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The Paddock Commercial Development – Acoustic Report

Acoustic Report for Development Application
Rev. C [issue]

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Hewshott International | Acoustics 16 Century Court 100 Hay Street Subiaco Western Australia 6008
PO Box 1188 Kalamunda Western Australia 6926
t: +61 8 6230 2780 e: info@hewshott.com w: www.hewshott.com

green building council australia
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1. Executive Summary

Hewshott International has been engaged by Urbanista Town Planning on behalf of Little Tree Holding Pty Ltd to undertake the acoustic consultancy services for Development Application for the proposed commercial development at 448 Nicholson Road, Forrestdale.

This desktop review has identified key aspects of the acoustic design of the development.

The key aspects are:

- Environmental noise emission from the development
- Internal indoor ambient noise levels
- Reverberation time (speech intelligibility)
- Walls, floors, ceilings and services separation
- Mechanical services noise and vibration
- Amplified music noise.

To ensure that the final design of the building achieves the recommended acoustic design criteria, we recommend that a further acoustic assessment is undertaken at subsequent phases of the project (e.g. detailed design).

2. Design and Test Standards

Australian Standards (AS) are now equivalent of International Standards (ISO), although some additional Australian Standards are referenced in this briefing document which have not yet been introduced into an ISO version. Note that British and European Standards are now being merged with ISO Standards.

2.1. Noise

2.1.1 *Internal Noise*

- AS 2021-2015, "Acoustics - Aircraft Noise Intrusion-Building Siting and Construction".
- AS 2107-2016, "Acoustics - Recommended design sound levels and reverberation times for building interiors".

2.1.2 *External Noise Emission*

- AS 1055-1997 "Acoustics - Description and measurement of environmental noise-general procedures"

The above standard is similar to ISO 1996:2016 "Acoustics - Description, measurement and assessment of environmental noise".

- Environmental Protection (Noise) Regulations 1997

2.1.3 *Room Acoustics*

- AS ISO 354-2006 "Acoustics - Measurement of sound absorption in a reverberation room"
- AS ISO 11654-2002 "Acoustics - Rating of sound absorption - Materials and systems"

  Also refer to AS 2107 above.

2.1.4 *Sound Insulation (Speech Privacy)*

- National Construction Code 2019 (NCC 2019) Building Code of Australia
- AS ISO 140-2006 "Acoustics – Measurements of sound insulation in building and of building elements"
- AS/NZS ISO 717-1:2013 "Acoustics - Rating of Sound Insulation in Buildings and of Building Elements-Airborne Sound Insulation".
- AS 2822-1985 "Acoustics-Methods of Assessing and Predicting Speech Privacy and Speech Intelligibility".

2.2. Vibration

2.2.1 *Human Response*

These standards relate to the response of humans within a building, when subjected to continuous or intermittent vibration (e.g. footfall, transportation), or transient vibration (e.g. piling during construction). The excitation frequency considered is between 1Hz and 80Hz.

- AS 2670-2001 “Evaluation of human exposure to whole-body vibration”

Equivalent to ISO 2631-2003 “Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration”.

Where resonance of a building structure results from wind excitation with a resonance frequency less than 1Hz, the following standard is relevant:

- ISO 6897-1984 “Guidelines for the evaluation of the response of occupants of fixed structures, especially buildings and off-shore structures, to low-frequency horizontal motion (0.063 to 1Hz)”

2.2.2 *Machinery*

These standards relate to allowable vibration limits for machinery installed within a building.

- ISO 10816:2015 “Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts”

2.2.3 *Structures*

These standards refer to compromise of the integrity of structures subject to vibration from ground-borne sources such as construction, demolition and transportation.

- ISO 4866:2010: Mechanical vibration and shock - Vibration of fixed structures (equivalent to BS ISO 4866:2010)

Other standards for consideration include DIN 4150-3 (1999-02): “Structural vibration - Effects of vibration on structures”. The Australian Standard AS 2187-2006 “Explosives-Storage and Use of explosives” also provides guidance.

3. Project Location

448 Nicholson Road, Forrestdale WA is a rural living land located within Rural zone, according to the City of Armadale Town Planning Scheme No. 4. It is surrounded by parks and recreation lands and other rural living properties.

The nearest noise sensitive receiver (NSR) has been identified and is located at:

- 440 Nicholson Road, to the north of the development.

Jandakot Airport is located approximately 6km to the east of the proposed development, therefore the proposed site falls outside the ANEF Contours stated in AS 2021-2015, The proposed development is not expected to require additional sound insulation for aircraft noise.

Figure 3.1: **Aerial view of site and its surroundings – source: Google Maps**

4. Environmental Noise Impact Criteria

In Western Australia, the noise emissions from a development to a receiver are assessed in accordance with the Environmental Protection (Noise) Regulations 1997 (EPNR 1997). The noise emissions from the development are compared with calculated assigned noise levels at a given noise sensitive receiver.

4.1. EPNR 1997 Assigned Noise Levels Table

The Western Australian Department of Environmental Protection Noise Regulations (EPNR 1997), operate under the Environmental Protection Act 1986. The Regulations specify maximum noise levels that can be received at noise sensitive premises, including industrial, commercial and residential premises.

EPNR 1997 provides a methodology and stipulates clear procedures relating to noise assessments and control. The regulations provide limits for three types of assigned noise level:

- L_{Amax} assigned noise level which cannot be exceeded at any time;
- L_{A1} assigned noise level that cannot be exceeded for more than 1% of the time;
- L_{A10} assigned noise level that cannot be exceeded for more than 10% of the time.

The resulting assigned noise levels are displayed in Table 4.1.1 below.

Table 4.1.1: Assigned noise levels

Type of premises receiving noise	Time of day	Assigned noise level (dB_A)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	07:00 to 19:00 Monday to Saturday	45+IF	55+IF	65+IF
	09:00 to 19:00 Sunday and Public holidays	40+IF	50+IF	65+IF
	19:00 to 22:00 All days	40+IF	50+IF	55+IF
	22:00 to 07:00 Monday to Saturday 22:00 to 09:00 Sunday and public holidays	35+IF	45+IF	55+IF
Noise sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use	All hours	60	75	80
Commercial premises	All times	60	75	80
Industrial and utility premises	All times	60	75	80

The "influencing factor" (IF) is calculated for each of noise-sensitive premises receiving noise. It takes into account the amount of industrial and commercial land and the presence of major roads within a 450m radius around the noise receiver.

4.2. EPNR 1997 Noise Character Adjustments

It is a requirement of EPNR 1997 that the noise character of any breakout noise from a development be free of annoying characteristics, namely –

- Tonality, e.g. whining, droning;
- Modulation, e.g. like a siren; and
- Impulsiveness, e.g. banging, thumping.

According to EPNR 1997, "if these characteristics cannot be reasonably and practicably removed, e.g. in the case of an emission like music, then a series of adjustments to the measured levels are set out, and the adjusted level must comply with the assigned level". The adjustments are set out below.

Table 4.2.1: EPNR 1997 noise character adjustments

Adjustment where noise emission is not music These adjustments are cumulative to a maximum of 15 dB			**Adjustment where noise emission is music**	
Where tonality is present	Where modulation is present	Where impulsiveness is present	Where impulsiveness is not present	Where impulsiveness is present
+5 dB	+5 dB	+10 dB	+10 dB	+15 dB

4.3. Nearest Noise Sensitive Receiver (NSR)

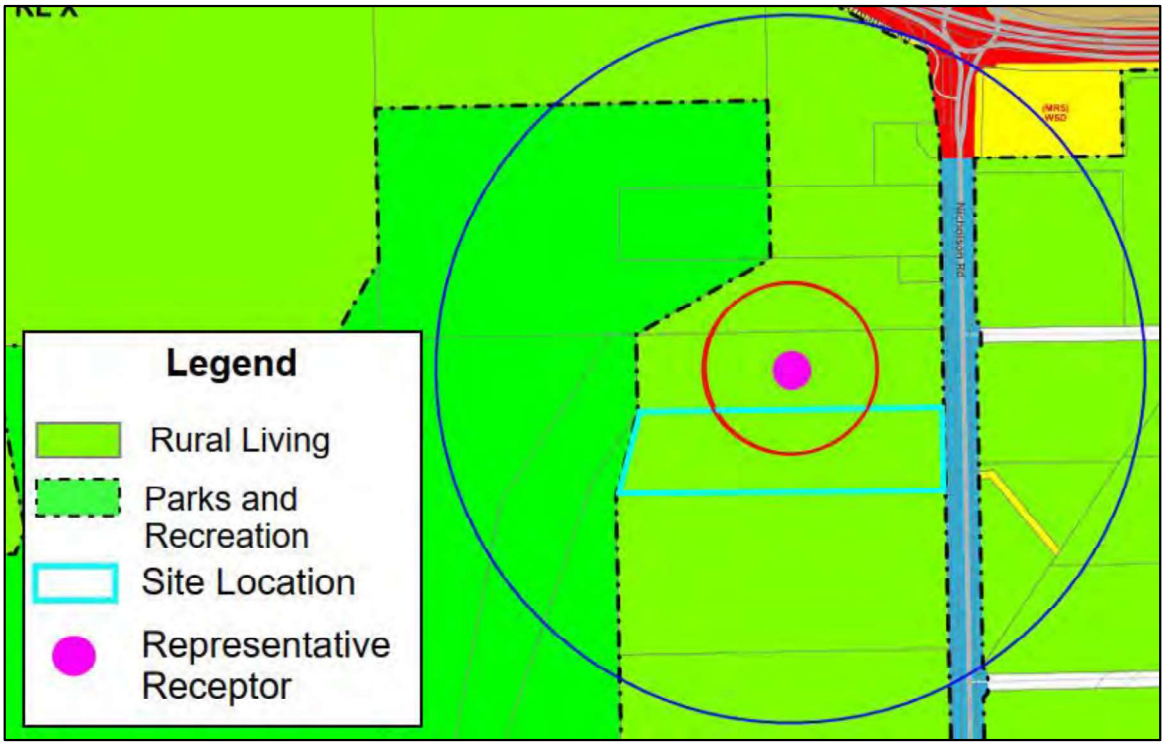
The assigned noise levels defined in the regulations have been calculated for the following nearest noise sensitive receiver (NSR) below, located about 10m from the development:

1. 440 Nicholson Rd, Forrestdale.

4.4. Calculation of Assigned Noise Levels

Based on the regulations set out in the WA Environmental Protection (Noise) Regulations 1997, the maximum allowable noise levels are determined using the assigned noise level base values and the influencing factor (IF). The influencing factor takes into account zoning and road traffic around the receiver of interest within a 100 and 450m radius. In figure 4.4.1, the red circle is the 100m radius circle, and the blue circle is the 450m radius circle. Their centre is the noise-sensitive receiver under consideration (440 Nicholson Rd).

Figure 4.4.1: Composite map showing zoning around proposed development – source: City of Armadale Intramaps



4.4.1 *100-Metre-Radius Circle*

Based on the available information the percentage of commercial and industrial use within the 100-metre-radius circle is 0%.

4.4.2 *450-Metre-Radius Circle*

Based on the available information, no commercial or industrial activity has been identified within the 450-metre-radius cirle.

4.4.3 *Traffic/Transport Factor*

There are no major (more than 15,000 vehicles per day) roads within the 100m or 450m radius areas. There is one secondary (6,000 – 15,000 vehicles per day) road within the 100m radius area from the residential building.

From information provided by Main Roads WA, which is summarised in table below, the transport factor is 2.

Table 4.4.3.1: Traffic data 2019/2020

Road	Vehicles per day	Classification
Nicholson Road	8455	Secondary

4.4.4 *Influencing Factor*

Based on calculations, and taking into account the percentage of commercial and industrial areas as well as secondary and major roads in the 100 and 450 metre radius circles, the influencing factor is 2 dB.

4.4.5 *EPNR 1997 Assigned Noise Levels Table – NSR*

The resulting assigned noise levels for the NSR are displayed in Table 4.4.5.1 below.

Table 4.4.5.1: Assigned Noise Levels for the project

Type of premises receiving noise	Time of the day	Assigned Noise Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	07.00 to 19.00 hrs Monday To Saturday	47	57	67
	09.00 to 19.00 hrs Sunday and Public holidays	42	52	67
	19.00 to 22.00 hrs All days	42	52	57
	22:00 to 07:00 Monday to Saturday 22:00 to 09:00 Sunday and public holidays	**37**	**47**	**57**
Commercial premises	All times	60	75	80
Industrial and utility premises	All times	65	80	90

The most sensitive period is highlighted in bold.

L_{A10} is an acoustic descriptor which corresponds to the noise level exceeded for ten per cent of the time period under consideration; this may be considered to represent an “average maximum level” and is often used for the assessment of road traffic noise. The L_{A1} is the level exceeded for one per cent of the time; this is representative of the maximum levels recorded during the sample period. The L_{Amax} is the absolute maximum recorded level, which is most useful for assessing sounds of short duration.

4.5. Noise emissions – Mechanical Services

The mechanical services noise emissions must be kept to a level that is not exceeded at any nearby neighbours' boundary. The night-time assigned noise level is 37 dB, L_{A10} and has been calculated in Table 4.4.5.1.

All noise from condenser units and exhaust fans must not exceed this value at the boundary of any nearby residential neighbour.

The nearest noise sensitive residential receiver is located about 50m to the north of the development, and it is unlikely the mechanical services will have a noise impact. However, it is recommended the noise from condenser units will be mitigated using the following options:

- All condenser units should be roof located, facing away from nearby residents.
- If the intention is to mount units on walls, it is the responsibility of the installer that noise at the outlet must be kept to a sound pressure level of 60 dBA or less at one metre.
- Vibration from any condenser units would also need to be controlled appropriately to minimise structure borne noise. Guidance has been provided on how to mitigate vibration in Section 4.7.

As far as practicable, noise from mechanical services including condenser units and exhaust fans should be free from tonality and impulsiveness.

Provided that condenser units and exhaust fans are carefully selected and mitigated, assigned noise levels will not be exceeded at nearby properties.

4.6. Noise emission – Back-of-House Service Vehicles

The BoH services vehicles noise emissions must be kept to a level that is not exceeded at any nearby neighbours' boundary. The daytime and night-time assigned levels have been calculated and are presented in Table 4.4.5.1.

All noise from services vehicles must not exceed daytime value of 67 dB, L_{Amax} and night-time value of 57 dB, L_{Amax} at the boundary of any nearby residential neighbour.

4.7. Noise emission – Amplified Music

An amplified live music is proposed to be played at the Amphitheatre as complementary to the Café to provide an ambience. The Amphitheatre is an outdoor venue located to the west of the Restaurant, approximately 65m away from the north site boundary and 35m from the south site boundary.

The noise levels from an amplified music must be kept to a level that is not exceeded at any nearby neighbours' boundary.

It should be noted that the property to the south of the site is a commercial premise and is not classified as a noise sensitive receptor. It is predicted there the assigned noise levels for all times of day will be met, therefore there will be no noise impact from the amplified music to the south neighbouring property.

The typical noise levels from an amplified live background music are presented in table 4.7.1. below.

Table 4.7.1: Typical noise levels at live music event.

Noise source	Noise level L_{Aeq} [dB]
Amplified live background music	60-65

Based on the noise levels detailed above, provisional calculations have been undertaken to confirm compliance with the EPNR assigned noise levels. To represent the worst-case scenario for the typical

noise levels from the amplified live background music, the upper range noise level (65 dBA) has been used for the calculations.

The preliminary predicted noise levels from the site are presented in table 4.7.2. below.

Table 4.7.2: Estimated noise levels at NSR.

Noise source	Time of the day	EPNR 1997 Assigned Noise Level L_{A10} [dB]	Predicted Outdoor Noise Level* L_{A10} [dB]	Compliance predicted?
Amplified live background music	07.00 to 19.00 hrs Monday To Saturday	47	39	Yes
	09.00 to 19.00 hrs Sunday and Public holidays	42	39	Yes
	Day time 19.00 to 22.00 hours all days	42	39	Yes
	22:00 to 07:00 Monday to Saturday 22:00 to 09:00 Sunday and public holidays	37	39	No

*The predicted noise levels assume a +10dB adjustment on account of music.

Provisional calculations indicate that the noise level will achieve compliance at the NSR in accordance with the EPNR 1997 for day and evening times.

It is predicted that the noise level will not achieve compliance at the NSR in accordance with the EPNR 1997 for night-time period, therefore it is not recommended to use an amplified music outdoors during this time.

4.8. Vibration mitigation

It is the responsibility of the installer to ensure that any rotational equipment or pumps do not cause objectionable vibration. In order to minimise the transmission of vibration and noise from rotating reciprocating or vibrating equipment to building elements, it is necessary to provide vibration control comprising vibration isolators and inertia bases where necessary to limit building vibrations in occupied areas as follows:

Table 4.7.1: Maximum allowable RMS velocity levels

Equipment	Allowable rms velocity level mm/s
Pumps	3.3
Centrifugal compressors	3.3
Fans (vent sets, centrifugal, axial)	2.3

Isolator selection: Select mounts with static deflections to limit building vibration allowing for span, stiffness and mass of supporting structure, and mass, imbalance, and operating speed range of equipment.

All equipment must be balanced to minimise vibration.

Rotating and reciprocating machinery – within evaluation zone A measured in accordance with *ISO 10816-3:1998* and *AS 2625.4:2003*.

Vibration mounts are required except for external equipment which is not connected to the structure of any building, support rotating, reciprocating or vibrating equipment on vibration isolating mounts.

5. Indoor Ambient Noise

AS/NZS 2107 has been used to derive the indoor noise criteria.

The 'educational buildings', 'residential buildings' and 'public buildings' categories in AS/NZS 2107 have been considered appropriate due to the proximity of Nicholson Road.

Table 5.1: Recommended indoor noise levels summary according to AS/NZS 2107

Type of occupancy/activity	Recommended design sound level L_{Aeq} (dB)		Recommended reverberation time (RT), s
	Satisfactory	Maximum	
EDUCATIONAL BUILDINGS			
Teaching spaces	35	45	0.4 – 0.5
Staff common rooms	40	45	< 0.6
Office	40	45	0.4 – 0.7
Toilets	-	55	-
RESIDENTIAL BUILDINGS			
Hostels, residential halls and barracks –			
Games rooms	45	50	< 1.0
Kitchen and service areas	45	55	-
Sleeping areas near minor roads	30	35	-
PUBLIC BUILDINGS			
Cafeterias	40	50	See note 2
Restaurants	40	50	See note 2

NOTES:

1. The recommended indoor design sound levels are for a fully fitted out and completed building. Attention is drawn to the additive noise effect of many machines within the same area and adjacent areas. Allowance for the total number and type of noise sources should therefore be made in the selection of equipment and in the design of building spaces. A building owner or developer may consider an allowance of 3-5 dBA to be appropriate.

2. Reverberation time should be minimised as far as practicable for noise control.

Any mechanical services must be selected and installed so that the resultant indoor ambient noise levels in the proposed development do not exceed the values shown in Table 5.1.

6. Internal Sound Insulation / Speech Privacy

AS 2822-1985, "Acoustics-Methods of Assessing and Predicting Speech Privacy and Speech Intelligibility" gives methods of assessing and predicting speech intelligibility/privacy of sound insulation ratings for adjoining spaces (The Building Code of Australia regulates sound insulation criteria for residential buildings). The privacy rating is not just dependent on the acoustic performance of the dividing partition (and flanking partitions), but also on the reverberation time and background noise level in the adjoining space. Recommendations are provided in terms of the Dw rating (Weighted Sound Level Difference as defined in AS/NZS ISO 717.1-2004 and ISO 141-4-1998), with Table 6.1 below providing the subjective response to given ratings.

Table 6.1: Wall Partition Privacy Criteria

Weighted Sound Level Difference (D_w)	Weighted Sound Reduction Index (R_w)	Subjective Rating[1]
50-55	55-60	High Confidential Privacy. Good sound insulation for loud (or amplified) speech. Loud speech inaudible.
45-50	50-55	Very good privacy. Moderate sound insulation for loud speech. Speech inaudible unless raised.
40-45	45-50	Good privacy. Good sound insulation for normal speech. Speech audible but unintelligible (unless raised).
35-40	40-45	Average Privacy. Moderate sound insulation for normal speech. Speech audible and intelligible (unless soft).
<35	35	Privacy not required or not critical

1. *Subjective Privacy Ratings are based on an ambient noise level in the receiving room of 35-40 dB(A).*

The ratings above do not account for partitions with doorsets. If doorsets are included within the partition, the above ratings should be reduced by 10 dB. Where subjective speech privacy must be achieved between two spaces, we recommend designing the layout of rooms in such a way that doors do not separate two sensitive areas. Where this is unavoidable, doors designed to match the sound insulation performance of the partition may be required in order to retain the desired level of speech privacy.

Mark-ups showing privacy wall recommendations for the childcare centre and commercial spaces are available in Appendix B and C.

7. Internal Design Criteria

7.1. Internal Background Noise and Reverberation Time

The acoustic requirements of the building with reference to the descriptors of performance in Section 5 and 6 are nominated in Table 7.1.1 & 7.2.1 below.

Table 7.1.1: Indoor noise levels & Reverberation Time design criteria for the project

Location	Design sound level range L_{Aeq} dB		Reverberation Time RT (seconds)
Childcare Centre			
Teaching areas	35	45	0.4 – 0.5
Group/play area	45	50	< 1.0
Rest area	30	35	-
Office	40	45	0.4 – 0.7
Staff	40	45	< 0.6
Kitchen	45	55	-
Toilets	-	55	-
Café and Restaurant			
Café	40	50	See note 1
Restaurant	40	50	See note 1

Note 1: in accordance with AS 2107:2016, reverberation time should be minimized as far as practicable for noise control.

7.2. Internal Sound Insulation

Doors are inevitably the weakest point in a partition, for this reason it is necessary to specify partitions (typically room frontage or entrance) with doors separately than partitions separating room to room (no doors). Table 7.2.1 below presents the privacy subject rating along with the design criteria for both situations, values have been nominated in accordance with the values stated in Table 6.1.1.

Table 7.2.1: Sound insulation design criteria for the project

Location	Security Rating Recommended Privacy Subjective Rating Airborne	Room to Room Airborne Sound Insulation Walls/Floors D_w	Room to Corridor Room Frontage, Doors within partition D_w
Childcare Centre			
Office	Good privacy	40-45	30-35
Teaching areas	Good privacy	40-45	30-35
Rest area	Very good privacy	45-50	35-40
Toilets	Very good privacy	45-50	30-35
Café and Restaurant			
Kitchen	Good privacy	40-45	30-35
Toilet	Very good privacy	45-50	30-35

A colour coded Acoustic Partition (Privacy) Mark-up for office areas showing partition ratings is presented in Appendix B and C.

The D_w is an onsite performance where the R_w is a laboratory performance, for simplicity D_w in Table 7.2.1. is approximately equal to the Rw -5 to 8 dB, as shown in the equation below.

$$D_w \approx R_w - (5 \text{ to } 8)$$

8. State Planning Policy 5.4 Assessment

8.1. Noise Targets

Existing noise levels generated from the surrounding environment has the potential to cause noise impacts on the proposed childcare centre development. Therefore, it is necessary for a noise assessment to be undertaken in accordance with the guidelines of the Western Australian Planning Commission (WAPC) State Planning Policy 5.4 Road and Rail Noise (SPP 5.4).

Table 8.1.1 presents the external and internal noise level target based on SPP 5.4.

Table 8.1.1: Noise targets.

Noise-sensitive development	Noise targets	
	Day 6am – 10pm L_{Aeq} dB	Night 10pm – 6am L_{Aeq} dB
Outdoor	55	50
Indoor – living and work areas	40	-
Indoor – bedrooms	-	35

8.2. Screening Assessment

A screening assessment for the site location in accordance with WAPC State Planning Policy 5.4 "Road and Rail Noise", has been undertaken for 2020.

Nicholson Road is classified as a significant traffic route according to the Strategic freight and major traffic route Schedule 3 of SPP 5.4.

Based on the Main Roads WA online portal there is 8,455 vehicles per day driving Nicholson Road, South of Armadale Rd, including 11.5% of trucks.

Noise exposure forecast has been assessed based on the policy requirements for noise-sensitive developments and is presented in table 8.2.1 below.

Table 8.2.1: Screening Assessment – Noise Exposure Forecast.

Transport Corridor Classification		Number of lanes (both directions), including bus/priority lanes and entrance/ exit ramps	Forecast noise exposure category based on lot distance(m) from edge of nearest main road carriageway (not entrance/exit ramps)															
			adjacent	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Strategic freight/major traffic route • 500 or more Class 7-12 Austroads vehicles per day, or • 50,000+ vehicles per day		2 to 4 lanes	72	68	66	65	63	62	61	61	60	59	59	58	57	57	56	
		5 to 6 lanes	74	70	68	66	65	64	63	62	61	61	60	59	59	58	58	
		7 to 8 lanes	76	72	69	68	66	65	64	64	63	62	62	61	60	60	59	
		9 to 10 lanes	77	73	70	69	67	66	65	65	64	63	63	62	61	61	60	
		10 or more lanes	78	74	71	70	68	67	66	66	65	64	64	63	62	62	61	
Other significant freight / traffic routes • Any actual or planned future State Administered Road • Local Government Roads Carrying 100 or more Class 7 – 12 Austroads vehicles/day • 25,000+ vehicles per days vehicles/day	Urban Region Scheme areas 60-80 km/hr	1 to 2 lanes	67	64	62	61	60	59	58	57								
		3 to 6 lanes	69	66	64	63	62	61	60	59								
	Urban Region Scheme areas 100+ km/hr	1 to 2 lanes	70	67	65	64	63	62	61	60								
		3 to 6 lanes	74	70	68	66	65	64	63	62								
	Rural areas 60-80 km/hr	1 to 2 lanes	62	59	57	56	55	54	53	52								
		3 to 4 lanes	66	63	61	60	59	58	56	56								
	Rural areas 100+ km/hr	1 to 2 lanes	67	64	62	61	60	59	58	57								
		3 to 4 lanes	69	66	64	63	62	61	60	59								

Forecast Excess Noise Level, dB	Exposure Category	Policy requirements for noise-sensitive land-use and/or development
0 or less	-	No further measures
1 to 3	A	Noise-sensitive land-use and/or development is acceptable, subject to: Mitigation measures in accordance with an approved noise management plan; or quiet house package as specified
–	*A+	
4 to 7	B	
–	*B+	
8 to 11	C	
–	*C+	

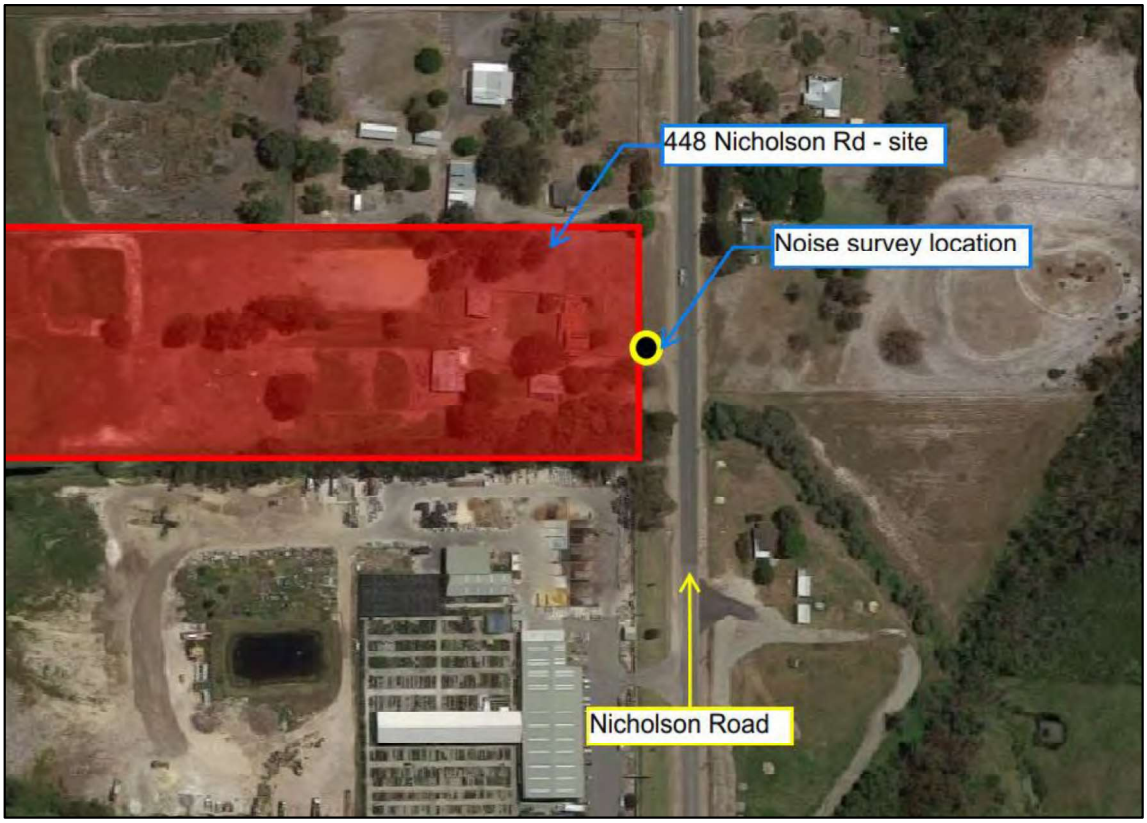
Based on the result from the above, the site exposure is predicted to be 60 dB, meaning the site falls into Exposure Category B and a Quiet House package should be implemented into the childcare centre development.
A noise survey has been undertaken to confirm predicted noise levels at the site and the results are presented below.

8.3. Existing Noise Levels

A noise survey was undertaken in the vicinity of the proposed development to assess noise levels which are to be incident upon the façade of the development.

Sample measurements were undertaken on Wednesday 23rd September 2020, in one location at site boundary approximately 14 meters from the side of the road on Nicholson Road, as presented on Figure 8.3.1 below.

Figure 8.3.1: Noise survey location



The weather conditions during the measurements have been recorded and are presented in table 8.3.1 below.

Table 8.3.1: Weather conditions recorded during the noise survey

Item	Description
Temperature	25°C
Wind speed	3m/s
Humidity	37%
Rain	0mm

Table 8.3.2: Measurement equipment and settings used in survey

Item	Description
Sound level meter	RION NA-28 Type 1 Sound Level Meter
Calibrator	RION NC-74 Sound Calibrator
Real time analysis	One-third octave band and octave band frequencies
Frequency weighting	Unweighted and A-weighted

The sound level meter was calibrated both before and after the survey and did not deviate from the calibration level of 94dB.

Results of the noise survey are given in table 8.3.3 for the measurement location, along with the corresponding Leq spectral data.

Table 8.3.3: Sample measurement spectra L_{Aeq} [dB]

Position	Time	Duration [min]	L_{Aeq} [dB]	Octave band centre frequency [Hz]				
				125	250	500	1k	2k
1	15:30 – 16:30	15	**67**	52	59	59	63	59
1	15:30 – 16:30	15	**66**	50	54	58	63	59
1	15:30 – 16:30	15	**65**	49	55	57	62	59
1	15:30 – 16:30	15	**66**	49	54	58	63	60

The noise survey has been undertaken approximately 26m away from the building façade. In order to obtain the noise levels to be incident upon the façade of the proposed childcare centre development, the distance correction has been applied. Based on this, the estimated noise level to be incident upon a façade is **58 dBA**.

Based on the predicted noise levels and existing noise levels the site falls between Exposure Category A and B.

It is recommended to implement Quiet House package B into the childcare centre development. This will include a protection against increased noise levels associated with future traffic growth. The examples of building façade construction have been given below.

8.4. Quiet House Package

From the values of predicted noise exposure forecast and noise levels measured during the noise survey, the development falls into the Noise Exposure Category B, therefore Quiet House package has been specified in order to achieve the indoor noise level standards.

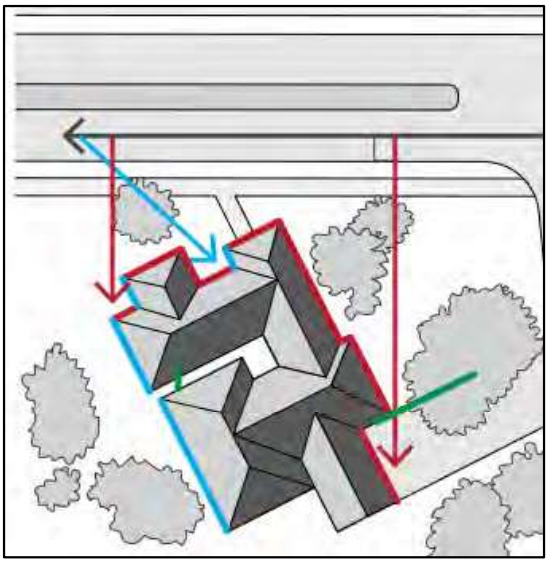
Table 8.4.1: Quiet House requirements – SPP 5.4

Exposure Category – Package	Orientation to corridor	Acoustic rating and example of construction					Mechanical ventilation/air conditioning considerations
		Walls	External doors	Windows	Roofs and ceilings	Outdoor living areas	
B – Quiet House B	Facing	**Bedroom and indoor living and work areas to Rw+Ctr 50dB** • Single leaf of 90mm clay brick masonry with: - A row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, - A cavity of 25mm between leaves, - 50mm glass wool or polyester cavity insulation (R2.0+) between studs, and - One layer of 10mm plasterboard fixed to the inside face • Single leaf of 220mm brick masonry with 13mm cement render on each face • 150mm thick unlined concrete panel or 200mm thick concrete panels with one layer of 13mm plasterboard or 13mm cement render on each face • Double brick: two leaves or 90mm clay brick masonry with: - A 50mm cavity between leaves - 50mm glass wool or polyester cavity insulation (R2.0+) - Resilient ties where required to connect leaves • Double brick: two leaves or 110mm clay brick masonry with a 50mm cavity between leaves and R2.0+ cavity insulation	**Bedrooms** • Fully glazed hinged door with certified Rw+Ctr 31dB rated door and frame including seals and 10mm glass. Other external doors to Rw+Ctr 28dB: • Fully glazed hinged door with certified Rw+Ctr 28dB rated door and frame including seals and 6mm glass.	**Bedrooms** • Total external door and window system are up to 40% of room floor area: fixed sash, awning or casement with minimum 6mm single or 6-12-6mm double insulated glazing (Rw+Ctr 31dB) • Up to 60% floor area: as per above but must be minimum 10mm single or 6-12-6mm double insulated glazing (Rw+Ctr 34dB) Indoor living and work areas • Up to 40% floor area: sliding or double hung with minimum 6mm single pane or 6-12-6mm double insulated glazing (Rw+Ctr 28dB). Sealed awning or casement windows may use 6mm glazing instead. • Up to 60% floor area: as per bedrooms at up to 40% area (Rw+Ctr 31dB) • Up to 80% floor area: as per bedrooms at up to 60% area (Rw+Ctr 34dB).	To Rw+Ctr 40dB • Concrete or terracotta tile roof with sarking, or metal sheet roof, sarking and at least 10mm plasterboard ceiling, R3.0+ insulation.	At least one outdoor living area located on the opposite side of the building from the traffic corridor and/or at least one outdoor living area screened using a solid continuous fence or other structure of minimum 2.4m metres height above ground level.	• Acoustically rated opening and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces. • Evaporative systems require attenuated ceiling air vents to allow closed windows. • Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements. • Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable.
	Side-on	Same as above	**Bedrooms** • Fully glazed hinged door with certified Rw+Ctr 28dB rated door and frame including seals and 6mm glass. Other external doors to Rw+Ctr 25dB • 35mm solid core timber hinged door and frame system certified to Rw 28dB including seals. • Glazed sliding door with 10mm glass and weather seals. Rw+Ctr values may be 3dB less, or max % area increased by 20%.	**Bedrooms** • Total external door and window system are up to 40% of room floor area: fixed sash, awning or casement with minimum 10mm single or 6-12-6mm double insulated glazing (Rw+Ctr 28dB). • Up to 60% floor area: as per above but must sealed awning or casement type windows (Rw+Ctr 31dB). Indoor living and work areas • Up to 40% floor area: sliding, awning, casement or double hung with minimum 6mm single pane or 6-12-6mm double insulated glazing (Rw+Ctr 25dB). • Up to 60% floor area: as per bedrooms at up to 40% area (Rw+Ctr 28dB). • Up to 80% floor area: as per bedrooms at up to 60% area (Rw+Ctr 31dB). Rw+Ctr values may be 3dB less, or max % area increased by 20%.	Same as above	Same as above	Same as above
	Opposite	Same as above	As per 'Side-on' above, except Rw+Ctr values may be 3dB less, e.g. glazed sliding door with 10m glass and weather seas for bedroom.	As per 'Side-on' above, except Rw+Ctr values may be 3dB less, or max % area increased by 20%.	Same as above	Same as above	Same as above

Notes:

- **'Facing'** the transport corridor **(red)**: Any part of a building façade is 'facing; the transport corridor if any straight line drawn perpendicular (at a 90 deg angle) to its nearest road lane intersects that part of the façade without obstruction (ignoring any fence).
- **'Side on'** to transport corridor **(blue)**: Any part of a building façade that is not 'facing' is 'side on' to the transport corridor if any straight line, at any angle, can be drawn from it to intersect the nearest road lane without obstruction (ignoring any fence).
- **'Opposite'** to transport corridor **(green)**: Neither 'side on' or 'facing', as defined above.

Figure 3: Determining building face orientation.



9. Mechanical Services – General Advice

9.1. New Ductwork

New ductwork should be lined internally with 25-50mm acoustic insulation where necessary. Insulation should be faced to prevent the erosion of fibres. Any new flexible ductwork should provide acoustic attenuation (with or without an unperforated inner core) which should be considered when analysing noise transmitted down-duct from fans.

When ductwork penetrates internal partitions, it should be isolated from the partition, with standard penetration details as required. Ductwork layout must be considered to avoid introducing unexpected system effects on fans, and turbulence within ducts, which may increase sound power levels above manufacturer's claims.

Particular attention shall be given to potential flanking noise via ductwork between noise sensitive spaces, or between noise sensitive spaces and adjoining public spaces. Potential paths include return and relief air ductwork.

9.2. Fans, Air-Handling Units, Fan-Coil-Units, Variable-Air-Volume Units

Sound power levels for fan powered units (AHU, FCU, Fans, Fan assisted VAV's) or pressure break-down boxes (eg. VAV's) must be specified. Sound power levels from a range of manufacturers must be considered during the design process to ensure they are achievable. System resistance for powered units must be sized to allow for further resistance from sound attenuators if considered necessary.

9.3. Crosstalk Noise

Where ducted systems supply or exhaust from adjacent rooms, such that there is a short route for noise through the outlets and ductwork from one room to another, the possibility of cross-talk must be considered. Where privacy between rooms is required, with minimal sound insulation requirements, attenuation may be needed. Where the rooms have a low services noise criterion, additional noise control may be necessary, for example the use of crosstalk attenuators or transfer air ducts (TAD's) may be required.

9.4. Diffusers, Grilles and Dampers

Noise from diffusers and grilles is related to airflow across the louvres/grille and is subject to the air velocity across the face of the diffuser/grille. Manufacturer's test data (in the form of NC ratings based on air-flow) will be reviewed to ensure compliance with the Schematic Design.

10. Vibration Isolation – General Advice

This section's objective is to provide guidance on how to prevent the transmission of unwanted vibration or structure-borne noise to the building.

Unwanted vibration has the potential to transmit through the structure and re-radiate as noise - known as structure borne noise - causing disturbance in occupied spaces. Mitigation of vibration must be implemented where machinery connects to ducts, pipes and conduits and to isolate the slab/plinth on which it rests.

10.1. Partition penetrations

Any duct or pipe penetrations through a wall's or a floor's penetrations must be detailed carefully. The plant room wall or floor must not be rigidly connected to any duct or pipework. 25mm is the minimum size for any opening around pipes/ducts penetrating plant room walls.

10.2. Cabling, ducting and Piping

Flexible couplings must be incorporated in all pipework to mitigate the transmission of vibration. The ''decoupled pipe'' should have a minimum of two 90 degrees elbows in order to provide a threefold degree of freedom of movement. Successive elbows and bends should be separated by comparable distances.

Resilient supports must be incorporated to any pipe connected to rotating mechanical equipment. The size of the support must meet the same static deflections as the isolators designated for the associated item of plant. Pipe work shall be resiliently supported over distances as per the table below.

Table 10.2.1: Pipework minimum resilient support length vs. pipework distance to vibration source/plant room

Pipework length	Distance to plant room/vibration source
40mm or less	3 m
40mm to 65mm	4 m
65mm to 100mm	5 m
100mm to 150mm	6 m
150mm and over	8 m

Pipes passing in ceiling voids must be suspended from the slab. It must be ensured there is no contact with any lightweight ceiling support members, stud wall framing or other services.

Where rotating equipment connects to electrical wiring, it must be in a 360° looped form. Rigid conduits should not be used as they short-circuit vibration isolators.

10.3. Rotating machinery

Static and dynamic balancing is required of all equipment rotating parts. The balancing in accordance with *ISO 1940: 2003 Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State – Part 1: Specification and Verification of Balance Tolerances* is to proceed to G6.3 quality grade.

Any equipment containing rotating parts or capable of transmitting vibration shall be isolated from the building structure. Suitable vibration isolation devices are specified in section 10.4 Vibration isolation.

Large machines may require inertia bases. Examples of large machines that may require inertia bases are: high-pressure fans, air compressors, internal combustion engines, reciprocating refrigeration compressors and pumps.

All floor mounted mechanical and electrical equipment with a considerable size must have reinforced concrete housekeeping pads with minimum 100mm thickness.

10.4. Vibration Isolation

In order to prevent structure borne noise, it is absolutely crucial that any equipment capable of producing objectionable vibration is isolated form the building structure. The size and location of mounts and isolators should be carefully chosen to achieve the specified deflection under the static load of the machine to be isolated. This includes any associated components such as, but not limited to, fan transitions or silencers. Levelling screws are to be used in conjunction with all mounts and isolators.

All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

Any mounts or plant items must be fitted with seismic limit stops to limit any horizontal or vertical movement to 12mm before striking a limit stop. The contact surface of the limit stop should be fixed to 6mm of resilient material as a minimum. Under normal operation there should be a clear air gap of at least 4mm between limit surfaces of the machine to be isolated.

Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:

1. Determine vibration isolation and seismic restraint sizes and locations.

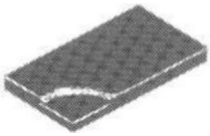
2. Provide vibration isolation and seismic restraints as scheduled or specified.

3. Provide calculations and materials if required for restraint of non-isolated equipment.

4. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.

The isolator or base selected for a particular application depends on the required deflection, life cost and compatibility with associated structures and shall be nominated as follows:

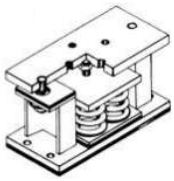
Isolation types 1 and 2: Rubber isolators are available in pad (type 1) and molded (type 2) configurations. Pads are used in single or multiple layers. Molded isolators come in a range of 30 to 70 durometer (a measure of stiffness). Material in excess of 70 durometer is usually ineffective as an isolator. Isolators are designed for up to 13mm deflection but are used where 8mm or less deflection is required. Solid rubber and composite fabric and rubber pads are also available. They provide high load capacities and are used as noise barriers under columns and for pipe supports. These pad types work well only when they are properly loaded and the mass load is evenly distributed over the entire pad surface. Metal loading plates can be used for this purpose.



Isolator type 1: Glass fiber with elastic coating (type 1). This type of isolation is pre-compressed molded fiberglass pads individually coated with a flexible moisture impervious elastomeric membrane. Natural frequency of fiberglass vibration isolators should be essentially constant for the operating load range of the supported equipment. Mass load is evenly distributed over the entire pad surface. Metal loading plates can be used for this purpose.

Isolators type 3 and 4: Steel springs are the most popular and versatile isolators for HVAC applications because they are available for almost any deflection and have a virtually unlimited life. Spring isolators may have a rubber acoustical barrier to reduce transmission of high-frequency vibration and noise that can migrate down the steel spring coil. They should be corrosion-protect if installed outdoors or in a corrosive environment. The basic types include the following:

Isolator type 3: Open spring isolators (type 3) consist of top and bottom load plates with adjustment bolts for leveling equipment. Springs should be designed with a horizontal stiffness of at least 80% of the vertical stiffness to ensure stability. Similarly, the springs should have a mini-spring height.

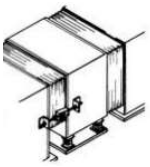


Isolator type 4: Restrained spring isolators (type 4) have hold-down bolts to limit vertical as well as horizontal movement. They are used with (a) equipment with large variations in mass (e.g., boilers, chillers. cooling towers) to restrict movement and prevent strain on piping when water is removed, and (b) outdoor equipment, such as condensing units and cooling towers, to prevent excessive movement due to wind loads. Spring criteria should be the same as open spring isolators, and restraints should have adequate clearance so that they are activated only when a temporary restraint is needed. Closed mounts or housed spring isolators consist of two telescoping housings separated by a resilient material. These provide lateral snubbing and some vertical damping of equipment movement, bill do not limit the vertical movement. Care should be taken selection and installation to minimize binding and short-circuiting.

Isolators 2 and 6: Air springs can be designed for any frequency, but are economical only in applications with natural frequencies of 1.33 Hz or less (150 mm or greater installations). A constant air supply (an air compressor with an air dryer) and leveling valves are typically required.

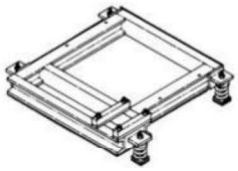
Isolator type 3: Isolation hangers (types 2 and 3) are used for suspended pipe and equipment and have rubber, springs, or a combination of spring and rubber elements. Criteria should be similar to open spring isolators, though lateral stability is less important. Where support rod angular misalignment is a concern use hangers that have sufficient clearance and/or incorporate rubber bushings to prevent the rod from touching the housing. Swivel or traveler means arrangements may be necessary for connections to piping systems subject to large thermal movements.

Pre-compressed spring hangers incorporate some means of pre-compression or preloading of the isolator spring to minimize movement of the isolated equipment or system. These are typically used on piping systems that can change mass substantially between installation and operation



Isolator type 5: Thrust restraints (type 5) are similar 10 spring hangers or isolators and are installed in pairs to resist the thrust caused by air pressure. These are typically sized 10 limit lateral movement 106.4 mm or less.

Base type A: Direct isolation (type A) is used when equipment is unitary and rigid and does not require additional support. Direct isolation can be used with large chillers, some fans, packaged air-handling units, and air-cooled condensers. If there is any doubt that the equipment can be supported directly on isolators, use structural bases (type B) or inertia bases (type C), or consult the equipment manufacturer.

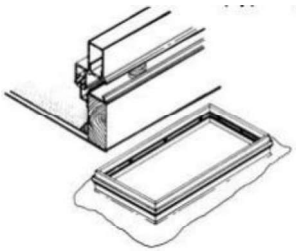


Base type B: Structural bases (type B) are used where equipment cannot be support at individual locations and/or where some means is necessary to maintain alignment of component pans in equipment.

These bases can be used with spring or rubber isolators (types 2 and 3) and should have enough rigidity to resist all starting and operating forces without supplemental hold-down devices. Bases are made in rectangular configuration using structural members with a depth equal to one-tenth the longest span between isolators. Typical base depth is between 100 and 300 mm, except where structural or alignment considerations dictate otherwise.

Structural rails (type B) are used to support equipment that does not require a unitary base or where the isolators are outside the equipment and the rails act as a cradle. Structural rails can be used with spring or rubber isolators and should be rigid enough to support the equipment without flexing. Usual practice is to use structural members with a depth one tenth of the longest span between isolators, typically between 100 and 300mm, except where structural consideration dictate otherwise.

Base type C: Concrete bases (type C) are used where the supported equipment requires a rigid support (e.g. flexible coupled pumps) or excess heaving motion may occur with spring isolators. They consist of a steel pouring form usually with welded-in rein forcing bars, provision for equipment hold-down, and isolator brackets. Like structural bases, concrete bases should be sized to support piping elbow supports, rectangular or T-shaped, and for rigidity, have a depth equal to one-tenth the longest span between isolators. Base depth is typically between 150 and 300mm unless additional depth is specifically required for mass, rigidity, or component alignment.



Base type D: Curb isolation systems (type D) are specifically designed for curb-supported roof top equipment and have spring isolation with a watertight, and sometimes airtight, assembly. Rooftop rails consist of upper and lower frames separated by nonadjustable springs and rest on top of architectural roof curbs.

Isolation curbs incorporate the roof curb into their design as well. Both kinds are designed with springs that have static deflections 25 to 75mm range to meet design criteria described in type 3. Flexible elastomeric seals are typically most effective for weatherproofing between the upper and lower frames. A continuous sponge gasket around the perimeter of the top frame is typically applied to further weatherproof the installation.

A. Glossary

Term	Description
A-weighting:	Refers to a standardised frequency response used in sound measuring instruments, specified in Australian Standard *AS 1259.1*. Historically it was developed to model human ear response at low-level sounds. However A-weighting is now frequently specified for measuring sounds irrespective of level, and studies have shown a relationship between the long term exposure to A-weighted sound pressure levels and hearing damage risk.
Airborne sound:	Sound waves propagate within a construction (structure-borne sound) and are radiated into the air where their propagation continues (airborne sound).
AS:2107	AS/NZS 2107:2016 Acoustics -Recommended design sound levels and reverberation times for building interiors
Impact noise	Noise resulting from the direct impact on a building element (e.g. footfall, furniture movement on a floor).
C_{tr}, C_I	Spectrum adaptation term
D:	This value, in decibels, is the difference in sound pressure level values between two rooms.
dB:	Means the abbreviation for decibel.
dBA :	A-weighted sound pressure level in decibels.
D_{nT}:	The 'normalized level difference', in decibels, compares the sound pressure level values between two rooms by referring the result to a standard reverberation time value, typical in most residential rooms and office spaces.
$D_{nT,w}$:	The 'weighted standardized level difference' is a single-number value which is determined by applying *ISO 717-1* to the D_{nT} results obtained in the field measurements. It is used to describe the ability to isolate noise. Higher values represent a better performance. This value is usually between 5 to 8 dB lower than the laboratory tests for a certain type of construction (R_w).
$D_{nT,w}$ (C; C_{tr}):	This is the complete expression that covers all values obtained from the test. If the result is 20 (-2; -3), it means the $D_{nT,w}$ is 20 dB, the $D_{nT,A}$ is 20-2=18, and the value of the equivalent D_{nT} related to traffic noise or other similar sources is 20-3=17.
$L_{Aeq,T}$:	The equivalent continuous A-weighted sound pressure level in dBA. It is often accompanied by an additional subscript suffix "T" such as $L_{Aeq,15min}$, which means it is evaluated over 15 minutes.
$L_{A10,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 10% of the measurement time. This value is often similar to that of the L_{Aeq} for the same period of time.
$L_{A1,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 1% of the measurement time. This value is often used to have a reference of the highest levels of the measured noise and is used to evaluate the presence of occasional impulsiveness in the noise.
$L_{A90,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 90% of the measurement time. This value is often used to have a certain reference of the constant floor background noise level.
L_{Amax} :	Maximum A-weighted sound pressure level over a certain period of evaluation.
L_w	Impact sound level reduction L_w is an acoustic descriptor quantifying the improvement in impact noise isolation as a result of the installation of a floor covering or floating floor on a test floor in a laboratory (*ISO717.2:1997*)
$L_{n,w}$	The lower the $L_{n,w}$ rating the better the performance of a building element at insulating impact noise.
Perception of noise level differences:	Generally, a variation of 2-3 dB in a sound pressure level cannot be detected by most of the population; a 5 dB difference is perceived as a louder noise, and a 10 dB variation is perceived as a sound which is twice as loud.

Term	Description
Reverberation time:	RT, or T_{60} is the time that would be required for a sound to decrease by 60 dB after the source has stopped emitting sound. Rooms with high reverberation time values are reverberant or acoustically “live”. If a room has a low reverberation time value, it is considered to be a quiet or “dead” space.
R_w:	The insulation of walls and doors against airborne sound is described by way of the sound reduction index R. This index specifies the number of decibels by which the sound is weakened as it passes through the component. The sound reduction index is therefore a component-related variable. As the sound insulation of components depends on frequency, the sound reduction index is also specified depending on the frequency, at least in one-third octave bands between 100 and 3150 Hz. For simplicity, a single value, the weighted sound reduction index R_w, is derived from the frequency-related values. R_w values provided by manufacturers must comply with standard international test regulation *ISO 140-3*.

NOTES-FLOOR PLAN-CHILD CARE	
MARK	DESCRIPTION
1	ROOM: TO BE MADE HABITABLE
2	WC: EXISITNG BATH REPLACED WITH ACCESSIBLE WC
3	CIRCULATION: ENTRY POINT TO CENTRE

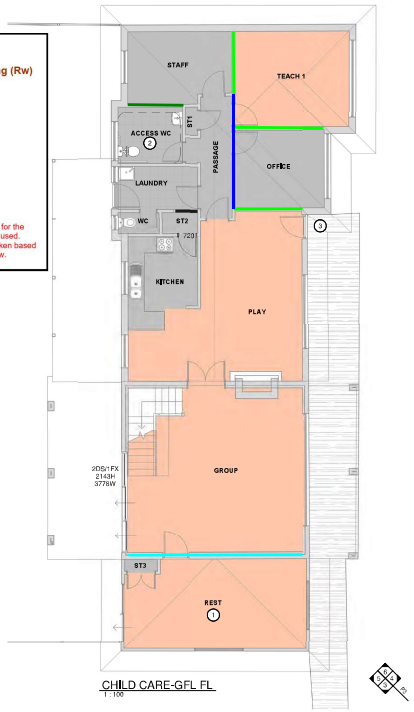
B. Acoustic Mark-up - Childcare Centre

Weighted Level Difference (Dw)

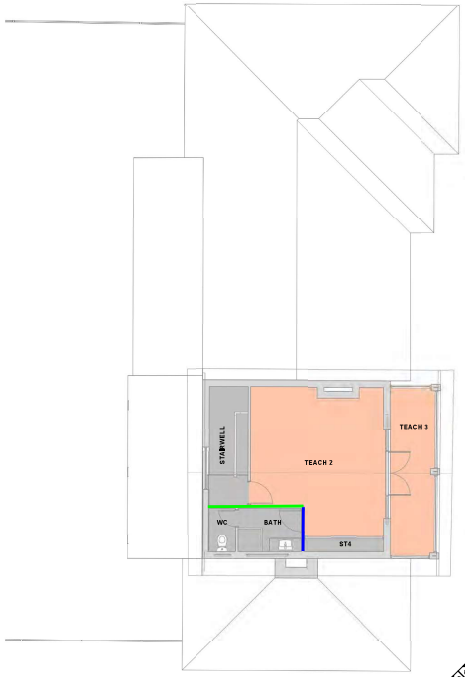
Weighted Sound Reduction Index Rating (Rw)

Dw 25-30	Rw 30-35
Dw 30-35	Rw 35-40
Dw 35-40	Rw 40-45
Dw 40-45	Rw 45-50
Dw 45-50	Rw 50-55
Dw 50-55	Rw 55-60

Note: Generally the Rw is +5-8 points above the Dw, for the above nominated ratings. For simplicity +5 has been used. However calculations for all areas should be undertaken based on the required Dw to obtain the correct and exact Rw.



CHILD CARE-GFL FL
1 : 100



CHILD CARE-1FL FL
1 : 100

CHILDCARE-FRONTAGE

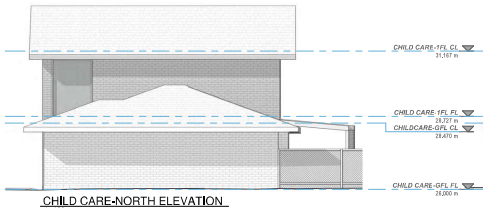
CHILD CARE-REAR YARD

CC-INDOOR AREA
CC-NA

AREA SCHEDULE		
LOCATION	FLOOR FINISH	AREA
CC-INDOOR AREA		
TEACH 1		15 m²
PLAY		30 m²
GROUP		40 m²
REST		22 m²
TEACH 2		25 m²
TEACH 3		11 m²
		143 m²
CC-NA		
STAFF		10 m²
OFFICE		10 m²
PASSAGE		6 m²
ST1		1 m²
ACCESS WC		5 m²
LAUNDRY		5 m²
WC		1 m²
ST2		1 m²
KITCHEN		8 m²
ST3		1 m²
STAIRWELL		6 m²
ST4		1 m²
BATH		4 m²
WC		2 m²
		60 m²
ALL AREAS		203 m²

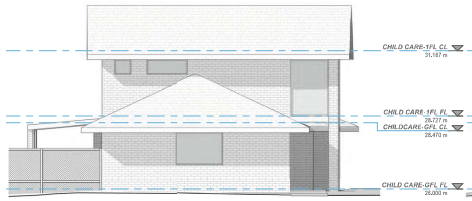
NOTES-CHILD CARE

1. PROPOSED NUMBER OF CHILDREN: 44
2. FLOOR AREA(INDOOR): 143m2
3. FACILITIES:
A. PANS: 3
B. BASINS: 3

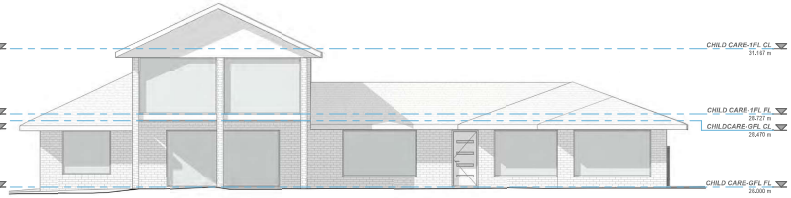


CHILD CARE-NORTH ELEVATION
1 : 100

CHILD CARE-WEST ELEVATION
1 : 100



CHILD CARE-SOUTH ELEVATION
1 : 100



CHILD CARE-EAST ELEVATION
1 : 100

NOTES-ELEVATIONS-CHILD CARE	
MARK	DESCRIPTION
1	DOOR: EXISTING REPLACED WITH STACKER DOOR

11/07/2022 07:46 PM

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CHILD CARE CENTRE

North Point:

Project: THE PADDOCK COMMERCIAL DEVELOPMENT
Client: ERCEG FAMILY TRUST
Address: L23 #448 NICHOLSON RD, FORRESTDALE, 6112

Revision: 3
Sheet: P3

AllAspectDesign

Ph: 0438245256
Web: www.allaspectdesign.com.au
Email: allaspectdesign@outlook.com

Scale @A1: 1 : 100
Drawn: JE
Project: AA11485
Date: 31/07/20

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	11/07	Plan Updated for Client
	11/07	Plan Updated for Client
	11/07	Plan Updated for Client
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	11/07	Plan Updated for Client

NOTE: DESIGN SUBJECT TO ENGINEERING AND STATUTORY APPROVALS

NOTES-FLOOR PLAN-CAFE/RESTAURANT	
MARK	DESCRIPTION
1	SERVERY: 1200H CAPPED
2	PORTAL: EXISTING HARDWOOD PORTAL FRAME FIXED TO NEW PORTAL STRUCTURE

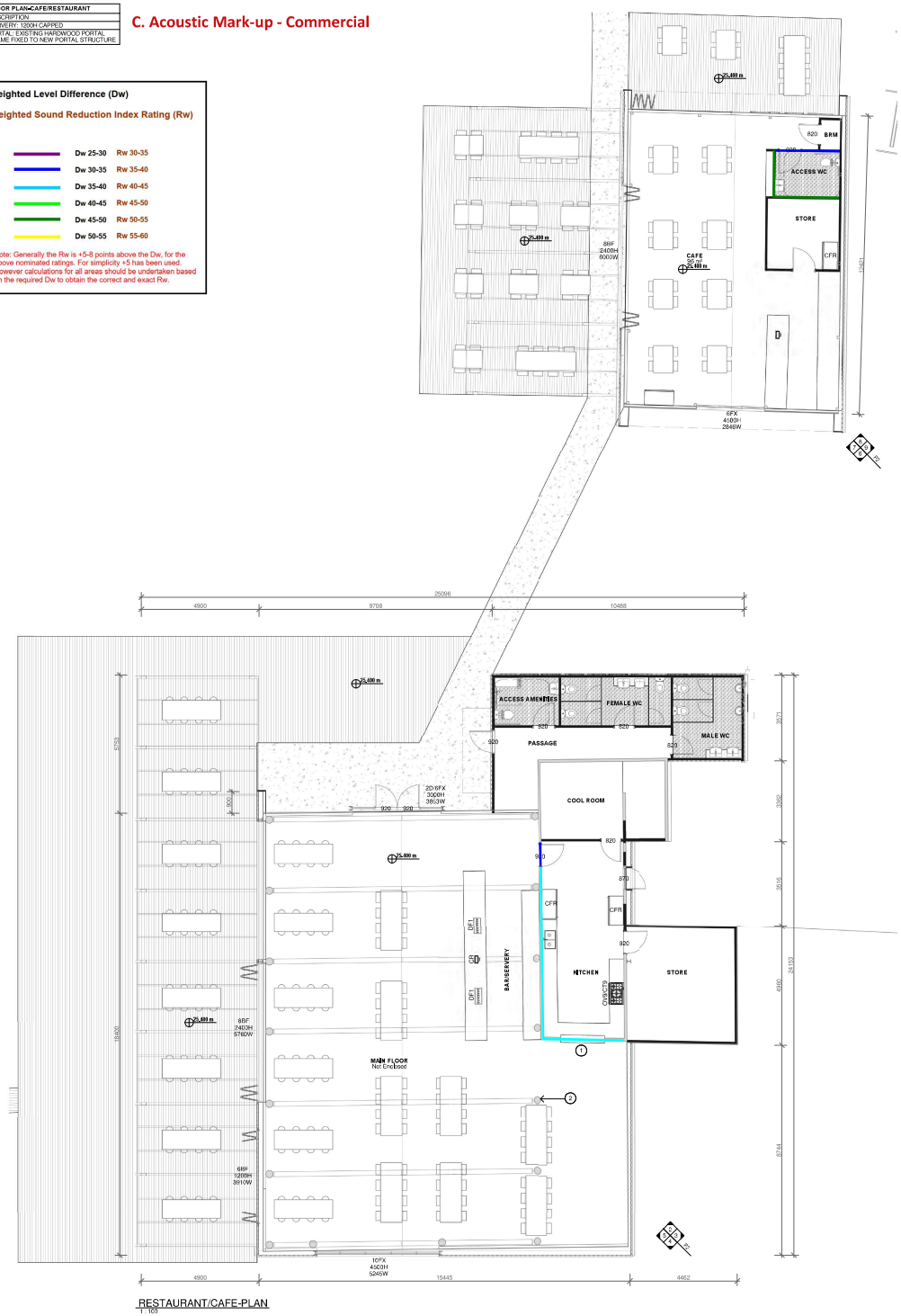
C. Acoustic Mark-up - Commercial

Weighted Level Difference (Dw)

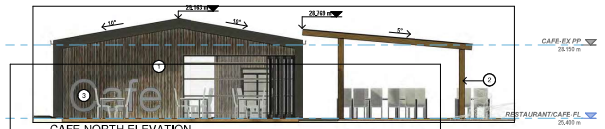
Weighted Sound Reduction Index Rating (Rw)

Dw 25-30	Rw 30-35
Dw 30-35	Rw 35-40
Dw 35-40	Rw 40-45
Dw 40-45	Rw 45-50
Dw 45-50	Rw 50-55
Dw 50-55	Rw 55-60

Note: Generally the Rw is +5-8 points above the Dw, for the above nominated ratings. For simplicity +5 has been used. However calculations for all areas should be undertaken based on the required Dw to obtain the correct and exact Rw.

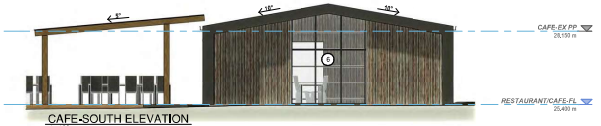


RESTAURANT/CAFE-PLAN
1 : 100



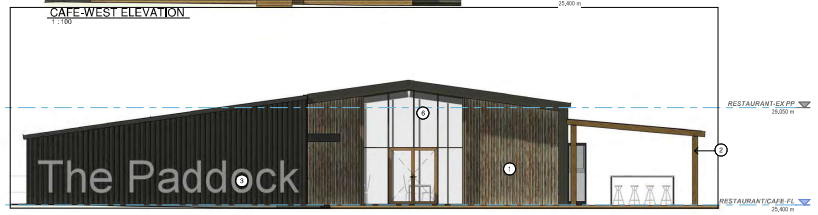
CAFE-NORTH ELEVATION
1 : 100

CAFE-EAST ELEVATION
1 : 100



CAFE-SOUTH ELEVATION
1 : 100

CAFE-WEST ELEVATION
1 : 100



RESTAURANT-NORTH ELEVATION
1 : 100

RESTAURANT-EAST ELEVATION
1 : 100

RESTAURANT-SOUTH ELEVATION
1 : 100

RESTAURANT-WEST ELEVATION
1 : 100

NOTES-ELEVATIONS-RESTAURANT/CAFE	
MARK	DESCRIPTION
1	WALL FINISH: EXISTING CLADDING MADE GOOD AND LEFT EXPOSED
2	STRUCTURE: COVER AREA, HARDWOOD TIMBER FRAME, WITH TWIN WALL POLYCARBONATE SYSTEM
3	SIGNAGE: OVERSIZE LETTERING
4	ROOF FINISH: COLORBOND TRIMDEK PROFILE, IN 'MONUMENT' MATT FINISH
5	WALL FINISH: COLORBOND TRIMDEK PROFILE, IN 'MONUMENT' MATT FINISH
6	WINDOWS: ALUMINIUM FRAME, WITH SELECTED GLAZING

11/07/2022 2:15:06 PM

ISSUED FOR PLANNING APPROVAL

RESTAURANT/CAFE

North Point:

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Client: ERCEG FAMILY TRUST
Address: L23 #448 NICHOLSON RD, FORRESTDALE, 6112

Revision: 3
Sheet: P2

AllAspectDesign

Ph: 0438245256
Web: www.allaspectdesign.com.au
Email: allaspectdesign@outlook.com

Scale @A1: 1 : 100
Drawn: JH
Project: AA11485
Date: 31/07/20

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NOTE: DESIGN SUBJECT TO ENGINEERING AND STATUTORY APPROVALS

REV	DATE	DESCRIPTION
1	10/07/2020	ISSUED FOR PLANNING APPROVAL
2	10/07/2020	ISSUED FOR PLANNING APPROVAL
3	10/07/2020	ISSUED FOR PLANNING APPROVAL
4	10/07/2020	ISSUED FOR PLANNING APPROVAL
5	10/07/2020	ISSUED FOR PLANNING APPROVAL