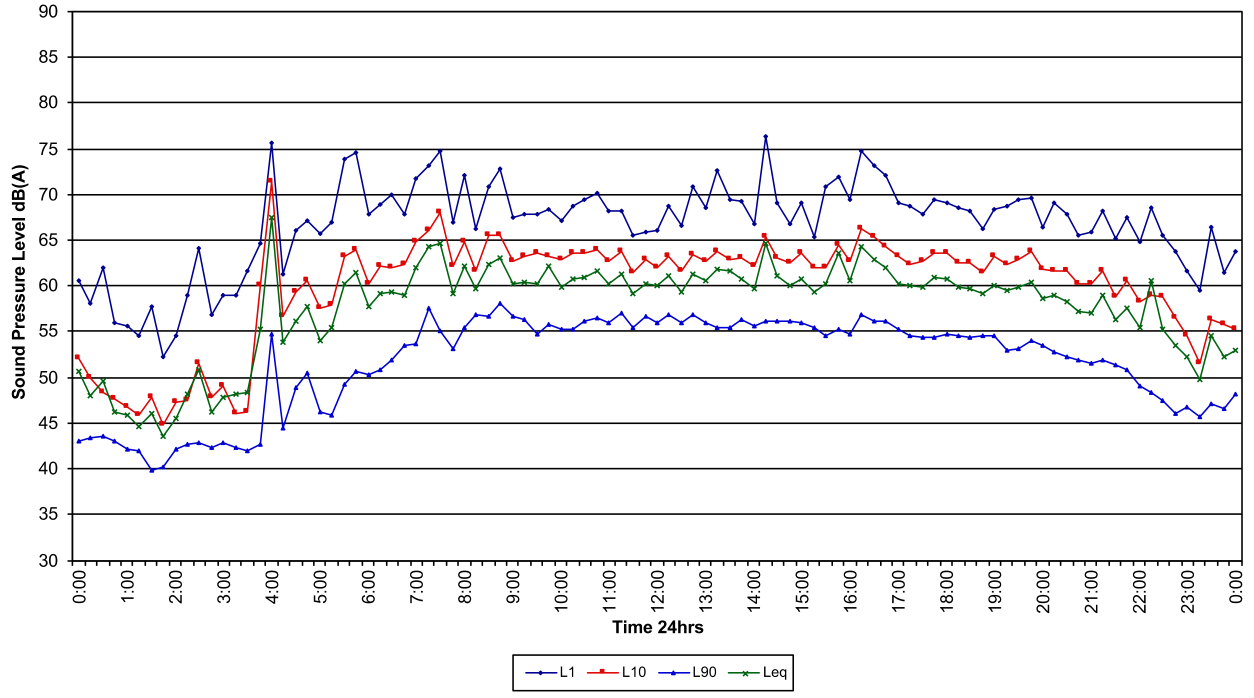

The Emporium
6 The Corso, Manly
Tuesday 16/7/19
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


The Emporium
6 The Corso, Manly
Wednesday 17/7/19
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq

The Emporium

6 The Corso, Manly

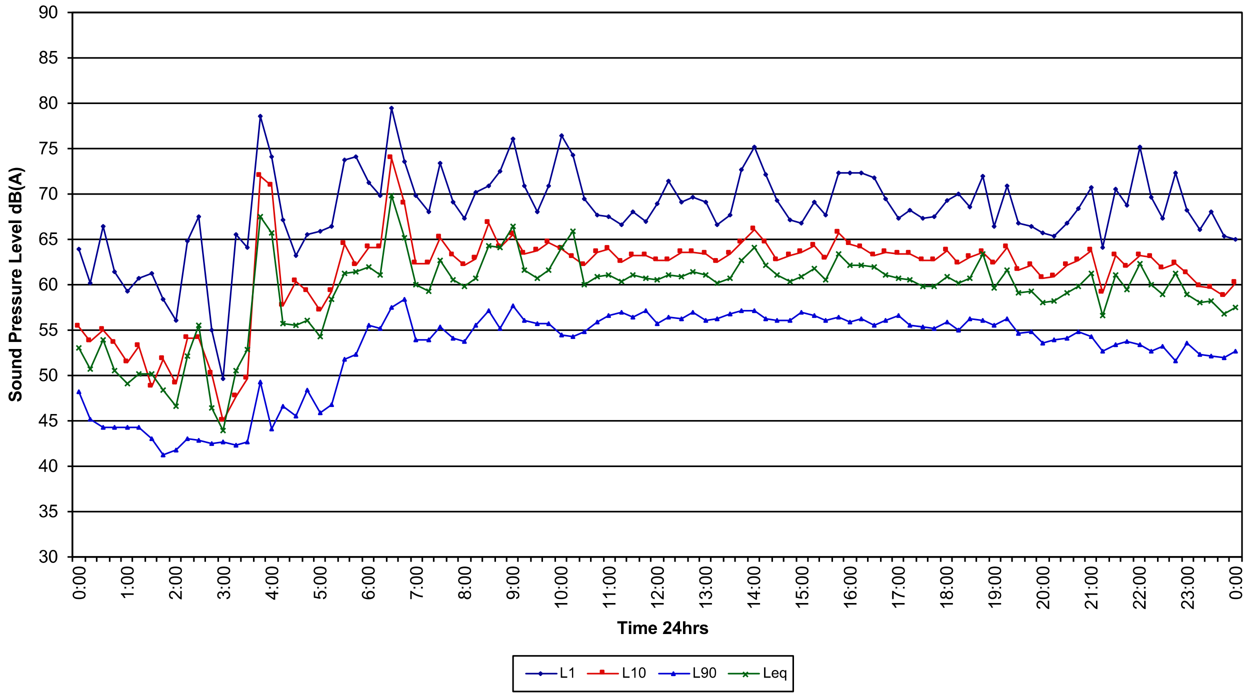
Thursday 18/7/19



The Emporium

6 The Corso, Manly

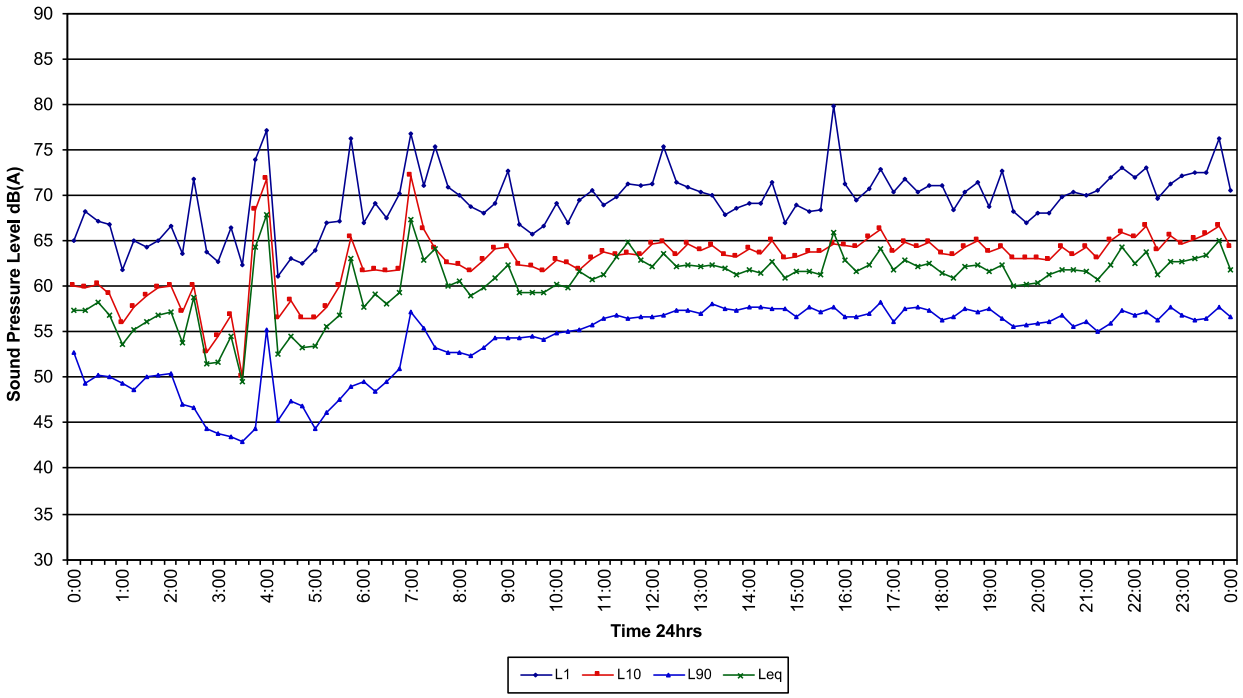
Friday 19/7/19



The Emporium

6 The Corso, Manly

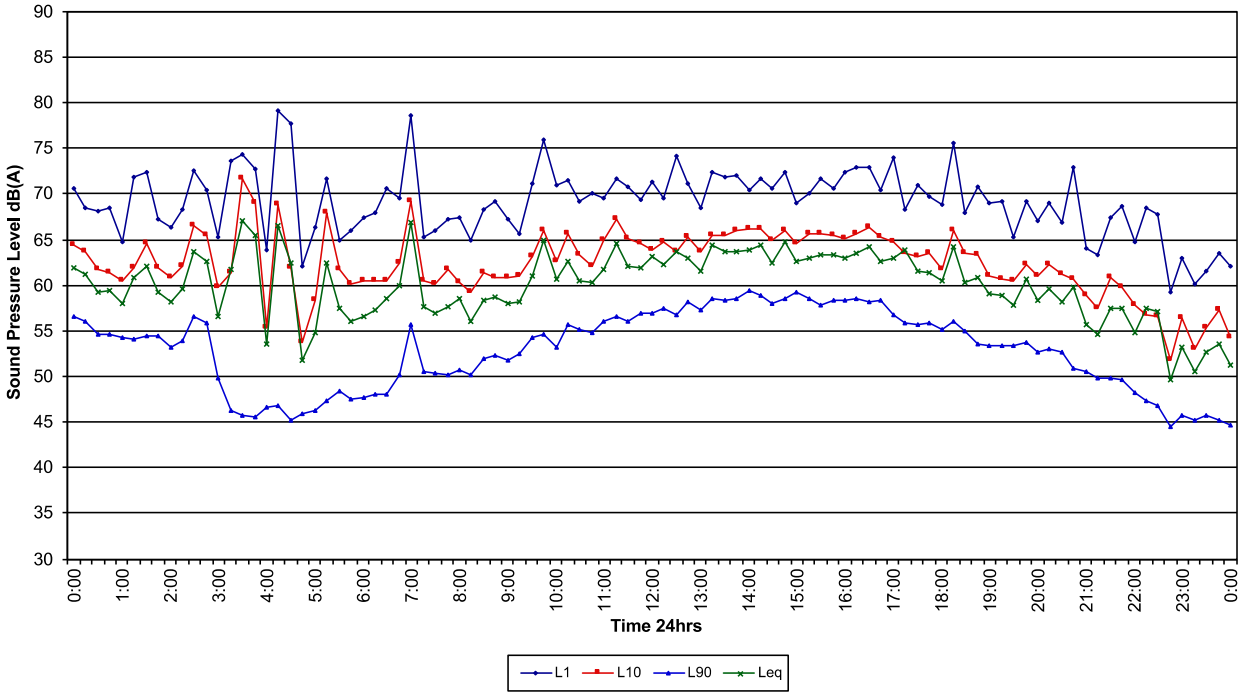
Saturday 20/7/19



The Emporium

6 The Corso, Manly

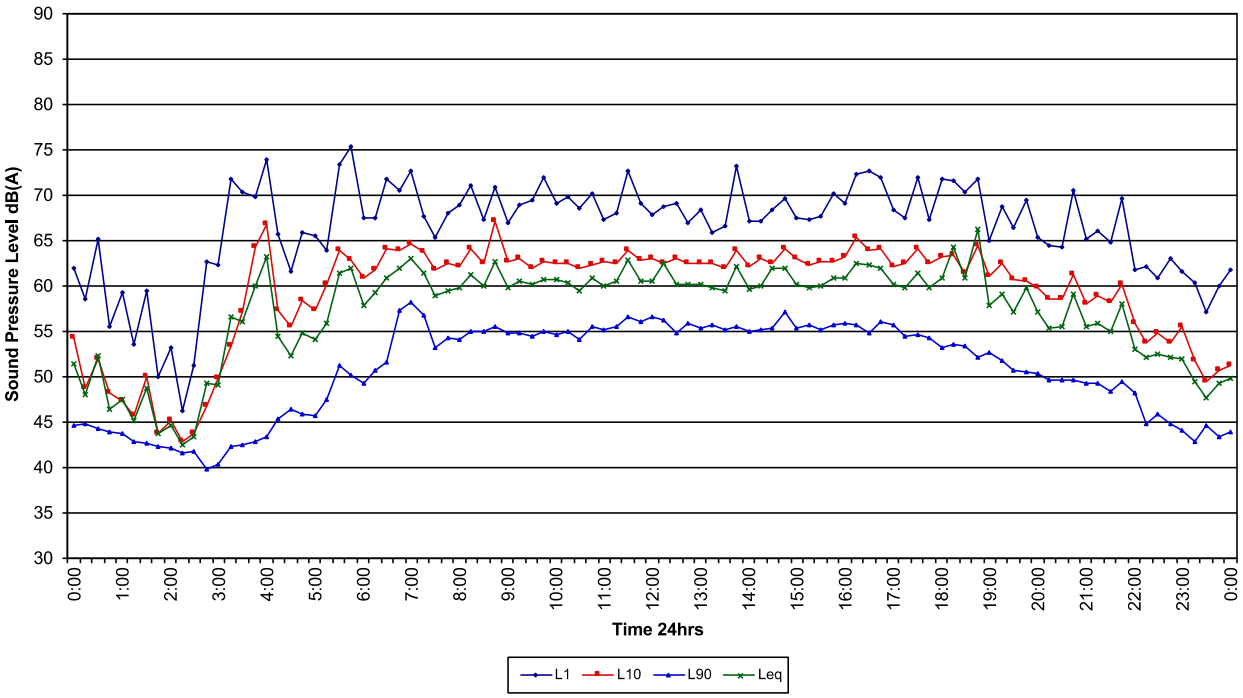
Sunday 21/7/19



The Emporium

6 The Corso, Manly

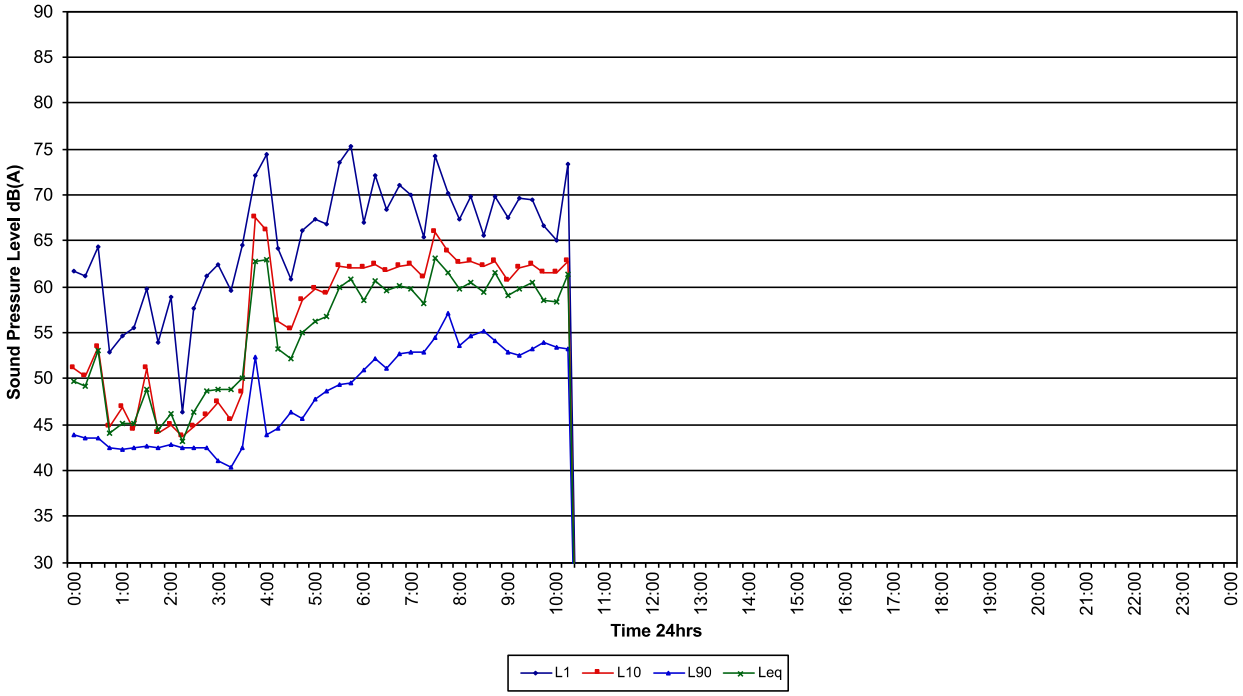
Monday 22/7/19



The Emporium

6 The Corso, Manly

Tuesday 23/7/19



Appendix C Calibration Certificate

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C18124

Client Details	Rodney Stevens Acoustics Pty Ltd 1 Majura Close St Ives Chase NSW 2075
Equipment Tested/ Model Number :	Rion NL-42EX
Instrument Serial Number :	00184112
Microphone Serial Number :	173008
Pre-amplifier Serial Number :	74638

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	22.8°C	**Ambient Temperature :**	22.3°C
Relative Humidity :	57.6%	**Relative Humidity :**	58.2%
Barometric Pressure :	99.35kPa	**Barometric Pressure :**	99.37kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 5 Mar 2018
Secondary Check: Riley Cooper
Report Issue Date : 5 Mar 2018

Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.07°C*
12.5kHz	*±0.21dB*	*Relative Humidity*	*±0.58%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Sound Level Meter
IEC 61672-3:2013

Calibration Certificate

Calibration Number C17632

Client Details	Acoustic Research Labs Pty Ltd Level 7, Bld 2, 423 Pennant Hills Road Pennant Hills NSW 2120
Equipment Tested/ Model Number :	ARL Ngara
Instrument Serial Number :	878GBA
Microphone Serial Number :	319483
Pre-amplifier Serial Number :	28071

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	22.7°C	**Ambient Temperature :**	22.8°C
Relative Humidity :	54.2%	**Relative Humidity :**	50.2%
Barometric Pressure :	98.66kPa	**Barometric Pressure :**	98.59kPa

Calibration Technician :	Vicky Jaiswal	**Secondary Check:**	Riley Cooper
Calibration Date :	05/12/2017	**Report Issue Date :**	05/12/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity Incl. the level range control	Pass
13: Electrical Sig. tests of frequency weightings	Pass	18: Tone burst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	Pass
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conforms to the requirements of IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 500 Hz	±0.16dB	Temperature	±0.5°C
1 kHz	±0.2dB	Relative Humidity	±1.5%
1 kHz	±0.2dB	Barometric Pressure	±0.75kPa
Electrical Tests			
31.5 Hz to 8 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

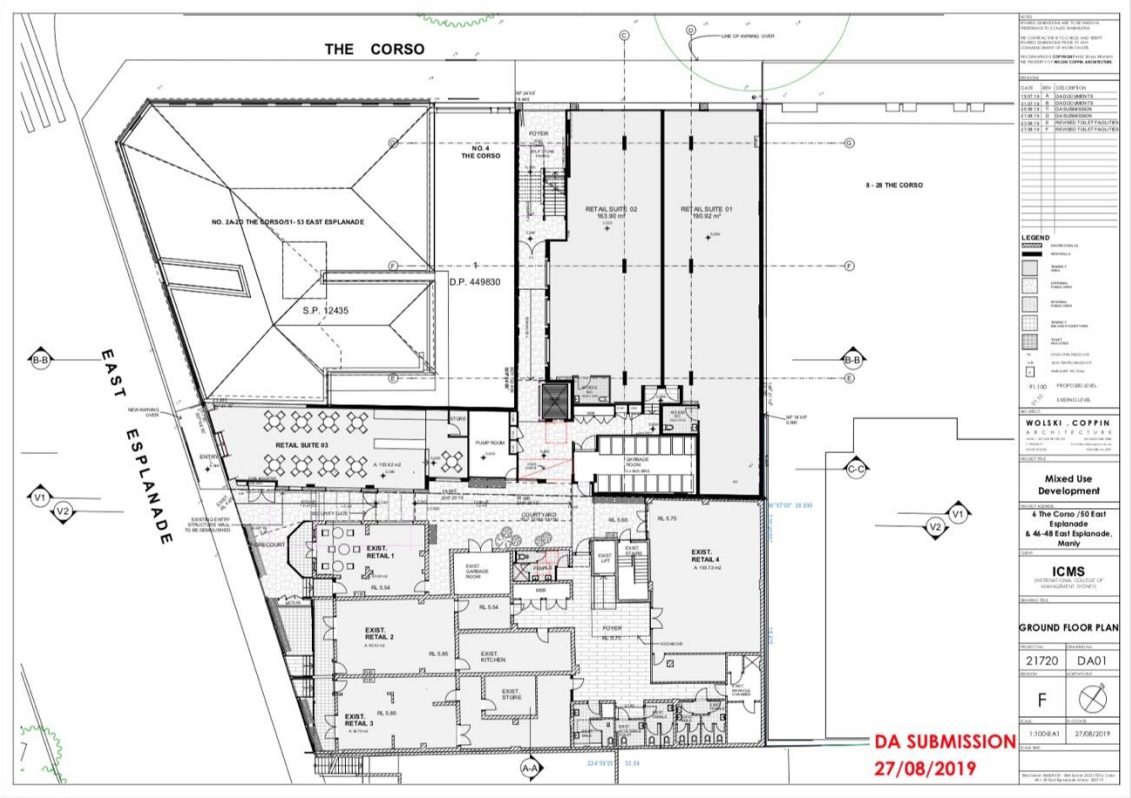
Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14372
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

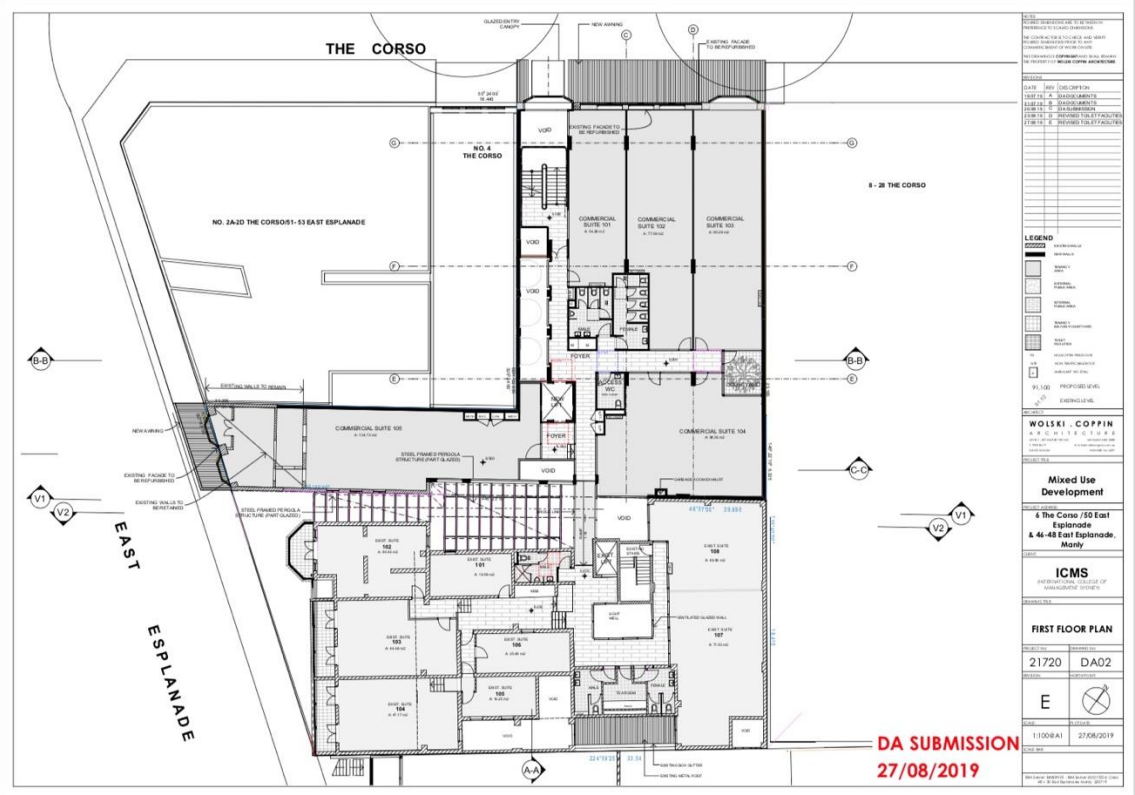
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Appendix D Architectural Plans

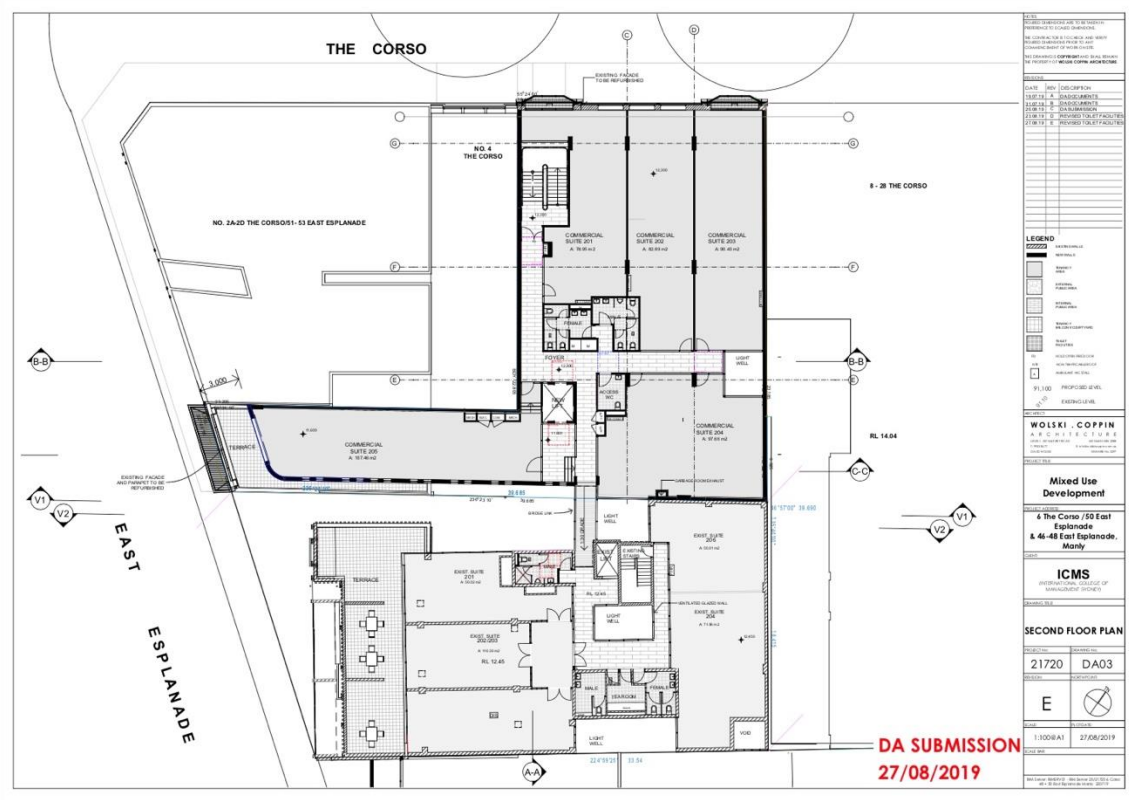
Ground Floor Plan



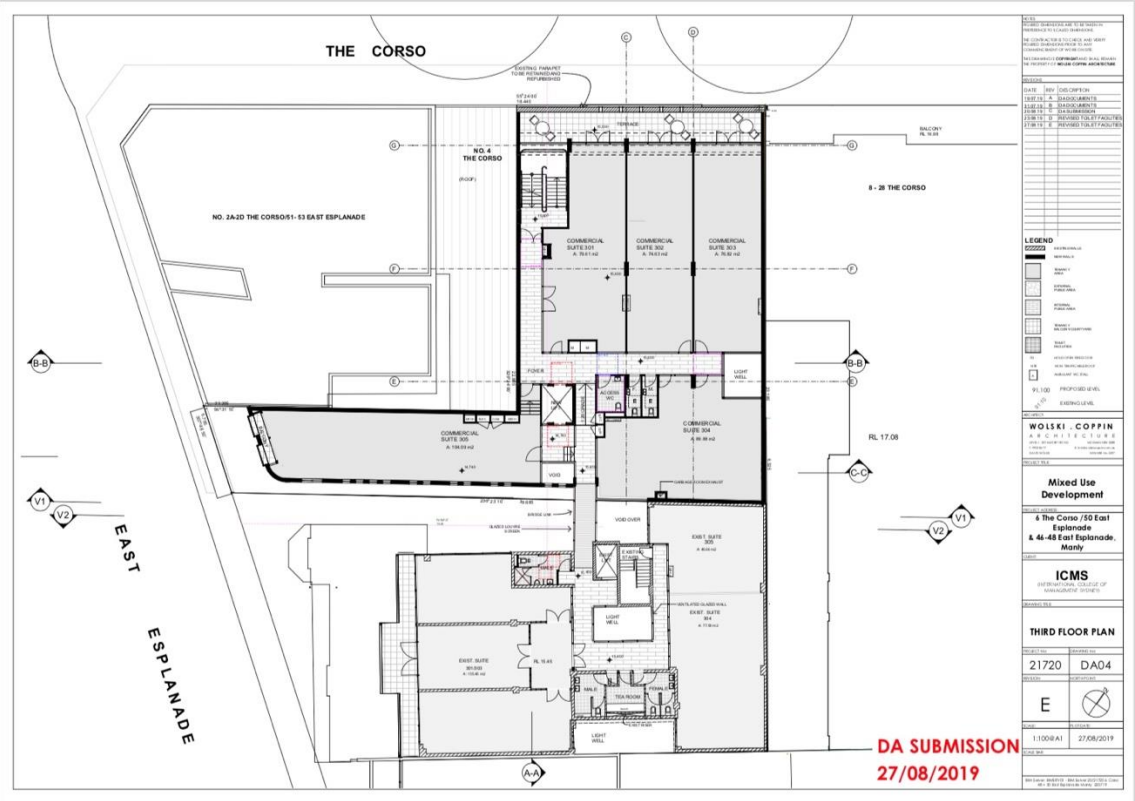
First Floor Plan



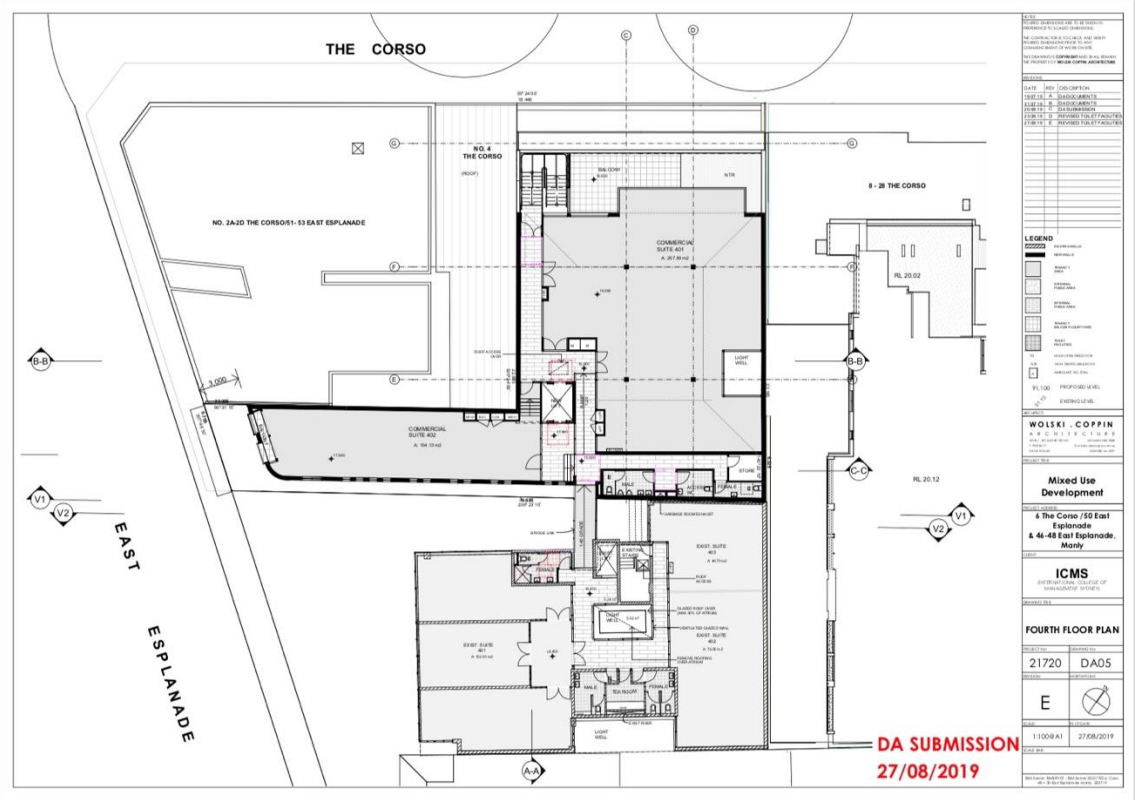
Second Floor Plan



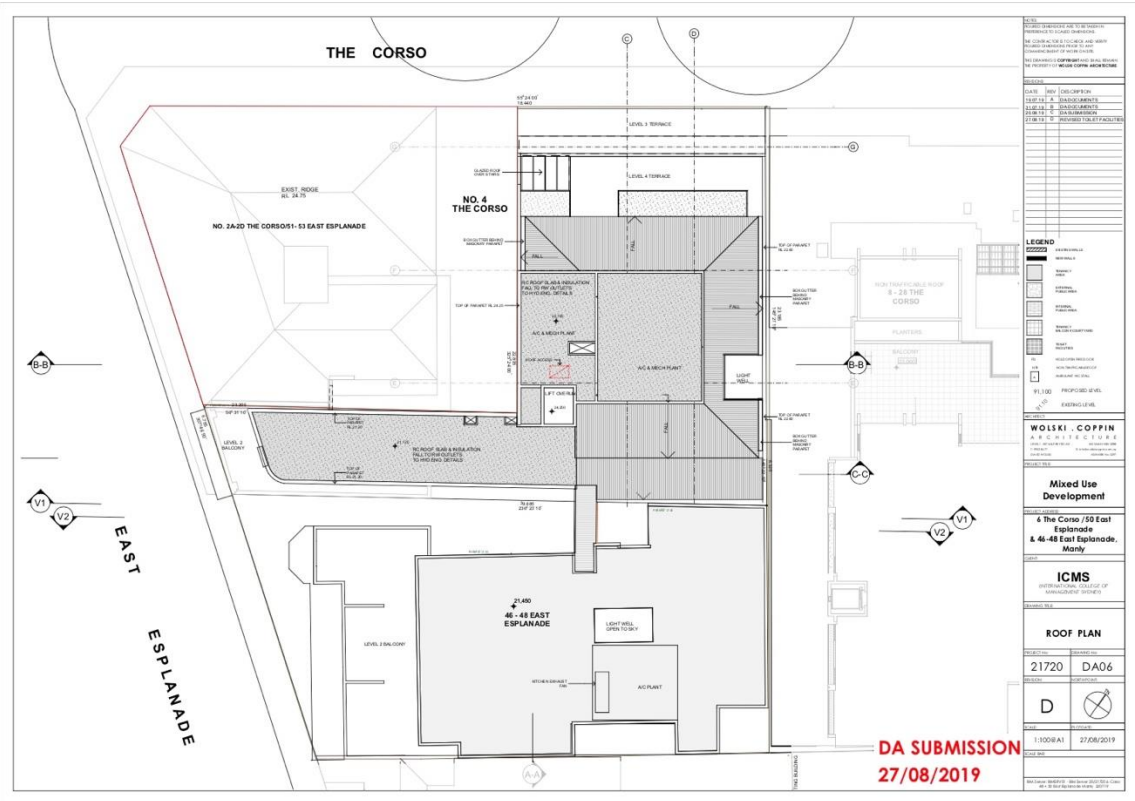
Third Floor Plan



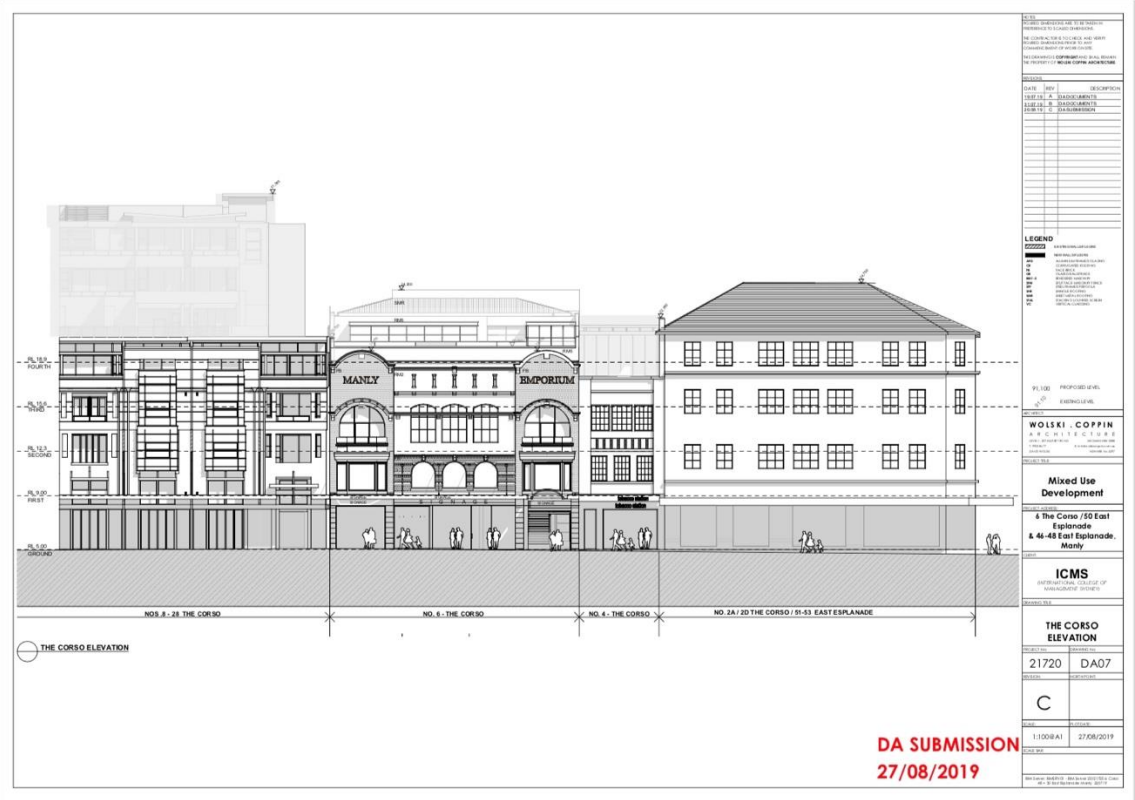
Fourth Floor Plan



Roof Plan



The Corso Elevations



East Esplanade Elevations