RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT 210699R1

Revision 4

Noise Impact Assessment
Proposed Child Care Centre
208 Victoria Road, Punchbowl

PREPARED FOR:
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24 October 2023

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Noise Impact Assessment

Proposed Child Care Centre

208 Victoria Road, Punchbowl

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210699R1	Revision 0	16 November 2021	Brian Mendieta	Desmond Raymond	Rodney Stevens
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210699R1	Revision 4	24 October 2023	Brian Mendieta	Desmond Raymond	Rodney Stevens

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1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by DBG to prepare a Noise Impact Assessment Report for the proposed Child Care Centre to be located at 208 Victoria Road, Punchbowl (the site).

This report details the results of a noise survey and assesses noise from the proposed Child Care Centre on nearby residential premises, as well as road traffic noise impact on the proposed Child Care Centre.

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 development site is bounded by a residential flat building to the north, residential dwellings to the east and south side, and Victoria Road to the west. The existing site consists of a single storey residential dwelling, which will be demolished in order to construct the proposed Child Care Centre.

The proposal is to construct a double-storey Child Care Centre with four indoor playrooms, a kitchen and staff/office spaces, two outdoor play areas (back yard and first floor) and a basement carpark.

2.2 Hours of Operation

The following hours of operation are proposed:

- Monday to Friday 7:00 am until 6:00 pm

2.3 Enrolment Numbers

The proposed Child Care Centre plans to cater for up to 76 children between the ages of 0 and 6 years of age. The number of children and their age groups are as follows:

- 0-2 years old - 16 Children
- 2-3 years old - 40 Children
- 3-6 years old - 20 Children

2.4 Outdoor Play Activities

In RSA's experience with child care centres, potential noise issues occur primarily when children are engaged in outdoor play activities, in terms of intrusive environmental noise to the play areas and play area noise to nearby sensitive receivers.

2.5 Surrounding Receivers

There are a number of sensitive receivers surrounding the proposed development, these receivers are considered in the noise impact assessment. Table 2-1 shows the nearby surrounding receivers considered in this noise assessment.

Table 2-1 Sensitive Receivers

Receiver	Sensitive Receiver's Address
R1	204-206 Victoria Road
R2	115 Augusta Street
R3	117 Augusta Street
R4	119 Augusta Street
R5	210 Victoria Road
R6	205 Victoria Road

Figure 2-1 shows an aerial image of the site area, the surrounding receivers and location of noise loggers.

Figure 2-1 Site Location

Image Courtesy of Google Maps © 2021.

The following figure presents the proposed Child Care Centre Layout:

Figure 2-2 Proposed Child Care Centre Layout – Ground Level

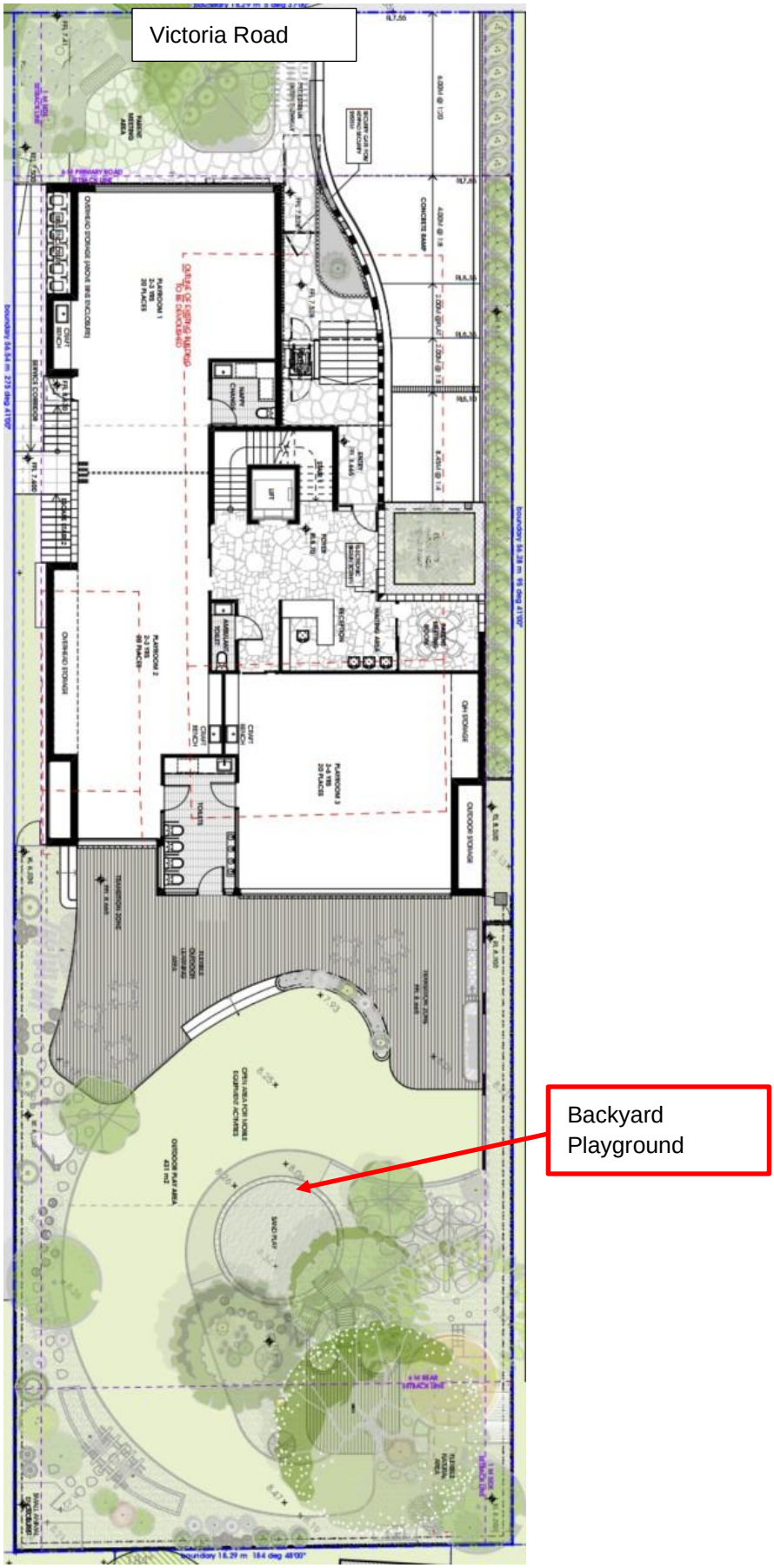
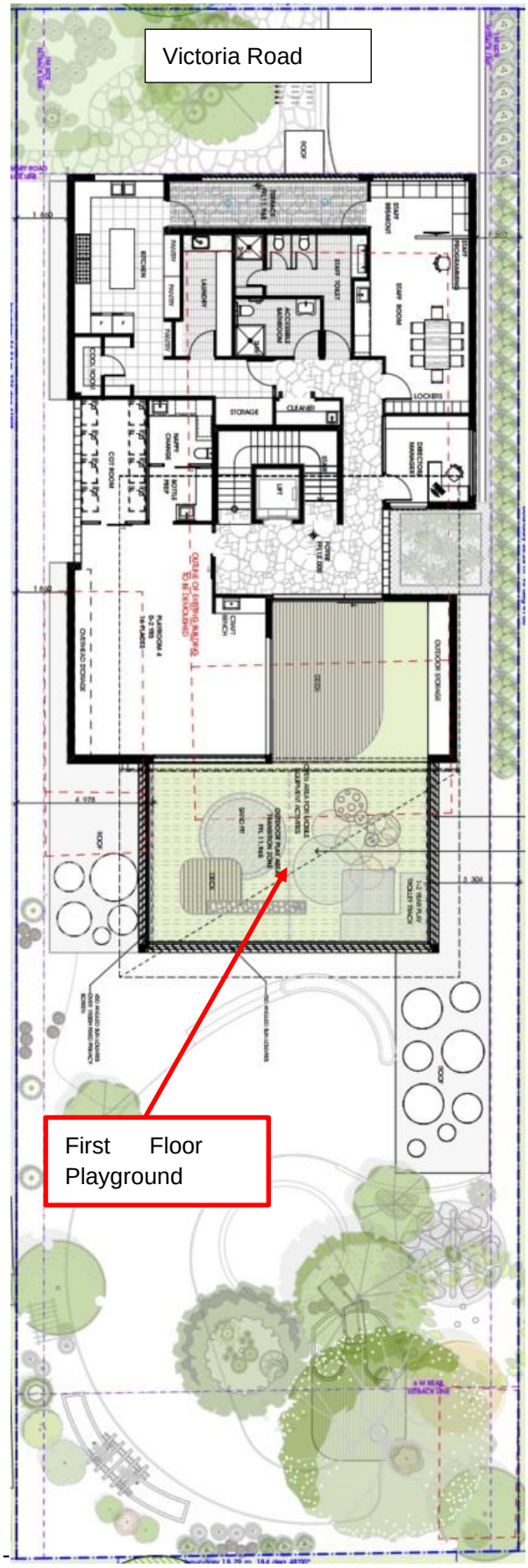


Figure 2-3 Proposed Child Care Centre Layout – First Floor



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 Friday 22nd and Thursday 28th of October 2021 in the front and back yard of 208 Victoria Road, Punchbowl.

The noise located the backyard yard of the site monitored ambient noise level and is used to establish the noise limit for the backyard of receivers R1 to R5. The noise logger at the front measured road traffic noise. This logger also establishes the background noise level for the front yard of receivers R1, R5 and R6.

Instrumentation for the survey comprised of two ARL NGARA environmental noise loggers (serial numbers 8780F0 and 87802E) fitted with microphone windshields. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. Noise data affected by significant weather conditions (i.e. heavy rain and strong winds) was removed from the noise analysis; this includes measurements taken from the 24th of October 2021.

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 Child Care Centre, 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			
		Morning Shoulder 5 am – 7am	Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
Frontyard of R1, R5 and R6	L_{Aeq}	57	57	54	53
	RBL (Background)	47	44	40	37
Backyard of R1 to R5	L_{Aeq}	49	53	52	46
	RBL (Background)	40	40	41	34

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).

3.2.2 Noise Intrusion (*Road Noise Policy*)

To assess noise intrusion into the outdoor play areas and internal areas of the Child Care Centre, the data obtained from the logger location has been processed to establish representative ambient noise levels from Struan Street. The time periods used for this assessment are as defined in the EPA's *Road Noise Policy* (RNP, 2011). Results are presented below in Table 3-2.

Table 3-2 Ambient Noise Levels Corresponding to Defined RNP Periods

Location	Period	External Noise Levels dB(A)
Western Facade	1 Hour	$L_{Aeq(1hour)}$ 57 dB

4 NOISE GUIDELINES AND CRITERIA

4.1 Operational Noise From Child Care Centre

A guideline for the assessment of noise from Child Care Centre, has been prepared by the Association of Australian Acoustical Consultants (AAAC). The document, *AAAC Technical Guideline Child Care Centre Noise Assessment V3.0*, provides criteria for the assessment of noise intrusion into and noise emissions from Child Care Centres and also provides recommendations for treatment to minimise acoustical impacts upon neighbouring premises.

4.1.1 Outdoor Play Noise Emission

Since the time in which children are involved in outdoor play can be limited, the potential impact associated with these noise emissions reduces. The AAAC considers a total limit of 4 hours outdoor play per day (typically 2 hour in the morning and 2 hour in the afternoon) reasonable to apply a criterion of $L_{Aeq(15minute)}$ noise level emitted from the outdoor play area not exceed the background noise level by more than 10 dB at the assessment location. However, if the proposed outdoor play time is more than 4 hours per day, the $L_{Aeq(15minute)}$ noise level emitted from the outdoor play area must not exceed the background noise level by more than 5 dB at the assessment location.

The client has advised the outdoor play will be limited to 4 hours per day (typically 2 hour in the morning and 2 hour in the afternoon). In this case, the noise criteria for outdoor play area noise is 54 dB(A) for receivers located near the front of the site and 50dB(A) for receivers located near the site's backyard..

4.1.2 Other Noise Emissions

Based on Section 3.2.2 of the AAAC guidelines, the cumulative $L_{Aeq,15\ minute}$ noise emission level resulting from the use and operation of the Child Care Centre, with the exception of noise emission from outdoor play shall not exceed the background noise level by more than 5 dB at the assessment location. This includes the noise emission resulting from:

- Indoor play
- Mechanical plant
- Drop off and pick up
- Other activities/operations (not including outdoor play).

4.1.3 Sleep Disturbance

Staff members may enter before 7.00am (and not before 6.00am). Therefore, noise assessment in relation to sleep disturbance is considered. The L_{Amax} noise level emitted from vehicles arriving and parking shall not exceed the background noise level by more than 15 dB during the morning shoulder period outside the nearest habitable room window.

4.1.4 Road and Rail Noise Intrusion to Outdoor Playground

For the assessment of road traffic noise impact on the outdoor play areas, the AAAC *Technical Guideline Child Care Centre Noise Assessment V3.0* has been used to determine the appropriate noise level. In accordance with the AAAC guideline, the noise criterion for outdoor play areas is as follow:

- Outdoor play areas – $L_{Aeq,(1hour)}$ 55 dB(A) (external).

4.1.5 Noise Intrusion to Indoor Areas

For the assessment of road traffic noise impact on the outdoor play areas, *the AAAC Technical Guideline Child Care Centre Noise Assessment V3.0* has been used to determine the appropriate noise level. In accordance with the AAAC guideline, the noise criterion for outdoor play areas is as follow:

- Indoor play areas – $L_{Aeq,(1hour)}$ 40 dB(A) (internal)
- Sleeping areas – $L_{Aeq,(1hour)}$ 35 dB(A) (internal)

4.1.6 Summarised Noise Emission

Based on the AAAC guideline, the noise criteria for noise emission from the Child Care Centre on surrounding receivers are presented Table 4-1. Figure 4-1 presents an aerial photo the proposed Child Care Centre along with the surrounding receivers.

Table 4-1 Summarised Noise Emission Criteria

Receiver	Noise Type (Assessed Separately)	Noise Criteria			
		Morning Shoulder L_{Aeq} dB(A)	Day Time L_{Aeq} dB(A)	Evening Time L_{Aeq} dB(A)	Sleep Disturbance L_{Max} dB(A)
Front of R1, R5 and R6	Indoor play, mechanical, drop off and pick up and other activities and operations	52	49	45	62
	Limited Outdoor Play time - 4 hours	-	54	-	-
Backyard of R1 to R5	Indoor play, mechanical, drop off and pick up and other activities and operations	45	45	46	55
	Limited Outdoor Play time - 4 hours	-	50	-	-

Figure 4-1 Aerial Figure with proposed Child Care Centre and Surrounding Receivers

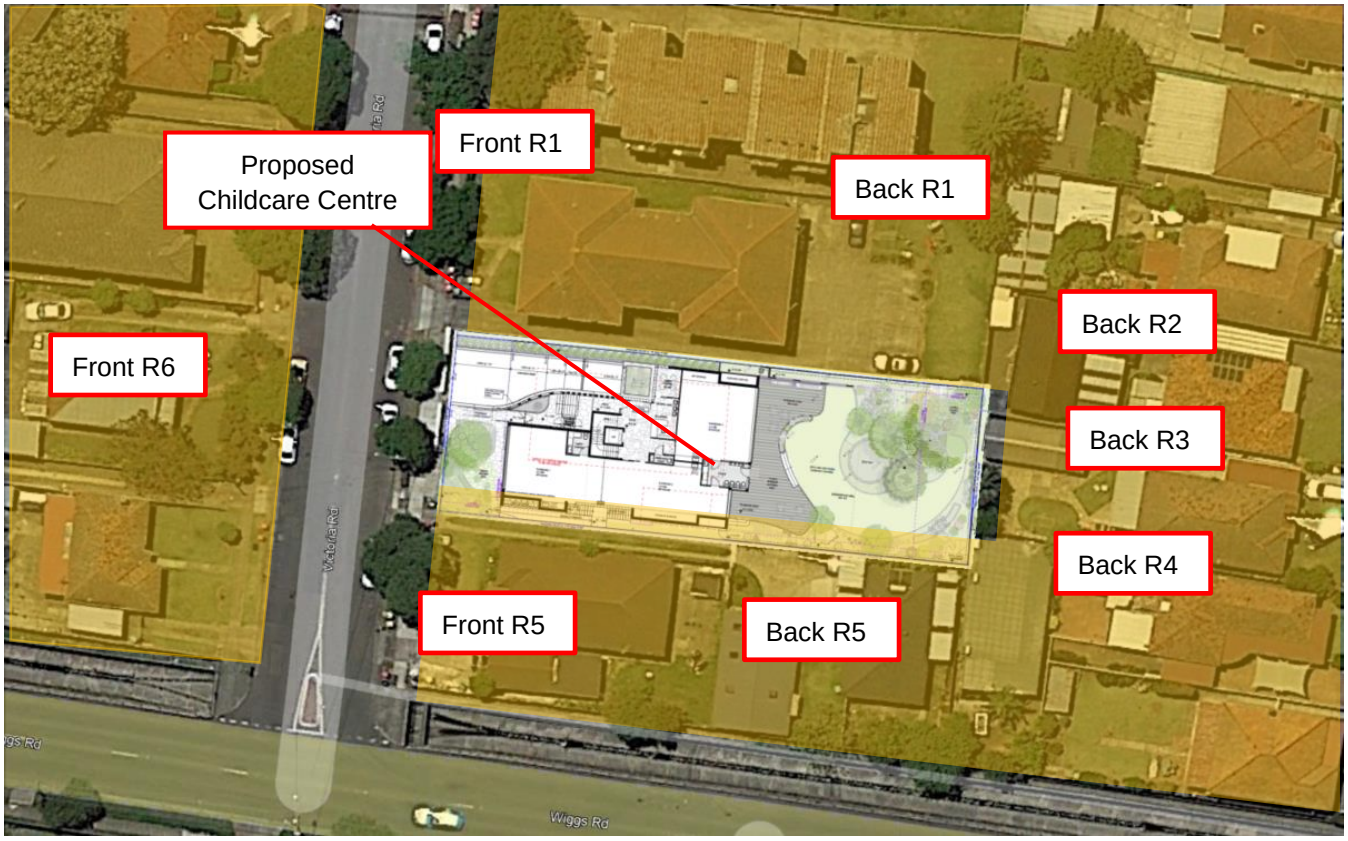


Image Courtesy of Google Maps © 2023.

5 NOISE IMPACT ASSESSMENT

5.1 Noise Emissions from Outdoor Play

Potential noise management issues occur primarily when children are engaged in outdoor play activities. The Association of Australian Acoustical Consultants (AAAC) technical guideline for Child Care Centre Noise Assessment V3.0 provides the following sound power levels (L_w) for various age groups of children

Table 5-1 Effective Sound Power Levels ($L_{Aeq,\ 15min}$) for Groups of 10 Children Playing

Noise Descriptor	Noise Level (dB) at Octave Band Centre Frequency (Hz)								
	63	125	250	500	1 k	2 k	4 k	8 k	Overall dB(A)
0 to 2 Years	54	60	66	72	74	71	67	64	78
2 to 3 Years	61	67	73	79	81	78	74	70	85
3 to 5 Years	64	70	75	81	83	80	76	72	87

If applicable, an adjustment to the above sound power levels of -6 dB could be applied in each age group for children involved in passive play.

Calculations have been made based on the spectra above assuming 40 children outside, 16 children within each outdoor play area. The following assumptions have been made in the noise modelling of the Outdoor Play areas noise impacts on the neighbouring residences:

- A 2.1 metres high solid barrier with angled cantilever ontop (total height of 2.4m) surrounding the backyard outdoor play area and 2.1m high along the southern and northern boundary of the site. A 2.1m high barrier along the north side of the first floor outdoor area and a 1.5m high barrier on the east and south side of the first floor outdoor play area. Layout of the noise barrier is shown in Figure 6-1.
- Noise control includes a veggie garden/passive play area in the north-eastern area of the playground and a 3m high wall extending 9m long, parallel with the northern boundary. Layout of the veggie garden and the wall is shown in Figure 6-1.
- Maximum of 46 children outside at one time. This is made up of 20 children between the ages of 3 and 6 in the backyard playground, 10 children between 3-6 year olds in the veggie garden (passively playing) and 16 children between the ages of 0 and 2 within the first floor playground;
- The height of the residential receivers has been assumed to be 1.5 metres for residential buildings on their respective level;
- Source height in the outdoor play area, i.e. children height, have been taken to be 0.7 meter for children between 0 and 2 years and children between 3 and 5 years are 1 meter from the ground;
- Resulting noise levels have been calculated to the most affected point on the boundary of the affected receivers.

The following figure shows the receiver locations in relation to the proposed Child Care Centre.

The predicted noise levels experienced by nearest residential receivers are presented in Table 5-2 below. Noise levels have been calculated at the most affected boundary heights. The noise levels presented below are representative of the worst case scenarios for receiver.

Table 5-2 Predicted Outdoor Play Activities Noise Emission

Receiver	Predicted Outdoor Play Activities Noise at Neighbouring Residents – dB(A)	Criteria	Compliance
R1 Front yard	38	**54**	Yes
R1 Back yard	50	**50**	Yes
R2 Back yard	46	**50**	Yes
R3 Back yard	47	**50**	Yes
R4 Back yard	47	**50**	Yes
R5 Front yard	42	**54**	Yes
R5 Back yard	48	**50**	Yes
R6 Front yard	22	**54**	Yes

Noise from the outdoor play activities at the surrounding residences is predicted to comply with the 50 dB(A) criterion with scenario presented above.

5.2 Noise Emissions from Indoor Activities

Calculations have been carried out to ascertain the noise breakout from indoor activities to the neighbouring premises. The sliding doors of the indoor play room to the outdoor play area are assumed to be half open except for the 3-6 year old indoor play area.

The resulting noise levels are presented in Table 5-3 below. Noise levels have been calculated at the most affected boundary heights.

Table 5-3 Predicted Indoor Play Activities Noise Emission

Receiver	Predicted Indoor Play Activities Noise at Neighbouring Residents – dB(A)	Criteria	Compliance
R1 Front yard	<20	49	Yes
R1 Back yard	26	45	Yes
R2 Back yard	<20	45	Yes
R3 Back yard	<20	45	Yes
R4 Back yard	<20	45	Yes
R5 Front yard	<20	49	Yes
R5 Back yard	21	45	Yes
R6 Front yard	<20	49	Yes

Noise from the outdoor play activities at the surrounding residences is predicted to comply with the relevant noise limits.

5.3 Carpark Emission

The proposed car park is underground and has a capacity of 20 parking, 13 spaces for staff members and 7 spaces for visitors. Calculations of noise from the carpark activities have been based on typical noise generating events within a carpark such as, door slams, engine starts and cars driving away. RSA has assumed a scenario where 5 staff members entering and 10 parent vehicles entering and leaving within a span of 15 minutes.

The noise prediction of the car park activities include the noise control measures outlined in Section 6.3. The calculated noise levels from the activities carried out within the carpark are presented in the Table 5-4. The predicted noise results below are compared against the day time noise criterion. It should be noted that the day time criterion is more stringent than the morning shoulder criterion.

Table 5-4 Calculated Carpark Noise Levels

Receiver	Predicted Carpark Activities Noise at Neighbouring Residents – dB(A)	Criteria	Compliance
R1 Front yard	47	49	Yes
R1 Back yard	38	45	Yes
R2 Back yard	<20	45	Yes
R3 Back yard	<20	45	Yes
R4 Back yard	<20	45	Yes
R5 Front yard	24	49	Yes
R5 Back yard	<20	45	Yes
R6 Front yard	32	49	Yes

Noise from the carpark activities at the surrounding residences is predicted to comply with the relevant noise limits.

Table 5-5 presents the L_{AMax} noise prediction of staff vehicles entering the centre before 7am. It is recommended that staff entering the site before 7am park inside the basement carpark. The noise prediction takes into both vehicle movement on basement ramp and door shutting inside the basement car park. Noise prediction results are compared against the L_{AMax} Sleep Disturbance criterion.

Table 5-5 Car Park Sleep Disturbance Noise Prediction

Receiver	Predicted Staff entering carpark before 7am noise at Neighbouring Residents – dB(A)	L_{Max} Criteria	Compliance
R1 Front yard	53	62	Yes
R1 Back yard	48	55	Yes
R2 Back yard	24	55	Yes
R3 Back yard	<20	55	Yes
R4 Back yard	<20	55	Yes
R5 Front yard	<20	62	Yes
R5 Back yard	31	55	Yes
R6 Front yard	38	62	Yes

Noise from vehicle movement on the premises is predicted to achieve the sleep disturbance criterion.

5.4 Mechanical Plant Noise Assessment

Mechanical ventilation may be installed at the proposed Child Care Centre, the operation of such mechanical plant must be in accordance with the relevant regulations such as the Building Code of Australia (BCA Vol.1, Part 4.5 *Ventilation of rooms*) and AS1668.2-2002 *The use of ventilation and air conditioning in buildings* will be required.

A specific mechanical plant selection has not been supplied at this stage. It is anticipated that the building will be serviced by typical mechanical ventilation/air conditioning equipment.

It is likely that the relevant noise criteria may be met through the use of conventional noise control methods (e.g. selection of equipment on the basis of quiet operation and, where necessary, providing enclosures, localised barriers, silencers and lined ductwork).

An appropriately qualified acoustic consultant should review the mechanical plant associated with the development at the detailed design stage when final plant selections have been made.

5.5 Road Traffic Noise Intrusion into Centre

5.5.1 Outdoor Play Area

Road noise on the east side is likely influenced by road traffic along Victoria Road, and partially from Wiggs Road farther south, was measured to be 57dB(A) $L_{Aeq(1hour)}$ at the western façade.

The predicted traffic noise impacts at the outdoor play areas are presented in Table 5-6 below. The predicted noise level includes the noise barrier as outlined in Section 6.4.

Table 5-6 Predicted Road Traffic Noise Levels Into Outdoor Play Areas

Area	Predicted L_{Aeq} Road Traffic Noise Level – dB(A)	Noise Criterion L_{Aeq} – dB(A)	Compliance (Yes / No)
Backyard Outdoor Play Area	39	55	Yes
First Floor Outdoor Play Area	41	55	Yes

Existing road traffic noise levels in the Outdoor Play areas are predicted to comply with the $L_{Aeq,(1hour)}$ 55 dB(A) (external) criterion stipulated in Section 4.1.4. Based on this assessment no additional no control measures will be required.

5.5.2 Indoor Areas

The typical outdoor to indoor noise reductions provided by most standard glazed facades (i.e. without special acoustical treatment) is generally accepted as being 10 dB(A) through an open window. A closed window is likely to provide at least 20dB noise reduction or more depending on the acoustic performance of the glazing.

It was noted that some windows are fixed and not operable. Determination of closing window/doors is only for the operable glazed window/doors. Taking into account the distance, shielding and glazing performance, the resultant indoor noise levels for opened and closed windows at the northern facade, corresponding to the typical noise reductions are as follow:

Table 5-7 Predicted Road Traffic Noise Levels Into Indoor Areas

Area	Predicted L_{Aeq} Road Traffic Noise Level – dB(A)		Rw Glazing Requirement	Noise Criterion L_{Aeq} – dB(A)	Compliance (Open / Closed)
	Windows Open	Windows Closed			
Playroom 1 (Ground)	51	35	32	40	Closed
Playroom 2 (Ground)	36	26	30	40	Open
Playroom 3 (Ground)	36	26	30	40	Open
Playroom 4 (1st Floor)	39	29	30	40	Open

The glazing acoustic requirement for windows/doors outlined above can be standard glazing, with an acoustic rating of 30 R_w. We note that the R_w rating is required for the complete glazing and frame assembly. The minimum glazing thicknesses will not necessarily meet the required R_w rating without an appropriate frame system. It will be necessary to provide a window glass and frame system having a laboratory tested acoustic performance meeting the specified requirements.

6 RECOMMENDATIONS

The following recommendations must be implemented in order to achieve compliance with the criteria requirements from relevant noise guideline.

6.1 Outdoor Play Areas

In order to achieve compliance with AAAC's noise requirements for outdoor play, the following must be implemented:

- The backyard playground should be limited to 20 children and a maximum of 10 children in the passive play area. And the first-floor outdoor playground can have a maximum of 16 children between the ages of 0 and 2 at one time.
- The south-eastern area of the ground floor playground is to be designated as passive play area, as shown in Figure 6-1. The passive play area should comprise of passive activities such as painting, garden exploration, reading, block-playing or drawing. Maximum of six children can play in the active play area, while a maximum of eight children are permitted in the passive play area.
- Outdoor play time should be limited to the day time period only (7am to 6pm).
- No music is to be played in the outdoor areas
- Outdoor play is to be limited to a maximum of 4 hours per day, ideally 2 hours in the morning and 2 hours in the afternoon.
- Ceiling above ground floor outdoor play area should be lined with absorption material/panels with a Noise Reduction Coefficient (NRC) 0.7.
- Children must be supervised at all times

6.2 Indoor Play Areas

In order to achieve compliance with council's noise requirements for outdoor play, the following must be implemented:

- The windows marked orange in Figure 6-1 must be closed during intensive indoor play time (e.g. children screaming or singing and/or the use of speakers/music).
- The glazing for Playroom 1 must have a minimum Rw 32 and all glazing for the Playrooms should be Rw 30.
- When children are playing outside, all indoor playroom doors are to remain closed.

6.3 Car Park Noise Control Measures

The following noise control measures and management plan should be implemented for the carpark space:

- Parents and guardians should be informed of the importance of noise minimisation when entering the site, dropping off or picking up children. This includes avoiding raising your voice within the centre's carpark area or beeping car horn.
- Carpark ceiling should be fitted with absorption material/panels with a Noise Reduction Coefficient (NRC) of 0.7 to absorb noise emission from the carpark.

6.4 Acoustic Barrier Details

The following noise barriers have been included in the noise prediction model (which is also presented in Figure 6-1):

- A 3m high wall extending 9m long from Playroom 3 is to be constructed parallel with the northern boundary. Layout of the wall is shown in in Figure 6-1.
- The barrier surrounding the backyard playground should have a 2.1 meters high solid barrier with angled cantilever ontop (total height of 2.4m).
- The northern barrier on the first floor playground should be 2.1m high. The eastern and southern side of the first floor playground barrier height should be no less than 1.5m high.

Acoustic barrier is required to provide the adequate noise attenuation, the construction material of the barriers must have a surface density of 10-15 kg/m^2 and be free from holes and gaps. Some suitable materials include:

- 25 mm thick plywood timber panelling
- 9 mm thick fibre cement sheet
- 12 mm thick Perspex, polycarbonate or Danpalon
- 6 mm toughened laminated safety glass
- Any other approved material which meets the above surface density specification

A typical material used in childcare centres is Perspex, which is a polycarbonate material. The use of the 12 mm thick Perspex or 6 mm glass for this purpose which has a surface mass of 11 kg/m^2 will meet the mass requirements detailed above and be suitable for use as it is transparent and will not unduly restrict light or vision.

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

Figure 6-1 Ground Floor - Proposed Child Care Centre Layout

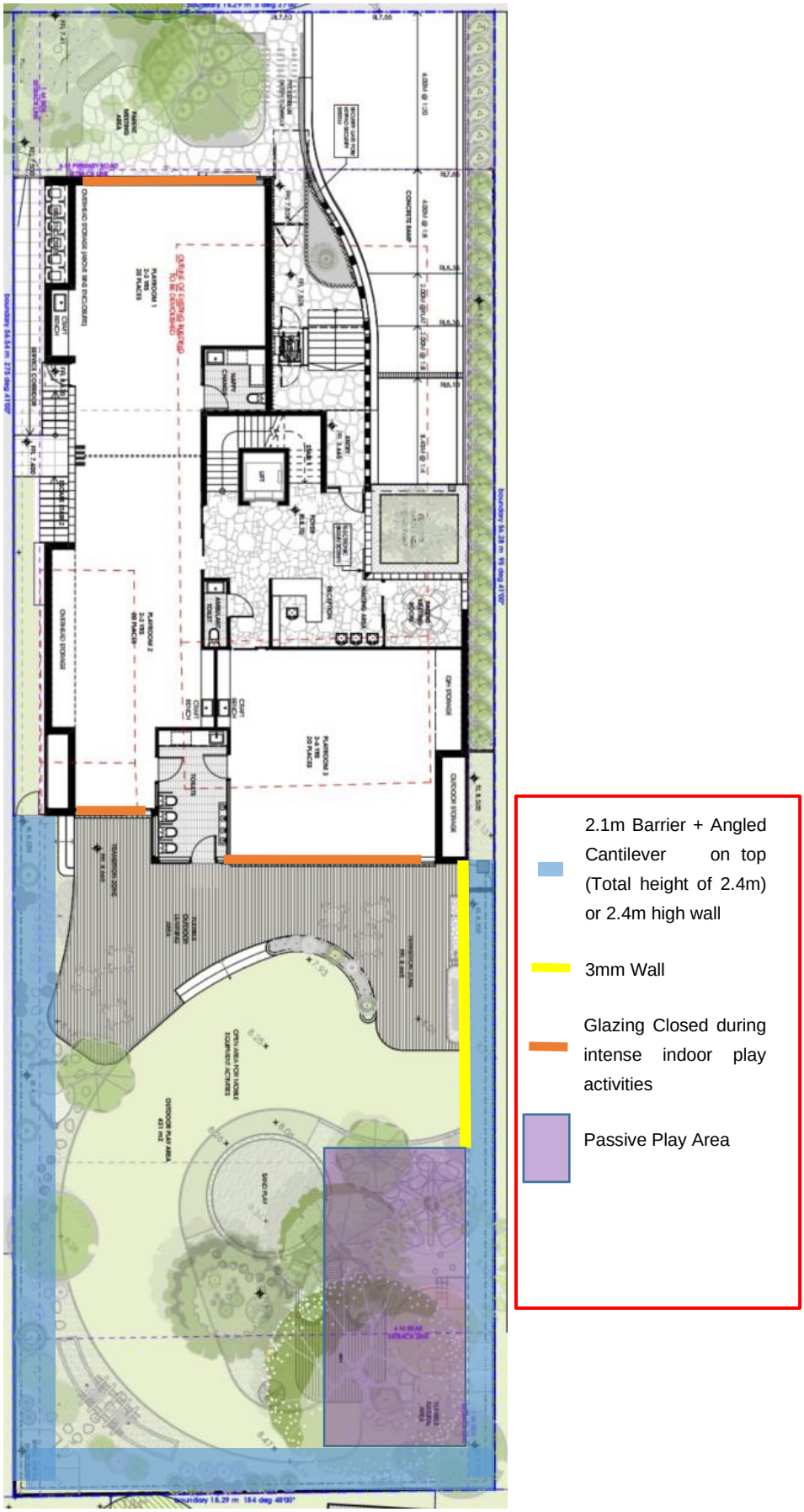
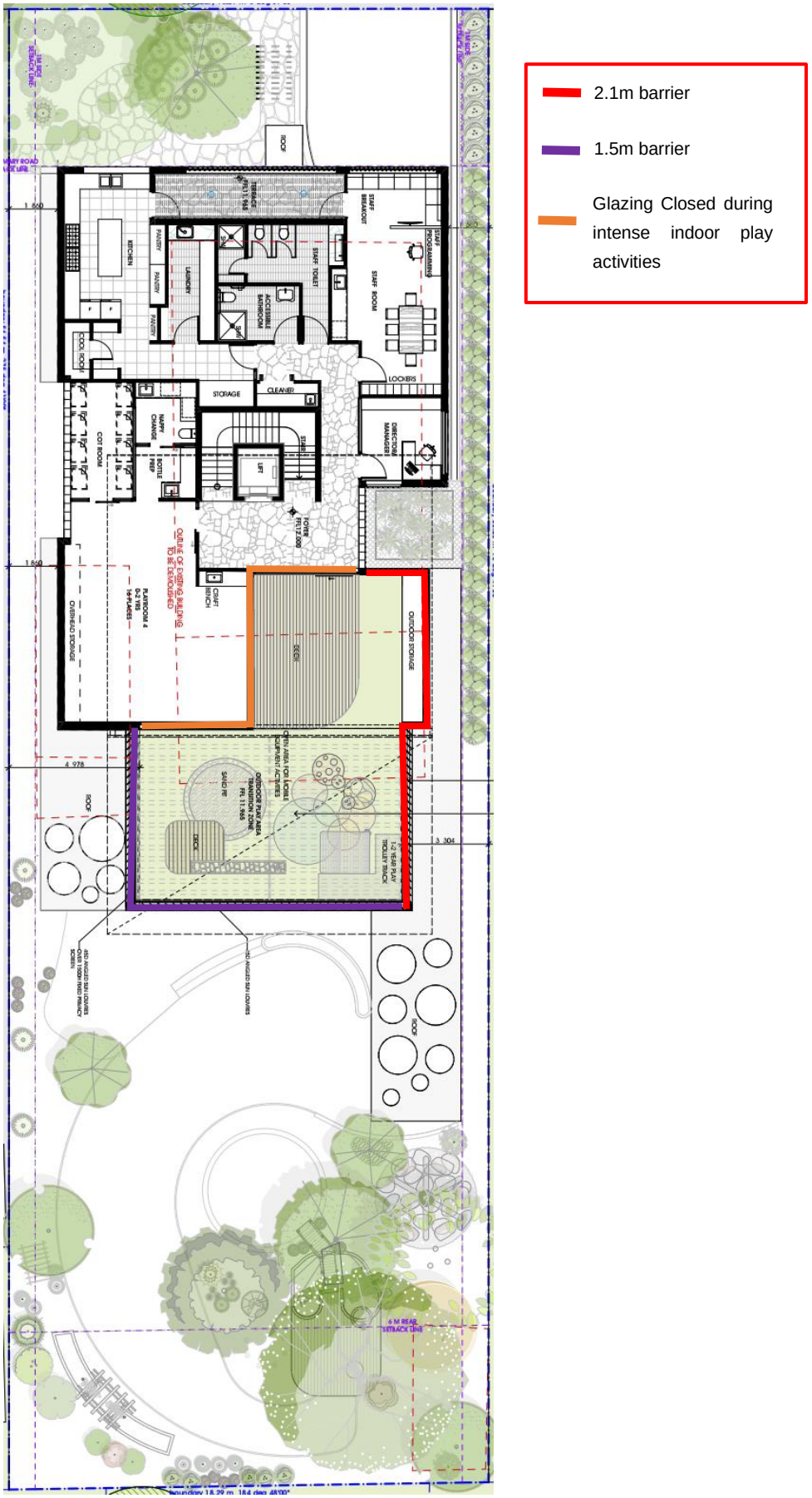


Figure 6-2 First Floor - Proposed Child Care Centre Layout



7 CONCLUSION

RSA has conducted a noise impact assessment of the proposed Child Care Centre at 208 Victoria Road, Punchbowl. The assessment has comprised the establishment of noise criteria and assesses noise impacts with regard to relevant statutory requirements.

Noise emissions from the outdoor area play activities to the nearest residential receivers have been calculated to comply with the noise criterion (4 hour limit). Provided the following control measures are established:

- A 3m high wall extending 9m long from Playroom 3 is to be constructed parallel with the northern boundary. Layout of the wall is shown in in Figure 6-1.
- The barrier surrounding the backyard playground should have a 2.1 meters high solid barrier with angled cantilever ontop (total height of 2.4m).
- The northern barrier on the first floor playground should be 2.1m high. The eastern and southern side of the first floor playground barrier height should be no less than 1.5m high.
- A veggie garden on the north-western area of the outdoor play area is to be established to ensure outdoor passive play is made adjacent to the northern receiver.
- The backyard playground should be limited to 20 children (either 3-6 year olds or 2-3 year olds) and 10 children (either 3-6 year olds or 2-3 year olds) in the proposed veggie garden area. And the first floor outdoor playground can have a maximum of 16 children between the ages of 0 and 2 at one time.

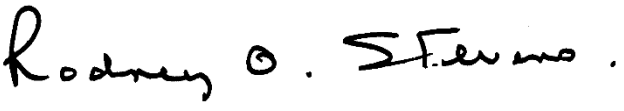
Noise emissions from the indoor play activities and carpark noise to the nearest residential receivers have been calculated to comply with the relevant noise limits, provided the noise control measures outlined in Sections 6.2 and 6.3 are implemented.

Criteria for noise emissions from mechanical plant have been established, a further acoustic survey by a qualified acoustic consultant will be required once mechanical plant schedules have been selected.

Traffic noise intrusion into the indoor playrooms and outdoor play area has been assessed. Provided the sliding doors for the indoor play rooms are closed, the indoor playroom noise limits would be achieved.

Based on our assessment the proposed Child Care Centre at 208 Victoria Road, Punchbowl is deemed to not cause “Offensive Noise” to neighbouring residences provided that the noise control measures recommended is implemented. It is therefore recommended that planning approval be granted for the proposed development on the basis of acoustics.

Approved:-



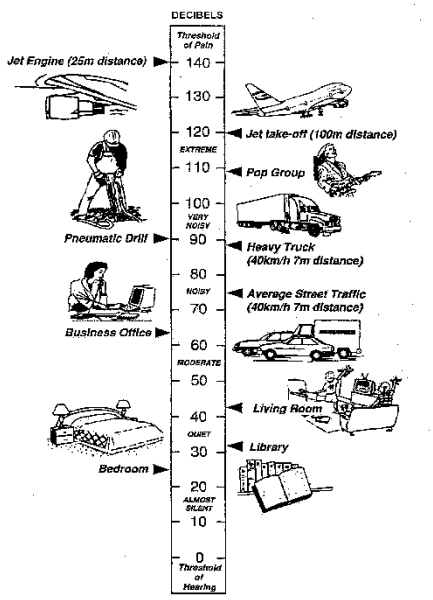
Rodney Stevens

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: ▪ 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 10th 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)*.

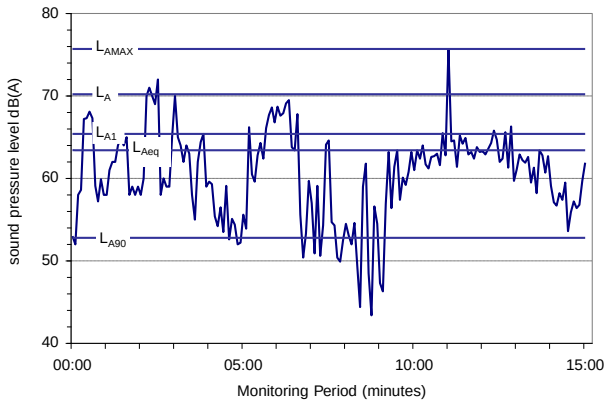
Sound Pressure Level (SPL)

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:



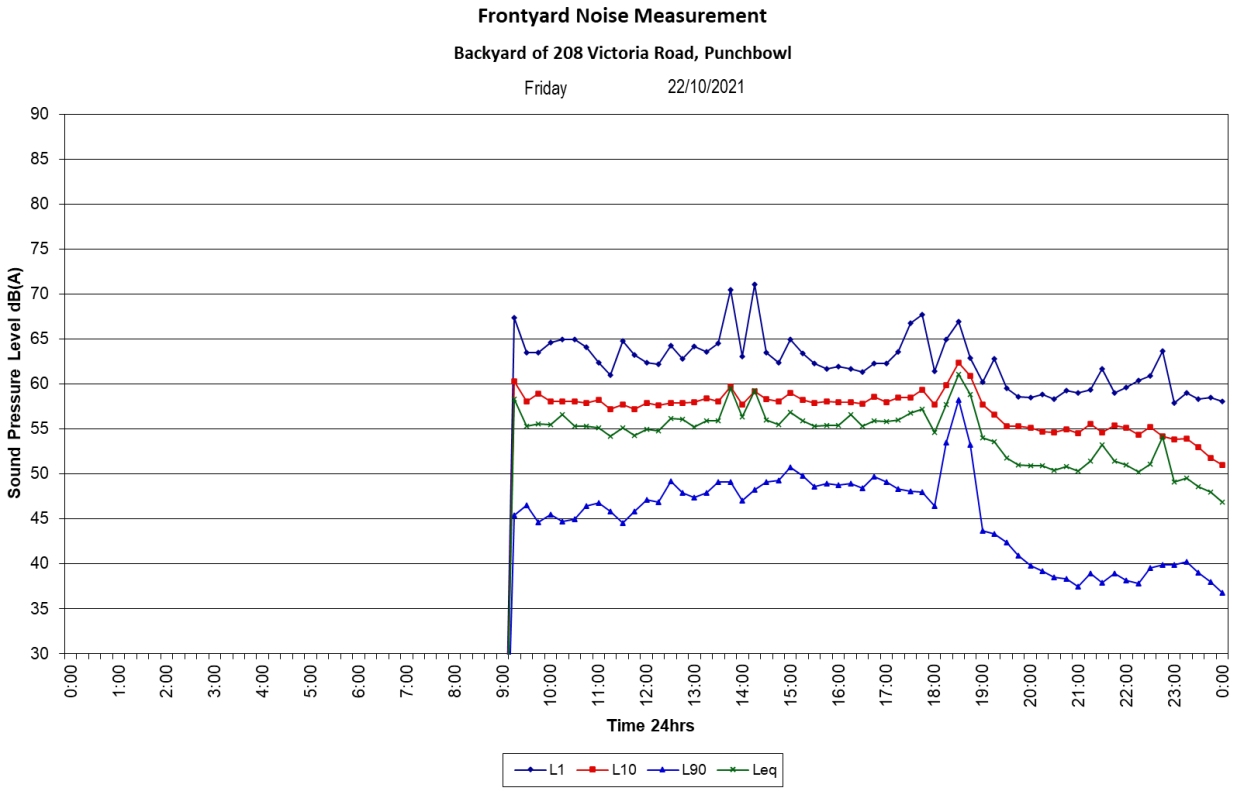
Key descriptors:

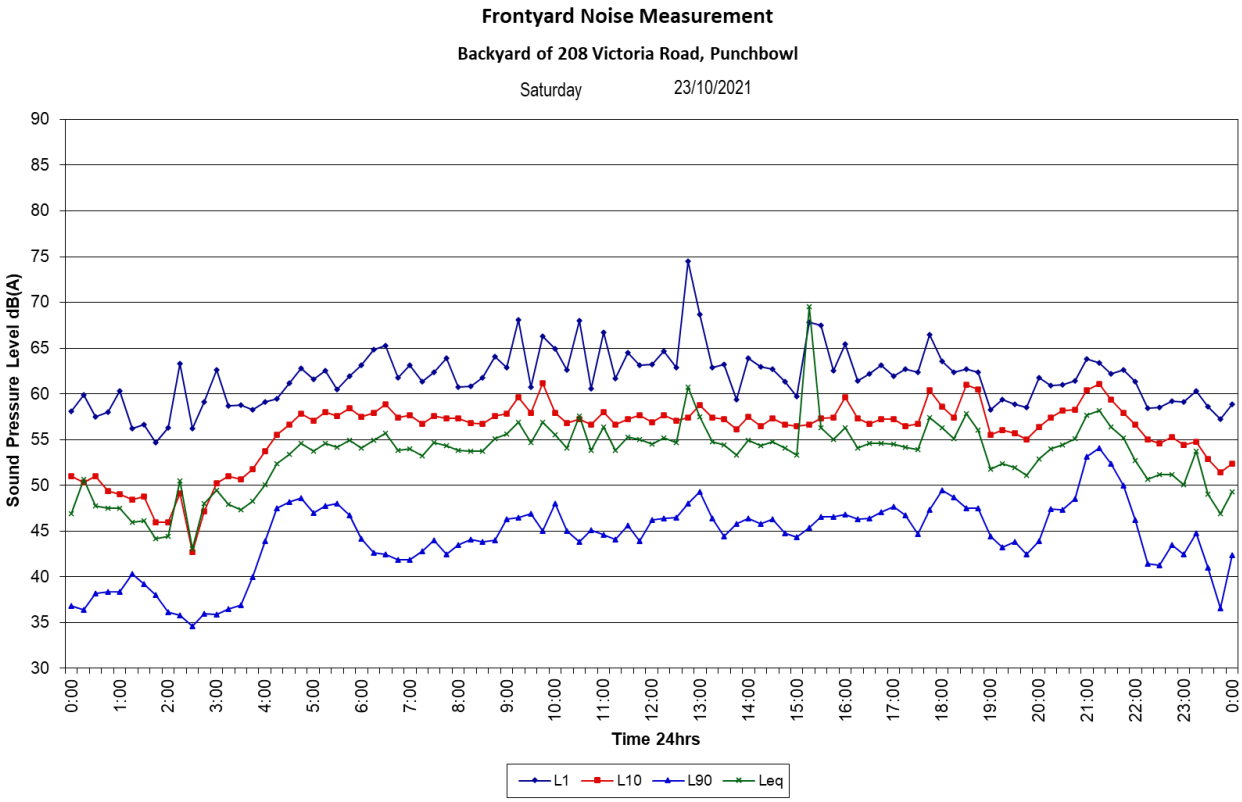
L_{Amax} Maximum recorded noise level.

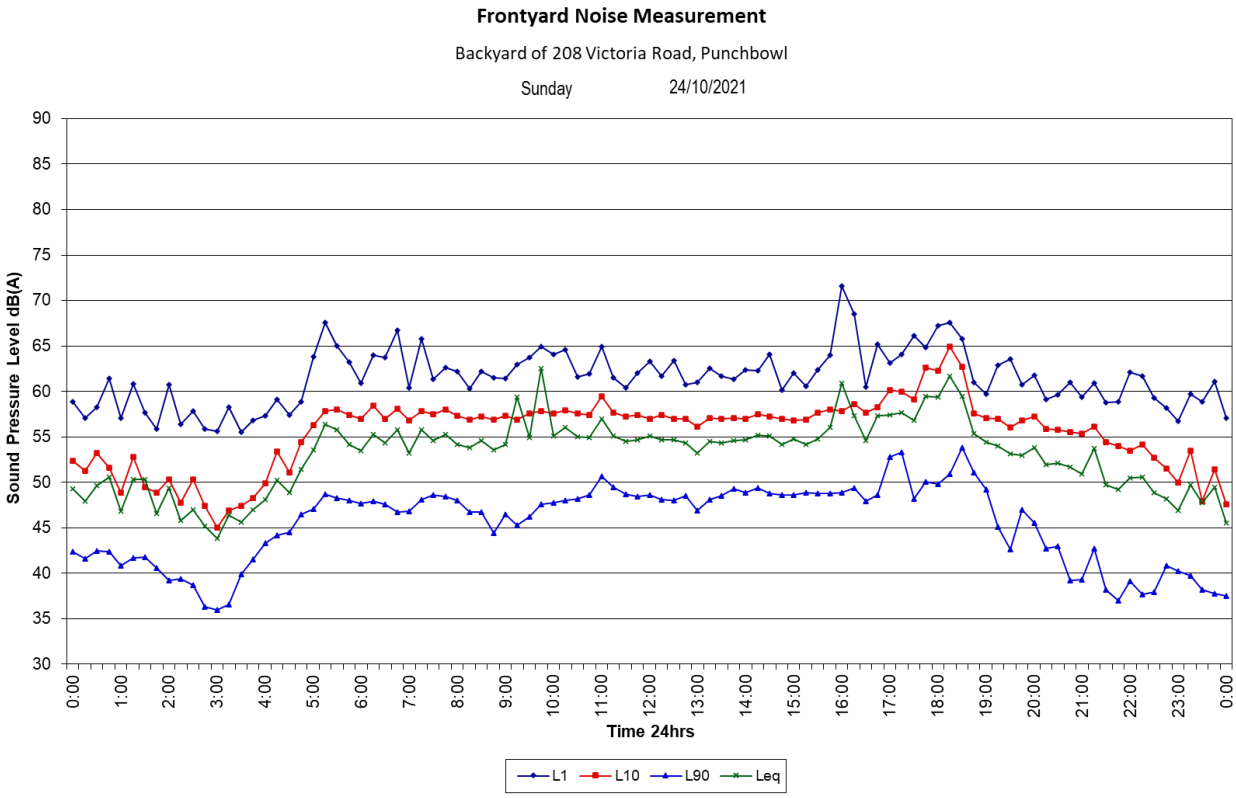
L_{A1} The noise level exceeded for 1% of the 15 minute interval.

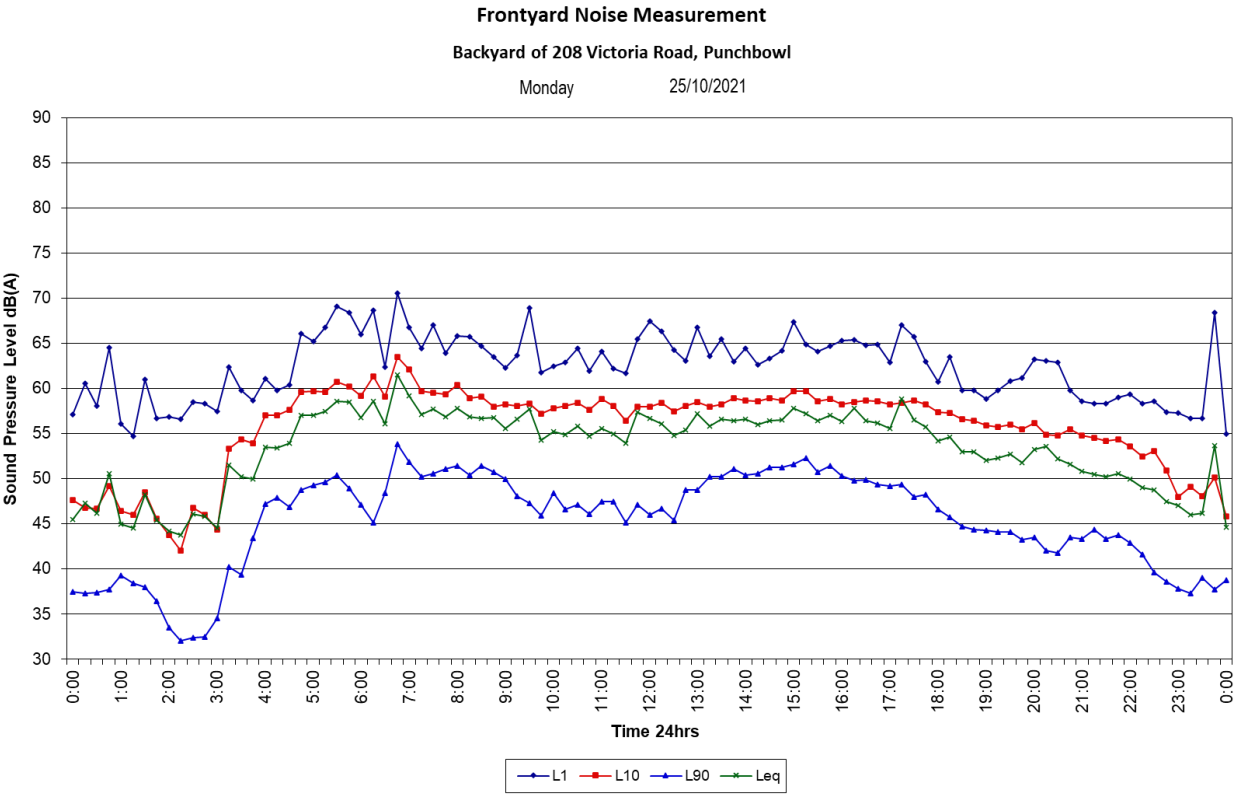
	L_{A10} Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level. L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding 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

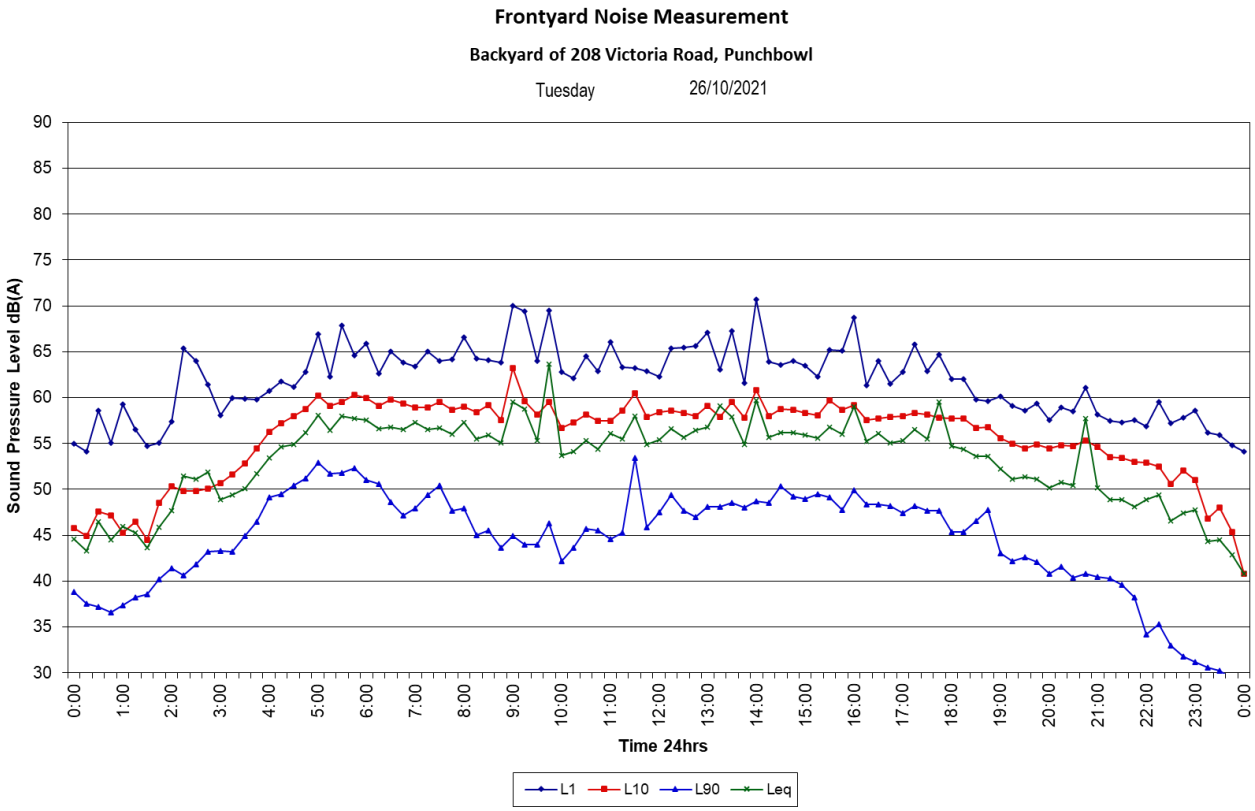


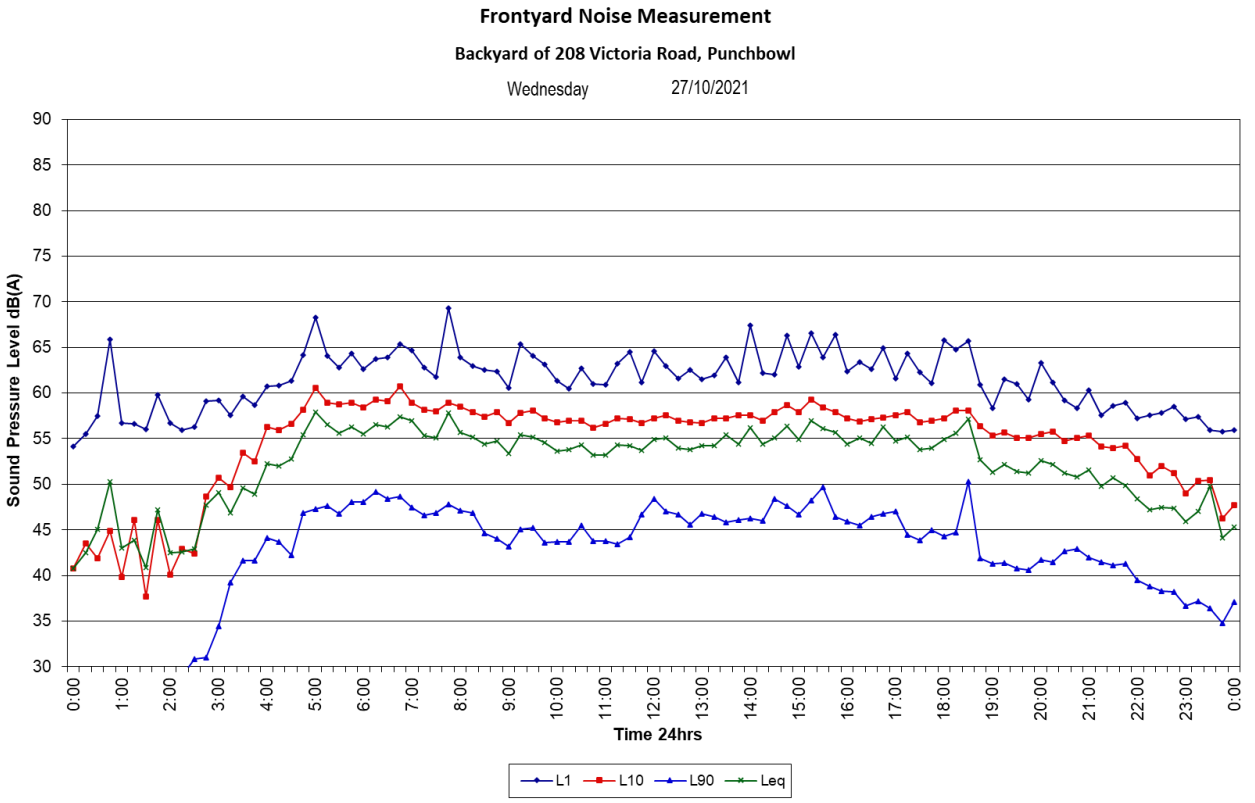


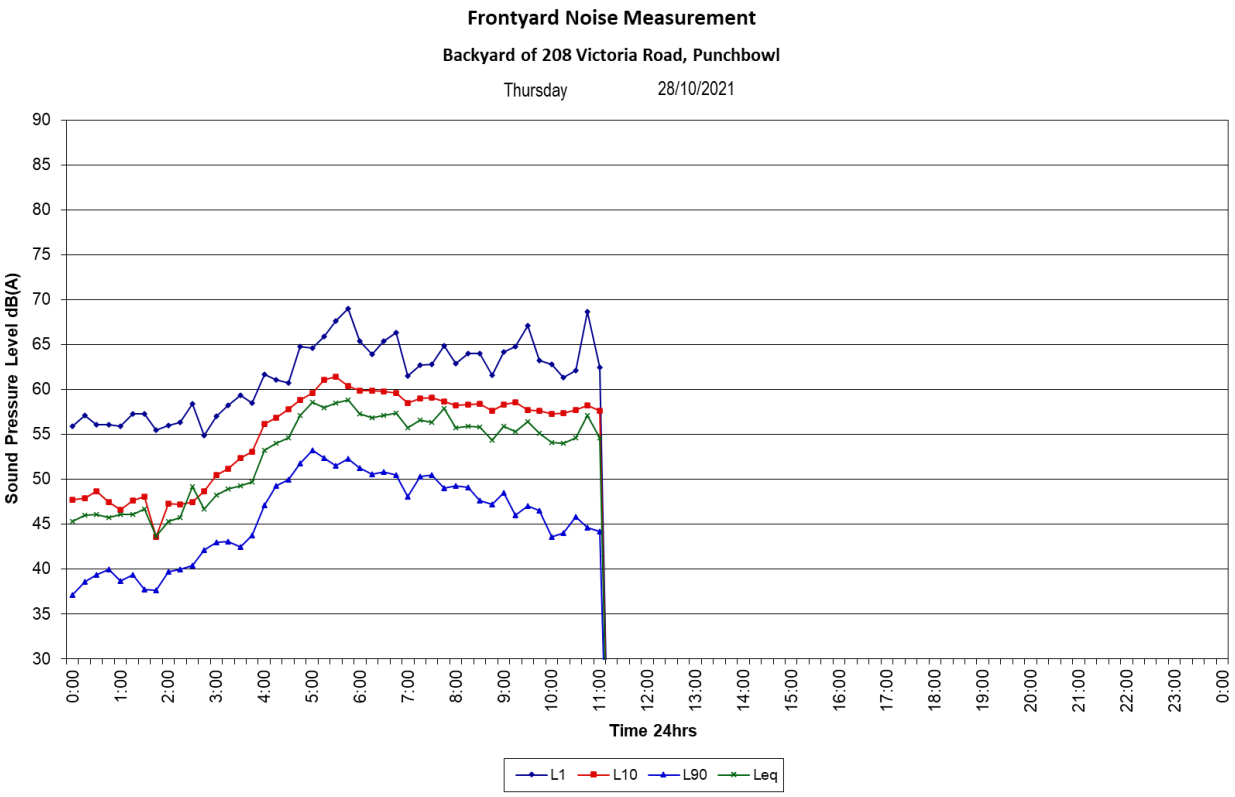


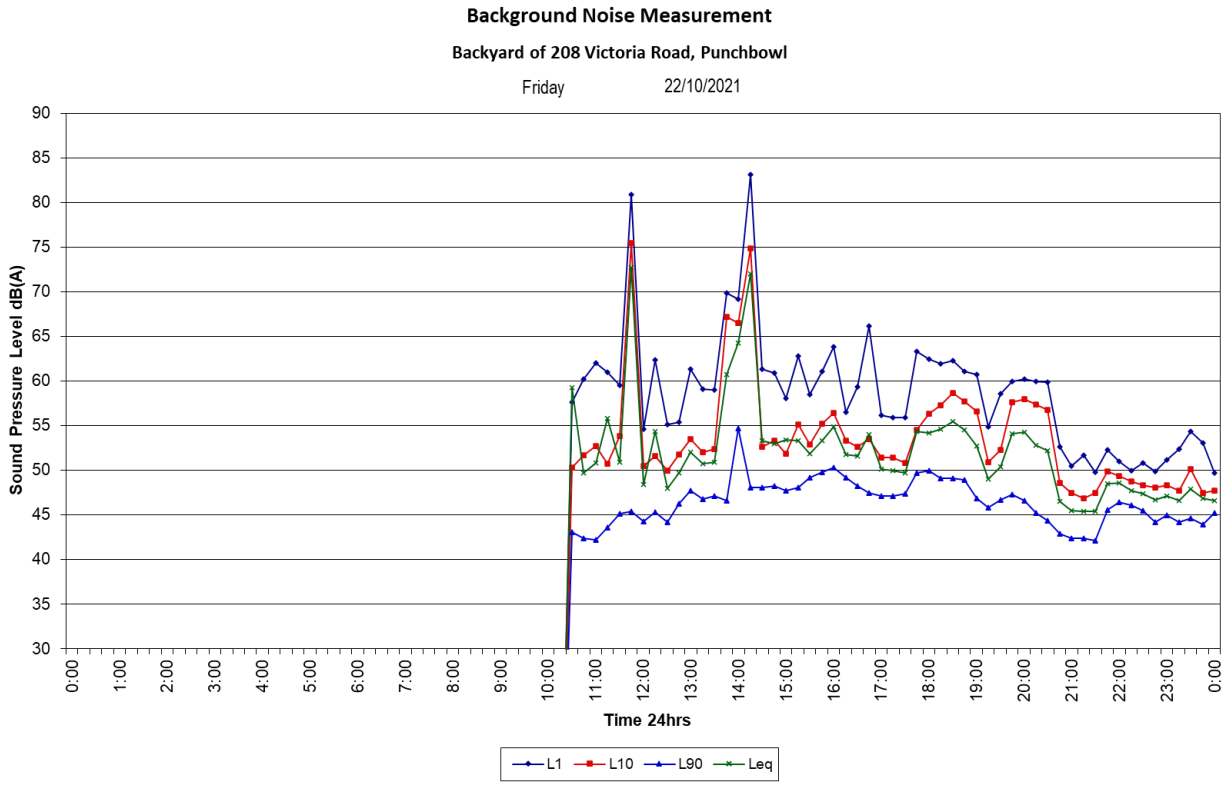


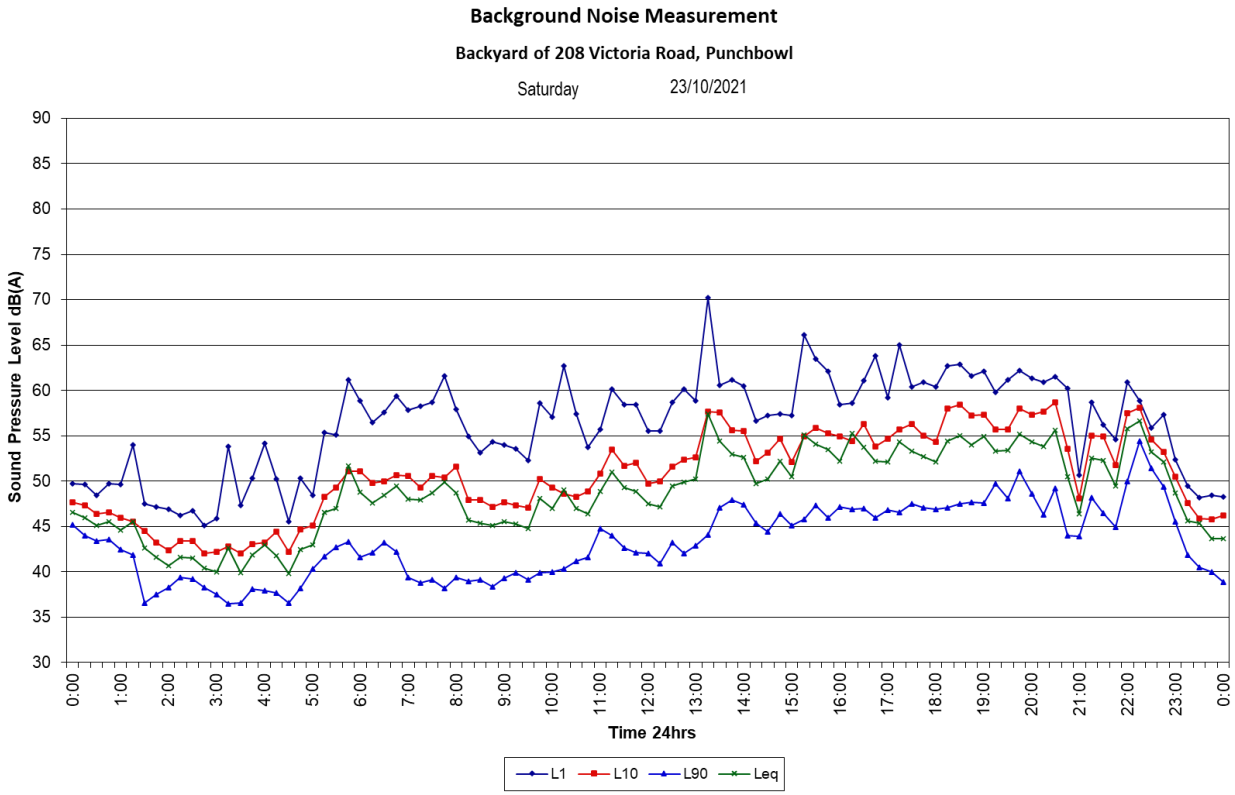
Ambient Logger

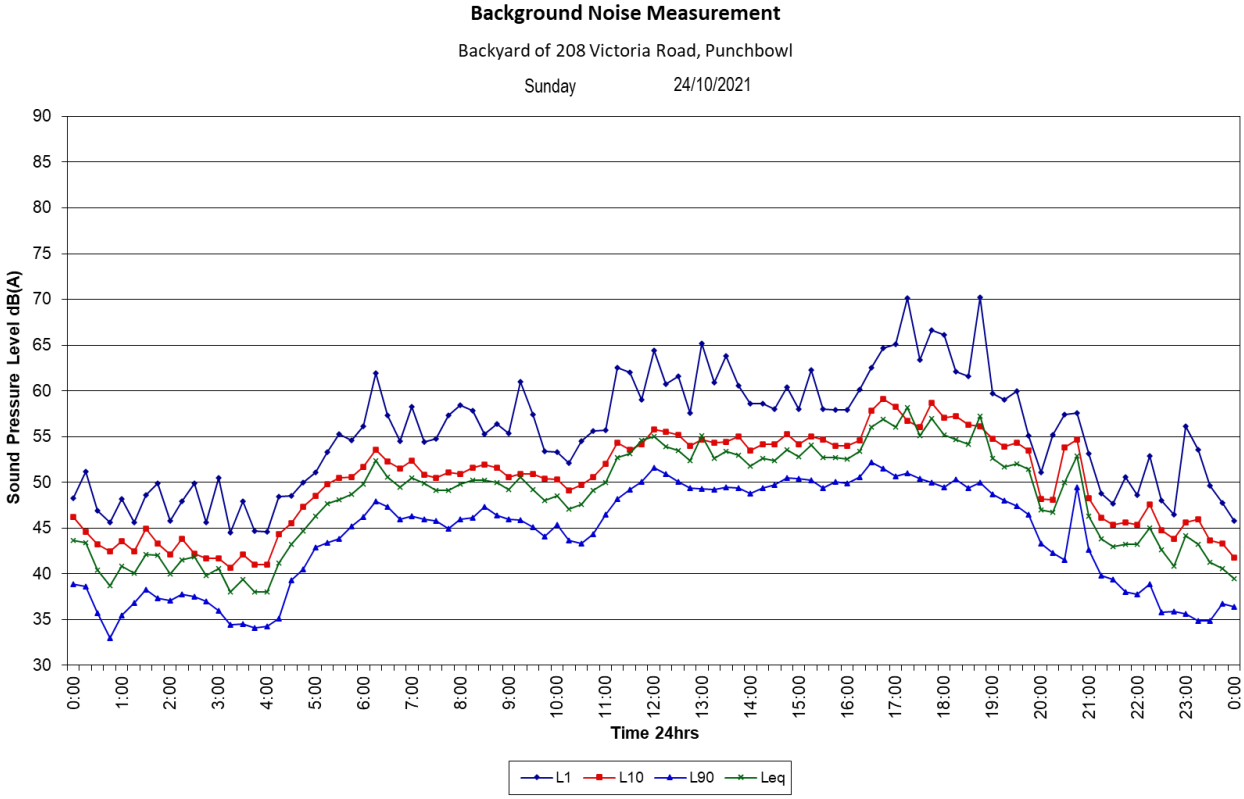

Frontyard Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Tuesday 26/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Frontyard Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Wednesday 27/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Frontyard Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Thursday 28/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Background Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Friday 22/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Background Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Saturday 23/10/2021
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


Background Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Sunday 24/10/2021
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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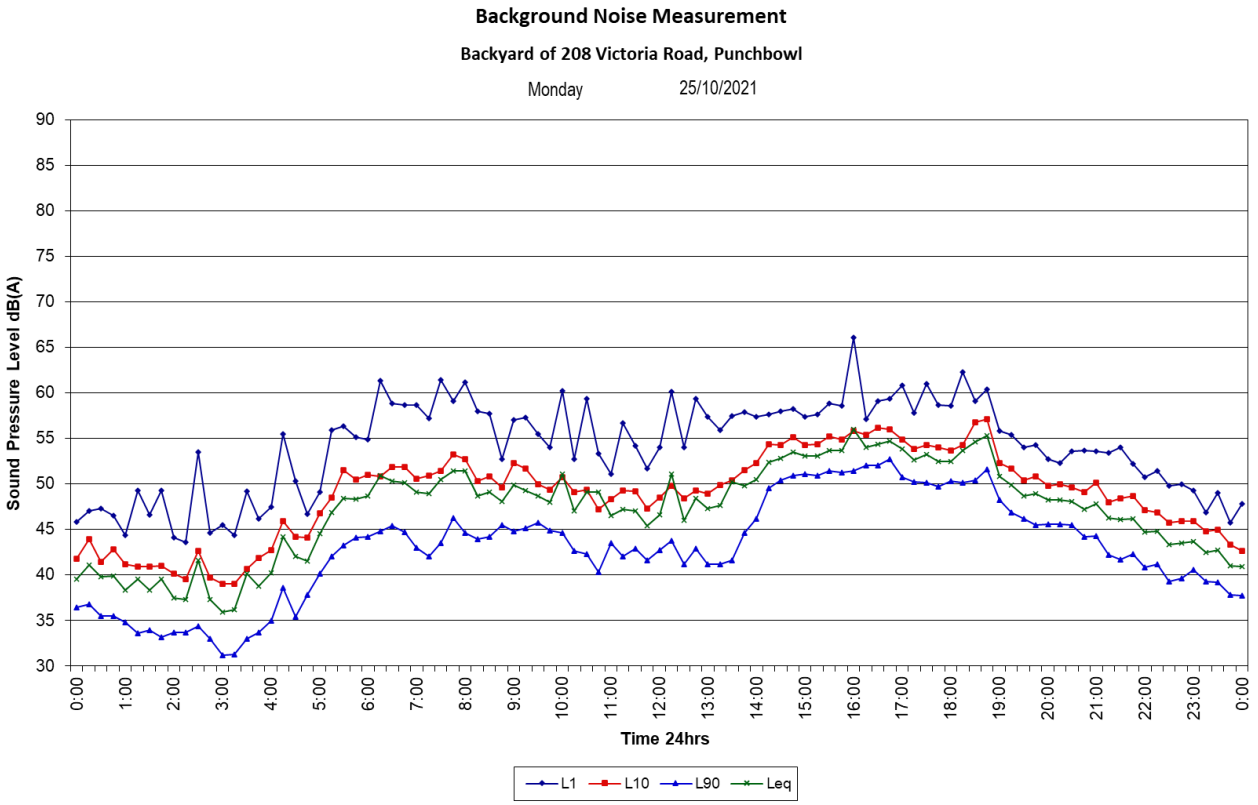
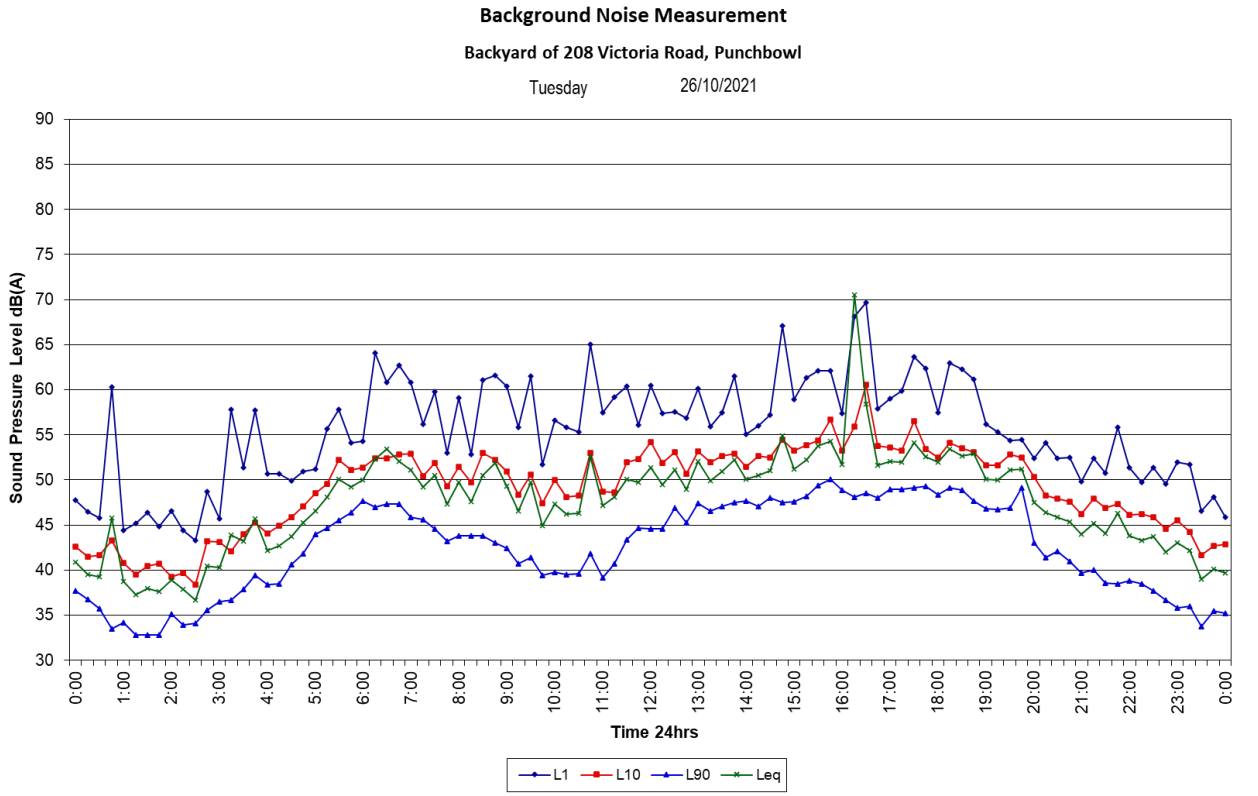
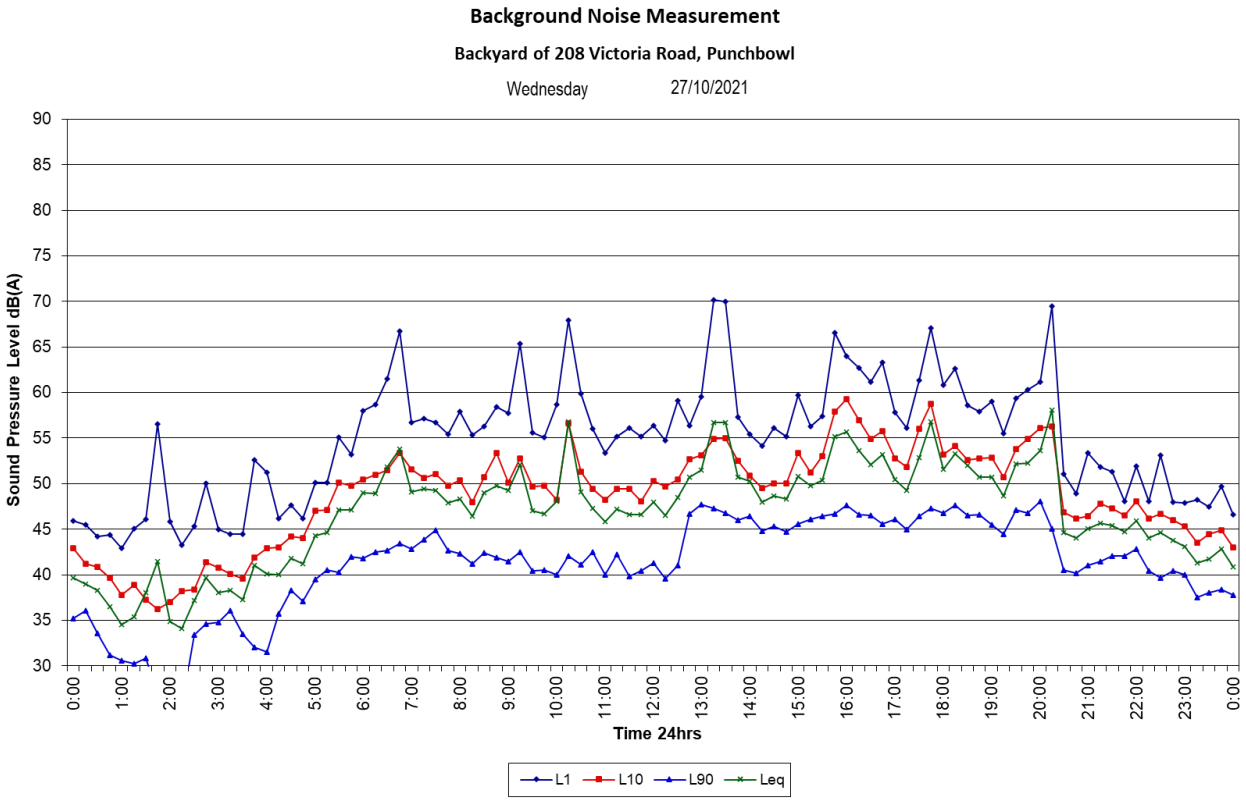
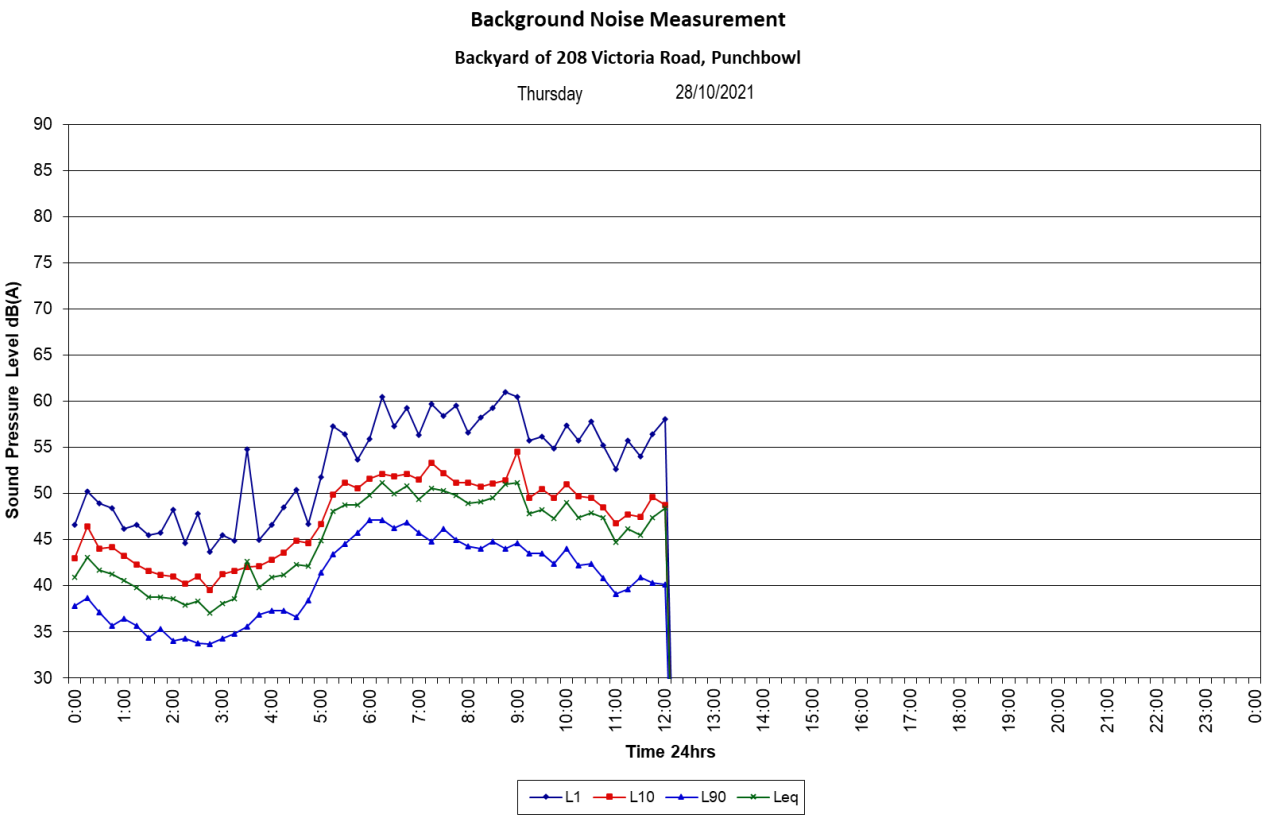
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Monday 25/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Background Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Tuesday 26/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Background Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Wednesday 27/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Background Noise Measurement
Backyard of 208 Victoria Road, Punchbowl
Thursday 28/10/2021
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq

Appendix C – Calibration Certificates

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 C21599

Client Details	Acoustic Research Labs Pty Ltd 36/14 Loyalty Road North Rocks NSW 2151
Equipment Tested/ Model Number :	ARL Ngara
Instrument Serial Number :	87802E
Microphone Serial Number :	315009
Pre-amplifier Serial Number :	27880

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24.7°C	**Ambient Temperature :**	24.8°C
Relative Humidity :	43%	**Relative Humidity :**	42.9%
Barometric Pressure :	100.4kPa	**Barometric Pressure :**	100.4kPa

Calibration Technician : Lucky Jaiswal **Secondary Check:** Rhys Gravelle
Calibration Date : 18 Oct 2021 **Report Issue Date :** 18 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	*N/A*
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 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

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C21601

Client Details	Acoustic Research Labs Pty Ltd 36/14 Loyalty Road North Rocks NSW 2151
Equipment Tested/ Model Number :	ARL Ngara
Instrument Serial Number :	8780F0
Microphone Serial Number :	320920
Pre-amplifier Serial Number :	28270

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	25°C	**Ambient Temperature :**	23.4°C
Relative Humidity :	42.2%	**Relative Humidity :**	39.9%
Barometric Pressure :	100.2kPa	**Barometric Pressure :**	100.2kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Rhys Gravelle
Calibration Date :	18 Oct 2021	**Report Issue Date :**	18 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	*N/A*
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 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.

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