364 – 374 Canterbury Road
Canterbury

Childcare Centre
Noise Impact Assessment

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Document Control

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1 Introduction

Pulse White Noise Acoustics has been engaged to undertake the Noise Impact Assessment of the operational childcare centre located on the ground floor of the 364-372 Canterbury Road, Canterbury building.

The location of the building includes the following:

1. The operational childcare centre located on the ground floor of the building including an open play area.
2. Existing residential dwellings on the levels above, including the five-story building above.

This assessment includes the acoustic investigation into the potential for noise impacts from the operation of the childcare centre on the surrounding receivers including the residential dwellings located on the levels above and overlooking the childcare centre. A cross section of the site is included in the figure below.

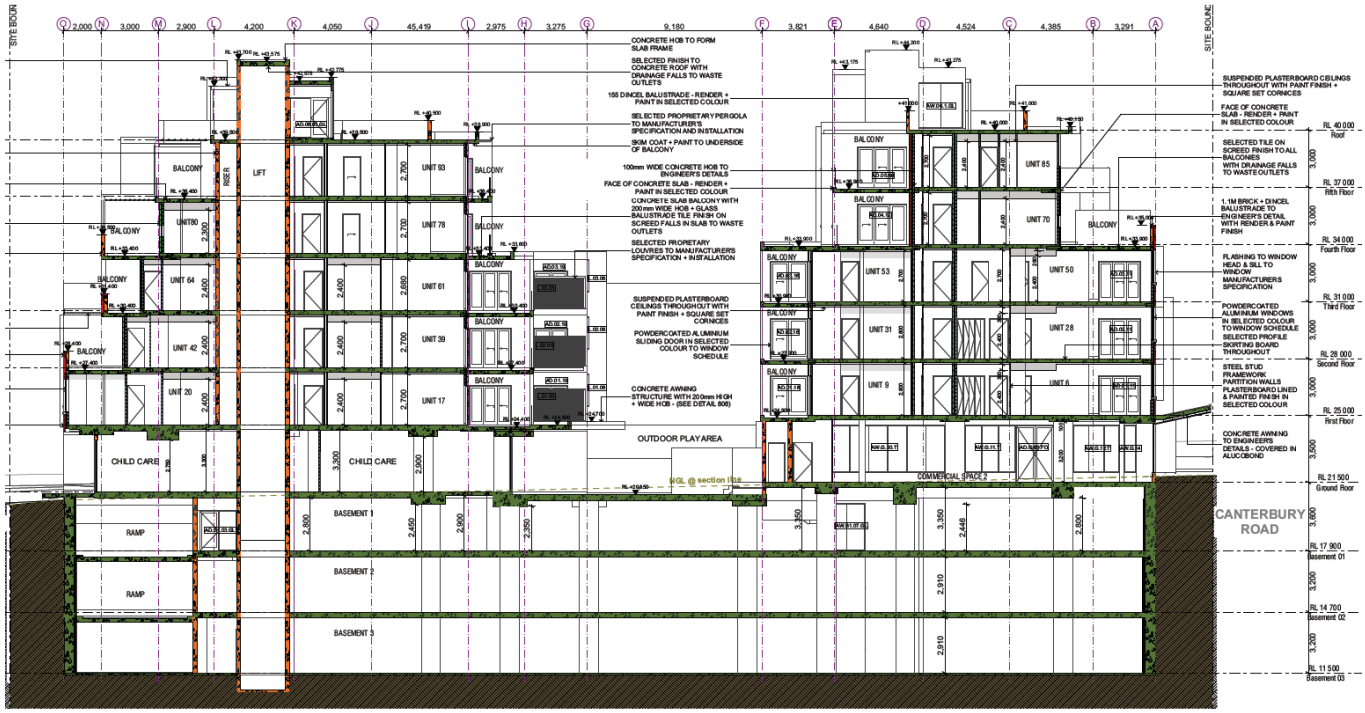


Figure 1 – Proposed Childcare Centre location

1.1 Development Description

The development is located at 364-374 Canterbury Road, Canterbury. The surrounding receivers to the site include the existing residential receivers located on within the building and located on the levels above.

The site location is detailed in Figure 1 below.

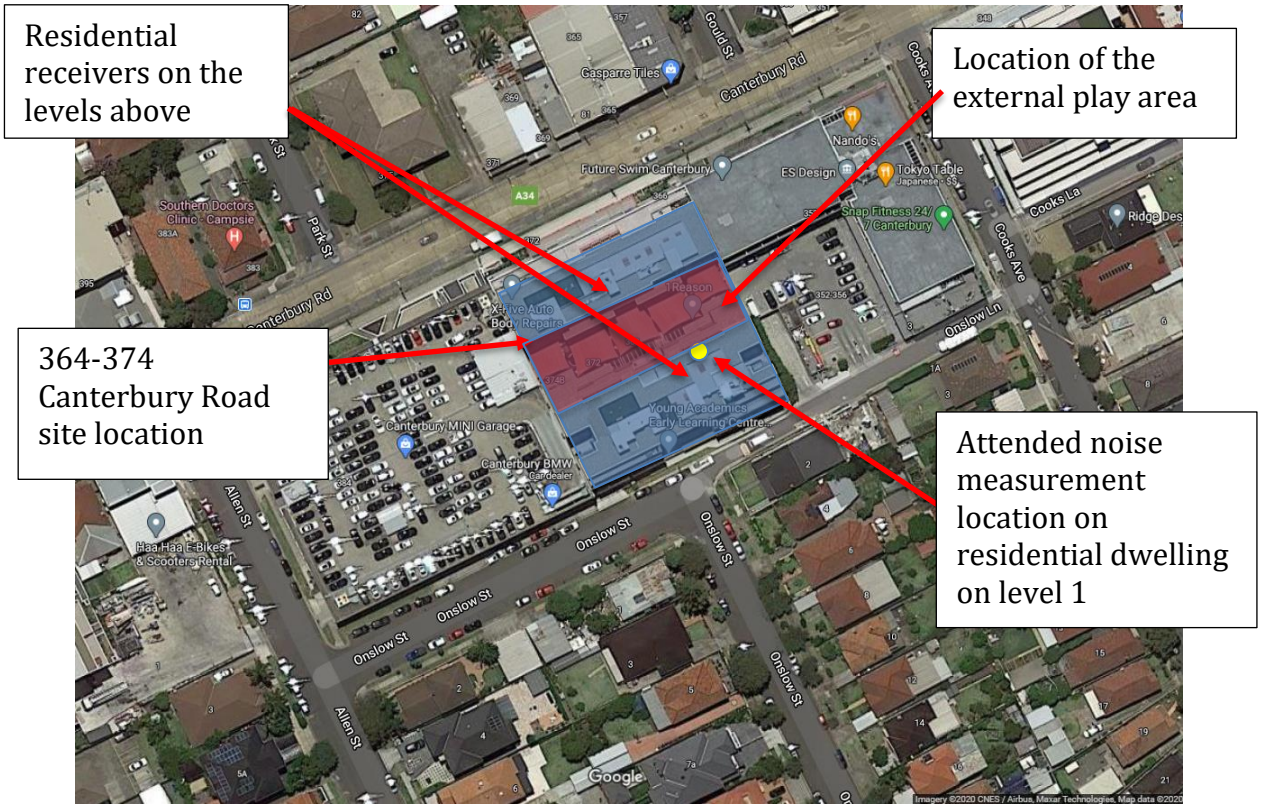


Figure 2 – 364-374 Canterbury Road, Canterbury site location

2 Existing Acoustic Environment

The childcare is located within the existing building located at 364-374 Canterbury Road, Canterbury. The childcare centre is located within the existing building which includes screening from the surrounding roadways. The site is located within an area which includes residential and commercial properties with transportation noise which is classified as a Suburban area. The exiting noise levels at the site are predominantly as a result from the following:

1. Existing noise levels from surrounding roadways including Canterbury Road, which is screed from the internal courtyard by the existing building on the site.
2. Other environmental noise levels within the vicinity of the site including the neighbouring car parking areas.

2.1 Background Noise Survey

As part of this assessment a background noise survey has been conducted at the site. The survey included an attended background noise level which included the following:

1. Noise level undertaken on the balcony of a dwelling looking into the internal area of the building as detailed in figure 2 above.
2. The measurement location was selected as it included the greatest barrier from the surrounding roadways and will result in the lower background noise level experienced by the residential dwellings within the building.
3. It is noted that higher background noise levels may \be present on the balconies of units on levels above level 1.
4. An attended background noise level was undertaken as this was conducted during a period when the external area of the childcare centre was not being used by children. During the attended background noise level measurement there were no children using the external play area. Noise logging would not be beneficial for the recording of background noise levels as the logging would include noise levels generated from the children at play and result in an elevated representative background noise level.
5. The survey included attended noise level measurements at the site, during periods when there were no children using the external play area on the 28th October, 2020 during a typical day time period.
6. Background noise levels were undertaken using a ARL EL-215 type noise meter with serial number 396932 and calibration with calibration number C19465.
7. The noise measurement position was selected such that it was 1.5m above the balcony in a free field location and façade corrects were not required to be applied.
8. The attended noise measurement location was selected to obtain suitable noise levels for the assessment of background noise levels ($L_{90\,(t)}$) as well as the existing ambient noise levels ($Leq_{(t)}$). The results of the acoustic survey is detailed in the table below.

Table 1 – Results of the Attended Noise Survey at the Site

Measurement Location	Time of Measurement	Recoded Ambient Noise level $L_{eq\ (15min)}$ dB(A)	Background Noise Level $L_{A90,\ 15min}$ dB(A)	Comments
Balcony of Level 1 dwelling overlooking the internal area	During typical daytime environmental noise levels	57	46	Noise level at the site dominated by surrounding environmental noise from roadways and neighboring land uses

3 External Noise Emission Assessment

This section of the report details the relevant noise level criteria for noise emissions generated on the site once completed.

Relevant authorities which detail noise level emissions include the following:

1. Offensive noise is defined by the Protection of the Environment Operations Act, 1997.
2. AAAC *Child Care Centre Acoustic Assessment* 2013 – Noise from the use of the childcare centre.

3.1 Offensive Noise

Offensive noise is defined by the Protection of the Environment Operations Act, 1997 and means;

> *Noise*
> *(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances;*
> > *(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
> > *(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is inside the premises from which it is emitted, or*
> > *(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.*

3.2 AAAC *Guideline for Child Care Acoustic Assessment*

The AAAC *Guideline for Child Care Centre Acoustic Assessment Version 3* includes recommendations for the assessment of noise levels from the use of play areas impacting on neighbouring residential receivers. The AAAC includes the following:

> **Background Greater Than 40 dB(A)** – The contributed $L_{eq,15min}$ 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 $L_{eq,15\ minute}$ 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 $L_{eq,15\ minute}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.

As the childcare centre proposes to use external areas of the centre for more than 4 hours per day the suitable noise level emission criteria is background noise + 5 dB(A). The relevant noise level criteria for the use of the childcare centre is detailed in the table below.

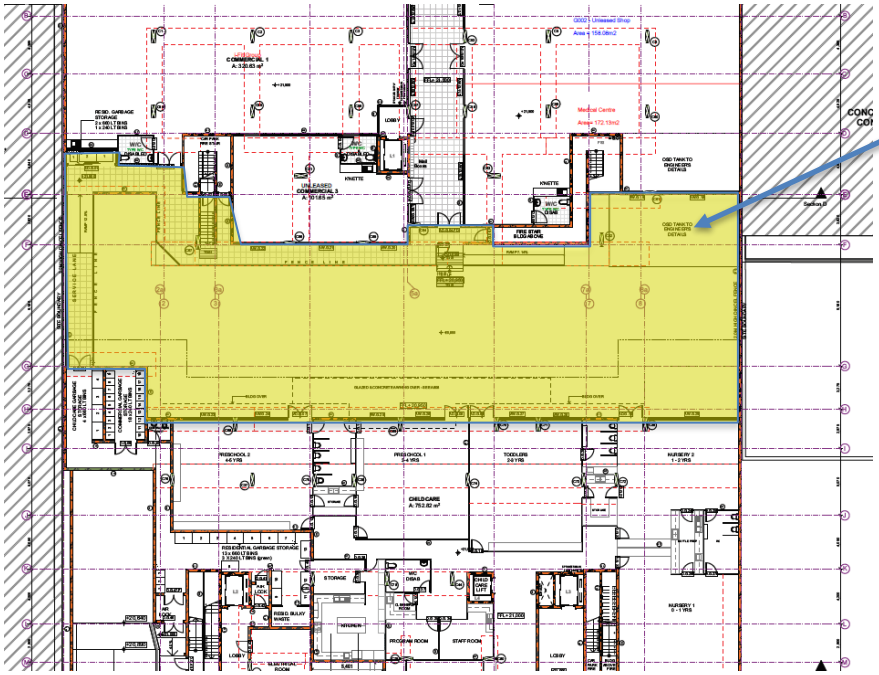
Table 2 – Noise Emission Criteria for Activity Noise on the site

Location	Time of Day	Measured $L_{A90,\ 15\ min}$ (dBA)	AAAC Criteria for Childcare Noise $L_{Aeq,\ 15\ min}$ (dBA)
Residential Receivers	Day – less than 4 hours of use	46	**56**
	Day – More than 4 hours of use	46	**51**

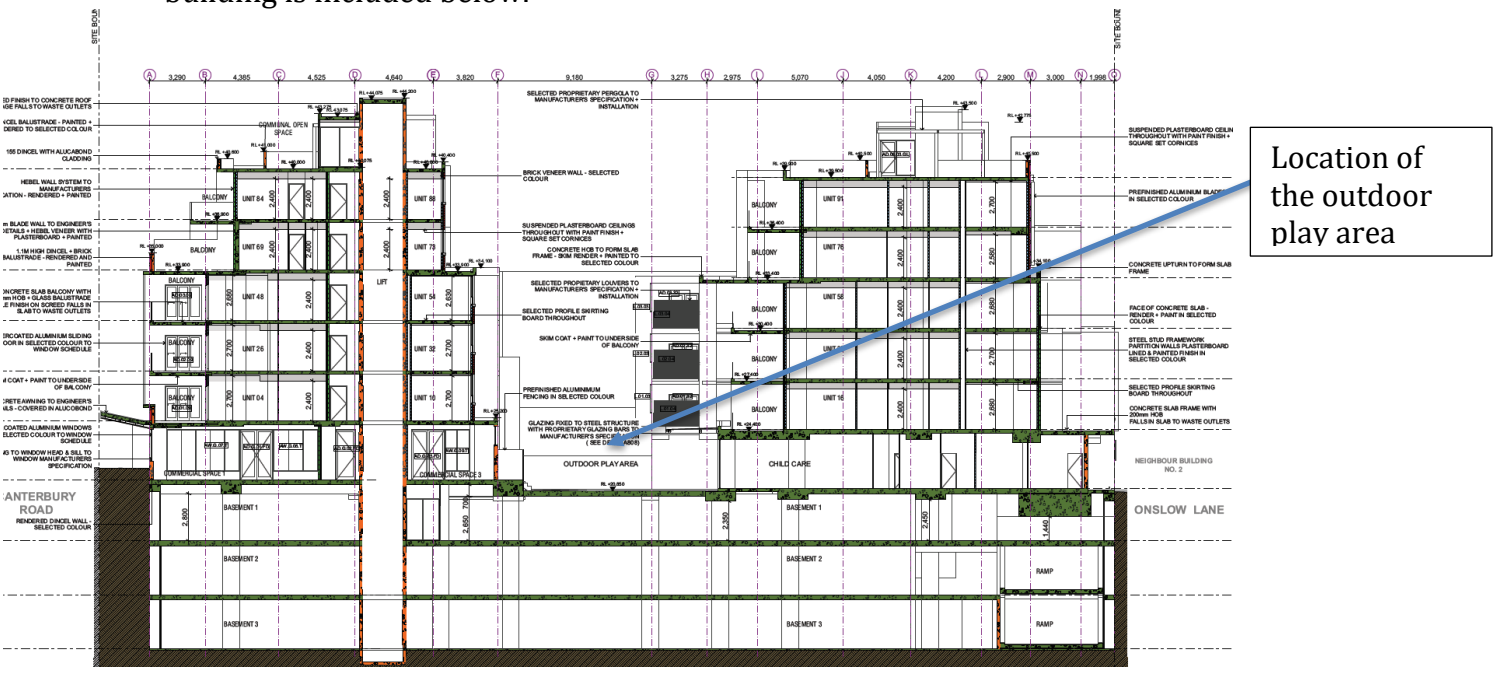
3.3 Childcare Centre - Activity Noise Assessment

This section of the report details the assessment of activity noise levels generated from the childcare centre including the use of the external area for play.

The childcare centre is to be located on ground level of the building, as detailed in the figure below.



The childcare centre in located on the ground floor of the existing building which includes residential dwelling son the levels above. A section of the existing building is included below.



This section of the report details the activity noise assessment which has been undertaken for the proposed childcare centre. The assessment has been undertaken based on the following:

1. The centre is operational to maximum capacity including up to 56 children using the external area at any one time.
2. The use of the external area is being use at maximum capacity.
3. All recommended acoustic treatments and controls detailed in this report are included in the construction and operation of the site.
4. Noise level generated are based on the source noise levels of the AAAC for external play areas. Details of the source noise levels used in this assessment are detailed in the following table.

Table 3 – Activity Source Noise Levels

Location	Play Type	Age Group	Source Noise Level
External Play Areas	Active Play[1] For groups of 10 children	0-2	78 dB(A) Sound Power Level
		2-3	85 dB(A) Sound Power Level
		3-6	87 dB(A) Sound Power Level
	Passive Play[2] For groups of 10 children	0-2	77 dB(A) Sound Power Level
		2-3	83 dB(A) Sound Power Level
		3-6	84 dB(A) Sound Power Level

Notes: 1 – Active play include areas where children can actively play and generate noise levels such as running, playing with movable items (scooters and the like). Active play noise levels are based on the medium noise level presented in the AAAC guideline.

2 – Passive play includes areas where play will include less active play such as a sand pit, use of tables and the like where play includes activities do not include moving around and hence a lower noise level results. Passive play noise levels are based on the lower range detailed within the AAAC guideline.

The AAAC *Guideline for Child Care Centre Acoustic Assessment Version 3* includes the effective sound power levels of children which have been used in this report (as detailed above), including the following:

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 ($L_{Aeq,\ 15min}$) 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 1metre is suggested as the source heights.

3.3.1 Activity Noise Emission Assessment

This section of the report details the assessment of resulting noise level emissions from the external area of the childcare centre at the affected surrounding receivers including those located on the levels above within the same building.

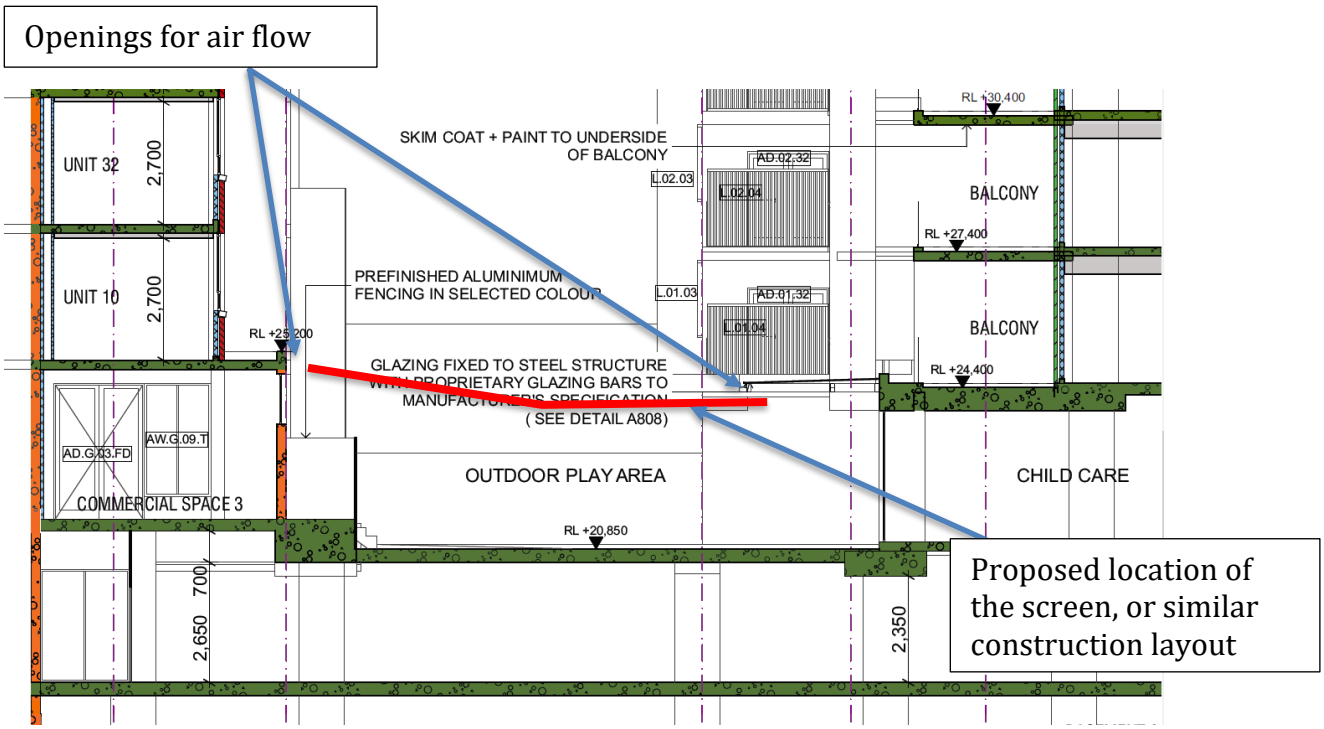
3.3.2 Recommended Acoustic Treatments and Controls

This section of the report details the required acoustic treatments and controls required for the proposed childcare centre to ensure noise emissions comply with the noise level criteria detailed in this report at the neighbouring property boundaries.

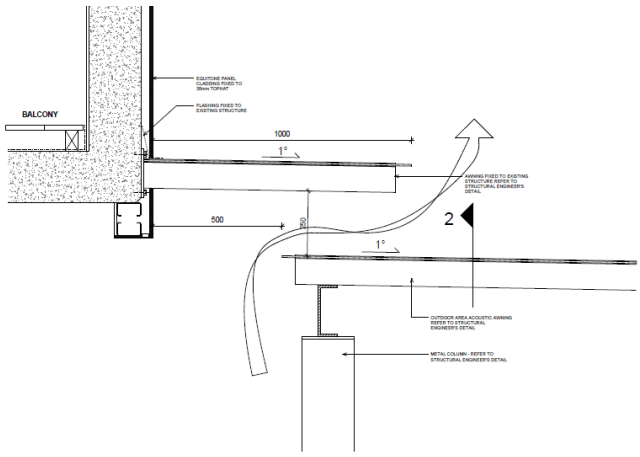
The required acoustic treatments and controls include the following:

1. Install a solid acoustic screen above the outdoor play area including a construction from solid material including one of the following types;
    a. 6.38mm laminated glass.
    b. 9mm FC sheet.
    c. 10mm Perspex
    d. Colour bond metal roof
    e. Similar solid material.

2. The construction is to cover the outdoor play area including all areas where play can occur. The proposed location of the screening is detailed in the figure below.



3. The proposed screening should include aeras to be extended under the existing awnings such that air flow can occur. A possible detail is indicated below.



4. The ends of the play area to the east and west can remain open.

5. An acoustically absorptive material is to be installed to the underside of the proposed screening above the external play area (spry on or fixed) to the area of absorption treatment to no less than 30% of the ceiling area. The material is to include a minimum acoustic performance of NRC no less than 0.60.

6. All external play areas are to include supervision when used by children by a childcare operator.

7. No outdoor play to occur on the site after 7pm.

3.4 Noise Modelling

As part of this assessment noise modelling of the proposed external area and proposed treatments has been undertaken. The acoustic modelling included the use of a Soundplan noise modelling including the details included in the Section above.

Operational noise impacts from the use of the external play area includes predicted noise levels using the ISO 9613 algorithm within the Soundplan noise modelling software. The Soundplan package was specifically used, as the 3D computational model of the site and surrounding area allows for building heights, reflections, source locations and multiple receiver locations to be specifically modelled. In addition buildings and noise sources, the Soundplan model also considers absorption and receiver characteristics where relevant. The noise model enables the operational noise impacts of the external childcare play area to be calculated at the nearest receivers.

The modelling has been undertaken to include the following:

1. Modelling has included use of the external areas with the maximum number of children at play. Including 2 classes at play with one class of 2 to 3 year old's and 1 class of 3 to 5 year old's.
2. All children can use all area of the out door play area.
3. Noise levels have been based on all children in active play.
4. The resulting environmental noise level emissions have been calculated to the first floor unit located above the external play area. These locations represent the potentially worst case locations, compliance at these locations represent compliance at the locations on the levels above with a greater distance separation from the children on the ground floor play area.
5. Receiver locations include a passion at 1.5m above the balconies at a location of 500mm from the edge of the balustrade.

The results of the of the Soundplan modelling are included in Appendix B, and summarised in the table below.

The results below include the modelled results for the level 1 balconies based on the recommended treatments being installed to the childcare centre. The receiver locations which are assessed are detailed in the figure below.

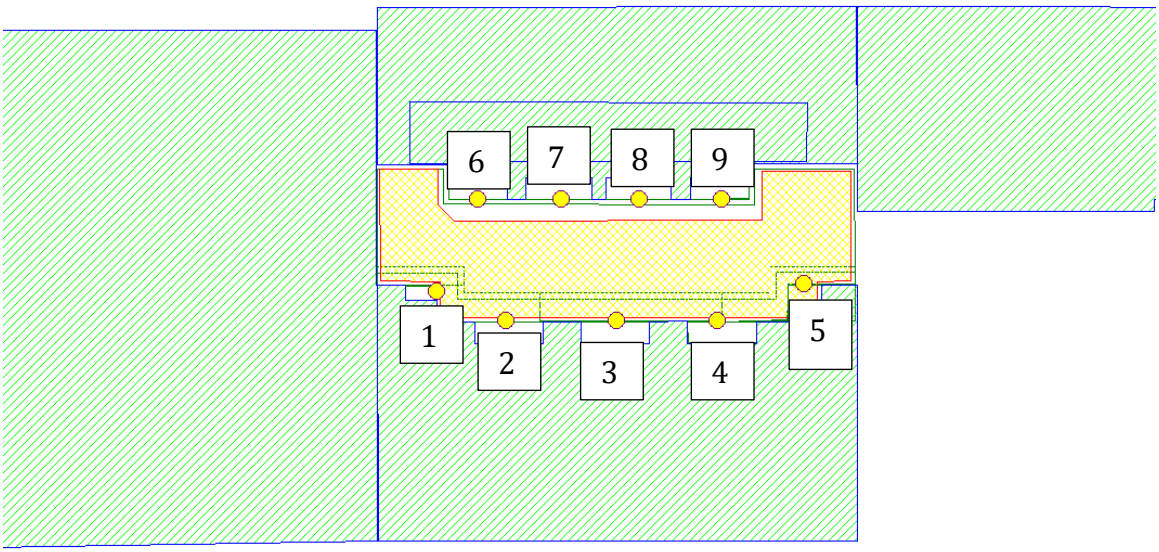


Table 4 – Summary of Noise Modelling

Receiver Location	Time of Day	Calculated External Noise level	AAAC Criteria for Childcare Noise $L_{Aeq,\ 15\ min}$ (dBA)	Comments
1	Day – with maximum number of children using external play area	50	51 – for more than 4 hours of use a day	Resulting noise levels at the balconies of all balconies on level 1 above the external play area will be acoustically acceptable based on the proposed treatments in this report
2		47		
3		46		
4		51		
5		48		
6		51		
7		50		
8		50		
9		51		

Based on the results of this assessment, including the Soundplan noise modelling the noise emissions from the ground floor external play area of the childcare centre will comply with the relevant noise emissions criteria providing the recommended acoustic treatments in this report are included to the existing area.

4 Conclusion

This report details the Noise Impact Assessment of the childcare centre located at 364-374 Canterbury Road, Canterbury.

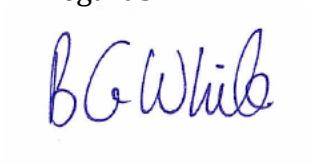
This report has included an assessment of exiting environmental noise including road traffic noise and train noise well as vibration impacts from train pass byes on the railway line to the west of the site.

External noise emissions from the site have been assessed and detailed in accordance with the NSW Environmental Protection Authorities Noise Policy for Industry (previously the Industrial Noise Policy) and the AAAC for noise emission from the childcare centre. The future design and treatment of the building has been assessed and recommendations included in this report to mitigate noise resulting from the use of the childcare centre such that compliance with the relevant noise emission criteria can be achieved.

An assessment of the proposed childcare centre has been conducted and the recommended acoustic mitigations to ensure noise emissions comply with the recommendations of the AAAC at all surrounding receivers is presented in this report.

For any additional information please do not hesitate to contact the person below.

Regards



Ben White
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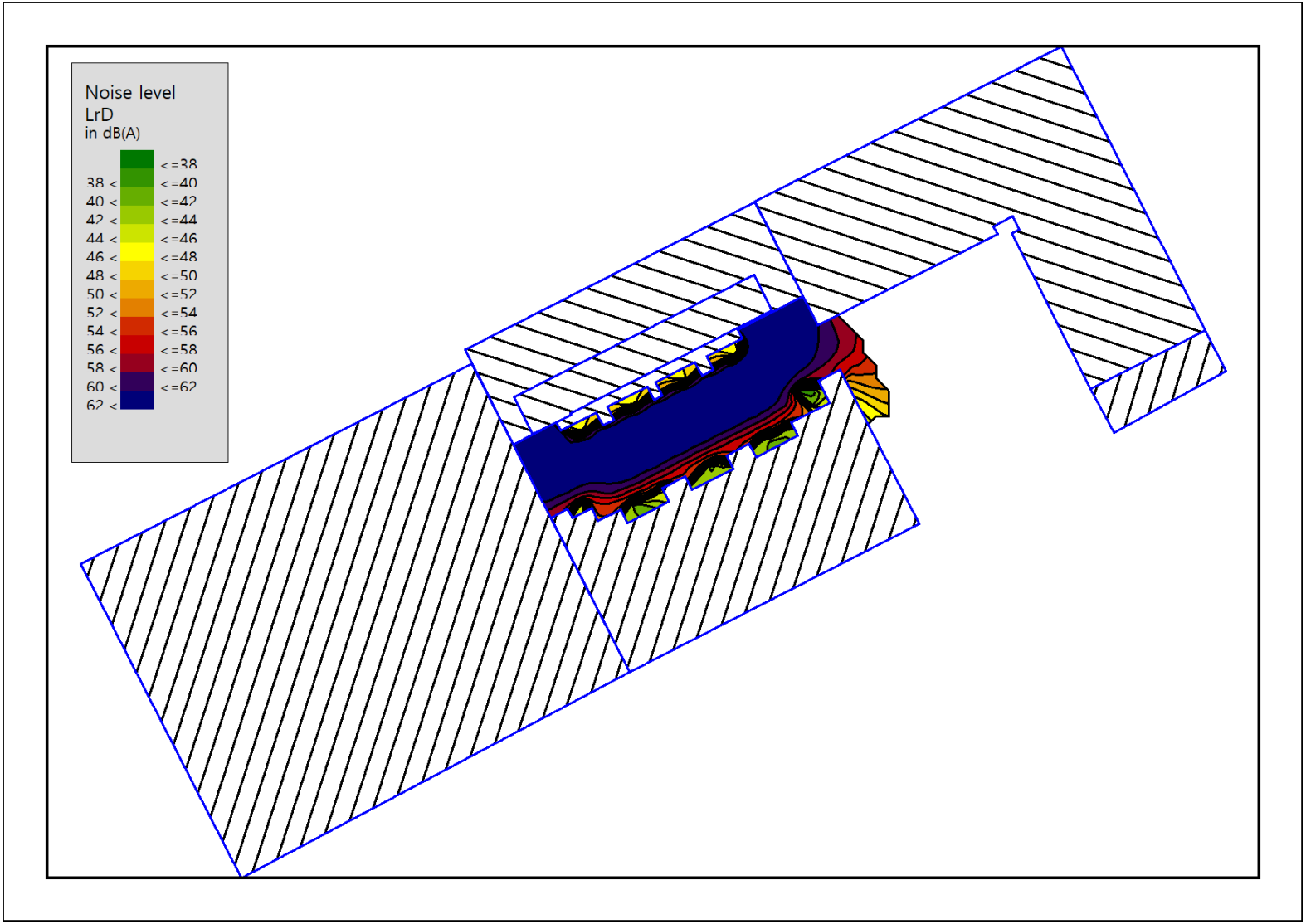
5 Appendix A – Glossary of Terms

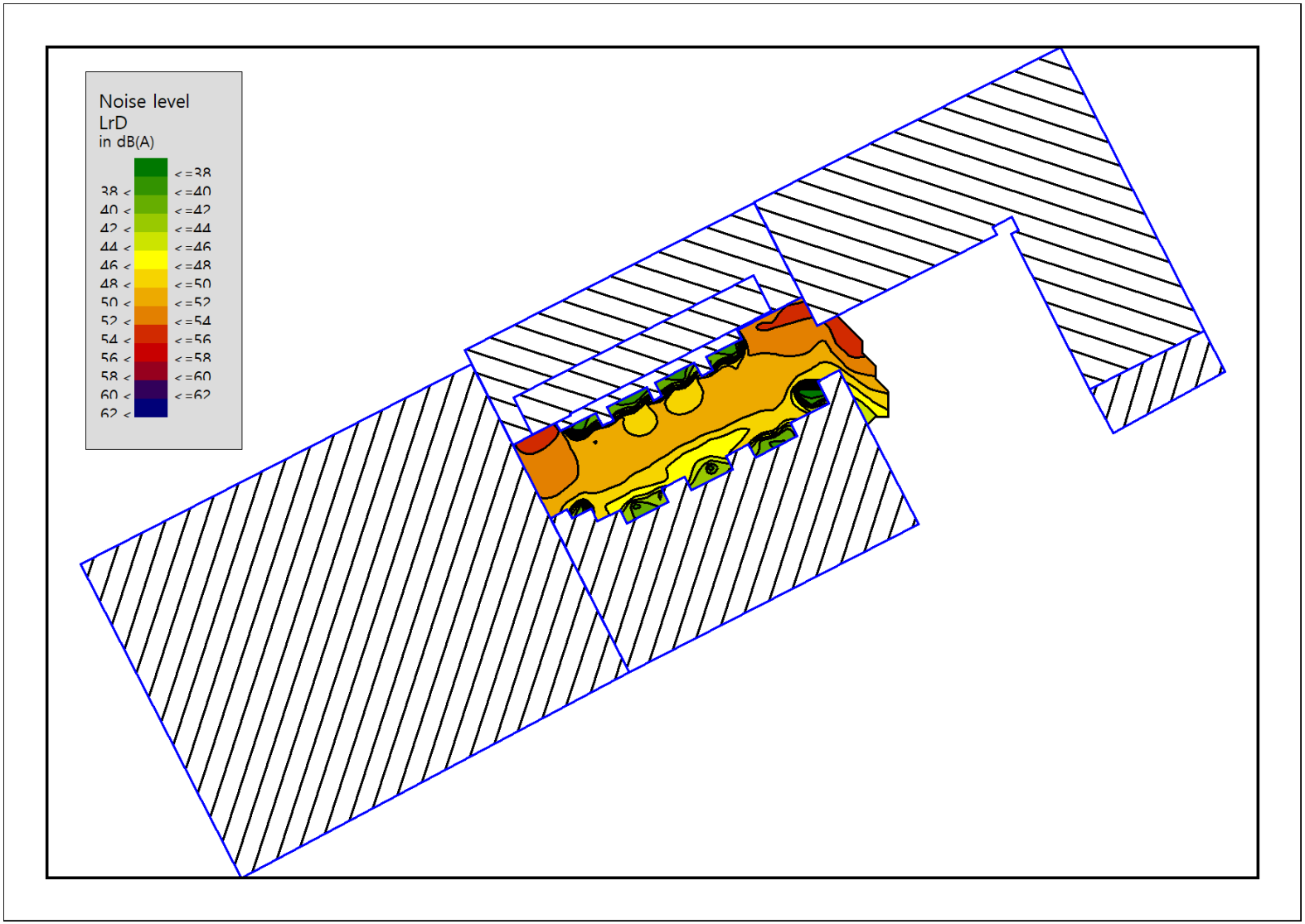
Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dB(A)	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Background Sound Low	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the L_{A90} value
Ctr	A frequency adaptation term applied in accordance with the procedures described in ISO 717.
dB (A)	'A' Weighted overall sound pressure level

Noise Reduction	The difference in sound pressure level between any two areas. The term “noise reduction” does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply
NR Noise Rating	Single number evaluation of the background noise level. The NR level is normally around 5 to 6 dB below the “A” weighted noise level. The NR curve describes a spectrum of noise levels and is categorised by the level at 1000 Hz ie the NR 50 curve has a value of 50 dB at 1000 Hz. The NR rating is a tangential system where a noise spectrum is classified by the NR curve that just encompasses the entire noise spectrum consideration.
R_w	Weighted Sound Reduction Index - Laboratory test measurement procedure that provides a single number indication of the acoustic performance of a partition or single element. Calculation procedures for Rw are defined in ISO 140-2:1991 “Measurement of Sound Insulation in Buildings and of Building Elements Part 2: Determination, verification and application of precision data”.
R'_w	Field obtained Weighted Sound Reduction Index - this figure is generally up to 3-5 lower than the laboratory test determined level data due to flanked sound transmission and imperfect site construction.
Sound Isolation	A reference to the degree of acoustical separation between any two areas. Sound isolation may refer to sound transmission loss of a partition or to noise reduction from any unwanted noise source. The term “sound isolation” does not specify any grade or performance quality and requires the units to be specified for any contractual condition
Sound Pressure Level, L_P dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, L_W dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt
Speech Privacy	A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible.
Transmission Loss	Equivalent to Sound Transmission Loss and to Sound Reduction Index in terminology used in countries other than Australia. A formal test rating of sound transmission properties of any construction, by usually a wall, floor, roof etc. The transmission loss of all materials varies with frequency and may be determined by either laboratory or field tests. Australian Standards apply to test methods for both situations.

6 Appendix B – Noise Model Results



Model of Level 1 with no treatments installed



Level 1 model with the proposed treatment are installed