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Proposed Child Care at 2 and 6 Chalker Street, Thirlmere – Acoustic Report

July 2019

Building Acoustics: Sound Insulation, BCA Compliance, Offices, Studios, Auditoriums ♦
Noise: Transportation(road, rail, aircraft) ♦ Mechanical Services ♦ Domestic Airconditioning ♦
Environmental ♦ Occupational ♦ Industrial

Report prepared for:

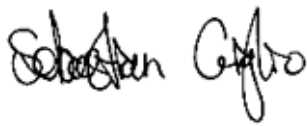
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Report Name:

Proposed Child Care at 2 and 6 Chalker Street, Thirlmere – Acoustic Report

Prepared by:

Sebastian Giglio
B Eng (Hons) Mech



Date: 24 July 2019

Please note that this correspondence has only addressed the acoustical issues discussed. Other aspects of building design, such as fire-rating, structural and waterproofing considerations must be referred to others. Drawings shown are not for construction.

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1 INTRODUCTION

This report provides an assessment of potential acoustic issues for the proposed development, which is the construction of a single-storey child care centre for 48 children. There will be 9 teachers and 13 car park spaces in an at-grade car park at the front of the site. The location of the proposed Centre is in a newly developed residential subdivision (a suburban area). Operating hours will be 7am to 7pm, Monday to Friday. Figure 1-1 below shows an aerial view of the site and surrounds. Figure 1-3 shows a site plan and plan layout of the proposed Centre. The following acoustic issues are potentially relevant for consideration of this child care centre development:

- Noise emission from children playing in designated outdoor play areas;
- Potential noise emission from outdoor air-conditioning equipment;
- Children noise indoors;
- Traffic noise from parent/carer vehicles accessing the centre,
- Noise generated within the car park on site.

The following information has been used in preparing this acoustic assessment:

- Architectural drawings prepared by Algorry Zappia & Associates Pty Ltd. See drawing list below.
- Association of Australian Acoustical Consultants (AAAC) *Child Care Centre Noise Assessment Technical Guideline*, November 2009
- EPA Guideline, *Noise Guide for Local Government*
- Wollondilly Shire Council Development Control Plan 2016 and Local Environment Plan 2011
- Acoustic criteria used in various Land and Environment Court cases (see Appendix)
- *Traffic & Parking Impact Statement – 2 & 6 Chalker Street Thirlmere (Proposed Child Care Centre)*, prepared by Thompson Stanbury Associates
- Proposed Childcare Centre Thirlmere – Operational Plan of Management For Childcare Centre at 50 Rita Street, Thirlmere, V1 – 25.06.19

Architectural drawings used for reference are listed below:

- | | |
|-------------------|-------------------|
| • DA1026-19 A01 A | • DA1026-19 A09 A |
| • DA1026-19 A02 A | • DA1026-19 A10 A |
| • DA1026-19 A03 A | |
| • DA1026-19 A04 A | |
| • DA1026-19 A05 A | |
| • DA1026-19 A06 A | |
| • DA1026-19 A07 A | |
| • DA1026-19 A08 A | |

Figure 1-1 Site Aerial Photo © Nearmap.com January 2019

Figure 1-2 Site Aerial Photo © Nearmap.com January 2019



Figure 1-3 Proposed Layout Plans – Site/Ground Floor Plan

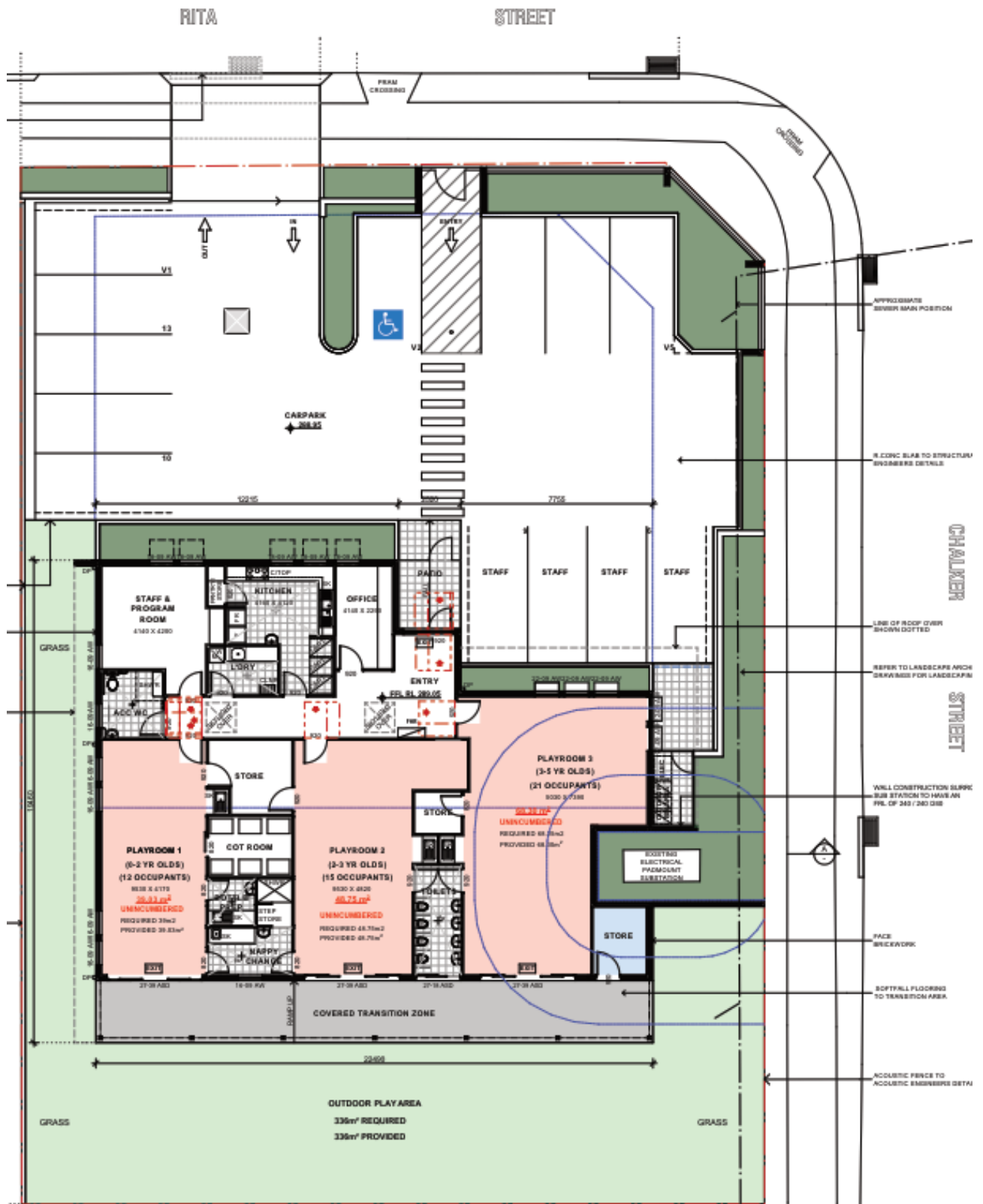
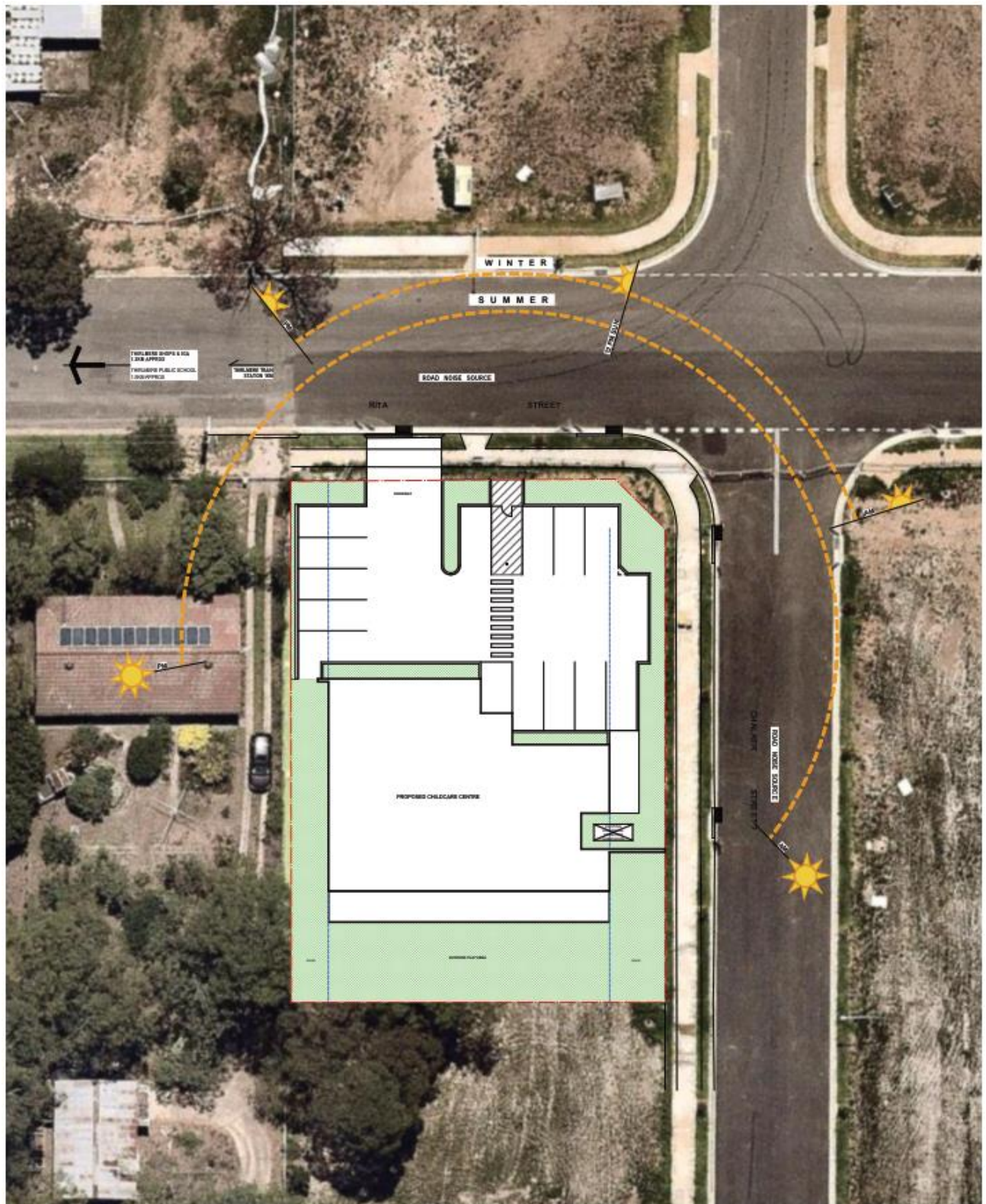


Figure 1-4 Site Plan

2 PROJECT/SITE DESCRIPTION

The area surrounding the proposed development is a mix of rural residential and newly subdivided residential blocks. The latest Nearmap.com aerial photograph, Figure 1-1 and Figure 1-2, show the land as undeveloped but site photographs taken July 2019 show a number of single-storey dwellings currently under construction.

The site is on the corner of Chalker Street and Rita Street, with driveway frontage to Rita Street. The site is currently vacant land, with a single existing residential neighbour to the west.

The proposal involves construction of a new single-storey child care centre building with at-grade carpark at the Rita Street frontage.

The configuration of the proposed child care centre is as follows:

- Car park: 13 car spaces including 4 dedicated staff spaces;
- Play Room 1, 39.03m², 12 children 0-2 years old;
- Play Room 2, 48.75m², 15 children 2-3 years old;
- Play Room 3, 68.30m², 21 children 3-5 years old;
- Other rooms include Staff Room, Office, Cot Room, WC, store and Kitchen.

The total number of children is 48.

The Centre will operate 7am to 7pm, Monday – Friday. Based on the Architectural drawings, staff parking requirements are four (4) cars.

The main issue to be addressed in this assessment is noise from children playing outdoors. Noise from children playing indoors will also be assessed, as will car park and traffic noise. Mechanical services noise will be assessed for this development in a preliminary manner since the project is still at Development Application stage and equipment selections have not been made.

The following extracts are taken from the Plan of Management.

Table 2-1 Outdoor Play Schedule

Age Group	Times
0-2 years	Mornings: 8:00 -9:00 (First group of 8 children)
	Mornings: 9:00 -10:00 (Second group of 8 children)
	Afternoons: 2:00 - 3:00 (First group of 8 children)
	Afternoons: 3:00 - 4:00 (Second group of 8 children)
2-5 years	Mornings: 8:00 -9:30
	Afternoons: 3:00 - 5:00

Table 2-2 Extract of Plan of Management

Age Group	Time	Description of Routine
0-2	10:00am: Transition to Indoor/Outdoor Active Play Area	A time for babies and staff to tidy the 0-2 years Room then transition to the Indoor/ Outdoor play area. Transition strategies include music and movement. A staff member stays upstairs with babies who are still sleeping, and bring them Outdoor as they wake.
	10:00am –10:45am: Planned and Spontaneous Indoor/Outdoor Active Activities	A time for babies who are interested to participate in planned and spontaneous activities and projects that are based on developing babies emerging skills and development. These are pre-planned and/or spontaneous activities based on meeting the Early Years learning Framework Outcomes; and, babies developing interests, skills and needs.
	11:00am: Transition to the 0-2 years Room	A time for babies to tidy the Outdoor play area then transition to the 0-2 year's room.
	2:30pm: Transition to Play Area for Free Play and Family Grouping	A time for babies and staff to tidy the Caterpillar room and then transition to the Outdoor play area. Transition strategies include music and movement. Once outdoors, this is a time for babies who are interested to engage with various learning centre and play experiences provided both indoors and outdoors. The glass sliding doors may be left open for babies to choose indoor/outdoor play (staff/child ratio permitting).
2-3	8:00am: Transition to the Indoor/Outdoor Active Play Area	A time for children to tidy the Caterpillar room then transition to the outdoor play area. This involves children having to follow teacher instruction. Transition strategies include music and movement, e.g. our 'lining up Song.'
	8:00am -9:00am: Free play in the Active Indoor/Outdoor Area	A time for children to participate in a variety of free play learning experiences. Children are given the choice and flexibility to play indoors or outdoors (weather permitting).
	9:00am -9:30am: Progressive Morning Tea & Various Learning Centre Activities Held in the Outdoor play area	A time for hand washing, fruit and a healthy snack; and, for children to practice their developing self-help skills. Daily Communication Chart record completed for individual children's eating.

Age Group	Time	Description of Routine
3-5	9:45am-10:00am: Planned Outdoor Activities	A time for children who are interested to participate in planned outdoor activities and projects.
	10:00am: Transition to the Busy Bees Classroom	A time for children to tidy the Outdoor play area then transition to the 2-3 years class room. This involves children having to follow teacher instruction, Transition strategies include music and movement.
	2:30pm: Transition to Outdoor Play Area for Free Play and Family Grouping	A time for children to transition to the Outdoor play area. This involves children following teacher instruction. Transition strategies include music and movement, e.g. our 'Lining up Song.' Once outdoors, this is a time for children who are interested to engage with various Learning centre and play experiences provided both indoors and outdoors. The glass sliding doors may be left open for children to choose indoor/outdoor play.
	3:45pm - 4:00pm: Music and movement Group Time	A time for children who are interested to participate in a music and movement session. This could also be a gross motor game outside (weather permitting).
	8:00am: Transition to the indoor/Outdoor Active Play Area	A time for children to tidy the Caterpillar room then transition to the Indoor/outdoor Active play area. This involves children having to follow teacher instruction. Transition strategies include music and movement, e.g. our 'Lining up Song,'
	8:00am – 9:00am: Free play in the Indoor/Outdoor Active Play Area	A time for children to participate in a variety of free play learning experiences. Children are given the choice and flexibility to play indoors or outdoors (weather permitting).
3-5	9:00am – 9:30am: Progressive Morning Tea & Various Learning Centre Activities	Held in the Outdoor play area. A time for hand washing, fruit and a healthy snack; and, for children to practice their developing self-help skills. Daily Communication Chart record completed for individual children's eating.
	9:45am -10:00am: Planned Outdoor Activities	A time for children who are interested to participate in planned outdoor activities and projects.
	10:00am: Transition to the 3-5 years room	A time for children to tidy the Indoor/Outdoor Active play area then transition to the 3 to 5 years class room. This involves children having to follow teacher instruction. Transition strategies include music and movement.

Age Group	Time	Description of Routine
	2:30pm: Transition to Indoor/Outdoor Play Area for Free Play and Family Grouping	A time for children to transition to the indoor/Outdoor play area. This involves children following teacher instruction. Transition strategies include music and movement, e.g. our 'Lining up Song.' Once outdoors, this is a time for children who are interested to engage with various Learning centre and play experiences provided both indoors and outdoors. The glass sliding doors may be left open for children to choose indoor/outdoor play.
	3:45pm - 4:00pm: Music and movement Group Time	A time for children who are interested to participate in a music and movement session. This could also be a gross motor game outside (weather permitting).

Figure 2-1 Extract from Plan of Management**4 - Noise Management Plan**

The childcare centre should not become a source of 'offensive noise' impacting adversely on the acoustic amenity of neighbouring businesses.

Children

Time out of doors is an essential component of the child's experience of the Centre.

Whilst active play is encouraged, screaming and shouting is not. This type of behaviour can be intimidating to other children, and can be disturbing to neighbours. Children who persist in such behaviour may need to be excluded from outdoor activities.

A crying or distressed child will be attended to immediately (without delay). The child will be taken to a quiet area to be comforted and to be assessed for any injury, or other cause of distress.

When children are in the "Active" play area, each group will be fully supervised by two (2) teachers / carers per group at all times.

Musical instruments likely to generate excessive noise will not be permitted in the "Active" play area.

The 0-2 years infants will be maintained separate from toddlers and pre-schoolers age groups.

Educators/Carers

Centre management of the centre recognise the importance of ensuring all Educators and Carers are properly trained.

In-house training will include familiarisation with the procedures and requirements set out in the Noise Management Plan.

Recent graduates and relieving teachers (who may lack experience in the operation of the centre) will be supervised by permanent staff members.

Staff will be instructed to engage the children in educational play activities that the children will find both mentally and physically stimulating, at all times.

Staff will be instructed to refrain from encouraging activities that may result in excessively noisy play and running.

All temporary & permanent staff will be required to read the Noise Management Plan before starting work and to comply with it at all times.

Management

Centre management will maintain a Log of any, and all, noise complaints received. Any complaints received shall be logged with details of the nature of the complaint, time of the event and contact details of the complainant. Centre management will endeavour to respond to any noise complaint as quickly as possible, and will advise the complainant within 48 hours of what, if any, actions have been undertaken as a result of reviewing the complaint. These actions will be recorded in the Log.

The Log will be located in the Nominated Superior's office and will be accessible to Council at any time within normal operating hours. Centre management will provide Council and the occupants of the building with name(s) and contact details (phone number) of designated person (or persons) responsible for the addressing noise complaints. At least one designated responsible person shall be available on site at all times during operational hours. Centre management will provide Council, and other occupants of the building with an Activity Schedule. A laminated copy of the Noise Management Plan will be displayed in the entry foyer.

All parents / guardians will be required to read the section of the Noise Management Plan relating to their Children. Continued attendance at the Centre will be contingent on the parent and/or guardian abiding by the requirements of the Noise Management Plan.

Other building occupants will be encouraged to visit and observe the operation of the Centre. Any such visit will need to comply with NSW Department of Education & Communities guidelines and accompanied by an Authorised Supervisor of the centre.

Should noise complaints persist, the Centre will engage the services of a recognised Acoustical Consultant (being a full and current member of the Australian Acoustical Society) to monitor noise levels and provide advice on any additional noise mitigation measures (if required).

Such a reporting will form part of the Log and be freely available to Council and to the Complainant. Attended noise monitoring may require access to the complainant premises.

Investigation of any noise complaint requiring the services of a recognised Acoustical Consultant will be contingent on this permission being given.

Complainants should be made aware that this will be a requirement of the investigation.

Centre Management is committed to being a responsible and good neighbour to local businesses.

3 NOISE CRITERIA

The following documents have been used for reference in the preparation of this Section of the Acoustic Report:

- AAAC *Child Care Centre Noise Assessment Technical Guideline*, November 2009 (available from www.aaac.org.au), published by the Australian Association of Acoustical Consultants (AAAC).
- NSW EPA (Environment Protection Authority) *Noise Guide for Local Government*
- Various Land and Environment Court cases pertaining to child care centres.

Potential noise emission from the Centre has been considered.

3.1 Allowable Noise Emission

In general, noise emission from commercial and industrial noise generators is assessed as “background + 5dBA”. This is discussed in the EPA *Noise Guide for Local Government*.

In the case of noise from child care centres, it is considered appropriate to use “background + 10dBA” as the noise criterion for outdoor play. This is for the following reasons:

- The children do not play outdoors continuously all day but only for defined periods.
- The noise source is not industrial in nature. Many people find the sound of children playing to be less objectionable at the same level compared to typical industrial/commercial noise.
- The “background + 10dBA” approach is supported by a number of Land and Environment Court cases – see Appendix C at the end of this report.

It is noted that the Association of Australian Acoustical Consultants (AAAC) current guideline suggests a duration limit of 2 hours of outdoor play for child care centres when “background + 10dBA” is used as the noise criterion. This office understands that this guideline is currently under review but in any case, a number of Land and Environment Court cases have not adopted the duration restriction. In this Report, a restriction on the duration of outdoor play of 3.5 hours is considered warranted for the older children – the 3-5 year olds.

Noise from the other noise sources on site, such as car park noise, mechanical services noise and children indoors, is assessed using the usual “background + 5dBA” criterion.

3.2 Existing Ambient Noise

An unattended noise data logger was installed at the site from July 17 to July 20, 2019. In general, it would have been preferred to leave the logger on site for another 4 days, however,

due to an incident of verbal abuse from an occupant of the neighbouring property, it was decided to not leave the noise logger for a longer period. Meteorological conditions were fine during the noise monitoring period and the observed ambient background sound levels are within the expected levels for a reasonably quiet suburb.

The noise logger location is shown in Figure 1-1 and the Appendix. It was in the approximate future location of the future outdoor play area, near to the western boundary.

The details of the noise logger installation and data are included in the Appendix. Analysis of meteorological conditions from nearby Bureau of Meteorology weather station (Camden Airport) indicate that there was fine weather during the majority of the noise monitoring.

The ambient sound level data at the noise logger locations was as follows:

- L_{A90} (RBL): 38dBA, 7am-6pm

The allowable noise emission goal for children playing outdoors is background + 10dBA, that is:

- $L_{Aeq,15\text{-minutes}}$ 48dBA.

The allowable noise emission goal for other noise sources such as children playing indoors, for car park noise and for mechanical services equipment, is background + 5dBA, that is:

- $L_{Aeq,15\text{-minutes}}$ 43dBA.

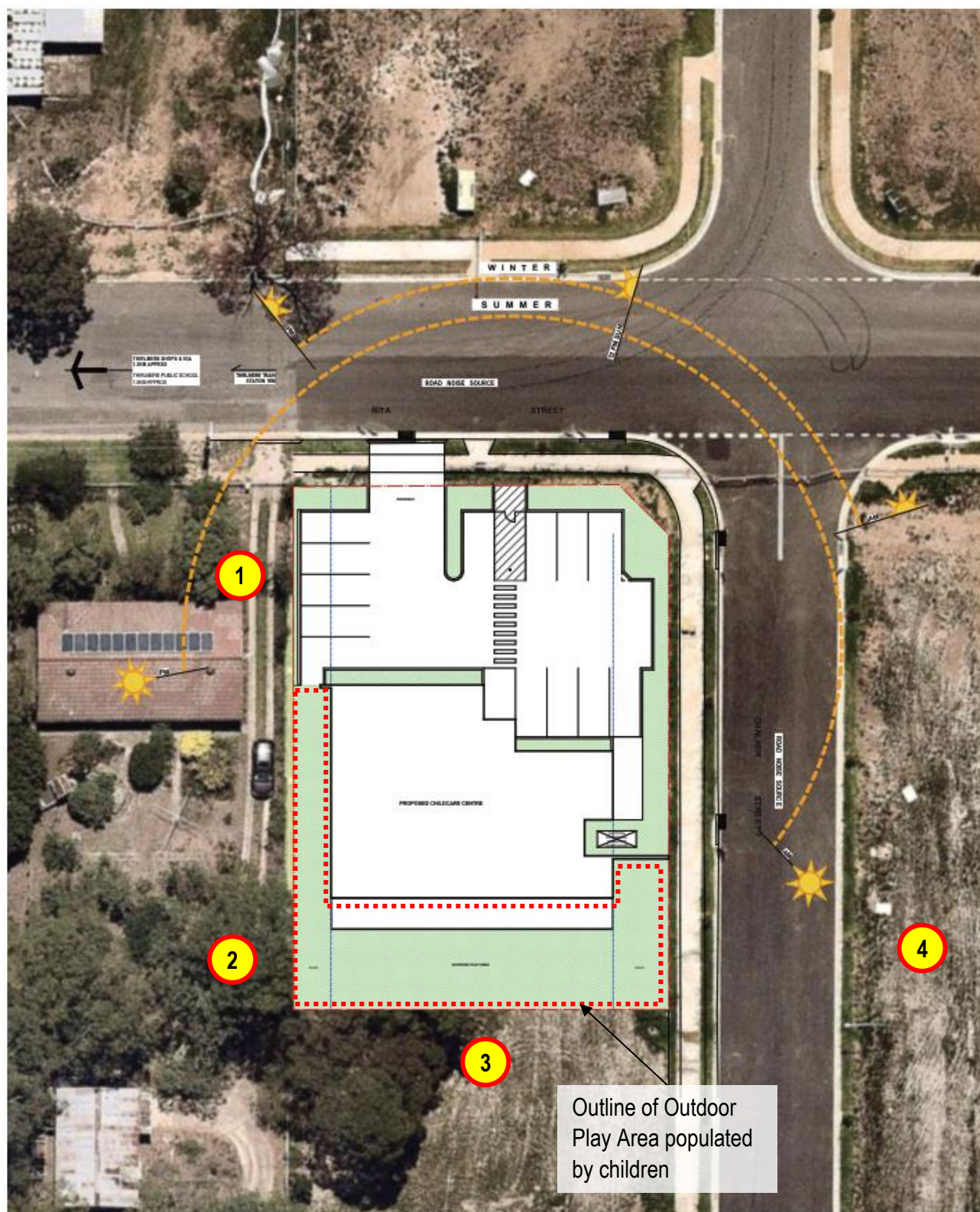
3.3 Residential Noise Receivers

Refer to Figure 3-1 and Figure 4-1. In this case, the nearest residential noise receivers that have been assessed are as follows:

1. Front yard of the house at 38 Rita Street, to the east of the Child Care Centre car park.
2. Backyard of the house at 38 Rita Street, to the east of the Child Care Centre outdoor play area.
3. Front yard of the house (currently under construction) at 5 Chalker Street, across the road to the east.
4. Property to the south, at 8 Chalker Street.

For noise assessment purposes, the potential noise receiver locations are shown in Figure 3-1. The height of the noise receivers for acoustic calculation purposes is in accordance with EPA guidelines – 1.5m above the ground level, for outdoor noise receiver locations and 1.5m above floor level for facades of dwellings (assumed 1.7m above ground RL). It is noted that all neighbours are single-storey and that the prevailing geography is a fairly flat site and surrounding area.

Figure 3-1 and Figure 4-1 show the indicative noise source locations used in the assessment. The children using the outdoor play area have been divided evenly throughout the nominated play area, for the purposes of acoustic calculation.

Figure 3-1 Representative Noise Source & Receiver Locations for Assessment

4 NOISE AND ASSESSMENT OF CHILDREN PLAYING

4.1 Children Playing Outdoors

The allowable noise emission level at the nearby residential premises is “background + 10dBA”, for children playing outdoors and “background + 5dBA” for other noise sources. That is, the noise goals are:

- 48dBA for children playing outdoors;
- 43dBA for other noise sources on the site.

Based on other projects carried out by this office, the sound data published in the AAAC Guideline is considered the most appropriate for acoustic calculation purposes. The sound level of children playing is summarised in Table 4-1 below.

Table 4-1 Sound Power Levels of Children Playing, $L_{Aeq,15min}$

Age Group	Groups of 10 Children Playing
0-2 years	77-80
2-3 years	83-87
3-5 years	84-90

It is generally considered that the noise levels at the upper end of the range refer to children engaged in “active play” outdoors, such as running, being boisterous and calling out. The noise levels at the lower end of the range represent children engaged in less boisterous activities such as sandpits and other seated activities.

For the purposes of the assessment, it is assumed that half of the children will be engaged in active play and half in passive play, at any given time. This approach has been used and accepted in L&E court cases, for example, *Hunters Hill Ventures Pty Ltd v Hunters Hill Council*, [2016] NSWLEC 1614 (22 and 22A Joubert Street, Hunters Hill).

For acoustic calculation purposes, the children are distributed evenly throughout the play area at the same density (no. of children per m²).

Figure 3-1 and Figure 4-1 show the representative noise source and noise receiver locations used for the acoustic calculations. The sound source data used for the calculations is shown below:

- 6 children aged 0-2: 76.5dBA (12 children divided in two separat groups)
- 15 children aged 2-3: 87.2dBA
- 21 children aged 3-5: 91.2dBA

For calculation purposes the following acoustic information and treatment has been included:

- Extent of noise barriers as shown in Figure 4-3.
- Total Sound Power Level of all children in the ground floor outdoor play area 92.7dBA, distributed evenly through the outdoor play area.
- Acoustic absorption treatment to the underside of the covered play areas, awning roofs and transition areas.
- Acoustic absorption treatment to the façade of the child care centre building (external wall face, facing the outdoor play area). This prevents unwanted reflections which would otherwise increase noise emission.
- Solid, full-height walls along the bounding walls to the outdoor play area (all sides). These noise barrier walls can be transparent, translucent or obscured, provided they are solid and without gaps.
- Acoustic absorption and/or shrubbery to the walls bounding the outdoor play areas.

Figure 4-3 through to Figure 4-8 provide sketch details of the recommended acoustic measures.

Section 4.2 below summarises the acoustic calculation results for the outdoor play areas.

4.1.1 iNoise Noise Modelling Software

Acoustic calculations have been carried out using iNoise 2019.1 Environmental Noise Modelling Software, based on the latest architectural proposal. The software implements calculation methods outlined in ISO 9613 and has been tested to conform to the software requirements of ISO 17354. The software is based on the following Standards:

- ISO 9613-1 *Acoustics – Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere*
- ISO 9613-2:1996 *Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation*
- ISO/TR 17534-3:2015 *Acoustics -- Software for the calculation of sound outdoors -- Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1*

The modelling was done using the following settings:

- Each outdoor play area was modelled as an area source at 1.0m height, comprised of individual point sources at 1m centres.
- The total Sound Power Level of each area source was as listed above.
- The outdoor play areas have been modelled as soft ground, as these will be soft-fall type material.
- Default software calculation settings were used including standard temperature, pressure and humidity, hard ground generally and default meteorological conditions.

Figure 4-1 and Figure 4-2 shows some screenshots from the iNoise software.

Figure 4-1 Outline of iNoise Computer Model

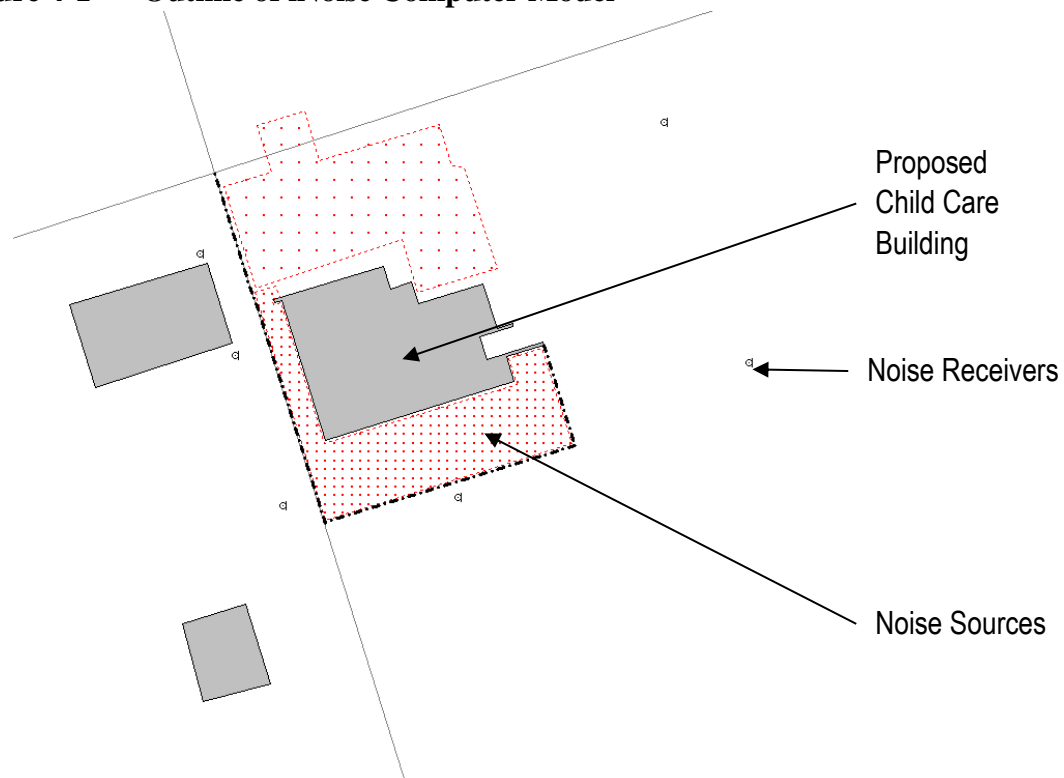
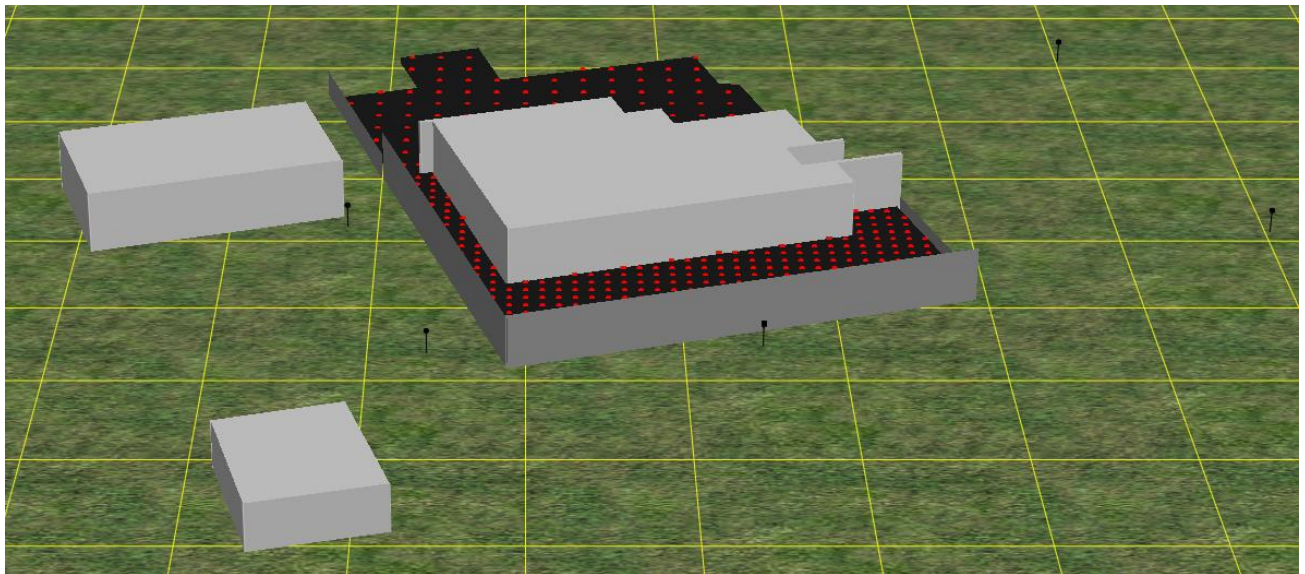


Figure 4-2 3D Views of iNoise Computer Model

4.2 Acoustic Calculation Results

The noise barriers and other acoustic treatment described in this section of the Report have been used to determine noise emission from the site. Noise levels are based on the noise barriers described in the next Section. Noise levels have been calculated to be:

1. 40dBA (Front yard of 38 Rita Street).
2. 46dBA (Back yard of 38 Rita Street).
3. 48dBA (New property subdivision 8 Chalker Street).
4. 48dBA (Front yard of 5 Chalker Street).

The noise goal for this project is 48dBA. Therefore, the calculated noise emission complies with the noise goals.

The sketches on the following pages summarise the acoustic treatment recommended in order to achieve the stated noise emission levels.

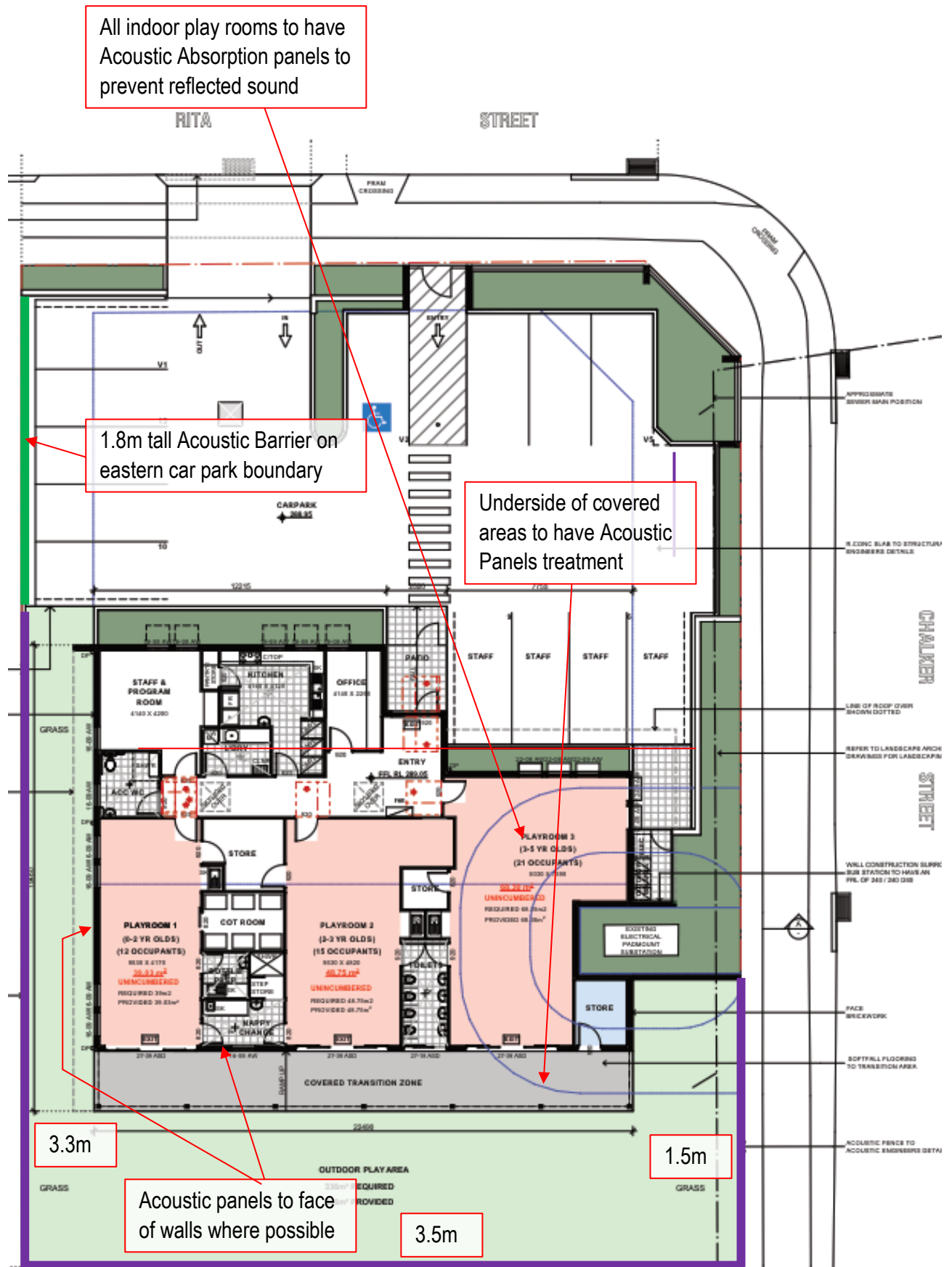
Figure 4-3 Extent of Noise Barriers

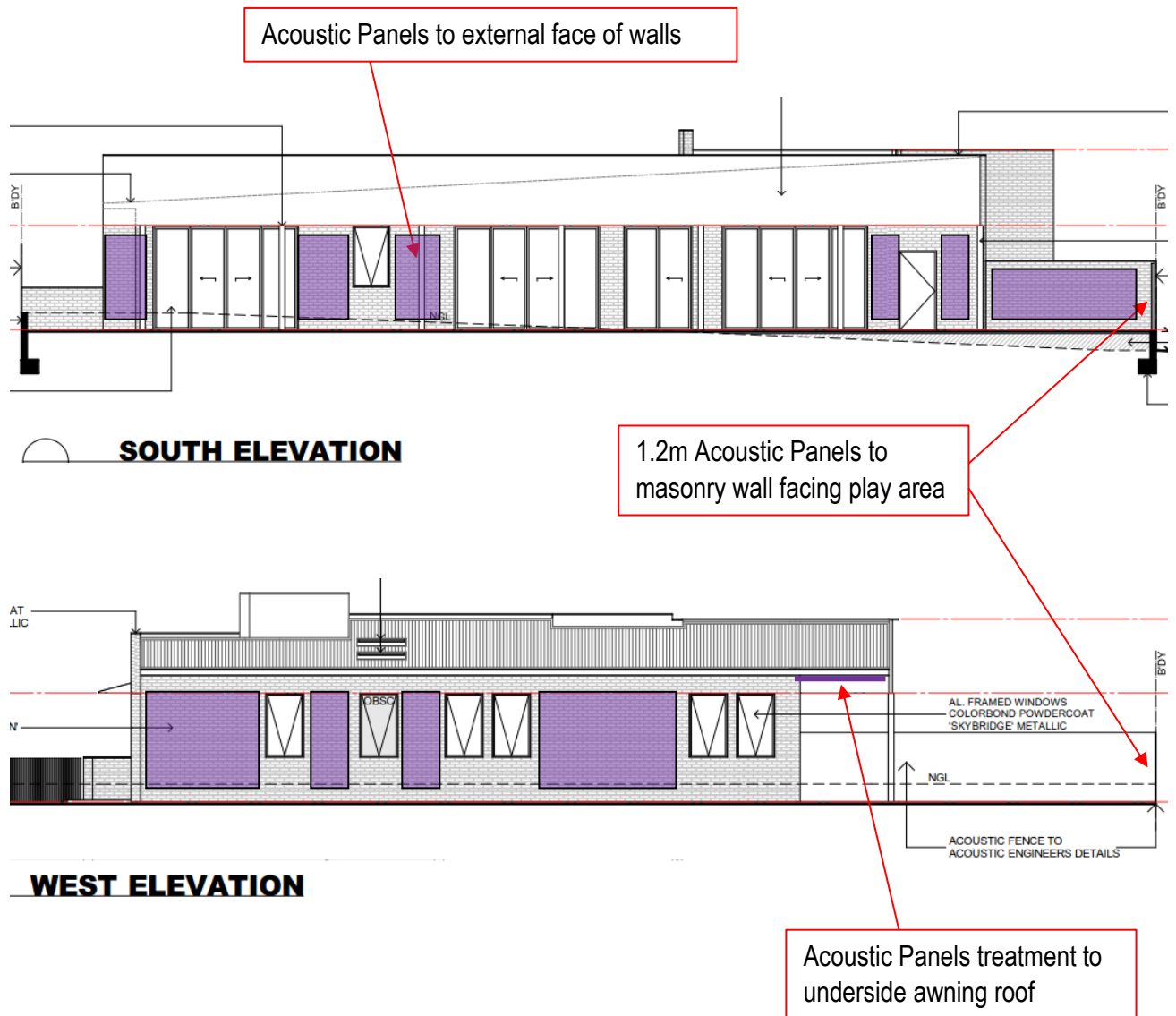
Figure 4-4 Extent of Acoustic Treatment – Elevations

Figure 4-5 Acoustic Treatment to the Awning Roofs

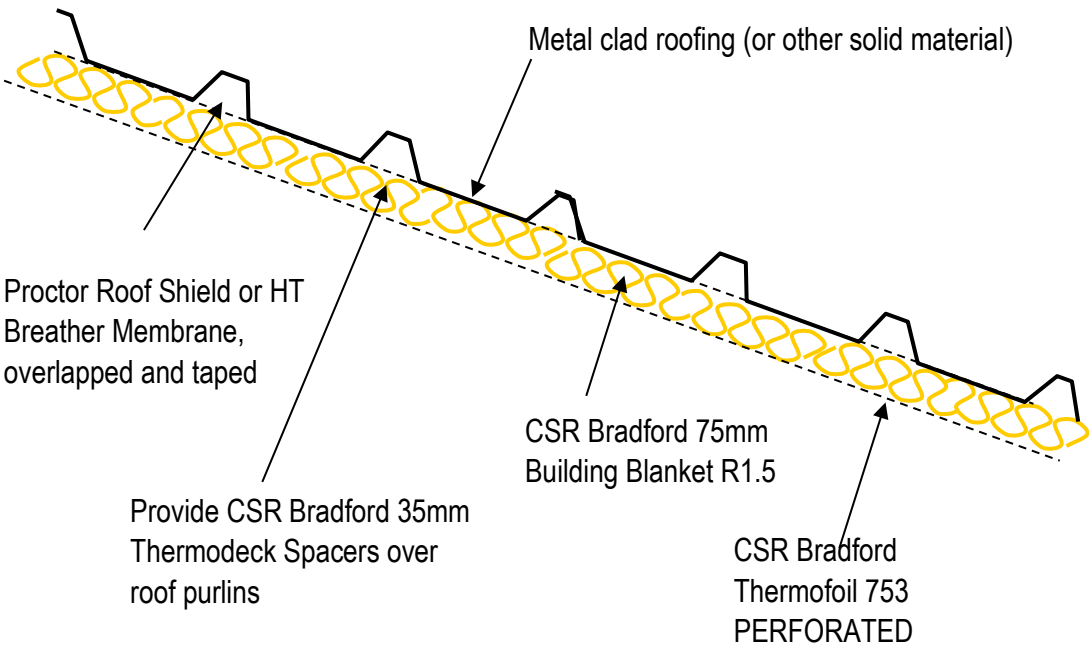


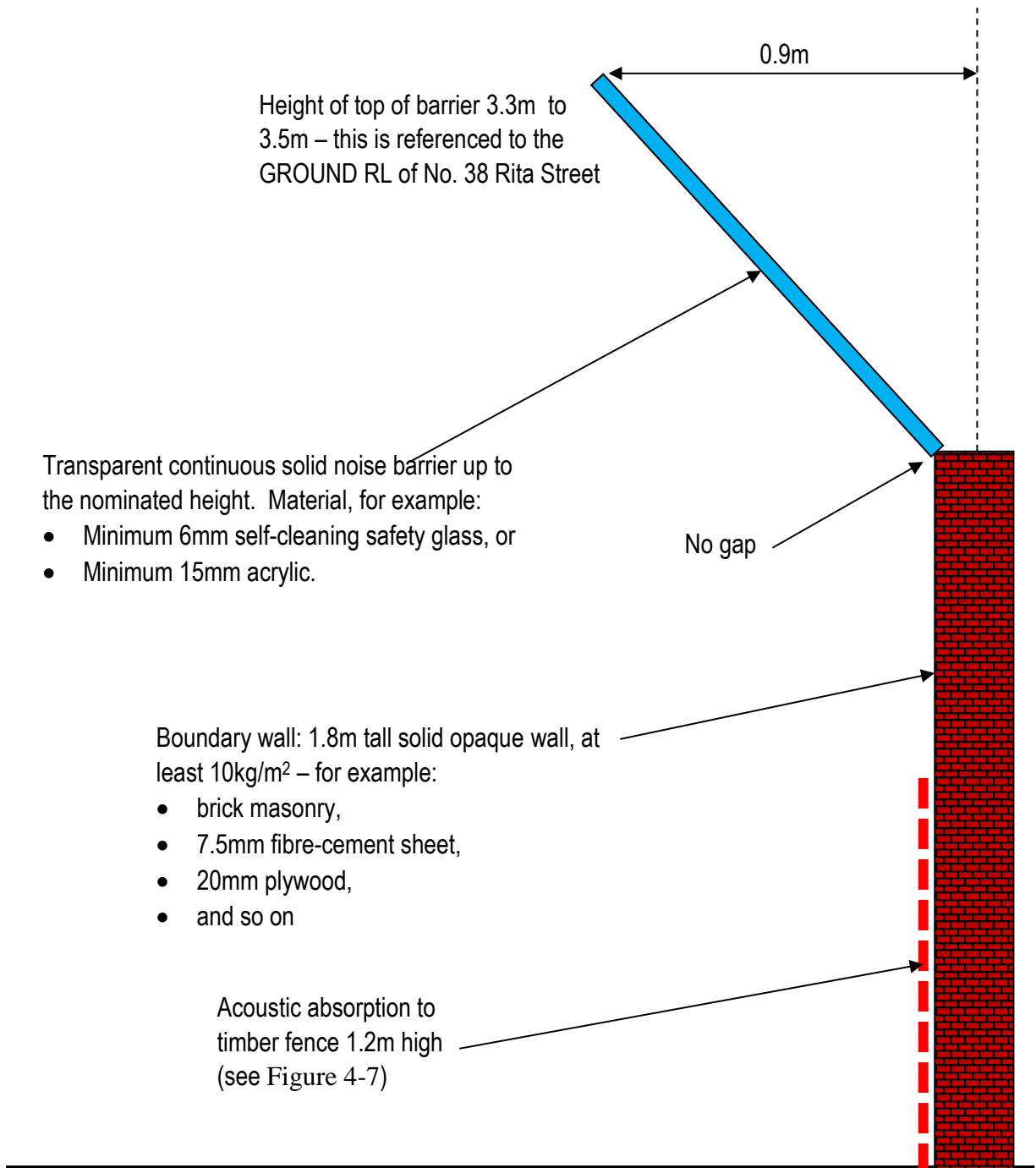
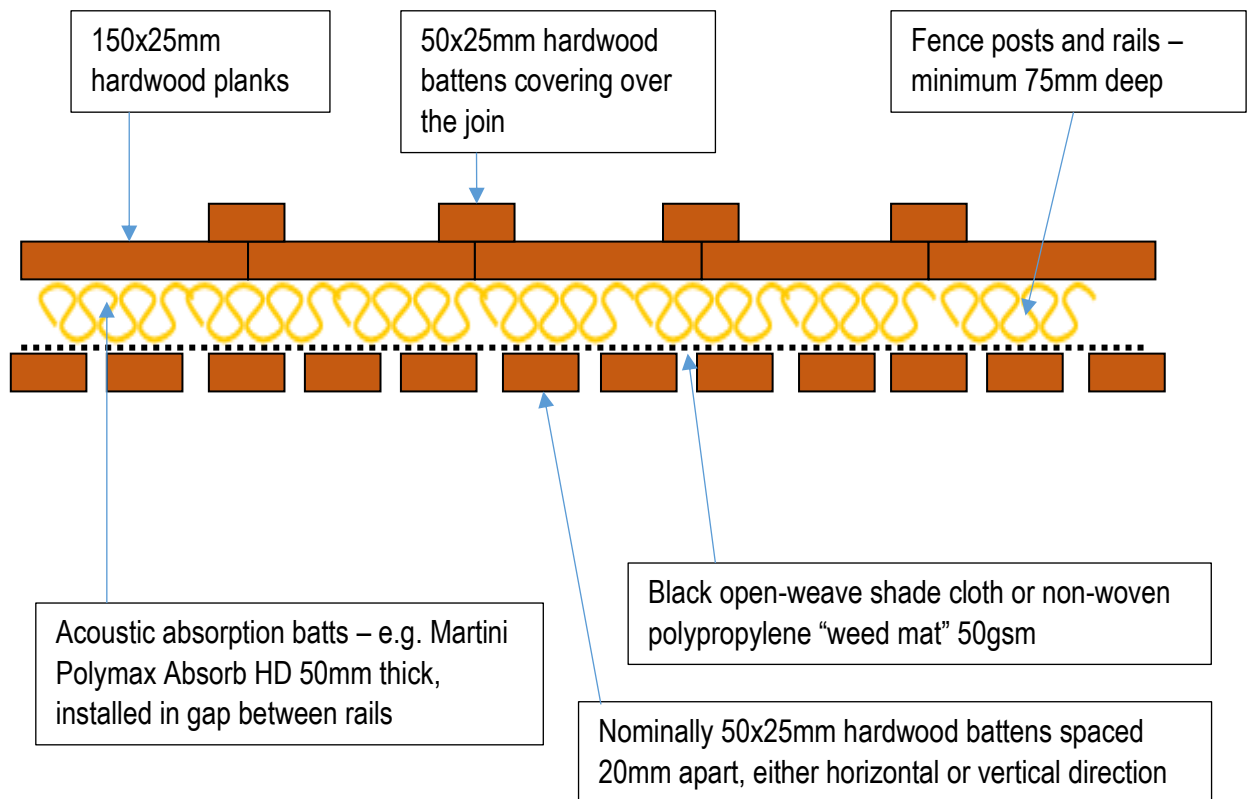
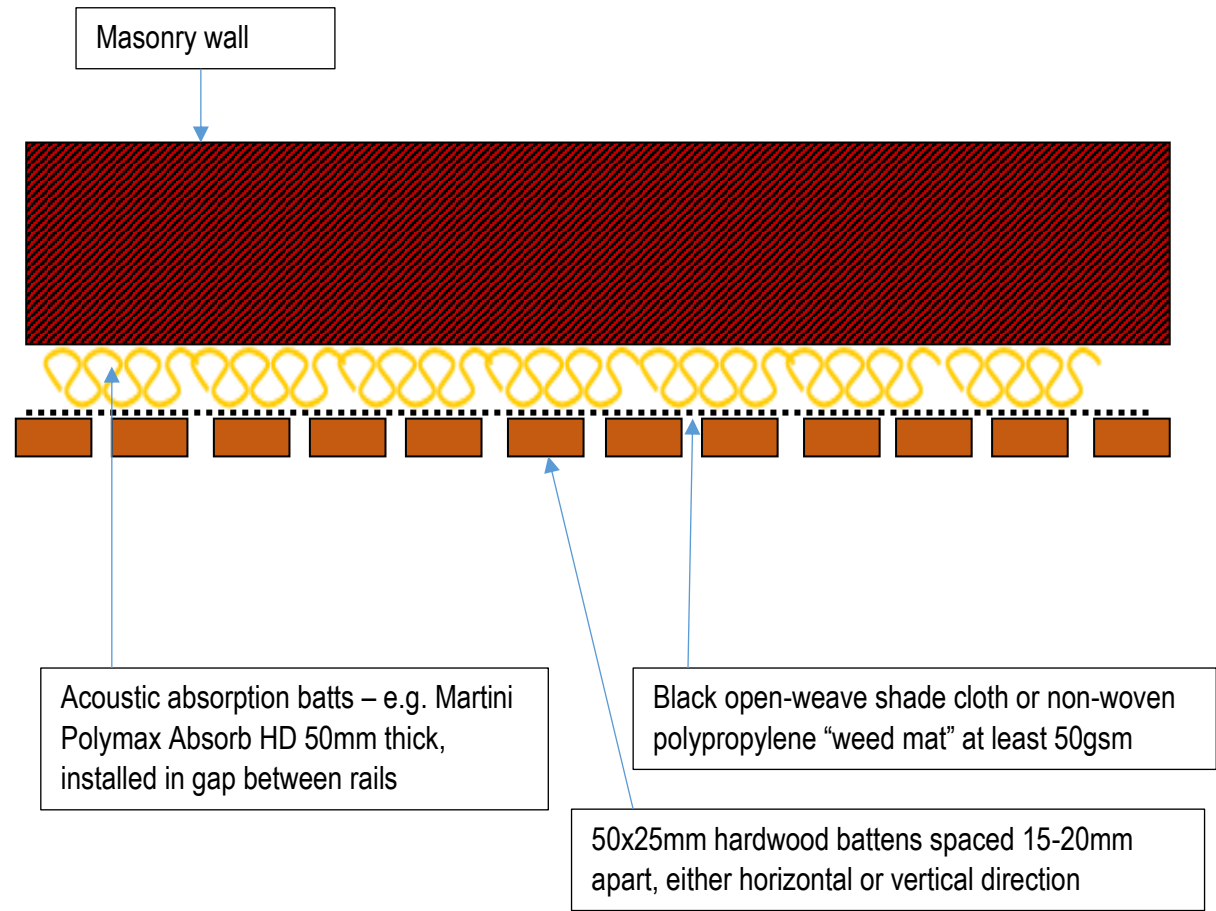
Figure 4-6 Eastern Boundary Noise Wall - Example

Figure 4-7 Detail Sketch of Timber Acoustic Fence with Acoustic Absorption

NB. Not shown;

- Fence is “lapped and capped” construction
- The insulation stops 50mm short of the ground so that insulation batts do not sit in pooled water and can drain at the bottom.

Figure 4-8 Detail Sketch of Façade of Building Facing Outdoor Play Area



4.3 Noise Emission from Indoors to Outdoors

The indoor Playrooms have openable windows and doors and the potential exists for noise emission from these rooms to be radiated to the noise receiver locations shown in Figure 3-1.

The following recommendations are made:

1. Windows on the western façade of Playroom 1 should be fixed 10.38mm laminated glass.
2. Play Rooms should be provided with acoustic absorption finishes to ceilings and walls, as outlined in the next Section of the Report.

With the above measures in place, it is expected that noise emission from children engaged in supervised indoor activities will meet the “background + 5dBA” noise emission goal.

5 INDOOR REVERBERATION CONTROL

In order to control noise levels within the Playrooms, which helps to control noise emission, it is recommended that acoustic absorption materials should be installed in all child care play rooms. The materials used for reverberation control can be one or more of the following:

- Mineral Fibre Ceiling tiles installed in an exposed grid. These tiles must have NRC 0.7 and CAC 40 acoustic properties. In addition, the tiles should be overlaid with 50mm thick 32kg/m³ Polyester insulation batts.
- USG Boral Ensemble Acoustic Perforated Plasterboard overlaid with R2.5 insulation batts.
- Bevelled Edge Melamine Foam Acoustic Tiles, 625x625mm x 50mm thick. These are usually installed by gluing to the underside of a plasterboard ceiling.
- 25mm thick fabric-faced panels such as Autex Quietspace Panels. These are usually installed by gluing to the underside of a plasterboard ceiling or face of walls.
- 24mm thick Autex Cube Panels. These don't require a fabric facing as the product is the same colour all the way through.

The total area of absorption materials in a room should be 125% of the ceiling area. This means that the Playrooms must have acoustic absorption panels installed onto the walls as well as the ceilings.

The wall acoustic absorption in the Playrooms can be in the form of "acoustic pinboard" material, such as:

- 25mm thick Autex Quietspace Workstation panels (NRC 0.85).
Or
- 24mm thick Autex Cube panels (NRC 0.65).

Figure 5-1 Examples of Acoustic Treatment to Classrooms

Play room with high-performance acoustic ceiling tiles



Classroom with 50mm thick bevelled edge Melamine Foam Acoustic Tiles

Figure 5-2 Examples of Acoustic Treatment to Child Care

6 NOISE AND ASSESSMENT OF GENERATED VEHICLE NOISE

6.1 Car Park Noise

Car parking activity has been measured by the Author for a number of projects. In addition, there is a published guideline from Germany, together with an assessment of this guideline in Australian conditions; viz:

- *Parking Area Noise; Recommendations for the Sound Emissions of Parking Areas, Motorcar Centers [sic] and Bus Stations, as well as of Multi-Storey Car Parks and Underground Car Parks*, Bayerisches Landesamt für Umwelt [Bavarian State Office for the Environment], 6th Edition, 2007.
- *Prediction of parking area noise in Australian conditions*, Paper Number 39, Proceedings of ACOUSTICS 2011, Laurence Nicol and Paul Johnson

The noise data in the above guideline is consistent with the Author's noise data and will be used in this assessment.

A single car park activity is 64dBA $L_{Aeq,1-hour}$ Sound Power Level; that is, a single car entering (or leaving) a car space, together with the noise of the car driving along the car park to reach the car parking space, as well as the noise of car doors and car boots opening/closing, car engine starting. This is based on smooth car park surface. If that activity is measured over a 15-minute period then the Sound Power Level is $L_{Aeq,15-minute}$ 70dBA. For the purposes of this calculation, no rough surface correction will be used for the car park. Therefore, the Sound Power Level is $L_{Aeq,15-minute}$ 70dBA per car trip.

Based on the data in the TSA Traffic Consultant's Report – see the next Section – there are 39 peak vehicle trips in the period 7am-9am. This is an average of 4.9 per 15-minute period. It is estimated that the busiest 15-minute period is 150% of the average, or 7.4 parking movements.

The noise receiver locations are:

1. The house to the west, at 38 Rita Street.
2. The houses across the road to the east, at 3 Chalker Street.

The calculated car park noise level to these noise receivers is:

1. 40dBA $L_{Aeq,15-minute}$.
2. 39dBA $L_{Aeq,15-minute}$.

These noise levels comply with the noise goal set of 43dBA for this noise source.

6.2 Road Traffic Noise

The EPA publication *Road Noise Policy* (RNP) supersedes the previous *Environmental Criteria for Road Traffic Noise*. The RNP addresses the issue of traffic noise generated by new land developments and new road developments. This project under consideration has the potential to generate additional traffic numbers compared to the current traffic along Conroy Road and Oatlands Court.

Conroy Road and Oatlands Court are considered local roads.

Figure 6-1 RNP 2011 (Table 3, Section 2.3.1) – traffic noise assessment criteria

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	L _{Aeq} , (15 hour) 55 (external)	L _{Aeq} , (9 hour) 50 (external)
	2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	L _{Aeq} , (15 hour) 60 (external)	L _{Aeq} , (9 hour) 55 (external)
	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments		
Local roads	4. Existing residences affected by noise from new local road corridors	L _{Aeq} , (1 hour) 55 (external)	L _{Aeq} , (1 hour) 50 (external)
	5. Existing residences affected by noise from redevelopment of existing local roads		
	6. Existing residences affected by additional traffic on existing local roads generated by land use developments		

Noise is generated by staff and parent/carer motor vehicles accessing the site on public roads. The traffic consultant's report (reference: 19-037) has reported the following figures for the child-care centre, based on RMS published data:

- 39 peak vehicle trips between 7.00am – 9.00am, (RMS data 0.8 trips/child)
- 15 peak vehicle trips between 2.30pm – 4.00pm, (RMS data 0.3 trips/child)
- 34 peak vehicle trips between 4.00pm – 6.00pm (RMS data 0.7 trips/child).

(Note that a “vehicle trip” refers to one-way travel by a vehicle. Vehicle arriving at a location and then leaving again is two trips. The above values include both ingress and egress movements associated with children being dropped-off or picked-up).

The Traffic Consultant's report states only the traffic generation over the two-hour periods nominated; for example, 7am – 9am. For this acoustic assessment, it is assumed that 60% of this traffic generation occurs in a one-hour period, or 23.4 vehicles. Furthermore, the Traffic Consultant has provisioned flows as follows:

- 60%, traffic along Rita Street to the west.
- 35%, traffic along Rita Street to the east and Chalker Street to the south. For this assessment, this has been further subdivided as 20% Rita Street to the east and 15% Chalker Street.
- 5%, Station Master Avenue (the northern continuation of Chalker Street).

The traffic noise generated at the residential façade along the adjoining local roads has been calculated using CORTN. The road corridors are 20m wide for Rita Street and 18m wide for Chalker Street. Building setbacks are typically around 6m. The calculated value at the residential façade, including façade reflection correction, is:

- 51dBA $L_{Aeq,1-hour}$

This complies with the RNP noise goal for this noise source.

7 MECHANICAL EQUIPMENT

At the current Development Application stage of the development, it is possible to make reasonably accurate assessments about the likely noise emission from mechanical equipment.

It is probable that one or two large outdoor condensers will be installed. The expected Sound Power Level of each of these will be around 75dBA.

The outdoor air-conditioning condensers must be located and/or shielded so as to produce no more than 43dBA at the neighbouring properties.

8 CONCLUSION

This report has provided an assessment of potential acoustic issues for the proposed Child Care Centre at 2-6 Chalker Street, Thirlmere. The following are the conclusions from this investigation:

- Noise emission from the Centre can comply with the noise goals set. The noise goal is “background + 5dBA” for most noise sources and “background + 10dBA” for children playing outdoors, in accordance with various Land and Environment Court decisions.
- Noise emission has been assessed at neighbouring noise receiver heights of 1.5m and 1.7m for outdoor noise receiver locations and façade receiver locations (ie, windows), respectively.
- The potentially most affected neighbour is the back yard of the single-storey residential dwelling at 38 Rita Street, adjoining the outdoor play area.
- It is recommended that the outdoor play areas are fitted with acoustic absorption panels, as described in the text. This is to the underside of awnings and to the facade of the child care centre building and to the façade of the noise barriers.
- It is recommended that the indoor play areas are fitted with acoustic absorption panels, as described in the text.
- The eastern wall to the outdoor play area must be 3.3m solid material with no gaps. The height is with respect to the ground RL of the neighbouring dwelling. To reduce the visual impact, the top 1.5m may be transparent.
- Similarly, the southern noise barrier to the outdoor play area should be 3.5m tall.
- The street front boundary fence of the outdoor play area should be at least a 1.5m tall solid acoustic barrier.
- Noise barriers can consist of transparent, translucent or opaque materials at least 10kg/m².

Provided the acoustic measures contained in this Report are correctly implemented, the Centre can operate without causing a noise nuisance to neighbours and with acceptable levels of acoustic amenity for the staff and children using the Centre. Noise arising from within the development will not result in ‘offensive noise’ at any adjoining premises.

9 APPENDIX A – GLOSSARY OF TERMS

Most locations where ambient noise is studied are affected by environmental noise which varies continuously, largely as a result of variations in road traffic. To describe the overall noise environment, a number of noise descriptors are used. These involve sampling the varying sound level for a defined time period (e.g. 15 minutes, or for the 9-hours from 10pm to 7am). Statistical and other analysis of the varying sound level are carried out. These descriptors are described below.

Maximum Noise Level (L_{Amax})	The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.
L_{A1}	The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.
L_{A10}	The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} has in the past been used as a descriptor for environmental noise and road traffic noise.
L_{Aeq}	The equivalent continuous sound level (L_{Aeq}) 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. (In simple terms it is the average sound level). This descriptor is usually used to measure environmental noise and road traffic noise.
L_{A50}	The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.
L_{A90}	The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} 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 (day, evening and night) for each day. It is determined by calculating the lowest 10 th percentile background level ($L_{A90,15-minute}$) for each assessment period on each day. There are therefore three ABL values for each day of the noise monitoring (one for Daytime, one for Evening and one for Night-time).
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period, day, evening and night.
SEL	Single Event noise Level. This is a shorthand means to describe the acoustic energy of a noise event. Technically it is the same acoustic energy compressed to fit into 1 second; i.e. $L_{Aeq} + 10 \times \text{Log}(\text{duration in seconds of the noise event})$.

10 APPENDIX B – LOGGER GRAPHS

10.1 Noise Logger

See the photographs below and Figure 1-1 for the noise logger location.

Figure 10-1 Noise logger at the site western boundary

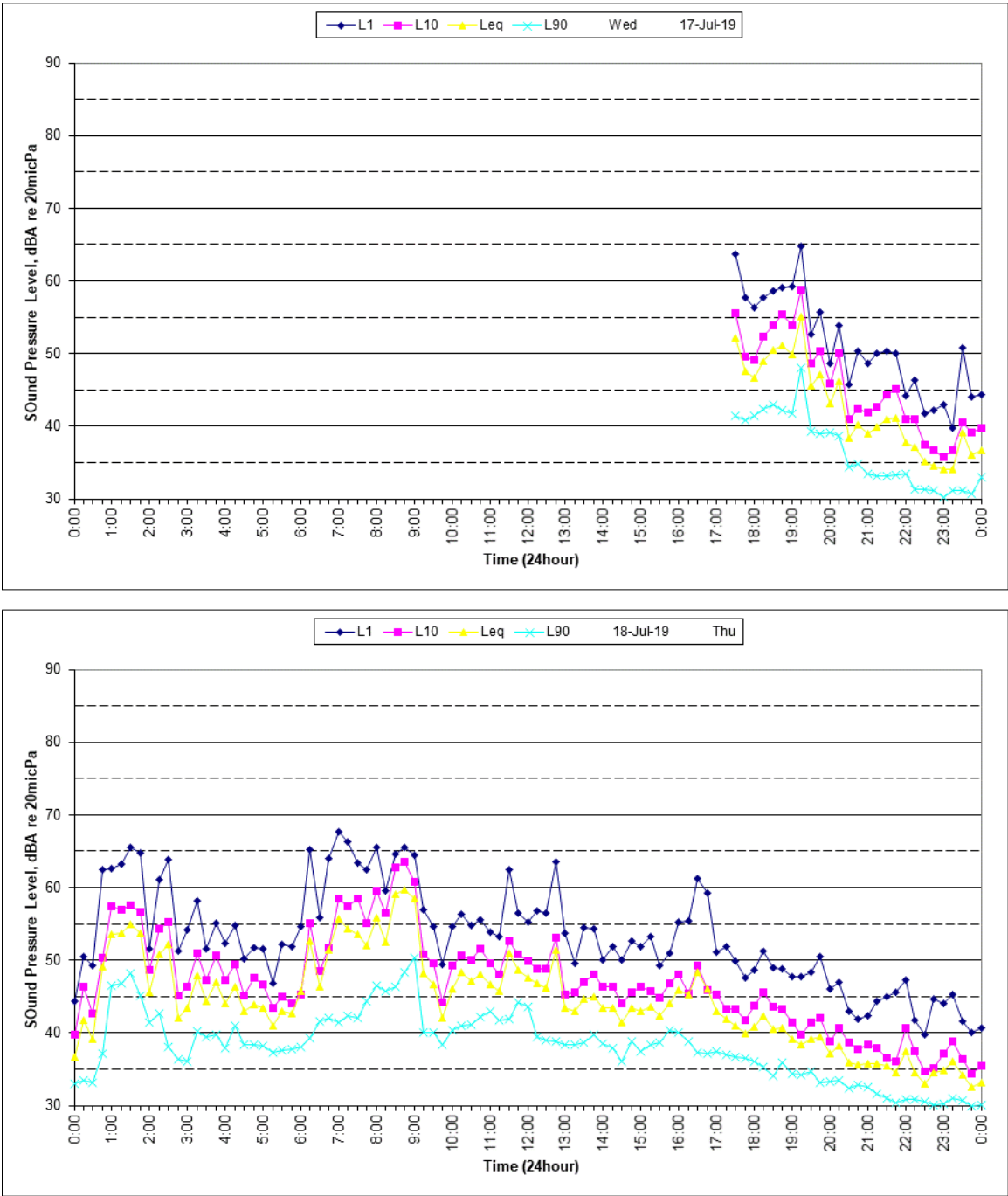


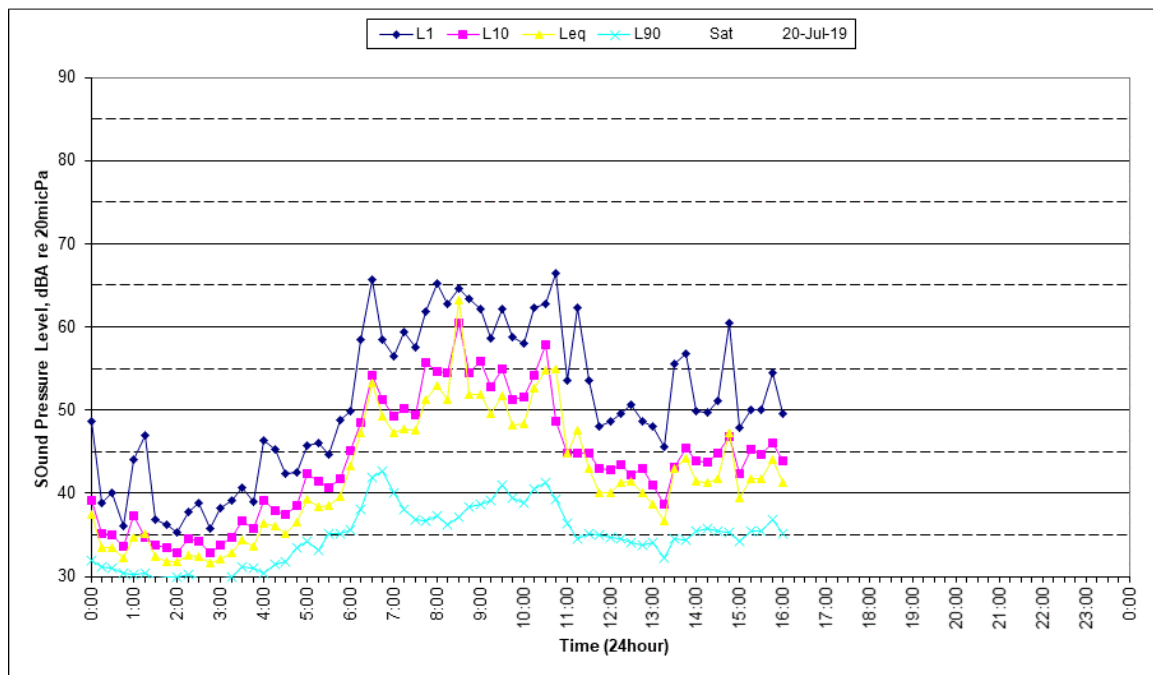
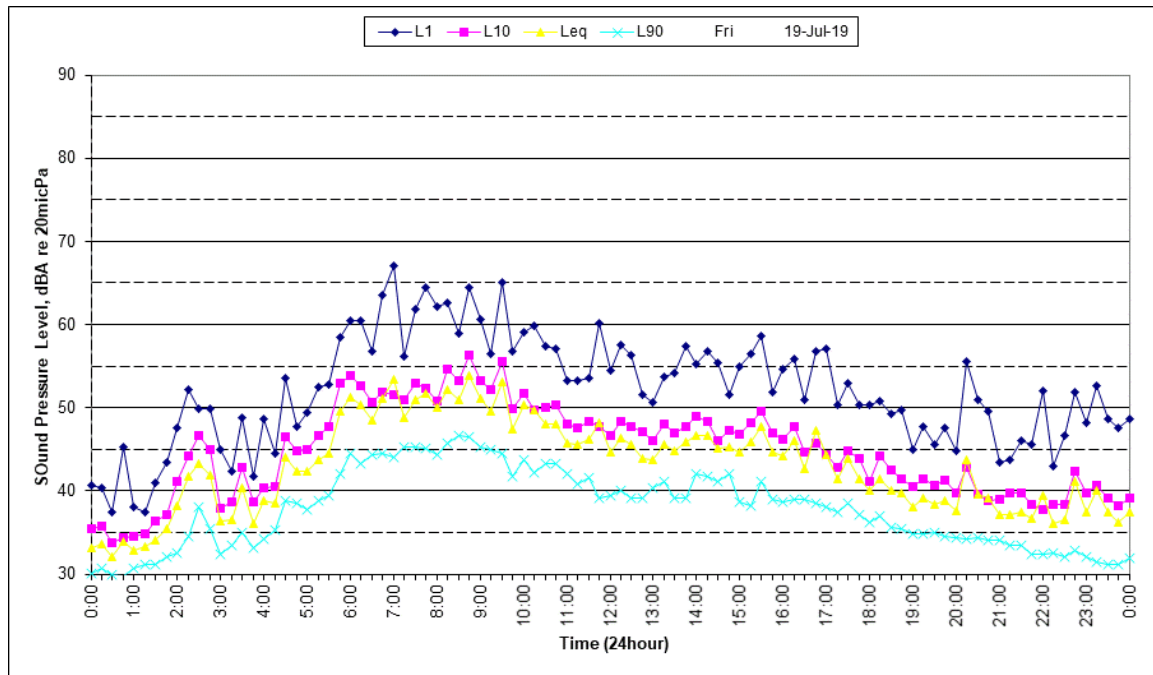
A Svan 957 Sound and Vibration Analyser was used for this project. This is a Type 1 instrument suitable for environmental noise logging purposes. The sound level analysis settings were A-weighted, fast response and 15 minute sampling periods. This equipment continuously monitors noise levels and stores statistical noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines LA1, LA10, LA90 and LAeq levels of the ambient noise. LA1, LA10 and LA90 are the levels exceeded for 1%, 10% and 90% of the sample time, respectively. The LA1 is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle or aircraft. The LA90 level is normally taken as the background noise level during the relevant period. LAeq is the energy-average sound level during the measurement; in simple terms it can be thought of as the average sound level.

The graphical results of the noise logging are shown on the following pages.

10.2 Noise Logger Graphs





11 APPENDIX C – LAND AND ENVIRONMENT COURT REFERENCES

This Appendix outlines some references, including Land and Environment Court cases using “background + 10dBA” for child care centres with defined play times. In addition, the Association of Australian Acoustical Consultants (AAAC) has published a document entitled *Technical Guideline Child Care Centre Noise Assessment*. This is available on the Association’s website www.aaac.org.au. The Guideline includes the following:

Residential Receptors – Outdoor Play Area

As the duration of time that children are allowed to play outside is reduced, the overall noise impact reduces. Therefore, it is reasonable to allow a higher level of noise impact for a shorter duration. AAAC members regard that a total time limit of 2 hours outdoor play per day (eg 1 hour in the morning and 1 hour in the afternoon) should allow an additional 5 dB noise impact.

- Up to 2 hours (total) per day – The Leq,15 min noise level emitted from the outdoor play area shall not exceed the background noise level by more than 10 dB at the assessment location.
- More than 2 hours per day – The Leq,15 min noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.

A few relevant NSWLEC cases are listed below.

- The Land and Environment Court in *Huntington & MacGillivray v Strathfield Municipal Council* [2005] NSWLEC 391, an appeal in relation to a development application for a childcare centre for 76 children, at par 22, determined:

“There are no noise controls in terms of the council’s policies, and I agree with Mr Cooper [acoustic consultant]. In his experience he considers that background plus ten is appropriate for a childcare centre rather than background plus five, which is the normal requirement for industrial commercial noise.”

- This position was also previously supported in *Mesabo Pty Limited v Mosman Municipal Council* [2004] NSWLEC 492:

At par 31, “It was agreed that an appropriate noise criterion for the protection of residential amenity is background noise level + 10dBA at residential receivers.” In this case it was noted that a background +10dB noise level was satisfactory for a centre where the play area was in use no more than 4.5hours per day, five days per week.

- Woollahra Municipal Council Development Control Committee Minutes, “Development Application Assessment Report”, dated 22 May 2006, for a proposed Child Care Centre DA 710/2005/1 at 5 Billong Avenue, Vacluse, concluded:

"In summary, the offensive and intrusive nature of noise is created by not only the sound pressure levels at the receiver but by the tone, cyclic nature, time of day and the duration of the sound, or simply the character as put by the second WM [Acoustic Consultant] report. The submission by WM that Council should, in this particular circumstance, adopt an intrusive noise criterion of $L_{Aeq,15min} \leq RBL + 10dBA$ is supported subject to conditions which limit the hours of external play by children."

- Ku-ring-gai Council v Nicholls Pty Ltd, February 2001. The NSW Land and Environment Court accepted "background + 10dBA" as the criterion in relation to the case of extending the play area of a primary school, where there were clearly defined play times.
- Balmain Care for Kids Pty Ltd v Leichhardt Municipal Council [2009] NSWLEC 1146

The Court accepted "background + 10dBA" for noise emission from the long day care centre for defined hours of free play (2 hours).

- Meriden School v Pedavoli [2009] NSWLEC 183

The Court accepted "background + 10dBA" for noise emission from the school.

- Dounis v Kogarah Municipal Council [2006] NSWLEC 50

The Court accepted "background + 10dBA" for noise emission from the proposed child care centre but refused the application on the grounds that the require noise barrier height to protect habitable rooms on the first floor of overlooking residential dwellings was not complementary with a residential area.

Therefore, there are established precedents that set allowable noise levels at "background + 10dBA" for childcare centres, sometimes with defined play times and some not. Most child care centres have defined play times in order to limit children's exposure to sunlight during the hottest parts of the day. Given the limitation that typically only half the children play outside at a time, it is considered that a "background + 10dBA" noise criterion is reasonable and appropriate.