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Environmental Noise Assessment - Childcare Centre

Lots 143 (#34) & 144 (#36) St Michael Terrace, Mount Pleasant

Reference: 24119666-01

Prepared for:
Ray Pardo C/- Element Advisory

Association of Australasian Acoustical Consultants

Reference: 24119666-01

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EXECUTIVE SUMMARY

Lloyd George Acoustics was engaged by Ray Pardo C/- Element Advisory to undertake a noise assessment for a proposed childcare centre (CCC) to be located at Lots 143 (#34) & 144 (#36) St Michael Terrace, Mount Pleasant. This report considered noise emissions from the proposed childcare centre to surrounding properties by way of noise modelling of child play, mechanical plant and car door closings.

Outdoor Child Play

Three different fencing options were included in the assessment of the outdoor child play noise, with all options predicted to achieve compliance at the nearby residences. The variation provided is based on whether strict compliance is required at the primary school, given this generates similar types of noise. This is to be discussed with stakeholders to determine an appropriate outcome. Where fencing is noted as solid, it is to be free of any gaps and have a minimum surface mass of 8 kg/m^2. Such material includes brick, limestone or double sheeted *Colorbond*. For areas where visual permeability is required, sound-rated plexiglass can be used.

Mechanical Plant

The mechanical plant assessment was based on assumptions in relation to the number, location, size and type of mechanical plant. Based on these assumptions, the plant was shown to exceed the assigned levels at multiple locations, although it was determined that compliance can be practicably achieved by including the following:

- For the condensing units:
  - install screening at a minimum of 1.8m high on the west side of the units; and
  - apply a 'night' / 'quiet' mode to reduce the noise levels by a minimum of 5 dB during the night period.
- For the kitchen exhaust:
  - install a residential spec range hood; or
  - only operate after 7am.

Once the mechanical plant has been designed and selected, noise is to be reviewed by a suitably qualified acoustical consultant.

Car Doors

The predicted noise from car door closings is compliant provided all bays (not including three bays located on the north side) are located under a roofed section of the basement with no openings.

1. INTRODUCTION

Lloyd George Acoustics was engaged by Ray Pardo C/- Element Advisory to undertake an environmental noise assessment for a proposed childcare centre (CCC) to be located at Lots 143 (#34) & 144 (#36) St Michael Terrace, Mount Pleasant (refer *Figure* 1-1) with the site plan shown in *Figure 1-2* and full Development Application (DA) plans provided in *Appendix A*. The purpose of this report is to consider noise emissions from the proposed childcare centre to surrounding properties.

Figure 1-1: Subject Site Location (Source: DPLH PlanWA)

The proposed childcare centre will be open Monday to Friday, 6.30am to 6.30pm and consist of the following:

- Six internal teaching spaces capable of accommodating up to 113 children, grouped as follows:
  - Activity 1: 15 places for children aged 2-3 years;
  - Activity 2: 20 places for children aged 2-3 years;
  - Activity 3: 30 places for children aged 3+ years;
  - Activity 4: 20 places for children aged 3+ years;
  - Activity 5: 12 places for children aged 0-1 years; and
  - Activity 6: 16 places for children aged 1-2 years.
- Outdoor play areas (not used prior to 7.00am);
- Amenities and associated mechanical plant such as:
  - Kitchen exhaust fan assumed to be located on roof above;
  - Various exhaust fans (toilets, laundry, nappy room) assumed to be located on the roof above;
  - Air-conditioning (AC) plant, assumed to located on the roof above Activity 3 teaching space.
- Car parking in the basement.

Figure 1-2: Proposed Site Plan

With regard to noise emissions, consideration is given to noise from child play, mechanical services and closing car doors at neighbouring properties, against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997*.

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

2. CRITERIA

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

2.1. Regulations 7, 8 & 9

This group of regulations defines the prescribed standard for noise emissions applicable to child play, mechanical services and car door closing as follows:

*"**7. Prescribed standard for noise emissions***

(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; and

(ii) impulsiveness; and

(iii) modulation,

when assessed under regulation 9.

(2) For the purposes of subregulation (1)(a), 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 at the point of reception."

Tonality, impulsiveness and modulation are defined in regulation 9 (refer *Appendix B*). Under regulation 9(3), *"Noise is taken to be free of the characteristics of tonality, impulsiveness and modulation 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(1)(a) after the adjustments in the table [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

* These adjustments are cumulative to a maximum of 15 dB.

The assigned levels (prescribed standards) for all premises are specified in regulation 8(3) and are shown in *Table 2-2*. The L_{A10} assigned level is applicable to noises present for more than 10% of a representative assessment period, generally applicable to "steady-state" noise sources. The L_{A1} is for short-term noise sources present for less than 10% and more than 1% of the time. The L_{Amax} assigned level is applicable for incidental noise sources, present for less than 1% of the time.

Table 2-2 Baseline Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	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 Premises	All hours	60	75	80
Industrial and Utility Premises	All hours	65	80	90

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.

The influencing factor (IF), in relation to noise received at noise sensitive premises, has been calculated as 0 dB. *Table 2-3* shows the assigned levels including the influencing factor at the receiving locations.

Note that the primary school at 29 Queens Road is considered a noise sensitive premises and that strict compliance is required at this locality and at 15m from a building.

Table 2-3 Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
0 dB IF Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45	55	65
	0900 to 1900 hours Sunday and public holidays (Sunday)	40	50	65
	1900 to 2200 hours all days (Evening)	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35	45	55

It must be noted the assigned levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces.

The assigned 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, 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 Water Environmental 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.

2.2. Regulation 3

*"**3. Regulations do not apply to certain noise emissions***

(1) Nothing in these regulations applies to the following noise emissions –

(a) Noise emissions from the propulsion and braking systems of motor vehicles operating on a road;"

The childcare centre car park is considered a road and therefore vehicle noise (propulsion and braking) is not assessed. Noise from vehicle car doors however are applicable, since these are not part of the propulsion or braking system.

2.3. Regulation 14A

"14A. Waste Collection and Other Works

(2) Regulation 7 does not apply to noise emitted in the course of carrying out class 1 works if –

(a) The works are carried out in the quietest reasonable and practicable manner; and

(b) The equipment used to carry out the works is the quietest reasonably available;

class 1 works means specified works carried out between -

(a) 0700 hours and 1900 hours on any day that is not a Sunday or a public holiday; or

(b) 0900 hours and 1900 hours on a Sunday or public holiday.

specified works means -

(a) The collection of waste; or

(b) The cleaning of a road or the drains for a road; or

(c) The cleaning of public places, including footpaths, cycle paths, car parks and beaches;"

In the case where specified works are to be carried out outside of class 1, a noise management plan is to be prepared and approved by the CEO.

3. METHODOLOGY

Computer modelling has been used to predict the noise emissions from the development to all nearby receivers. The software used was *SoundPLAN 9.0* with the ISO 9613 algorithms (ISO 17534-3 improved method) selected, as they include the influence of wind and are considered appropriate given the relatively short source to receiver distances. Input data required in the model are listed below and discussed in *Section 3.1* to *Section 3.5*:

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

3.1. Meteorological Conditions

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	Day (7.00am to 7.00pm)	Night (7.00pm to 7.00am)
Temperature (°C)	20	15
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5	Up to 5
Wind Direction*	All	All

* The modelling package allows for all wind directions to be modelled simultaneously.

Alternatives to the above default conditions can be used where one year of weather data is available and the analysis considers the worst 2% of the day and night for the month of the year in which the worst-case weather conditions prevail (source: *Draft Guideline on Environmental Noise for Prescribed Premises*, May 2016). In most cases, the default conditions occur for more than 2% of the time and therefore must be satisfied.

3.2. Topographical Data

Topographical data was adapted from publicly available information (e.g. *Google*) in the form of spot heights and combined with the site plan.

Surrounding existing buildings were also incorporated in the noise model, as these can provide noise shielding as well as reflection paths. Single storey buildings are modelled with a height of 3.5-metres and any double storey buildings identified assumed to be 7.0-metres in height with receivers 1.4-metres above floor level.

3.3. Fencing

Three different fencing options have been included in the assessment as shown in *Table 3-2*. This fencing is to be solid, free of any gaps and have a minimum surface mass of 8 kg/m^2. Such material includes brick, limestone or double sheeted *Colorbond*. For areas where visual permeability is required, sound-rated plexiglass can be used. The three fence options were developed to:

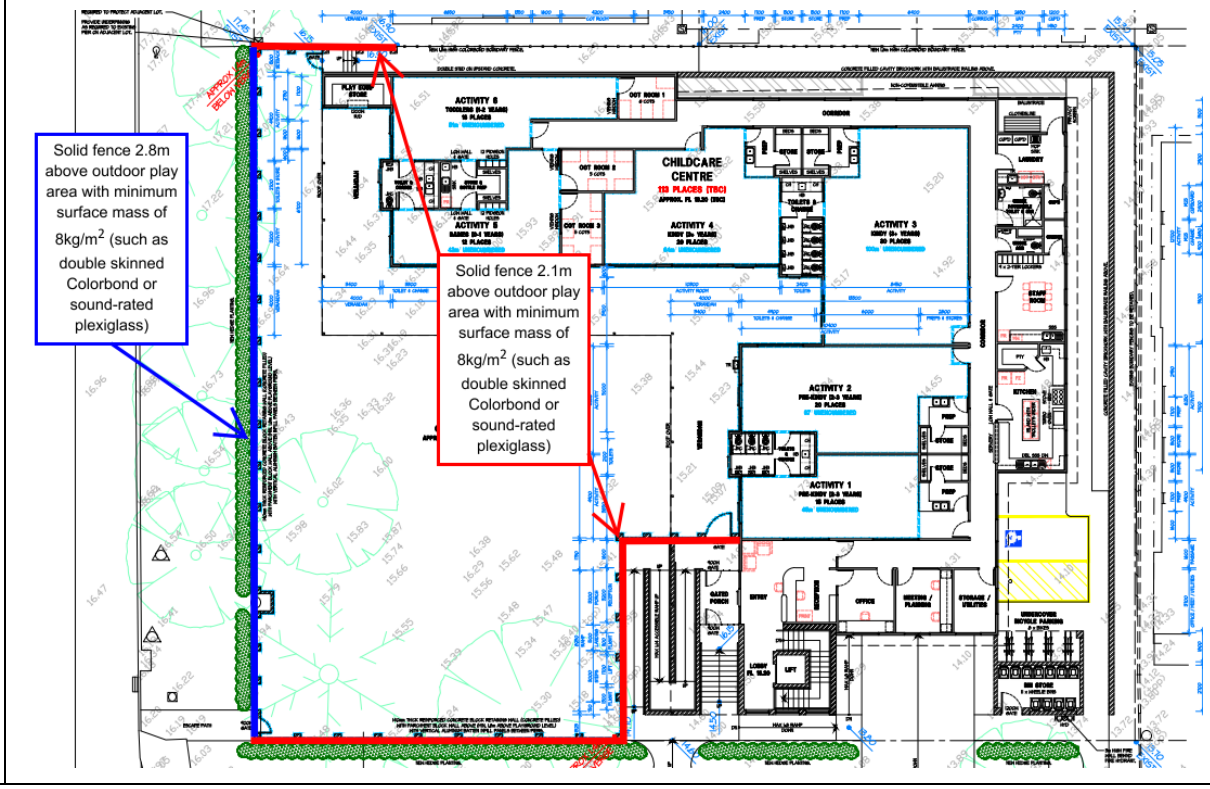
- A – Achieve strict compliance at all noise sensitive premises, including the primary school (within 15 metres of a building);
- B – Achieve compliance at all residences and within 1 metre of a building associated with the primary school, but not at all locations 15 metres from a school building; and
- C – Achieve compliance at all residences only.

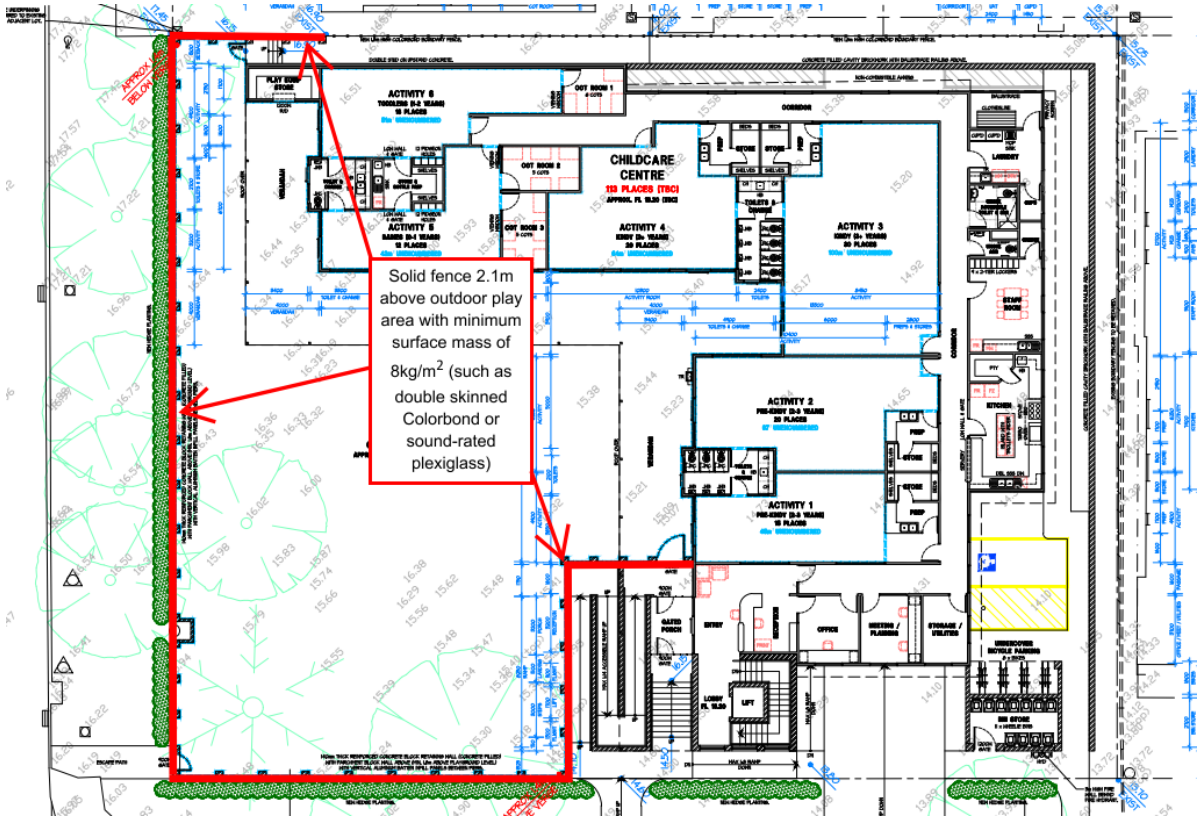
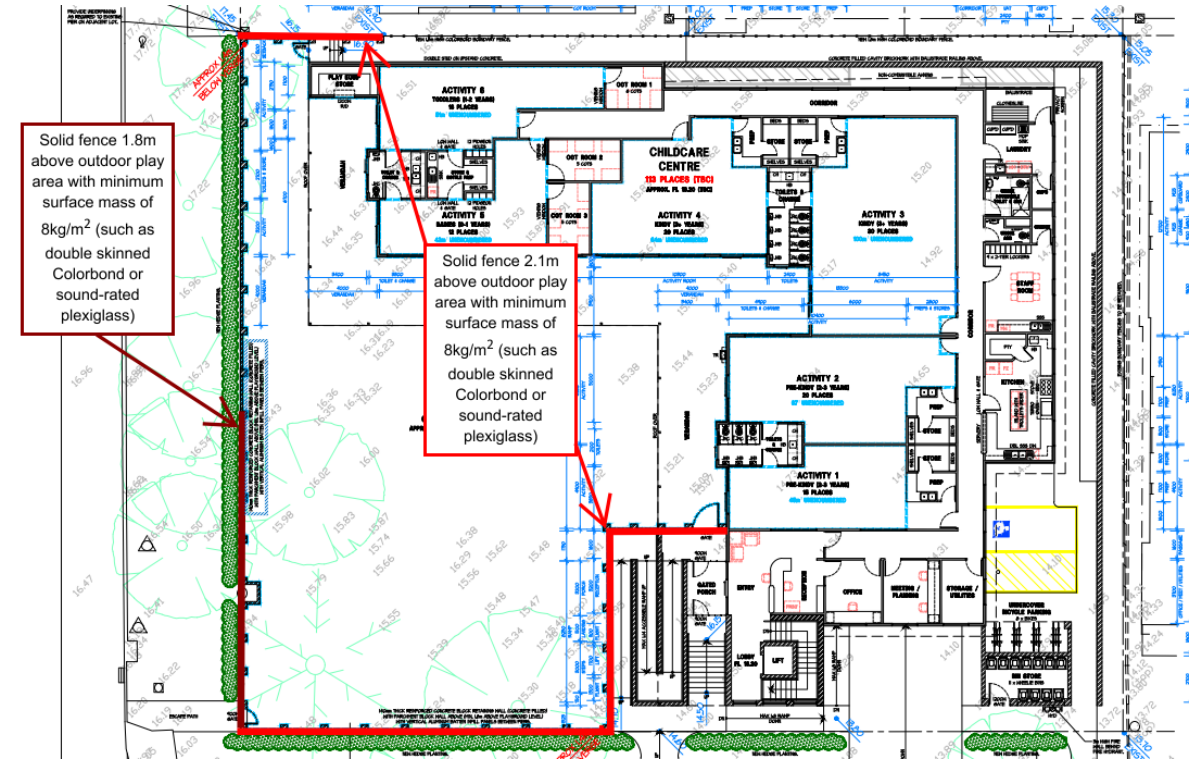
By presenting the three options, discussions can be had with relevant stakeholders on the necessity to achieve compliance at the primary school.

All other fencing is assumed to be standard *Colorbond*. Whilst *Colorbond* fencing is 1.8 metres high, it is modelled as 1.6 metres high to take into account the lightweight nature of the product and potential lesser acoustic performance compared to a denser product.

Figure 3-1 shows a 2D overview of the noise model with the location of all relevant receivers identified. Pink dots represent mechanical sources in the noise model with the pink polygon representing child play.

Table 3-2: Fencing Options

Fencing Option	Figure
A	

Fencing Option	Figure
B	
C	

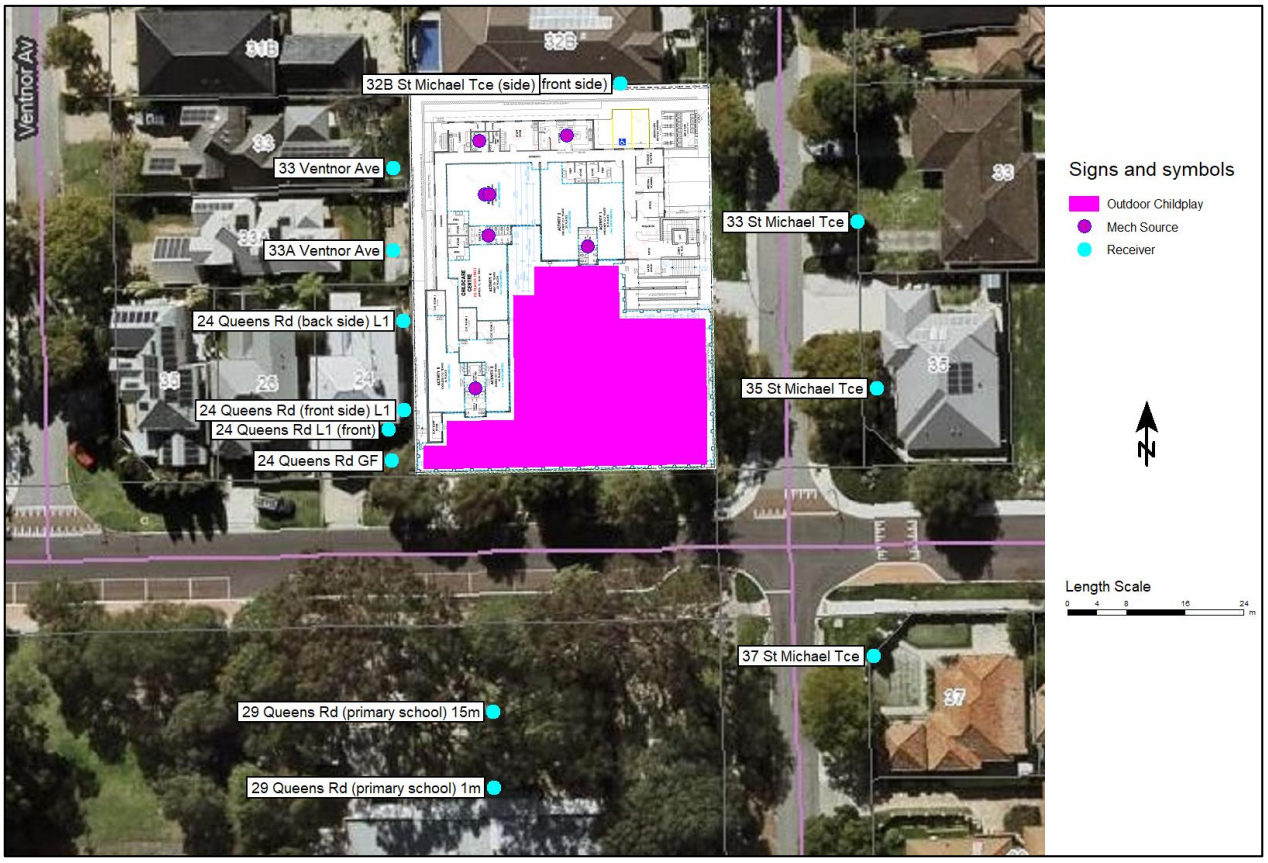


Figure 3-1: Overview of Noise Model

3.4. Ground Absorption

The ground absorption has been assumed to be 0.0 (0%) for the roads, 0.5 (50%) outside of the roads and 1.0 (100%) for the play areas, noting that 0.0 represents hard reflective surfaces such as water and 1.0 represents absorptive surfaces such as grass.

3.5. Source Sound Levels

The source sound power levels used in the modelling are provided in *Table 3-3*.

Table 3-3: Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Babies Play Aged 0-2 Years (10 kids), L_{10}	54	60	66	72	74	71	67	64	**78**
Toddler Play Aged 2-3 Years (10 kids), L_{10}	61	67	73	79	81	78	74	70	**85**
Kindy Play Aged 3+ Years (10 kids), L_{10}	64	70	75	81	83	80	76	72	**87**
AC Plant, double fan unit (each), L_{10}	72	74	68	69	63	61	53	47	**70**
General Exhaust Fans (each), L_{10}	60	65	62	63	60	61	56	53	**67**
Kitchen Exhaust Fan, L_{10}	50	64	61	70	69	66	62	50	**73**
Closing Car Door (each), L_{max}	71	74	77	81	80	78	72	61	**84**

The following is noted in relation to *Table 3-3*:

- Child play source levels are based on *Guideline for Childcare Centre Acoustic Assessments Version 3.0* produced by the Association of Australasian Acoustical Consultants (AAAC) published 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 1.0-metre above ground level. The sound power levels used in the model were scaled as follows:
  - 28 children aged 0-2 years = 82 dB(A);
  - 35 children aged 2-3 years = 90 dB(A);
  - 50 children aged 3+ years = 94 dB(A).
- Based on the AAAC Guideline 3.0, source sound power levels for AC condensing units were assumed. Medium sized (double fan) outdoor units were deemed appropriate with two (2) modelled as point sources 1.0 metre above roof level of the Activity 3 room.
- Other mechanical plant includes four (4) exhaust fans (toilets and laundry) and one kitchen exhaust fan. All were modelled as point sources approximately 0.5 metres above roof level and above the area serviced.
- Car doors closing from three car bays located on the north side of the basement were modelled as a point source 1.0-metre above ground level. All other car door closings that will occur within the basement are located under a roofed section of the basement and are therefore not considered to have a significant impact. Since noise from a car door closing is a short term event, only the L_{Amax} level is applicable.

4. RESULTS AND ASSESSMENT

4.1. Outdoor Child Play Noise

The childcare development will host up to 113 children. It is noted play time is generally staggered and therefore not all children would be playing outside at once for extended periods of time. However, noise levels were conservatively predicted for all children playing simultaneously, as a worst-case scenario. The critical assigned level is during the day, as whilst the childcare centre will open at 6.30am, child play will not commence until after 7.00am. Noise from child play is not considered to contain annoying characteristics within the definition of the Regulations and therefore no adjustments are made to the predicted noise levels.

To understand the noise impact of changing the height/extent of the south boundary fence, predominantly affecting noise impacts to the primary school, three different fencing options (as shown in *Table 3-2*) have been included in the assessment of the outdoor child play noise as follows:

- Scenario 1 – Outdoor Child Play Noise with Fencing Option A – full compliance at residences and primary school
- Scenario 2 - Outdoor Child Play Noise with Fencing Option B – full compliance at residences and partial compliance at primary school
- Scenario 3 – Outdoor Child Play Noise with Fencing Option C – full compliance at residences only.

4.1.1. Scenario 1 – Outdoor Child Play Noise with Fencing Option A

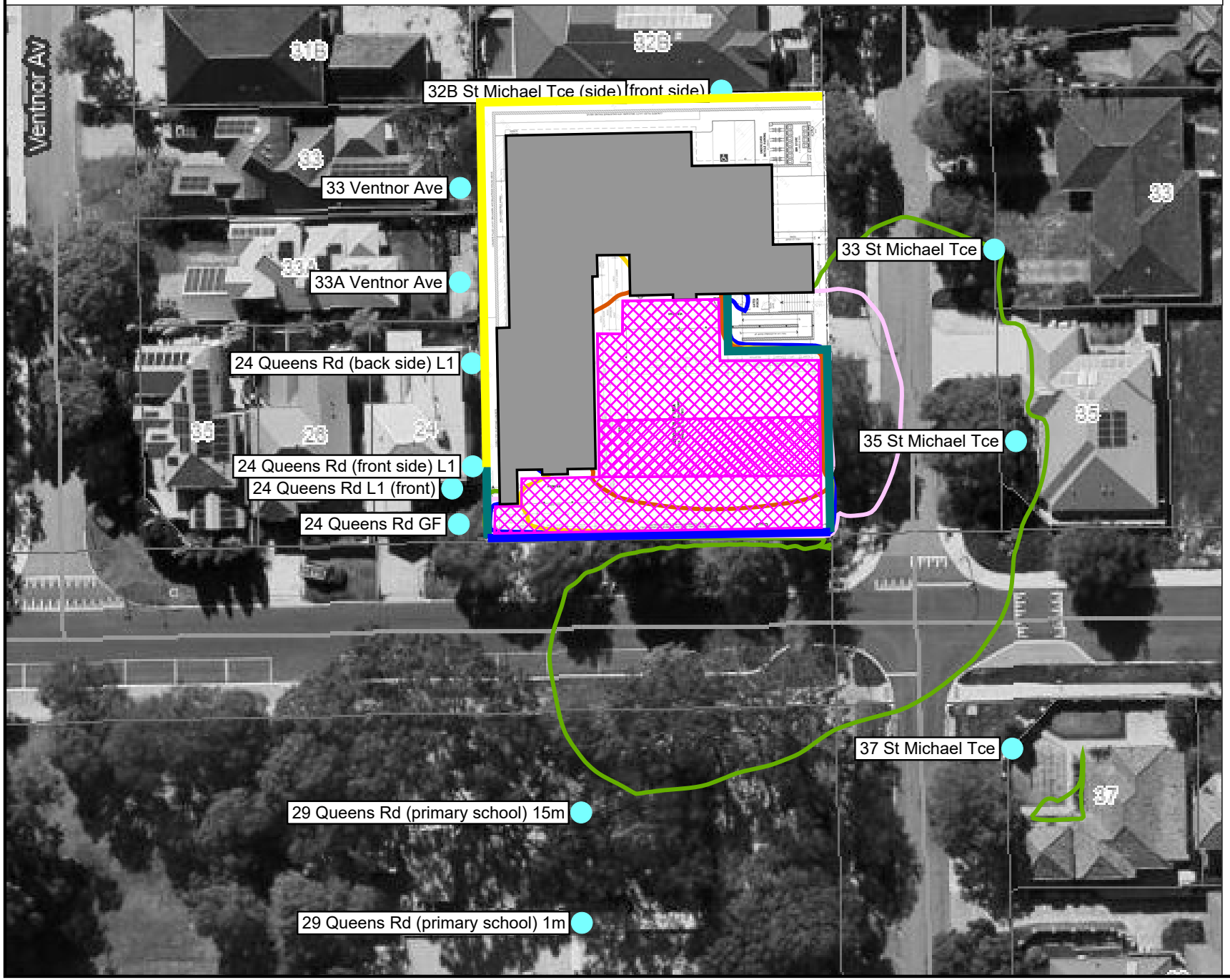
The results of the child play noise are provided and assessed in *Table 4-1*, noting this includes a 2.8-metre high fence along the full length of the south boundary, and a 2.1-metre high fence along the other sides of the outdoor child play area. It is noted that these fence heights are measured from the outdoor play area ground level. A noise contour plot is also provided in *Figure 4-1* showing noise levels at ground floor.

Table 4-1: Scenario 1 - Child Play Noise Predicted Levels and Assessment, dB L_{A10}

Receiver	Babies (0-2 yo)	Toddler (2-3 yo)	Kindy (3+ yo)	Total	Assigned Level	Assessment
24 Queens Rd GF	36	37	41	**43**	**45**	*Complies*
24 Queens Rd L1 (back side)	31	36	39	**41**	**45**	*Complies*
24 Queens Rd L1 (front side)	39	36	39	**43**	**45**	*Complies*
24 Queens Rd L1 (front)	42	37	41	**45**	**45**	*Complies*
29 Queens Rd (1m from primary school building)	28	38	42	**43**	**45**	*Complies*
29 Queens Rd (15m from primary school building)	30	39	43	**45**	**45**	*Complies*
32B St Michael Tce (front side)	19	28	31	**33**	**45**	*Complies*
32B St Michael Tce (side)	18	26	30	**32**	**45**	*Complies*
33 St Michael Tce	32	40	43	**45**	**45**	*Complies*
33 Ventnor Ave	21	29	32	**34**	**45**	*Complies*
33A Ventnor Ave	22	29	32	**34**	**45**	*Complies*
35 St Michael Tce	31	39	43	**44**	**45**	*Complies*
37 St Michael Tce	28	38	42	**44**	**45**	*Complies*

The assessment demonstrates compliance is achieved during the day at all noise sensitive premises.

Figure 4-1 Scenario 1 - Child Play Noise Contour Plot (1.4m AGL), dB L_{A10}



Predicted Noise level

	= 45
	= 50
	= 55
	= 60
	= 65

Legend

- Childcare Centre
- Receiver
- Outdoor Childplay
- 1.8m Colorbond Fence
- 2.1m Solid Barrier
- 2.8m Solid Barrier

N

Scale 1:600

0 4 8 16 24 m

Project No: 24119666
Consultant: MN
Date: 25/03/2025
Algorithm: ISO 9613
SoundPLAN Version: 9.0

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4.1.2. Scenario 2 - Outdoor Child Play Noise with Fencing Option B

The results of the child play noise are provided and assessed in *Table 4-2*, noting this includes a 2.1-metre high fence along all sides of the outdoor child play area. It is noted that this fence height is measured from the outdoor play area ground level. A noise contour plot is also provided in *Figure 4-2* showing noise levels at ground floor.

Table 4-2: Scenario 2 - Child Play Noise Predicted Levels and Assessment, dB L_{A10}

Receiver	Babies (0-2 yo)	Toddler (2-3 yo)	Kindy (3+ yo)	Total	Assigned Level	Assessment
24 Queens Rd GF	36	37	41	**43**	**45**	*Complies*
24 Queens Rd L1 (back side)	31	35	39	**41**	**45**	*Complies*
24 Queens Rd L1 (front side)	39	36	40	**43**	**45**	*Complies*
24 Queens Rd L1 (front)	41	37	40	**44**	**45**	*Complies*
29 Queens Rd (1m from primary school building)	31	40	43	**45**	**45**	*Complies*
29 Queens Rd (15m from primary school building)	33	42	45	**47**	**45**	+2 dB
32B St Michael Tce (front side)	19	27	31	**33**	**45**	*Complies*
32B St Michael Tce (side)	17	26	29	**31**	**45**	*Complies*
33 St Michael Tce	31	39	43	**45**	**45**	*Complies*
33 Ventnor Ave	21	29	32	**34**	**45**	*Complies*
33A Ventnor Ave	22	29	32	**34**	**45**	*Complies*
35 St Michael Tce	30	39	43	**44**	**45**	*Complies*
37 St Michael Tce	30	39	43	**45**	**45**	*Complies*

The assessment demonstrates compliance is achieved during the day at all nearby residences. If noise from child play was assessable against the assigned levels at the primary school located to the south, exceedances would be predicted when further than 1m from the building.

Figure 4-2 Scenario 2 - Child Play Noise Contour Plot (1.4m AGL), dB L_{A10}

Predicted Noise level

	= 45
	= 50
	= 55
	= 60
	= 65

Legend

- Childcare Centre
- Receiver
- Outdoor Childplay
- 1.8m Colorbond Fence
- 2.1m Solid Barrier

Scale 1:600

0 4 8 16 24 m

Project No: 24119666
Consultant: MN
Date: 25/03/2025
Algorithm: ISO 9613
SoundPLAN Version: 9.0

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4.1.3. Scenario 3 – Outdoor Child Play Noise with Fencing Option C

The results of the child play noise are provided and assessed in *Table 4-3*, noting this includes a 1.8-metre high fence along approximately half the length of the south boundary, and a 2.1 metre high fence along the other sides of the outdoor child play area. It is noted that these fence heights are measured from the outdoor play area ground level.

Table 4-3: Scenario 3 - Child Play Noise Predicted Levels and Assessment, dB L_{A10}

Receiver	Babies (0-2 yo)	Toddler (2-3 yo)	Kindy (3+ yo)	Total	Assigned Level	Assessment
24 Queens Rd GF	35	36	39	**42**	**45**	*Complies*
24 Queens Rd L1 (back side)	30	36	39	**41**	**45**	*Complies*
24 Queens Rd L1 (front side)	37	37	40	**43**	**45**	*Complies*
24 Queens Rd L1 (front)	39	37	41	**44**	**45**	*Complies*
29 Queens Rd (1m from primary school building)	36	43	46	**48**	**45**	+3 dB
29 Queens Rd (15m from primary school building)	39	46	49	**51**	**45**	+6 dB
32B St Michael Tce (front side)	19	27	31	**33**	**45**	*Complies*
32B St Michael Tce (side)	17	26	29	**31**	**45**	*Complies*
33 St Michael Tce	31	39	43	**45**	**45**	*Complies*
33 Ventnor Ave	20	29	32	**34**	**45**	*Complies*
33A Ventnor Ave	21	29	32	**34**	**45**	*Complies*
35 St Michael Tce	30	39	43	**44**	**45**	*Complies*
37 St Michael Tce	34	40	44	**45**	**45**	*Complies*

The assessment demonstrates compliance is achieved during the day at all nearby residences. If noise from child play was assessable against the assigned levels at the primary school located to the south, exceedances would be predicted at 1m and 15m from the primary school building.

Figure 4-3 Scenario 3 - Child Play Noise Contour Plot (1.4m AGL), dB L_{A10}

Predicted Noise level

	= 45
	= 50
	= 55
	= 60
	= 65

Legend

- Childcare Centre
- Receiver
- Outdoor Childplay
- 1.8m Colorbond Fence
- 2.1m Solid Barrier
- 1.8m Solid Barrier

Scale 1:600

0 4 8 16 24 m

Project No: 24119666
Consultant: MN
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4.2. Mechanical Plant Noise

Mechanical plant noise consists of the outdoor AC condensing units and exhaust fans, with the predicted and assessed noise levels provided in *Table 4-4*. As all the mechanical plant is assumed to be located on the roof, the fencing around the outdoor child play area is not expected to make a significant difference to the noise levels at the nearby receivers. Therefore, only Fencing Option C (as shown in *Table 3-2*) was used in the assessment as a worst case. The critical assigned level is during the night, as the plant may operate prior to 7.00am. An adjustment of + 5 dB is included for tonality, since this may be present for such noise sources. A noise contour plot is also provided in *Figure 4-4* showing noise levels at ground floor.

Table 4-4: Mechanical Plant Noise Predicted Levels and Assessment, dB L_{A10}

Receiver	AC	Exhaust Fans	Total	Total Adjusted	Assigned Level	Assessment
24 Queens Rd GF	23	24	27	**32**	**35**	*Complies*
24 Queens Rd L1 (back side)	34	35	37	**42**	**35**	+7 dB
24 Queens Rd L1 (front side)	29	35	36	**41**	**35**	+6 dB
24 Queens Rd L1 (front)	22	32	32	**37**	**35**	+2 dB
29 Queens Rd (1m from primary school building)	21	25	26	**31**	**35**	*Complies*
29 Queens Rd (15m from primary school building)	22	27	28	**33**	**35**	*Complies*
32B St Michael Tce (front side)	25	36	36	**41**	**35**	+ 6 dB
32B St Michael Tce (side)	27	37	38	**43**	**35**	+8 dB
33 St Michael Tce	23	29	30	**35**	**35**	*Complies*
33 Ventnor Ave	33	31	35	**40**	**35**	+5 dB
33A Ventnor Ave	32	29	34	**39**	**35**	+4 dB
35 St Michael Tce	21	26	27	**32**	**35**	*Complies*
37 St Michael Tce	21	25	27	**32**	**35**	*Complies*

The calculations show exceedances at multiple receiver locations due to the condensing units and kitchen exhaust fan located on the roof. Compliance can be achieved by including the following:

- For the condensing units:
  - install screening at a minimum of 1.8m high on the west side of the units; and
  - apply a 'night' / 'quiet' mode to reduce the noise levels by a minimum of 5 dB during the night period.
- For the kitchen exhaust:
  - install a residential spec range hood; or
  - only operate after 7am.

It must be noted that the assessment is based on assumptions in relation to the number, location, size and type of mechanical plant. Therefore, once the mechanical plant has been designed and selected, noise is to be reviewed by a suitably qualified acoustical consultant.

4.3. Indoor Child Play

An assessment of noise levels from indoor child play was carried out and the resulting noise levels at all locations were predicted to be well below that of outdoor child play considered in *Section 4.1*. This assessment was carried out 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 open or closed; and
- Any music played within the internal activity areas would be 'light' music with no significant bass content and played at a relatively low level.

Figure 4-4 Mechanical Plant Noise Contour Plot (1.4m AGL), dB L_{A10}

Predicted Noise level

= 35
= 40
= 45
= 50
= 55

Legend

- Childcare Centre
- Receiver
- Mech Source
- 1.8m Colorbond Fence
- 2.1m Solid Barrier
- 1.8m Solid Barrier

Scale 1:600

0 4 8 16 24 m

Project No: 24119666
Consultant: MN
Date: 25/03/2025
Algorithm: ISO 9613
SoundPLAN Version: 9.0

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

4.4. Car Door Closing Noise

Predicted and assessed noise levels for car doors closing are provided in *Table 4-5* being the maximum noise level from the worst-case car bay for each receiver. The assessment has only included car doors closing from three car bays located on the north side of the basement and Fencing Option C (as shown in *Table 3-2*) as a worst case. The critical assigned level is during the night, as car door closings will occur prior to 7.00am. An adjustment of + 10 dB is included for impulsiveness, since this may be present for such noise sources. A noise contour plot is also provided in *Figure 4-5* showing noise levels at ground floor.

Table 4-5: Car Door Closing Noise Predicted Levels and Assessment, dB L_{Amax}

Receiver	Car Door	Total Adjusted	Assigned Level	Assessment
24 Queens Rd GF	18	**28**	**55**	*Complies*
24 Queens Rd L1 (back side)	19	**29**	**55**	*Complies*
24 Queens Rd L1 (front side)	17	**27**	**55**	*Complies*
24 Queens Rd L1 (front)	16	**26**	**55**	*Complies*
29 Queens Rd (1m from primary school building)	15	**25**	**55**	*Complies*
29 Queens Rd (15m from primary school building)	17	**27**	**55**	*Complies*
32B St Michael Tce (front side)	45	**55**	**55**	*Complies*
32B St Michael Tce (side)	43	**53**	**55**	*Complies*
33 St Michael Tce	33	**43**	**55**	*Complies*
33 Ventnor Ave	24	**34**	**55**	*Complies*
33A Ventnor Ave	22	**32**	**55**	*Complies*
35 St Michael Tce	29	**39**	**55**	*Complies*
37 St Michael Tce	23	**33**	**55**	*Complies*

Noise from car doors is predicted to comply at all nearest receivers during the critical night period.

Figure 4-5 Car Door Noise Contour Plot (1.4m AGL), dB L_{Amax}

Predicted Noise level

	= 55
	= 60
	= 65
	= 70
	= 75

Legend

- Childcare Centre
- Receiver
- Car Source
- 1.8m Colorbond Fence
- 2.1m Solid Barrier
- 1.8m Solid Barrier

N

Scale 1:600

0 4 8 16 24 m

Project No: 24119666
Consultant: MN
Date: 25/03/2025
Algorithm: ISO 9613
SoundPLAN Version: 9.0

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PO Box 717
HILLARYS WA 6923
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5. RECOMMENDATIONS

5.1. Child Play

Three different fencing options were included in the assessment (as shown in *Table 3-2*) of the outdoor child play noise, with all options predicted to achieve compliance at the nearby residences. The variation provided is based on whether strict compliance is required at the primary school, given this generates similar types of noise. This is to be discussed with stakeholders to determine an appropriate outcome. *Table 5-1* provides the predicted noise levels for each fencing option at 1m and 15m from the primary school building. This fencing is to be free of any gaps and have a minimum surface mass of 8 kg/m^2. Such material includes brick, limestone or double sheeted *Colorbond*. For areas where visual permeability is required, sound-rated plexiglass can be used.

Table 5-1: Fencing Options and Noise Levels at the Primary School

Fencing Option	Fencing on East and West Side of Child Play Area	Fencing on South Side of Child Play Area	L_{A10} Noise Level Predicted at Distance from Primary School Building		Assessment at Distance from Primary School Building	
			1m	15m	1m	15m
A	2.1 metre high above outdoor play area	2.8 metre high above outdoor play area, included along the full length	43	45	Compliant	Compliant
B	2.1 metre high above outdoor play area	2.1 metre high above outdoor play area, included along the full length	45	47	Compliant	+2 dB
C	2.1 metre high above outdoor play area	1.8 metre high above outdoor play area, included along approx. half the length	48	51	+3 dB	+6 dB

Whilst not necessarily required for compliance, to further minimise noise impacts as part of best practice, the following are provided:

- 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;
- Child play to be staggered;
- No amplified music to be played outside;
- Any music played within the internal activity areas to be 'light' music with no significant bass content and played at a relatively low level;

5.2. Mechanical Plant

Mechanical plant was shown to exceed the assigned levels within the assessment, although compliance can be practicably achieved by including the following:

- For the condensing units:
  - install screening at a minimum of 1.8m high on the west side of the units; and
  - apply a 'night' / 'quiet' mode to reduce the noise levels by a minimum of 5 dB during the night period.
- For the kitchen exhaust:
  - install a residential spec range hood; or
  - only operate after 7am.

It must be noted that the assessment is based on assumptions in relation to the number, location, size and type of mechanical plant. Therefore, the following are also recommended:

- Once the mechanical plant has been designed and selected, the noise levels shall be reviewed prior to Building Permit;
- All exhaust fans shall be located inside the ceiling void and shall be axial fan type, allowing the incorporation of an attenuator if required;
- All fans shall be variable speed drive so that maximum speed is only occurring when necessary with demand;
- All plant shall be selected taking into consideration noise levels. That is, when comparing manufacturers of equivalent equipment, select the quieter model;
- All plant is to be appropriately vibration isolated to 95% isolation efficiency.

5.3. Car Doors

The predicted noise from car door closings is compliant provided all bays (not including three bays located on the north side) are located under a roofed section of the basement with no openings.

Appendix A – Development Plans

CAR PARKING:

USE	VALUE	CALC	REQUIRED
CHILDCARE	29 EMPLOYEES (est)	0.5/STAFF	14.5 (est)
	113 CHILDREN	1/0 CHILDREN	11.3
TOTAL REQUIRED			**25.8 (est)**
TOTAL PROVIDED			**26**

NOTES

THIS DRAWING IS CONCEPTUAL ONLY (INCLUDING CHILD PLACEMENT NUMBERS WHICH ARE ESTIMATES ONLY) AND SUBJECT TO THE FOLLOWING:-

1. ANY TITLE ENCUMBRANCES;
2. CONTOUR AND FEATURE SURVEY;
3. LOCATION OF EXISTING SERVICES / EASEMENTS;
4. END USER / OPERATOR REQUIREMENTS;
5. FULL TOWN PLANNING ASSESSMENT;
6. PLANNING APPROVAL;
7. TRAFFIC / TRANSPORT ASSESSMENT;
8. BUSHFIRE RISK ASSESSMENT;
9. ACOUSTIC ASSESSMENT;
10. DETAILED DESIGN DEVELOPMENT;
11. CERTIFICATE OF COMPLIANCE WITH NCC AND RELEVANT AUSTRALIAN STANDARDS;
12. BUILDING PERMIT;
13. CHILDCARE LICENCE.

PROPOSED CHILDCARE CENTRE
113 CHILDREN
BASEMENT LOBBY GLA 30m²
GROUND FLOOR GLA 813m²
APPROX. GF FL 16.20 (TBC)*

OUTDOOR PLAY AREA
APPROX. RL 16.10 (TBC)*

EXISTING TREES TO BE RETAINED IF POSSIBLE.
NOTE: TREES MAY NOT SURVIVE DUE TO AMOUNT OF NEW FILL AROUND THE TRUNKS AND THE PROXIMITY TO RETAINING WALLS. ALL TREES ARE TO BE INSPECTED BY A QUALIFIED ARBORIST TO IDENTIFY ANY TREES OR BRANCHES THAT POSE A RISK TO CHILDREN. REMOVE AS REQUIRED.

Q U E E N S R O A D

S T M I C H A E L T E R R A C E

7 D/STOREY BRICK&IRON

290 S/STOREY BRICK&TILE

BIN STORE

ENTRY

RAMP DOWN TO UNDERCROFT CARPARK

SEWERLINE APPROX

1.8m HIGH APPROX. RETAINING

1.8m HIGH COLORBOND FENCE PANEL

CONC. PATH

FOOTPATH

NON MOUNTABLE KERB

SPEED BUMP

T.B.M D/S IN BITUMEN RL 14.11 AHD(APPROX.)

CENTRELINE

HINDLEY & ASSOCIATES PTY LTD
BUILDING DESIGNERS

166 STIRLING HIGHWAY
NEDLANDS WA 6009

PO BOX 199
NEDLANDS WA 6909

PHONE - 9386 6699
FAX - 9386 6700
admin@hindley.com.au

PRELIMINARY DEVELOPMENT APPLICATION

HINDLEY & ASSOCIATES P/L AS TRUSTEE FOR HINDLEY TRUST
ACN No. 088 989 904

BUILDING DESIGNERS ASSOCIATION OF WA INC

NO:	DATE:	REVISION:	DRAWN:	CHECK:
-				
-				
-				
-				
-				
-				
-				

A1 SHEET

PROPOSED SITE PLAN

SCALE 1:200

N

PROPOSED CHILDCARE CENTRE
LOTS 143 (34) & 144 (36)
ST MICHAEL TCE, MOUNT PLEASANT
for STOCK ROAD LAND PTY LTD

Date	-	28.11.24
Design	-	SDS
Drawn	-	SDS
Checked	-	SDS
Scale	-	1:200
Job No.	-	0847
Dwg	-	DA01
Rev	-	-

PROVIDE PAINTED RENDER FINISH TO NEW BOUNDARY WALL WITH ADJOINING OWNER'S CONSENT. PROVIDE SHORING AS REQUIRED TO PROTECT ADJACENT LOT.

PROVIDE UNDERPINNING AS REQUIRED TO EXISTING PIER ON ADJACENT LOT.

NEW 1.8m HIGH COLORBOND BOUNDARY FENCE.

DOUBLE STUD ON UPSTAND CONCRETE.

CONCRETE FILLED CAVITY BRICKWORK WITH BALUSTRADE RAILING ABOVE.

NON-COMBUSTIBLE AWNING

PLAY EQUIP STORE

ACTIVITY 6
TODDLERS (1-2 YEARS)
16 PLACES
51m² UNENCUMBERED

COT ROOM 1
6 COTS

CORRIDOR

BALUSTRADE

CLOTHESLINE

PRIVACY SCREEN

LAUNDRY

UNISEX ACCESSIBLE TOILET & SHR

UNISEX AMB

CHANGE

4 x 2-TIER LOCKERS

STAFF ROOM

KITCHEN

ISLAND WITH TROLLEYS UNDER

DBL SSS DIH

SERVERY

LOW HALL & GATE

CONCRETE FILLED CAVITY BRICKWORK WITH BALUSTRADE RAILING ABOVE.

EXISING BOUNDARY FENCING TO BE RETAINED.

VERANDAH

ROOF OVER

LOW WALL & GATE

12 PIDGEON HOLES

TOILET & CHANGE

STORE & BOTTLE PREP

SHELVES

VIEWING WINDOW

COT ROOM 2
5 COTS

COT ROOM 3
5 COTS

CHILDCARE CENTRE
113 PLACES (TBC)
APPROX. FL 16.20 (TBC)

ACTIVITY 5
BABIES (0-1 YEARS)
12 PLACES
42m² UNENCUMBERED

ACTIVITY 4
KINDY (3+ YEARS)
20 PLACES
64m² UNENCUMBERED

ACTIVITY 3
KINDY (3+ YEARS)
30 PLACES
100m² UNENCUMBERED

PREP
STORE
BEDS
SHELVES

TOILETS & CHANGE

TOILET & CHANGE

PIDGEON

COT ROOM

ACTIVITY ROOM

TOILETS

ACTIVITY

PREPS & STORES

NEW HEDGE PLANTING

140mm THICK REINFORCED CONCRETE BLOCK RETAINING WALL (CONCRETE FILLED) WITH PARCHMENT BLOCK WALL ABOVE (MIN. 1.8m ABOVE PLAYGROUND LEVEL) WITH VERTICAL ALUMINIUM BATTEN INFILL PANELS BETWEEN PIERS.

OUTDOOR PLAY AREA
APPROX. 794m² (MIN. 791m² REQUIRED)
APPROX. RL 16.10 (TBC)

ACTIVITY 2
PRE-KINDY (2-3 YEARS)
20 PLACES
67² UNENCUMBERED

ACTIVITY 1
PRE-KINDY (2-3 YEARS)
15 PLACES
45m² UNENCUMBERED

TOILETS & HB CHANGE

GATED PORCH

ENTRY

RECEPTION

OFFICE

MEETING / PLANNING

STORAGE / UTILITIES

UNDERCOVER BICYCLE PARKING
9 x BIKES

BIN STORE
11 x WHEELIE BINS

LOBBY FL 16.20

LIFT

MAX 1:14 ACCESSIBLE RAMP UP

MAX 1:8 RAMP DOWN

MAX 1:20 RAMP UP

MAX 1:20 RAMP DOWN

RAMP

STAIRS

FLIGHT

LOBBY

LIFT

PATH

DRIVEWAY

ESCAPE PATH

3m HIGH FIRE WALL BEHIND FIRE HYDRANT

HYD

APPROX. 20m ABOVE VESSEL

EXIST

PROPOSED GROUND FLOOR PLAN

SCALE 1:100

A1 SHEET

PROPOSED CHILDCARE CENTRE
LOTS 143 (34) & 144 (36)
ST MICHAEL TCE, MOUNT PLEASANT
for STOCK ROAD LAND PTY LTD

PRELIMINARY
DEVELOPMENT APPLICATION

HINDLEY & ASSOCIATES PTY LTD
BUILDING DESIGNERS

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HINDLEY & ASSOCIATES P/L
AS TRUSTEE FOR
HINDLEY TRUST
ACN No. 088 989 904

BUILDING DESIGNERS ASSOCIATION OF WA INC

NO:	DATE:	REVISION:	DRAWN:	CHECK:
-				

Date	28.11.24
Design	SDS
Drawn	SDS
Checked	SDS
Scale	1:100
Job No.	0847
Dwg	DA04
Rev	-

HINDLEY & ASSOCIATES PTY LTD
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HINDLEY TRUST
ACN No. 088 989 904

BUILDING DESIGNERS ASSOCIATION OF WA INC

NO:	DATE:	REVISION:	DRAWN:	CHECK:
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-				
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-				

A1 SHEET

PROPOSED BASEMENT FLOOR PLAN

SCALE 1:100

N

PROPOSED CHILDCARE CENTRE
LOTS 143 (34) & 144 (36)
ST MICHAEL TCE, MOUNT PLEASANT
for STOCK ROAD LAND PTY LTD

Date	-	28.11.24
Design	-	SDS
Drawn	-	SDS
Checked	-	SDS
Scale	-	1:100
Job No.	-	0847
Dwg	-	DA03
Rev	-	-

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 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 level 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. 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. This is used when assessing the presence of modulation.

- **L_{APeak}**

This is the greatest absolute instantaneous sound pressure level in decibels using the A-frequency weighting.

- **L_{Amax}**

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

- **L_{A1}**

The L_{A1} level is the A-weighted noise level exceeded for 1 percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

- **L_{A10}**

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

- **L_{A90}**

The L_{A90} level is the A-weighted noise level exceeded for 90 percent of the measurement period and is considered to represent the "background" 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.

- **One-Third-Octave Band**

Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20000 Hz inclusive.

- **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.

- **L_{Amax} assigned level**

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

- **L_{A1} assigned level**

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

- **L_{A10} assigned level**

Means an assigned level, which, measured as a L_{ASlow} value, is not to be exceeded for more than 10 percent 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; and

(b) is present for at least 10% of the representative assessment period; and

(c) is regular, cyclic and audible.

- **Impulsive Noise**

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

– a variation in the emission of a noise where the difference between L_{Apeak} and L_{Amax} is more than 15 dB when determined for a single representative event.

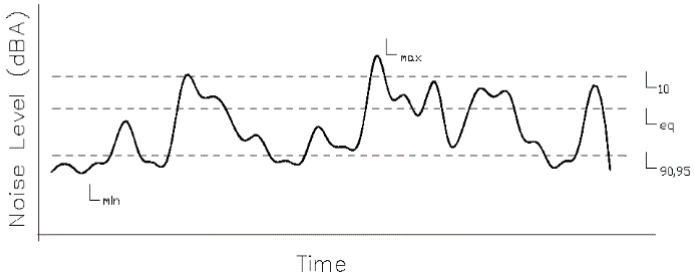
- **Major Road**

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

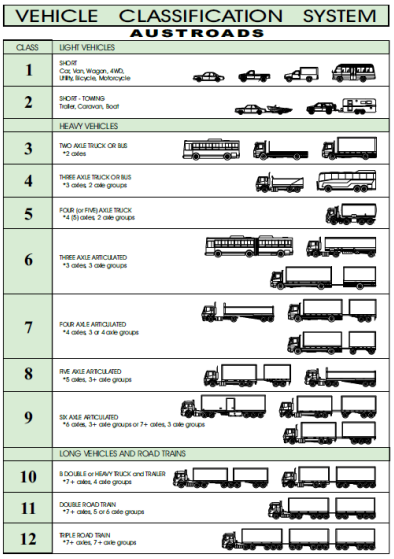
- **Secondary / Minor Road**

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

- **Chart of Noise Level Descriptors**



- **Austroads Vehicle Class**



- **Typical Noise Levels**