ACOUSTIC ASSESSMENT

Proposed Childcare Centre Development

31-32 Park Avenue Kingswood NSW

Report To:

MIM Property Pty Ltd

Report By:

NG Child & Associates

19 August 2021

`

DOCUMENT CONTROL REGISTER

Project Reference	CA/21/172/2002
Project Name	Acoustic Assessment for a Proposed Childcare Centre Development at 31-32 Park Avenue Kingswood NSW – Based on Final Plans and Drawings
Document Title	Acoustic Assessment: Proposed Childcare Centre Development 31-32 Park Avenue Kingswood NSW (Version 2: August 19th, 2021)
Document Reference	Park Avenue – Acoustic Assessment for Childcare (Version 2) – 190821.docx
Issue Type	Electronic
Attention	Eltin Miletic

Version	Date	Document Reference	Prepared By	Checked By	Approved By
1	31 July 2021	Park Avenue – Acoustic Assessment for Childcare (Version 1) – 310721.docx	NGC	HMC	NGC
1	19 August 2021	Park Avenue – Acoustic Assessment for Childcare (Version 2) – 190821.docx	NGC	HMC	NGC

TABLE OF CONTENTS

APPENDICES

LIST OF DIAGRAMS

LIST OF TABLES

EXECUTIVE SUMMARY

INTRODUCTION

MIM Property Pty Ltd is involved in the planning, design and prospective development of a new childcare centre at 31-32 Park Avenue Kingswood, NSW. The prospective developments involves the demolition of existing structures at the site; associated site preparation works, and the development of new, purpose designed and built childcare centre

.

This report presents an acoustic assessment of the proposed development.

The key findings and recommendations of the assessment are summarised below.

ACOUSTIC ASSESSMENT – CHILDCARE CENTRE

Key Findings:

The following is a summary of the key findings of this assessment:

1. Sound levels of less than 40 dB(A) will be achieved throughout the internal areas of the proposed childcare centre, based on measured background sound levels and proposed layout and design details as described in this report;

2. Sound levels in the range 30-35 dB(A) will be achievable within any sleep areas or cot rooms associated with the proposed facility, based on measured background sound levels; and proposed layout and design details as described in this report;

3. Background noise levels of less than 55 dBA are projected to be achieved within the two outdoor play areas associated with the proposed childcare centre;

4. The level of noise estimated to be generated by activities within the internal areas of the proposed facility is projected to be essentially contained by the building structure of the childcare centre building itself, and accordingly is projected to have no negative or non-compliant impacts on surrounding buildings, activities and individuals;

5. The level of noise estimated to be generated by activities within the outdoor activity areas associated with the proposed childcare centre is projected to have no negative or non-compliant impacts on surrounding buildings, activities and individuals, subject to the implementation of the recommendations summarised below;

6. The level of noise associated with motor vehicle activities associated with the proposed childcare centre, including the drop-off and pick-up of children is projected to have no negative or non-compliant impacts on surrounding buildings, activities and individuals, subject to the implementation of the recommendations summarised below; and

7. On this basis, the acoustic performance of the proposed childcare centre will comply fully with the requirements of all relevant acoustic guidelines and requirements.

Recommendations:

The assessment has found that the proposed childcare centre will comply with the requirements of all relevant acoustic guidelines and regulations, subject to the advice provided generally in this report; adherence to normally accepted design and building practices, and the implementation of the following recommendations:

1. External windows and doors are fitted with 6.38 mm laminated glass, or minimum acoustic equivalent;

2. External window and door frames are fitted to façade openings with a sealant such as "Bostik Fireban One", or equivalent;

3. Full perimeter acoustic seals equal to Schlegel Q-Lon seals to be fitted to all external windows and doors;

4. Solid form metal panel boundary fencing (or acoustic equivalent) of height 1800 mm with a minimum Rw rating of 15 to be installed along the northern and eastern outdoor play area boundaries with adjacent residential properties, as detailed in this report;

5. A combination of 1800 mm gap-free laminated 6.38 mm safety glass panels and 800 mm gap-free laminated 6.38 mm safety glass panels mounted on 1000 mm concrete block walls are installed at the external boundaries of the proposed Level 1 terraced outdoor play area, as detailed in this report;

6. Mineral wool-based ceiling insulation equivalent to Bradford SoundScreen™ 2.5 with a minimum Rw rating of 43 to be fitted in the roof void of the childcare centre building;

7. A Noise Management Plan consistent with the guidelines provided in Section 6.5.10 above is prepared and included in the overall Management Plan for the childcare centre;

8. Management of children in the outdoor play area of the childcare centre is undertaken in accordance with the protocols set out in this report; and

9. The acoustic performance of all plant and equipment associated with the facility is validated following construction, and prior to the issue of an Occupation Certificate for the premises.

On this basis, it is the finding of this acoustic assessment that the acoustic performance of the proposed childcare centre will comply fully with the requirements of all relevant acoustic guidelines and requirements.

OVERALL CONCLUSION

The overall conclusion of this acoustic assessment is that:

- Subject to consideration of the various comments and implementation of the various recommendations set out in this report, as summarised above, the childcare centre proposed for development at 31-32 Park Avenue Kingswood can reasonably be expected to comply with the requirements of all relevant acoustic guidelines and regulations.

Noel Child BSc (Hons), PhD, MIEA, MRACI
Visiting Fellow, Engineering
University of Technology, Sydney
Principal, NG Child & Associates
19 August 2021

1 INTRODUCTION

MIM Property Pty Ltd is involved in the planning, design and prospective development of a new two level childcare centre at 31-32 Park Avenue Kingswood, NSW. The proposed centre will accommodate a total of 116 children, comprising sixteen 0-2 year old's; twenty 2-3 year old's and eighty 3-5 year old's. Sixty-six children will be accommodated in the ground floor areas, and fifty in the Level 1 areas.

MIM Property Pty Ltd has engaged NG Child & Associates undertake the acoustic assessment required for the Development Application submission associated with the project.

NG Child & Associates has considerable experience in the evaluation and assessment of childcare centre developments

Noel Child of NG Child & Associates is a suitably qualified and experienced person to undertake the various assessments required. His CV has been included for reference at Appendix D.

This document describes the acoustic assessment undertaken and presents its findings and recommendations.

2 SITE & ASSESSMENT DETAILS

2.1 LOCATION

The location of 31-32 Park Avenue Kingswood is shown highlighted in blue in Figure 2.1 below. The direction of north is towards the top of the diagram, and an approximate indication of scale is included below.

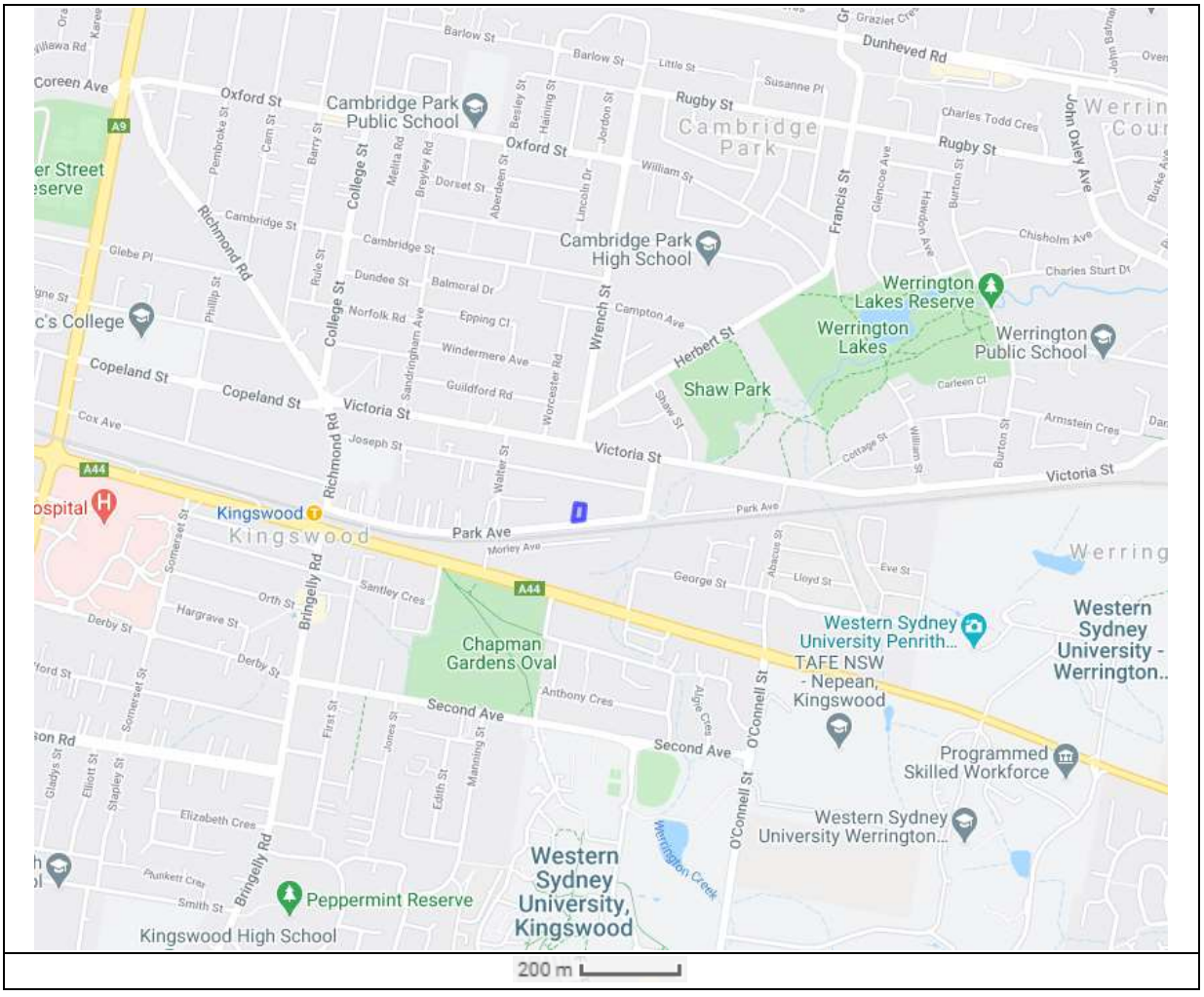


Figure 2.1 – Location of 31-32 Park Avenue Kingswood

A recent (July 5th, 2021) satellite photograph of the site is provided in Figure 2.2, below.

Figure 2.2 – Satellite Photograph of 31-32 Park Avenue Kingswood (July 5th, 2021)

The site comprises land of approximate area 1430 square metres with frontage to Park Avenue. The nearest significant thoroughfare is Park Avenue. The Great Western Highway is some 200 metres to the south.

2.2 LAND DETAILS & ZONING

The proposed site falls within the local government area of Penrith City Council, and relevant local government consents and approvals regarding site and the proposed development reside with that Council.

Zoning details applicable to the site and nearby areas are provided in Figure 2.3, below, based on information available from the current Penrith Local Environment Plan.

The site is shown at the centre of the diagram. The site is zoned “R3 – Medium Density Residential”. Adjoining and nearby properties are similarly zoned.

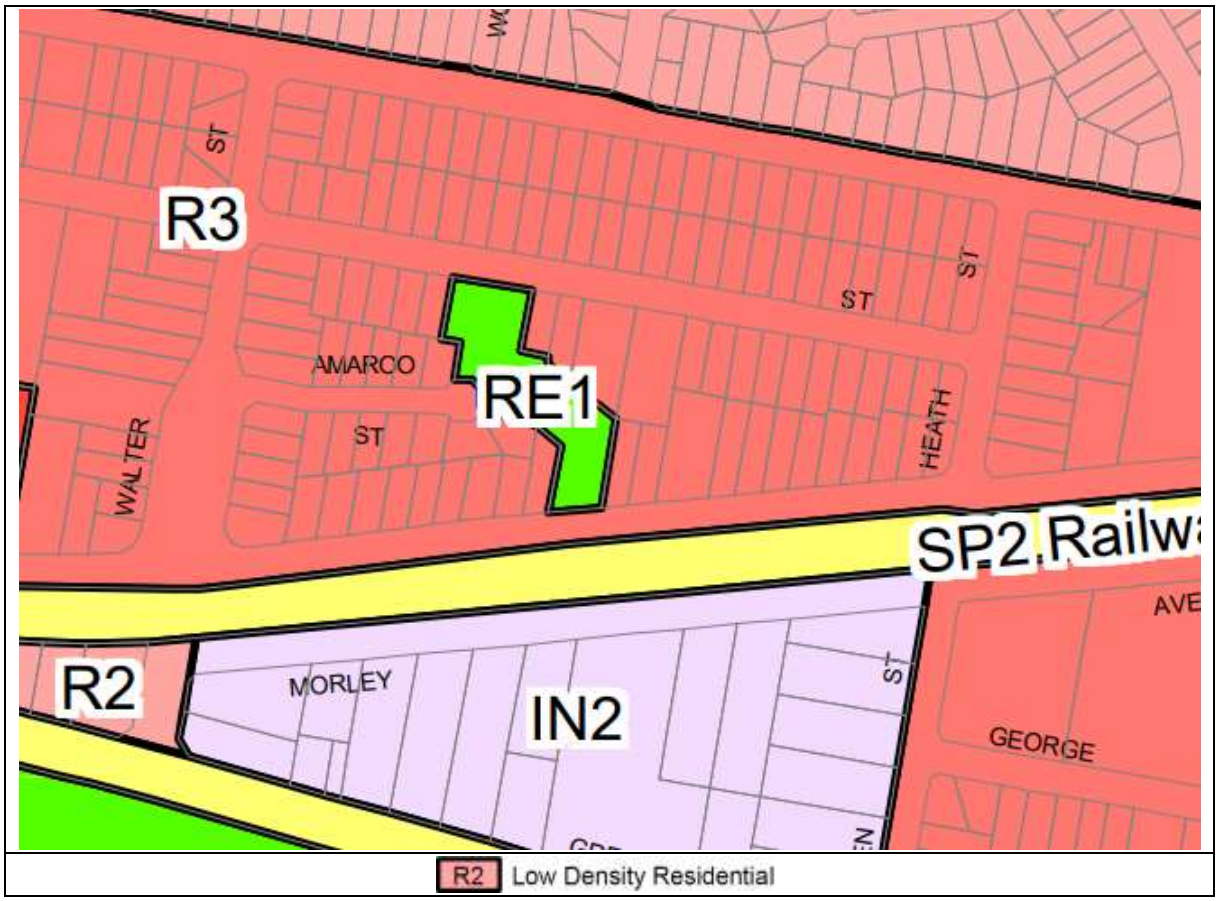


Figure 2.3 – Zoning Details

A photograph of the existing residential dwelling at the site is shown in Figure 2.4, below.

Figure 2.4 – View of the Site from Park Avenue

3 PROPOSED DEVELOPMENT

The proposed development involves the demolition and removal of existing structures, and the construction of a new purpose built childcare centre in accordance with the plans and drawings provided in Figures 3.1 to 3.18 on subsequent pages, as follows:

Figure 3.1 Site Analysis

Figure 3.2 Notification Plan

Figure 3.3 Basement Plan

Figure 3.4 Ground Floor Plan

Figure 3.5 First Floor Plan

Figure 3.6 Roof Plan

Figure 3.7 Section

Figure 3.8 Section BB

Figure 3.9 Window & Door Schedule

Figure 3.10 Elevations 01

Figure 3.11 Elevations 02

Figure 3.12 Streetscape Elevation

Figure 3.13 Material Schedule

Figure 3.14 3D Views 01

Figure 3.15 3D Views 02

Figure 3.16 3D Views 03

Figure 3.17 3D Views 04

Figure 3.18 3D Views 05

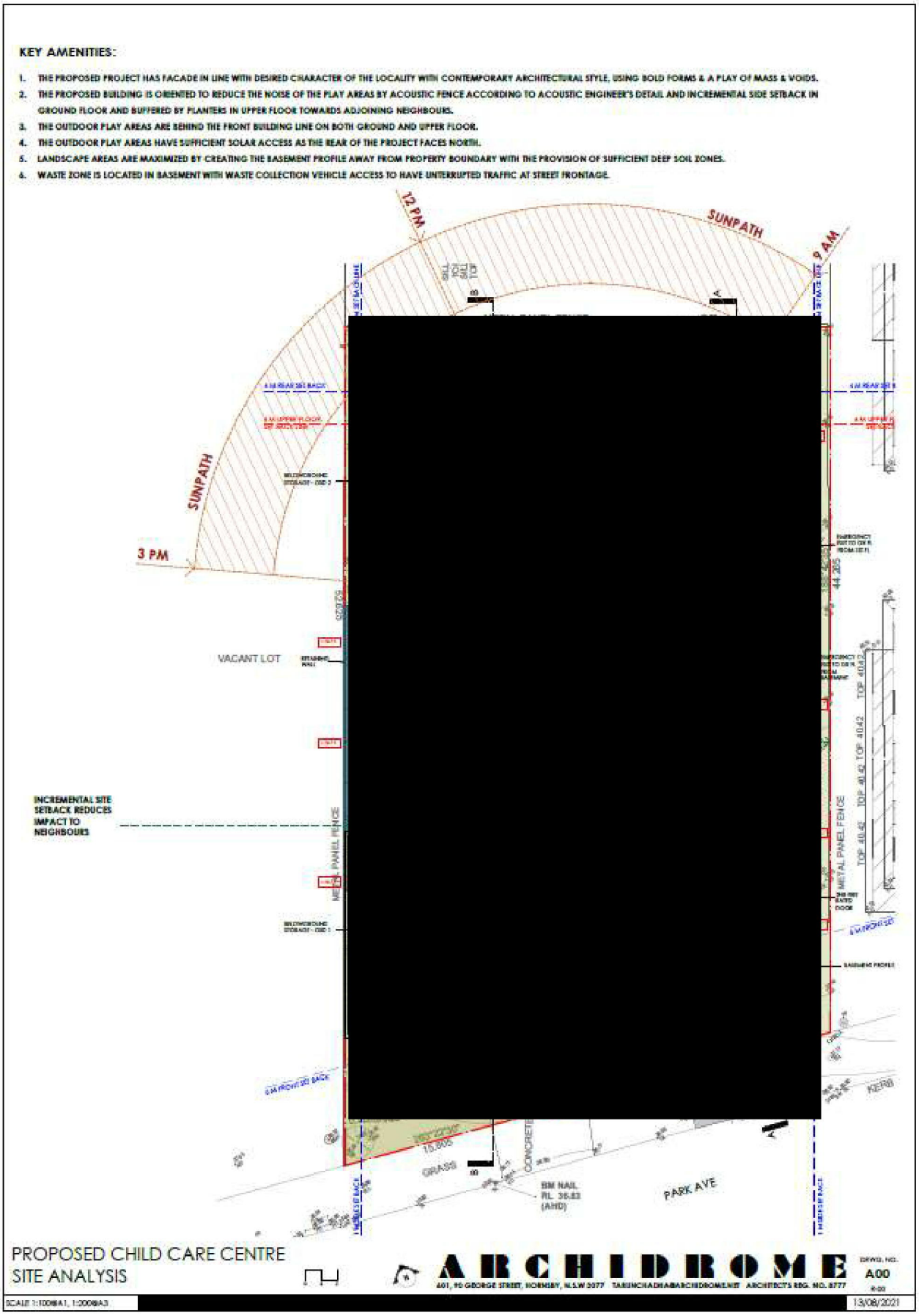


Figure 3.1 – Site Analysis

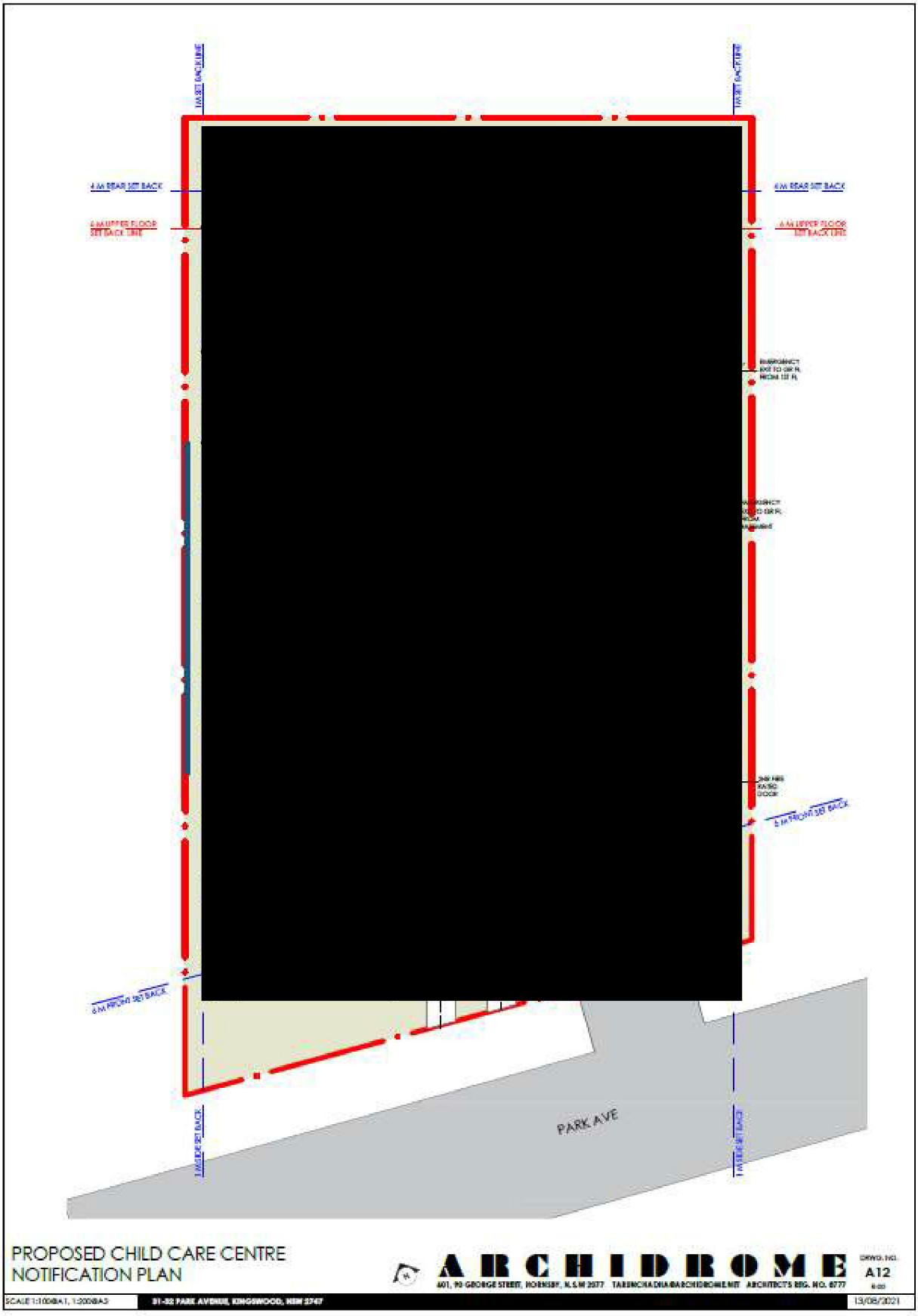


Figure 3.2 – Notification Plan

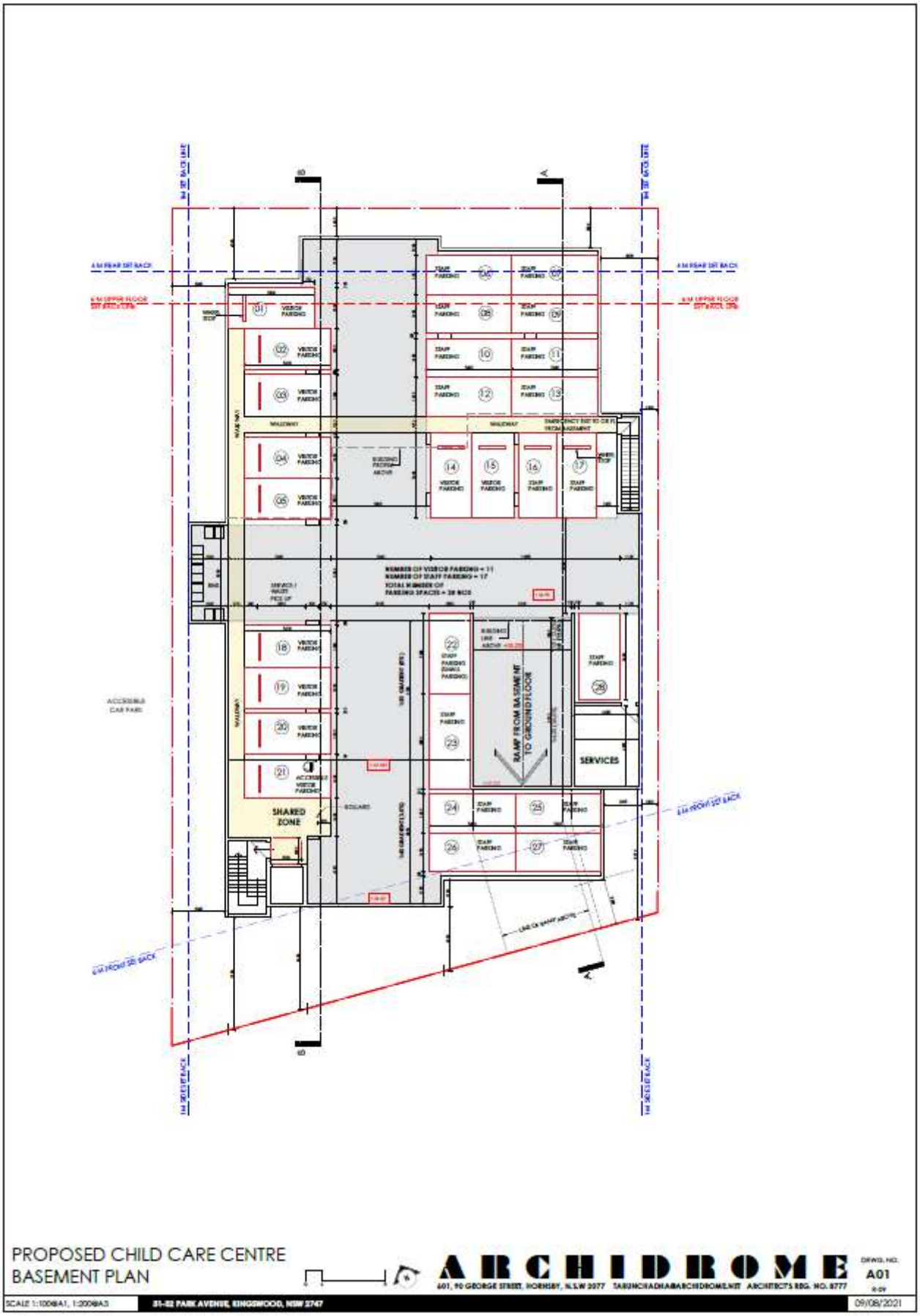


Figure 3.3 – Basement Plan

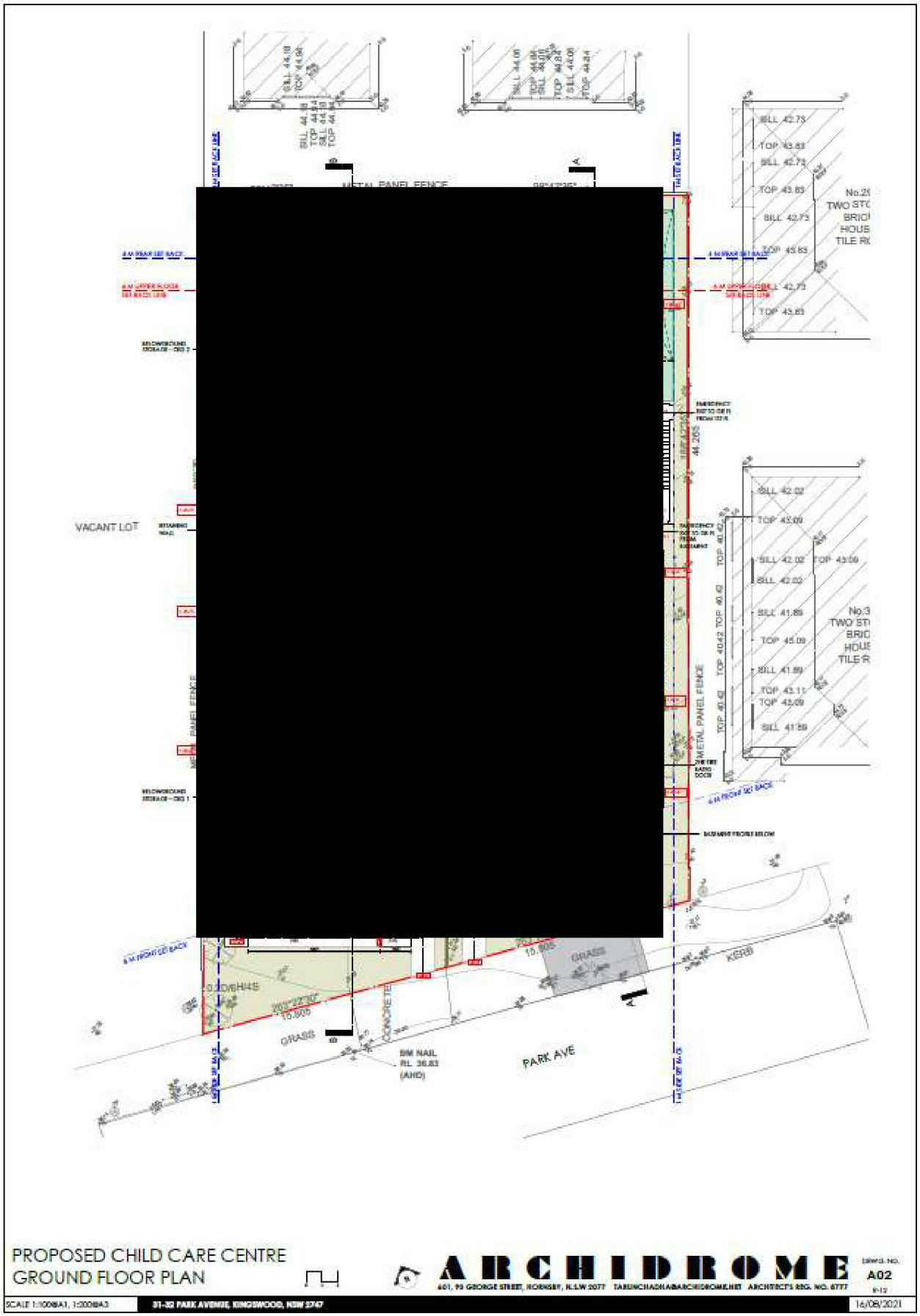


Figure 3.4 – Ground Floor Plan

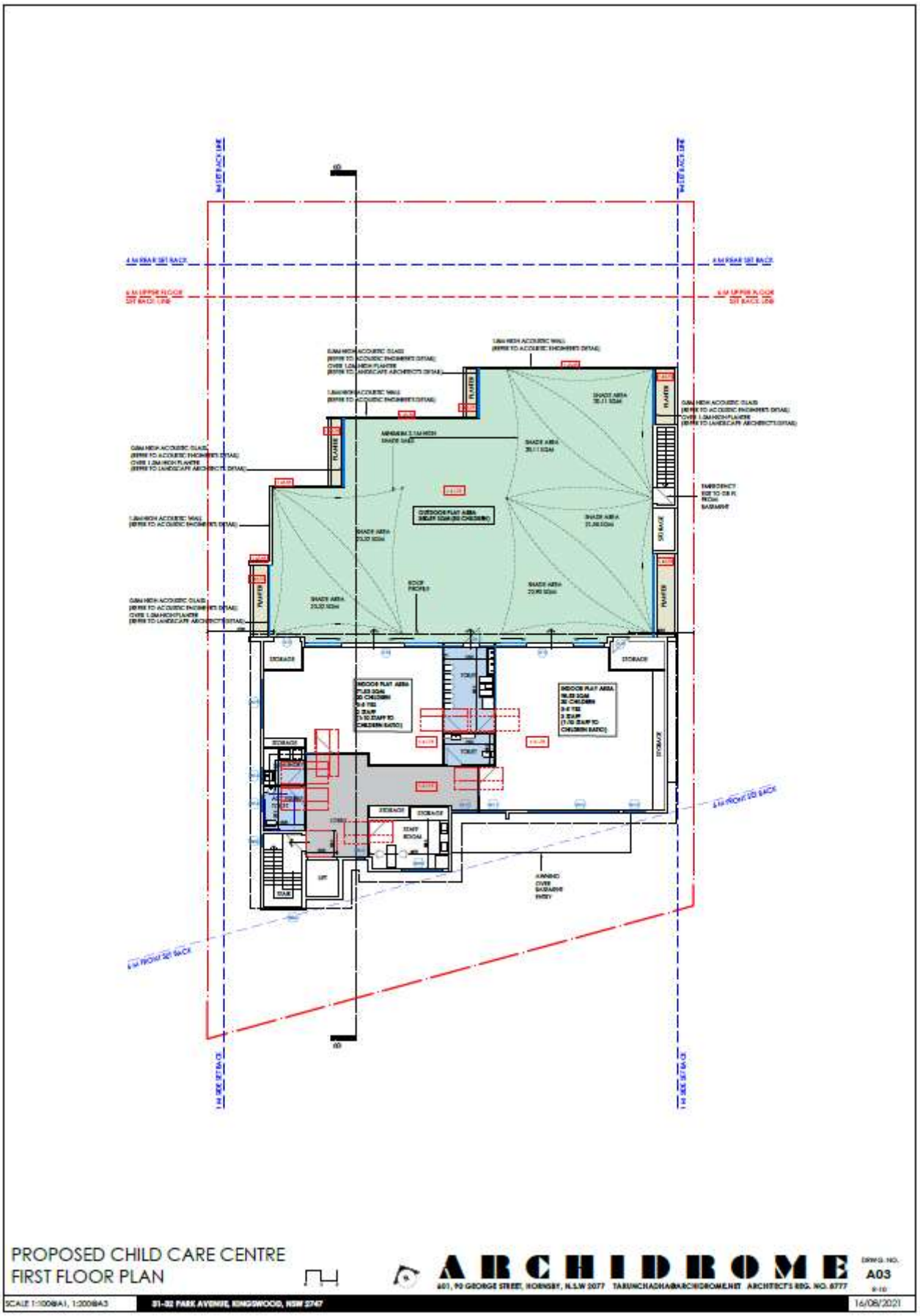


Figure 3.5 – First Floor Plan

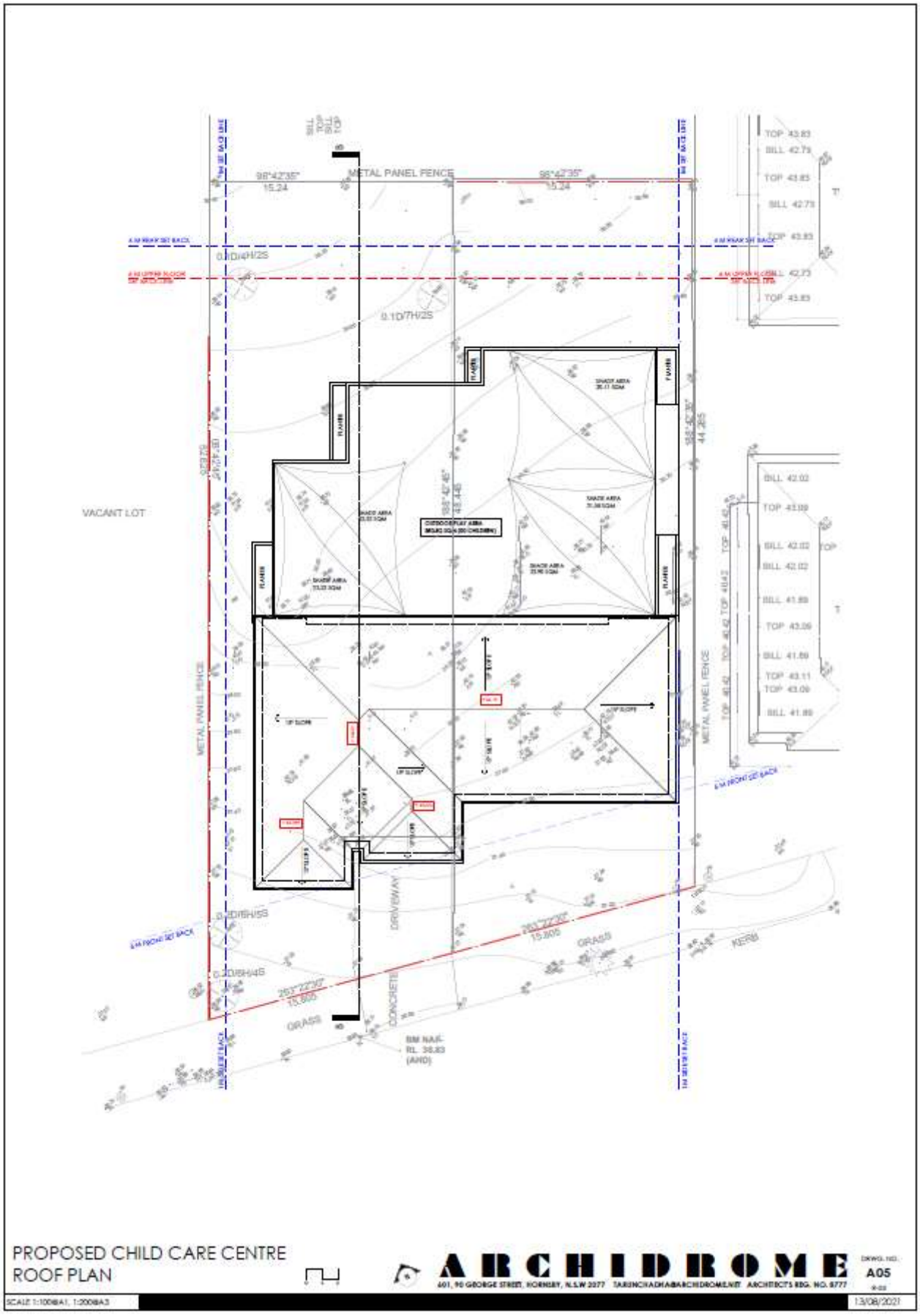


Figure 3.6 – Roof Plan

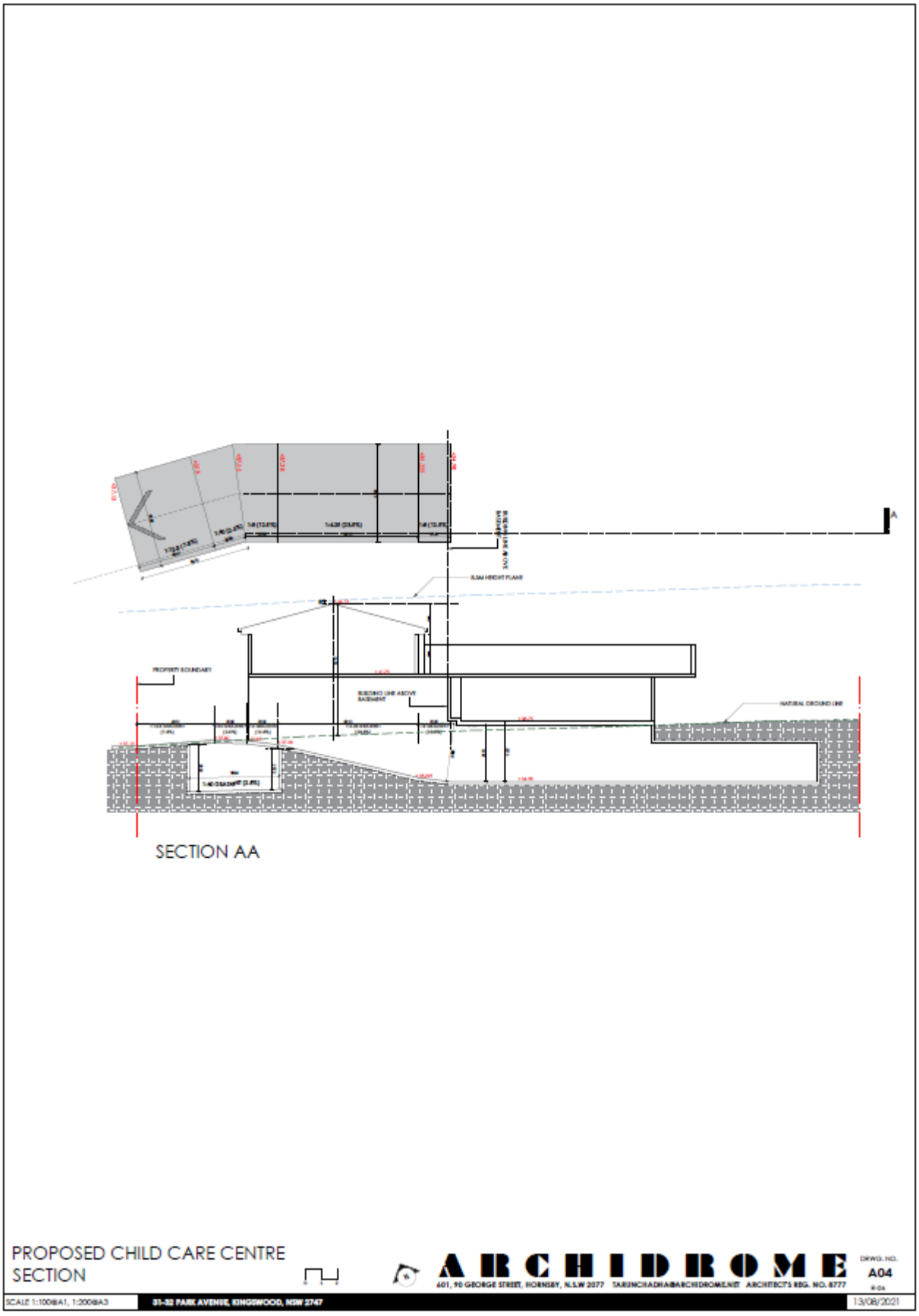


Figure 3.7 – Section

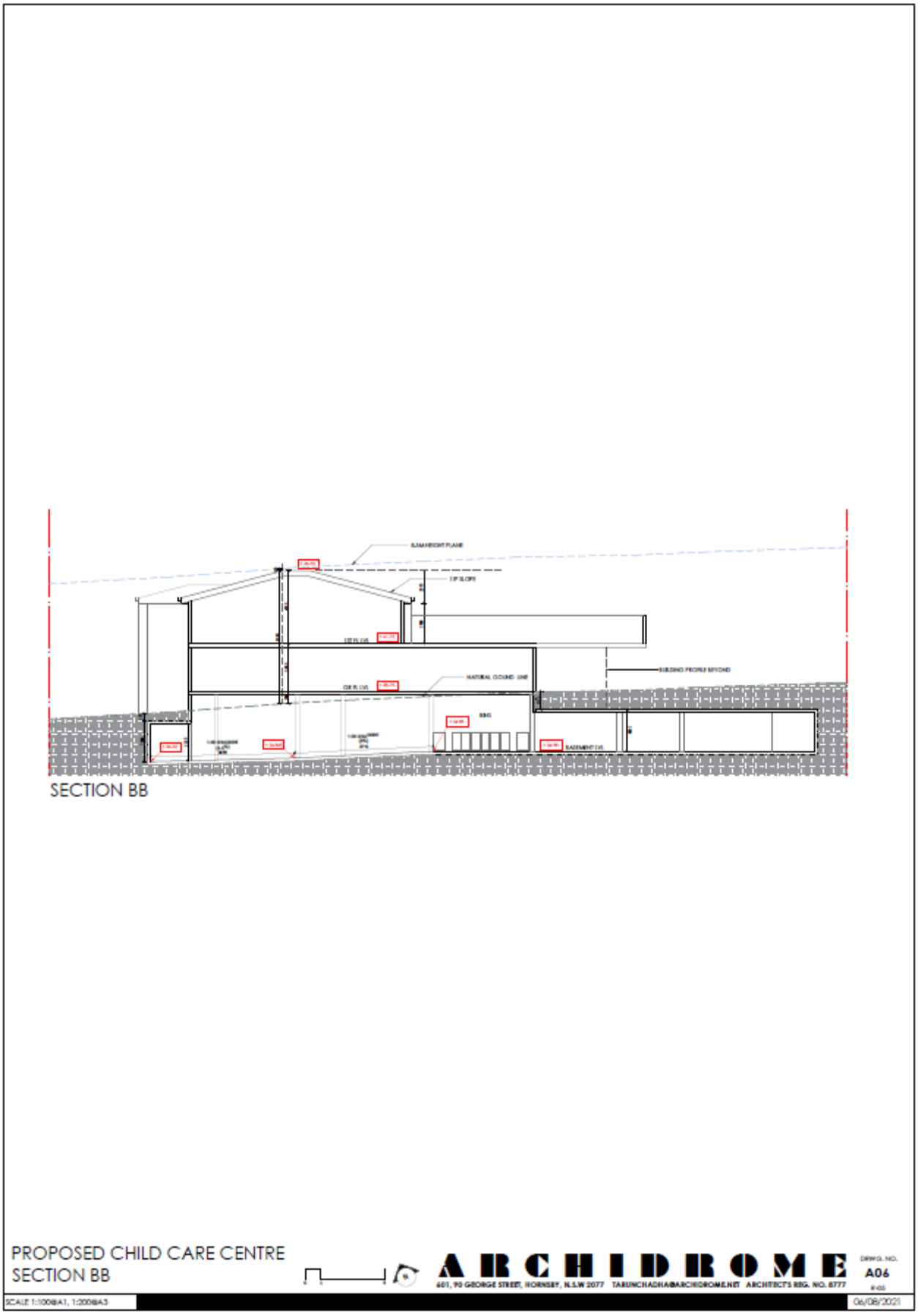


Figure 3.8 – Section BB

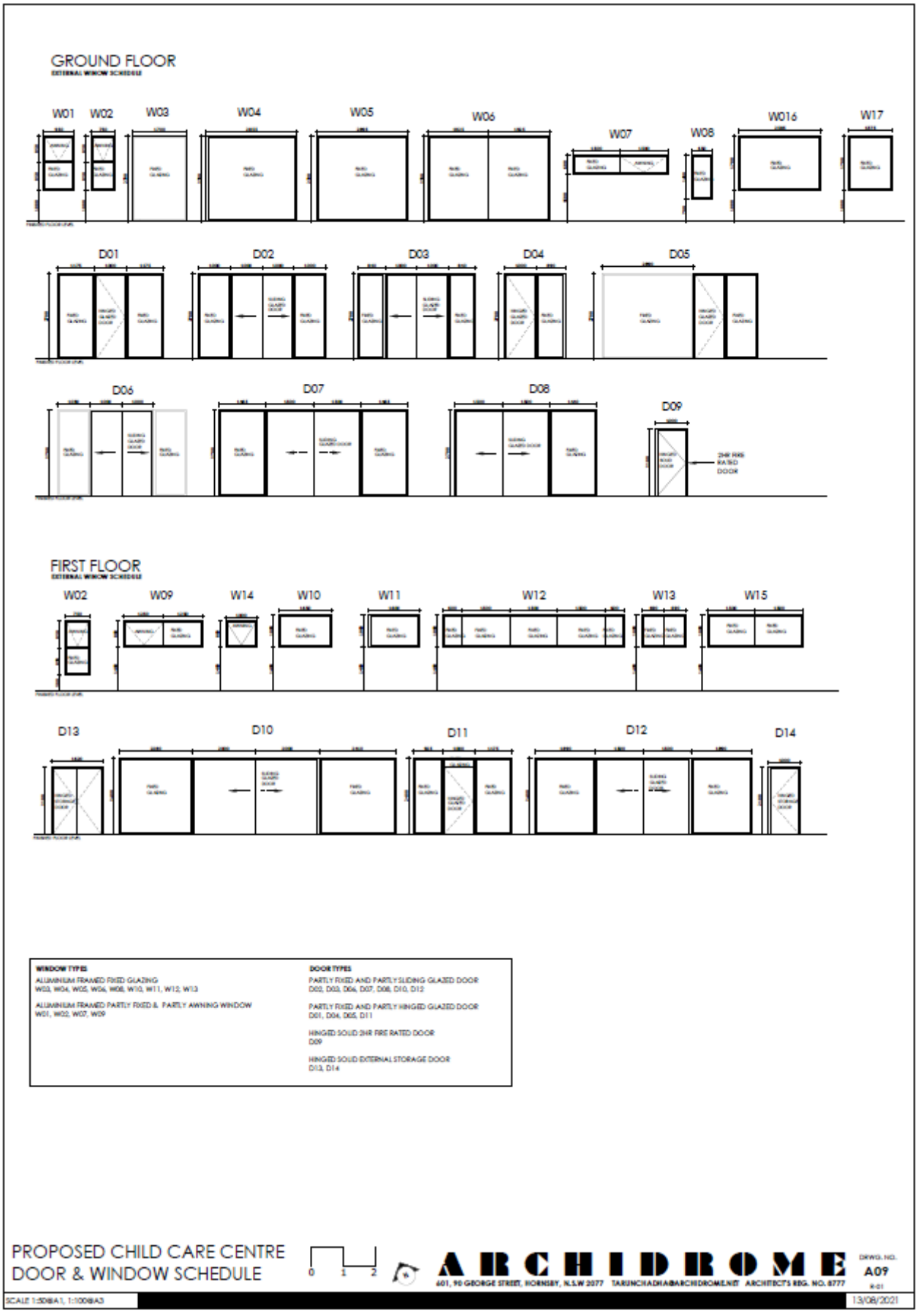


Figure 3.9 – Window & Door Schedule

Figure 3.10 – Elevations 01

Figure 3.11 – Elevations 02

Figure 3.12 – Streetscape Elevation

Figure 3.13 – Material Schedule

Figure 3.14 – 3D Views 01

Figure 3.15 – 3D Views 02

Figure 3.16 – 3D Views 03

Figure 3.17 – 3D Views 04

Figure 3.18 – 3D Views 05

4 ASSESSMENT CONSIDERATIONS

4.1 PENRITH CITY COUNCIL

4.1.1 General Assessment Guidelines

Penrith Council is the local government consent authority at interest.

Development guidelines for childcare and educational facilities are provided in Council's Development Control Plan.

The Guide to the (SEPP) State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017 is also applicable in the Penrith LGA and has been assumed to prevail over Council's Local Environmental Plan and Development Control Plan, in circumstances where an inconsistency may arise.

State Environmental planning Policy (Educational Establishments and Child Care Facilities) 2017 and the Child Care Planning Guideline apply to all development for childcare in NSW. This includes all new and existing childcare facilities.

All Development Applications must demonstrate how the development complies with:

- The National Quality Framework for Early Childhood Education and Care Facilities; and
- The relevant objectives, provisions and considerations in the SEPP and the Child Care Planning Guideline.

Typically, individual local government DCP's do not apply where they are inconsistent with the SEPP or the guideline, except for building height, side and rear setback or car parking provisions. All relevant provisions of the SEPP have been considered in the preparation of this acoustic assessment.

4.1.2 Penrith City Council Pre Lodgement Advice

A pre-lodgement meeting with Council officers during May 2021. The outcomes of the meeting were recoded in Councils letter reference PL/21/0029 of May 11th, 2021.

The following requirements were identified in relation to acoustic issues:

ENVIRONMENTAL MANAGEMENT:

Noise

An Acoustic Report is required to be submitted as a part of the development application to demonstrate that the proposed childcare centre will not have any impact on nearby sensitive receivers or be affected by the nearby railway line. This report is to be prepared by a suitably qualified acoustic consultant, and is to consider:

- The NSW 'Noise Policy for Industry' (October 2017) in terms of assessing the noise impacts associated with development, including noise from inside the childcare centre, the outdoor play area, plant and equipment (air conditioning), hours of operation, mechanical ventilation from basement carpark and the use of the driveway and carpark, deliveries and garbage removal;
- Potential impact on neighbouring outdoor private open space;
- The 'Guideline for Child Care Centre Acoustic Assessment' by AAAC to demonstrate noise generated by the childcare centre, particularly the outdoor spaces and first floor play area, can be appropriately mitigated;

- The potential impact from rail noise resulting from the nearby railway line;
- The NSW Government's Child Care Planning Guideline dated August 2017; and
- The 'Interim Construction Noise Guideline' in assessing the impacts associated with the construction phase of the development.

Should mitigation measures be necessary, recommendations should be included in the Report to this effect. Recommendations and mitigation measures must be shown on all architectural plans. Any fencing treatments proposed should give consideration to neighbouring properties (amenity and solar access).

These considerations have been taken into account in the assessment presented in this document.

4.2 GENERAL POLICIES & GUIDELINES

The following general policies and guidelines apply to the proposed development:

Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River (No. 2 - 1997)
State Environmental Planning Policy No. 55 – Remediation of Land
State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017
State Environmental Planning Policy (Infrastructure) 2007
Penrith Local Environmental Plan 2010
Penrith Development Control Plan 2014
NSW Department of Planning and Environment Child Care Planning Guideline 2017

4.3 NSW CHILD CARE PLANNING GUIDELINE (2017)

The Child Care Planning Guideline : Delivering quality childcare for NSW (August 2017) supports the SEPP described in 4.2 above.

State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017 (the SEPP) determines that a consent authority must take into consideration this Guideline when assessing a development application (DA) for a centre based childcare facility ("childcare facility").

It also determines this Guideline will take precedence over a Development Control Plan (DCP), with some exceptions, where the two overlap in relation to a childcare facility.

This Guideline informs state and local government, industry and the community about how good design can maximise the safety, health and overall care of young children. At the same time, it aims to deliver attractive buildings that are sympathetic to the streetscape and appropriate for the setting while minimising any adverse impacts on surrounding areas. It will help achieve a high level of design that is practical and aligned with the National Quality Framework.

The Guideline is intended to provide a consistent statewide planning and design framework. In terms of visual and acoustic issues, Sections 3.5 and 3.6 of the Guidelines apply.

4.4 THE AAAC GUIDELINE (VERSION 3; 2020)

The Association of Australasian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment Version 3.0 (2020) provides a methodology and approach for the acoustic assessment of childcare and educational facilities. The AAAC guidelines includes the following key topics:

Chapter 3 NOISE CRITERIA

- Background Noise Monitoring
- Criteria – Residential Receptors
- Outdoor Play Area
- Mechanical Plant
- Pick-up and Drop-off of children
- Sleep Disturbance
- Commercial Receptors

Chapter 4 SOUND POWER LEVELS

- Children – Outdoor Play
- Mechanical Plant
- Vehicles Within Premises

Chapter 5 EXTERNAL NOISE IMPACT ON CHILDREN

- Road, Rail Traffic and Industry
- Aircraft

Chapter 6 NOISE CONTROL RECOMMENDATIONS

- Building Design
- Outdoor Play Areas
- Indoor Activity Areas
- Buildings and Other Structures
- Boundary Fences / Barriers
- Limiting the Number of Children Outside
- Car Parking
- Noise Management Plan

This assessment has considered the various guidelines provided by the AAAC document.

For convenience, reference to the AAAC guideline has been provided in blue shaded text boxes in relevant sections of the acoustic assessment provided in this report.

4.5 NSW EPA NOISE GUIDE FOR LOCAL GOVERNMENT (2013)

The NSW EPA Noise Guide for Local Government (2013) is relevant to this assessment and has been taken into account.

The Noise Guide provides guidelines on the following matters:

Part 1 Framework for noise control

- Introduction
- Noise complaints
- Responses to noise
- Legal framework for noise control
- Responsible authorities – quick reference guide
- Useful links
- References

Part 2 Noise assessment

- Assessment of offensive noise
- Assessing noise with a sound level meter
- Measuring noise
- Common sources of noise
- References

Part 3 Noise management principles
- Preventing noise impacts through planning
- Managing noise
- Managing specific noise issues
- Other noise management options
- Dealing with the community
- Case studies
- References

Part 4 Regulating noise impacts
- Deciding on a course of action
- The Protection of the Environment Operations Act 1997
- The POEO (Noise Control) Regulation 2008
- Dealing with warnings and offences
- Dealing with offences committed by minors
- References

4.6 NOISE POLICY FOR INDUSTRY (2017)

It has been assumed as a basis for this assessment that appropriate noise criteria for the proposed development are specified in the Noise Policy for Industry (NPI) 2017 (formerly the NSW Industrial Noise Policy 2000). The noise criterion set out in the INP depends on whether existing noise levels in a given area are close to recommended amenity levels for different types of residential receiver, for example whether the receivers in question are urban, rural, near existing roads and so on. In this case, the potential receivers in question appear to be primarily residential in nature. The NPI requires that the following actions or circumstances be taken into account in the acoustic assessment of a development of the type proposed:

- Identify the existing level of noise, or noise background
- Determine what weather conditions should be used when predicting noise background
- Assess noise levels that will be involved with the various aspects of the proposed development
- Assess noise from the proposed development at residential receivers
- Assess noise from the proposed development at industrial/commercial receivers
- Apply the urban/industrial interface amenity category, if required
- Identify the appropriate receiver amenity category
- Apply amenity criteria in high traffic noise areas
- Take into account any cumulative noise from multiple developments
- Identify which of the amenity or intrusive criteria apply
- Take into account maximum noise levels during shoulder periods
- Consider the tonality - sliding scale test
- Apply duration correction, if required
- Sleep disturbance
- Present the results of the acoustic assessment in appropriate report form

Further comments on some of these assessment criteria are included in Sections 4.3.1 to 4.3.4, below.

4.6.1 Intrusiveness Criterion

As set out in the various reference guidelines listed above, where existing noise levels are low, noise levels from a proposed new (or changed) operation are limited by the intrusiveness criterion. In such cases, the L_{Aeq} noise level resulting from the impact of any new or substantially changed operation should not exceed the Rating Background Level (RBL) applicable to the residential receivers in question by more than 5 dBA.

4.6.2 Amenity Criterion

The amenity criterion sets an upper limit to control the L_{Aeq} noise level from all industrial sources for daytime, evening and nighttime periods, respectively. In accordance with the relevant acoustic criteria and guidelines listed, "maximum" recommended incremental noise levels for these periods are all 5 dBA higher than the "acceptable" levels mentioned in the various NSW acoustic guidelines.

4.6.3 Interpretation of Criteria

Where noise levels from industrial sources are close to or above the 5 dBA maximum increment over the existing Rating Background Level, as recommended in the NSW Noise Policy for Industry, then the amenity criterion, which incorporates a sliding scale to set limits, becomes relevant. The sliding scale prevents the overall noise level exceeding the acceptable level as a result of a new noise source. The amenity criterion also needs to consider the possibility of other developments which may affect aggregate noise levels in any given situation.

4.6.4 Sleep Disturbance

In order to minimise any risk of sleep disturbance to affected residential receivers as a consequence of operations that occur during the nighttime period (10:00 pm – 7:00 am), the NSW Office of Environment & Heritage (OEH) recommends that:

> *Sleep disturbance is assessed as the emergence of the $L_{A\ (1\ minute)}$ level above the $L_{A90\ (15\ minute)}$ level at the time. Appropriate screening criteria for sleep disturbance are determined to be an $LA1_{\ (l\ minute)}$ level 15 dBA above the Rating Background Level (RBL) for the nighttime period.*

This approach to the assessment of sleep disturbance has been discussed with the NSW OEH by the author of this assessment proposal. The NSW OEH has confirmed that this is the correct and accepted way to undertake the assessment of sleep disturbance. In this case, the operating hours of the proposed centre will be within the prescribed "daytime" period for acoustic assessment purposes that is between 7:00 am and 6:00 pm Monday to Friday.

4.7 SUMMARY OF ACOUSTIC GUIDELINES & REQUIREMENTS

Taking into account all relevant guidelines, the acoustic conditions that will be required to be demonstrated in relation to the proposed development are as follows:

The effect of noise from external sources on the childcare centre development:

Childcare Centre Location	Noise Level dBA	Applicable Time Period
Internal Areas of the childcare centre	40 [1]	At any time
Outdoor areas of the childcare centre	55 [1]	At any time

[1] Leq 1 hour basis

While childcare guidelines typically require noise levels below 40 dBA in all internal areas, a further objective of 35 dBA for noise levels achievable in any sleep or rest areas associated with the facility has been adopted for this assessment.

While the principal sources of external noise in this case appears to be road traffic on Park Avenue and the nearby western rail corridor, the assessment methodology used ensures that all other potential noise sources have been taken fully into account in the assessment.

The effect of noise from the childcare centre development on nearby receivers:

Type of Receiver	Noise Level dBA	Applicable Time Period
Nearby Residential Properties	+ 5 dBA (max) versus RBL [1]	At any time
Nearby Commercial Properties	65 dBA max [2]	At any time

1 RBL = Rated Background Sound Level
2 NSW Noise Policy for Industry

In this case, surrounding properties are predominantly residential in nature,

The requirement in relation to the impact of noise associated with the proposed childcare centre on nearby residential properties is that such noise is not permitted to result in an increase of more than 5 dBA above existing background LA90 sound levels measured at the boundary between the development and the nearest residential boundary, and also that noise impact complies with any other specific guidelines. Noise impacts due to activities and operations associated with the development are required to be no greater than 65 dBA at any affected commercial premises, however in this case no commercial premises were noted in the vicinity of the proposed childcare centre.

It is noted that the assessment of noise impacts is required to be based on measurements over a 15-minute period, and this approach has been adopted in the assessment presented in this document.

5 ACOUSTIC MEASUREMENTS

5.1 BACKGROUND SOUND LEVEL MEASUREMENTS

Unattended noise monitoring was conducted at the site between Monday 19th and Sunday 25th October 2020. Background sound monitoring for the 31 and 32 Park Avenue sites was undertaken was undertaken together.

An unattended noise monitor was installed in the rear of the 31 Park Avenue property, to measure the lower LA90 background sound levels against which acoustic impacts on the adjoining residential property at 30 Park Avenue are required to be assessed, in order to protect the acoustic amenity of residential neighbours. Attended sound level measurements were recorded at the Park Avenue site boundary in order to assess the anticipated increase in the background Leq sound measure at this location, in turn to ensure that building design and structure is appropriate to ensure that the required indoor sound levels are achieved. The two monitoring locations are indicated by “A” and “B” in Figure 5.1, below.

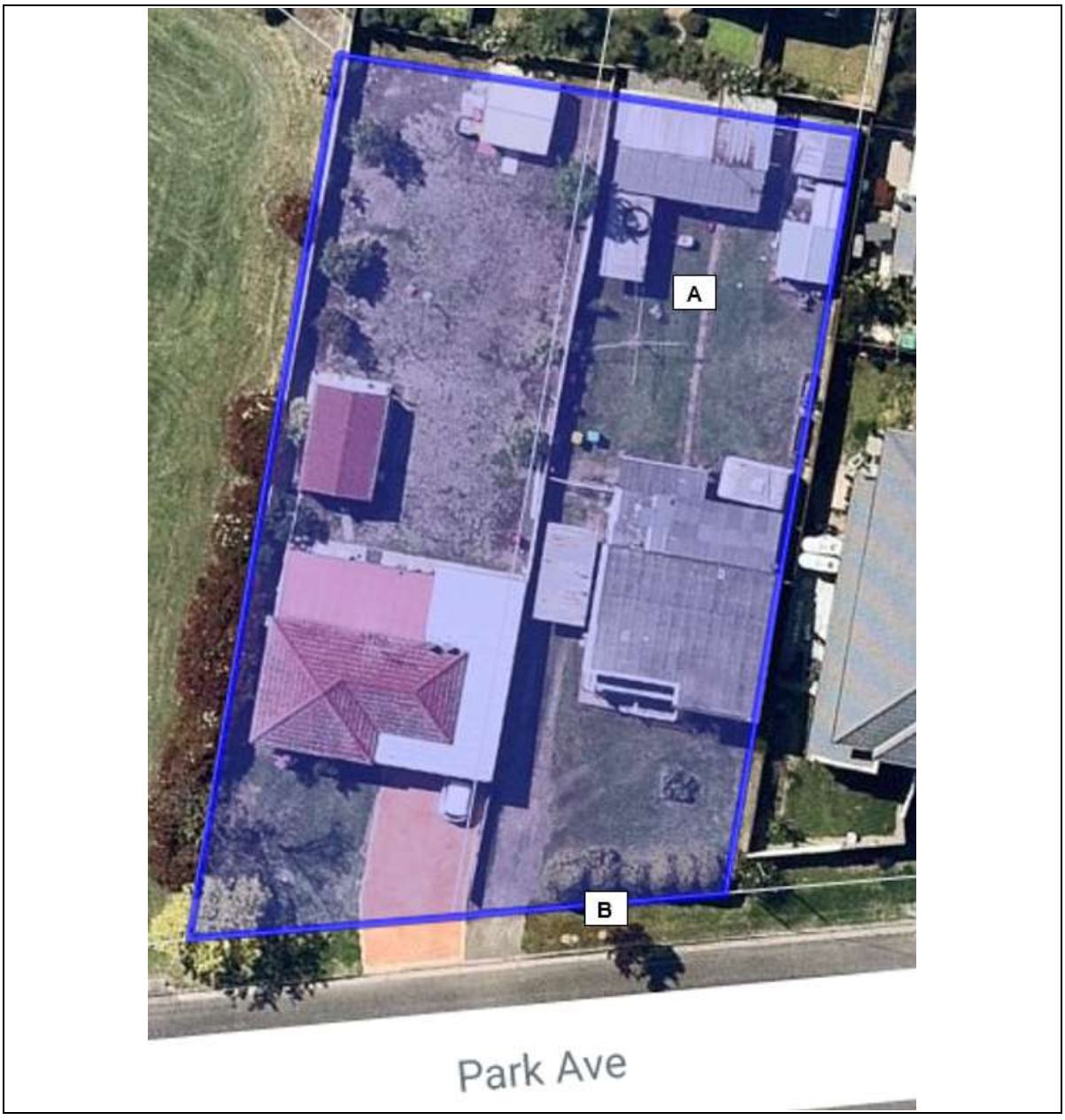


Figure 5.1 – Background Acoustic Monitoring Locations

Recording microphones were located approximately 1000 mm above ground level, in free field conditions.

5.2 INSTRUMENTATION

The noise monitoring equipment used for these measurements was a Brüel & Kjaer 2238 noise monitoring terminal, incorporating a Brüel & Kjaer 2238 sound level meter.

The instrument was set to A-weighted, fast response, and was programmed to monitor on a continuous basis over 15-minute sampling periods, and to store sound level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

Attended measurements were recorded using the sound level meter without the weatherproof housing used for unattended measurements.

A photograph of the unattended sound monitor in place at the site is provided in Figure 5.2, below.

Figure 5.2 – Acoustic Monitor in Position at Site

5.3 ACOUSTIC PARAMETERS

5.3.1 Location A

The logger was set to measure the Lmax, LAmin, LA1, LA10, LA50, LA90, LA99 and LAeq levels of the existing sound or noise environment. The LAmax measure reflects the highest noise level recorded during each monitoring period and is indicative of maximum noise levels due to individual noise events, including road traffic on Park Avenue and other local roads, and the nearby main western rail corridor.

The LA90 level is generally adopted as the background noise level, excluding road and rail traffic noise influences. The LAeq level is the Equivalent Continuous Sound Level and has the same sound energy over the sampling period as the actual noise environment with its fluctuating sound levels. The LAeq is accepted for acoustic assessment purposes as the standard descriptor for environmental noise that is noise including influences such as road and rail traffic. The LAeq measure has been used for that purpose in this assessment. Weather during the measurement period was generally fine, and no adjustments to the measured data (to adjust for extreme meteorological conditions) were considered necessary or applied. Detailed reports of sound level measurements have been included for reference at Appendices A and B. Summaries of the key LA90 and LAeq descriptors for the seven days of the monitoring period are shown in Table 5.1, on the following page.

Table 5.1 – Background Sound Level Measurement Results (Location A)

	Mean logarithmic LA90 Daytime (7:00am to 6:00pm) *	Mean logarithmic LA90 Evening (6:00pm to 10:00pm)	Mean logarithmic LA90 Night-time (10:00pm to 7:00am)
Mon 19 October 2020	44.2042	40.2938	34.6906
Tue 20 October 2020	44.0795	43.3875	35.2417
Wed 21 October 2020	44.5063	43.7375	36.0969
Thu 22 October 2020	46.3864	43.8750	38.5028
Fri 23 October 2020	44.4292	45.2000	37.9563
5 Working Days	**44.7211**	**43.2988**	**36.4976**
Sat 24 October 2020	43.2604	45.3438	37.0375
Sun 25 October 2020	44.1667	43.4375	43.9031
2 Day Weekend	**43.7135**	**44.3906**	**40.4703**
	Mean logarithmic LAeq Day-time (7:00am to 6:00pm) *	**Mean logarithmic LAeq Evening (6:00pm to 10:00pm)**	**Mean logarithmic LAeq Night-time (10:00pm to 7:00am)**
Mon 19 October 2020	49.7604	45.7688	39.3875
Tue 20 October 2020	49.5841	46.9750	40.0000
Wed 21 October 2020	50.7875	47.3375	40.3844
Thu 22 October 2020	51.9795	48.8188	41.9750
Fri 23 October 2020	50.0313	50.8813	42.4188
5 Working Days	**50.4286**	**47.9563**	**40.8331**
Sat 24 October 2020	48.5104	49.9500	41.3000
Sun 25 October 2020	47.5479	44.9813	47.1094
2 Day Weekend	**48.0292**	**47.4656**	**44.2047**

* Sundays and Public Holidays daytime commences 8:00am

A summary of the LA90 and LAeq noise measures for the 2-day weekend and 5-day working week periods is presented in Table 5.2, below.

Table 5.2 – Noise Monitoring Summary (Location A)

	Mean logarithmic LA90 Daytime (7:00am to 6:00pm) *	Mean logarithmic LA90 Evening (6:00pm to 10:00pm)	Mean logarithmic LA90 Night-time (10:00pm to 7:00am)
5 Working Days	**44.7211**	**43.2988**	**36.4976**
2 Day Weekend	**43.7135**	**44.3906**	**40.4703**
	Mean logarithmic LAeq Day-time (7:00am to 6:00pm) *	**Mean logarithmic LAeq Evening (6:00pm to 10:00pm)**	**Mean logarithmic LAeq Night-time (10:00pm to 7:00am)**
5 Working Days	**50.4286**	**47.9563**	**40.8331**
2 Day Weekend	**48.0292**	**47.4656**	**44.2047**

* Sundays and Public Holidays daytime commences 8:00am

5.3.2 Location B

As indicated in 5.1 above, 15-minute attended sound level measurements were recorded at Location B, on the Park Avenue site boundary, to measure the higher anticipated sound levels at this location.

These comparative measurements were carried out on the morning and afternoon of Thursday and Friday October 22nd and 23rd, 2020.

Based on an average of these Location B measurements, the following sound level differential was established between Location A and Location B:

Table 5.3 – Sound Level Difference between Locations "A" and "B"

	Location "A"	Location "B"
LAeq $_{\text{15-min; Daytime}}$	X dBA	X + 6 dBA
L90 $_{\text{15-min, Daytime}}$	Y dBA	X + 3 dBA

In other words, the LAeq measure was found to be 6 dBA higher at Location "B" than at "Location "A", and the LA90 measure 3 dBA higher.

5.4 REFERENCE & DESIGN BACKGROUND SOUND LEVELS (RBL'S)

The acoustic measurements described in Section 5.3 above effectively quantify external noise with the potential to impact on the proposed development, with the general acoustic background without road and rail traffic identified by the LA90 measure, and existing road and rail traffic noise included in the LAeq measure.

The proposed childcare centre will operate between 6:30 am and 7:00 pm, Monday to Friday.

These are essentially daytime hours. The half hour period before 7:00 am, and the one-hour period after 6:00 pm, do not materially affect the daytime results presented in the tables above.

To ensure a conservative acoustic assessment in terms of potential impacts on neighbours, the lower daytime (7:00 am to 6:00 pm) daytime LA90 measure of 43.7 dBA (refer Table 5.2) measured at the rear boundary has been adopted as a reference sound level.

To ensure a conservative assessment in terms of the impacts of external sound on the childcare building itself, the higher 56.4 dBA daytime LAeq measure from the front of the site (refer Tables 5.2 and 5.3) has been adopted.

In terms of external acoustic impacts on the outdoor play areas, the highest measured daytime, Monday to Friday LAeq level of 50.4 from the rear monitoring location has been adopted.

In accordance with standard assessment practice, these RBL's have been rounded to the nearest whole number.

RBL's for this assessment project are identified in Table 5.4, below.

Table 5.4 – Rated Background & Design Sound Levels

Rated Background Sound Levels for Assessment Purposes	
Daytime:	
LA90	44
LAeq	56
Evening	
LA90	44
LAeq	54

6 ACOUSTIC ASSESSMENT – CHILDCARE CENTRE

6.1 SOUND TRANSMISSION RATINGS

The Building Code of Australia (BCA) requires that building elements have certain levels of insulation from airborne noise and impact sound.

Regulatory guidelines require that certain maximum sound or noise levels be achieved, or achievable, within the internal spaces of childcare centres.

The weighted sound reduction index (Rw) is the measure used to describe the acoustic performance of the various building elements making up a construction system.

Rw is a single number quantity for the airborne sound insulation rating of building elements.

As the acoustic performance of a material or construction improves, the higher the Rw value will be.

Rw ratings are determined by laboratory tests of a specimen of the construction system. The specimen is fixed within a frame to form the wall between two test chambers.

A high noise level is generated in one room and the difference in sound level between the source room and the receiver room represents the transmission loss through the test specimen.

The measurements are conducted over a range of sound frequencies. The Rw rating is then determined by comparing the results with reference curves.

Correction factors (C and Ctr) can be added to Rw to take into account the characteristics of particular sound spectra and indicate the performance drop of the wall in the corresponding sound frequency range.

The correction factor C relates to mainly mid to high frequency noise. The correction factor Ctr relates to lower to medium frequency noise.

The weighted sound reduction index is quoted as Rw(C, Ctr), where C and Ctr are correction factors representing different noise sources.

For example, if a wall is measured as Rw 54(-1,-4) the value of the index when the lower frequency correction factor (Ctr) is applied is:

$$Rw + Ctr = 54 + (-4)$$
$$Rw + Ctr = 50$$

In practice, small gaps and cracks which permit even minor air leakage will provide a means for sound transmission, leading to lower field performance.

This degradation in acoustic performance should be recognised, and an appropriate allowance made when selecting a tested system to achieve a particular Rw rating when installed.

The sound transmission class (STC) was the method that was used previously to measure acoustic performance.

The requirements of the BCA have changed to comply with international regulations and Rw is now used.

The STC was based on different criteria and did not include any correction factors.

6.2 CAPACITY & OPERATING HOURS OF THE CHILDCARE CENTRE

The proposed childcare centre is described in the plans and drawings included for reference as Figures 3.1 to 3.18 in Section 3 above.

The proposed centre will have a capacity for a total of one hundred and sixteen (116) children.

It is proposed that sixty-six children will be accommodated within the ground floor areas of the centre, and fifty within the first floor areas.

The breakdown of children by age group will be as follows:

0 -2 year old's	16
2 – 3 year old's	20
3 – 5 year old's	80
Total	116

The proposed centre will have a staff of sixteen (16).

Twenty-eight car parking spaces will be provided with a basement car parking area, as shown with Figure 3.3 in Section 3, above, providing for both staff and visitor parking (including the drop-off and pick-up of children in accordance with relevant guidelines.

The centre will operate from 7:00 am to 6:00 pm, with staff "shoulder" times for thirty minutes before and after those operating hours.

These operating hours equate to daytime hours from an acoustic perspective, as detailed in Section 5 above.

6.3 IMPACT OF AMBIENT NOISE ON THE PROPOSED DEVELOPMENT

6.3.1 Indicative Sound Levels

Projected "Internal" Sound Levels – General Indoor Areas

Sound levels within the proposed childcare centre will be influenced by the ambient external sound levels as indicated by the rated background sound levels as summarised in Table 5.4 in the previous section, which will be subject to attenuation or reduction by the external and internal structural features of the development and proposed fit-out detail.

The proposed childcare centre will involve both indoor and outdoor activity areas and spaces as shown in the plans and drawings provided in Section 2.

Car parking will be provided in a basement car park, with ingress and egress from and to Park Avenue.

Acoustic protection to the internal spaces of the proposed facility will be provided by the external masonry structural walls and glazed elements of the building, together with internal dividing walls associated with the proposed construction, and the various floor and wall finishes used.

The structure of the childcare centre building will comprise masonry or masonry clad external walls; glazed window and door elements, and a metal clad or tiled framed roof structure as indicated in the plans and drawings provided in Section 2.

The proposed development will involve the demolition and removal of the existing structures at the site, and the construction of a new, purpose built childcare centre.

Sound Transmission through Structures

The structural elements of buildings (walls, windows, doors etc) reduce the level of sound. The degree of sound reduction varies from material to material.

The weighted sound reduction index (Rw) is the measure used to describe the acoustic performance of the various building elements making up a construction system, as described in 6.1 above.

The Rw rating indicates the reduction that is achieved when noise passes through a given material.

If the noise outside is 70 dB and inside it is 40 dB, the structural element (wall, window, door etc) is said to have an Rw rating of 30. As mentioned in 6.1, structural imperfections mean that this nominal level of noise reduction is not always achieved, and a degree of conservatism is required.

Acoustic Qualities of Solid Walls

Typically, solid form external wall elements have minimum Rw sound reduction (or attenuation) ratings in excess of 35 dBA, and more typically in excess of 45 dBA.

This means that the maximum rated external sound level in this case, which is 56 dBA (refer Table 5.4), can readily be reduced to the desired maximum indoor sound levels of 40 dBA maximum (general areas) and 35 dBA objective maximum in any required rest or “quiet” by the effect of external walls, and in the case of internal spaces by the combined effect of external walls and internal structural elements.

The sound reduction or Rw ratings of typical external and internal wall structures are shown in Table 6.1, on the following page.

Table 6.1 - Sound Reduction Capabilities of Typical Walls

Wall Type	Rw
Single layer of 1/2″ drywall on each side, wood studs, no insulation (typical interior wall)	33
Single layer of 1/2″ drywall on each side, wood studs, fiberglass insulation	39
External brick veneer (single brick; timber frame, dry wall internal lining) 4″ Hollow CMU (Concrete Masonry Unit)	42 44
6″ Hollow CMU (Concrete Masonry Unit)	46
8″ Hollow CMU (Concrete Masonry Unit)	48
Double brick	>50

Source: Harris CM, "Noise Control in Buildings: A Practical Guide for Architects and Engineers"

Note: Rw ratings for walls exclude the effect of doors and windows, which need to be separately considered

As shown above, the acoustic qualities of the solid façade elements are generally more than adequate to reduce external sound levels to the levels required internally. The rated external background LAeq sound level (background including traffic noise) in this case, based on continuous monitoring, is 56 dBA (refer Table 5.4).

A conservative estimate of 25 dBA for the sound reduction capability of external walls would reduce this maximum daytime external Rated Background Sound Level of 56 dBA to below the required indoor sound level of 40 dBA (and the objective level of 35 dBA adopted for any rest or “quiet” areas).

External Windows & Doors

The most acoustically “vulnerable” elements of the external building facades are the glazed windows and doors. Glazed construction elements (windows and doors) provide lower levels of sound attenuation (or reduction) than solid structural elements such as walls.

The indicative acoustic reduction effects provided by various glazing options available for the doors and windows fitted to the facades of the proposed childcare centre are shown in Table 6.2, on the following page.

Table 6.2 – Acoustic Attenuation due to Glazing

Glazing Type	Sound Attenuation *
10.38 mm laminated	35
6.38 mm laminated	31
10 mm float	33
6 mm float	27
4 mm float	22

* Based on specifications provided by Pilkington Glass

The maximum rated external background sound level (RBL) in this case, based on continuous monitoring is 56 dBA (refer Table 5.4, above). The sound level required to be achieved within the general internal spaces of the proposed centre, with windows and doors closed, is 40 dBA maximum. To achieve these internal sound levels, with a reasonable margin for error and variation, glazing with a minimum effective sound attenuation capability in the range 25 - 30 dBA is considered appropriate. In this case, 6.38mm laminated glass is recommended for glazed external window and door elements.

Review of AAAC Guidelines for Childcare Centres

The AAAC (2020) guideline provides the following specific recommendations in relation to noise control:

> *NOISE CONTROL RECOMMENDATIONS*
>
> *Where the predicted level of noise exceeds the criteria at the noise assessment location, noise control measures should be considered to enable compliance with the acoustic criteria to be achieved.*
>
> *The following indicative noise controls may be used to achieve compliance with the noise criteria. Site-specific controls should be recommended in the childcare centre noise assessment.*
>
> *Building Design*
>
> *The design of the childcare centre should aim to locate sleep rooms and outdoor play areas away from external noise sources.*
>
> *Where feasible, building designs could be based on a "U" shaped or "L" shaped layout, with outdoor play areas positioned such that the building structures act as a noise barrier.*
>
> *Orienting the building and outdoor play spaces having regard to impacts on neighbours (for example, locating play areas away from neighbouring sensitive spaces).*
>
> *Maximise the separation between the active outdoor play area (as opposed to passive activities such as painting, drawing etc) and the façade of any neighbouring residential premises.*
>
> *Ensuring operable windows of the childcare centre and external play areas do not have a direct line of sight to neighbouring noise sensitive areas.*
>
> *Locate access ramps away from neighbouring sensitive premises where possible.*
>
> *Include low noise features such as self-closing gates with soft closure hinges, selection of low noise air-conditioning condensers, minimize the use of speed humps and ensure car park surfaces and access ways are smooth.*

In this case, the proposed childcare building design will achieve the interior noise level criteria required as a result of the design proposed (refer Figures 3.1 to 3.7), and accordingly no further site-specific noise control measures are proposed in relation to design issues.

6.3.2 Projected Internal Sound Levels

Projected "Internal" Sound Levels – General Areas

On the basis of the external glazing conditions described above, sound levels projected to apply in the general indoor areas of the proposed centre, as a consequence of external acoustic influences, are summarised in Table 6.3 below.

Table 6.3 – Forecast Sound Levels: General Internal Areas

Projected Sound Level	Typical Daytime
Rated External Sound Level (RBL)	56 L_{Aeq} (dBA $_{Leq, 1 hour}$)
Less 30 (dBA) Attenuation due to Rw of Glazing	-25 (dBA)
Projected Internal Sound Levels	<35 L_{Aeq} (dBA $_{Leq, 1 hour}$)

Internal sound levels below 40 dBA satisfy relevant acoustic amenity requirements and guidelines applicable to childcare centres.

Internal sound levels below 35 dBA satisfy the additional objective of 35 dBA maximum adopted for this assessment for any rest and "quiet" areas that may be associated with the development. As demonstrated below, the acoustic effect of internal walls will further reduce these already acceptable sound levels in the internal areas associated with the childcare centre.

It is noted that the degree of conservatism built into this acoustic projection also provides protection against any occasional peak external noise events that may occur from time to time, including peak noise that might result from activities within the adjacent rail corridor.

Projected "Internal" Sound Levels – Indoor Sleeping & "Quiet" Rooms

A background indoor sound level of less than 35 dBA has been projected for the general internal areas of the proposed childcare centre (refer Table 6.3, above).

Taking variation into account, this projected sound level can conservatively be considered to deliver a minimum background acoustic range of 35–40 dBA for the general interior areas of the proposed centre, under all external circumstances. Any internal rest or "quiet" areas associated with the development will be subject to further acoustic attenuation from external noise influences due to the internal walls, and the acoustic effect of the internal the fit out proposed, including floor finishes. Other internal play areas will also be further acoustically shielded from external sound by internal walls associated with the existing building (refer plans and drawings provided in Section 2).

These projected sound levels, which have been calculated on a conservative basis and take into account variation in background sound levels, indicate that sound levels of less than 40 dBA will be achieved within the general indoor areas of the centre, and sound levels of less than 35 dBA will be achieved in any rest or "quiet" areas associated with the facility, consistent with relevant and adopted acoustic criteria.

6.3.3 Outdoor Play Areas

Outdoor play areas will be located at ground level in the rear or northern portion of the development and on Level 1 of the proposed childcare centre building, as shown in the diagrams provided in Section 2. A Rated Leq Background Sound Level of 50 dBA LAeq has been determined in this area of the site (refer Table 5.2). This measured background sound level is already lower than the ambient background sound level of 55 dBA required within the proposed outdoor play areas.

6.3.4 Road Traffic & Car Park Noise

The measured and adopted LAeq RBL of 54 dBA applicable to the proposed childcare centre building includes the effect of existing environmental noise, including road traffic on Park Avenue and activities within the adjacent rail corridor.

The additional effect of noise generated by vehicles accessing the proposed basement level car park is considered unlikely to significantly change this measured RBL.

Noise levels within the proposed childcare centre building will be effectively shielded by building structural elements from the noise associated with vehicles accessing and operating within the proposed car park.

The potential impact of traffic noise on nearby receivers is considered in Section 6.7.

6.3.5 Summary: Implications of Estimated Noise Levels

General Indoor Areas

Typical maximum ambient sound levels achievable in the general indoor areas of the proposed centre are estimated to be in the range 35 – 40 dBA. This assessment demonstrates that sound levels in the general interior spaces of the proposed childcare centre will satisfy the typical criterion of 40 dBA applicable to childcare centres.

Outdoor Play Areas

Background noise levels in the outdoor play areas will be less than 55 dBA, based on the measured RBL for the site.

Review of AAAC Guidelines for Childcare Centres

The effects of ambient external noise levels on the proposed childcare centre have been considered in accordance with the general principles described in the AAAC (2020) guideline.

The proposed centre structure and design has been assessed to comply with relevant internal noise level requirements.

6.4 IMPACT OF SOUND FROM THE CENTRE ON SURROUNDING PREMISES

The potential impact of sound from external sources on activities within the proposed childcare centre has been considered in 6.2 above. A second and probably more important acoustic consideration is that of the potential impact of noise from activities associated with the proposed childcare centre on nearby individuals and premises.

6.5 SOUND OF CHILDREN AT PLAY - AAAC GUIDELINES

The assessment of noise impacts from the centre on external and nearby receivers requires an estimate of the sound levels generated by the activities of children within the proposed childcare centre. The data summarised in Table 6.4, below, was reported by RSA Acoustic in 2015 provides a useful reference.

Table 6.4 – Indicative Sound Pressure Levels of Children at Play

	Octave Band Centre Frequencies Plus A-weighted Level								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**A**
Descriptors	**Linear Sound pressure levels plus the Overall A-weighted Sound Level**								
$L_{max,\ 15\ min}$	85	86	85	82	92	95	86	74	98
$L_{01,\ 15mi}$	73	73	71	72	79	79	70	61	83
$L_{10,\ 15min}$	66	66	63	66	71	70	62	52	75
$L_{90,\ 15minutes}$	55	56	55	57	58	56	51	41	62
$L_{min,\ 15\ min}$	49	49	48	48	48	47	42	34	53
$L_{eq,\ 15\ min}$	64	64	62	63	68	68	61	50	73

This data was recorded in the play area of a Sydney CBD childcare centre, at a time when children were permitted to play without close supervision, at distances of between 2 and 5 metres from the recording microphone.

This data is considered to provide a realistic worst-case estimate of the noise generated by children playing within a childcare centre and is considered to provide a conservative estimate of the noise likely to be generated within the outdoor play areas at the proposed childcare centre.

However, it is noted that the Association of Australian Acoustical Consultants (AAAC) Guideline for Acoustic Assessment states that:

- 10 children aged between 0-2 years typically produce a sound pressure level of 77-80 dBA, and
- 10 children aged 3-6 years 84-90 dBA.

It is possible for children at play to generate sound levels of this magnitude, however it is considered that sound levels of these magnitudes are very much at the upper end of the expected range.

For example, sound levels in the range 84 – 90 dBA equate to noise associated with the following activities (refer Appendix C):

Pneumatic Drill	90 dBA
Heavy Truck, 40 km/h	87 dBA - 90 dBA
Motor Car	80 dBA
Motor Bikes (2-Wheel)	70 dBA – 92 dBA

Typical maximum sound levels of 70 – 75 dBA have been assumed for the outdoor play area in this assessment, but the higher sound levels identified by the AAAC Guideline referenced above have been taken into account as a contingency.

Review of AAAC Guidelines for Childcare Centres

Children – Outdoor Play

The sound levels of children playing in the indoor and particularly, the outdoor areas vary widely depending on many factors such as the:-

- *number of children vocal at any one time;*
- *activity that the children are engaged in;*
- *type of voice (from shout to whisper);*
- *age of the children;*
- *directionality of voice;*
- *distance between the children and the receiver point for outdoor and indoor areas;*
- *height of the child (i.e. whether standing or seated) for outdoor areas; and*
- *reverberation ('echo') in the room for indoor or semi-enclosed areas.*

Children under 1 year of age are generally not walking or talking, although, they do cry and make sound. Nevertheless, they do not significantly contribute to 15 minute averaged noise levels in outdoor areas.

For older children, there are marginal differences in groups of children from 2 to 3 years of age and those from 3 to 5 years of age.

Table 1 provides recommended sound power levels for lots of 10 children, within the different age groupings, along with a recommended source height.

Table 1 – Effective Sound Power Levels (LAeq, 15min) for Groups of 10 Children Playing

Number and Age of Children	Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz]								
	dB(A)	63	125	250	500	1k	2k	4k	8k
10 Children - 0 to 2 years	78	54	60	66	72	74	71	67	64
10 Children - 2 to 3 years	85	61	67	73	79	81	78	74	70
10 Children - 3 to 5 years	87	64	70	75	81	83	80	76	72

Notes:

1. *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.*
2. *For simplicity, based upon a review of World Health Organization (WHO) data, a single recommended source height of 1 metre is suggested as the source heights.*

To calculate the effective sound power level for a specific number of children, the following formula shall be used:

Effective Sound Power Level

for 'n' children = Effective Sound Power Level for 10 children + 10 log (n/10)

Notes:

1. *The noise level of boys and girls are assumed to be very similar and therefore are not differentiated in this guideline.*
2. *For every doubling of the number of children, 3 dB is added.*

These guidelines have been considered in relation to the noise levels likely to be generated by children at play, and in particular in relation to activities associated with the outdoor play areas.

6.6 ACOUSTIC IMPACT FROM THE CHILDCARE CENTRE

6.6.1 Introduction

The indoor and outdoor areas of the proposed childcare centre are shown for convenient reference in Figures 6.1 and 6.2, below and on the following page.

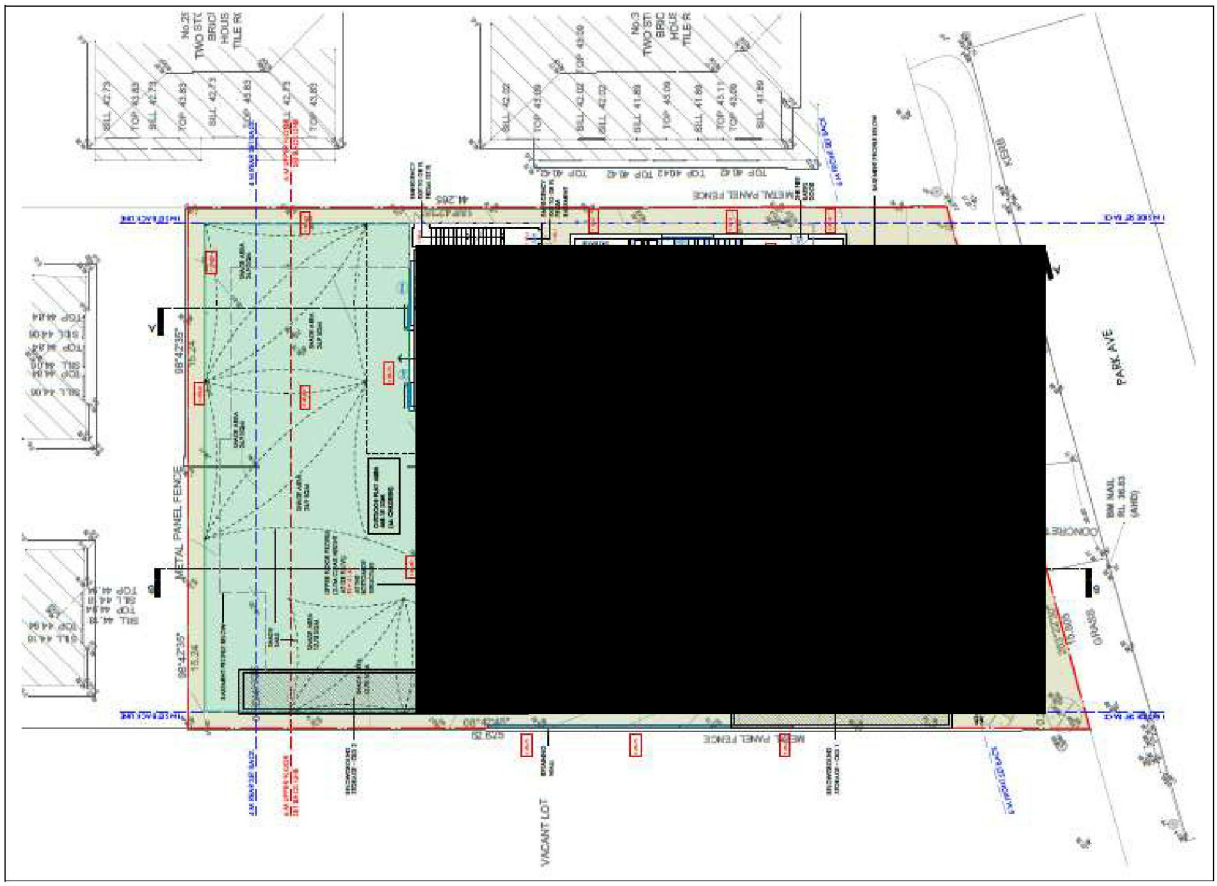


Figure 6.1 – Ground Floor Areas

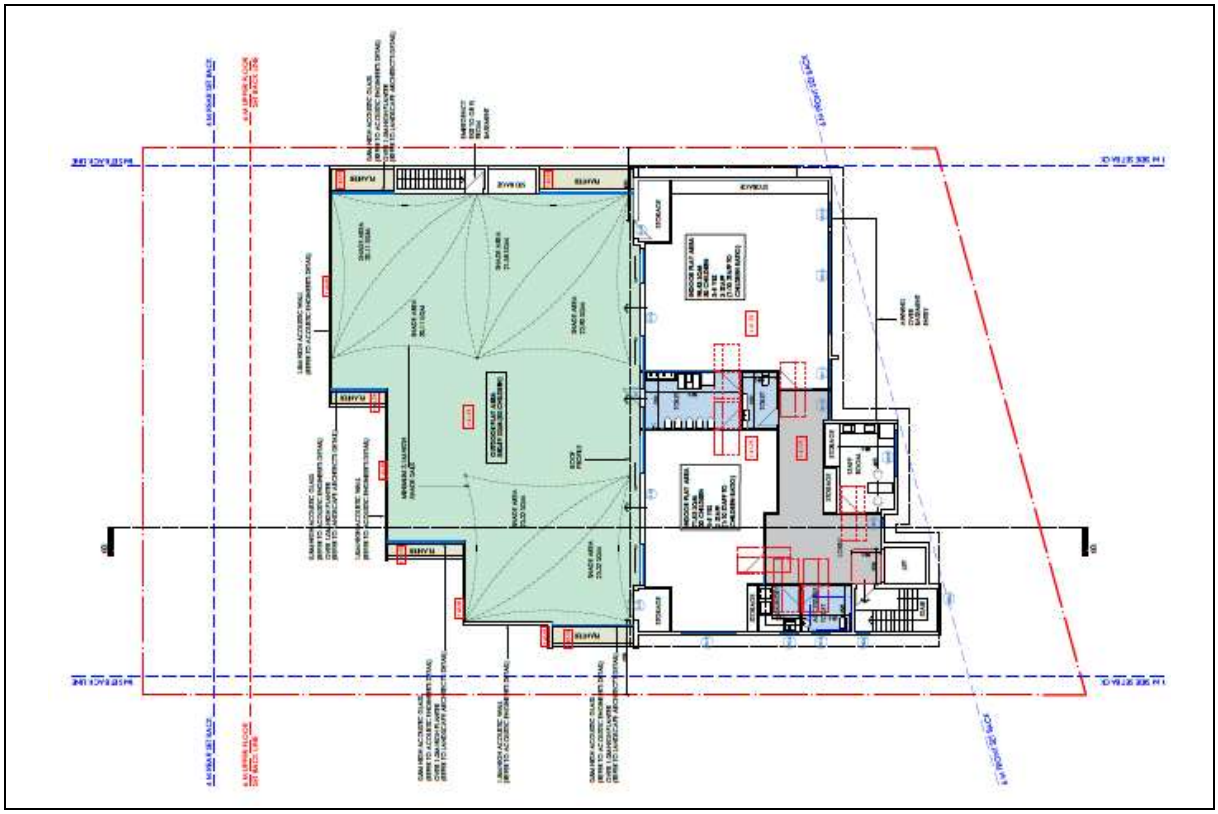


Figure 6.2 – Level 1 Areas

6.6.2 Noise Emissions from Indoor Activities

Noise generated within the childcare centre building itself will be reduced or attenuated by the internal and external structural elements of the building.

A conservative minimum noise reduction or attenuation of 35 dBA applies to outside noise passing through the solid external walls of the proposed childcare centre to the general interior spaces of the building, and that a noise reduction or attenuation of 25 dBA applies to outside noise passing through glazed elements in the building façade to the general interior spaces of the building (refer 6.2, above)

These processes also apply in reverse.

Noise generated by activities within the centre will also be attenuated or reduced by the effects of internal fittings and layout.

Assuming typical maximum noise levels in the range 70-75 dBA during periods of supervised activity within the indoor areas at the proposed centre (refer 6.4 above (this is considered to be conservative – and represents perceived noise levels between two and three times that of typical adult conversation) the maximum acoustic impact of internal noise immediately outside the centre, and at adjoining property boundaries, is indicated in Table 6.5, below.

Table 6.5 – Effect of Internally Generated Noise Outside the Centre

Detail	Projected Noise Level
Worst Case Noise due to Activities within the Centre	70 - 75 dBA
Less 30 dBA Attenuation due to Structure (Conservative)	-25 dBA
Projected Acoustic Impact Outside the Centre	45 - 50 dBA

This maximum projected noise impact of 45 - 50 dBA is the impact at the external façade of the centre.

A further noise attenuation or reduction will apply due to distance to the nearest residential property boundary. Reduction in noise due to distance has been calculated using the following equation:

$SPL_2 = SPL_1 – 20 \log (d_2/d_1)$

where:

SPL_2	=	sound level a distance "2" from the source in metres (predicted)
SPL_1	=	sound level a distance "1" from the source in metres (measured)
d_2	=	distance in metres to location 2 from the source
d_1	=	distance in metres to location 1 from the source

On this basis, the impact of noise from internal activities within the centre at the nearest residential property boundary will comply with the relevant requirement, which is that noise associated with the childcare centre should not result in an increase of greater than 5 dBA over existing background sound levels at any affected residential boundary, as shown in table 6.6, on the following page.

It is noted that the adopted LA90 background sound level is 44 dBA (refer Table 5.4)

Table 6.6 – Acoustic Impact of Internal Play Areas at Adjoining Residential Boundaries

	"Worst Case" Indoor Noise Level (dBA)	Minimum Attenuation due to Structure (dBA)	Minimum Attenuation due to Distance (dBA)	Maximum Impact at Boundary (dBA)	Allowable Impact * (RBL + 5 dBA)	Comply
Indoor Areas	70 - 75	25	5 -10	35 - 40	49 *	**YES**

"Allowable noise impact is the L90 RBL plus 5 dBA, that is 44 + 5 = 49 dBA

Review of AAAC Guidelines for Childcare Centres

The AAAC (2020) guideline provides the following specific recommendations in relation to noise control fir indoor activity areas:

NOISE CONTROL RECOMMENDATIONS.

Indoor Activity Areas

The weakest acoustical link from activity areas to the outside is typically through windows or glazed doors. However, with proper design considerations, noise emanating from within a childcare centre, even with windows and doors open, would at the neighbouring receptors normally be significantly less than that received from the children within the outdoor play area.

Even so, there may be situations where, due to the orientation or layout of the childcare centre, internal activity spaces are located adjacent or near to neighbouring receptors. In these cases, thicker glazing should be used (e.g. minimum 6.38 mm laminated glazing) in the indoor playroom windows/doors.

Additionally, preference should be given to casement or awning type windows, with compressible seals.

Indoor or partially enclosed play areas can be fitted with acoustically absorbent panels to the ceilings (or walls) to minimise the reverberant noise within the internal areas. This will also have a beneficial effect on the acoustical environment for both children and staff and enhance communication and speech intelligibility. A ceiling with a noise reduction coefficient (NRC) of at least 0.7 should be considered.

In this case, the proposed childcare building design will achieve the noise level criteria applicable to the potential impact of noise from internal activities on potentially affected residential receivers, and accordingly no further site-specific noise control measures are proposed in relation to design issues.

6.6.3 Acoustic Impact from Outdoor Play Areas

Acoustic Impact from Ground and Level 1 Outdoor Play Areas

In terms of acoustic impacts from the proposed facility on external receivers, the key limiting requirement is that the existing background LA90 RBL at any adjoining residential receiver should not be exceeded by more than 5 dBA as a result of noise emissions from the childcare centre.

Relevant guidelines also allow for a maximum period of two hours each day where the measured background may be exceeded by up to 10 dBA.

The outdoor play and activity areas will be situated on both the ground floor and level 1 areas of the proposed centre, as indicated in Figures 6.1 and 6.2.

Typical maximum noise levels generated within play areas have been assessed as being 70-75 dBA (refer Section 6.4 above). The measured LA90 RBL is 44 dBA, which must not generally be exceed by more than 5 dBA in the case of residential receivers, or by more than 10 dBA for maximum periods of two hours each day. This means that a maximum attenuation of (70-75) – 49 dBA, or 21 - 26 dBA maximum, is required in the case of residential receivers subject to acoustic impact. As noted, this maximum attenuation requirement is reduced by 5 dBA to 16 - 21 dBA for maximum periods of two hours each day.

In addition to the sound reduction provided by the sound absorbing effect of natural and artificial external surfaces, acoustic protection is provided by the types of external fences fitted to the two outdoor play areas, and by distance. Acoustic barriers or walls fitted to the boundaries of the ground and level 1 outdoor play areas can include solid panel acoustic fences; laminated glass fences; lapped timber fences; louvered timber privacy/acoustic screens, and metal mesh privacy/acoustic screens. It is noted that for other regulatory reasons, external acoustic fencing around childcare centres is required to be at least 1800 mm high at property boundaries. External barriers of minimum height 1200 mm are required around internal terraced areas.

Appropriate acoustic performance regarding the outdoor play areas can be delivered by the boundary fences or barriers described above. General boundary fencing to the site will need to also provide acoustic protection regarding the potential impacts of car park noise including noise associated with the drop off and pick up of children on adjoining residential receivers. The type of site boundary fencing and barriers required for this purpose is described in Section 6.5.4, below.

Table 6.7 below identifies the acoustic qualities associated with the various external acoustic boundary structural elements.

Table 6.7 – Acoustic Qualities of Boundary Structural Elements

Material/Structural Element	Sound Reduction
1800 mm Laminated Glass Acoustic Fence/Barrier (10.38 mmm Glass)	30 – 35 dBA [1]
1400 mm Laminated Glass Acoustic Fence/Barrier (6.38 mmm Glass)	26 - 31 dBA [1]
1200 mm Laminated Glass Acoustic Wall/Fence (6.38 mm Glass)	24 – 29 dBA [1]
2100 mm Double Lapped & Capped Timber Fence	27 – 32 dBA [2]
1800 mm Double Lapped & Capped Timber Fence	25 - 30 dBA [2]
2100 mm Solid Form Colorbond Metal Fence	22 - 25 dBA [3]
1800 mm Solid Form Colorbond Metal Fence	20 - 23 dBA [3]

Sources & References:
1 Knauff Australia, as example
2 Screenwood Australia, as example
3 Fencescape Fencing Australia, as example

In this case, residential receivers adjoin the childcare centre, and its ground floor outdoor play area, to the immediate north and east. The centre is bounded by recreational land to the west, and Park Avenue and the western rail corridor to the south.

The total noise reduction required to be provided for the immediately adjoining residential receivers to the north and east is identified in Table 6.8, below.

Table 6.8 – Minimum Sound Reduction Required for Outdoor Play Areas

Noise Level	LA90 RBL + 5 or 10	Attenuation Required
70 – 75 dBA	49 - 54 dBA *	21 - 26 dBA

* Allowable noise impact is the L90 RBL plus 5 dBA, that is 44 + 5 = 49 dBA generally, and L90 RBL + 10 dBA, that is 44 + 10 = 54 dBA for a maximum of two hours each day

In our professional opinion, the minimum acoustic protection required to ensure that external activities associated with the proposed childcare centre will not impact in an undue or non-compliant manner on surrounding and adjoining receivers, in particular residential receivers, will involve the following measures:

- Acoustic fencing with an Rw rating of 20 (minimum) to the northern and eastern boundaries of the ground level outdoor play area;
- The level 1 play area (refer Figure 6.2) will be bounded to the north (the boundary adjacent to the residential receivers to the north or rear of the site) by a proposed structural wall elements. It has been assumed that the structure of these walls be appropriate to satisfy safety requirements in terms of height and accessibility. Provided these requirements are satisfied, it is assessed that no further specific acoustic attenuation performance will be required from these boundary structures. The purpose of this external boundary to the proposed upper level outdoor play area is primarily structural, and safety;
- The reduction in sound with distance, based on the fact that the average play activities within the outdoor play areas in question will be some distance from the actual external boundaries;
- The acoustic attenuation provided by design elements such as soft fall; and
- The actual and perceived acoustic effects of landscaping (refer Section 4.3; NSW Child Care Planning Guideline (2017); Condition C25.

A conservative estimate of the aggregate acoustic protection provided by this combination of construction elements, distance and landscaping elements is summarised in Table 6.9, below.

Table 6.9 – Sound Reduction due to Landscaping, Distance Elements & Acoustic Fence

Outdoor Area & Structural Element		Sound Reduction
Outdoor Play Area		
	Distance (refer Section 3.1.4; assumes minimum average of 5 metres) [1]	5 - 10 dBA
	Structural & Design Elements	3 - 5 dBA
	Landscaping Elements	3 - 5 dBA
	Perimeter Acoustic Fence [2,3,4]	15 - 20 dBA
	Aggregate Effect (Conservative Estimate)	**26 – 40 dBA [5]**

Sources & References:
1 Noise reduction with distance
2 Knauff Australia, as example
3 Screenwood Australia, as example
4 Fencescape Fencing Australia, as example
5 Calculated on additive basis (refer Section 3)

Acoustic performance due to activities within the outdoor play areas, taking into account the aggregate effects of the treatments described above, is summarised in Table 6.10, below.

Table 6.10 – Acoustic Impact of External Play Areas at Adjoining Residential Boundaries

Outdoor Area	Noise Level (dBA)	Attenuation due to Structural Elements (dBA)	Maximum Impact at Boundary (dBA)	Allowable Impact * (RBL + 5 - 10 dBA)	Comply
Outdoor Play Areas	70 - 75	26 – 40 dBA	44 - 49	49 - 54	YES

* Allowable noise impact is the L90 RBL plus 5 dBA, that is 44 + 5 = 49 dBA generally, and L90 RBL + 10 dBA, that is 44 + 10 = 54 dBA for a maximum of two hours each day

It is noted that this assessment is conservative and allows for variations in noise emission levels that might arise.

6.6.4 Acoustic Fencing and Barriers to Outdoor Play Areas

Acoustic Fencing to Ground Floor Outdoor Play Area

As indicated by Table 6.8 above, an overall acoustic attenuation of 21 – 26 dBA will be required to ensure that noise generated by activities associated within the ground floor outdoor play area will have no undue or non-compliant impacts at adjoining residential boundaries. The boundaries to this outdoor play area are also the perimeter boundary between the site and adjoining residential properties to the north and east, and the recreational land to the west. Taking into account the attenuation effect of distance and landscaping elements, a minimum contribution of 10 -15 dBA is conservatively estimated to be required from these boundary fences. To achieve this, it is recommended that:

- An 1800 mm solid panel metal fence (or acoustic equivalent) with a minimum Rw rating or noise reduction potential of 15, is installed around the northern and eastern boundaries of the ground outdoor play area, as indicated in the location marked in black in Figure 6.3 on the following page; and

- An appropriate boundary fence is installed to the remainder of the site area, that is along the western site boundary marked in blue in Figure 6.3. The site adjoins recreational; land at this western boundary, and while no specific acoustic performance is identified at this non-residential boundary, a continuation of the 1800 mm solid form metal panel fence recommended for the northern and eastern site boundaries is probably a logical option. No specific acoustic performance is assigned to the eastern and western site fences between the front building line and Park Avenue, where fence heights may be lower than the 1800 mm required around the outdoor play areas.

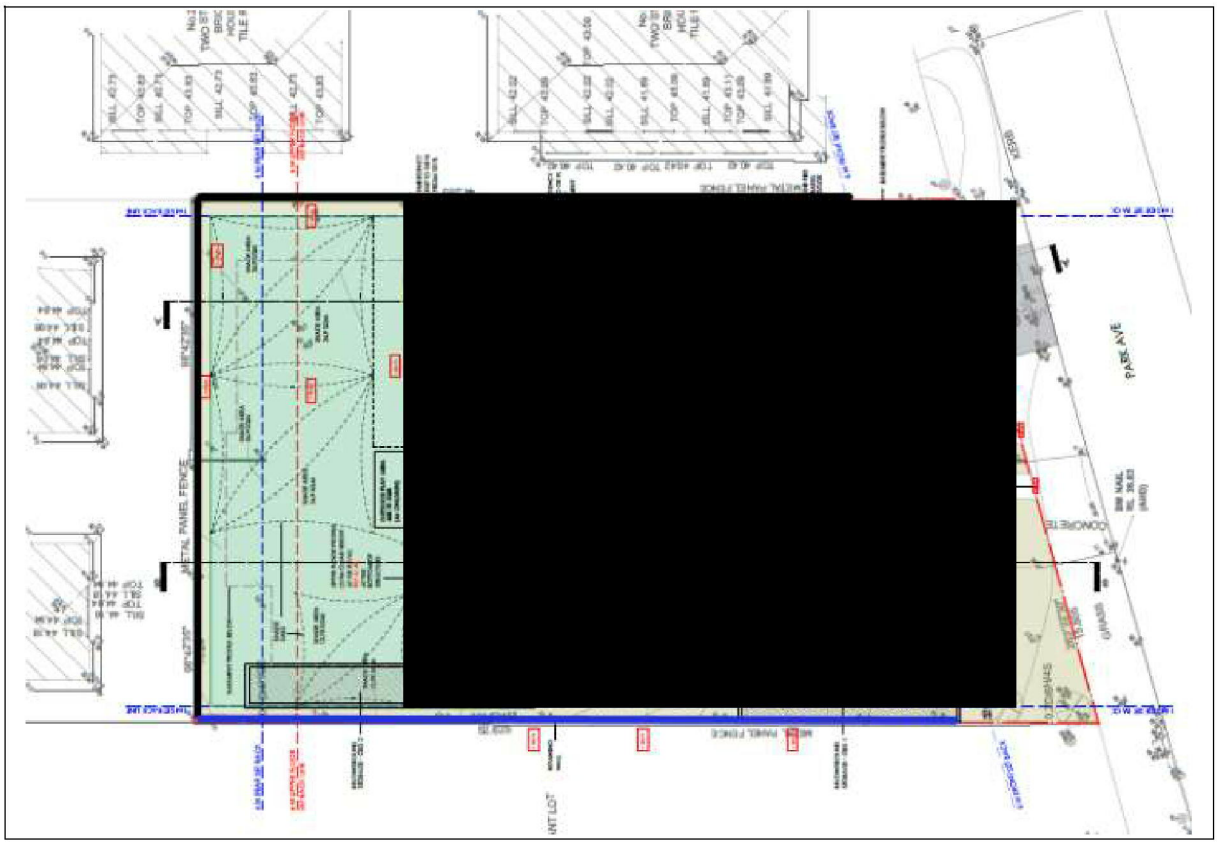


Figure 6.3 – Recommended Boundary Fencing – Ground Level Outdoor Play Area

It has been proposed that the 1800 mm boundary fencing is extended to the front building line on the eastern residential boundary to help ensure that noise associated with vehicle entering and leaving the basement car park, and any noise emissions from the drop-off and pick-up of children within the basement carpark, do not impact in an undue of non-compliant manner on the neighbouring residential property.

Barrier to the Upper Level Outdoor Play Area

External walls or barriers will be required to the boundaries of the level 1 outdoor play area.

The acoustic barriers or boundaries considered necessary to ensure that noise emission from the terraced Level 1 outdoor play area do not impact in an undue or non-compliant manner on neighbouring residential properties are shown in Figure 6.4, below.

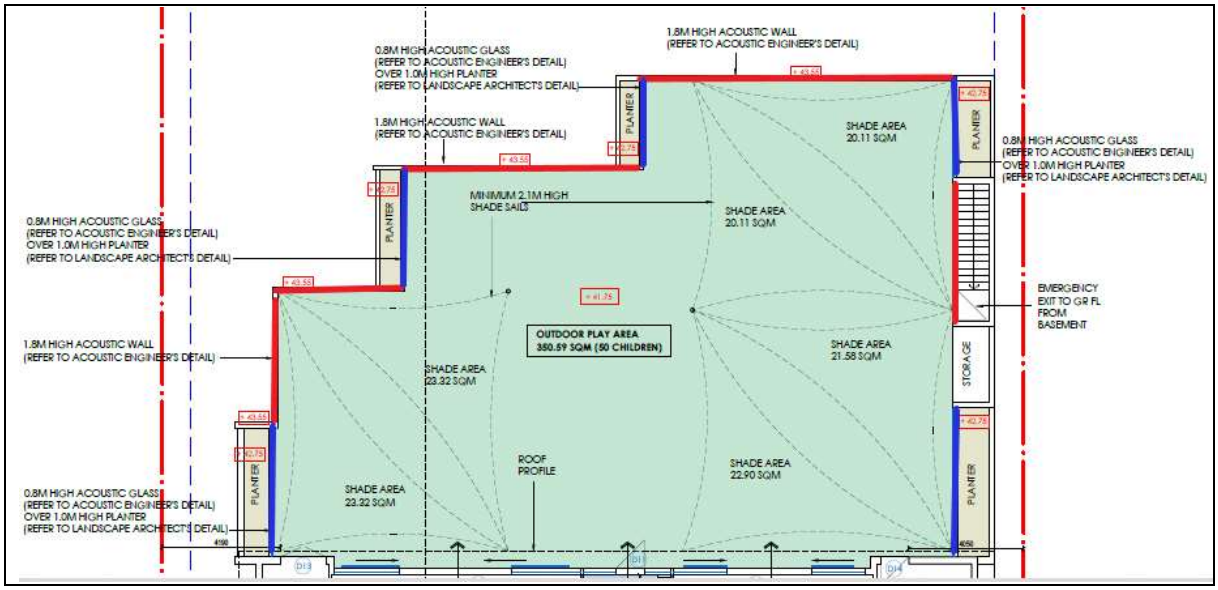


Figure 6.4 – External Walls or Barriers – Level 1 Outdoor Play Area

Acoustic performance will be required from the boundary walls or barriers along the eastern, northern and western perimeters of this play area.

While the acoustic performance required from the northern play area perimeter wall is less than that required from the eastern perimeter wall (because of greater distance to the site boundary), and no specific acoustic performance is required from the western perimeter wall which is adjacent to non-residential and vacant recreational land, in order to ensure overall acoustic performance similar acoustic boundary performance has been included for all external boundaries of the play area.

The boundaries recommended comprise 1800 mm laminated gap-free 6.38 mm safety glass panels in the areas shown in red in Figure 6.4, and 800 mm laminated gap-free 6.38 mm safety glass panels in the areas shown in blue in Figure 6.4, with these 800 mm panel mounted above 1000 mm concrete block walls proposed in these areas.

It is noted that an 1800 mm storage structure is proposed along the eastern side of this play area. This structure will provide the acoustic treatment required at this section of the play area boundary.

It is assessed that the acoustic protection associated with the boundary wall options described above will satisfy safety and structural requirements will also provide the appropriate level of acoustic performance required.

6.6.5 Acoustic Implications of the Numbers of Children in the Outdoor Play Areas

The levels of noise generated by outdoor play activities needs to take into account the numbers of children involved in those play activities.

No specific numbers of children have been specified for the two outdoor play areas in the plans and drawing provided in Section 3.

The reference data provided in Section 6.4 above was based on the measurement of peak noise from groups of children playing without close supervision in a Sydney CBD childcare centre.

Data was recorded at distances of between 2 and 5 metres from the playing group, and therefore provides a reasonably immediate and maximum measure of the noise emissions that might be expected to be experienced at a boundary fence as a result of children playing close to that fence or boundary.

The data presented in 6.4 related to individual play groups of five to eight children, in an outdoor playground containing approximately 40 children, playing in separate groups of between five and eight children.

This data indicates a maximum typical noise impact of 70 – 75 dBA at any boundary of the outdoor play area, assuming play close to the play area boundaries by some of the total cohort of children in the play area at any given time.

Data (also presented in 6.4 above) from the Association of Australian Acoustical Consultants (AAAC) Guideline for Acoustic Assessment (2020) presents slightly higher maximum noise levels from groups of ten children involved in unsupervised play. This data is understood to be based on measurements at two metres from the playing group.

A typical maximum noise level of 75 dBA at a distance of five metres from the source play group has been adopted for this assessment.

AAAC guidelines involve consideration of the numbers of children in the outdoor play area at any time, and whether restrictions on numbers are indicated in order to achieve relevant acoustic performance.

The following key factors are considered to apply to the question of noise generated by activities in the outdoor play area, and to the numbers of children involved:

- Noise emission data from sub-groups of between five and eight children in a total outdoor play group population of forty children (at any one time) has been considered;
- Noise emissions are estimates, and are subject to individual situations and circumstances;
- The effectiveness of supervision and control is very important in managing and minimising noise emissions from outdoor play activities;
- A precautionary approach is appropriate to ensure compliance with reasonable and permissible noise impacts at affected residential receiving boundaries; and
- An appropriate response and control mechanism is required to ensure that appropriate noise levels are maintained.

From an acoustic perspective, the following controls and procedures are recommended;

1. That, in this case, the presence of a maximum of 66 children at any one time within the ground level play area is considered appropriate;
2. That, in this case, the presence of a maximum of 50 children at any one time within the Level 1 play area is considered appropriate;
3. That, however, these maximum assessed numbers of children are subject to the careful supervision of outdoor play, particularly in terms of noisy play and activity, and that staff intervene to control any excessively or unduly noisy activities (consistent with the "*Effect of Management and Supervision*" described in 6.6.13, below);
4. That if undue noise is noted in the outdoor play areas, or if complaints are received from neighbours, then appropriate action to rectify the situation is to be taken by teachers and staff . However, it is noted that subject to effective supervision and performance, corrective action in relation to noise is considered unlikely to be necessary; and
5. That these procedures are included in a concise Noise Management Plan, that should in turn be incorporated in the overall Plan of Management to be prepared for the childcare centre.

It is noted that acoustic issues associated with the numbers of children in the outdoor play area at any one time are very much subject to individual circumstances.

Our professional experience has been that facilities of the type and scale addressed in this report can operate without the generation of undue noise levels and with acoustic compliance, in the absence of a specific restriction on the numbers of children at play in outdoor play areas. In practice it has been our experience that effective supervision and good operating procedures are the key factors in ensuring that undue noise is managed and effectively minimised. In our opinion, the guidelines and procedures summarised above provide an appropriately precautionary approach and will ensure acoustic performance and compliance. It is noted that the AAAC (2020) guideline indicates that:

Review of AAAC Guidelines for Childcare Centres

> The AAAC (2020) guideline provides the following comments in relation to the potential to reduce noise levels in specific play areas by reducing the number of children in those areas.
>
> The number of children within the Centre or playing in the outdoor play areas at any one time may be limited to reduce the noise impact.
>
> A reduction in the number of children by half will reduce the noise impact by approximately 3 dB.

6.6.6 Residential Receivers

The position of the proposed childcare centre in relation to residential neighbours is shown in Figure 6.5, below. Residential receivers are present to the immediate north and east of the site (Locations A, B, C, D & E), and on the other side of the recreational land (Amaroo Street Reserve) to the west. Subject to the use of appropriate acoustic fencing to the perimeters of the outdoor play area, it has been demonstrated above that:

- noise generated within the outdoor play and activity areas will be effectively contained; and
- noise impacts at adjoining residential boundaries will comply with relevant acoustic guidelines.

Figure 6.5 – Location of Residential Receivers

Review of AAAC Guidelines for Childcare Centres

The AAAC (2020) guideline provides the following specific recommendations in relation to noise control fir indoor play areas:

NOISE CONTROL RECOMMENDATIONS.

Outdoor Play Area

The noise impact from children at play in a childcare centre differs from the domestic situation in that it is a business carried out for commercial gain, the number of children can be far greater than in a domestic situation and the age range of the children at the centre does not significantly vary over time as it would in a domestic situation. However, the noise from children is vastly different, in both character and duration, from industrial, commercial or even domestic machine noise. The sound from children at play, in some circumstances, can be pleasant, with noise emission generally only audible during the times the children play outside. Night-time, weekend or public holiday activity is not typical and childcare centres have considerable social and community benefit.

Base Criteria – With the development of childcare centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed Leq,15min 45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).

Background Greater Than 40 dB(A) – The contributed Leq,15min noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10 dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10 dB (ie background +10 dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).

Up to 4 hours (total) per day – If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed Leq,15 minute noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.

More than 4 hours (total) per day – If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed Leq,15 minute noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- 1.5 m above ground level;
- On a balcony at 1.5 m above floor level;
- Outside a window on the ground or higher floors.

Compliance with that requirement has been demonstrated above in relation to the three outdoor play areas proposed for the subject development .

6.6.7 Motor Vehicle Noise

Subject to appropriate driving practices, noise associated with the drop off and pick up of children from the centre is not expected to impose a noise burden of greater than 5 dBA (15-minute) above the measured LA90 RBL background level of 44 dBA (15-minute) at any potentially affected residential boundary.

A Noise Management Plan is also recommended to help ensure that activities associated with the proposed car park involve a minimum of noise generation.

Review of AAAC Guidelines – Motor Vehicle Noise

The AAAC (2020) guideline provides the following comment in relation to motor vehicle noise within childcare centre car parks:

> *The noise from cars and small delivery vans arriving at the centre may be a significant source of noise and should be considered. Typical sound power levels for vehicles within the car park area of a childcare centre are given below in Table 3.*

Table 3 – Sound Power Levels for Traffic (LAeq)

Car	81 dB
Delivery Van	86 dB

The acoustic assessment and projected outcomes presented in this report are consistent with the requirements of the AAAC (2020) guideline

Review of AAAC Guidelines – Drop-Off and Pick-Ip of Children

The AAAC (2020) guideline provides the following comment in relation to the drop-off and pick-up of children:

> *Pick-up and Drop-off*
>
> *Depending on the requirements of the state or territory where the centre is located, noise emission from vehicles on site should be considered.* These requirements have been taken into account in the design of the centre, and the preparation of this acoustic assessment.

Review of AAAC Guidelines – Car Parking

The AAAC (2020) guideline provides the following comment in relation to car parking:

> *Noise mitigation measures should be implemented to minimise adverse impact to neighbours caused by car doors slamming and the sounds of parents and children arriving or departing the centre.*
>
> *Such measures could include the judicious positioning of arrival and departure access points and pathways away from residential property boundaries, the appropriate placement of buildings constructed on site to shield the noise or the provision of acoustic fencing or landscaping.*

The acoustic assessment and projected outcomes presented in this report are consistent with the requirements of the AAAC (2020) guideline

6.6.8 Industrial & Commercial Receivers

The NSW Noise Policy for Industry (2017) requires that the impact of any commercially or industrially sourced noise, in this case the noise from the proposed community childcare centre, must not exceed 65 dBA at any existing industrial or commercial boundary.

In this case, no industrial or commercial premises are present in the immediate vicinity of the proposed childcare centre, which is located in a residential neighbourhood.

Review of AAAC Guidelines

The AAAC (2020) guideline provides the following comment in relation to acoustic impacts at industrial & commercial receptors:

> *The cumulative Leq,15min noise level emitted from the use and operation of the childcare centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within any commercial property boundary.*

In this case, no such receptors are present, and as indicated above the relevant criterion does not apply.

6.6.9 Mechanical Plant

The impact of typical mechanical plant typically projected to be associated with the proposed childcare centre has been generally assessed, and it is considered that acoustic impacts of significantly less than 5 dBA above the measured background LA90 RBL will be achieved at all property boundaries.

However at the time of preparing this assessment no final plan had been developed for the types and locations of plant and equipment to be used.

For this reason, it is recommended that the acoustic performance of plant and equipment is validated following final fit-out of the proposed childcare centre, and prior to the issue of an Occupation Certificate for the premises.

The AAAC (2020) guideline provides the following comment in relation to noise associated with mechanical plant & equipment:

> *Childcare centres may include air-conditioning plant and equipment, kitchen and wet area exhaust fans, car park and garbage room ventilation fans. Depending on the requirements of the state or territory where the centre is located, any such mechanical equipment should be assessed in accordance with this section and should not be audible outside the premises between 6 pm and 7am.*

The acoustic assessment and projected outcomes presented in this report are consistent with the requirements of the AAAC (2020) guideline

6.6.10 Mechanical Plant & Services within the Basement

The comments provided in 6.6.9 above in relation to noise emissions from plant and equipment generally include mechanical plant and services to be included in the basement carpark area.

Again, no final determination regarding the types or locations of mechanical plant and equipment to be installed in the basement car park have been developed at the time of preparing this acoustic report.

Based on our experience with projects of a similar scale, and the acoustic qualities of the various structural elements associated with this proposed development, it is our opinion that noise emissions from the types of mechanical plant, equipment and services likley to be installed in the basement carpark will not result in noise impacts approaching the permissible “5 dBA above background” at any residential boundary.

However, it is recommended that this finding is conformed based on actual mechanical services specifications and designs prior to the issue of a Construction Certificate for the development.

6.6.11 Deliveries & Garbage Removal within the Basement

Commercial deliveries including garbage collection within the basement car park will result in noise emissions.

The AAAC noise guidelines for delivery vehicles involve a sound power level of 86 dBA (refer 6.6.7 above).

As in the case of other vehicle movements in the basement carpark and given that the external structural elements of the proposed building will have an Rw in the range 40 – 45 (refer Section 6.3.1), the acoustic impact of noise emissions associated with commercial vehicle operations in the basement carpark will not exceed the measured LA90 background sound level at any residential boundary.

6.6.12 Noise Impacts from the Rail Corridor Opposite

Noise imp[acts associated with rail operations within the Western Rail Corridor opposite the site to the south (on the opposite side of Park Avenue) are taken into account in the background acoustic measurements presented in Section 5 of this report.

The structure and design of the proposed centre as described in the plans and drawings presented in Section 3 of this report, and the acoustic assessment presented in Section 6.3 above, confirm that the acoustic amenity within the internal spaces and external play areas of the proposed centre will comply with relevant acoustic guidelines.

6.6.13 Acoustic Impacts Generally

In our professional opinion, due to the relatively low level of sounds projected to be generated by activities associated with the proposed facility, and the various attenuation or noise reduction factors involved, and subject to the recommendations made in this report, there is very little likelihood that the proposed childcare centre will cause any undue acoustic impacts on nearby receivers.

Sound generated by the activities of children at the proposed childcare centre will be additional to background, ambient sound levels. However, these incremental sound levels will be subject to the following management and control:

> **Structural Attenuation:** Sound levels generated within the proposed childcare centre will be subject to attenuation by the materials associated with the construction and fit-out of the facility, such as wall and flooring finishes. It is considered reasonable to assume that a measurable reduction in noise impact will be achieved by this means.
>
> **Effect of Management and Supervision:** It is also considered reasonable to assume that sound generated by the activities of children playing in play areas at the proposed childcare centre will be subject to minimisation and control as a result of appropriate management and supervisory protocols.

These factors will provide additional acoustic management and minimisation controls.

6.6.14 Noise Management Plan

The proposed facility is adjoined to the immediate north, west and south by existing residential properties. For this reason, it is considered important that the various controls required to ensure the effective management and minimisation of noise impacts on neighboring properties is formalised in the form of a concise, plain language Noise Management Plan. This Noise Management Plan should be incorporated into the overall Management Plan for the proposed childcare centre, and should include but not be limited to the following issues:

- Separate daily programs for both the warmer and cooler months in order to regulate the total time spent outdoors and indoors. The program should be made publicly available to parents and neighbours;
- Contact phone numbers for the overall facility manager or director should be made available to neighbours to facilitate communication and to resolve any neighbourhood issues that may arise due to operation of the childcare centre;
- Details of the typical number of children anticipated to be present in the outdoor play area;
- Details of any limitations recommended on the total time spent outside in the play area each day in order to meet the noise criteria (refer 6.3.2 above);

- Procedure to ensure that crying children are taken inside the childcare centre building and comforted;
- Details of plans and procedures to ensure that the behaviour of children is monitored and modified as required by adequately trained teachers and childcare workers, to assist in ensuring compliance with overall noise guidelines
- A procedure to ensure that parents and guardians are informed regarding the importance of noise minimisation when entering the site, and dropping off or picking up children;
- Procedures as required to ensure that staff control the level of their voices while outside;
- Minimisation or control of any use of amplified music to ensure compliance with noise management guidelines.

Review of AAAC Guidelines

The AAAC (2020) guideline provides specific recommendations in relation to the inclusion of an appropriate Noise Management Plan in the overall Centre Management Plan.

One of the most effective measures that should be implemented in conjunction with the physical noise controls is a noise management plan (NMP). The NMP should be incorporated within the Centre's overall management plan.

The following are examples of management measures that may be incorporated into a Noise Management Plan (NMP).

- *A separate daily program for both the warmer and cooler months should be established to regulate the total time spent outdoors and indoors;*
- *The NMP should be made publicly available to parents and neighbours;*
- *A contact phone number for the Centre's director should be made available to neighbours to facilitate communication and to resolve any neighbourhood issues that may arise due to operation of the Centre;*
- *The number of children playing outside at any one time may need to be limited to meet the noise criteria;*
- *The type of outdoor activities may be programmed to only allow quiet or "passive" activities such as painting, garden exploration, reading, block play or drawing in certain areas of the outdoor play area;*
- *Crying children should be taken inside the centre and comforted;*
- *The behaviour of children should be monitored and modified as required by adequately trained childcare workers;*
- *Parents and guardians should be informed of the importance of noise minimisation when entering the site, dropping off or picking up children;*
- *Carers / staff should be educated to control the level of their voice while outside; and*
- *To meet the noise criteria, amplified music may need to be controlled.*

The recommendations made above are consistent with this requirement.

6.7 RECOMMENDATIONS

Based on the assessment presented above, the proposed childcare centre will comply with all relevant acoustic guidelines and requirements, however, to ensure that acoustic compliance is achieved at all times, it is recommended that:

- External windows and doors are fitted with 6.38 mm laminated glass, or minimum acoustic equivalent;
- External window and door frames are fitted to façade openings with a sealant such as “Bostik Fireban One”, or equivalent;
- Full perimeter acoustic seals equal to Schlegel Q-Lon seals to be fitted to all external windows and doors;
- 1800 mm solid form metal panel fence (or acoustic equivalent) with an Rw rating or noise reduction potential of minimum 15, is installed around the ground outdoor play area, as indicated in black in Figure 6.3 above;
- A combination of 1800 mm gap-free laminated 6.38 mm safety glass panels and 800 mm gap-free laminated 6.38 mm safety glass panels mounted on 1000 mm concrete block walls are installed at the external boundaries of the proposed Level 1 terraced outdoor play area, as indicated in Figure 6.4, above;
- Mineral wool-based ceiling insulation equivalent to Bradford SoundScreen™ 2.5 with a minimum Rw rating of 43 to be fitted in the roof void of the childcare centre building;
- Validation that any plant & equipment associated with the proposed childcare centre will not have an impact greater than 5 dBA above the measured background LA90 RBL, as indicated in this report, should be provided prior to the issue of an Occupation Certificate for the development; and
- A Noise Management Plan consistent with the guidelines provided in Section 6.6.14 above is prepared and included in the overall Management Plan for the childcare centre.

6.8 COMPARISON WITH THE NOISE LEVELS OF COMMON ACTIVITIES

Appendix C provides a comparison of the noise levels projected to apply at the proposed childcare centre with those associated with a range of common activities.

These comparisons suggest that the sound levels forecast to be associated with the proposed facility will be comparable with the sound levels associated with a range of accepted community activities, and subject to implementation of the and recommendations and controls included in this assessment report, are considered extremely unlikely to cause offence, nuisance or harm.

7 FINDINGS & RECOMMENDATIONS

7.1 KEY FINDINGS

This report presents the results of an acoustic assessment undertaken in relation to a childcare centre proposed for development proposed for 31-32 Park Avenue Kingswood NSW.

The assessment has been undertaken in accordance with relevant acoustic assessment protocols, standards and guidelines.

The following is a summary of the key findings of this assessment:

1. Sound levels of less than 40 dB(A) will be achieved throughout the internal areas of the proposed childcare centre, based on measured background sound levels and proposed layout and design details as described in this report;

2. Sound levels in the range 30-35 dB(A) will be achievable within any sleep areas or cot rooms associated with the proposed facility, based on measured background sound levels; and proposed layout and design details as described in this report;

3. Background noise levels of less than 55 dBA are projected to be achieved within the two outdoor play areas associated with the proposed childcare centre;

4. The level of noise estimated to be generated by activities within the internal areas of the proposed facility is projected to be essentially contained by the building structure of the childcare centre building itself, and accordingly is projected to have no negative or non-compliant impacts on surrounding buildings, activities and individuals;

5. The level of noise estimated to be generated by activities within the outdoor activity areas associated with the proposed childcare centre is projected to have no negative or non-compliant impacts on surrounding buildings, activities and individuals, subject to the implementation of the recommendations summarised below;

6. The level of noise associated with motor vehicle activities associated with the proposed childcare centre, including the drop-off and pick-up of children is projected to have no negative or non-compliant impacts on surrounding buildings, activities and individuals, subject to the implementation of the recommendations summarised below; and

7. On this basis, the acoustic performance of the proposed childcare centre will comply fully with the requirements of all relevant acoustic guidelines and requirements.

7.2 RECOMMENDATIONS

The assessment has found that the proposed childcare centre will comply with the requirements of all relevant acoustic guidelines and regulations, subject to the advice provided generally in this report; adherence to normally accepted design and building practices, and the implementation of the following recommendations:

1. External windows and doors are fitted with 6.38 mm laminated glass, or minimum acoustic equivalent;

2. External window and door frames are fitted to façade openings with a sealant such as “Bostik Fireban One”, or equivalent;

3. Full perimeter acoustic seals equal to Schlegel Q-Lon seals to be fitted to all external windows and doors;

4. Solid form metal panel boundary fencing (or acoustic equivalent) of height 1800 mm with a minimum Rw rating of 15 to be installed along the northern and eastern outdoor play area boundaries with adjacent residential properties, as detailed in this report;

5. A combination of 1800 mm gap-free laminated 6.38 mm safety glass panels and 800 mm gap-free laminated 6.38 mm safety glass panels mounted on 1000 mm concrete block walls are installed at the external boundaries of the proposed Level 1 terraced outdoor play area, as detailed in this report;

6. Mineral wool-based ceiling insulation equivalent to Bradford SoundScreen™ 2.5 with a minimum Rw rating of 43 to be fitted in the roof void of the childcare centre building;

7. A Noise Management Plan consistent with the guidelines provided in Section 6.5.10 above is prepared and included in the overall Management Plan for the childcare centre;

8. Management of children in the outdoor play area of the childcare centre is undertaken in accordance with the protocols set out in this report; and

9. The acoustic performance of all plant and equipment associated with the facility is validated following construction, and prior to the issue of an Occupation Certificate for the premises.

On this basis, it is the finding of this acoustic assessment that the acoustic performance of the proposed childcare centre will comply fully with the requirements of all relevant acoustic guidelines and requirements.

It should be noted that all materials or material types mentioned in this report have been suggested solely on the basis of acoustic performance.

Any other properties of these materials, including fire rating and chemical properties should be checked with the suppliers or other specialised bodies to ensure fitness for non-acoustic purposes.

It should also be noted that any specific material brands or types mentioned in this report have been mentioned as a guide to acoustic properties, and not as a recommendation, and that a range of products may be available that can deliver the acoustic performance required.

8 AUTHORISATION & LIMITATIONS

NG Child & Associates has based this report on the data, methods and sources described herein.

Subject to the limitations described within the report, it is the view of NG Child & Associates that this report presents an accurate and reliable assessment of the acoustic environment applicable at and in the immediate vicinity of the childcare centre development proposed for 31-32 Park Avenue Kingswood NSW, as described in this document.

The information presented in this document has been prepared by NG Child & Associates exclusively for the use of MIM Property Pty Ltd, and for submission to the local government consent authority or certifying authority at interest as required in relation to the proposed development.

This document should not be used for any purposes other than those of MIM Property Pty Ltd in relation to the development described in this report.

Noel Child BSc (Hons), PhD, MIEA, MRACI
Visiting Fellow, Engineering
University of Technology, Sydney
Principal, NG Child & Associates

19 August 2021

GLOSSARY

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph overleaf, are here defined.

Maximum Noise Level (LAmax) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

LA1 – The LA1 level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the LA1 level for 99% of the time.

LA10 – The LA10 level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the LA10 level for 90% of the time. The LA10 is a common noise descriptor for environmental noise and road traffic noise.

LAeq – The equivalent continuous sound level (LAeq) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

LA50 – The LA50 level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the LA50 level for 50% of the time.

LA90 – The LA90 level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the LA90 level for 10% of the time. This measure is commonly referred to as the background noise level.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening, and night-time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (LA90) for each period.

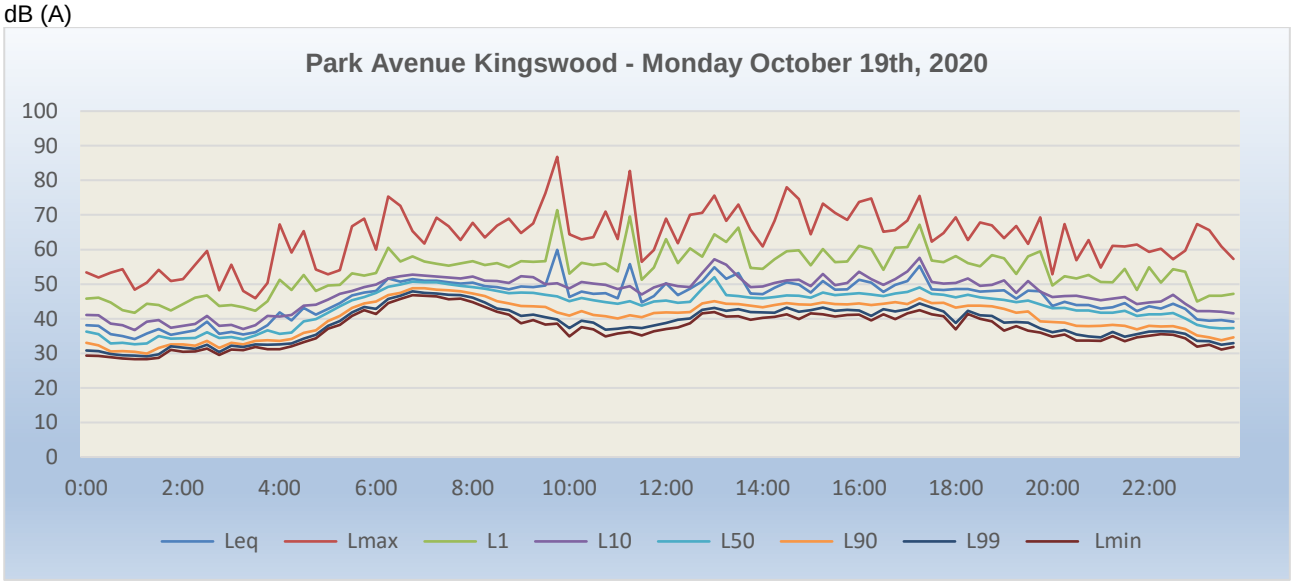
RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all the days measured. There is therefore an RBL value for each period – daytime, evening, and night-time.

APPENDIX A

Background Noise Monitoring Data - Location A

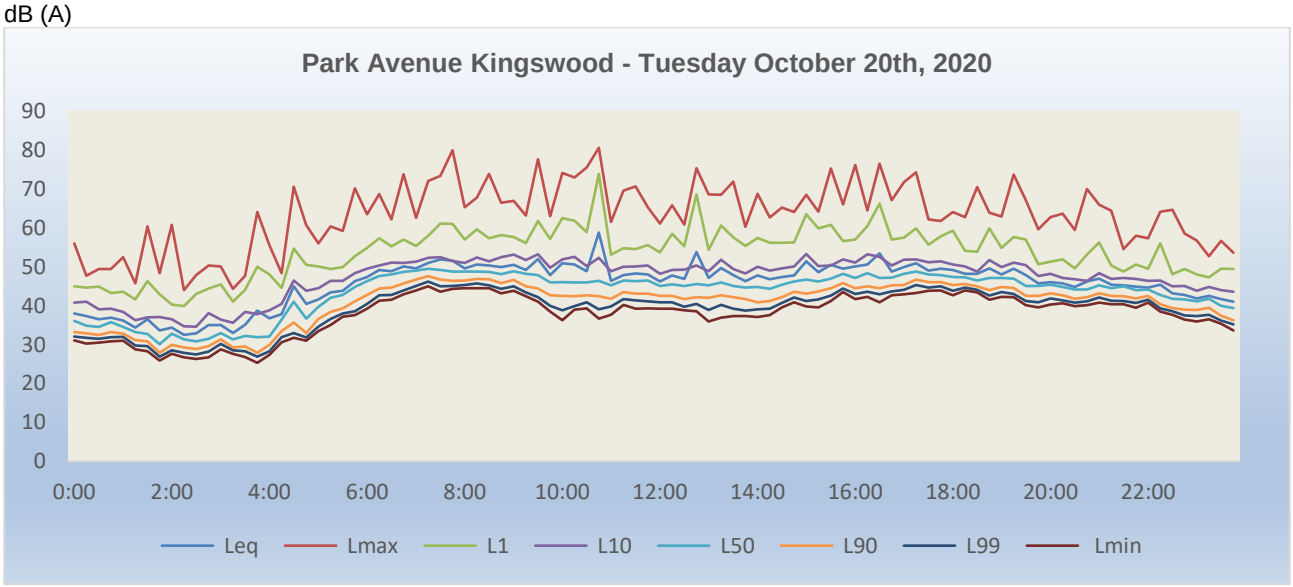
Monday October 19th, 2020

dB (A)



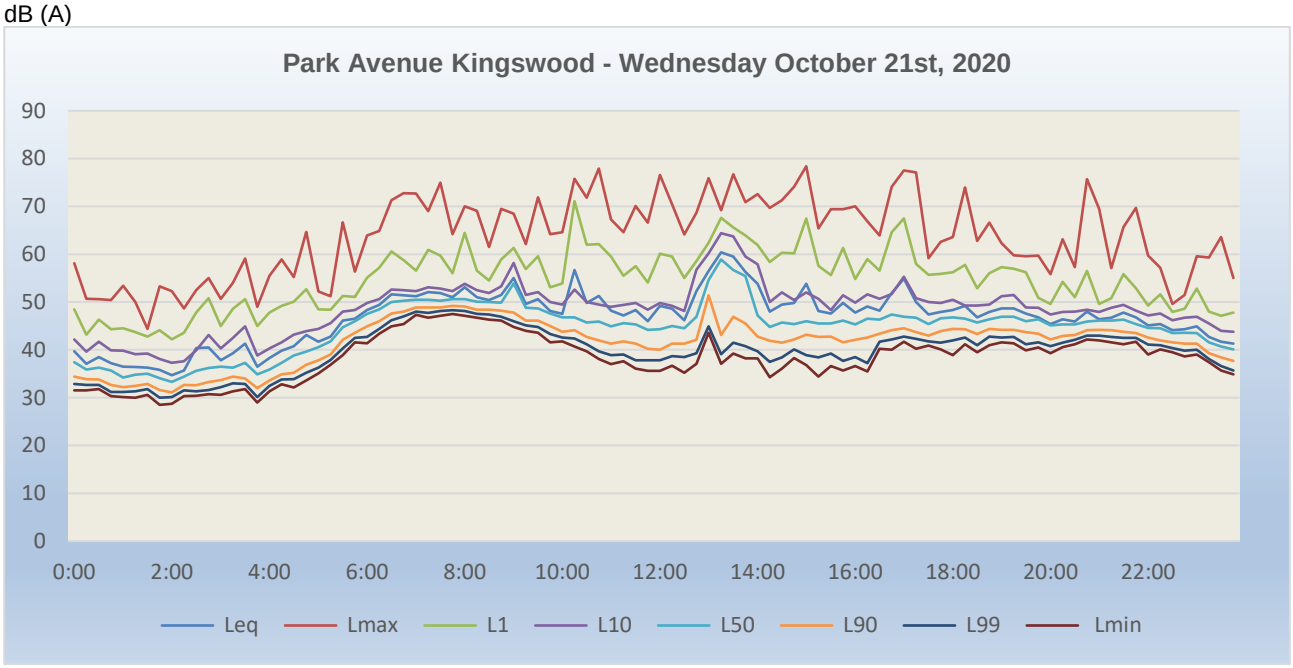
Tuesday October 20th, 2020

dB (A)



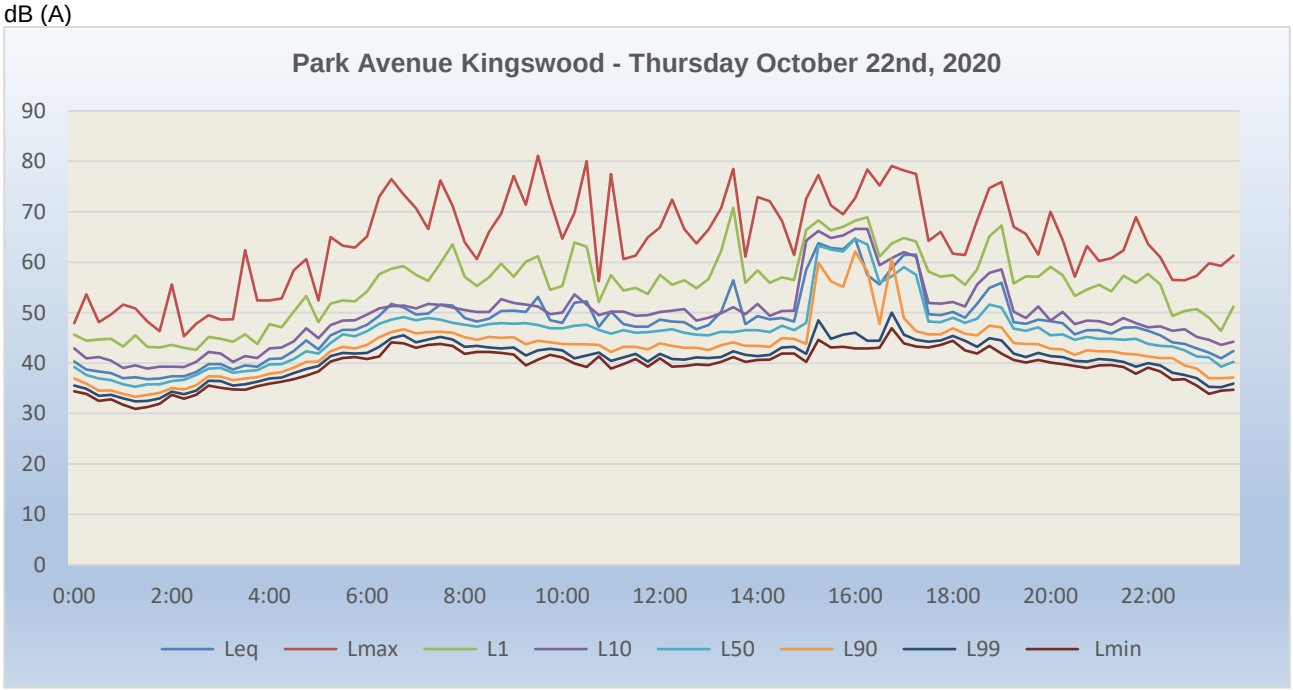
Wednesday October 21st, 2020

dB (A)



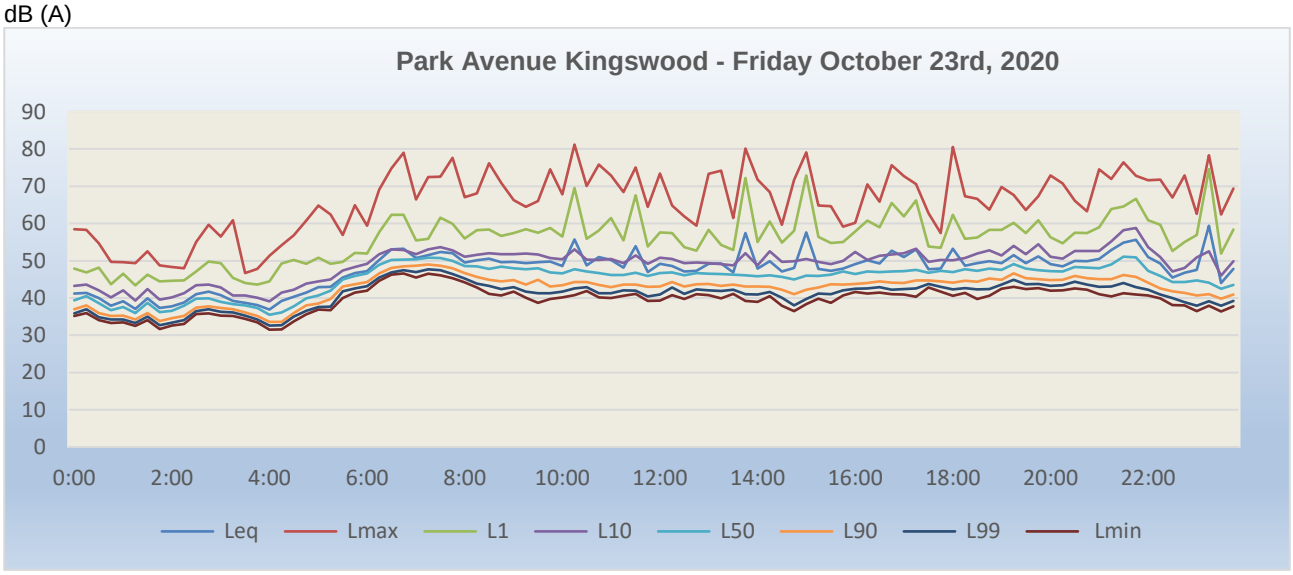
Thursday October 22nd, 2020

dB (A)



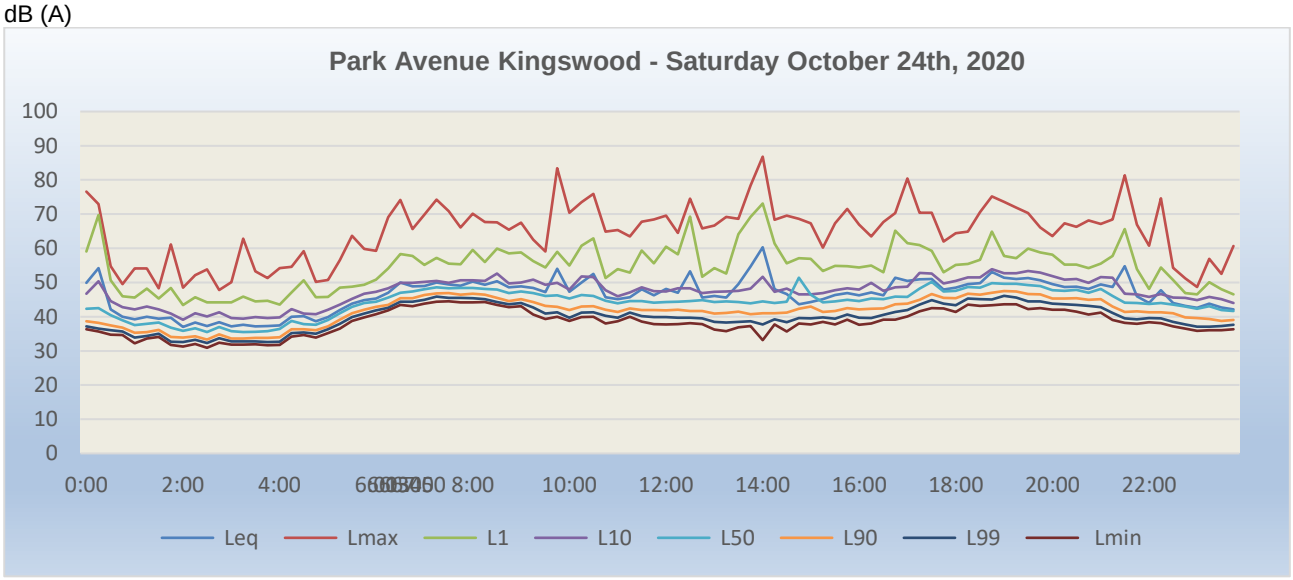
Friday October 23rd, 2020

dB (A)



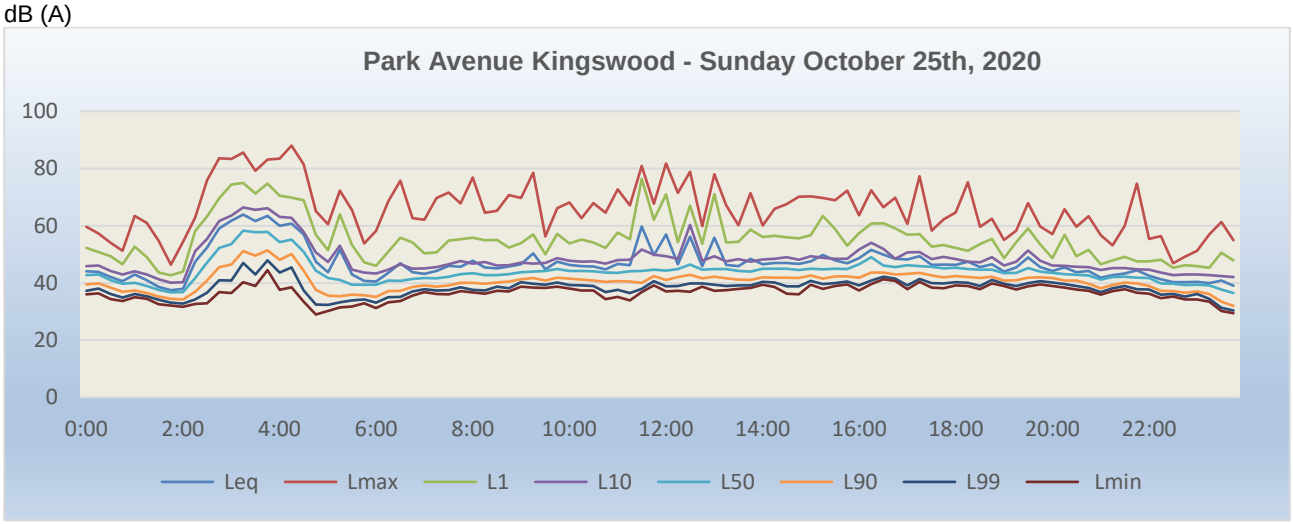
Saturday October 24th, 2020

dB (A)



Sunday October 25th, 2020

dB (A)



31-32 Park Avenue Kingswood NSW
Summary of Background Noise Monitoring Data – Location A

	Leq			Lmax			L1			L10		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Monday 19 October 2020	49.7604	45.7688	39.3875	68.3854	62.8625	56.4750	58.0625	54.0938	47.2031	51.1500	47.8438	41.5281
Tuesday 20 October 2020	49.5841	46.9750	40.0000	68.7386	63.9688	56.4583	58.5955	53.7125	47.8361	50.9614	48.6250	42.1500
Wednesday 21 October 2020	50.7875	47.3375	40.3844	69.6542	63.8938	54.6406	59.4500	54.0438	47.6000	52.3271	49.0625	42.7250
Thursday 22 October 2020	51.9795	48.8188	41.9750	70.1068	65.1875	56.5944	59.6705	57.5813	48.6167	53.6068	50.8125	43.9528
Friday 23 October 2020	50.0313	50.8813	42.4188	69.2646	69.7125	58.5156	58.5896	59.3438	50.0313	50.9563	53.0500	44.2656
Weekday Average	**50.4286**	**47.9563**	**40.8331**	**69.2299**	**65.1250**	**56.5368**	**58.8736**	**55.7550**	**48.2574**	**51.8003**	**49.8788**	**42.9243**
	Leq			Lmax			L1			L10		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Saturday 24 October 2020	48.5104	49.9500	41.3000	68.9708	69.1375	56.2406	57.6583	57.5688	48.1313	48.9708	51.1813	43.0250
Sunday 25 October 2020	47.5479	44.9813	47.1094	68.3396	62.0813	64.3125	56.6583	51.6063	55.5063	56.6583	51.6063	55.5063
Weekend Average	**48.0292**	**47.4656**	**44.2047**	**68.6552**	**65.6094**	**60.2766**	**57.1583**	**54.5875**	**51.8188**	**52.8146**	**51.3938**	**49.2656**

	L50			L90			L99			Lmin		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Monday 19 October 2020	47.2021	43.8750	37.3125	44.2042	40.2938	34.6906	42.1500	37.5688	33.4344	40.6063	36.1625	32.3688
Tuesday 20 October 2020	46.9250	45.6188	37.9278	44.0795	43.3875	35.2417	42.2136	42.1438	33.8194	40.7023	41.1063	32.6722
Wednesday 21 October 2020	48.0542	46.0688	38.5844	44.5063	43.7375	36.0969	42.0708	42.1625	34.7375	40.3917	40.8625	33.5500
Thursday 22 October 2020	49.8364	46.7938	40.6361	46.3864	43.8750	38.5028	43.0909	41.9813	37.2583	41.6386	40.6188	36.1694
Friday 23 October 2020	47.3146	48.2375	40.3156	44.4292	45.2000	37.9563	42.6854	43.3375	36.6469	41.2542	41.5875	35.5875
Weekday Average	**47.8664**	**46.1188**	**38.9553**	**44.7211**	**43.2988**	**36.4976**	**42.4422**	**41.4388**	**35.1793**	**40.9186**	**40.0675**	**34.0696**
	L50			L90			L99			Lmin		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Saturday 24 October 2020	45.9813	47.7750	39.4688	43.2604	45.3438	37.0375	41.4167	43.5000	35.6844	39.8104	41.6063	34.5531
Sunday 25 October 2020	48.3354	46.7375	49.5344	44.1667	43.4375	43.9031	41.0979	40.9250	39.5594	37.3875	38.1563	34.4375
Weekend Average	**47.1583**	**47.2563**	**44.5016**	**43.7135**	**44.3906**	**40.4703**	**41.2573**	**42.2125**	**37.6219**	**38.5990**	**39.8813**	**34.4953**

APPENDIX C

Unattended Background Sound Level Monitoring
Raw Data

Table B1 – Raw Noise Monitoring Data (19-25 October 2020)

Date	Time	Leq	Lmax	L1	L10	L50	L90	L99	Lmin
19/10/2020	0:00	49.9	76.6	59.1	46.7	42.3	38.7	37.2	36.3
		54.2	72.9	69.7	50.4	42.5	38.2	36.5	35.7
		42.1	54.8	50.6	44.6	40.4	37.4	36	34.7
		40	49.5	46	42.8	38.9	36.8	35.7	34.6
		39.2	54.1	45.6	42.1	37.5	35.3	33.9	32.2
		40	54.1	48.2	43	37.9	35.5	34.4	33.6
		39.4	48.3	45.3	42.1	38.3	36.1	35	34.1
		39.7	61.1	48.4	40.9	36.8	34.1	32.7	31.7
	2:00	37	48.5	43.4	39.1	35.9	33.9	32.6	31.3
		38.3	52.1	45.7	41	36.6	34.3	33.2	32
		37.3	53.8	44.2	40.1	35.5	33.3	32.3	30.9
		38.4	47.8	44.2	41.3	37	34.8	33.7	32.4
		37.2	50.1	44.2	39.6	35.8	33.6	32.8	31.8
		37.6	62.8	45.9	39.4	35.5	33.6	32.8	31.8
		37.2	53.3	44.5	39.9	35.6	33.8	32.8	31.9
		37.3	51.3	44.7	39.6	35.8	33.8	32.6	31.6
	4:00	37.4	54.2	43.5	39.8	36.4	34	32.7	31.7
		40	54.6	47.1	42.2	38.8	36.3	35.2	34.2
		40.2	59.2	50.6	40.9	37.8	36.3	35.4	34.6
		38.7	50.2	45.7	40.7	37.6	36	35	33.9
		39.9	50.7	45.8	42	39	37.2	36.3	35.2
		41.9	56.5	48.5	43.5	41	39.1	37.9	36.5
		43.8	63.7	48.8	45.2	42.9	41	39.9	38.8
		44.8	59.8	49.3	46.7	44	42	40.9	39.8
	6:00	45.3	59.3	50.8	47.3	44.4	42.9	41.8	40.7
		47	69.1	54.1	48.3	45.6	43.4	42.6	41.8
		50	74.1	58.3	49.9	47	45.4	44.4	43.4
		48.9	65.6	57.8	49.9	47.4	45.4	44.4	43.1
		49	69.8	55.1	50.2	48	46.3	44.9	43.8
		50	74.2	57.2	50.5	48.6	46.8	45.9	44.4
		49.4	70.9	55.5	49.9	48.3	46.9	45.5	44.5
		49.1	66.1	55.3	50.6	48.4	46.4	45.5	44.2
	8:00	50.3	70.1	59.5	50.6	48.4	46.7	45.4	44.2
		49.3	67.7	56	50.5	48.1	46.4	45.1	44.3
		50.4	67.6	59.9	52.6	47.9	45.5	44.3	43.4
		48.6	65.4	58.5	49.7	46.9	44.6	43.6	42.8
		48.9	67.5	58.8	50	47.4	45.1	44	43.1
		48.4	62.5	56.3	50.8	46.9	44.3	42.7	40.6
		47.2	59.1	54.4	49.3	46.1	43.2	40.9	39.3
		54	83.4	59	49.9	46.2	42.9	41.3	40
	10:00	47.3	70.4	55	47.9	45.3	41.9	39.7	38.8
		50	73.5	60.8	51.8	46.3	43	41.2	39.9
		52.5	75.9	62.9	51.6	46.1	43.1	41.3	40
		45.7	64.9	51.3	47.7	44.7	42	40.3	38
		45.1	65.3	53.9	46	43.9	41.4	39.7	38.7
		45.7	63.5	52.9	47.1	44.6	42.4	41.2	40
		48	67.8	59.4	48.6	44.6	41.9	40.2	38.6
		46.2	68.4	55.6	47.5	44.1	41.9	39.9	37.8
	12:00	48.1	69.6	60.5	47.4	44.3	41.8	39.9	37.7
		47	64.5	58.2	48.3	44.4	42	39.7	37.8
		53.3	74.5	69.3	48.3	44.6	41.7	39.7	38.1
		45.6	65.8	51.7	46.9	44.8	41.7	39.5	37.8
		46.1	66.7	54.2	47.3	44.3	40.9	38.5	36.2

		45.6	69.2	52.6	47.4	44.5	41.1	38.3	35.8
		49.5	68.6	64.1	47.6	44.3	41.5	38.5	36.9
		54.7	78.4	69.2	48.2	43.9	40.7	38.7	37.3
	14:00	60.3	86.8	73.1	51.7	44.5	41	37.7	33.1
		48	68.3	61.4	47.3	44	41	39.2	37.7
		46.6	69.6	55.6	48.2	44.4	41.2	38.4	35.7
		43.6	68.6	57.1	46.5	51.4	42.3	39.6	38
		44.3	67.3	56.9	46.5	46.4	43	39.5	37.7
		45.1	60.2	53.4	46.9	44.2	41.4	39.8	38.5
		46.3	67.3	54.9	47.7	44.5	41.7	39.4	37.7
		46.9	71.5	54.8	48.3	44.9	42.5	40.6	39.1
	16:00	46.2	66.9	54.4	47.9	44.6	42.1	39.7	37.6
		47.1	63.5	55	49.9	45.3	42.3	39.6	38
		46.2	67.7	53	47.6	45.1	42.4	40.5	39.1
		51.4	70.3	65.2	48.6	45.9	43.6	41.4	39.1
		50.5	80.4	61.5	48.8	45.8	43.8	41.9	40.1
		50.9	70.4	60.9	52.8	48.2	44.9	43.5	41.6
		51	70.4	59.3	52.6	50.2	46.6	44.8	42.5
		47.9	62	53	49.7	47.4	45.5	43.8	42.4
	18:00	48.5	64.4	55.1	50.5	47.6	45.4	43.3	41.4
		49.5	64.9	55.4	51.5	48.7	46.7	45.3	43.5
		49.8	70.6	56.6	51.5	48.5	46.4	45.1	43.2
		53.1	75.2	64.9	53.9	49.8	47	45	43.3
		51.4	73.6	57.8	52.7	49.6	47.5	46.1	43.6
		51	71.9	57.1	52.7	49.6	47.4	45.6	43.6
		51.3	70.3	59.9	53.4	49.2	46.6	44.5	42.2
		50.6	66.1	58.8	52.9	49	46.5	44.5	42.5
	20:00	49.5	63.6	58.1	51.9	47.7	45.3	43.8	42
		48.7	67.3	55.2	50.8	47.6	45.3	43.6	42
		48.8	66.3	55.2	51	47.8	45.4	43.4	41.5
		48.1	68.2	54.2	49.9	47	44.9	43.2	40.6
		49.4	67.1	55.5	51.6	48.1	45.1	42.8	41.2
		48.7	68.4	57.8	51.4	46.1	43	41.1	39
		54.8	81.4	65.6	46.7	44.1	41.4	39.5	38.2
		46	66.9	53.9	46.5	44	41.6	39.2	37.9
	22:00	44	60.8	48.1	45.8	43.7	41.3	39.6	38.4
		47.7	74.6	54.4	46.6	44	41.3	39.5	38.1
		44	54.3	50.7	45.6	43.5	41	38.5	37.2
		43.2	51.2	46.9	45.5	43	39.8	37.7	36.5
		42.6	48.7	46.5	44.8	42.3	39.6	37.1	35.9
		43.8	56.9	50.1	45.8	43.1	39.3	37.1	36
		42.7	52.5	48	45.1	41.9	38.8	37.3	36
		42.1	60.7	46.5	44	41.7	39	37.6	36.3
20/10/2020	0:00	44.1	59.6	52.3	45.9	42.7	39.5	37.3	36
		43.9	57.3	50.8	46.1	43	39.9	38	36.4
		42.1	54	49.3	44.2	41	38.4	36.1	34.4
		40.6	51.3	46.6	43	39.7	36.9	34.9	33.7
		43	63.4	52.7	44.1	40.1	37.4	36.1	35
		41	61	49	43	39	36.5	35.4	34.5
		38.6	54.7	43.6	41.3	37.6	35.3	34.1	32.6
		37.5	46.4	42.7	40.1	36.7	34.5	33.1	32.1
	2:00	37.9	54.4	44	40.3	36.8	34.2	32.8	31.7
		47.4	62.9	58.2	51.1	41.8	36.9	34.3	32.7
		52.4	75.8	63.2	55.4	47.1	40.9	36.6	32.9
		59.1	83.6	69.6	61.7	52.2	45.6	41	36.8
		61.8	83.3	74.4	63.5	53.6	46.4	40.9	36.5

		63.9	85.6	74.9	66.4	58.3	51.1	47	40.3
		61.7	79.2	71.3	65.6	57.7	49.6	43	38.9
		63.4	83.1	74.7	66.1	57.8	51.4	47.9	44.5
	4:00	60	83.5	70.5	63.1	54.3	48.1	43.7	37.6
		60.7	88	69.8	62.8	55.2	50.1	45.4	38.5
		57	81.4	68.9	57.9	50.9	44.3	37.4	33.5
		47.5	65.1	56.8	50.7	44.3	37.6	32.5	29
		43.8	60.5	51.5	47.3	41.7	35.6	32.3	30.2
		51.6	72.3	64	53	41.1	35.4	33.3	31.5
		43	65.5	53.3	44.6	39.4	35.9	33.9	31.8
		40.7	53.8	47.2	43.7	39.4	35.7	34.3	32.9
	6:00	40.5	58.2	46	43.3	39.4	35.1	33.1	31.2
		43.5	68.5	50.9	44.6	40.9	37.2	35	33.2
		46.9	75.7	55.8	46.6	40.7	37.3	35.1	33.7
		43.8	62.6	54.2	45	41.4	38.6	37	35.6
		43.2	62.1	50.4	45.1	41.8	39.2	37.8	36.8
		44.2	69.7	50.7	45.5	41.6	38.7	37.4	36.2
		46	71.6	54.8	46.5	42.2	39.2	37.5	36
		45.7	67.8	55.3	47.7	43.1	40.1	38.5	37.2
	8:00	47.8	76.8	55.8	46.8	43.4	40.1	37.6	36.7
		45.4	64.5	54.9	47.3	42.8	39.7	37.4	36.3
		45.1	65.2	55.1	46.1	42.7	40.2	38.7	37.3
		45.8	70.7	52.4	46.2	43.1	40.5	38.2	37.1
		46.5	69.7	53.9	47.1	43.8	41.3	40.3	38.7
		50.3	78.5	57	46.8	44	41.7	39.7	38.4
		44.8	56.3	50	47	44.2	40.8	39.4	38.3
		47.4	66.1	57.2	48.7	44.9	41.9	40.2	38.7
	10:00	46.3	68.1	53.8	47.8	44.2	41.5	39.3	38.1
		45.9	62.7	55.2	47.5	44.2	41.2	39.2	37.4
		45.8	67.9	54.2	47.6	44.1	40.9	39	37.4
		44.8	64.6	52.3	46.8	43.6	40.4	36.8	34.4
		46.7	72.7	57.6	48	43.5	40.6	37.6	35.2
		46.2	67.1	55.3	48.1	44.1	40.5	36.5	33.9
		59.8	80.9	76.4	51.7	44.2	40.1	37.9	36.8
		49.7	67.7	62.1	49.9	44.6	42.4	40.6	39.2
	12:00	56.9	81.8	70.9	49.4	44.3	41.1	38.8	37
		46.5	71.5	54.3	48.4	44.9	42.1	38.9	37.3
		56.2	78.9	67	60.3	46.4	42.9	39.8	36.9
		45.9	59.9	53.7	47.8	44.7	41.6	39.8	38.7
		55.8	78	71	49.3	44.9	42.2	39.4	37.3
		46.3	67.1	54.2	47.6	44.9	41.6	38.9	37.5
		45.9	60.2	54.4	48.3	44.2	41.2	39.2	37.9
		48.4	71.4	58.6	47.5	44	41.1	39.2	38.3
	14:00	46.6	60.1	56.1	48.2	45	42	40.4	39.4
		47	65.9	56.5	48.4	45	41.9	40.2	38.6
		47	67.6	56	49	45	41.9	38.8	36.3
		46.7	70.2	55.6	48.1	44.5	41.8	38.8	36
		47.6	70.3	56.7	49.4	45	42.6	40.7	39.4
		49.8	69.7	63.4	48.8	44.8	41.5	39.6	37.9
		47.9	68.9	58.9	48.5	45	42.3	40	39
		46.9	72.3	53	48.4	44.9	42.3	40.5	39.5
	16:00	48.7	63.7	57.4	51.7	46.5	41.9	39.2	37.4
		51.6	72.4	60.7	54	49	43.6	40.8	39.6
		49.9	66.5	60.9	51.9	46.1	43.6	42.2	41.3
		48.4	69.8	59.1	48.5	45.5	43	41.5	40.7
		48.2	60.6	56.8	50.7	46.2	43.2	39.2	37.8

		49.3	77.3	57.1	50.8	45.9	43.5	41.4	40.4
		46.3	58.3	52.7	48.3	45.7	42.6	40	38.4
		46.4	62.2	53.3	49.1	45.1	42	39.8	38.2
	18:00	46.3	64.7	52.3	48.3	45.3	42.4	40.3	39.2
		47.4	75.2	51.2	47.5	44.9	42.1	40.1	38.9
		45.6	59.6	53.6	47.2	44.6	41.7	38.9	37.8
		46.5	62.4	55.4	49	44.6	42.2	41.1	39.9
		44	55.1	48.7	46.1	43.4	40.9	39.7	38.9
		45.4	58.3	54.3	47.5	43.5	41	39	37.7
		48.9	67.9	59.1	51.4	45.2	41.9	40	38.8
		45.6	59.8	53.5	47.8	44	42	40.6	39.5
	20:00	44.2	57.1	48.7	46.1	43.5	41.7	40.2	38.9
		45.4	65.8	56.8	46	43.1	40.9	39.6	38.4
		43.8	59.6	49.4	45.7	42.9	40.8	38.9	37.7
		44.2	63.3	51.6	45.5	42.6	39.7	38.3	37.3
		41.9	56.7	46.5	44.5	41.2	38.2	36.8	35.9
		42.8	53.1	47.9	45.2	42.1	39.3	38.2	37.2
		43.3	60	49.1	45.2	42.2	40.2	39	37.8
		44.4	74.7	47.6	44.8	41.9	39.8	37.8	36.6
	22:00	42.5	55.4	47.6	44.7	41.8	39	37.7	36.3
		41.3	56.4	48.1	43.6	39.9	37.3	35.9	34.7
		40.3	46.9	45.3	42.7	39.7	37.2	36.1	35.3
		40.3	49.2	46.2	43	39.3	36.6	35.3	34.2
		40.4	51.3	45.9	43	39.4	37	36.1	34.3
		40	56.9	45.3	42.7	39.2	36.1	34.5	33.5
		40.9	61.3	50.6	42.4	37.7	33.5	31.3	30.2
		39.1	54.9	47.9	42.1	36.5	32	30.4	29.5
21/10/2020	0:00	38.1	53.4	45.8	41.1	36.3	33	30.8	29.3
		37.9	51.9	46.1	41	35.5	32.3	30.6	29.2
		35.5	53.3	44.7	38.6	32.8	30.5	29.8	28.9
		35	54.3	42.5	38.1	33	30.6	29.4	28.5
		34.1	48.4	41.7	36.7	32.6	30.4	29.3	28.3
		35.7	50.4	44.3	39.1	32.8	29.9	29.1	28.3
		37	54.1	43.9	39.6	35	31.5	29.7	28.7
		35.3	50.9	42.4	37.4	34.2	32.6	32	31
	2:00	36	51.4	44.2	37.9	34.3	32.6	31.6	30.4
		36.6	55.6	46.1	38.5	34.4	32.2	31.3	30.5
		39.1	59.6	46.7	40.8	36.1	33.6	32.5	31.4
		35.6	48.2	43.7	37.9	34.4	31.5	30.3	29.5
		36.2	55.6	43.9	38.2	34.7	33	32.2	31.1
		35.4	48	43.3	37	34	32.6	31.8	30.9
		36.1	45.9	42.3	38.1	35.2	33.6	32.6	31.8
		38.1	50.3	45.1	40.8	36.6	33.8	32.5	31.2
	4:00	41.8	67.3	51.3	40.6	35.6	33.6	32.6	31.2
		39.5	59.1	48.3	41.1	36	34.1	32.8	32
		43.1	65.3	52.6	43.8	39.2	35.9	34.2	33.2
		41.2	54.2	48	44	39.9	36.6	35.3	34.3
		42.8	52.8	49.6	45.5	41.7	39.3	37.9	37.1
		44.5	54	49.8	47.2	43.6	40.8	39.3	38.2
		46.7	66.7	53.1	48	45.3	43.1	41.8	40.8
		47.6	68.9	52.5	49.1	46.3	44.4	43.4	42.5
	6:00	48	60	53.2	49.9	47.5	45	42.8	41.4
		51.6	75.3	60.5	51.6	49.2	46.8	45.7	44.5
		50.7	72.6	56.5	52.3	49.9	47.5	46.6	45.7
		51.4	65.3	58	52.7	50.7	48.8	47.9	46.8
		51	61.7	56.5	52.5	50.5	48.8	47.5	46.6

		51	69.2	55.9	52.2	50.5	48.4	47.3	46.4
		50.5	66.7	55.3	51.9	50	48.2	46.9	45.6
		50.1	62.7	56	51.6	49.5	47.9	46.8	45.8
	8:00	50.4	67.7	56.6	52.2	49.1	47.3	46.1	44.8
		49.4	63.5	55.5	51	48.7	46.5	44.7	43.4
		49.1	66.9	56.1	50.9	48	45.1	42.9	42
		48.5	68.9	54.9	50.3	47.4	44.4	42.5	41.2
		49.3	64.8	56.6	52.3	47.6	43.7	40.8	38.7
		49.1	67.5	56.4	52	47.5	43.6	41.2	39.6
		49.6	76.2	56.6	50	46.9	43.4	40.4	38.3
		59.9	86.8	71.4	50.2	46.4	41.8	39.8	38.6
	10:00	46.3	64.4	53	48.8	45.1	40.9	37.3	34.9
		47.8	62.9	56.2	50.6	46	42.2	39.4	37.6
		47.2	63.6	55.5	50.1	45.3	41.1	38.9	36.9
		47.4	71	56	49.8	44.8	40.7	36.8	34.9
		45.9	63	53.7	48.6	44.3	40.1	37.1	35.7
		55.8	82.7	69.6	49.4	45.1	41	37.6	36.2
		44.7	56.4	51.3	47	43.8	40.4	37.3	35.2
		46.5	59.9	54.8	49	45	41.6	38	36.4
	12:00	50.2	68.9	63	50.1	45.2	41.8	38.8	37
		46.8	61.8	56.1	49.4	44.6	41.7	39.7	37.5
		48.7	70	60.3	49.1	44.9	41.9	40.1	38.7
		50.8	70.6	57.9	53.2	48.7	44.4	42.6	41.5
		54.9	75.6	64.4	57.2	52	45.1	43.1	41.9
		51.5	68.3	62.2	55.6	46.8	44.3	42.3	40.6
		53.2	73	66.3	52.1	46.5	44.2	42.7	40.7
		47.3	65.7	54.7	49.1	46.1	43.8	41.9	39.7
	14:00	47.1	60.9	54.4	49.3	45.9	43.3	41.8	40.2
		48.9	68.3	57.2	50.3	46.3	43.9	41.7	40.5
		50.5	78	59.5	51.1	46.7	44.5	43.2	41.3
		49.9	74.6	59.8	51.3	46.6	44.1	42	39.9
		47.6	64.4	55.4	49.4	46.1	44	42.5	41.5
		50.9	73.3	60.1	52.9	47.6	44.7	43.2	41.3
		48.4	70.6	56.3	49.7	46.8	44.2	42.3	40.6
		48.5	68.6	56.5	50.3	47.1	44.1	42.6	41.1
	16:00	51.3	73.7	61.1	53.6	47.4	44.4	42.4	41.2
		50.4	74.8	60.1	51.4	47	43.9	40.8	39.5
		47.7	65.1	54.1	49.8	46.5	44.3	42.7	41.3
		49.8	65.6	60.5	51.4	47.3	44.8	42.1	39.9
		50.9	68.4	60.7	53.7	47.7	44.2	42.7	41.5
		55.2	75.5	67.2	57.6	49	45.9	44.4	42.5
		48.5	62.3	56.8	50.6	47.2	44.5	43.2	41.3
		48.3	64.8	56.3	50.1	46.9	44.6	42.1	40.7
	18:00	48.6	69.3	58.1	50.3	46.2	43.2	38.8	36.9
		48.6	62.7	56.1	51.6	46.9	43.8	42.3	41.4
		47.8	67.8	55.1	49.5	46.2	43.8	41	40
		48	67	58.4	49.8	45.8	43.6	40.8	39.2
		48.2	63.3	57.5	51.1	45.4	42.8	38.9	36.5
		45.8	66.8	52.9	47.5	44.8	41.7	39	37.8
		48.1	61.6	58	50.9	45.2	42.1	38.9	36.5
		47.9	69.3	59.5	47.8	44.1	39.2	37.2	36
	20:00	43.7	52.8	49.6	46.3	43	39	36.1	34.8
		44.9	67.4	52.3	46.5	43.1	38.9	36.7	35.4
		43.9	56.9	51.6	46.6	42.4	37.9	35.4	33.7
		43.9	62.7	52.6	46	42.4	37.8	34.9	33.7
		42.9	54.8	50.6	45.3	41.7	37.9	34.6	33.6

		43.3	61.1	50.5	45.8	41.7	38.2	36.2	35
		44.5	60.9	54.4	46.3	42.3	37.9	34.8	33.5
		42.2	61.4	48.3	44.2	40.8	36.9	35.5	34.6
	22:00	43.6	59.3	54.9	44.7	41.3	37.9	36.3	35.1
		42.9	60.2	50.4	45	41.3	37.7	36.4	35.5
		44.3	57.2	54.3	46.9	41.6	37.8	36.3	35.3
		42.8	59.7	53.6	44.3	40.1	37	35.6	34.3
		39.8	67.4	45	42.2	38.2	35.2	33.6	31.9
		39.4	65.6	46.6	42.2	37.5	34.6	33.5	32.5
		39.6	60.9	46.6	42	37.2	33.8	32.5	31.1
		39.1	57.3	47.2	41.5	37.3	34.6	32.9	31.8
22/10/2020	0:00	38	56	45	40.8	36.1	33.2	32.1	31.1
		37.3	47.7	44.7	41	34.9	32.9	31.7	30.3
		36.5	49.4	44.9	39.1	34.5	32.5	31.5	30.5
		36.9	49.4	43.3	39.2	35.8	33.2	31.9	30.8
		36.2	52.5	43.6	38.4	34.5	32.8	32	31
		34.4	45.7	41.6	36.3	33.2	31.2	29.8	28.8
		36.5	60.4	46.3	37	32.7	30.8	29.6	28.3
		33.6	48.4	42.9	37.1	30.1	27.9	26.9	25.9
	2:00	34.4	60.8	40.3	36.5	32.8	29.9	28.5	27.6
		32.5	44	39.9	34.7	31.3	29.3	27.9	26.7
		32.9	47.9	43	34.6	30.8	28.9	27.5	26.3
		35	50.3	44.4	38.1	31.5	29.6	28.2	26.7
		35	50.1	45.5	36.4	33	31.3	30.2	28.8
		33	44.3	41	35.6	31.3	29.3	28.5	27.6
		35.1	47.7	44.1	38.4	32.2	29.5	28.3	26.8
		38.7	64.1	50	37.8	31.9	27.9	26.9	25.3
	4:00	36.8	55.5	48	38.8	32.1	29.9	28.3	27.4
		37.8	48.4	44.6	40.5	36.4	33.5	31.9	30.6
		45	70.6	54.7	46.5	41	35.7	33	31.7
		40.5	60.7	50.5	43.8	36.7	33	31.8	31
		41.6	56	50.1	44.5	39.7	36.6	34.6	33.5
		43.4	60.4	49.4	46.4	42	38.4	36.6	35
		43.8	59.2	49.9	46.4	42.8	39.3	38	37.2
		46.3	70.2	52.7	48.4	44.8	41.1	38.6	37.6
	6:00	47.4	63.5	54.9	49.5	46.3	42.8	40.5	39.2
		49.2	68.7	57.3	50.3	47.6	44.4	42.7	41.3
		48.9	62.2	55.3	51.1	48	44.7	42.8	41.5
		50.1	73.8	57	51	48.7	45.7	43.9	42.9
		49.6	62.6	55.4	51.3	49	46.7	45.1	43.9
		51	72.1	58	52.3	49.5	47.6	46.2	45
		51.9	73.4	61.1	52.5	49.2	46.7	45	43.6
		51.6	80	61	51.5	48.8	46.4	45.1	44.3
	8:00	49.6	65.3	57	51	48.8	46.5	45.3	44.5
		50.6	67.8	59.6	52.4	48.8	46.9	45.7	44.5
		50.3	73.9	57.3	51.4	48.7	46.8	45.2	44.5
		49.9	66.5	58.2	52.5	48.1	45.8	44.3	43.2
		50.5	67	57.7	53.1	48.9	46.6	45	43.8
		49.2	63.2	56.1	51.7	48.2	45	43.4	42.4
		52	77.7	61.8	53.2	47.9	44.4	42.2	41
		47.9	63	57.2	49.8	46	42.7	40	38.5
	10:00	50.9	74.1	62.5	51.9	46.1	42.5	38.8	36.3
		50.6	73	61.9	52.6	46	42.4	39.9	39
		48.9	75.5	58.9	50.2	46	42.7	40.9	39.3
		58.8	80.6	73.9	52.3	46.4	42.4	39.1	36.7
		46.4	61.5	53.1	48.9	45.2	41.8	39.8	37.7

		47.9	69.6	54.8	50	46.5	43.5	41.7	40.2
		48.3	70.7	54.5	50.1	46.3	43.1	41.4	39.2
		48	65.3	55.6	50.3	46.5	43.1	41.1	39.3
	12:00	46.2	61.1	53.7	48.2	45.1	42.5	40.9	39.2
		47.8	65.8	58.5	49.2	45.5	42.5	40.9	39.2
		46.9	60.9	55.3	49.3	45.1	41.7	39.7	38.8
		53.8	75.4	68.6	50.3	45.6	42.2	40.5	38.6
		47.1	68.6	54.4	48.9	45.2	42	38.9	35.9
		49.7	68.5	60.6	51.8	46	42.7	40.2	36.9
		47.9	71.9	57.6	49.4	45.1	42.2	39.2	37.3
		46.3	60.3	55.4	48.3	44.7	41.7	38.7	37.3
	14:00	47.8	68.8	57.4	50	44.8	40.9	39.1	37.1
		46.8	62.7	56.2	49	44.3	41.2	39.2	37.6
		47.4	65.2	56.2	49.6	45.4	42.2	40.7	39.6
		47.8	64.1	56.3	50.1	46.2	43.6	42.1	40.9
		51.4	68.5	63.5	53.3	46.7	43.1	41.2	39.8
		48.6	64.2	59.9	50.2	46.2	43.7	41.6	39.6
		50.5	75.3	60.8	50.3	47	44.5	42.6	41.2
		49.5	66.1	56.6	51.9	48.2	45.8	44.4	43.5
	16:00	50.1	76.2	57	51.1	47.1	44.5	43	41.7
		50.6	64.5	60.5	53.2	48.4	45	43.6	42.3
		53.5	76.5	66.2	52.6	47.1	44.5	42.9	40.9
		48.8	67.1	57	50.3	47.2	45.2	43.7	42.7
		49.9	71.7	57.5	51.8	48.2	45.3	44.1	42.9
		50.9	74.3	59.9	51.9	48.8	46.7	45.3	43.3
		49	62.2	55.7	51.2	48	46.1	44.7	43.8
		49.5	61.8	57.8	51.4	47.9	46.1	45	43.9
	18:00	49.2	64.1	59.3	50.6	47.4	45.3	43.8	42.7
		48.2	62.8	54.1	50.1	47.3	45.6	44.7	43.9
		48.2	70.5	53.9	48.8	46.5	45	44.1	43.4
		49.6	63.9	59.9	51.7	47.1	44	42.6	41.5
		48	62.9	54.9	49.9	47.1	44.8	43.5	42.3
		49.5	73.7	57.7	51.1	47	44.6	43	42.2
		47.9	67.1	57	50.4	45.1	42.5	41.2	40.1
		45.7	59.6	50.7	47.6	45.1	42.5	40.9	39.6
	20:00	46.1	62.8	51.3	48.2	45.4	43.2	41.9	40.3
		45.7	63.7	51.9	47.1	44.8	42.7	41.4	40.6
		44.8	59.5	49.6	46.8	44.2	41.8	40.8	39.9
		46.2	70	53.1	46.4	44.2	42.2	41.1	40.1
		47	66	56.3	48.4	45.2	43.2	42.1	40.8
		45.4	64.4	50.3	46.9	44.5	42.5	41.3	40.4
		45.2	54.5	48.8	47.1	45	42.4	41.2	40.4
		44.9	58	50.6	46.9	44	41.9	40.7	39.5
	22:00	44.7	57.3	49.5	46.4	44.2	42.5	41.5	40.8
		45.4	64.2	56	46.5	42.8	40.4	39.3	38.5
		43.2	64.7	48.1	45	41.8	39.4	38.6	37.7
		42.8	58.6	49.4	45.1	41.6	39	37.5	36.4
		41.9	56.8	48	43.8	41.1	38.9	37.3	35.9
		42.5	52.7	47.3	44.8	41.8	39.5	37.7	36.5
		41.7	56.7	49.5	44	40	37.4	36.2	35.4
		41	53.6	49.4	43.6	39.4	36.3	35.2	33.6
23/10/2020	0:00	41.2	58.5	47.9	43.3	39.4	37	35.9	35.2
		41.4	58.3	46.9	43.6	40.5	38	37	36
		40	54.7	48.2	42.1	38.6	36	34.8	34.1
		37.9	49.7	43.7	40.2	36.7	35.2	34.2	33.3
		39.1	49.6	46.5	42.1	37.6	35.3	34.2	33.5

		37.1	49.4	43.4	39.3	36	34.2	33.3	32.5
		39.9	52.5	46.3	42.4	38.7	36	35	34.1
		37.3	48.8	44.5	39.6	36.2	33.8	32.7	31.7
	2:00	37.8	48.3	44.6	40.2	36.6	34.6	33.4	32.6
		38.8	48	44.7	41.3	37.9	35.2	34.1	33
		41	55	47.1	43.4	39.8	37.4	36.5	35.7
		41.7	59.7	49.8	43.6	39.9	37.8	37	35.9
		40.8	56.5	49.4	42.8	39	37.3	36.3	35.3
		39.2	60.9	45.4	40.7	38.4	37	36.1	35.2
		38.7	46.7	44	40.7	38	36.1	35.3	34.4
		38.1	47.8	43.6	40.1	37.3	35.2	34.2	33.5
	4:00	36.9	51.3	44.5	39.1	35.5	33.6	32.6	31.5
		39.2	54.2	49.3	41.5	36.1	33.6	32.7	31.6
		40.3	56.8	50.2	42.2	37.8	36	35	33.7
		41.5	60.8	49.2	43.9	39.9	38	36.6	35.6
		42.9	64.8	50.8	44.5	40.7	38.5	37.6	36.9
		43	62.4	49.2	45	42	39.7	37.7	36.7
		45.5	56.9	49.7	47.4	45	43.1	41.8	40
		46.7	64.9	52.1	48.3	45.9	43.7	42.6	41.5
	6:00	47.2	59.4	51.9	49.2	46.6	44.3	43.2	42
		50.2	69.1	57.7	51.8	48.9	46.6	45.5	44.6
		53.1	74.8	62.3	53.1	50.2	48.1	46.9	46.3
		53.2	79	62.3	52.9	50.3	48.5	47.5	46.6
		50.7	66.5	55.5	51.8	50.4	48.7	47	45.5
		51.5	72.5	55.9	53.1	50.8	49	47.7	46.5
		52.4	72.6	61.6	53.7	50.7	48.7	47.5	46.1
		52	77.6	59.9	52.8	50	48	46.4	45.3
	8:00	49.5	67.1	56	51.1	48.6	46.7	45.2	44.2
		50.1	68.1	58.2	51.6	48.5	45.7	43.9	42.8
		50.6	76.2	58.4	52	47.8	44.9	43.3	41.1
		49.6	70.9	56.7	51.8	48.4	44.5	42.4	40.7
		49.7	66.3	57.4	51.8	48	44.8	42.9	41.7
		49.4	64.5	58.5	51.9	47.7	43.6	41.7	40.1
		49.6	66	57.5	51.7	48	44.9	41.3	38.7
		49.8	74.5	58.8	50.7	46.9	43.1	41.3	39.7
	10:00	48.6	67.8	56.5	50.4	46.6	43.4	41.7	40.2
		55.7	81.2	69.6	53.1	47.7	44.3	42.6	40.8
		48.8	70.1	55.9	50.3	47.1	44.3	42.9	41.9
		51	75.8	58.1	50.2	46.7	43.5	41.3	40.2
		50.2	72.9	61.5	50.5	46.2	42.9	41.3	40
		48.2	68.4	55.5	49.4	46.2	43.6	42.1	40.6
		53.9	75.1	67.6	51.4	46.8	43.6	42	41.1
		47	64.5	53.8	49.2	45.9	43	40.4	39.2
	12:00	49.2	73.4	57.6	50.8	46.7	43.1	40.9	39.3
		48.6	64.8	57.4	50.5	46.9	44.3	42.8	40.8
		47.1	61.9	53.7	49.4	46.1	43.1	41.1	39.7
		47.3	59.4	52.7	49.5	46.7	43.7	42.3	41
		49.2	73.3	58.3	49.4	46.5	43.8	42.1	40.8
		49.3	74.2	54.3	49.1	46.4	43.3	41.9	39.9
		46.9	61.5	52.9	48.8	46.3	43.6	42.2	41.1
		57.4	80.1	72.2	52	46.1	43.1	41	39.2
	14:00	47.9	71.8	55	48.8	45.8	43.1	40.9	39
		49.9	68.4	60.5	52.5	46.1	43	41.6	40.5
		47.1	59.7	54.9	49.7	45.7	42.2	40.1	37.9
		48.1	71.7	58	49.9	45	41	38	36.5
		57.6	79.1	72.9	50.5	46	42.2	39.7	38.4

		47.8	64.8	56.4	49.7	45.9	42.8	41.2	39.8
		47.3	64.7	54.8	49.1	46.3	43.7	41	38.7
		47.9	59.2	55	50	47.1	43.6	42.1	40.7
	16:00	49.1	60.2	57.9	52.4	46.4	43.8	42.5	41.6
		50.1	70.5	60.8	50.2	47.1	44	42.6	41.2
		49.3	65.9	59	51.3	47	44.5	42.9	41.5
		52.7	75.7	65.5	51.7	47.1	44.1	42.2	41
		51	72.7	61.9	52	47.2	44	42.4	40.9
		53.1	70.6	66.2	53.2	47.6	44.7	42.6	40.3
		47.7	62.8	53.8	49.7	46.8	44.7	43.8	42.8
		47.9	57.4	53.5	50.2	47.3	44.5	43	41.7
	18:00	53.2	80.6	62.3	50.1	47	44.1	42.3	40.6
		48.7	67.3	55.9	50.7	47.7	44.6	42.7	41.4
		49.4	66.6	56.2	51.9	47.3	44.4	42.3	39.7
		49.9	63.7	58.3	52.8	47.9	45.2	42.4	40.6
		49.4	69.8	58.3	51.4	47.6	44.9	43.6	42.5
		51.5	67.7	60.2	54	49.1	46.6	44.9	43
		49.4	63.6	57.4	51.8	47.9	45.3	43.7	42.4
		51.2	67.3	60.9	54.4	47.5	45.1	43.8	42.7
	20:00	49.1	72.9	56.3	51.1	47.2	44.8	43.3	42
		48.5	70.8	54.7	50.6	47.1	44.9	43.4	42.1
		50	66.1	57.5	52.6	48.3	45.9	44.4	42.6
		49.9	63.3	57.4	52.6	48.2	45.3	43.6	42.2
		50.5	74.5	59	52.6	48	45.1	43	41
		52.9	72	63.9	55.2	49	45.1	43.1	40.4
		54.9	76.4	64.6	58.2	51.1	46.2	44	41.3
		55.6	72.8	66.6	58.8	50.9	45.7	42.9	40.9
	22:00	51	71.6	60.9	53.7	47.3	44.1	42.2	40.7
		49.3	71.8	59.7	51	45.9	42.6	40.9	39.9
		45.5	67	52.6	47.1	44.3	41.8	40	38.1
		46.8	72.9	55	48.1	44.3	41.4	38.9	38
		47.6	62.6	56.9	50.9	44.7	40.7	37.9	36.5
		59.4	78.3	74.6	52.5	44.1	41	39.1	37.9
		44	62.4	51.9	46	42.5	39.8	37.9	36.4
		47.8	69.4	58.4	49.9	43.5	40.9	39.2	37.8
24/10/2020	0:00	39.7	58.1	48.5	42.2	37.4	34.4	32.9	31.5
		37.1	50.7	43.2	39.6	35.9	33.9	32.7	31.5
		38.5	50.6	46.3	41.7	36.3	33.8	32.7	31.8
		37.2	50.4	44.3	39.9	35.7	32.7	31.2	30.3
		36.5	53.4	44.5	39.8	34.2	32.2	31.2	30.1
		36.4	50	43.7	39.1	34.8	32.5	31.3	30
		36.3	44.4	42.8	39.2	35	32.9	31.8	30.6
		35.8	53.3	44.1	38.1	34.1	31.6	30	28.5
	2:00	34.7	52.3	42.2	37.3	33.3	31.1	30.1	28.7
		35.7	48.7	43.6	37.6	34.4	32.7	31.5	30.3
		40.4	52.5	47.8	39.9	35.6	32.6	31.3	30.4
		40.5	55	50.8	43.1	36.2	33.3	31.6	30.7
		37.8	50.7	45	40.3	36.5	33.7	32.2	30.6
		39.3	54	48.6	42.5	36.3	34.4	33	31.3
		41.3	59.1	50.6	44.9	37.3	34	32.9	31.8
		36.5	49	45	38.8	34.9	32	30.1	29
	4:00	38.3	55.5	47.8	40.3	35.9	33.6	32.5	31.3
		39.8	58.9	49.2	41.6	37.3	34.9	33.8	32.8
		40.8	55.2	50.1	43.2	38.8	35.2	33.9	32.1
		43.1	64.7	52.7	43.9	39.6	36.9	35.2	33.6
		41.7	52.2	48.5	44.4	40.6	37.8	36.3	35.1

		42.8	51.2	48.4	45.6	41.8	39	37.9	36.9
		46.1	66.7	51.3	48	44.7	42.1	40.3	38.9
		46.5	56.4	51.1	48.3	46	43.6	42.5	41.6
	6:00	48.3	63.9	55.1	49.8	47.5	44.9	42.7	41.4
		49.4	64.9	57.2	50.6	48.5	46	44.4	43.4
		51.6	71.3	60.6	52.6	50	47.6	46.2	44.9
		51.4	72.8	58.8	52.5	50.3	48	47	45.4
		51.2	72.7	56.6	52.3	50.5	48.9	48	47.3
		52.1	69	60.9	53.1	50.5	48.9	47.7	46.7
		51.9	75	59.7	52.8	50.3	48.9	48.1	47.1
		51	64.2	56	52.3	50.6	49.2	48.3	47.5
	8:00	53.1	70	64.5	53.8	50.6	49.1	48.1	47.1
		51	69.1	56.6	52.5	50.1	48.4	47.5	46.7
		50.4	61.5	54.5	51.9	50	48.4	47.4	46.3
		51.5	69.5	58.9	53.3	49.9	48.2	46.9	46.1
		55	68.5	61.3	58.2	53.9	47.8	46	44.8
		49.6	62.1	56.9	51.5	48.8	46.1	45.1	44
		50.6	71.9	59.6	52.1	48.7	46.1	44.8	43.6
		48.1	64.2	53.1	50	47.6	45	43.3	41.6
	10:00	47.5	64.6	53.9	49.5	46.8	43.8	42.6	41.8
		56.7	75.8	71.1	52.6	46.8	44.1	42.4	40.7
		49.8	71.8	62	50	45.7	42.7	41.2	39.7
		51.3	77.9	62.1	49.5	45.9	42	39.7	38.1
		48.2	67.3	59.5	49	44.9	41.3	38.9	37
		47.2	64.6	55.5	49.4	45.6	41.8	39	37.6
		48.3	70.1	57.5	49.8	45.3	41.3	37.8	36.1
		46	66.6	54.1	48.4	44.2	40.2	37.8	35.6
	12:00	49.2	76.6	60.1	49.8	44.3	40	37.8	35.6
		48.6	70.4	59.5	49.2	45	41.3	38.7	36.7
		46.2	64.1	55	48.1	44.5	41.3	38.5	35.2
		52.3	68.7	58.6	56.8	46.9	42.1	39.3	37.1
		56.5	75.9	62.4	60.2	54.6	51.4	44.9	43.6
		60.4	69.2	67.6	64.4	58.9	43.1	39.1	37.1
		59.5	76.7	65.6	63.7	56.7	46.9	41.5	39.2
		56.3	70.9	63.9	59.5	55.4	45.5	40.8	38.2
	14:00	53.8	72.6	61.9	57.9	47.2	42.8	39.7	38.2
		48	69.7	58.4	50	44.8	41.9	37.5	34.3
		49.5	71.3	60.3	52	45.7	41.5	38.4	36.1
		49.8	74.1	60.2	50.4	45.4	42.2	40.1	38.3
		53.8	78.4	67.5	52	46	43.2	38.9	36.8
		48.1	65.4	57.6	50.7	45.5	42.7	38.4	34.4
		47.6	69.4	55.6	48.3	45.5	42.8	39.2	36.6
		49.8	69.4	61.3	51.4	46.1	41.6	37.7	35.7
	16:00	47.8	70	54.8	49.9	45.3	42.1	38.5	36.6
		49.1	66.9	59	51.6	46.5	42.6	37.2	35.5
		48.2	63.9	56.6	50.7	46.3	43.4	41.7	40.2
		51.9	74.1	64.6	51.7	47.4	44.1	42.2	40
		54.9	77.5	67.5	55.3	46.9	44.5	42.8	41.7
		50	77.1	58	50.8	46.7	43.7	42.3	40.2
		47.4	59.2	55.7	50	45.4	43	41.8	40.9
		47.9	62.6	55.9	49.8	46.6	43.9	41.5	40.1
	18:00	48.3	63.6	56.2	50.5	46.8	44.4	42	38.9
		49.2	74	57.8	49.3	46.5	44.3	42.6	41.2
		46.8	62.8	52.9	49.3	45.7	43.3	41	39.5
		47.9	66.6	56	49.5	46.4	44.4	42.8	41
		48.7	62.3	57.3	51.2	46.9	44.2	42.6	41.6

		48.7	59.8	57	51.5	46.9	44.2	42.7	41.4
		47.6	59.6	56.2	48.9	46	43.7	41.2	39.9
		46.8	59.7	50.9	48.8	46.4	43.4	41.6	40.5
	20:00	45.4	55.8	49.6	47.4	45.1	42.2	40.8	39.3
		46.4	63.1	54.2	47.9	45.3	42.9	41.5	40.6
		45.9	57.3	51	48	45.3	43.1	42.1	41.2
		48	75.7	56.5	48.4	45.9	44.1	43	42.2
		46.4	69.5	49.6	47.9	46.1	44.2	43	42
		46.7	57.1	50.8	48.8	46.1	44.1	42.7	41.6
		47.8	65.7	55.8	49.4	46.3	43.8	42.5	41.2
		46.8	69.7	52.9	48.2	45.4	43.5	42.5	41.7
	22:00	45.1	59.7	49.3	47.2	44.6	42.6	41.1	39
		45.4	57.2	51.6	47.6	44.5	42	41	40.1
		44.1	49.6	47.9	46.2	43.5	41.6	40.4	39.5
		44.3	51.5	48.6	46.7	43.6	41.3	39.8	38.6
		44.9	59.6	52.8	46.9	43.5	41.3	40	39
		42.7	59.3	48	45.5	41.6	39.3	38.1	37.4
		41.7	63.6	47.1	44	40.7	38.4	36.6	35.7
		41.3	55	47.8	43.8	40.1	37.7	35.7	34.9
25/10/2020	0:00	40.3	47.9	45.6	42.9	39.2	36.9	35.5	34.4
		38.7	53.6	44.4	40.9	37.6	35.9	34.9	33.9
		38.3	48.1	44.7	41.2	36.9	34.5	33.5	32.5
		38	49.6	44.8	40.5	36.6	34.6	33.7	32.8
		37	51.6	43.3	39	35.8	33.9	33	31.7
		37.2	50.8	45.5	39.5	35.3	33.3	32.4	30.9
		36.8	48.2	43.2	38.9	35.8	33.7	32.5	31.3
		36.9	46.3	43.1	39.3	35.8	34.1	33	31.9
	2:00	37.4	55.6	43.6	39.3	36.4	35	34.3	33.7
		37.4	45.3	43	39.2	36.7	34.8	33.8	32.9
		38.2	47.8	42.6	40.2	37.6	35.6	34.5	33.7
		39.8	49.5	45.2	42.2	38.9	37.4	36.5	35.5
		39.8	48.6	44.8	41.9	39	37.3	36.4	35.1
		38.7	48.7	44.2	40.2	38.1	36.6	35.5	34.8
		39.5	62.4	45.7	41.4	38.4	36.9	35.8	34.7
		39.3	52.4	43.8	41	38.6	37.2	36.3	35.4
	4:00	40.8	52.4	47.7	42.9	39.7	37.9	36.9	35.9
		40.9	52.8	47.1	43.1	39.8	38.2	37.1	36.3
		42.4	58.4	50.2	44.3	40.8	39.1	38	36.8
		44.5	60.6	53.3	46.9	42.3	40.2	38.8	37.5
		42.7	52.4	48.1	44.9	41.9	40.3	39.4	38.3
		45.5	65	51.8	47.5	44	42.3	41.4	40.3
		46.6	63.3	52.4	48.4	45.7	43.2	42	41
		46.6	62.9	52.2	48.5	45.3	42.9	41.9	41.2
	6:00	47.6	65.1	54.2	49.6	46.3	43.6	42	40.8
		49.4	73	57.6	50.8	47.8	45.1	43.2	41.3
		51.7	76.5	58.7	51.3	48.6	46.1	44.9	44.1
		51	73.4	59.2	51.4	49.1	46.7	45.5	43.9
		49.6	70.7	57.5	50.8	48.5	45.9	44.1	43
		49.8	66.6	56.3	51.7	48.9	46.1	44.7	43.6
		51.6	76.2	59.8	51.5	48.6	46.2	45.2	43.8
		51.4	71.2	63.5	51	48	46	44.7	43.4
	8:00	48.9	64	57.1	50.5	47.6	45.1	43.2	41.8
		48.2	60.6	55.3	50.1	47.2	44.6	43.4	42.2
		48.8	66	57	50.1	47.7	45.2	43.1	42.2
		50.3	69.6	59.7	52.7	47.9	45	42.9	42
		50.4	77.1	57.1	51.9	47.8	45.1	43.1	41.7

		50.1	71.4	60.1	51.6	47.9	43.7	41.5	39.5
		53.1	81.1	61.2	51.2	47.5	44.4	42.5	40.7
		48.5	72.2	54.5	49.7	46.9	44.1	42.8	41.6
	10:00	48	64.7	55.3	50	46.9	43.8	42.5	41.1
		52	69.8	63.9	53.6	47.4	43.7	40.9	39.9
		52.2	80	63.1	51.6	47.6	43.7	41.5	39.2
		47.2	56.2	52.1	49.5	46.6	43.6	42.1	41.3
		50.2	77.5	57.4	50.2	45.8	42.2	40.4	38.9
		47.7	60.6	54.4	50.2	46.5	43.2	41.1	39.8
		47.2	61.3	54.9	49.4	46	43.2	41.8	40.8
		47.2	64.9	53.7	49.5	46.1	42.7	40.3	39.3
	12:00	48.6	66.9	57.5	50.1	46.4	43.9	41.8	40.9
		48.2	72.4	55.5	50.4	46.7	43.4	40.8	39.3
		48.1	66.6	56.4	50.7	46	43	40.7	39.4
		46.7	63.7	54.8	48.4	45.6	43	41.1	39.7
		47.5	66.5	56.7	49	45.5	42.6	41	39.6
		50.1	70.7	62.2	49.9	46.2	43.5	41.2	40.2
		56.4	78.5	70.8	51.1	46.1	44.1	42.3	41.2
		47.7	61.1	55.9	49.7	46.5	43.4	41.6	40.2
	14:00	49.3	72.9	58.4	51.7	46.5	43.4	41.4	40.6
		48.7	72.1	55.9	49.4	46.1	43.2	41.6	40.7
		48.9	68.2	57	50.3	47.4	44.9	43.1	41.9
		48.2	61.4	56.5	50.4	46.5	44.8	43.2	41.9
		58.5	72.6	66.4	64.3	48	43.8	41.8	40.2
		63.8	77.3	68.3	66.2	63.3	59.9	48.5	44.6
		62.8	71.3	66.3	64.8	62.5	56.2	44.8	43.1
		62.6	69.5	67	65.3	62.1	55.1	45.6	43.2
	16:00	64.7	72.7	68.2	66.6	64.6	62.1	46	42.9
		57.4	78.4	68.9	66.6	63.5	58.2	44.4	42.9
		55.6	75.2	61.1	59.4	55.9	47.7	44.4	43
		58.8	79.1	63.7	60.8	57.2	60.7	50	46.9
		61.4	78.2	64.8	62	59	48.9	45.6	43.9
		61.5	77.5	64.1	61.1	57.5	46.3	44.6	43.3
		49.7	64.2	58.1	51.9	48.2	45.7	44.2	43.1
		49.5	66	57.1	51.8	48.1	45.7	44.5	43.6
	18:00	50.1	61.7	57.4	52.1	49	46.9	45.4	44.4
		49	61.4	55.5	51.2	48	45.8	44.4	42.5
		51.8	68.3	58.6	55.6	48.8	45.5	43.2	41.9
		54.9	74.7	65.1	57.9	51.6	47.4	44.9	43.4
		55.9	75.9	67.3	58.6	51	47.1	44.5	41.9
		48.1	67	55.8	50.2	46.8	44	41.9	40.6
		47.8	65.6	57.2	48.9	46.4	43.8	41.2	40.1
		48.6	61.5	57.1	51.2	47.1	43.7	42	40.6
	20:00	48.3	70	59.1	48.4	45.5	42.8	41.4	40.1
		47.9	64.4	57.4	50.1	45.7	42.7	41.2	39.8
		45.7	57.1	53.3	47.7	44.6	41.6	40.4	39.4
		46.5	63.2	54.6	48.4	45.2	42.5	40.3	39
		46.5	60.2	55.5	48.3	44.8	42.3	40.8	39.5
		45.9	60.8	54.2	47.6	44.8	42.3	40.6	39.6
		47	62.3	57.3	48.9	44.6	41.9	40.2	39.2
		47.1	68.9	55.9	47.9	44.8	41.7	39.3	37.9
	22:00	46.4	63.6	57.7	47.1	43.8	41.3	40	39.1
		45.5	61	55.6	47.3	43.4	41	39.5	38.3
		44.1	56.5	49.3	46.4	43.3	41	38.1	36.7
		43.8	56.4	50.3	46.7	42.5	39.5	37.6	36.8
		42.9	57.3	50.7	45.2	41.3	38.9	37	35.5

		42.1	59.8	49	44.6	41.1	37	35.3	33.9
		40.9	59.3	46.4	43.6	39.3	37	35.2	34.5
		42.4	61.3	51.2	44.2	40.2	37.1	35.9	34.7

APPENDIX D

Acoustic Comparisons

31-32 Park Avenue Kingswood NSW

Projected Sound Levels Compared to Common Noise Events

NOISE LEVEL (dB)		THE LEVEL OF COMMON SOUNDS	PROJECTED SITE NOISE	
			OUTDOOR	INDOOR
	Threshold of Pain			
140		Jet Engine (25 metre distance) – 140 dB		
130				
120		Jet Take-Off (100 metre distance) – 120 dB		
	Extreme			
110		Rock Band		
		Chainsaws at 25 metres (104 dB – 107 dB) Jet Flyover at 400 metres - 105 dB		
100				
	Very Noisy			
90		Pneumatic Drill		
		Heavy Truck, 40km/h, 7a distance (87dBA - 90 dB)		
80		Motor Car at 7 (80dBA) Motor Bikes (2-Wheel) 70dBA – 92dBA)		
	Noisy	Average Street Traffic (40km/h, 7 metre distance)		
70				
		Lawn Mower at 30 metres 70dBA Vacuum Cleaner at 3 metres - 67 dB Normal Speech at 1 metre - 65 dB Business Office (60 dB – 65 dB)		
60		Inside an Average Residence- 60 dB		
	Moderate	Large Business Office 60 dB (55 dB – 65 dB)		
50		Dishwasher – Next Room 50 dB		
		Typical Living Room at Night (40 dB – 45 dB)		
40				
	Quiet			
		Library (30 dB – 34 dB) Soft Whisper at 2 metres 30 dB		
30				
		Typical Bedroom at Night (25 dB – 30 dB) Concert Hall Background 4D Slight Rustling of Leaves 20 dB		
20				
	Almost Silent	Broadcast & recording Studio 16 dB		
10				
0	***Silent***	Threshold of Human Hearing		

External Sound Levels (dBA, LAeq) | Internal Sound Levels (dBA, LAeq)

(Source: Australian Acoustic Association; NG Child & Associates)

APPENDIX E

Noel Child
Summary of Qualifications, Capability & Experience

1 PERSONAL DETAILS

Full Name: Noel George CHILD
Profession: Consultant in Environmental Assessment and Management
Date of Birth: 6th December 1946
Nationality: Australian
Experience: > 30 Years
Address: 22 Britannia Road, Castle Hill, NSW, 2154
Contact: **Phone**: 61 2 9899 1968 **Fax**: 61 2 9899 1797 **Mobile:** 0409 393024

2 CAPABILITY AND EXPERIENCE - SHORT SUMMARY

Noel Child is a successful and experienced commercial and technical professional with over 30 years' experience in a variety of senior level appointments and assignments, within both the corporate and private sectors, with a particular focus on strategic, infrastructure and environmental applications.

Noel's experience includes senior management at both the State and National levels in the Australian petroleum industry, and a number of senior consultancies for both government and corporate clients. His record reflects the ability to develop and achieve positive commercial outcomes through effective planning and communication; critical and objective analysis; and quality task completion and delivery at both the personal and team level.

His management responsibilities have included transport, environmental, safety, and general operational activities at a national level, while his formal professional training includes strategic management, environmental, engineering and business disciplines. He has undertaken a number of senior corporate appointments with distinction and been successfully involved in the ownership and operation of a major petroleum distribution and marketing company in regional Australia. More recently, working through his own businesses Environment Australia and NG Child & Associates, he has applied his knowledge and experience in the areas of strategic management, infrastructure development, energy and the environment on a consultancy and contractual basis to a number of private and public-sector clients, both nationally and internationally.

Noel has had post-graduate training in several technical and commercial disciplines, and provides specialised teaching input, by invitation, to post graduate engineering and business management courses conducted by the Faculties of Business and Engineering at Sydney's University of Technology. He has strong affiliations with a number of international corporations and agencies and has worked closely with both the regulators and the regulated in a number of aspects of environmental management, assessment and performance. He has also been recognised as an independent expert on engineering, and environmental issues by the Land and Environment Court of NSW.

Noel has a detailed understanding of environmental engineering and associated processes and has specific experience and expertise in the fields of acoustics, air quality, electromagnetic field assessment, electrolysis and stray current assessment, contaminated site assessment, and liquid and solid waste management. He also provides post graduate teaching input on environmental engineering issues to post graduate courses at the University of Technology, Sydney, and La Trobe and Monash Universities in Melbourne.

3 EDUCATION, QUALIFICATIONS AND AFFILIATIONS

BE, PhD (Chemical Engineering), UNSW, Sydney
Master of Business Studies, University of New South Wales, Sydney
B.Sc. (Hons) Applied Chemistry (Environmental), University of Technology, Sydney
Graduate Diploma (Environmental Engineering and Management), UNSW, Sydney
Qualified Environmental Auditor, Standards Australia
Member, Royal Australian Chemical Institute, 1972/2021
Member, Institution of Engineers, Australia, 1972/2021
Member, Clean Air Society of Australia and New Zealand, 1992/2021
Member, Australian Natural Gas Vehicle Council, 1996/2004
Executive Director, Australasian Natural Gas Vehicles Council, 2003/2004
Visiting Fellow, Institute for Sustainable Futures, UTS, 1995/2002
Research Fellow, Faculty of Civil & Environmental Engineering, UTS, 1996/2021
Research Associate, New York Academy of Sciences, 2000/2021

4 RECENT ASSIGNMENTS & EXPERIENCE

Mostyn Copper (2016 – Current) – Assessment of air quality, acoustic, electromagnetic field and site contamination issues associated with a number of childcare centre projects undertaken by the Mostyn Copper Group and clients throughout the Sydney metropolitan area.

Mostyn Copper & the ATC (2017 – Current) – Environmental assessment of various aspects of the Coopers Paddock site near the ATC racecourse at Warwick Farm.

Boskovitz Lawyers & Ceerose Construction (2019 - Current) – Independent assessment of acoustic, air quality and electromagnetic field issues associated with a proposed childcare centre development at Willoughby Road Willoughby for submission to the NSW Land and Environment Court,

Lodestone HQ (1998 - Current) – Environmental assessment of proposed childcare centre development at the Princes Highway Kirrawee NSW, and several previous childcare centre developments over a twenty year period, including acoustic, electromagnetic field, air quality and site contamination considerations.

Government of the PRC & Thyssen Transrapid Australia (2004 - Current) – Adviser on technical and operational issues associated with the development and construction of a high-speed magnetic levitation train systems within the People's Republic of China, and elsewhere, including electrolysis, electromagnetic and stray field effects.

The Bathla Group (2014 - Current) – Environmental assessment of a number of residential development projects for submission to local government consent authorities, or the NSW Land and Environment Court, including acoustic, air quality, site contamination and environmental management issues.

Trumen Corporation (2006 - Current) – Environmental assessment, including electromagnetic field, acoustic and contamination assessment and certification, of mixed use, childcare centre and industrial unit and self-storage development projects throughout the Sydney metropolitan area.

Montessori Academy (2012 - Current) – Independent audit and assessment of acoustic, air quality and electromagnetic field issues associated with a range of childcare centre and early learning developments throughout the Sydney area, and in the ACT.

Archizen Architects (2003 - Current) – Environmental assessment of a range of proposed childcare centre developments throughout NSW, including general environmental, acoustic assessment, air quality and electromagnetic field assessment.

Dr James Smith SC (2018 – Current) – Provision of specialist advice and delivery of expert evidence regarding a number of cases, including acoustic, electromagnetic and site contamination issues.

Australian Consulting Architects (2010 – 2019) – Acoustic, electromagnetic, stray current and electrolysis assessments of development projects a Field Place Telopea; Windsor Road Vineyard; Camden Valley way Horningsea Park and others.

Futurespace/Renascent (2008 - 2018) – Environmental assessment of proposed childcare centre developments at Waterloo Road Macquarie Park and Cleveland Street Strawberry Hills, including general environmental, acoustic assessment, air quality and electromagnetic field assessment.

Commonwealth Bank (2016 – Current) – Environmental assessment, including general, acoustic, air quality, electromagnetic field and wind impact assessment, of a childcare centre development to be located on Level 2 of Darling Park Power 2, Sussex Street, Sydney.

LEDA Holdings – Environmental Assessment of a proposed childcare centre at 32 Cawarra Road Caringbah NSW, including general environmental, acoustic, air quality and electromagnetic field assessments.

Universal Property Group (Current) – Environmental assessment of a proposed multi building, multi-level residential development at Garfield Street, Wentworthville NSW, including general environmental, acoustic, site and soil contamination and preliminary geotechnical assessments.

Gundagai Meat Processors (Current) – Review and enhancement of solid and liquid waste processing and management systems at GMP's Gundagai abattoir, including the on-site treatment of waste streams from meat processing and other operations.

Campbelltown City Council (Current) – Peer review of acoustic assessments submitted to Campbelltown City Council regarding assessment of the acoustic impacts of developments including a major truck maintenance facility and the expansion of Macarthur Square shopping centre, including the conduct of noise measurements.

Brenchley Architects (2009 - Current) – Acoustic assessments of proposed residential and commercial developments at Elizabeth Street Sydney; Spit Road Mosman, Botany Road Waterloo, Cranbrook Street, Botany and Bellevue Hill Road, Bellevue Hill NSW.

Bovis Lend Lease (20010 -2017) – Environmental assessment of a major development site at Darling Walk, Darling Harbour NSW, including a detailed review of air quality, electromagnetic field and acoustic issues for review by the NSW Department of Planning.

Penrith City Council (2012 - 2016) – Preparation of the ongoing Penrith City Council response to the NSW Government Long Term Transport Plan, including consideration of transport and associated environmental issues affecting the Penrith Local Government Area.

Western Sydney Mayoral Forum (1998- 2015) – Environmental assessment and review of the development of a second Sydney airport at Badgerys Creek, including assessment of acoustic and electromagnetic field impacts.

Michael Bell Architects & Clients (2004 to Current) – Assessment of the environmental impacts, including acoustic impacts, associated with various childcare centre applications in suburban Sydney, and the Sydney CBD, including the development of plans for the management and control of such impacts.

NSW Roads & Traffic Authority (2004 to 2018) – Review of international technologies, systems & applications in relation to the treatment of motor vehicle exhaust emissions and associated air pollution within and discharged from road tunnels, in accordance with the conditions of approval for the M5 East Motorway

Federal Airports Corporation (1995 - 2017) – Environmental studies for the Sydney West Airport, including consideration of air quality, acoustic and electromagnetic and radio-frequency issues.

Isuzu-GM (2003 to 2018) – Representations to Environment Australia and the Department of Transport and regional Services regarding the emission performance standards of Japanese sourced medium and heavy natural gas trucks, with the aim of having the current Japanese emission standard accepted within the Australian design Rule 80 series of vehicle emission standards.

City of Sydney (2005 - 2007) – Assessment of air quality and odour issues associated with a proposed redevelopment of craft studios and associated facilities at Fox Studios, Moore Park, Sydney, and review of air quality monitoring stations in the Sydney CBD area, in part as a basis for monitoring the air quality and potential health cost impacts of transport congestion and modes.

Warren Centre for Advanced Engineering, University of Sydney (2000 to 2003) – Contribution to the report "Sustainable Transport for Sustainable Cities", a major government and private enterprise funded study into the future sustainability of transport in Sydney and adjoining regions, including in particular a review of associated environmental issues. Study received the 2003 Bradfield Award for Engineering Excellence from the Australian Institute of Engineers.

United Kingdom Department of the Environment (1994) – Contribution to the development of revised environmental guidelines for air, soil and groundwater water quality.

United States Environmental Protection Agency (1994) - Contribution to an international team developing strategies for the control and management of air pollution in seven major US cities.

5 CORPORATE EXPERIENCE

NG Child & Associates

- **1992--Present**, Managing Principal - Responsible for all aspects of the conduct of a specialist private engineering and environmental consultancy, including administration, marketing, team coordination and technical and professional delivery.

Western Fuel Distributions Pty Limited, Australia

- **1984-92** Managing Principal. - Responsible for all aspects of the management and development of one of the largest private petroleum distributorships then operating in Australia, with a peak annual sales volume of 70 million litres, turnover of $30 million per annum, a direct staff of thirty, and a network of some 40 retail and wholesale agency outlets. This position included direct personal accountability for all aspects of storage, distribution and environmental performance.

Caltex Oil Australia Limited

- **1982-84** General Manager, Marketing and Operations. Responsible for the management and operation of Caltex Australia's marketing, storage, warehousing, distribution, environmental and safety functions, including seaboard terminal and marine operations.
- **1980-82** National Consumer Marketing Manager. Responsible for Caltex Australia's national consumer, industrial and distributor marketing activities.

Golden Fleece Petroleum Limited

- **1977 - 1980** Manager Operations, NSW. Responsible for the overall management of the distribution, warehousing, seaboard terminal and lubricant production activities of Golden Fleece Petroleum in New South Wales, including environmental, occupational health and safety matters.

Esso Australia Limited

- **1976-77** SA Manager, Marketing and Operations. Responsible for all aspects of the management of Esso's petroleum, lubricant and LPG storage, distribution and marketing throughout South Australia.
- **1975-76** Refinery Manager. Responsible for all engineering, operational and environmental aspects of the joint Esso/Mobil refinery at Port Stanvac in South Australia.
- **1975** Manager, Process Operations, Port Dixon Refinery, Malaysia. Six-month special assignment at the Esso Petroleum Refinery, Port Dixon, Malaysia.
- **1971-75** Senior Analyst, Logistics and Corporate Strategy Departments, Esso Sydney Head office.

6 SOME REPORTS & PUBLICATIONS

- **High Speed Rail – Benefits for the Nation,** Keynote address at the UNSW Institute of Environmental and Urban Studies International High-Speed Rail Seminar, August 2018.
- **Electromagnetic Impact of Magnetic Levitation Trains,** Report to the Shanghai Municipal Transport Commission detailing constraints associated with electromagnetic field impacts, September 2017)
- **The M5 East Road Tunnel: Implications for Ventilation, Air Quality and Emission Treatment Systems**, International Road Transport and Tunneling Forum, Graz Austria, May 2016.
- **Sydney's High Residential Growth Areas: Averting the Risk of a Transportation Underclass**, World Transport & Environmental Forum, Reims France, June 2014.
- **Review of Options for the Treatment or "Filtration" of Tunnel Gases and Stack Emissions**, City of Sydney. January 2014
- **M5 East Freeway: A Review of Emission Treatment Technologies, Systems and Applications**, NSW RTA and NSW Department of Planning, April 2004; June 2008; September 2010)
- **High Speed Trains in Australia: Connecting Cities and Energising Regions**; with the Hon Peter Nixon AO, October 2010.
- **Transport Fuels in Australia: The Folly of Australia's Increasing Reliance on Imported Crude Oil**, Submission to the Australian Senate Rural and Regional Affairs and Transport Committee Inquiry into Australia's Future Oil Supply and Alternative Transport Fuels, February 2006.
- **The Japan 2003 CNG Emission Standard & the Emission Performance of the Isuzu 4HF-1-CNG: The Case for Acceptance under ADR80**. Submission on behalf of Isuzu GM Australia to the Commonwealth Department of Transport and Regional Services, June 2004.
- **Sustainable Transport for Sustainable Cities**, Warren Centre for Advanced Engineering, Sydney University, January 2003
- **Future Directions: Challenges & Opportunities in the Australian CNG Vehicle Industry**, ANGVC, December 2002
- **Engineering and Environmental Aspects of Enclosing the Cahill Expressway Cutting**, City of Sydney, May 2001.
- **High Speed Rail in Australia: Beyond 2000** (with the Hon Peter Nixon), November 2000
- **M5 East Motorway: Proposed Single Emission Stack at Turrella – Review of Air Quality Impacts and Consideration of Alternative Strategies**, Canterbury City Council, February 1999

7 PERSONAL & PROFESSIONAL REFERENCES

- The Hon Peter Nixon AO, Former Federal Transport Minister
- John Black, Professor Emeritus of Civil & Transport Engineering, University of NSW
- The Hon Frank Sartor, former Lord Mayor of Sydney; Former NSW Government Minister.
- Dr Jack Mundey, Past Chairman Historic Houses Trust, Environmentalist
- Mr Stephen Lye, Development Manager, Trumen Corporation, Sydney.
- Mr Peter Han, Project Director, Commonwealth Bank, Sydney
- Mr Michael Bell, Principal, Michael Bell Architects, Sydney.
- Mr Graeme Allen, Director, the Bathla Group
- Mr Luke Johnson, General Manager, Wollondilly Shire Council
- Mr Bernie Clark, Chief Executive, Thyssen Australia
- Mr Bruce Glanville, former Managing Partner, Deloitte Canberra
- Alex Mitchell, Journalist

Noel G Child
19 August 2021

ATTACHMENT A
Client Reference List

Acre Woods Childcare Pty Ltd
Australian Commonwealth Environmental Protection Agency
Australian Consulting Architects
Australian Federal Airports Corporation
Australian Federal Department of Transport and Regional Development
Bovis Lend Lease
Brenchley Architects
Campbelltown City Council
Canterbury City Council, Sydney, NSW
Commonwealth Banking Corporation
Environment Protection Authority of NSW
Exxon Chemical
Fairfield City Council, Sydney, NSW
First Impressions Property
FreightCorp, Sydney, NSW
Futurespace
GM - Isuzu
Guangxi Environment Protection Bureau
Gundagai Meat Processors
Hong Kong Department of the Environment
Hornsby and Ku-ring-gai Councils, Sydney, NSW
John McCormack
Kaunitz Yeung Architecture
LEDA Holdings
Michael Bell Architects
Minter Ellison
Mobil Oil Australia Associated
NSW Roads & Traffic Authority
Ove Arup & Partners
Qantas Airways
Queensland Ports Corporation
Renascent
Salibeau Pty Ltd
Shell Australia
Sinclair Knight Merz
Skouras and Mabrokardatos
Southern Sydney Regional Organisation of Councils (SSROC)
State Rail Authority of NSW
Stephen Davidson Property Investments
Sydney Skips & Galaxy Waste
The City of Sydney
The Western Sydney Alliance of Mayors
Thyssen Krup Transrapid Australia
Tom Howard QC
Trumen Corporation
UK Department of the Environment
United States Environment Protection Agency
University of Technology, Sydney
Warren Centre for Advanced Engineering, University of Sydney
Waverley Council, Sydney, NSW
Western Sydney Parklands