Noise Impact Assessment

Forster Bowling Club

Forster Bowling Club Ltd

Level 1 Building Q – Head Street Carpark
Head Street, Forster NSW 2428

Prepared by:

SLR Consulting Australia

SLR Project No.: 610.032032.00001

9 April 2025

Revision: v3.0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
v3.0	9 April 2025	Jonathan Caine	Martin Davenport	Martin Davenport

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Forster Bowling Club Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Foster Bowling Club Ltd to undertake a Noise Impact Assessment (NIA) for indoor/outdoor live music entertainment to take place in the proposed alterations and additions to the Forster Bowling Club located at 2 Strand Street, Forster, NSW 2428 (the Project) to include an outdoor dining, café and playground and bar.

This report summarises the results of ambient noise measurements undertaken at the site and assesses the potential noise impacts associated with patron noise and live music from the Project with the aim to ensure noise may be managed and minimised to an acceptable level.

The following report uses specialist acoustic terminology. An explanation of common terms is provided in Appendix A.

1.1 Proposal Description

The Project is located at 2 Strand Street, Forster NSW 2428 within the Mid-Coast Council LGA, approximately 700 m south east of Forster Beach.

The site is zoned as RE2 – Private Recreation, with surrounding receivers to the north, east and south zoned as R2 – Low Density Residential and with R3 – Medium Density Residential to the west.

The Forster Bowling Club general opening hours are:

Sunday to Tuesday – 8:30 am – 10:30 pm

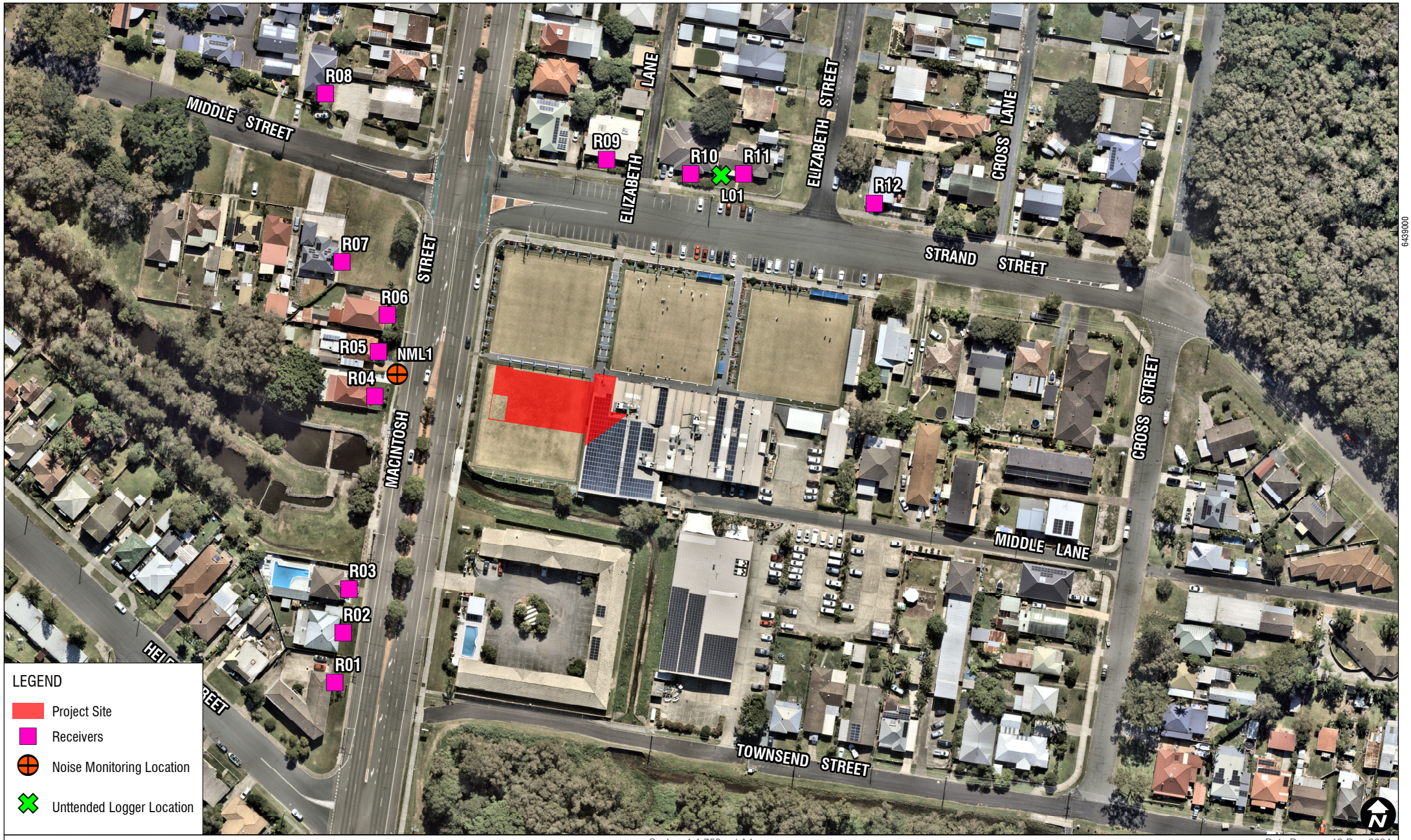
Wednesday to Saturday – 8:30 am – 11:00 pm

Assessed operational noise sources from the Project include:

- Live music including amplification.
- Patron-generated noise.

The site location, surrounding receivers and noise monitoring locations is shown in Figure 1.

The project layout is shown in Figure 2.



Scale: 1:1,750 at A4
Coordinate System: WGS 1984 UTM Zone 56S

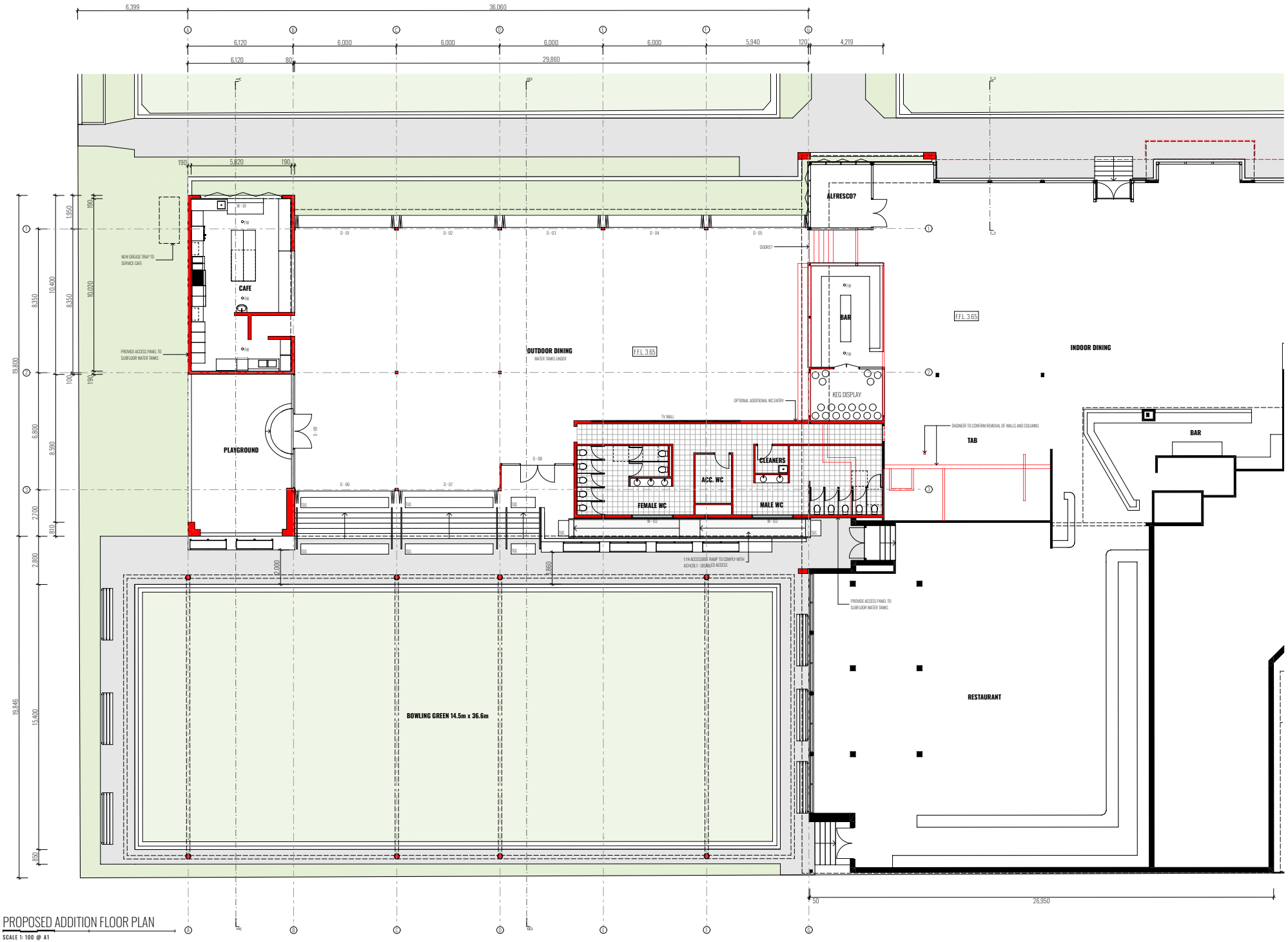
Date Drawn: 13-Dec-2024
Project Number: 630.032032

Data Source: NearMap April 2024

SLR

SITE LOCALITY AND NEAREST NOISE SENSITVE RECEIVERS

FIGURE 1



PROPOSED ADDITION FLOOR PLAN

SCALE 1: 100 @ A1

MJ MURRAY JAMES BUILDING DESIGN AND PLANNING
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FORSTER BOWLING CLUB
CLIENT

ALTERATIONS AND ADDITIONS
PROJECT

2 STRAND STREET, FORSTER NSW 2428
ADDRESS

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DATE ISSUE PAGE

1.2 Nearest Receivers

The noise sensitive receivers nearest the site consist of:

- Residential receivers to the west along Macintosh Street, with the closest being approximately 40 m from the Bowling Club land.
- Residential Receivers to the north along Strand Street, with the closest being 40 m from the Bowling Club land.
- The Forster Palms Motel 20 m to the south of the Bowling Club land. It's understood that the Forster Palms Motel, as a commercial premises owned and operated by the Forster Bowling Club, is considered a project-related receiver and as such has not been considered further in this report.

Residential receivers are shown in Figure 1 and detailed in Table 1.

Table 1 Surrounding Sensitive Receivers

Receiver ID	Address/Area	Receiver Type	Approximate Distance from Boundary (m)	Direction
R01	43 Helen Street Forster	Residential	90	SW
R02	41 Macintosh Street Forster	Residential	60	SW
R03	43 Macintosh Street Forster	Residential	40	W
R04	31 Macintosh Street Forster	Residential	40	W
R05	29 Macintosh Street Forster	Residential	40	W
R06	27 Macintosh Street Forster	Residential	60	W
R07	18 Middle Street Forster	Residential	85	NW
R08	11 Middle Street Forster	Residential	40	N
R09	3 Strand Street Forster	Residential	40	N
R10	5 Strand Street Forster	Residential	40	N
R11	7 Strand Street Forster	Residential	40	N
R12	9 Strand Street Forster	Residential	40	N

2.0 Assessment Criteria

2.1 MidCoast Council Assessment Requirements

The MidCoast Council Local Environment Plan (LEP) that currently applies to the Project is the Great Lakes Local Environmental Plan 2014. The LEP contains the following guidance in Part 5.20 relevant to noise:

> *Part 5.20 Standards that cannot be used to refuse consent – playing and performing music*
>
> *(2) The consent authority must not refuse consent to development in relation to licensed premises on the grounds of noise caused by the playing or performance of music, if the consent authority is satisfied the noise may be managed and minimised to an acceptable level.*

The MidCoast Council Development Control Plan (DCP) that currently applies to the Project, the Great Lakes Development Control Plan 2013, has no specific goals with respect to noise from licensed premises applicable to the Project.

However, it is noted that the application of the Liquor and Gaming NSW "LA10 noise criteria" has been applied to licensed premises in the LGA in the past.

2.2 Noise Policy for Industry 2017

The NSW EPA Noise Policy for Industry (NPfI) was released in 2017 and sets out the requirements for the assessment and management of operational noise from industry in NSW.

The NPfI in Section 1.5 states that "*amplified music/ patron noise from premises including those licensed by Liquor and Gaming NSW*" are exempted from the policy.

2.3 Liquor and Gaming NSW L_{A10} Noise Criteria

The Liquor and Gaming NSW LA10 noise criteria is derived from the Standard Noise Condition requirements of the formerly NSW Office of Liquor, Gaming and Racing, their guidance for the assessment of noise from a licensed premises was published in the EPA *Noise Guide for Local Government* 2013, this guidance is not present in the revised 2023 version.

In lieu of any updated quantitative noise guidelines and with the understanding that the Liquor and Gaming NSW L_{A10} criteria has been applied to licensed premises across NSW, including in the Project LGA, it is considered common and appropriate to apply the LA10 noise criteria in this instance. The wording of the LA10 Noise Criteria is shown below:

> *A) L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz-8 kHz inclusive) by more than 5 dB between 07.00 am and 12.00 midnight at the boundary of any affected residence.*
>
> *B) The L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz-8 kHz inclusive) between 12.00 midnight and 0.7:00 am at the boundary of any affected residence.*

C) Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 07.00 am.

As the Club is currently not expected to operate before 8:00am or after 11:00 pm, the noise criteria for the Project to be utilised is as follows:

L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz-8 kHz inclusive) by more than 5 dB between 07.00 am and 12.00 midnight at the boundary of any affected residence.

3.0 Existing Noise Environment

Unattended noise monitoring was completed in the study area in October 2024. The measured noise levels have been used to determine the existing noise environment and to set the criteria used to assess the potential impacts from the Project.

An environmental noise "logger" was deployed at the project site in a location representative of the nearest residential receivers.

The monitoring equipment was positioned to measure existing noise levels that are representative of receivers potentially most affected by the Project, within constraints such as accessibility, security and landowner permission.

The noise monitoring equipment continuously measured existing noise levels in 15-minute periods during the daytime, evening and night-time. All equipment carried current National Association of Testing Authorities (NATA) or manufacturer calibration certificates and equipment calibration was confirmed before and after each measurement.

The measured data has been processed to exclude periods affected by adverse weather conditions such as strong wind or rain (measured at Taree Airport weather station operated by the Bureau of Meteorology approximately 33 km NW of the study area), to establish representative existing noise levels during the unattended noise study.

Results of the unattended noise monitoring program are provided in graphical format in Appendix B. The noise monitoring locations are shown in Figure 2 and the results are summarised in Table 2.

Table 2 Summary of Unattended Noise Monitoring Results

ID	Address	Measured Noise Level (dBA)					
		Background Noise (RBL)			Average Noise (L_{Aeq})		
		Day	Evening	Night	Day	Evening	Night
L01	7 Strand Street, Forster NSW Lat: -32.184441 Long: 152.517250	48	39	30	59	58	50

Note 1: The assessment periods are the daytime which is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sundays and public holidays, the evening which is 6 pm to 10 pm, and the night-time which is 10 pm to 7 am on Monday to Saturday and 10 pm to 8 am on Sunday and public holidays. See the NSW EPA Noise Policy for Industry.

An analysis of the spectral content of the ambient noise was conducted to determine the Background L_{A90} RBL spectrum during each applicable period for the Project, the resulting spectra are shown in Table 3.

Table 3 Background L_{A90} (RBL) Spectrum

Representative Period	Overall dBA	Octave Band Centre Frequency (Hz) dBA								
		31.5	63	125	250	500	1K	2K	4K	8K
7:00 am to 6:00 pm	48	17	28	33	37	40	45	44	33	20
6:00 pm to 10:00 pm	39	11	20	26	28	32	35	34	24	16
10:00 pm to 11:00 pm	33	6	16	22	24	26	26	27	21	15

Short term attended noise measurements were also completed at the monitoring location and at an additional location representing receivers located to the west. The attended measurements allow the contributions of various noise sources at each location to be determined and to characterise the ambient noise environment. The results of the attended noise measurements are summarised in Table 4.

The attended measurements were found to be generally consistent with the results of the unattended noise monitoring and show that the existing noise levels are typically dominated by road traffic from the surrounding road network. The nearest major road to the Project site is Macintosh Street which runs north to south to the west of the Project site.

Table 4 Summary of Attended Noise Monitoring Results

Location	Period	Date/Start Time/Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
			L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
L01	Daytime	23/10/2024 1:43 pm	79	69	63	47	59	Power Lines 47-73 Traffic 47-79 Local Hammering 49 55 Bowling Club Patrons 49 Bowling Club Rooftop Plant <30
NML1	Daytime	23/10/2024 2:13 pm	80	76	72	57	69	Traffic 54-80 Birds 42-57 Bowling Club Patrons rarely audible <55

4.0 Patron and Entertainment Noise Assessment

A SoundPLAN v8.2 computer model was used to predict noise emissions from the Project. A three-dimensional digital terrain map giving all relevant topographic information was used in

the modelling process. Topographic information, together with noise source data, ground cover, shielding by barriers and/or adjacent buildings were used to predict the noise levels at the nearest potentially affected receivers

The potential operational noise levels from the project have been predicted to the surrounding most potentially affected receivers using the CONCAWE algorithm implemented in SoundPLAN. The model includes ground topography, ground type, buildings and representative noise sources from the Project.

4.1 Project Specific Patron Noise Goals

Applicable noise criteria for nearby residential receivers, based on measured ambient noise and council criteria as described in Section 2.1 is summarised in Table 5.

Table 5 Applicable Residential Patron Noise Criteria – Nearest Potentially Affected Receivers

Representative Period	Overall L_{A10} dBA	Octave Band Centre Frequency (Hz) L_{A10} dBA								
		31.5	63	125	250	500	1K	2K	4K	8K
7:00 am to 6:00 pm	53	22	33	38	42	45	50	49	38	25
6:00 pm to 10:00 pm	44	16	25	31	33	37	40	39	29	21
10:00 pm to 11:00 pm	38	11	21	27	29	31	31	32	26	20

4.2 Source Noise Levels

Typical noise levels from patron voices have been derived from Table 16.1 in *"Handbook of Acoustical Measurements and Noise Control"* by C.M. Harris.

Harris indicates that the sound pressure level from a typical casual male voice is 53 dBA at 1 m, a typical normal voice is 58 dBA at 1m, a typical raise voice is 65 dBA at 1 m, a typical loud voice is 75 dBA at 1 m and a shouting voice is 88 dBA at 1 m.

The sound power spectrum of a patron talking with a vocal effort of a raised voice is shown in Table 6.

Table 6 Typical L10 Sound Power Level Spectrum of 1 Person with Raised Voice

Scenario	Sound Power Level per Octave Band (Hz) dBA								Overall (dBA)
	63	125	250	500	1K	2K	4K	8K	
1 Patron Raised Voice	51	54	63	70	68	63	58	49	73

For the purpose of the assessment of noise impacts during all operating hours it has been conservatively assumed that half of all patrons in the Project area would be speaking with a raised voice at any one time.

4.3 Noise Modelling Assumptions

The maximum expected number of patrons in the Project area is understood to be 414, resulting in the sound power level (Lw) from patron voices shown in Table 7.

Table 7 Patron Sound Power Level – 414 Patrons

Scenario	Sound Power Level per Octave Band (Hz) dBA								Overall (dBA)
	63	125	250	500	1K	2K	4K	8K	
414 Patrons	75	78	87	94	92	87	82	73	98

Noise break-out from the Project area has been modelled using some basic assumptions regarding materials used in the construction including a minimum assumed weighted sound reduction index (Rw) as summarised in Table 8.

It is assumed that the playground area doors would only be open as people enter and exit and would not remain open.

Table 8 Modelled Construction Materials and Acoustic Property Assumptions

Interface / Façade	Type	Minimum Assumed Rw
Bifold Doors / Northern and Southern Openings (When Open)	Nil	-
Bifold Doors / Northern and Southern Openings (When Closed)	Bifold glass doors in aluminium frame	29
Dining Area / Kids Play Area	6 mm Glass	31
Ceiling	0.6 mm Profiled Metal Roof Cladding 75 mm Insulated Panels	32
Walls	Concrete Blocks Render Layer	50

4.4 Noise Predictions – Patron Noise

A summary of the predicted noise levels from patron noise to the nearest most potentially affected residential receivers from the Project for all applicable periods with doors open and closed is shown in Table 9.

Table 9 414 Patrons – Noise Predictions

Receiver	Receiver Type	Scenario	Predicted Noise Level L10 dBA
R01	Residential	Doors Open	47
		Doors Closed	24
R02	Residential	Doors Open	47
		Doors Closed	25
R03	Residential	Doors Open	50

Receiver	Receiver Type	Scenario	Predicted Noise Level L10 dBA
		Doors Closed	27
R04	Residential	Doors Open	45
		Doors Closed	29
R05	Residential	Doors Open	46
		Doors Closed	29
R06	Residential	Doors Open	58
		Doors Closed	33
R07	Residential	Doors Open	55
		Doors Closed	30
R08	Residential	Doors Open	50
		Doors Closed	25
R09	Residential	Doors Open	55
		Doors Closed	30
R10	Residential	Doors Open	54
		Doors Closed	29
R11	Residential	Doors Open	53
		Doors Closed	28
R12	Residential	Doors Open	50
		Doors Closed	25

Octave band centre frequency predictions at the nearest most affected residential receiver, is shown in Table 10 under two scenarios relating to the bi-fold doors:

- Doors Open
- All Doors Closed

Exceedances of the octave band centre frequency criteria are indicated with bold text and green shading.

Table 10 Predicted L10 Noise Levels – 414 Patrons

Scenario	Worst Affected Receiver	Period	Overall SPL (dBA)	Sound Pressure Level (dBA)								Complies
				Octave Band Centre Frequency (Hz)								
				63	125	250	500	1K	2K	4K	8K	
Doors Open	R06	7:00 am to 6:00 pm	58	14	23	39	**52**	**54**	**51**	**44**	**27**	**N**
		6:00 pm to 10:00 pm	58	14	23	**39**	**52**	**54**	**51**	**44**	**27**	**N**

Scenario	Worst Affected Receiver	Period	Overall SPL (dBA)	Sound Pressure Level (dBA)								Complies
				Octave Band Centre Frequency (Hz)								
				63	125	250	500	1K	2K	4K	8K	
		10:00 pm to 11:00 pm	58	14	23	**39**	**52**	**54**	**51**	**44**	**27**	**N**
All Doors Closed	R06	7:00 am to 6:00 pm	33	2	8	19	29	30	26	10	0	Y
		6:00 pm to 10:00 pm	33	2	8	19	29	30	26	10	0	Y
		10:00 pm to 11:00 pm	33	2	8	19	29	30	26	10	0	Y

The predictions Table 10 indicate that breakout noise from 414 patrons would exceed the project specific noise goals during all applicable periods with doors open, however compliance is predicted for all applicable periods where doors are closed.

For scenarios in Table 10 where compliance is predicted from patron noise levels, the corresponding maximum internal sound pressure level from music at the venue that would result in compliance at the most affected receiver is shown in Table 11.

Table 11 Maximum Live Music Indoor Sound Pressure Level – 414 Patrons – Doors Closed

Scenario	Period	Maximum Live Music Noise Level per Octave Band (Hz) dBA								Overall (dBA)
		63	125	250	500	1K	2K	4K	8K	
Northern Doors Closed	7:00 am to 6:00 pm	80	78	77	71	71	69	60	56	84
All Doors Closed	7:00 am to 6:00 pm	85	86	87	87	89	87	88	76	96
	6:00 pm to 10:00 pm	77	79	78	79	79	77	79	72	87
	10:00 pm to 11:00 pm	73	75	74	70	65	69	76	71	82

Notwithstanding the above, mitigation and management measures to allow for compliant operations with open bi-fold doors is examined in Section 5.0.

5.0 Noise Management and Mitigation Measures

5.1 Project Specific Noise Management Measures

The results in Table 10 show that with closed doors the Project could operate at a capacity of 414 Patrons during all applicable periods.

In order to allow for some or all doors to remain open the proposed mitigation measures for the Project include:

- Closure of only the Northern set of Bi-fold doors.
- Reduced Patron Numbers

Further it is recommended as a mitigation measure that all doors would be closed after 10 pm.

The maximum patron numbers for which the southern or both sets of bifold doors could be left open during the daytime (7:00 am – 6:00 pm) and evening (6:00 pm to 10:00 pm) and the resulting noise levels at the most affected receiver are provided in Table 12.

Table 12 Mitigated Scenarios – Patron Noise Predictions

Scenario	Period	Patrons	Predicted Noise Level per Octave Band (Hz) dBA								Overall (dBA)
			63	125	250	500	1K	2K	4K	8K	
Northern Doors Closed	7:00 am to 6:00 pm	414	0	9	22	38	41	38	31	13	45
	6:00 pm to 10:00 pm	280	0	7	20	36	39	37	29	11	43
All Doors Open	7:00 am to 6:00 pm	275	6	15	30	44	47	43	36	19	50
	6:00 pm to 10:00 pm	30	0	6	21	35	38	34	28	11	41

For the mitigated scenarios in Table 12 the maximum level of music allowable inside the Project are shown in Table 13.

Table 13 Mitigated Scenarios – Maximum Live Music Indoor Sound Pressure Level (SPL)

Scenario	Period	Patron Numbers	Maximum Live Music Noise Level per Octave Band (Hz) dBA								Overall (dBA)
			63	125	250	500	1K	2K	4K	8K	
Northern Doors Closed	7:00 am to 6:00 pm	414	80	78	77	71	71	69	60	56	84

Scenario	Period	Patron Numbers	Maximum Live Music Noise Level per Octave Band (Hz) dBA								Overall (dBA)
			63	125	250	500	1K	2K	4K	8K	
	6:00 pm to 10:00 pm	280	71	72	69	59	57	56	42	53	76
All Doors Open	7:00 am to 6:00 pm	275	71	69	66	55	59	60	48	46	74
	6:00 pm to 10:00 pm	30	60	62	57	50	49	49	36	43	65

A summary of the recommended patron numbers and door configuration is provided in Table 14.

Table 14 Specific Noise Management and Mitigation Measures – Summary

Operational Scenario	Compliant Patron Numbers		
	Time of Day		
	7:00 am to 6:00 pm	6:00 pm to 10:00 pm	10:00 pm to 11:00 pm
Closed Doors	414	414	414
Closed Northern Doors	414	280	-[1]
Open Doors	275	30	-[1]
Note 1: It is recommended as a mitigation measure that doors would be closed after 10 pm			

5.2 General Noise Management and Mitigation Measures

The following noise management and mitigation measures are recommended to be adopted (where reasonable and feasible) with a view to minimising noise emission from the Project as far as practicable:

- Noise generating equipment such as speakers, musical instruments etc. should be placed to avoid noise generation, in the vicinity of, or towards, the nearest most sensitive receivers.
- Patrons should be encouraged not to make excessive noise while in the indoor/outdoor area, particularly during the evening and night-time periods.
- Where complaints are received, work practices will be reviewed and feasible and reasonable practices implemented to minimise any further impacts.
- Noise monitoring may be conducted (as appropriate) in the event of formal complaints received to verify noise levels are consistent with the predicted levels.

6.0 Conclusion

SLR has conducted an NIA for the proposed indoor/outdoor live music entertainment and dining area at Forster Bowling Club located at 2 Strand Street, Forster, NSW 2428.

Patron and live music noise levels associated with the Project are expected to meet adopted noise criteria at maximum capacity when doors are closed during all applicable periods.

Mitigation has been proposed to allow patron activity and live music events with doors open to occur during the daytime and evening periods of operation.

Based on the predicted levels with the application of all feasible and reasonable mitigation, the Project is predicted to meet the adopted noise criteria and is considered appropriate from an acoustic standpoint.

Appendix A Acoustic Terminology

Noise Impact Assessment

Forster Bowling Club

Forster Bowling Club Ltd

SLR Project No.: 610.032032.00001

9 April 2025

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

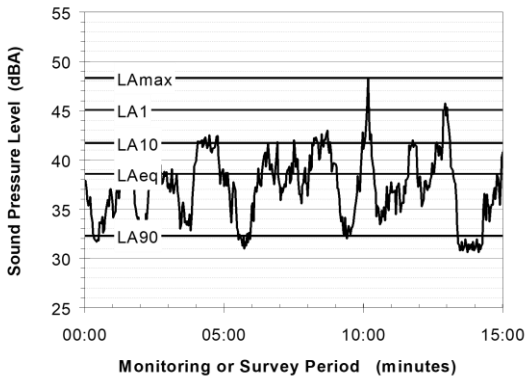
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

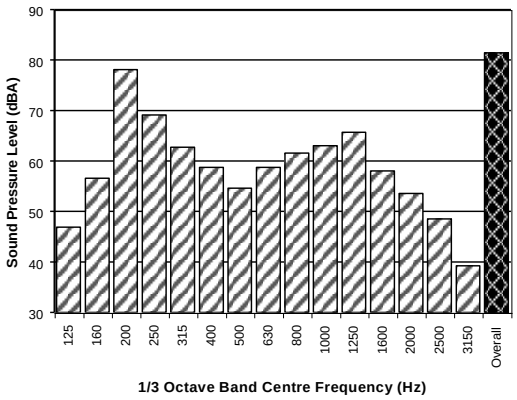
The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)

Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

Appendix B Statistical Ambient Noise Levels

Noise Impact Assessment

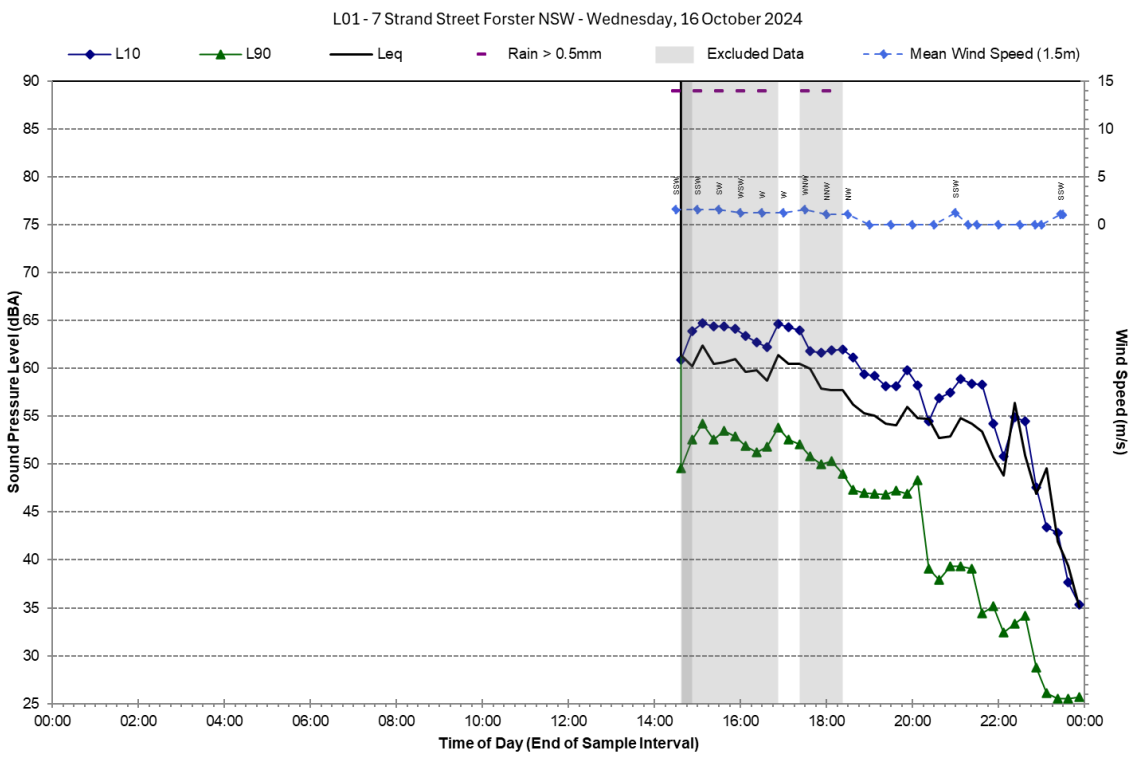
Forster Bowling Club

Forster Bowling Club Ltd

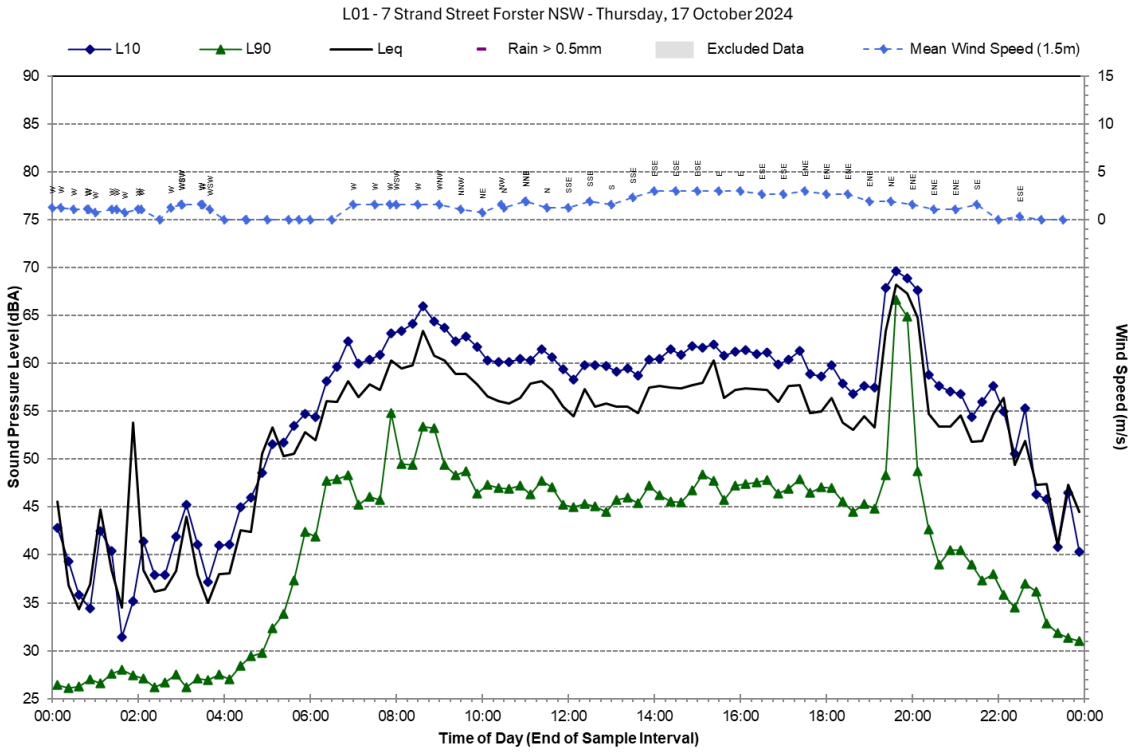
SLR Project No.: 610.032032.00001

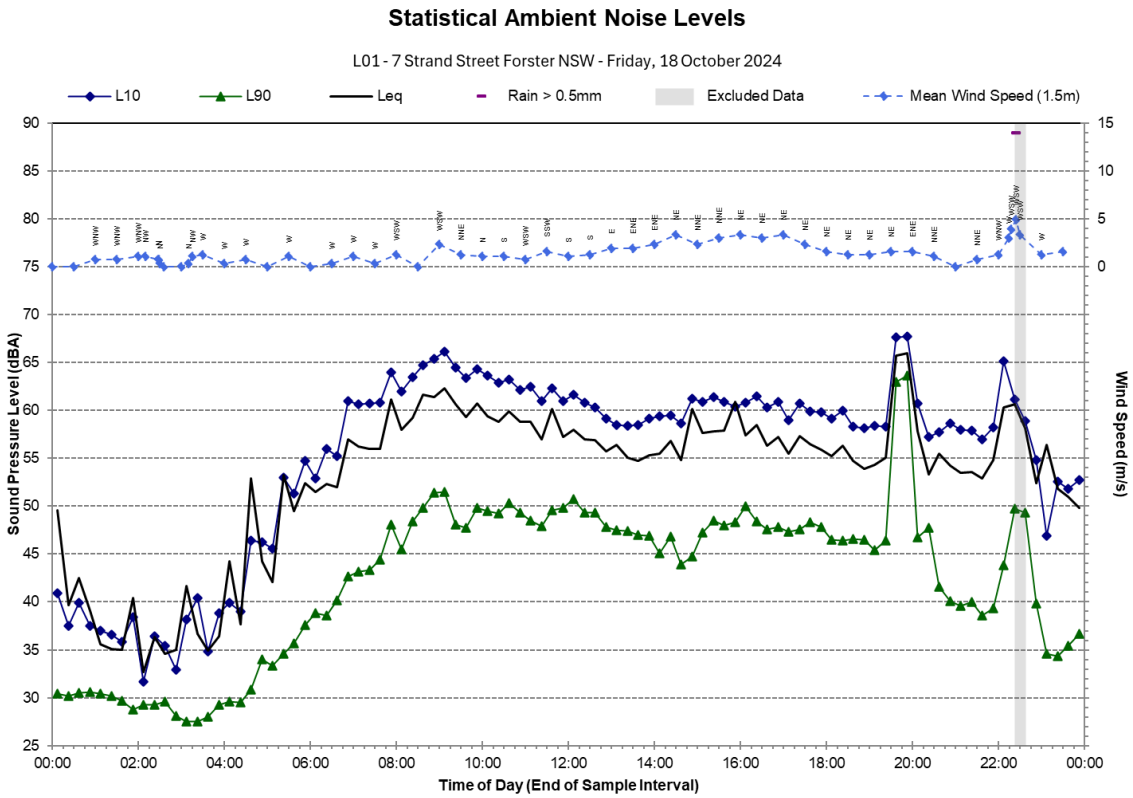
9 April 2025

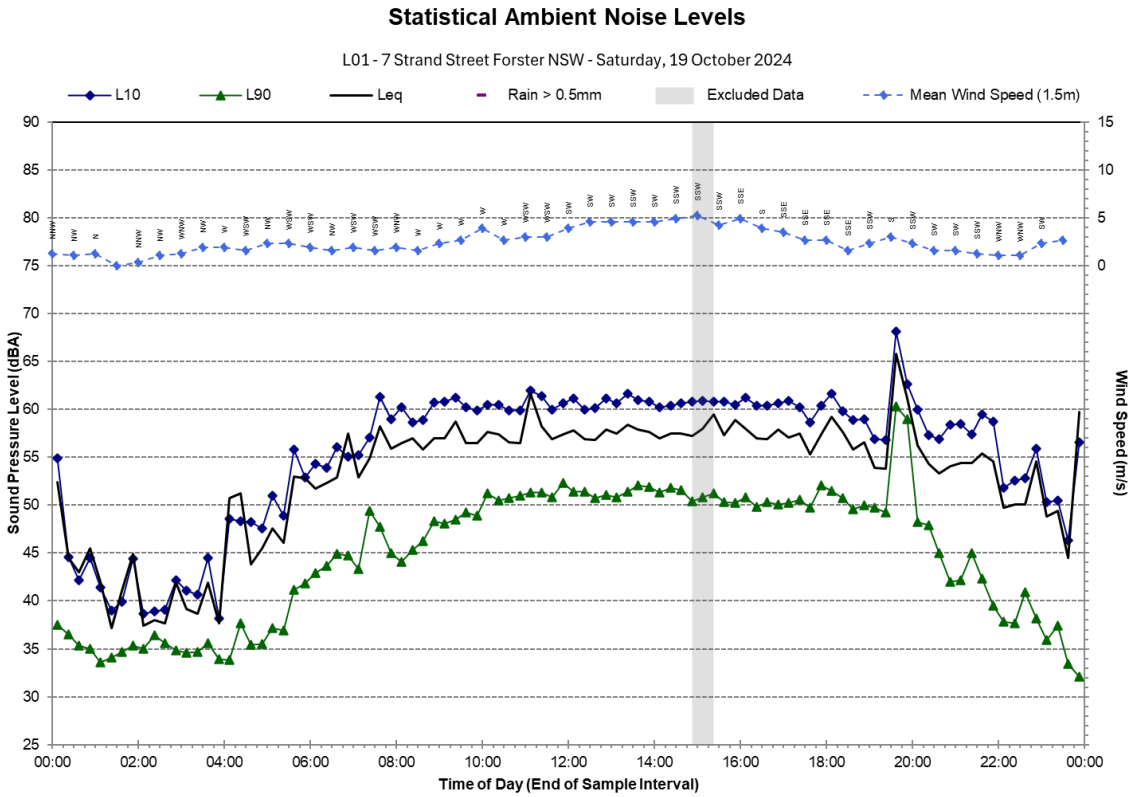
Statistical Ambient Noise Levels



Statistical Ambient Noise Levels

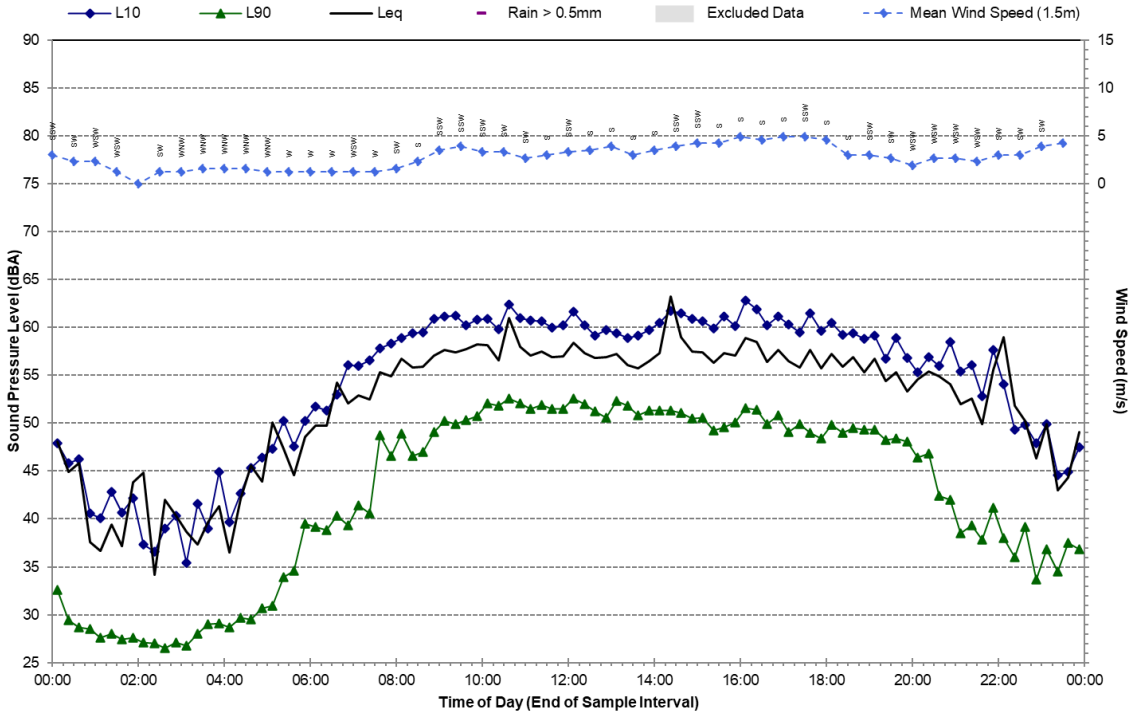



Statistical Ambient Noise Levels
L01 - 7 Strand Street Forster NSW - Friday, 18 October 2024
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L01 - 7 Strand Street Forster NSW - Saturday, 19 October 2024
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

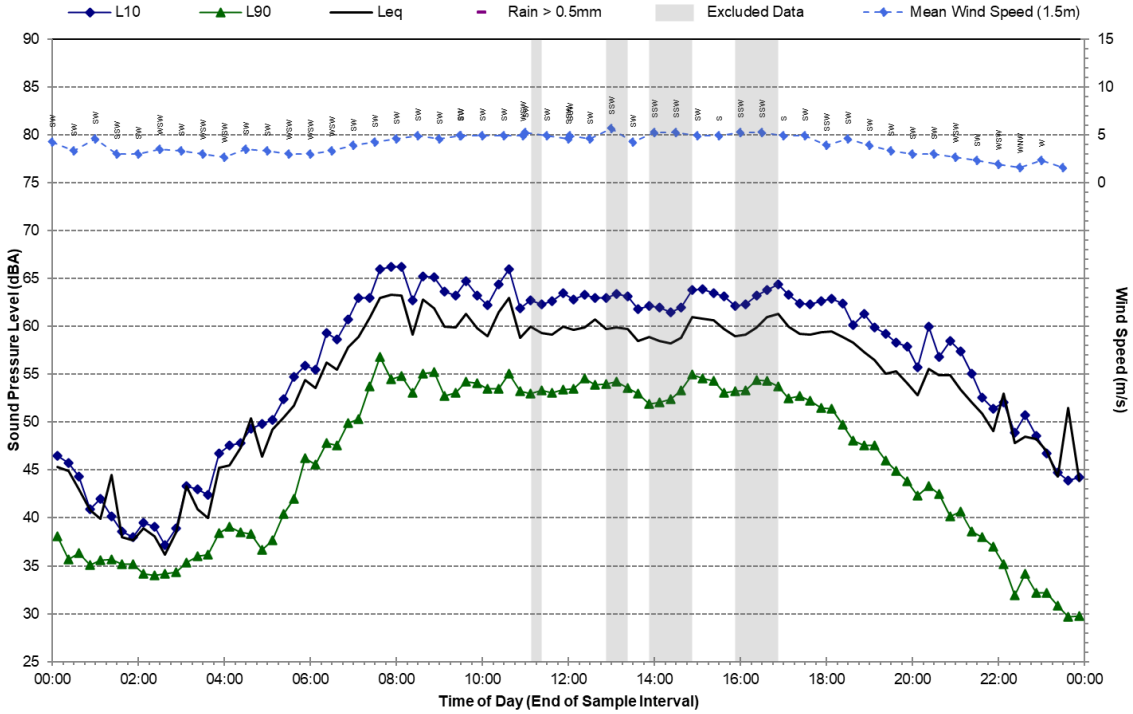
Statistical Ambient Noise Levels

L01 - 7 Strand Street Forster NSW - Sunday, 20 October 2024

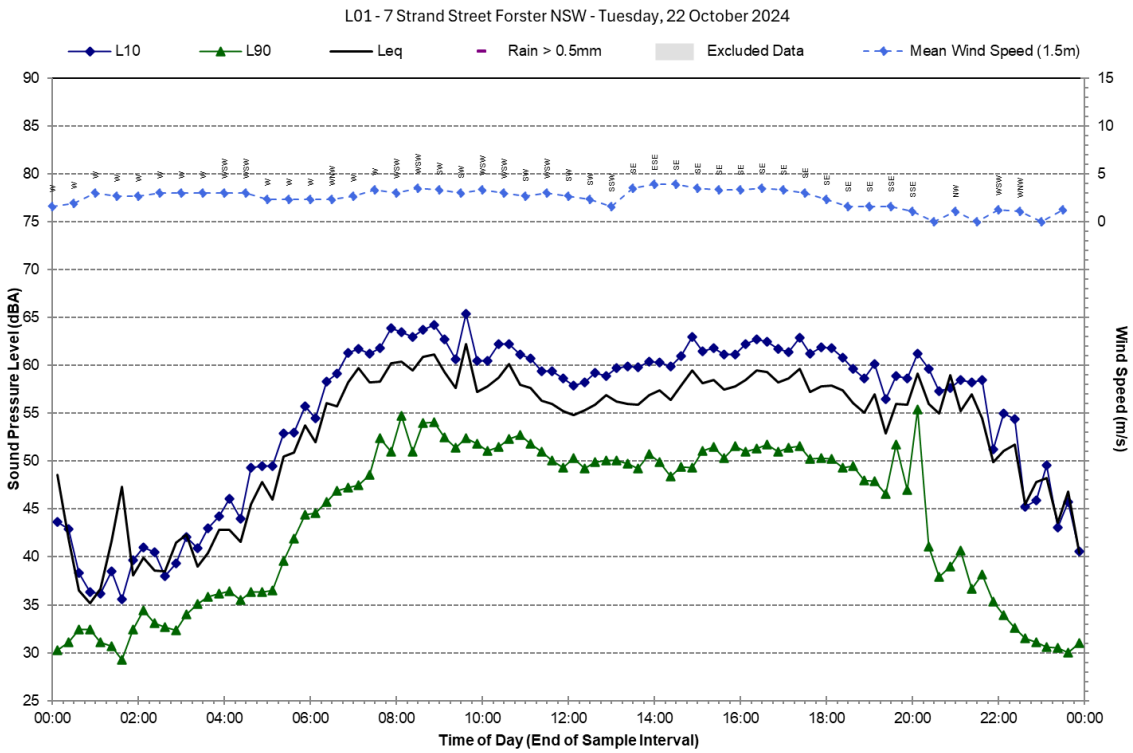


Statistical Ambient Noise Levels

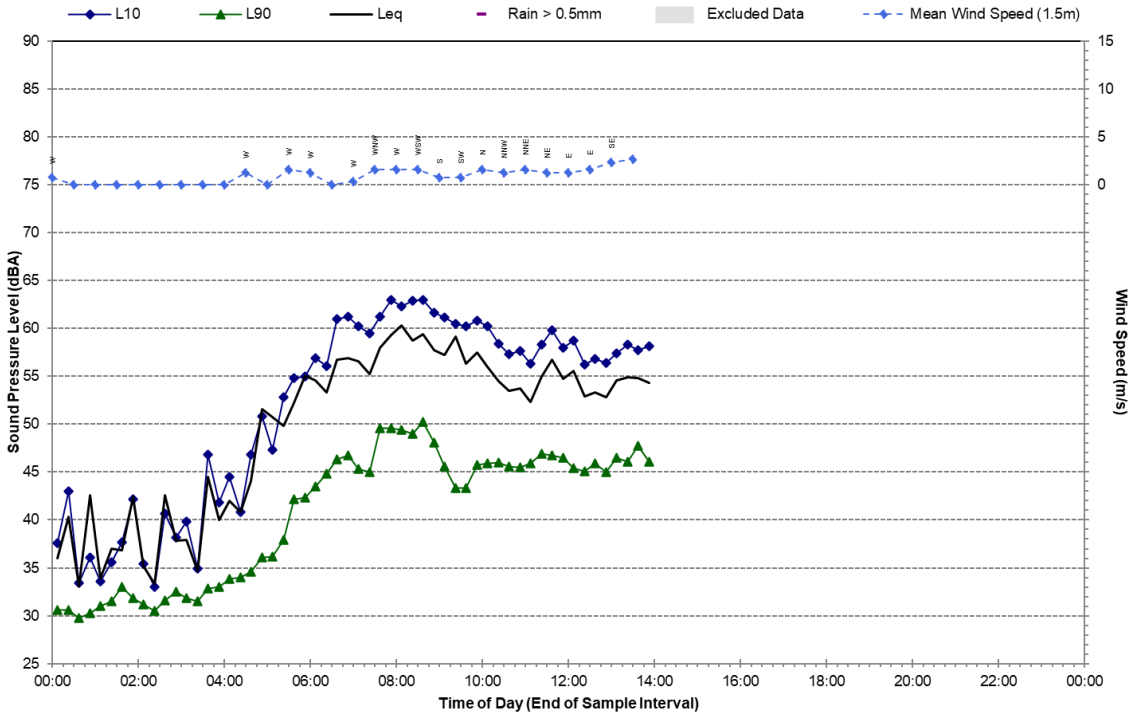
L01 - 7 Strand Street Forster NSW - Monday, 21 October 2024

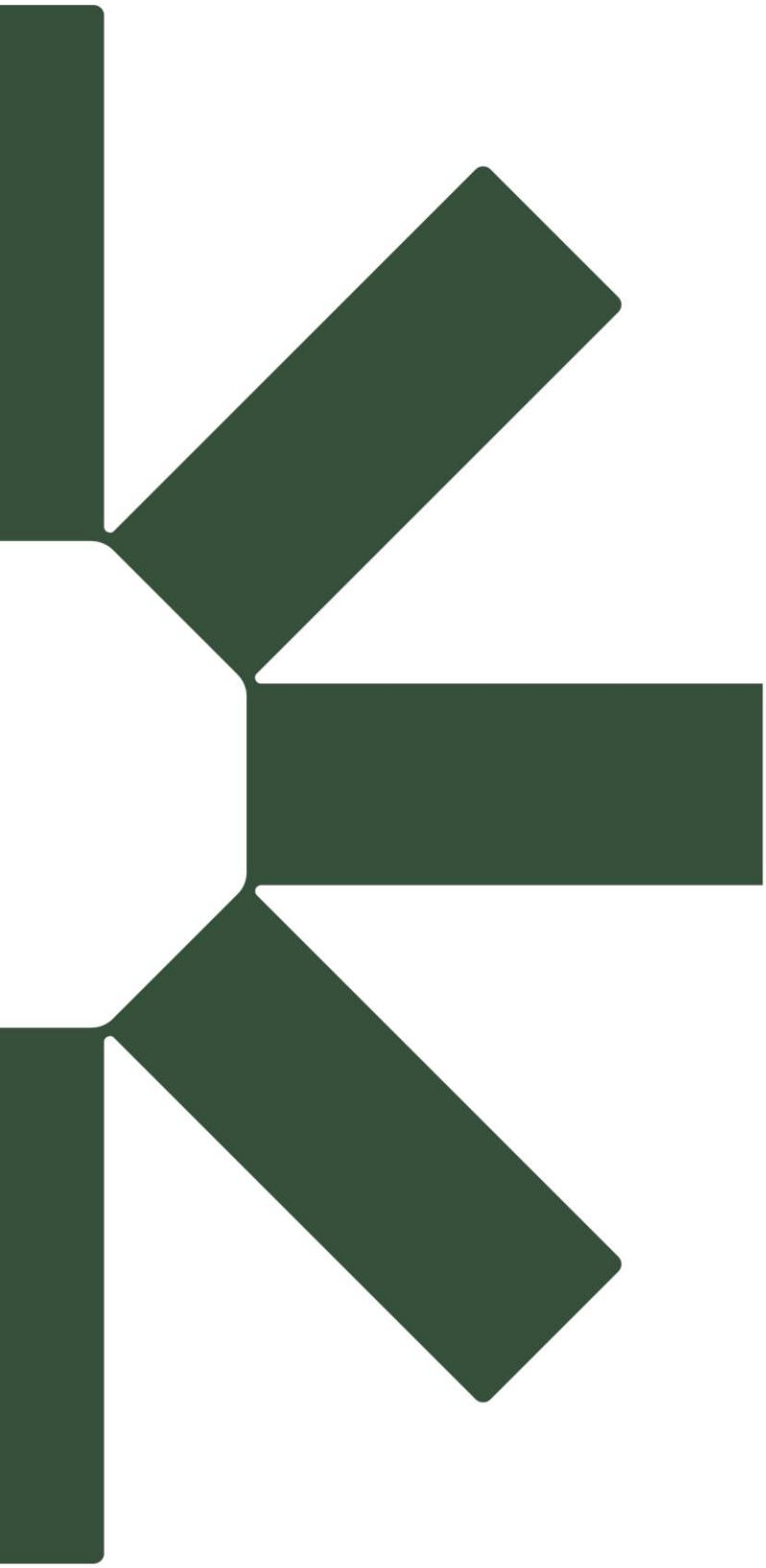


Statistical Ambient Noise Levels



Statistical Ambient Noise Levels





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