RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT R230113R1

Revision 8

# Noise Impact Assessment

# Proposed Additions & Alterations

# St George Motor Boat Club

PREPARED FOR:
Innovate

6 November 2024

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# Noise Impact Assessment

# Proposed Additions & Alterations

# St George Motor Boat Club

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# 1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by Innovate to prepare a Noise Impact Assessment addressing operational noise emissions resulting from the proposed additions and alterations at the St George Motor Boat Club located at 2 Wellington Street, San Souci. This assessment forms part of the supporting documentation for DA submission to Georges River Council.

The purpose of this report is to determine possible noise impacts on nearby receivers and if necessary, provide acoustic control recommendations so that the proposed modifications may operate in an acoustically compliant manner and in accordance with both Georges River Council's requirements and Liquor and Gaming NSW license conditions. Noise emissions from the extension of the carpark will also be covered in this report.

This report presents RSA's methodology, assessment criteria and recommendations regarding patron and live music noise emissions from operations resulting from the newly added or modified areas of the premises. It must be noted that a complete Construction Noise and Vibration Management Plan will be carried out during the detailed CC stage.

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

# 2 PROPOSED DEVELOPMENT

## 2.1 Site Description

The proposed modifications consist of changes to the carpark and marina in addition to the following club areas: an extension to the existing Sapphire Room and a newly proposed Ground Floor Terrace. Operational activities will include patron noise, background music and a live one-person band on the terraces.

The site is located in proximity to with residential receivers to the north, east and south east. Figure 2-1 shows an aerial image of the club, surrounding environment and noise monitoring locations.

There are a number of sensitive receivers surrounding the proposed development, they may be affected by noise generated by the proposed changes. The following table shows the most affected receivers.

Table 2-1 Sensitive Receivers

| Receiver | Sensitive Receiver's Address |
|---|---|
| R1 | 74-76 Vista Street |
| R2 | 43 Plimsoll Street |
| R3 | 38 Plimsoll Street |
| R4 | 40-44 Plimsoll Street |
| R5 | 48-50 Plimsoll Street |

## 2.2 Proposed Development

The proposal consists of additions and alterations to the following existing and proposed areas in addition to their maximum capacities:

- Sapphire Room (LG) 160 Patrons (an increase of 40 patrons)
- Terrace (GF) 100 Patrons (proposed)
- Carpark 276 Spaces (an increase of 35 spaces)

## 2.3 Hours of Operation

The proposed hours of operation are as follows:

- 11am - 12am (midnight) Monday to Thursday, 11am - 1am on Fri/Sat/Public Holidays and 11am - 11pm Sundays.

Figure 2-1 Site Location


Image Courtesy of Six Maps © 2024.

Presented below are the floor plans and proposed alterations of the site:

Figure 2-2 Proposed Alterations Lower Ground Floor

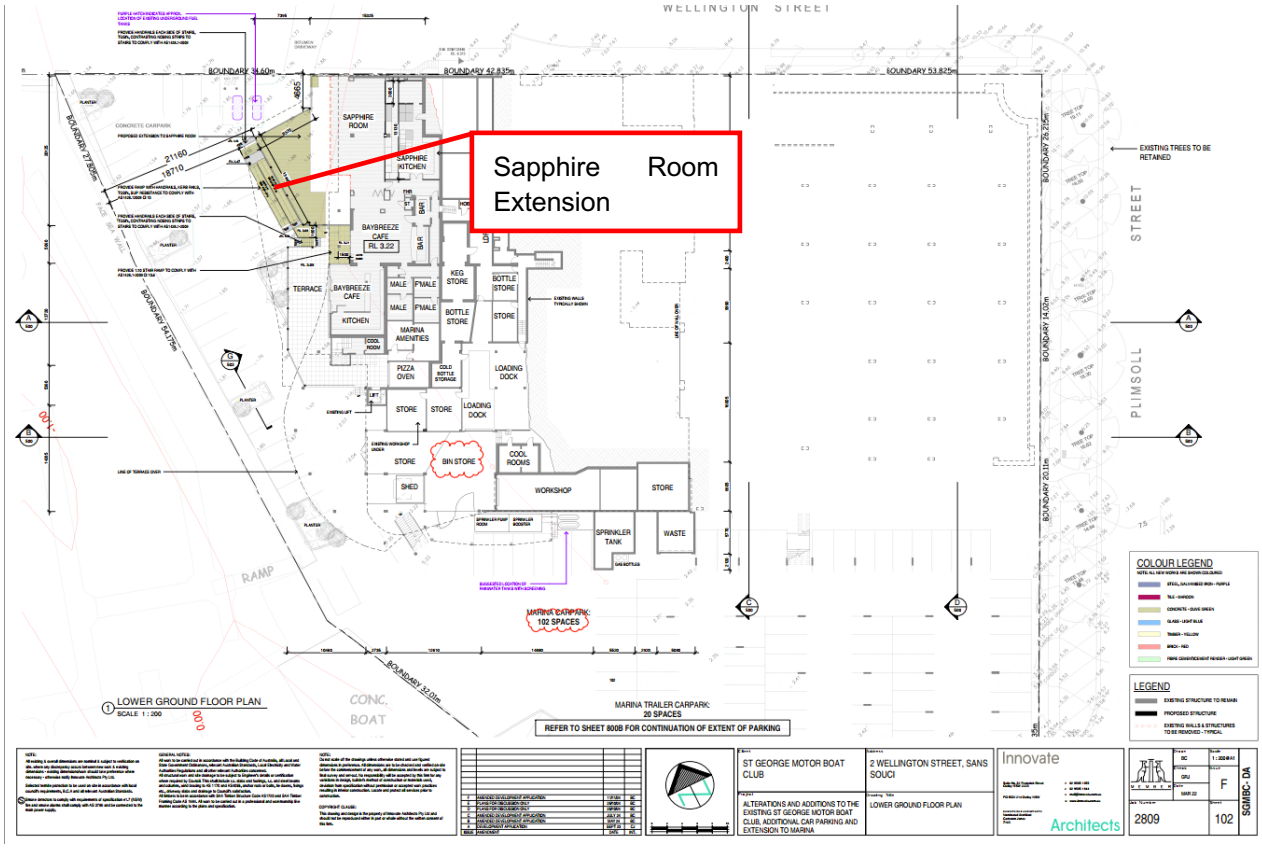



Figure 2-3 Proposed Alterations Ground Floor

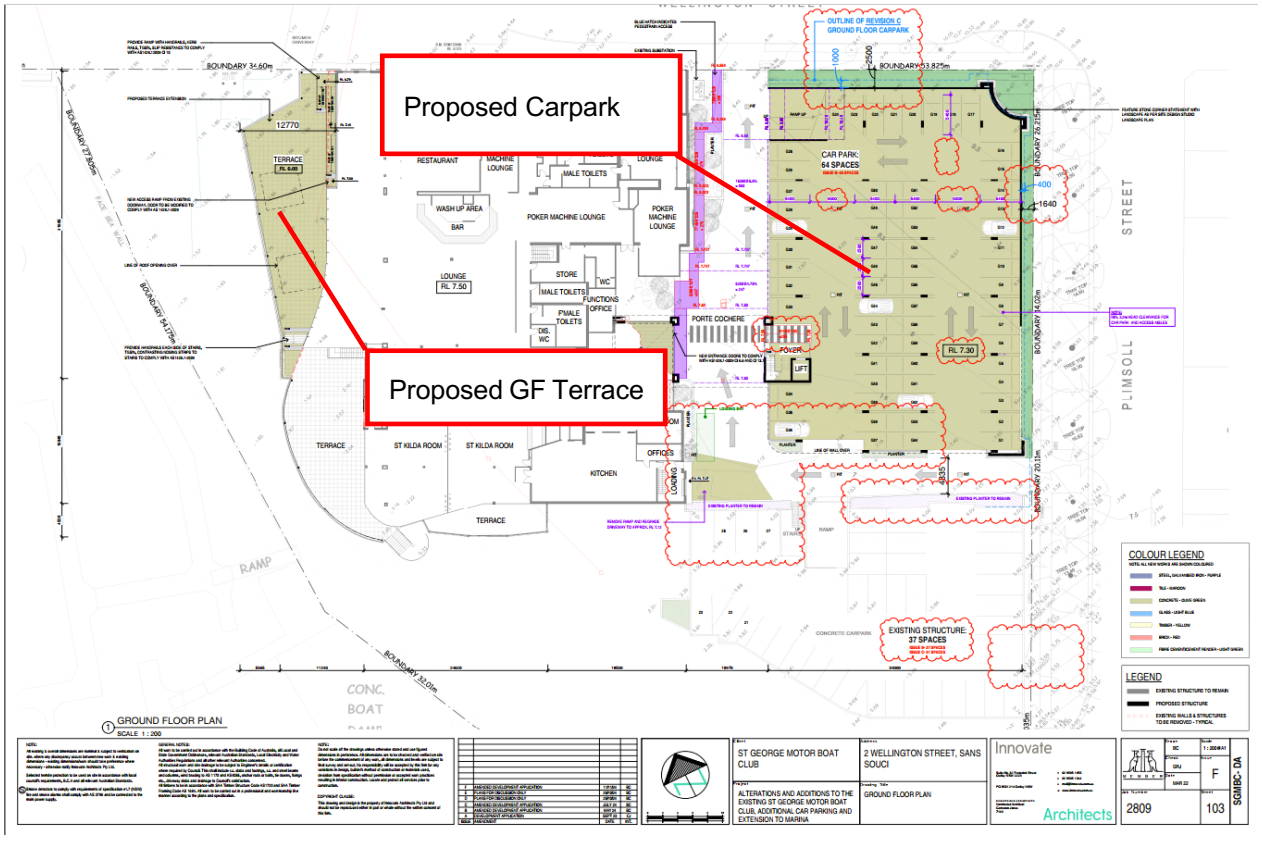


Figure 2-4 Proposed Alterations First Floor

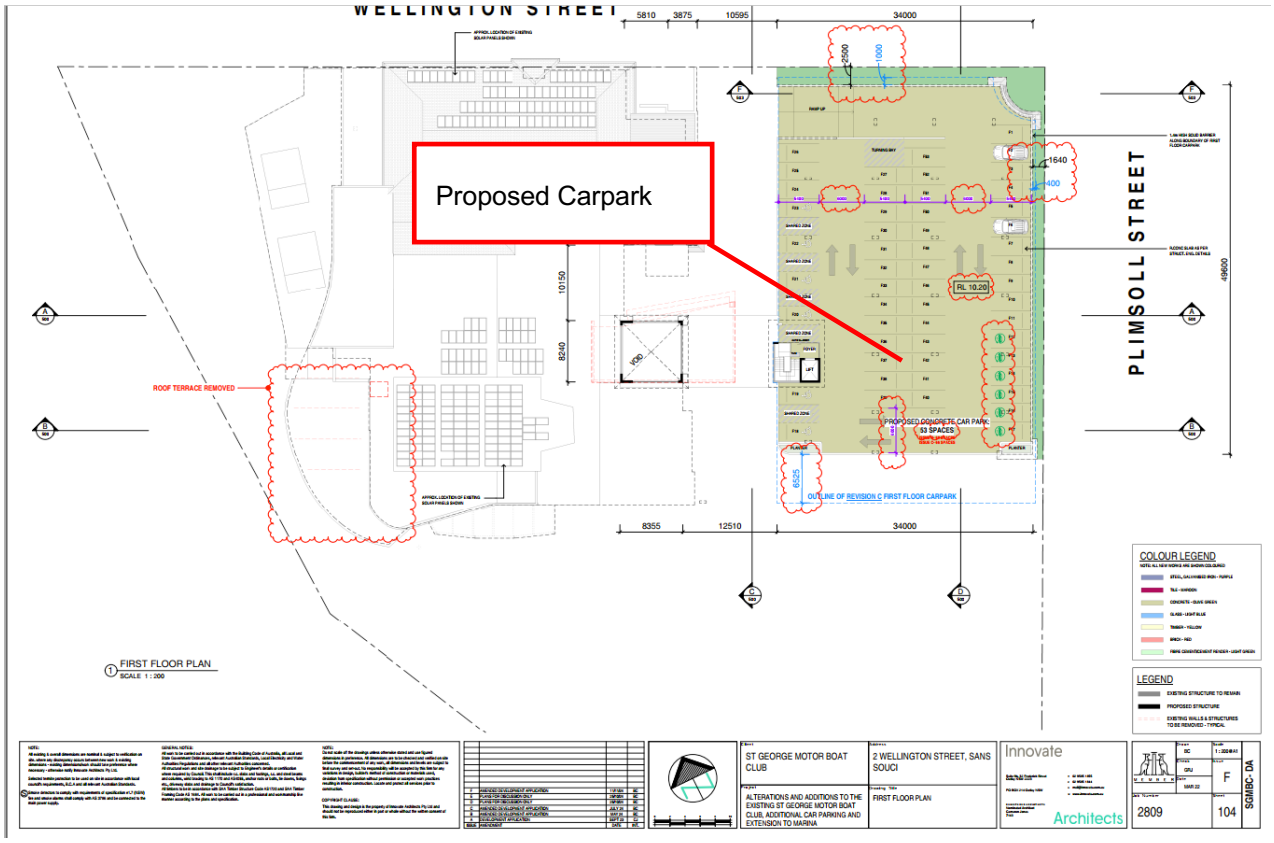
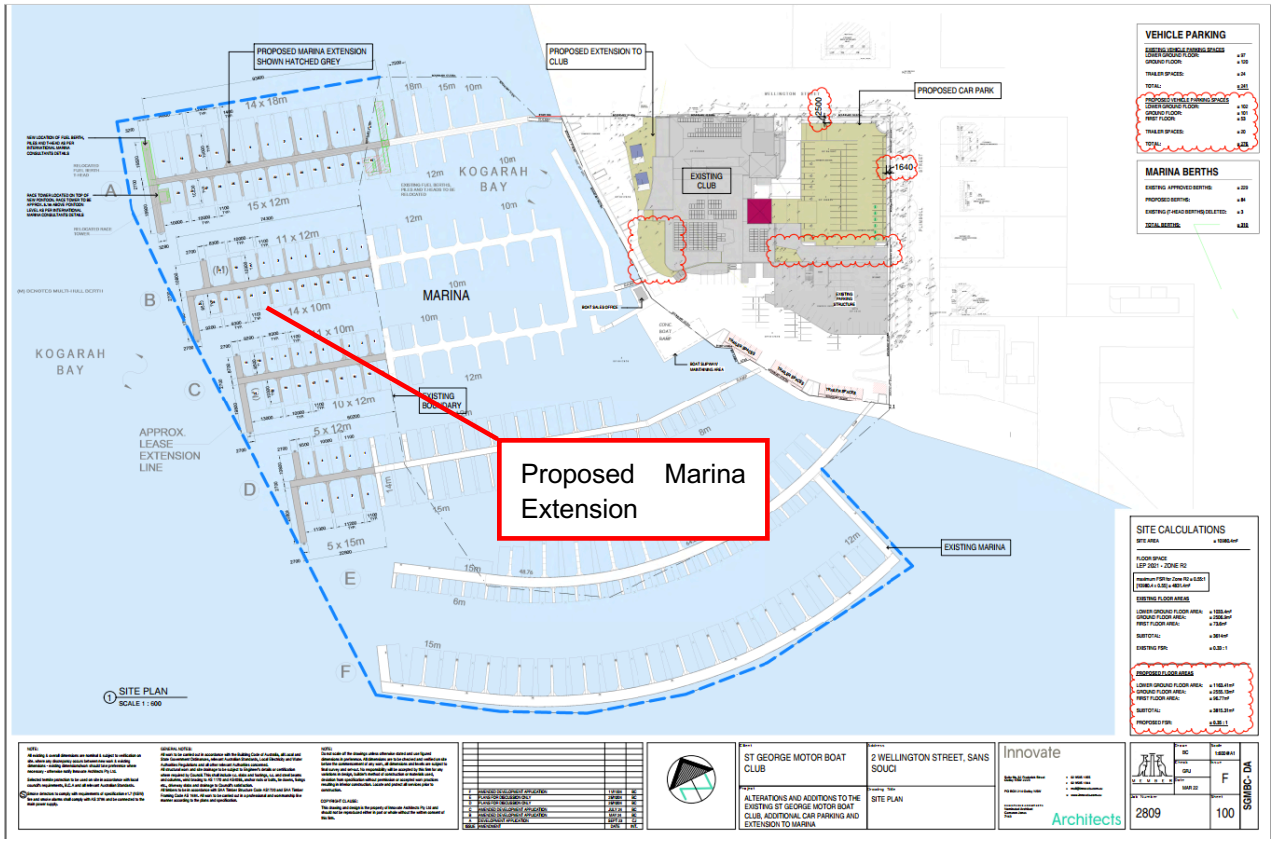



Figure 2-5 Proposed Marina Extension



## 2.4 Noise Generating Sources

As a result of the proposed additions and alterations the following areas and their respective noise generating sources have been identified

- Sapphire Room (LG): 160 Patrons (50% vocalising) and live five-piece band.
- Proposed Terrace (GF): 100 Patrons (50% vocalising) and one-person band or background music.
- Proposed Carpark 276 Spaces (an increase of 35 spaces). 35 new car movements per (15-min)
- Proposed Marina Extension: 84 additional berths

# 3 BASELINE NOISE SURVEY

## 3.1 Unattended Noise Monitoring

In order to characterize the existing acoustical environment of the area unattended noise monitoring was conducted between Thursday 16th March and Thursday 23rd March 2023. The noise logger was located at the boundary of nearest residential receiver and away from any noise generating equipment. This location is representative of the ambient noise levels of the area.

Logger location is 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 Octave Frequency Analyzing Environmental Noise Loggers (serial numbers 572559) fitted with microphone windshield. 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.

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

In order to establish the ambient noise criteria of the area, 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 µPa | | |
|---|---|---|---|---|
| | | Daytime 7 am - 6 pm | Evening 6 pm – 10 pm | Night-time 10 pm – 7 am |
| Logger as per Figure 2-1 | $L_{Aeq}$ | 57 | 52 | 52 |
| | RBL (Background) | 44 | 42 | 37 |

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).

### 3.2.1 LG Analysis

Liquor and Gaming NSW provides a guideline to access noise from licensed venues, the noise criteria is required to be in one octave band frequency. The noise logger used for the unattended measurements has the capability of recording noise data in one octave band frequency allowing us to establish spectral information of typical background noise levels experienced by the nearby residential receivers.

The background noise levels have been processed in accordance with NPfI procedures and are presented in octave band frequency form in Section 4.2 of this report.

## 4 NOISE CRITERIA

Noise criteria for the assessment of the site has been based on the relevant LG noise guidelines.

### 4.1 Liquor and Gaming

LG guidelines for the assessment of noise from licensed premises is as follows:

a) *The $L_{A10}$ noise level emitted from the use must not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 5 dB between the hour of 7.00 am and 12.00 midnight when assessed at the boundary of any affected residence.*

b) *The $L_{A10}$ noise level emitted from the use must not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) between the hour of 12.00 midnight and 7.00 am when assessed at the boundary of any affected residence.*

c) *Notwithstanding compliance with a) and b) above, the noise from the use must not be audible within any habitable room in any residential property between the hours of 12.00 midnight and 7.00 am.*

### 4.2 Project Specific Noise Criteria

Based on the spectral data from the noise logger the project specific noise criteria for the operation of the proposed alterations and additions to the club have been established in accordance with LG noise guidelines. The project specific noise criteria are presented in tables below.

Table 4-1 External Criteria for Operational Noise

| Description | Ambient Noise Level per Octave Band -dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 Hz | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1k Hz | 2k Hz | 4k Hz | 8k Hz |
| Measured Daytime $L_{90}$ Background Noise Level | 20 | 24 | 30 | 32 | 34 | 36 | 32 | 27 | 18 |
| **$L_{10}$ Daytime Criterion (Between 7 am and 12 midnight): At Surrounding Residences** | **25** | **29** | **35** | **37** | **39** | **41** | **37** | **32** | **23** |
| | | | | | | | | | |
| Measured Night-time $L_{90}$ Background Noise Level | 20 | 19 | 26 | 26 | 29 | 31 | 25 | 26 | 16 |
| **$L_{10}$ Night-time Criterion (Between 12 midnight and 7 am): At Surrounding Residences** | **21*** | **19** | **26** | **26** | **29** | **31** | **25** | **26** | **16** |

Table 4-2 Internal Criteria for Operational Noise

| Description | Ambient Noise Level per Octave Band -dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 Hz | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1k Hz | 2k Hz | 4k Hz | 8k Hz |
| Measured Night-time $L_{90}$ Background Noise Level | 20 | 19 | 26 | 26 | 29 | 31 | 25 | 26 | 16 |
| **Inaudibility Criterion L90 – 10dB (Between 12 midnight and 7 am): Inside Residences** | **21*** | **12*** | **16** | **16** | **19** | **21** | **15** | **16** | **6** |

*Threshold of audibility has been applied

## 4.3 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) October 2017 which provides a framework and process for deriving project trigger noise level. The NPfI is used to assess the carpark noise from the site. 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.

### *4.3.1* 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 ($L_{Aeq}$) of the source should not be more than 5 dB(A) above the measured Rated Background Level (RBL), over any 15-minute period.

### *4.3.2* 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.

### *4.3.3* Area Classification

The NPfI characterises the "Suburban" noise environment as an area with an acoustical environment that:

- has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry.
- This area often has the following characteristic: - evening ambient noise levels defined by the natural environment and human activity

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

### *4.3.4* Project Specific Trigger Noise Levels

Having defined the area type, the processed results of the unattended noise monitoring have been used to determine project specific project trigger noise levels. The intrusive and amenity project trigger noise levels for nearby residential premises are presented in Table 4-3.

These project trigger noise levels are nominated for the purpose of assessing potential noise impacts from the proposed development. For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive project trigger noise levels are adopted. These are shown in bold text in Table 4-3.

Table 4-3 Operational Project Trigger Noise Levels

| Receiver | Time of Day | ANL [1] $L_{Aeq}$ | Measured | | Project Trigger Noise Levels | |
|---|---|---|---|---|---|---|
| | | | RBL [2] $L_{A90(15min)}$ | Existing $L_{Aeq(Period)}$ | Intrusive $L_{Aeq(15min)}$ | Amenity $L_{Aeq(15min)}$ |
| Residential | Day | 55 | 44 | 57 | **49** | **58** |
| | Evening | 45 | 42 | 52 | **47** | **48** |
| | Night | 40 | 37 | 52 | **42** | **43** |

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

Note 2: RBL = "Rating Background Level".

## 4.4 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.

# 5 NOISE IMPACT ASSESSMENT

## 5.1 Typical Patron Vocal Levels

The following sections summarise the results of a patron and music noise assessment and predicted levels at nearby receivers as a result of the operation of the proposed alterations and additions.

Calculations of the amount of noise transmitted to these receivers from the proposed licensed venue have been based on voice levels as referenced in the AAAC Licensed Premises Noise Assessment Technical Guide V2.0. This document provides voice spectrums in different vocal efforts at 1 meter from the talker on axis of the mouth. The spectrum is given in Table 5-1.

Table 5-1 Speech Spectrums - AAAC Licensed Premises Noise Assessment Technical Guide V2.0.

| Type | LZeq at 1m (dB) Octave Band Centre Frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 125 | 250 | 500 | 1 k | 2 k | 4 k | 8 k | Overall dB(A) |
| Male (Normal) | 47 | 56 | 58 | 52 | 48 | 44 | 39 | 58 |
| Male (Raised) | 56 | 63 | 65 | 62 | 57 | 52 | 46 | 66 |
| Male (Loud) | 59 | 67 | 73 | 72 | 67 | 62 | 53 | 76 |

## 5.2 Patron Sound Power Levels

Based on the maximum number of patrons in all areas as shown in Section 2.2, the following worst-case operational scenarios have been assumed for our assessment:

- Only 50% of all patrons per room will be talking at any given time, this is assuming that 1 person will be talking, and 1 person will be listening.

The spectra have been scaled based upon the overall number of patrons expected to be in the respective areas at any given time.

Table 5-2 Sound Power Levels of People talking with Raised Voice - Lw – dB

| Scenario | Resultant Sound Power Level per Octave Band (dB) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| 80 Patrons with Raised Vocal in Sapphire Function Room | - | 85 | 92 | 94 | 91 | 86 | 81 | 75 |
| 50 Patrons with Raised Vocal Ground Floor Terrace | - | 83 | 89 | 92 | 89 | 84 | 79 | 73 |

It is generally agreed that the human voice is not capable of producing noise at 32 Hz and 63Hz octave bands at significant amplitudes. It is also very likely that even if noise emission in this low frequency octave bands exceeds the noise criterion; it will be very close to, if not below, the human threshold of hearing at the receivers.

Appropriate sound power levels conversations have been made for the varying distribution number of patrons.

## 5.3 Music Sound Power Level

RSA has conducted measurements of background music noise levels at various licensed venues, based on these measurements the sound power level spectrum of typical music is shown in Table 5-3 below:

Table 5-3 Typical Sound Power Level of Music - Lw – dB

| Scenario | Resultant Sound Power Level per Octave Band (dB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| Typical Background Music | 70 | 79 | 87 | 84 | 79 | 82 | 80 | 78 | 71 |
| Typical 1 Person Band | 81 | 91 | 91 | 90 | 92 | 85 | 79 | 78 | 75 |

## 5.4 Predicted Noise Impacts

Predictive resultant noise spectrums have been calculated for all proposed activities. Noise emissions at the nearest receivers are presented in the tables below. The predicted noise calculations consider the following:

- Heights of receivers are assumed to be 1.5 m above their respective floor level.
- The number of patrons is as presented in Section 2.2.
- Live band in the Sapphire function room.
- A one-person band (vocal, guitar/keyboard) will perform, or background music played on the proposed terrace.
- Sapphire Room glazing to remain closed after midnight (12.00am).
- The entry doors close automatically.
- No new mechanical plant items will be installed.
- Proposed and existing glazing, barriers and shielding from the building have been considered.
- Resulting noise levels have been calculated to the most affected point on the boundary of the affected receivers.

The following figure shows the proposed development in relation to the most affected receivers.

Figure 5-1 Affected Receiver Locations


The resulting noise levels from the operation of the proposed changes are presented in the table below, we have assumed the worst-case scenario were the function room and ground floor terrace are operating simultaneously and at full capacity.

The following tables shows the predicted noise level results for the residential receivers.

Table 5-4 Predicted External Noise Impact Levels - Residential Receivers Daytime

| Receivers | Resultant Sound Pressure Level per Octave Band - dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| **Daytime Assessment (7:00am to 12:00am)** | | | | | | | | | |
| **Combined Noise Level** | | | | | | | | | |
| R1 | 19 | 23 | 28 | 29 | 28 | 23 | 16 | 12 | 6 |
| R2 | 12 | 16 | 22 | 23 | 22 | 17 | 10 | 7 | 3 |
| R3 | 8 | 12 | 18 | 19 | 18 | 13 | 7 | 4 | 1 |
| R4 | 9 | 12 | 19 | 19 | 18 | 14 | 7 | 4 | 1 |

| Receivers | Resultant Sound Pressure Level per Octave Band - dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| R5 | 5 | 12 | 19 | 19 | 18 | 14 | 7 | 4 | 1 |
| Daytime Criteria | **25** | **29** | **35** | **37** | **39** | **41** | **37** | **32** | **23** |
| *Exceedance R1* | - | - | - | - | - | - | - | - | - |
| *Exceedance R2* | - | - | - | - | - | - | - | - | - |
| *Exceedance R3* | - | - | - | - | - | - | - | - | - |
| *Exceedance R4* | - | - | - | - | - | - | - | - | - |
| *Exceedance R5* | - | - | - | - | - | - | - | - | - |

Table 5-5 Predicted External Noise Impact Levels - Residential Receivers Night-time

| Receivers | Resultant Sound Pressure Level per Octave Band - dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| **Night-time Assessment (12:00am to 7:00am)** | | | | | | | | | |
| **Combined Noise Level** | | | | | | | | | |
| R1 | 19 | 23 | 28 | 29 | 28 | 23 | 16 | 12 | 6 |
| R2 | 12 | 16 | 22 | 23 | 22 | 17 | 10 | 7 | 3 |
| R3 | 8 | 12 | 18 | 19 | 18 | 13 | 7 | 4 | 1 |
| R4 | 9 | 12 | 19 | 19 | 18 | 14 | 7 | 4 | 1 |
| R5 | 5 | 12 | 19 | 19 | 18 | 14 | 7 | 4 | 1 |
| Night Time Criteria | **21*** | **19** | **26** | **26** | **29** | **31** | **25** | **26** | **16** |
| *Exceedance R1* | - | *4* | *2* | *3* | - | - | - | - | - |
| *Exceedance R2* | - | - | - | - | - | - | - | - | - |
| *Exceedance R3* | - | - | - | - | - | - | - | - | - |

| Receivers | Resultant Sound Pressure Level per Octave Band - dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| *Exceedance R4* | - | - | - | - | - | - | - | - | - |
| *Exceedance R5* | - | - | - | - | - | - | - | - | - |

*Threshold of audibility has been applied.

Table 5-6 Predicted Internal Noise Impact Levels - Residential Receivers Night-time

| Receivers | Resultant Sound Pressure Level per Octave Band - dBA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 31.5 Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| **Night-time Assessment (12:00am to 7:00am)** | | | | | | | | | |
| **Combined Noise Level** | | | | | | | | | |
| R1 | 9 | 13 | 18 | 19 | 18 | 13 | 6 | 2 | -4 |
| R2 | 2 | 6 | 12 | 13 | 12 | 7 | 0 | -3 | -7 |
| R3 | -2 | 2 | 8 | 9 | 8 | 3 | -3 | -6 | -9 |
| R4 | -1 | 2 | 9 | 9 | 8 | 4 | -3 | -6 | -9 |
| R5 | -5 | 2 | 9 | 9 | 8 | 4 | -3 | -6 | -9 |
| L90 Minus 10 dB (Inaudibility) | **21*** | **12*** | **16** | **16** | **19** | **21** | **15** | **16** | **6** |
| *Exceedance R1* | - | *1* | *2* | *3* | - | - | - | - | - |
| *Exceedance R2* | - | - | - | - | - | - | - | - | - |
| *Exceedance R3* | - | - | - | - | - | - | - | - | - |
| *Exceedance R4* | - | - | - | - | - | - | - | - | - |
| *Exceedance R5* | - | - | - | - | - | - | - | - | - |

*Threshold of audibility has been applied.

Noise level exceedances, both internal and external, have been predicted at receiver R1 for the night time period, however, the exceedances are only present in the 63Hz -250Hz octave range. Compliance is achievable for all periods with the implementation of recommendations presented in Section 6 of this assessment.

## 5.5 Carpark Emission

The proposed new carpark is now at ground level parking is to be located at the eastern side of the site, it will have capacity of 154 car spaces. Calculations of noise from the carpark have been based on typical noise generating events within a carpark such as, door slams, engine starts and cars driving away. We have assumed a scenario where 15 cars enter and leave the carpark (30 movements) in a span of 15 minutes. The prediction assumes shielding from a 1.4-meter balustrade on the first-floor carpark.

The calculated noise level from carpark operations during the most sensitive night time periods is presented in the table below:

Table 5-7 Predicted Carpark Noise Impact Levels at Nearby Receivers

| Receiver | Calculated Noise Level | Criteria | Compliance |
|---|---|---|---|
| R1 | 37 | 42 | Yes |
| R2 | 39 | 42 | Yes |
| R3 | 35 | 42 | Yes |
| R4 | 41 | 42 | Yes |
| R5 | 38 | 42 | Yes |

## 5.6 Marina Noise Emission

The proposed works of the marina will have an extension of the berths with additional 84 spaces. These additional berths will have recreational vessels docked and operated for members of the motor boat club. The noise emissions from the operation of the vessels have been conducted based on the operation of 20 vessels. It is reasonable to assume 20 vessels can operate at any one time.

RSA has utilised a typical sound power level of 79 dBA for a vessel with a V8 motor idling on the water. This has been utilised to determine the noise impact to the nearest sensitive receivers during the most sensitive night time period are presented in the table below:

Table 5-8 Predicted Berth Noise Impact Levels at Nearby Receivers

| Receiver | Calculated Noise Level | Criteria | Compliance |
|---|---|---|---|
| R1 | 37 | 42 | Yes |
| R2 | 34 | 42 | Yes |
| R3 | 32 | 42 | Yes |
| R4 | 32 | 42 | Yes |
| R5 | 31 | 42 | Yes |

The operation of the berths show compliance to the established noise criteria. No further noise control measures are required for the berths.

# 6 RECOMMENDATIONS

The noise emissions from the proposed changes to the site can comply with the required criteria with the implementation of the following recommendations:

## 6.1 Sapphire Function Room

- Proposed glazing is recommended to achieve a minimum rating of Rw 36 this can be achieved with 10.38mm laminated glass.
- Proposed glazing to have full perimeter seals such as Kilargo IS8010si and IS7080si or Raven equivalent.
- Operable glazing to remain closed during the night time hours of 12am (midnight) - 7am and during live music performances.

## 6.2 Ground Floor Terrace

- A noise limiter is to be installed to ensure music does not exceed 85 dB(A) in the 63Hz-250Hz range at the centre of the terrace. All amplified equipment must be connected to the limiter.
- No music to be played on the GF terrace during the night time hours of 12am (midnight) onwards.

## 6.3 First Floor Parking

- A 1.4 meters high solid balustrade or barrier along the boundary of the proposed carpark must be implemented. The construction material of the barrier must have a minimum surface density of 12-15 kg/$m^2$ and be free from holes and gaps.

All barriers must be free of gaps and penetrations, and it is particularly important to ensure that the gap at the bottom of the barrier is minimised as far as practicable. The base of the barriers should be well sealed at the junction where the barrier meets the floor, but still be designed to allow proper water drainage.

## 6.4 Berth POM

The noise predictions from the operation of recreational Vessels comply with established noise criteria. In order to protect the acoustic amenity of the following control, measures should be incorporated with the venue's plan of management (POM):

- Vessels are not to operate amplified music when:
    - Anchored at the marina
    - Within 200m of the marina shoreline
- Vessels are not to idle near the shoreline.

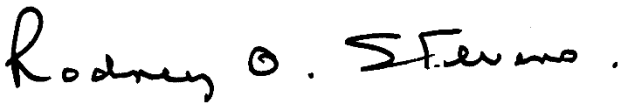
# 7 CONCLUSION

A noise impact assessment has been conducted in relation to the proposed additions and alterations to be carried out at St George Motor Boat Club, Sans Souci.

This assessment has been conducted and appropriate noise emission criteria have been established in accordance with Liquor & Gaming NSW noise guidelines.

This report shows compliance with the specific noise criteria with the implementation of the recommendations provided in this report. It is therefore recommended that planning approval be granted for the proposed alterations and additions on the basis of acoustics.

Approved: -



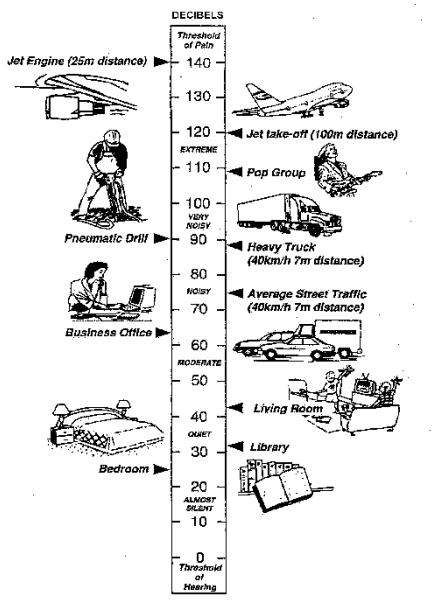
Rodney Stevens

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:<br>▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content)<br>▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry)<br>▪ miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations)<br>▪ 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, considering the following factors:<br>▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected).<br>▪ Cost of mitigation (cost of mitigation versus benefit provided).<br>▪ Community views (aesthetic impacts and community wishes).<br>▪ 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.<br><br>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)*.

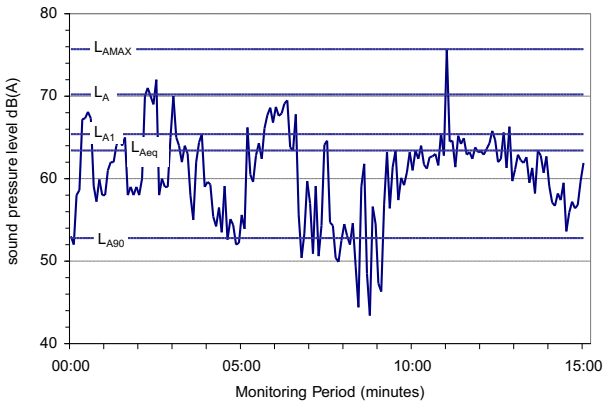
**Sound Pressure Level (SPL)**

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:



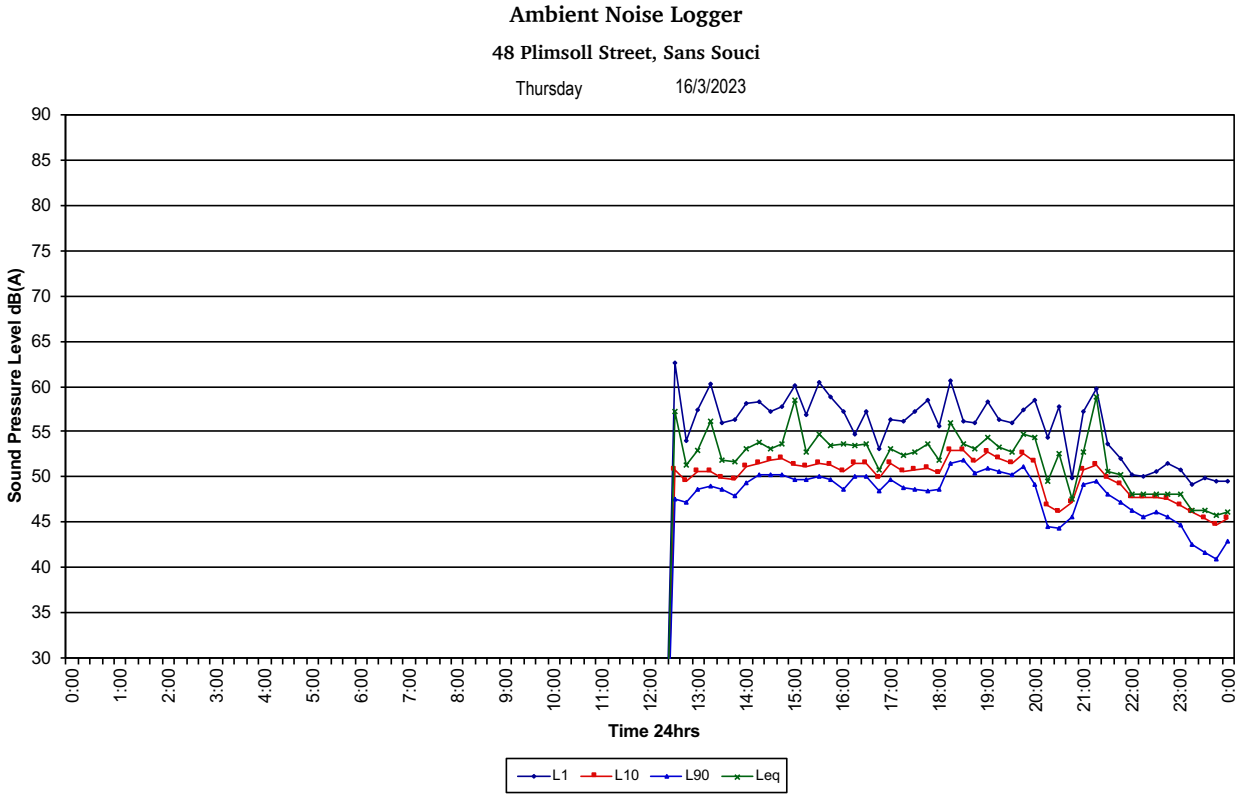

Key descriptors:

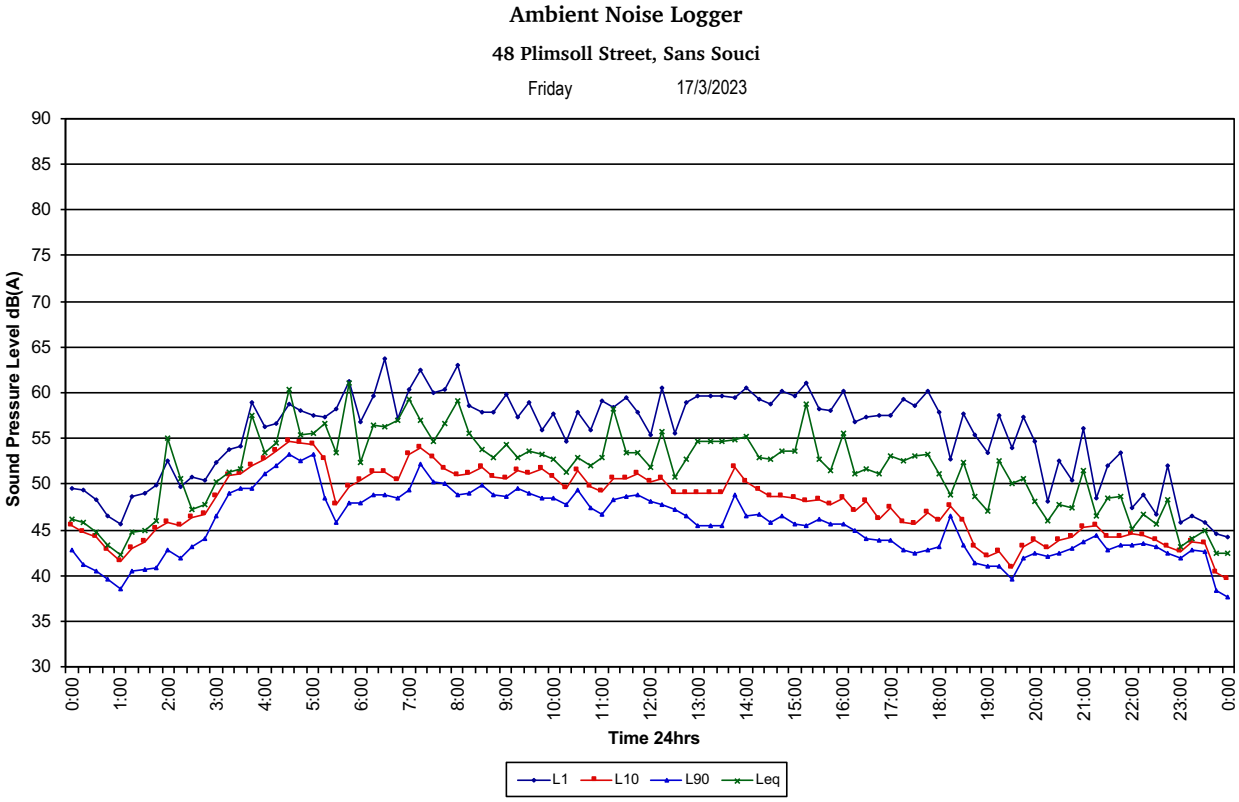
$L_{Amax}$ Maximum recorded noise level.

$L_{A1}$ 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.<br><br>$L_{Aeq}$ 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.<br><br>$L_{A90}$ 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 – Baseline Noise Survey Graphs

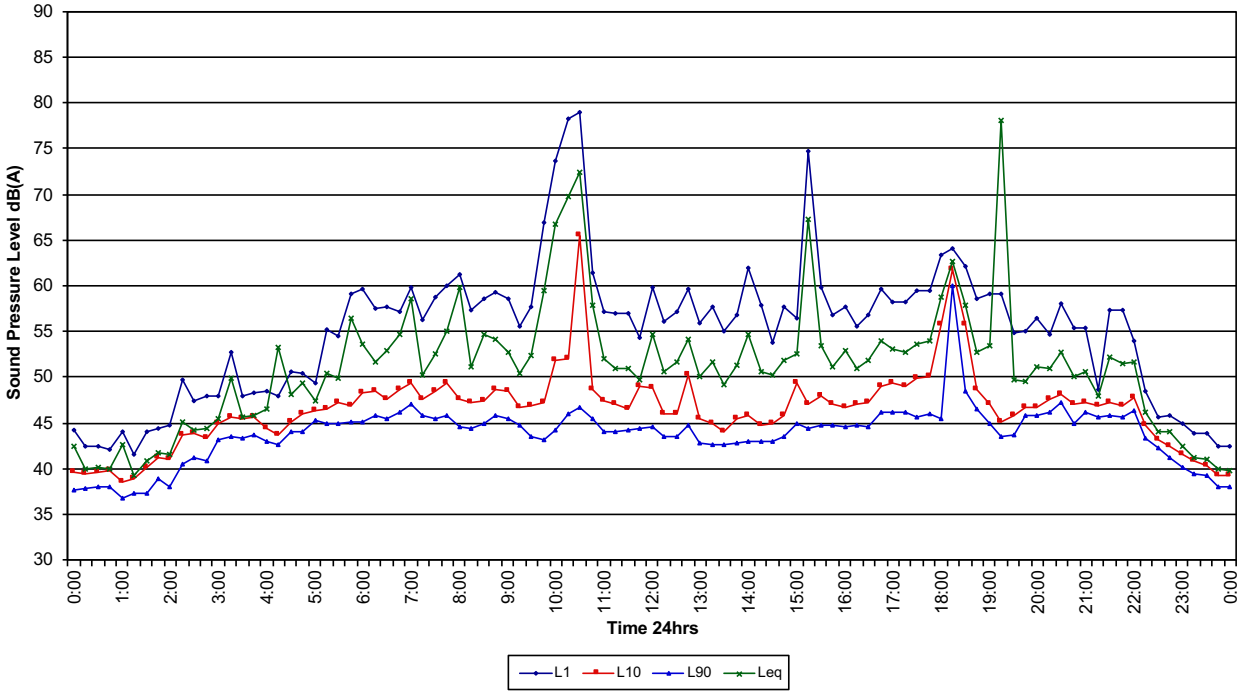


**Ambient Noise Logger**

48 Plimsoll Street, Sans Souci

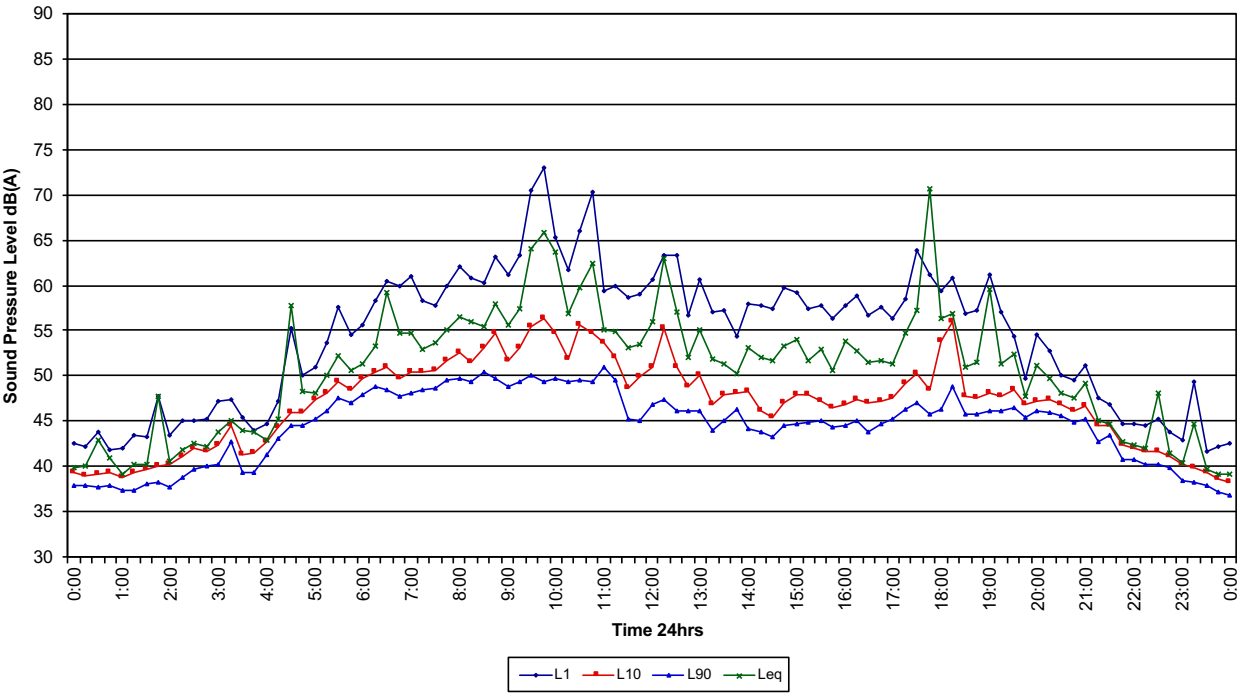
Saturday 18/3/2023




**Ambient Noise Logger**

**48 Plimsoll Street, Sans Souci**

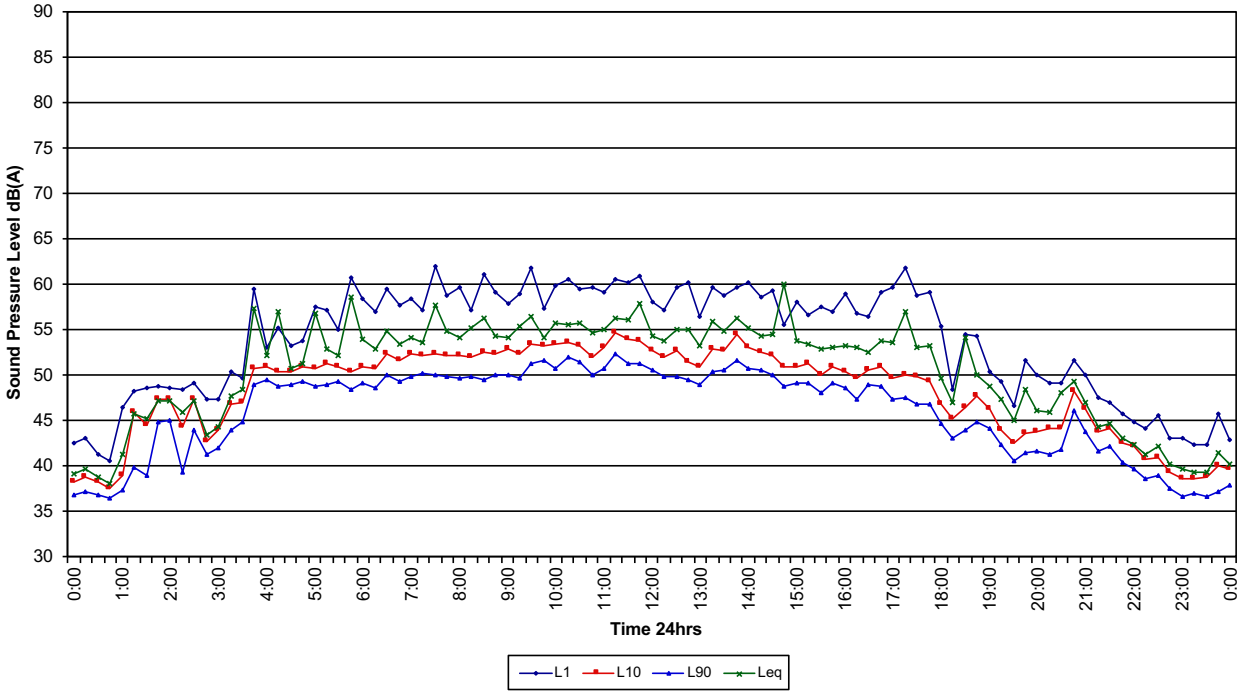
Sunday 19/3/2023



**Ambient Noise Logger**

**48 Plimsoll Street, Sans Souci**

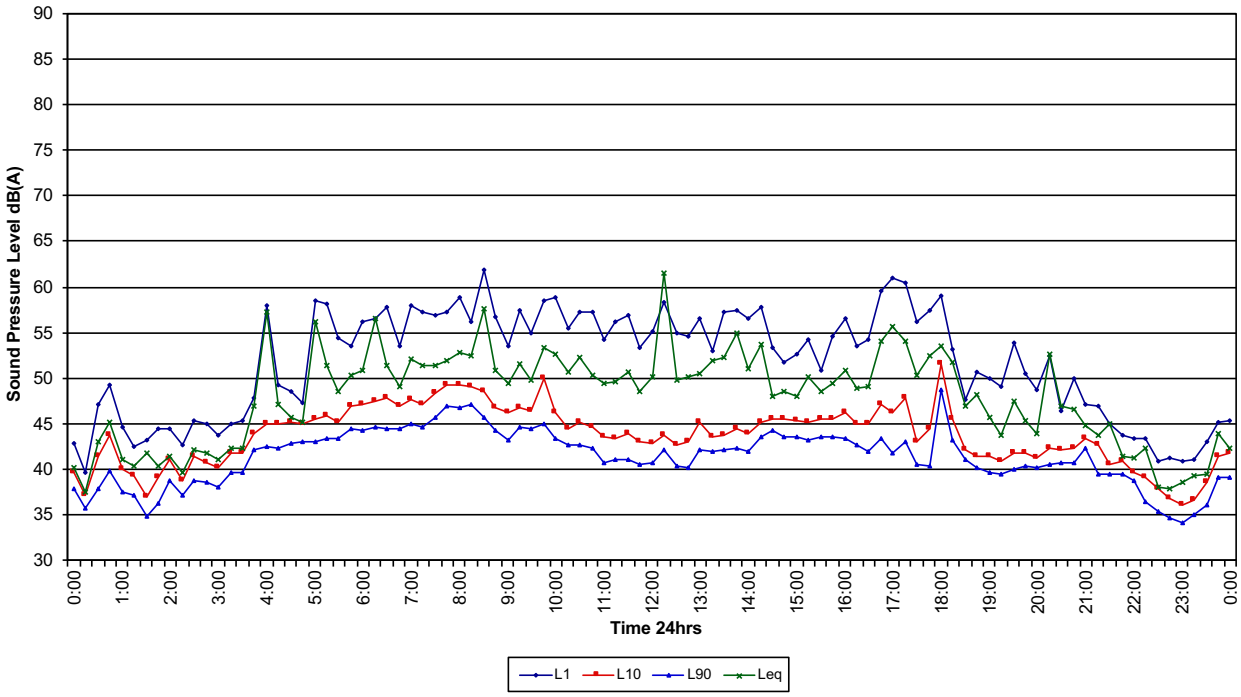
Monday 20/3/2023




**Ambient Noise Logger**

**48 Plimsoll Street, Sans Souci**

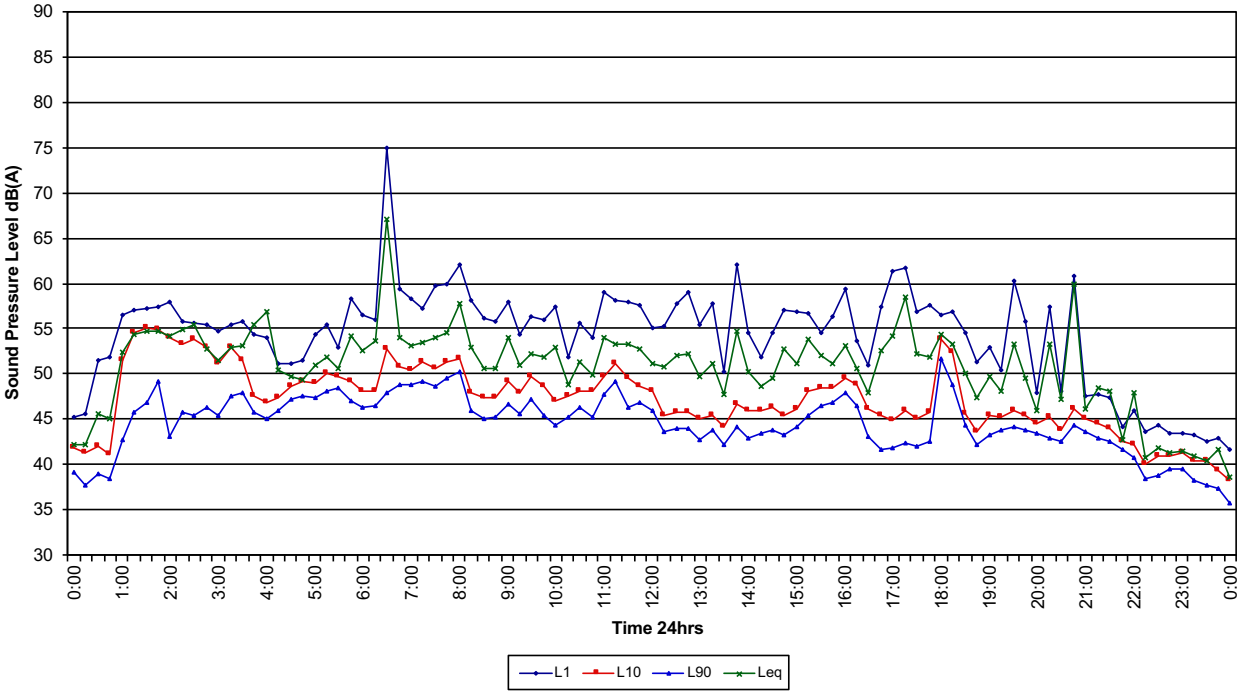
Tuesday 21/3/2023



**Ambient Noise Logger**

**48 Plimsoll Street, Sans Souci**

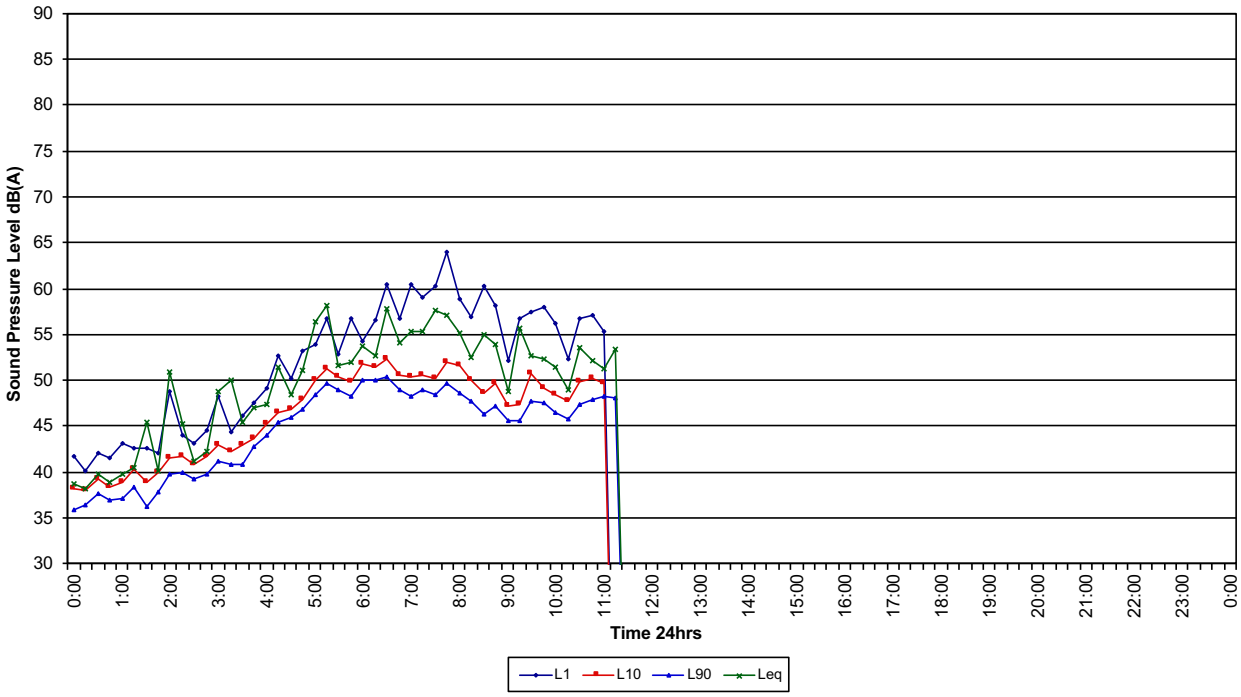
Wednesday 22/3/2023




**Ambient Noise Logger**

**48 Plimsoll Street, Sans Souci**

Thursday 23/3/2023



## Appendix C – Instrument Calibration Certificate

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
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** C21680

| | |
|---|---|
| **Client Details** | Rodney Stevens Acoustics Pty Ltd<br>1 Majura Close<br>St Ives Chase NSW 2075 |
| **Equipment Tested/ Model Number :** | Rion NL-42EX |
| **Instrument Serial Number :** | 00572559 |
| **Microphone Serial Number :** | 192152 |
| **Pre-amplifier Serial Number :** | 72897 |

| **Pre-Test Atmospheric Conditions** | | **Post-Test Atmospheric Conditions** | |
|---|---|---|---|
| **Ambient Temperature :** | 22.8°C | **Ambient Temperature :** | 22.8°C |
| **Relative Humidity :** | 51.2% | **Relative Humidity :** | 51.2% |
| **Barometric Pressure :** | 100.3kPa | **Barometric Pressure :** | 100.3kPa |

| | | | |
|---|---|---|---|
| **Calibration Technician :** | Lucky Jaiswal | **Secondary Check:** | Harrison Kim |
| **Calibration Date :** | 13 Oct 2021 | **Report Issue Date :** | 14 Oct 2021 |

**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: 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 | |
|---|---|---|---|
| *125Hz* | *±0.13dB* | *Temperature* | *±0.2°C* |
| *1kHz* | *±0.13dB* | *Relative Humidity* | *±2.4%* |
| *8kHz* | *±0.14dB* | *Barometric Pressure* | *±0.015kPa* |
| Electrical Tests | *±0.10dB* | | |

*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 SI units.

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.

PAGE 1 OF 1

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

# Octave Band Filter
## IEC 61260-3:2016
# Calibration Certificate

**Calibration Number** C21680A

| | |
|---|---|
| **Client Details** | Rodney Stevens Acoustics Pty Ltd<br>1 Majura Close<br>St Ives Chase NSW 2075 |
| **Filter Model Number :** | Rion NL-42EX |
| **Filter Serial Number :** | N/A |
| **Instrument Serial Number :** | 00572559 |
| **Microphone Serial Number :** | 192152 |
| **Pre-amplifier Serial Number :** | 72897 |

**Atmospheric Conditions**

| | |
|---|---|
| **Ambient Temperature :** | 23.2°C |
| **Relative Humidity :** | 50.9% |
| **Barometric Pressure :** | 100.2kPa |

**Calibration Technician :** Lucky Jaiswal **Secondary Check:** Harrison Kim
**Calibration Date :** 13 Oct 2021 **Report Issue Date :** 14 Oct 2021

**Approved Signatory :** Ken Williams

| Clause and Characteristic Tested | Result | Clause and Characteristic Tested | Result |
|---|---|---|---|
| Midband Relative Attenuation (Clause 10) | **Pass** | Operating Range Lower Limit (Clause 12) | **Pass** |
| Linearity, Range and Overload (Clause 11) | **Pass** | Relative Attenuation (Clause 13) | **Pass** |

The filter submitted for testing successfully completed the periodic tests of IEC 61260-3, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the filter to the full specifications of IEC 61260-1:2014 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of filter fully conformed to the class 2 specifications in IEC 61260-1:2014 and (b) because the periodic tests of IEC 61260-3 cover only a limited subset of the specifications in IEC 61260-1:2014.

Least Uncertainties of Measurement -

| Electrical Tests | | Environmental Conditions | |
|---|---|---|---|
| *5dB < ΔA(Ω) < -5dB* | *±0.1dB* | *Temperature* | *±0.2°C* |
| *40dB < ΔA(Ω) < 5dB* | *±0.2dB* | *Relative Humidity* | *±2.4%* |
| *ΔA(Ω) < 40dB* | *±0.3dB* | *Barometric Pressure* | *±0.015kPa* |

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

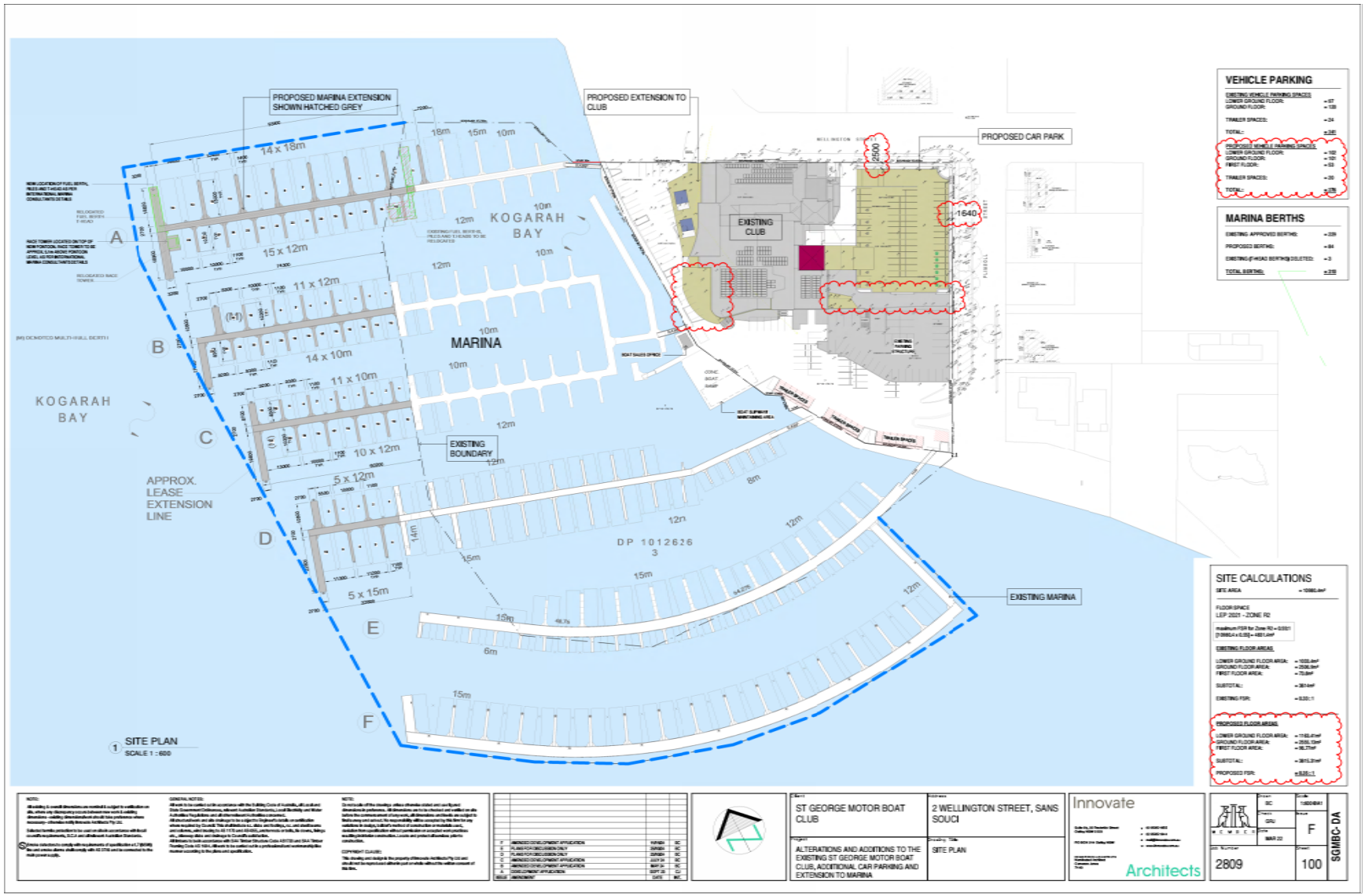
This calibration certificate is to be read in conjunction with the calibration test report.

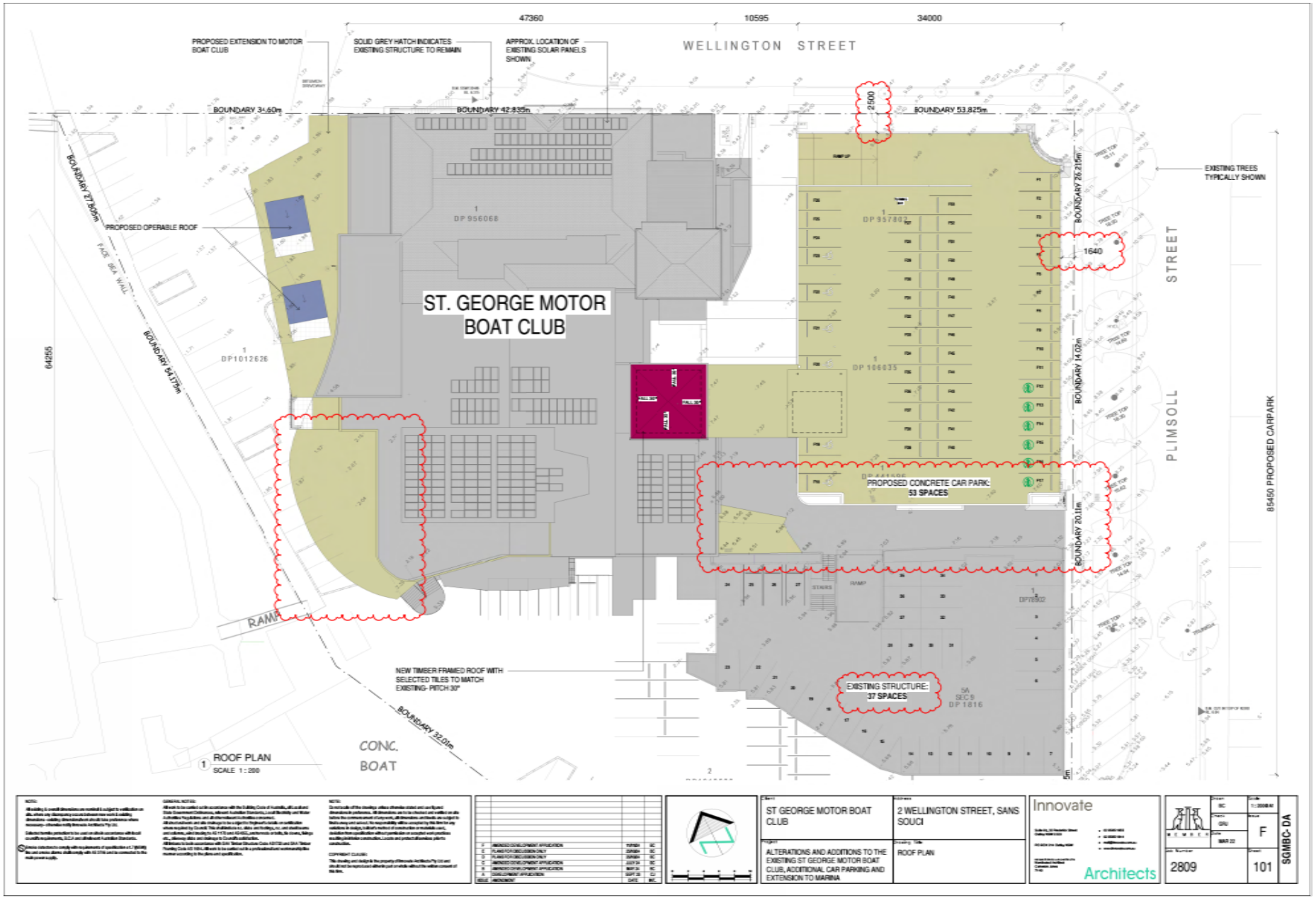
Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

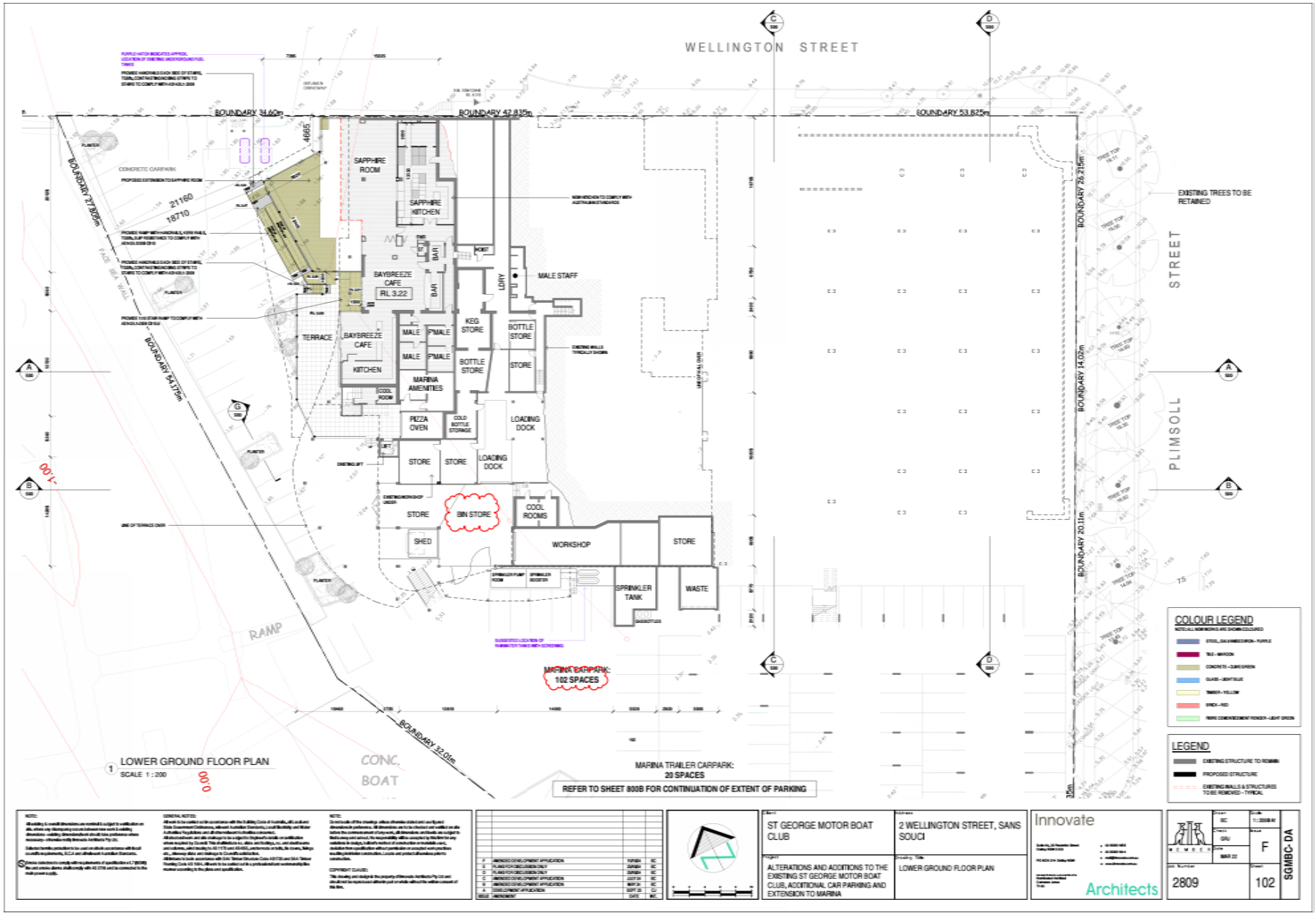
The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

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 E – Site Plan




47360
10595
34000
WELLINGTON STREET
PROPOSED EXTENSION TO MOTOR BOAT CLUB
SOLID GREY HATCH INDICATES EXISTING STRUCTURE TO REMAIN
APPROX. LOCATION OF EXISTING SOLAR PANELS SHOWN
BOUNDARY 3.60m
BOUNDARY 42.835m
BOUNDARY 53.825m
BOUNDARY 27.805m
BOUNDARY 54.175m
BOUNDARY 26.215m
BOUNDARY 14.02m
BOUNDARY 20.11m
BOUNDARY 32.01m
2500
1640
EXISTING TREES TYPICALLY SHOWN
PROPOSED OPERABLE ROOF
FACE SEA WALL
ST. GEORGE MOTOR BOAT CLUB
DP 956068
DP 957802
DP 1012626
DP 106035
DP 1816
PROPOSED CONCRETE CAR PARK: 53 SPACES
EXISTING STRUCTURE: 37 SPACES
NEW TIMBER FRAMED ROOF WITH SELECTED TILES TO MATCH EXISTING- PITCH 30°
PLIMSOLL STREET
85450 PROPOSED CARPARK
64255
RAMP
CONC. BOAT
1 ROOF PLAN
SCALE 1 : 200
ST GEORGE MOTOR BOAT CLUB
2 WELLINGTON STREET, SANS SOUCI
ALTERATIONS AND ADDITIONS TO THE EXISTING ST GEORGE MOTOR BOAT CLUB, ADDITIONAL CAR PARKING AND EXTENSION TO MARINA
ROOF PLAN
Innovate
Architects
2809
101
F
SGMBC- DA


WELLINGTON STREET
BOUNDARY 34.60m
BOUNDARY 42.835m
BOUNDARY 53.825m
BOUNDARY 27.905m
BOUNDARY 26.215m
BOUNDARY 14.02m
BOUNDARY 20.11m
BOUNDARY 54.175m
BOUNDARY 32.01m
PLIMSOLL STREET
EXISTING TREES TO BE RETAINED
SAPPHIRE ROOM
SAPPHIRE KITCHEN
BAYBREEZE CAFE
RL 3.22
BAR
MALE STAFF
LDRY
TERRACE
KITCHEN
MALE
FMALE
KEG STORE
BOTTLE STORE
STORE
MARINA AMENITIES
COOL ROOM
PIZZA OVEN
COLD BOTTLE STORAGE
LOADING DOCK
LIFT
BIN STORE
COOL ROOMS
WORKSHOP
SHED
SPRINKLER TANK
WASTE
RAMP
MARINA CARPARK: 102 SPACES
MARINA TRAILER CARPARK: 20 SPACES
REFER TO SHEET 800B FOR CONTINUATION OF EXTENT OF PARKING
CONC. BOAT
1 LOWER GROUND FLOOR PLAN
SCALE 1 : 200
COLOUR LEGEND
LEGEND
EXISTING STRUCTURE TO REMAIN
PROPOSED STRUCTURE
EXISTING WALLS & STRUCTURES TO BE REMOVED - TYPICAL
ST GEORGE MOTOR BOAT CLUB
2 WELLINGTON STREET, SANS SOUCI
ALTERATIONS AND ADDITIONS TO THE EXISTING ST GEORGE MOTOR BOAT CLUB, ADDITIONAL CAR PARKING AND EXTENSION TO MARINA
LOWER GROUND FLOOR PLAN
Innovate
Architects
2809
102
F
SGMBC- DA