



Lloyd George Acoustics

PO Box 717  
Hillarys WA 6923  
T: 9401 7770  
[www.lgacoustics.com.au](http://www.lgacoustics.com.au)

# Childcare Noise Impact Assessment

**Lot 29 (#38) Paterson Street, Mundijong**

**Reference: 21026105-01B**

**Prepared for:**

**JDH & JAM Investments No.5**



## Report: 21026105-01B

### Lloyd George Acoustics Pty Ltd

ABN: 79 125 812 544

PO Box 717  
Hillarys WA 6923

[www.lgacoustics.com.au](http://www.lgacoustics.com.au)

Contacts	General	Daniel Lloyd	Terry George	Matt Moyle
E:	<a href="mailto:info@lgacoustics.com.au">info@lgacoustics.com.au</a>	<a href="mailto:daniel@lgacoustics.com.au">daniel@lgacoustics.com.au</a>	<a href="mailto:terry@lgacoustics.com.au">terry@lgacoustics.com.au</a>	<a href="mailto:matt@lgacoustics.com.au">matt@lgacoustics.com.au</a>
P:	9401 7770	0439 032 844	0400 414 197	0412 611 330
Contacts	Accounts	Rob Connolly	Daryl Thompson	Hao Tran
E:	<a href="mailto:lisa@lgacoustics.com.au">lisa@lgacoustics.com.au</a>	<a href="mailto:rob@lgacoustics.com.au">rob@lgacoustics.com.au</a>	<a href="mailto:daryl@lgacoustics.com.au">daryl@lgacoustics.com.au</a>	<a href="mailto:hao@lgacoustics.com.au">hao@lgacoustics.com.au</a>
P:	9401 7770	0410 107 440	0420 364 650	0438 481 207

This report has been prepared in accordance with the scope of services described in the contract or agreement between Lloyd George Acoustics Pty Ltd and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client, and Lloyd George Acoustics Pty Ltd accepts no responsibility for its use by other parties.

Date:	Rev	Description	Prepared By	Verified
10-Mar-21	0	Issued to Client	Olivier Mallié	Terry George
24-Feb-22	A	Updated for revised centre design	Matt Moyle	Terry George
22-Jul-22	B	Updated for revised centre design	Matt Moyle	Terry George

## Table of Contents

1	INTRODUCTION _____	1
2	CRITERIA _____	3
2.1	Environmental Noise Emissions _____	3
2.2	Road and Rail Traffic Noise Intrusion _____	7
3	METHODOLOGY _____	8
3.1	Environmental Noise Emissions _____	8
3.1.1	Meteorological Information _____	8
3.1.2	Buildings, Fences and Receivers _____	8
3.1.3	Topographical Data _____	9
3.1.4	Ground Absorption _____	9
3.1.5	Source Sound Levels _____	9
3.2	Freight Rail Noise Intrusion _____	11
4	RESULTS _____	12
4.1	Outdoor Child Play _____	12
4.2	Mechanical Plant _____	14
4.3	Car Doors Closing _____	16
4.4	Indoor Child Play _____	18
5	ASSESSMENT _____	18
5.1	Outdoor Child Play _____	18
5.2	Mechanical Plant _____	19
5.3	Car Doors _____	20
5.4	Rail Noise Intrusion _____	20
6	CONCLUSIONS _____	21

## List of Tables

Table 2-1 Adjustments Where Characteristics Cannot Be Removed	3
Table 2-2 Baseline Assigned Noise Levels	4
Table 2-3 Influencing Factor Calculation	4
Table 2-4 Assigned Noise Levels	5
Table 2-5 Noise Targets for Noise-Sensitive Land-Use	7
Table 3-1 Modelling Meteorological Conditions	8
Table 3-2 Source Sound Power Levels, dB	10
Table 4-1 Predicted Noise Levels of Child Play, dB $L_{A10}$	12
Table 4-2 Predicted Noise Levels of Mechanical Plant, dB $L_{A10}$	14
Table 4-3 Predicted Car Door Noise Levels, dB $L_{Amax}$	16
Table 5-1 Assessment of Predicted Child Play Noise, dB $L_{A10}$	18
Table 5-2 Assessment of Predicted Mechanical Plant Noise, dB $L_{A10}$	19
Table 5-3 Assessment of Car Doors Noise, dB $L_{Amax}$	20
Table 5-4 External Construction Requirements	21

## List of Figures

Figure 1-1 Project Locality	2
Figure 2-1 Land Use Map	6
Figure 3-1 Noise Model Overview (North View)	10
Figure 3-2 Noise Exposure Forecast from Guidelines	11
Figure 4-1 Outdoor Child Play Noise, All Children Outside, dB $L_{A10}$	13
Figure 4-2 Mechanical Plant Noise, dB $L_{A10}$	15
Figure 4-3 Car Door Noise, dB $L_{Amax}$	17

## Appendices

A	Development Plans
B	Terminology

# 1 INTRODUCTION

It is proposed to develop the land located at Lot 29 (#38) Paterson Street in Mundijong (refer *Figure 1-1*) into a childcare centre. The proposed childcare centre will consist of the following:

- One single storey building capable of accommodating up to 45 children, grouped as follows:
  - 20 children aged 0-2 years old,
  - 10 children aged 2 to 3 years old, and
  - 15 children aged 3 years or over.
- One ground level outdoor play area,
- Amenities and associated mechanical plant such as:
  - Kitchen with range-hood and exhaust fan assumed to be located on the roof above,
  - Various exhaust fans (toilets, laundry, nappy room) assumed to be located on the roof above, and
  - AC plant, consisting of three condensing units assumed to be located on the roof of the childcare building.
- Car parking with 8+8 car stacker bays on the east side of the building.

This report presents the assessment of the noise emissions from child play, car doors closing in the car park and mechanical plant associated with the childcare centre against the *Environmental Protection (Noise) Regulations 1997* (the Regulations) based on the development drawings shown in *Appendix A*. The proposed site is bound by commercial land uses to the north and south, with the closest residential land to the west.

The proposed hours of operation are 6.30am to 6.30pm Monday to Friday. Therefore, it is expected for staff and parents to arrive and park before 7.00am, which is during the night-time period of the Regulations. However, it is noted that outdoor child play would not occur prior to 7.00am. In addition, mechanical plant was also considered to operate before 7.00am.

The east boundary of the site is located approximately 65 metres from a freight rail corridor. Therefore, potential impacts from rail traffic noise were also considered in accordance with *State Planning Policy 5.4 Road and Rail Noise* (SPP 5.4).

*Appendix B* contains a description of some of the terminology used throughout this report.



Figure 1-1 Project Locality

## 2 CRITERIA

### 2.1 Environmental Noise Emissions

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

“7. (1) Noise emitted from any premises or public place when received at other premises –

- (a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and
- (b) Must be free of –
  - i. tonality;
  - ii. impulsiveness; and
  - iii. modulation,

when assessed under regulation 9”

A “...noise emission is taken to significantly contribute to a level of noise if the noise emission ... exceeds a value which is 5 dB below the assigned level...”

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

- (a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and
- (b) The noise emission complies with the standard prescribed under regulation 7 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

**Table 2-1 Adjustments Where Characteristics Cannot Be Removed**

Where Noise Emission is Not Music			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>
Noise sensitive premises: highly sensitive area <sup>1</sup>	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial	All hours	60	75	80
Industrial	All hours	65	80	90

1. **highly sensitive area** means that area (if any) of noise sensitive premises comprising —
- a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
  - any other part of the premises within 15 metres of that building or that part of the building.

The closest sensitive receivers are the residences to the west at #25-#29 Anstey Street. The influencing factor, applicable at these noise sensitive premises, was estimated at 1 dB based on the Shire of Serpentine-Jarrahdale's Local Planning Scheme No 3, as shown on *Figure 2-1* and summarised in *Table 2-3*. The surrounding land is mostly zoned 'Urban Development' with residential uses, however known commercial land uses such as the family practice and rural supplies store at #40 and #42 Paterson Street, and tavern and car park at #32-#34 Paterson Street were counted as 'commercial'. All roads within 450 metres of the receivers carry less than 6,000 vehicles per day, therefore the transport factor is 0 dB.

Table 2-3 Influencing Factor Calculation

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Industrial Land	0 %	0 %	0 dB
Commercial Land	20 %	< 2 %	1 dB
<b>Transport Factor</b>			<b>0 dB</b>
<b>Total</b>			<b>1 dB</b>

Table 2-4 shows the assigned noise levels including the influencing factor and transport factor at the receiving locations.

**Table 2-4 Assigned Noise Levels**

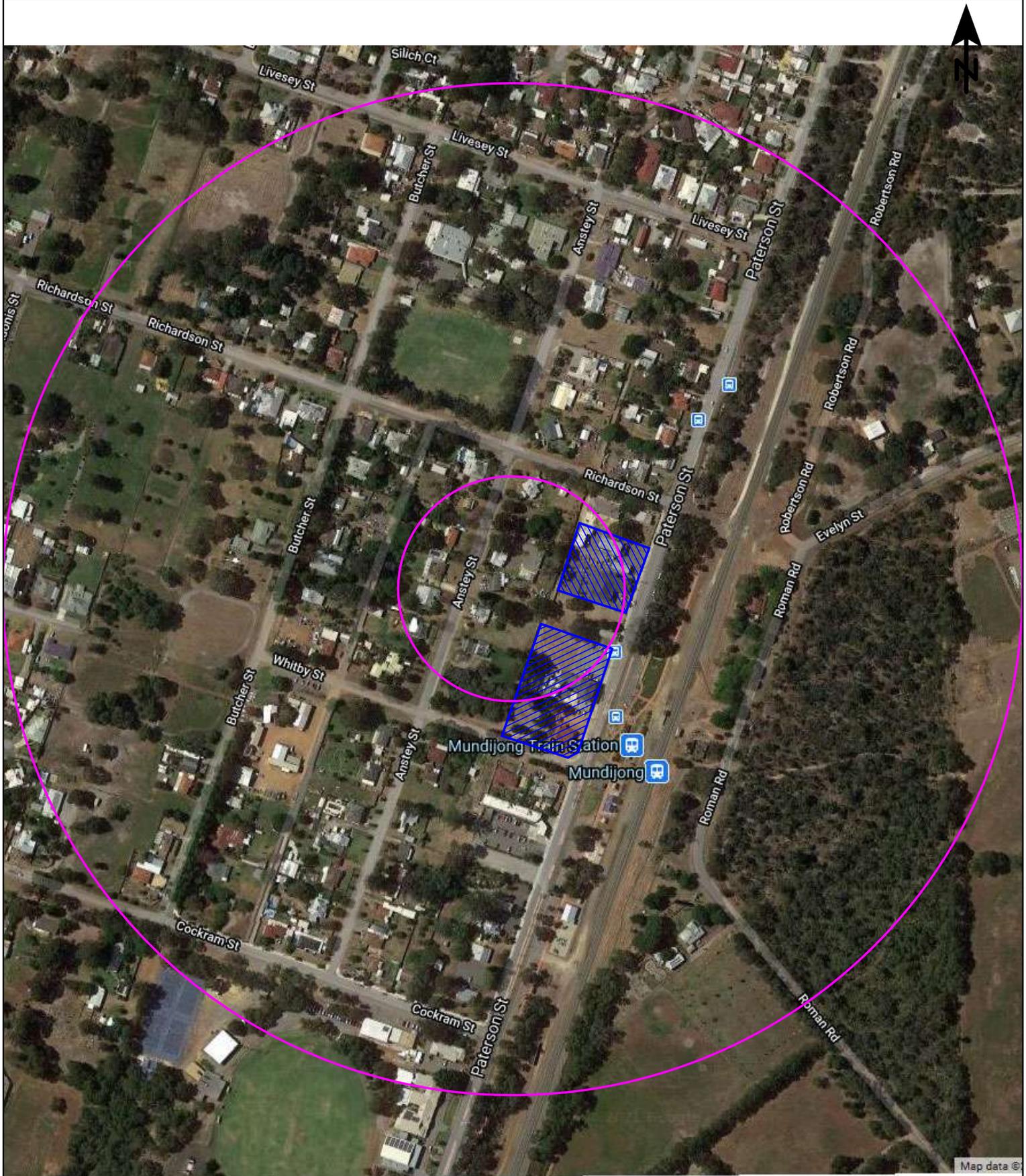
Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>
Noise sensitive premises: highly sensitive area <sup>1</sup>	0700 to 1900 hours Monday to Saturday (Day)	46	56	66
	0900 to 1900 hours Sunday and public holidays (Sunday)	41	51	66
	1900 to 2200 hours all days (Evening)	41	51	56
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	36	46	56
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial	All hours	60	75	80

1. **highly sensitive area** means that area (if any) of noise sensitive premises comprising —
- (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
  - (b) any other part of the premises within 15 metres of that building or that part of the building.

It must be noted the assigned noise levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces but within 15 metres of the house (not a shed).

It is noted the assigned noise levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as *a period of time of not less than 15 minutes, and not exceeding 4 hours*, which is determined by an *inspector or authorised person* to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission. An *inspector or authorised person* is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Environment Regulation. Acoustic consultants or other environmental consultants are not appointed as an *inspector or authorised person*. Therefore, whilst this assessment is based on a 4 hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

# Figure 2-1 Land Use Map



### Legend

- IF Circles, R100
- Commercial Land Use



Project No: 21026105  
 Consultant: OM  
 Date: 09-March-2021  
 SoundPLAN Version: 8.2



**Lloyd George Acoustics**  
 PO Box 717  
 HILLARYS WA 6923  
 (08) 9401 7770

## 2.2 Road and Rail Traffic Noise Intrusion

The criteria relevant to this assessment is the *State Planning Policy No. 5.4 Road and Rail Noise* (hereafter referred to as SPP 5.4) produced by the Western Australian Planning Commission (WAPC). The objectives of SPP 5.4 are to:

- Protect the community from unreasonable levels of transport noise;
- Protect strategic and other significant freight transport corridors from incompatible urban encroachment;
- Ensure transport infrastructure and land-use can mutually exist within urban corridors;
- Ensure that noise impacts are addressed as early as possible in the planning process; and
- Encourage best practice noise mitigation design and construction standards

Table 2-5 sets out noise targets that are to be achieved by proposals under which SPP 5.4 applies. Where the targets are exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.

**Table 2-5 Noise Targets for Noise-Sensitive Land-Use**

Outdoor Noise Target		Indoor Noise Target	
55 dB L <sub>Aeq</sub> (Day)	50 dB L <sub>Aeq</sub> (Night)	40 dB L <sub>Aeq</sub> (Day) (Living and Work Areas)	35 dB L <sub>Aeq</sub> (Night) (Bedrooms)

Notes:

- Day period is from 6am to 10pm and night period from 10pm to 6am.
- The outdoor noise target is to be measured at 1-metre from the most exposed, habitable<sup>1</sup> facade of the noise sensitive building.
- For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonable drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.
- Outdoor targets are to be met at all outdoor areas as far as is reasonable and practicable to do so using the various noise mitigation measures outlined in the Guidelines.

The application of SPP 5.4 is to consider anticipated traffic volumes for the next 20 years from when the noise assessment is undertaken.

In the application of the noise targets, the objective is to achieve:

- indoor noise levels specified in *Table 2-1* in noise-sensitive areas (e.g. bedrooms and living rooms of houses and school classrooms); and
- a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and childcare centres, the design of outdoor areas should take into consideration the noise target.

<sup>1</sup> A habitable room is defined in State Planning Policy 3.1 as a room used for normal domestic activities that includes a bedroom, living room, lounge room, music room, sitting room, television room, kitchen, dining room, sewing room, study, playroom, sunroom, gymnasium, fully enclosed swimming pool or patio.

## 3 METHODOLOGY

### 3.1 Environmental Noise Emissions

Computer modelling has been used to predict noise levels at each nearby receiver. The software used was *SoundPLAN 8.2* with the ISO 9613 (ISO 17534-3 improved method) algorithms selected. These algorithms have been selected as they include the influence of wind and atmospheric stability. Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

#### 3.1.1 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

**Table 3-1 Modelling Meteorological Conditions**

Parameter	Night (1900-0700)	Day (0700-1900)
Temperature (°C)	15	20
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5	Up to 5
Wind Direction*	All	All

\* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

#### 3.1.2 Buildings, Fences and Receivers

Surrounding existing buildings were included in the noise model, as these can provide noise shielding as well as reflection paths.

The childcare centre building was modelled at 3.5 metres high. Other buildings were modelled at 3.5 metres high when single storey (e.g. surrounding houses). All noise sensitive receivers are single storey and were modelled 1.4 metres above ground level.

The play area is noted to have a 2.0m high wall on the north boundary.

### 3.1.3 Topographical Data

Topographical information was based on data publicly available (e.g. *Google*) in the form of spot heights. It is noted the topography is generally flat with no significant differences in elevation between the childcare development and surrounding premises.

### 3.1.4 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. asphalt, concrete) and 1 for acoustically absorbent ground (e.g. grass/sand).

In this instance, a value of 1.0 has been used for the outdoor play areas, 0.6 for the large residential backyards and 0.0 for the car park, roads, pavement, driveways, etc.

### 3.1.5 Source Sound Levels

The sound power levels used in the modelling are provided in *Table 3-2*, noting the following:

- Based on similar projects, three medium AC condensing units were assumed to be required for the various spaces. Each was modelled as a point source located 1.0 metre above roof level.
- Car doors closing were modelled as a point source 1.0 metre above ground level.
- Other mechanical plant includes three exhaust fans (toilets and laundry) and one kitchen exhaust/rangehood fan. All were modelled as point sources 0.5 metres above upper roof level and nominally above the area serviced.
- Child play source levels are based on Guideline 3.0 provided by the Association of Australasian Acoustical Consultants (AAAC) published in September 2020. Where the number of children for individual play areas is specified in the plans, these have been adjusted from the reference source levels using appropriate acoustical calculations. Outdoor child play was modelled as area sources at 1-metre heights above ground level. The sound power levels used in the model were scaled as follows:
  - 20 children aged 0-2 years = 81 dB(A)
  - 10 children aged 2-3 years = 85 dB(A)
  - 15 children aged 3 years or over = 92 dB(A)

Table 3-2 Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Child play 0-2 Years (10 kids), L <sub>10</sub>	54	60	66	72	74	71	67	64	<b>78</b>
Child play 2-3 Years (10 kids), L <sub>10</sub>	61	67	73	79	81	78	74	70	<b>85</b>
Child play 3+ Years (10 kids), L <sub>10</sub>	64	70	75	81	83	80	76	72	<b>87</b>
AC plant, each, L <sub>10</sub>	88	85	80	76	71	68	61	56	<b>78</b>
Toilet / Laundry / Change Exhaust Fan, L <sub>10</sub>	60	65	62	63	60	61	56	53	<b>67</b>
Kitchen exhaust fan, L <sub>10</sub>	50	64	62	70	69	66	62	50	<b>73</b>
Hercules car stacker, each, L <sub>10</sub>	73	72	78	80	73	69	64	-	<b>80</b>
Closing Car Door, L <sub>max</sub>	71	74	77	81	80	78	72	61	<b>84</b>

Combining all of the above, results in the noise model overview shown in *Figure 3-1*.

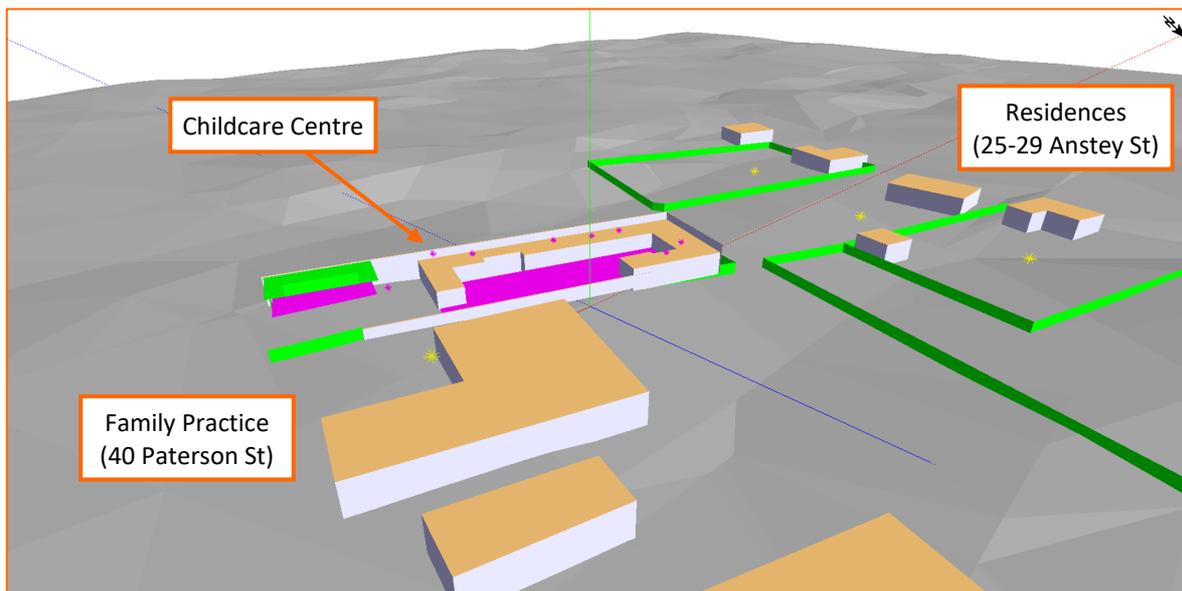


Figure 3-1 Noise Model Overview (North View)

### 3.2 Freight Rail Noise Intrusion

The methodology used in this assessment is to follow the screening assessment procedure provided in the Guidelines of *State Planning Policy 5.4 Road and Rail Noise* (SPP 5.4).

From Table 2 of the Guidelines (refer *Figure 3-2*), noise levels at the east façade of the proposed childcare building, being 90m from the rail line are expected to be 57 dB L<sub>Aeq</sub>(Day). The site is therefore within noise exposure category A+.

It is also noted that the outdoor play area is shielded by the building from the freight rail corridor which is in line with policy requirements.

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	175	200	225	250	275	300						
Strategic freight/major traffic route • 500 or more Class 7-12 Ausroads 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	55	54	53	52	51	50							
	5 to 6 lanes	74	70	68	66	65	64	63	62	61	61	60	59	59	58	58	57	56	55	54	53	52							
	7 to 8 lanes	76	72	69	68	66	65	64	63	62	62	61	60	60	59	58	57	56	55	54	53	52							
	9 to 10 lanes	77	73	70	69	67	66	65	64	63	63	62	61	61	60	59	58	57	56	55	54	53							
	10 or more lanes	78	74	71	70	68	67	66	66	65	64	64	63	62	62	61	60	59	58	57	56	56							
Other significant freight / traffic routes • Any actual or planned future State Administered Road • Local Government Roads Carrying 100 or more Class 7 – 12 Ausroads 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	56	56	55	54	54	53	53	52	51	50	49	48	47						
		3 to 6 lanes	69	66	64	63	62	61	60	59	58	58	57	56	56	55	55	54	53	52	51	50	49						
	Urban Region Scheme areas 100+ km/hr	1 to 2 lanes	70	67	65	64	63	62	61	60	59	59	58	57	57	56	56	55	54	53	52	51	50						
		3 to 6 lanes	74	70	68	66	65	64	63	62	61	61	60	60	59	59	58	57	56	55	54	53	52						
	Rural areas 60-80 km/hr	1 to 2 lanes	62	59	57	56	55	54	53	52	51	51	50	49	49	48	48	46	45	44	43	42	41						
		3 to 4 lanes	66	63	61	60	59	58	56	56	55	54	53	53	52	52	51	50	49	48	47	46	45						
	Rural areas 100+ km/hr	1 to 2 lanes	67	64	62	61	60	59	58	57	56	55	54	54	53	53	52	51	50	49	48	47	46						
	3 to 4 lanes	69	66	64	63	62	61	60	59	58	57	56	56	55	55	54	53	52	51	50	49	48							

Railway Transport Corridor Classification	Forecast period average noise level and exposure category based on distance from nearest rail centreline (m)																	
	adjacent	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200
Passenger railways Fremantle, Midland and Thornlie main lines only	68	64	62	60	59	58	56	56	55	54	53	52	52	51	50	49	48	47
	70	66	64	62	61	60	58	57	56	56	55	54	54	53	52	51	50	49
Freight railways, up to 1 movement per hour	72	68	65	63*	62*	60*	59*	58*	57*	57*	56	55	55	54	53	52	51	50

Figure 3-2 Noise Exposure Forecast from Guidelines

## 4 RESULTS

### 4.1 Outdoor Child Play

The childcare development will host up to 45 children, with play time generally being staggered so that not all children would be playing outside at once for extended periods of time. However, to provide for maximum flexibility, noise levels were predicted for all children playing outside simultaneously for extended periods of time.

The predicted noise levels are summarised in *Table 4-1* and are from child play only i.e. mechanical plant noise is not included (refer *Section 4-2* for details). *Figure 4-1* also shows the predicted noise levels as a noise contour map at ground level.

**Table 4-1 Predicted Noise Levels of Child Play, dB LA10**

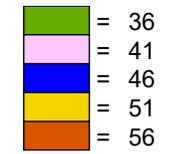
Receiver	0-2 yo	2-3 yo	3+ yo	Combined
25 Anstey St	27	21	24	29
27 Anstey St	27	23	26	30
29 Anstey St	31	26	29	34
Family Practice*	49	44	47	52

\* highest level at this receiver

**Figure 4-1 Outdoor Child Play Noise, All Children Outside, dB LA10**



**Predicted Noise level**



**Legend**



Scale 1:750



Project No: 21026105  
 Consultant: MM  
 Date: 22/07/2022  
 Algorithm: ISO 9613  
 SoundPLAN Version: 8.2



**Lloyd George Acoustics**  
 PO Box 717  
 HILLARYS WA 6923  
 (08) 9401 7770

## 4.2 Mechanical Plant

Mechanical plant consists of AC plant, extraction fans for the kitchen, laundry and toilets and the operation of the car stackers.

At this stage, AC plant and extraction fans have not been designed in detail so that the assessment uses typical plant located on the roof of the building based on guidance from the project architect. The car stacker motor noise is derived from measurements of a similar system installed in a parking garage.

Table 4-2 presents the overall noise levels assuming all plant is operating simultaneously and at full capacity e.g. cold winter day, with the noise contribution from the AC plant alone also provided for reference. Figure 4-2 also shows the predicted overall noise levels as a noise contour map at ground level.

**Table 4-2 Predicted Noise Levels of Mechanical Plant, dB LA10**

Receiver	AC and Fans	Car Stackers Operating	Overall Plant Noise Levels
25 Anstey St	24	11	<b>24</b>
27 Anstey St	26	10	<b>26</b>
29 Anstey St	27	16	<b>27</b>
Family Practice*	40	35	<b>41</b>

\* highest level at this receiver

**Figure 4-2 Mechanical Plant Noise, dB LA10**



**Predicted Noise level**

- = 31
- = 36
- = 41
- = 46
- = 51

**Legend**

- Childcare Centre
- Receiver
- Fence
- Point source
- Car Stackers

Scale 1:750



Project No: 21026105  
 Consultant: MM  
 Date: 22/07/2022  
 Algorithm: ISO 9613  
 SoundPLAN Version: 8.2



**Lloyd George Acoustics**  
 PO Box 717  
 HILLARYS WA 6923  
 (08) 9401 7770

### 4.3 Car Doors Closing

The model includes noise from car doors closing in various parking bays.

Table 4-3 presents the highest predicted noise levels from a car door closing. Figure 4-3 also shows the highest predicted noise levels as a noise contour map at ground level.

**Table 4-3 Predicted Car Door Noise Levels, dB  $L_{Amax}$**

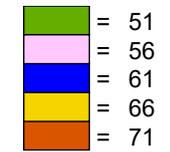
Receiver	Car Doors
25 Anstey St	22
27 Anstey St	18
29 Anstey St	27
Family Practice*	46

\* highest level at this receiver

**Figure 4-3 Car Door Noise, dB  $L_{Amax}$**



**Predicted Noise level**



**Legend**

-  Childcare Centre
-  Receiver
-  Fence
-  Car Door source

Scale 1:750



Project No: 21026105  
 Consultant: MM  
 Date: 22/07/2022  
 Algorithm: ISO 9613  
 SoundPLAN Version: 8.2



**Lloyd George Acoustics**  
 PO Box 717  
 HILLARYS WA 6923  
 (08) 9401 7770

#### 4.4 Indoor Child Play

Noise levels from indoor child play is expected to be below that of outdoor child play considered in *Section 4.1* based on the following considerations:

- Internal noise levels within activity rooms would not exceed those from outdoor play for each age group regardless of windows being opened or closed;
- Any music played within the internal activity areas would be 'light' music with no significant bass content and played at a relatively low level; and,

## 5 ASSESSMENT

### 5.1 Outdoor Child Play

Outdoor child play is considered to only occur during the daytime, that is, after 7.00am. Noise from child play is not considered to contain annoying characteristics within the definition of the Regulations, therefore no adjustments are made to the predicted noise levels.

As a worst-case scenario, all children are initially assumed to play outside simultaneously for extended periods of time (i.e. over 24 minutes), therefore the  $L_{A10}$  assigned noise level is applicable. *Table 5-1* presents the assessment of child play noise against the daytime assigned noise level.

*Table 5-1 Assessment of Predicted Child Play Noise, dB  $L_{A10}$*

Receiver	Assigned Noise Level	Predicted Level	Exceedence
25 Anstey St	46	29	Complies
27 Anstey St	46	30	Complies
29 Anstey St	46	34	Complies
Family Practice	60	52	Complies

From the assessment above, it can be seen that compliance with the daytime  $L_{A10}$  assigned noise level is achieved at all receivers despite the conservative scenario of all children playing outside simultaneously for extended periods. Therefore, no further control measures are required.

## 5.2 Mechanical Plant

Given the proposed hours of operations, the AC plant, all extractions fans and car stackers were assumed to be operating simultaneously before 7.00 am as a worst-case scenario.

Table 5-2 presents the assessment of the noise emissions from mechanical plant against the night-time assigned noise level. In this case, the source to noise sensitive receiver distances are in the order of 60-80 metres, therefore even before 7.00am, noise was not considered to be tonal when assessed at the residences.

**Table 5-2 Assessment of Predicted Mechanical Plant Noise, dB LA10**

Receiver	Night-time Assigned Noise Level	Predicted Level	Exceedence
25 Anstey St	36	24	Complies
27 Anstey St	36	26	Complies
29 Anstey St	36	27	Complies
Family Practice	60	46*	Complies

\* Predicted level adjusted by +5 dB for tonality

Based on the assessment in Table 5-2, it can be seen that compliance is predicted at all times and at all receivers. Even if tonality were considered, compliance would be achieved.

To ensure compliance at detailed design, the following noise controls should be considered:

- Outdoor condensers to be the quietest available, and
- Car stacker selected to be quietest available and to utilise soft closing systems on latches and gates.
- Select AC units which can operate on a 'low noise mode' prior to 7am, or potentially not operate before 7am, and
- Consider locating the kitchen exhaust fan within the ceiling space and ducted to the roof, with the roof cowl then located furthest away from sensitive receivers. Allow for silencers or acoustic flexible ducts on the outside air side of all exhaust fans, and
- All plant to be mounted on suitable anti-vibration mounts.

The above could be reviewed during detailed design/building permit stage when mechanical plant selection and layout is known.

### 5.3 Car Doors

Car doors closing are short duration events and were therefore assessed against the  $L_{Amax}$  assigned noise level. Given the proposed hours of operation, staff members and parents can arrive before 7.00am, when the night-time assigned noise level is 56 dB  $L_{Amax}$ .

In this case, the source to noise sensitive receiver distances are in the order of 75-100 metres, therefore car doors are not considered to be impulsive within the definition of the Regulations when assessed at these sensitive receivers. Therefore, no adjustment was applied to the predicted noise levels, except for those predicted at the family practice.

Table 5-4 presents the assessment of the highest noise emissions from car door noise at each receiver against the night-time assigned noise level.

**Table 5-3 Assessment of Car Doors Noise, dB  $L_{Amax}$**

Receiver	Night-time Assigned Noise Level	Predicted Level	Exceedence
25 Anstey St	56	22	Complies
27 Anstey St	56	18	Complies
29 Anstey St	56	27	Complies
Family Practice	80	56*	Complies

\* predicted level adjusted by +10 dB for impulsiveness

Based on the assessment in Table 5-4, it can be seen that compliance is predicted to be achieved at all surrounding receivers.

### 5.4 Rail Noise Intrusion

As described in Section 3.2, the childcare centre building falls within noise exposure category A+ in relation to the freight rail.

Table 5-5 provides the deemed-to-comply solution to be implemented to the childcare building based on the SPP 5.4 Guidelines. It is noted that since the premises subjected to noise is a childcare centre, the indoor noise target for living areas was considered applicable to activities or indoor play areas, and that of bedrooms to apply to cot rooms (where present).

In addition, it is noted that given the orientation and design of the childcare building, play areas would be subjected to noise levels within the outdoor target. Therefore, the Policy objective to have at least one outdoor area below the target is considered achieved. Furthermore all facing activity rooms are noted to be sufficient distance from the freight line to achieve compliance with the outdoor target.

With regards to the  $R_w + C_{tr}$  ratings and associated recommendations, these are taken from the Guidelines. Where a glazier can achieve the rating with a different construction, this can be accepted if supplied with laboratory certification.

Table 5-4 External Construction Requirements

Element	Room	Package A+ (Childcare Building)
Walls	All	Masonry construction to achieve $R_w + C_{tr}$ of 50 e.g. 150mm concrete tilt panel or double leaves of 90mm thick clay brick masonry with minimum 50mm cavity between leaves.
Glazing	All East facing glazing	Glazing to comprise of 6mm thick glass minimum. All operable glazing including sliding doors to incorporate acoustic seals.
Roof/Ceiling	Activity and Sleep Rooms	Metal sheet roof with one layer of 10mm thick plasterboard with R4.0 minimum fibrous insulation above.
Other	Outdoor Living Areas	At least one outdoor living/playing area is shielded to the freight corridor and therefore compliant with the objectives of the Policy.
	Ventilation	Fresh air requirements to be satisfied on the basis of windows closed.
	Notification	Notification on lot title required.

## 6 CONCLUSIONS

The noise impacts from the proposed childcare centre to be located at Lot 29 (#38) Paterson Street in Mundijong have been assessed against the relevant criteria of the *Environmental Protection (Noise) Regulations 1997* and *State Planning Policy 5.4 Road and Rail Noise*.

Based on the modelling and assessments in relation to the noise emissions from child play, mechanical plant and car doors closing, compliance is predicted to be achieved at the surrounding receivers without specific noise controls.

Separate to the above and not required for compliance, the following best practices in relation to child play should be implemented:

- The behaviour and 'style of play' of children should be monitored to prevent particularly loud activity e.g. loud banging/crashing of objects, 'group' shouts/yelling,
- Favour soft finishes in the outdoor play area to minimise impact noise (e.g. soft grass, sand pit(s), rubber mats) over timber or plastic,
- Favour soft balls and rubber wheeled toys,
- Crying children should be taken inside to be comforted,
- No amplified music to be played outside,
- External doors and windows to be closed during indoor activity / play, and
- Any music played within the internal activity areas to be 'light' music with no significant bass content and played at a relatively low level.

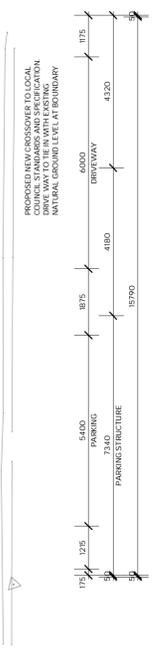
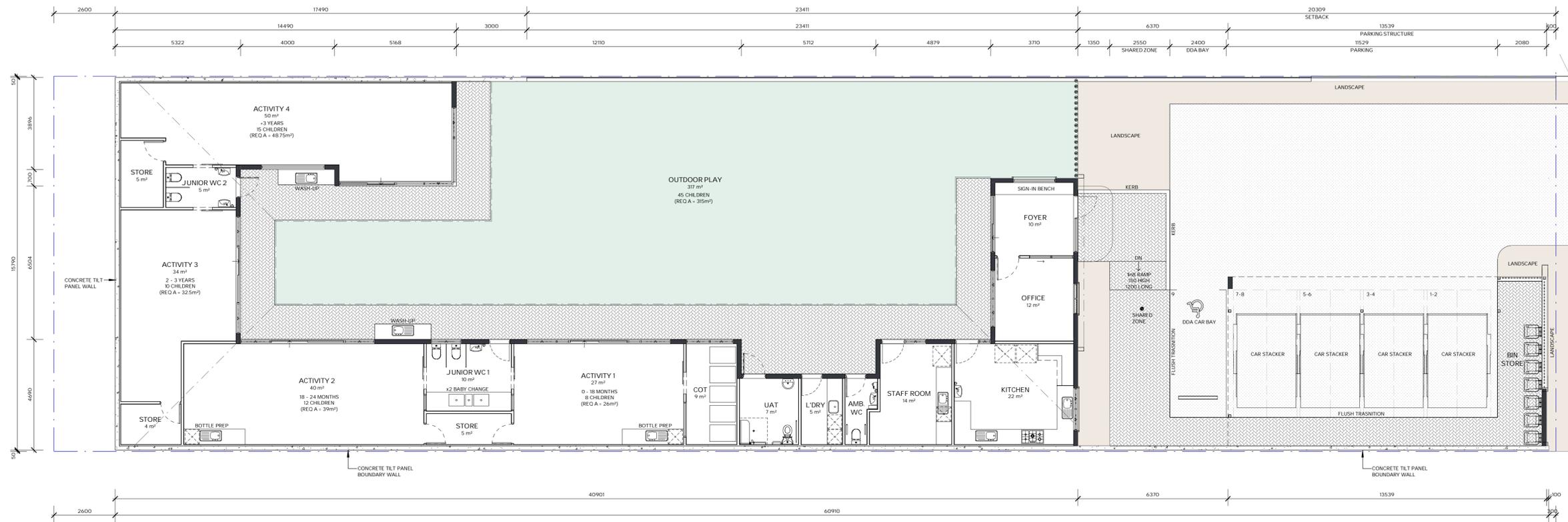
With regard to mechanical plant noise, while compliance is predicted to be achieved, the following is to be considered, and reviewed, during detailed design:

- Outdoor condensers to be the quietest available, and
- Select AC units which can operate on a 'low noise mode' prior to 7am, and
- Car stacker selected to be quietest available and to utilise soft closing systems on latches and gates, and
- Consider locating the kitchen exhaust fan within the ceiling space and ducted to the roof, with the roof cowl then located furthest away from sensitive receivers. Allow for silencers or acoustic flexible ducts on the outside air side of all exhaust fans, and
- All plant to be mounted on suitable anti-vibration mounts.

Finally, rail traffic noise impacts have been assessed against *State Planning Policy No. 5.4 Road and Rail Noise*, noting that the childcare building is located within noise exposure category A+. The construction requirements described in *Table 5-5* are to be implemented.

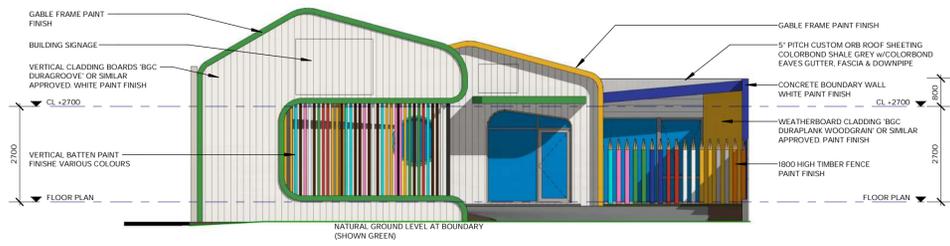
**Appendix A**

**Development Plans**



**FLOOR PLAN**  
SCALE 1:100

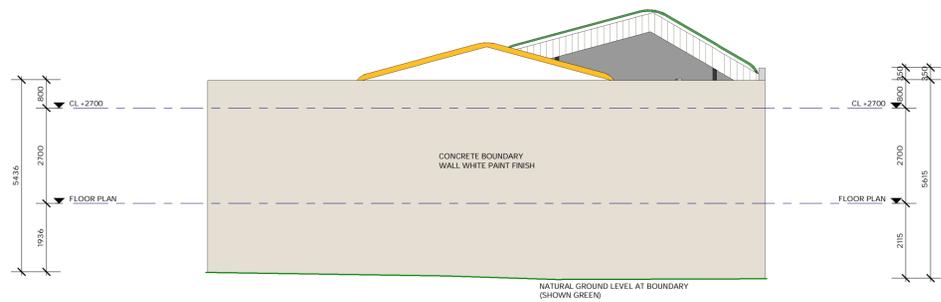




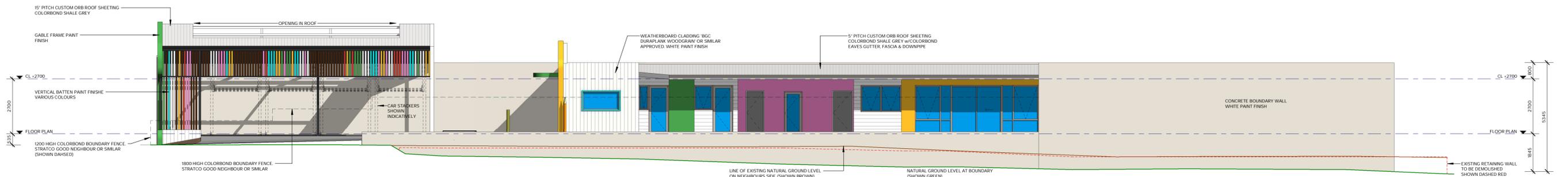
**FRONT (EAST) ELEVATION**  
SCALE 1:100



**STREET PERSPECTIVE**



**REAR (WEST) ELEVATION**  
SCALE 1:100



**NORTH ELEVATION**  
SCALE 1:100



**SOUTH ELEVATION**  
SCALE 1:100



# M2639 MUNDIJONG CHILD CARE

ALL DIMENSIONS SHALL BE CHECKED ON SITE BEFORE COMMENCING ANY WORK. FIGURED DIMENSIONS SHALL BE USED. DIMENSIONS NOT TO BE SCALED FROM DRAWINGS. ANY DISCREPANCIES MUST BE REFERRED TO THIS OFFICE OR NO RESPONSIBILITY WILL BE TAKEN BY MOTIVO DESIGN STUDIO. ANY CHANGES MUST BE REFERRED TO THIS OFFICE FOR AUTHORISATION. IMAGES ARE DIAGRAMMATIC. HARDWARE AND ACCESSORIES DEPICTED IN THESE IMAGE ONLY MAY NOT RESEMBLE THE FINAL PRODUCT AND TO BE USED AS EXAMPLE ONLY. ALL IMAGES, DESIGN WORK AND PLANS ARE COPYRIGHT PROTECTED AND MAY NOT BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF MOTIVO DESIGN STUDIO PTY LTD.

PROJECT ADDRESS  
 LOT 29 No. 38 PATERSON STREET,  
 MUNDIJONG WA 6123

SCALE DRAWING # PAGE SIZE  
 DA03 A3

ISSUE FOR REVIEW

23/06/22



Motivo Design Studio Pty Ltd  
 (a/cn) 147302056 (a/bn) 37812732103  
 (p/h) +61 08 9204 5090 (m) +61 0403 227 990  
 (e) info@motivodesignstudio.com.au  
 (w) www.motivodesignstudio.com.au  
 (o/office) First Floor U1/#22 King Edward Rd, Osborne Park, WA 6008  
 (p/office) PO Box 2005 Yokine South Post Office, WA 6060



# M2639 MUNDIJONG CHILD CARE

PROJECT ADDRESS  
 LOT 29 No. 38 PATERSON STREET,  
 MUNDIJONG WA 6123

SCALE DRAWING # PAGE SIZE  
 DA04 A3

ISSUE FOR REVIEW

23/06/22



**motivo**  
DESIGN STUDIO

Motivo Design Studio Pty Ltd  
 (acn) 147302056 | (abn) 37812732103  
 (ph) +61 08 9204 5090 | (m) +61 0403 227 990  
 (e) info@motivodesignstudio.com.au  
 (w) www.motivodesignstudio.com.au  
 (office) First Floor U1/#22 King Edward Rd, Osborne Park, WA 6006  
 (postal) PO Box 2005 Yokine South Post Office, WA 6060

ALL DIMENSIONS SHALL BE CHECKED ON SITE BEFORE COMMENCING ANY WORK. FIGURED DIMENSIONS SHALL BE USED. DIMENSIONS NOT TO BE SCALED FROM DRAWINGS. ANY DISCREPANCIES MUST BE REFERRED TO THIS OFFICE OR NO RESPONSIBILITY WILL BE TAKEN BY MOTIVO DESIGN STUDIO. ANY CHANGES MUST BE REFERRED TO THIS OFFICE FOR AUTHORISATION. IMAGES ARE DIAGRAMMATIC. HARDWARE AND ACCESSORIES DEPICTED IN THESE IMAGE ONLY MAY NOT RESEMBLE THE FINAL PRODUCT AND TO BE USED AS EXAMPLE ONLY. ALL IMAGES, DESIGN WORK AND PLANS ARE COPYRIGHT PROTECTED AND MAY NOT BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF MOTIVO DESIGN STUDIO PTY LTD.



# M2639 MUNDIJONG CHILD CARE

PROJECT ADDRESS  
 LOT 29 No. 38 PATERSON STREET,  
 MUNDIJONG WA 6123

SCALE DRAWING # PAGE SIZE  
 DA05 A3

ISSUE FOR REVIEW

23/06/22

Motivo Design Studio Pty Ltd  
 (a/n) 147302056 (a/bn) 37812732103  
 (p/h) +61 08 9204 5090 (m) +61 0403 227 990  
 (e) info@motivodesignstudio.com.au  
 (w) www.motivodesignstudio.com.au  
 (o/office) First Floor U1/#22 King Edward Rd, Osborne Park, WA 6008  
 (p/office) PO Box 2005 Yokine South Post Office, WA 6060

ALL DIMENSIONS SHALL BE CHECKED ON SITE BEFORE COMMENCING ANY WORK. FIGURED DIMENSIONS SHALL BE USED. DIMENSIONS NOT TO BE SCALED FROM DRAWINGS. ANY DISCREPANCIES MUST BE REFERRED TO THIS OFFICE OR NO RESPONSIBILITY WILL BE TAKEN BY MOTIVO DESIGN STUDIO. ANY CHANGES MUST BE REFERRED TO THIS OFFICE FOR AUTHORISATION. IMAGES ARE DIAGRAMMATIC. HARDWARE AND ACCESSORIES DEPICTED IN THESE IMAGE ONLY MAY NOT RESEMBLE THE FINAL PRODUCT AND TO BE USED AS EXAMPLE ONLY. ALL IMAGES, DESIGN WORK AND PLANS ARE COPYRIGHT PROTECTED AND MAY NOT BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF MOTIVO DESIGN STUDIO PTY LTD.

**Appendix B**

**Terminology**

The following is an explanation of the terminology used throughout this report.

### **Decibel (dB)**

The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

### **A-Weighting**

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as  $L_A$  dB.

### **Sound Power Level ( $L_w$ )**

Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

### **Sound Pressure Level ( $L_p$ )**

The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

### **$L_{ASlow}$**

This is the noise level in decibels, obtained using the A frequency weighting and the S (Slow) time weighting as specified in IEC 61672-1:2002. Unless assessing modulation, all measurements use the slow time weighting characteristic.

### **$L_{AFast}$**

This is the noise level in decibels, obtained using the A frequency weighting and the F (Fast) time weighting as specified in IEC 61672-1:2002. This is used when assessing the presence of modulation only.

### **$L_{APeak}$**

This is the greatest absolute instantaneous sound pressure in decibels using the A frequency weighting as specified in IEC 61672-1:2002.

### **$L_{Amax}$**

An  $L_{Amax}$  level is the maximum A-weighted noise level during a particular measurement.

### **$L_{A1}$**

An  $L_{A1}$  level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

### **$L_{A10}$**

An  $L_{A10}$  level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "intrusive" noise level.

**$L_{Aeq}$** 

The equivalent steady state A-weighted sound level (“equal energy”) in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the “average” noise level.

 **$L_{A90}$** 

An  $L_{A90}$  level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the “background” noise level.

**One-Third-Octave Band**

Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

 **$L_{Amax}$  assigned level**

Means an assigned level which, measured as a  $L_{A\ Slow}$  value, is not to be exceeded at any time.

 **$L_{A1}$  assigned level**

Means an assigned level which, measured as a  $L_{A\ Slow}$  value, is not to be exceeded for more than 1% of the representative assessment period.

 **$L_{A10}$  assigned level**

Means an assigned level which, measured as a  $L_{A\ Slow}$  value, is not to be exceeded for more than 10% of the representative assessment period.

**Tonal Noise**

A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

- (a) the A-weighted sound pressure level in any one-third octave band; and
- (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as  $L_{Aeq,T}$  levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as  $L_{A\ Slow}$  levels.

This is relatively common in most noise sources.

**Modulating Noise**

A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

- (a) is more than 3 dB  $L_{A\ Fast}$  or is more than 3 dB  $L_{A\ Fast}$  in any one-third octave band;
- (b) is present for at least 10% of the representative.

**Impulsive Noise**

An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between  $L_{A\ peak}$  and  $L_{A\ Max\ slow}$  is more than 15 dB when determined for a single representative event;

**Major Road**

Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

**Secondary / Minor Road**

Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

**Influencing Factor (IF)**

$$= \frac{1}{10} (\% \text{ Type A}_{100} + \% \text{ Type A}_{450}) + \frac{1}{20} (\% \text{ Type B}_{100} + \% \text{ Type B}_{450})$$

where:

% Type A<sub>100</sub> = the percentage of industrial land within  
a 100m radius of the premises receiving the noise

% Type A<sub>450</sub> = the percentage of industrial land within  
a 450m radius of the premises receiving the noise

% Type B<sub>100</sub> = the percentage of commercial land within  
a 100m radius of the premises receiving the noise

% Type B<sub>450</sub> = the percentage of commercial land within  
a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

**Representative Assessment Period**

Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

**Background Noise**

Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

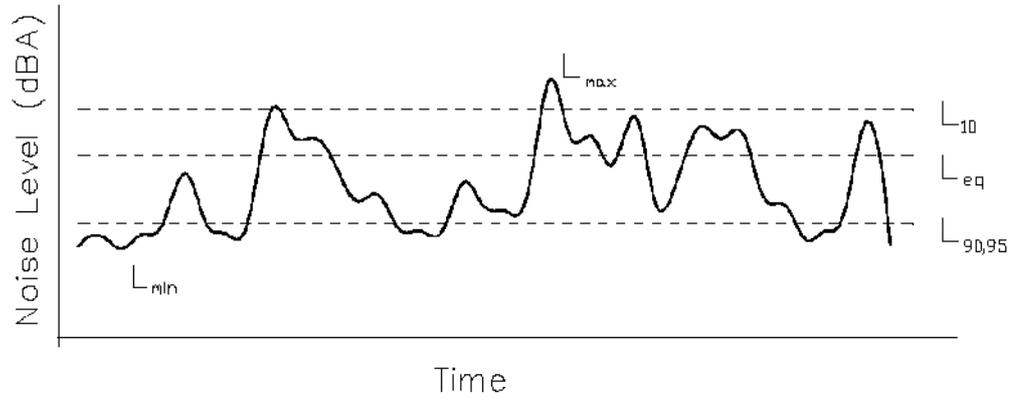
**Ambient Noise**

Means the level of noise from all sources, including background noise from near and far and the source of interest.

**Specific Noise**

Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest.

**Chart of Noise Level Descriptors**



**Typical Noise Levels**

