



PROJECT: 452-454 Waverley Road
Mount Waverley

SUBJECT: Application for a Child Care Centre
Acoustic Report

PREPARED FOR: Mount Waverley Childcare Pty Ltd

DATE: 9 June 2021

REPORT NO.: DL1732-1

| Reference | Description | Originator | Date | Comments |
|-----------|-------------|------------|--------|----------|
| DL1732-1 | PDF | DL | 9/6/21 | Issue A |
| | | | | |
| | | | | |

TABLE OF CONTENTS

| | | |
|----------|---|-----------|
| 1 | INTRODUCTION | 3 |
| 2 | SITE DESCRIPTION | 4 |
| 3 | PROPOSED CHILD CARE CENTRE AND CAFE | 5 |
| 4 | BACKGROUND NOISE LEVELS | 12 |
| 5 | NOISE CRITERIA | 14 |
| 5.1 | Children outdoor areas | 14 |
| 5.2 | Mechanical plant | 14 |
| 5.3 | Music Noise | 15 |
| 5.4 | Car park | 15 |
| 5.5 | Patron Noise (café) | 16 |
| 6 | SOURCE LEVELS (SOUND POWER LEVELS) | 16 |
| 7 | NOISE CONTROL RECOMMENDATIONS | 17 |
| 7.1 | Acoustic fence treatments | 17 |
| 7.2 | Mechanical plant noise control | 18 |
| 7.3 | Music noise control | 21 |
| 7.4 | Car park noise | 21 |
| 7.5 | Acoustic glazing to children's rooms | 21 |
| 7.6 | Acoustic treatment to children's rooms | 22 |
| 7.7 | Café noise control | 22 |
| 8 | PREDICTED NOISE LEVELS FROM THE OUTDOOR PLAY AREAS | 23 |
| 9 | CONCLUSION | 26 |
| | APPENDICES | 27 |
| | APPENDIX 1: ACOUSTIC TERMINOLOGY | 28 |
| | APPENDIX 2: EPA POLICY EXPLANATION (SEPP N-1) | 29 |
| | APPENDIX 3: ACOUSTIC FENCE DETAILS | 30 |

1 INTRODUCTION

This report has been prepared in relation to an application for a child care centre and café at 452-454 Waverley Road, Mount Waverley, Victoria.

The purpose of this report was to provide details of proposed noise attenuation measures, designed to minimise the impact of noise associated with the proposed use upon adjoining residential properties to the south east, specifically:

- Noise from outdoor play yards to neighbouring properties
- Noise from mechanical plant (ventilation systems and air conditioning plant)
- Noise from car park activities on site
- Noise from the proposed café on site

In preparation of this report, Acoustic Control Pty Ltd carried out the following work:

- Visited and inspected the site during the day on Friday 12th March 2021.
- Conducted background noise measurements (attended/manned) at the subject site on Friday 12th March 2021.
- Conducted long term background noise monitoring (unattended noise logging) at the subject site between Thursday 20th May 2021 and Thursday 27th 2021.
- Reviewed town planning drawings of the proposed childcare centre prepared by Perkins Architects.
- Conducted noise predictions/calculations in relation to noise from the proposed outdoor play areas.
- Developed acoustic fence treatments around the proposed play areas.
- Provided recommendations in respect to mechanical plant noise control and car park noise.
- Provided recommendations in respect to patron noise associated with the café.

This report specifies the recommended noise control measures required to reduce noise levels to within acceptable levels in accordance with statutory noise regulations and relevant guidelines.

Note: Refer to the glossary in appendix 1 for definition of acoustic terms used throughout this report.

2 SITE DESCRIPTION

The subject site is located at 452-454 Waverley Road, Mount Waverley, Victoria. It is currently vacant land behind a row of properties off Anthony Drive and Betty Court.

The land is a long narrow shaped parcel of land orientated in the south west – north east direction with topography such that the land rises from the south west corner to the north east corner relatively uniformly by 5 meters. The subject site is bounded by residential properties on the south east side and Scotchmans Creek and the BlueCross aged care facility on the western side. The noise sensitive interface will be on the south east side.

The aerial photo (figure 2.1) below shows the subject site and surrounding area.



Figure 2.1 – site aerial (source – Nearmaps)

The subject site is zoned residential (Neighbourhood residential Zone 2, NRZ2). Refer to the land zoning map (figure 2.2) below.

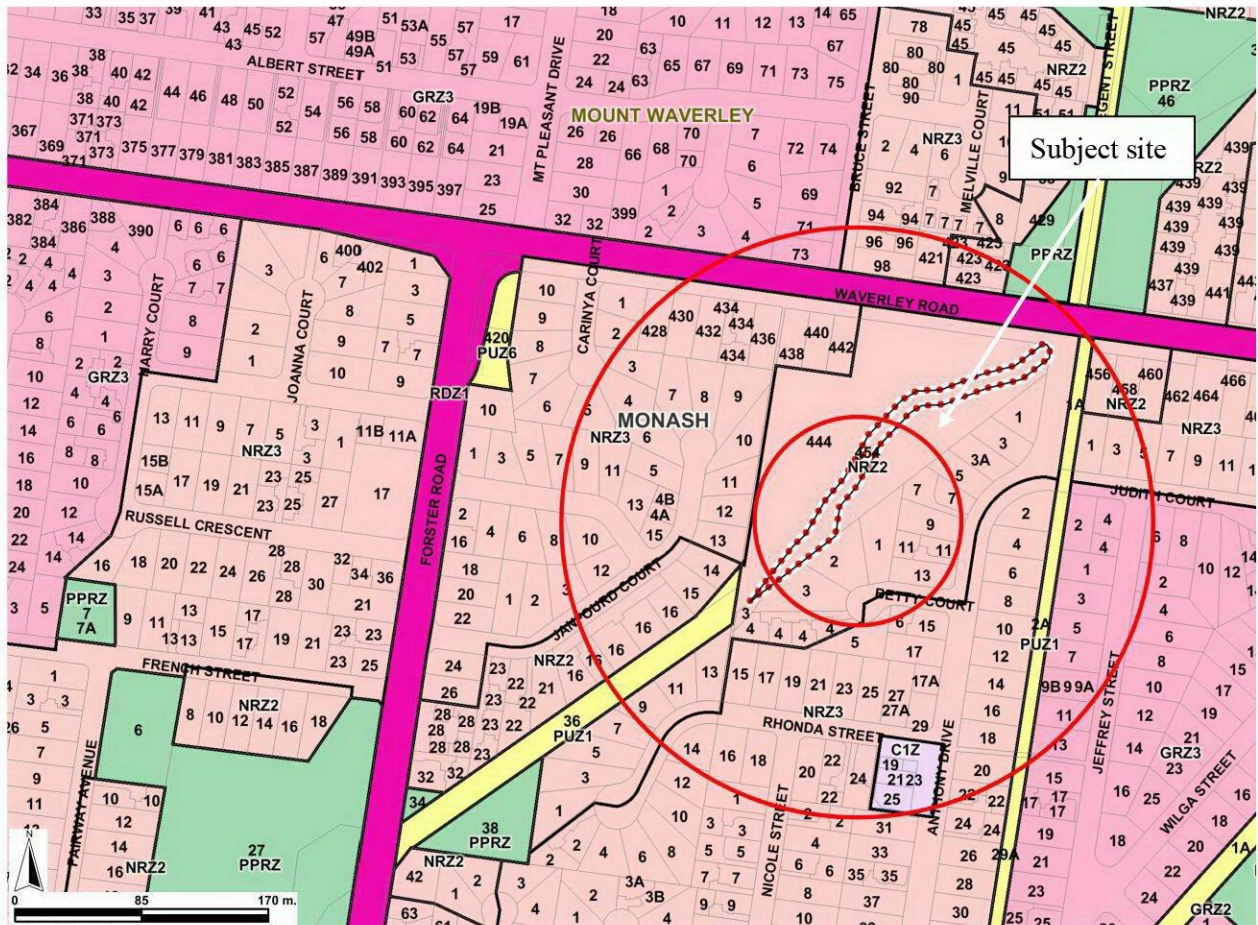


Figure 2.2 – land zoning map (note the SEPP N-1 concentric circles have been overlaid on the map)

3 PROPOSED CHILD CARE CENTRE AND CAFE

The proposed child care centre and café will be a combination of a main two story building and 2 x external playrooms (pods).

The main building will consist of a basement level, ground level and first floor level as follows:

Basement – carparking for 46 vehicle spaces, bins and services

Ground level – 5 x playrooms, entry foyer, offices, kitchen & dining area (play centre) and café (dining area and kitchen)

First floor– Performance and wellness rooms, offices, staff room and café roof top dining area.

The 2 x pods will be separate to the main building for an additional 2 x playrooms.

The application will be for a maximum of 184 children on the site. The proposed hours of operation are as follows:

Childcare centre: 6am to 7pm, Monday to Friday.

Café: 6am – 7pm, Monday to Friday.
7am – 4pm, Saturday to Sunday.

Play areas are proposed as follows:

Ground level – two main play areas are proposed, one to the north west of the main building and one to the south west of the site. External courtyards (3 off) are proposed along the south east boundary, but these areas will be quiet play areas with limits on children numbers.

First floor - no external play areas are proposed on the first floor.

Town planning drawings prepared by Perkins Architects show the proposed site layout and outdoor areas. Refer to figures 3.1 – 3.3 below extracted from the town planning drawings showing the proposed basement, ground floor and first floor plans.

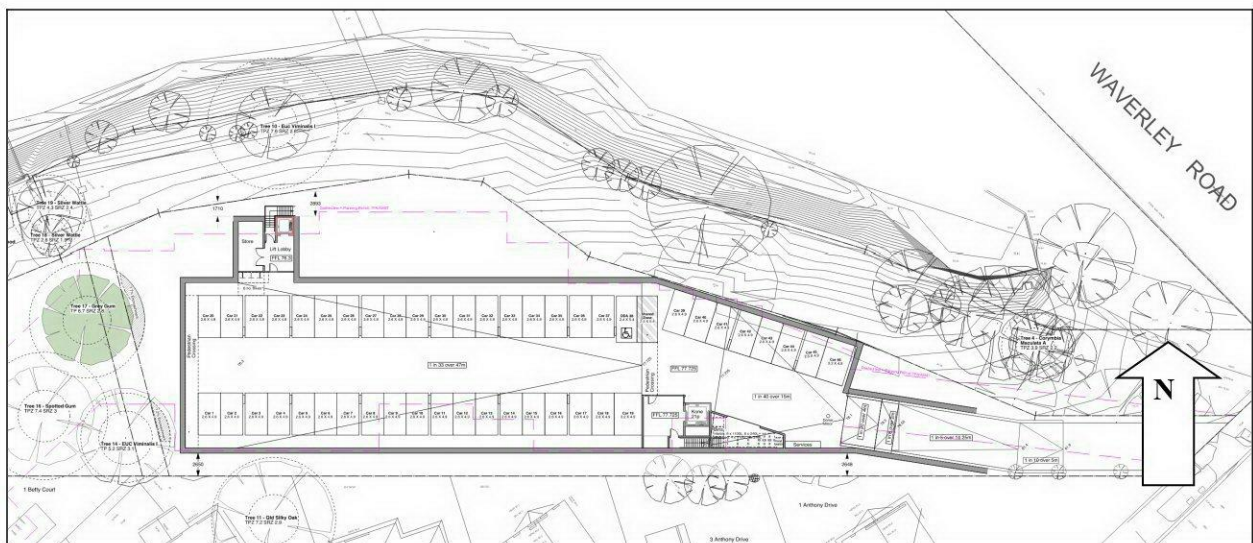


Figure 3.1 – Proposed basement

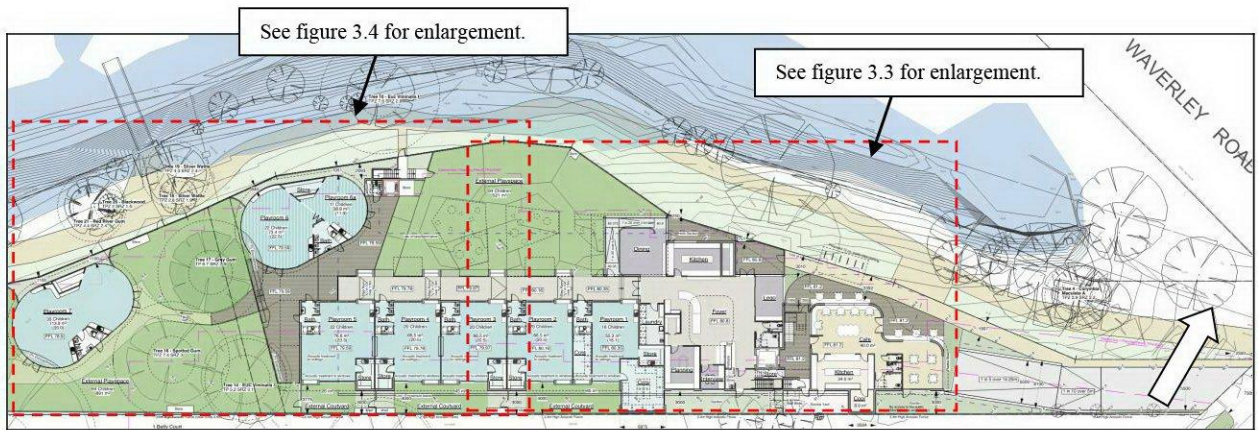


Figure 3.2 – Proposed ground floor

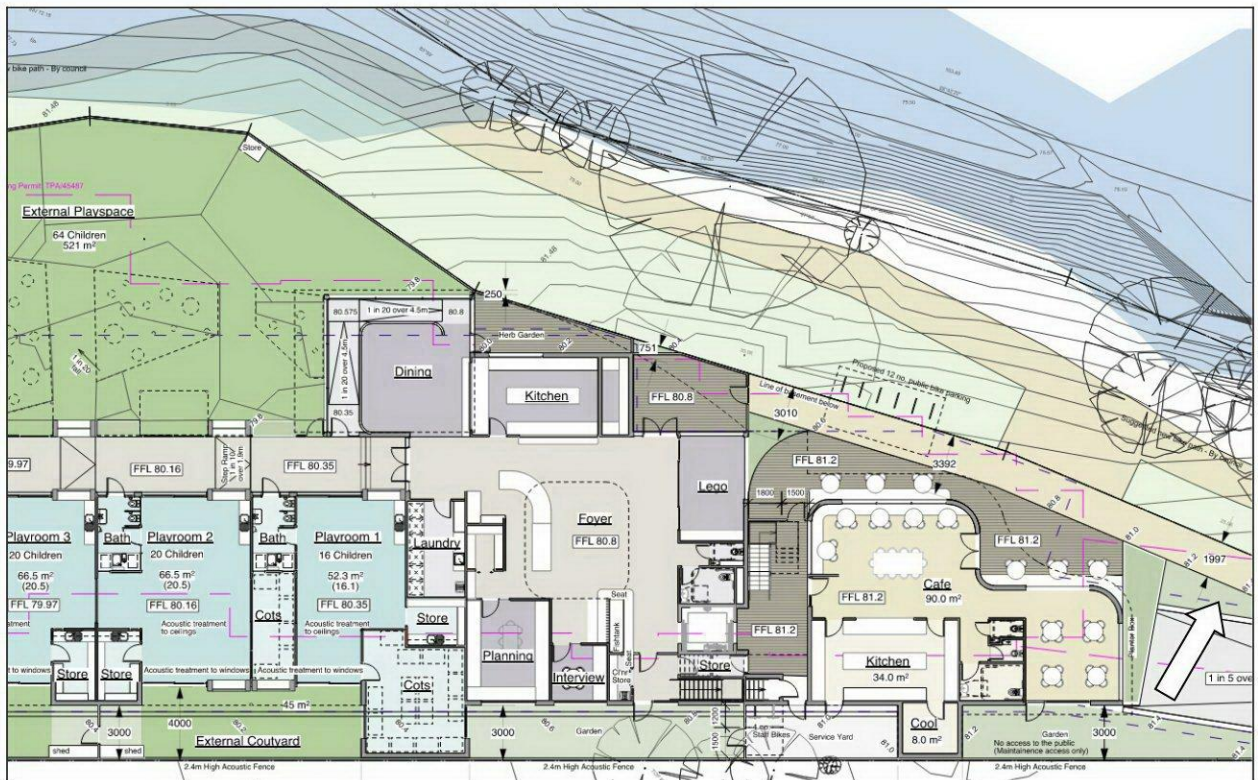


Figure 3.3 – Proposed ground floor (north eastern side)



Figure 3.4 – Proposed ground floor (South western side)

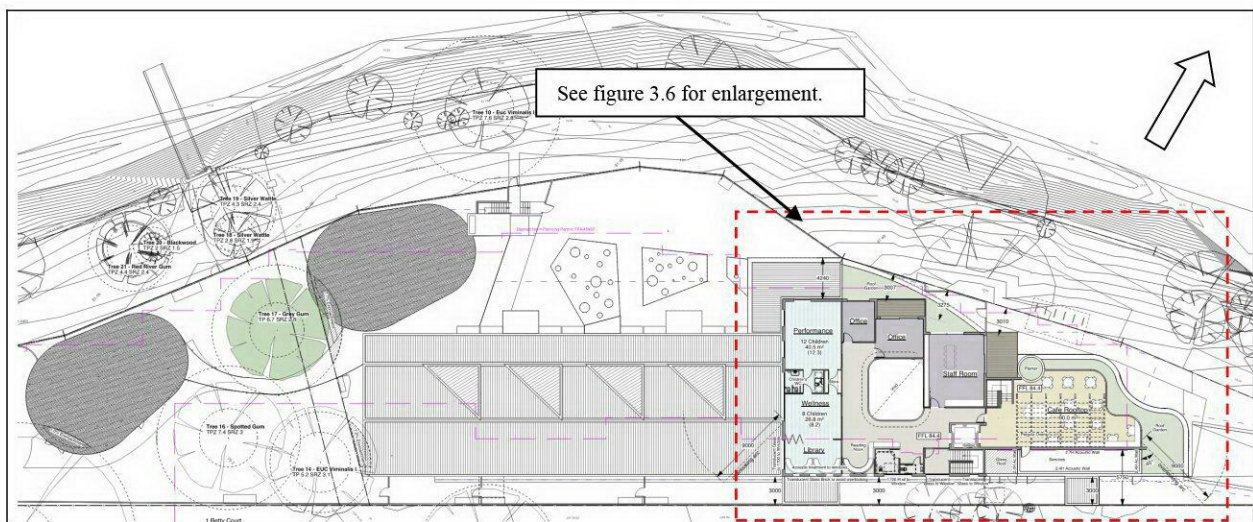


Figure 3.5 – Proposed first floor

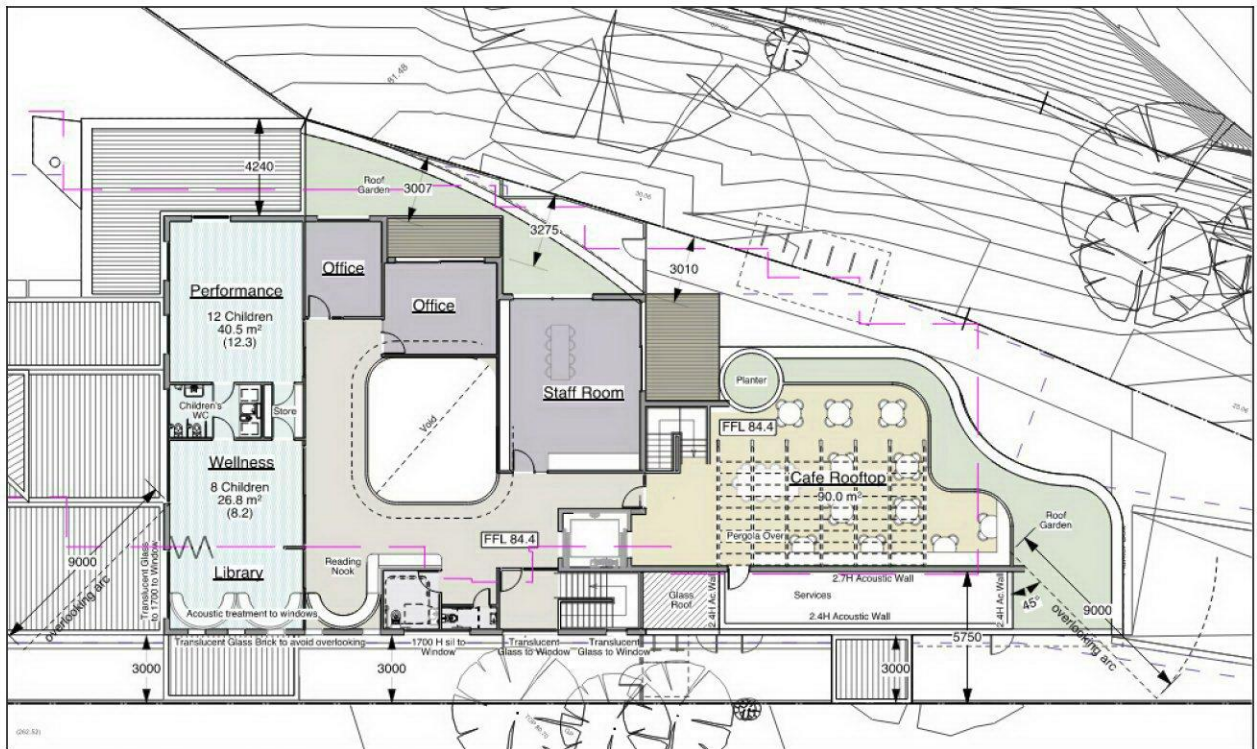


Figure 3.6 – Proposed First Floor Plan - north



Figure 3.7 – Proposed roof level

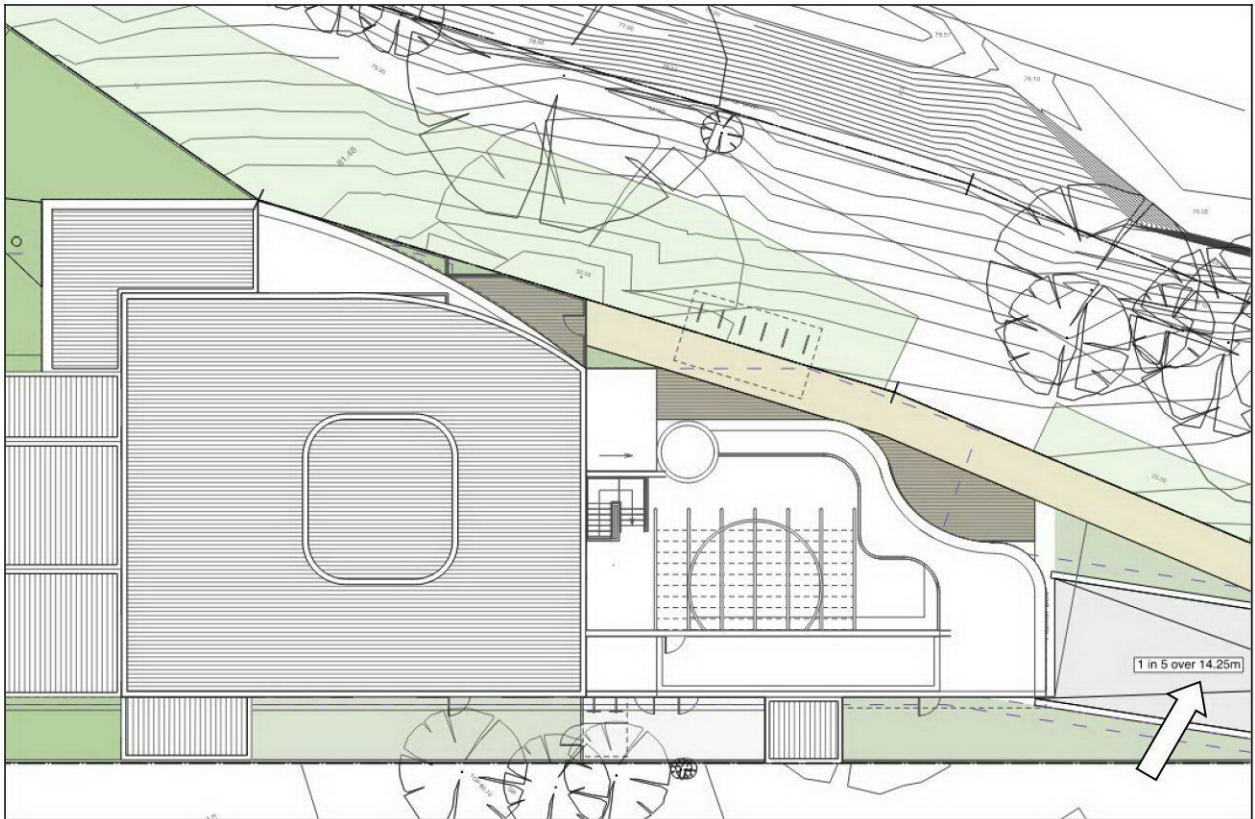


Figure 3.8 – Proposed roof level - north

Refer to figures 3.9 and 3.10 showing 3D perspective views.

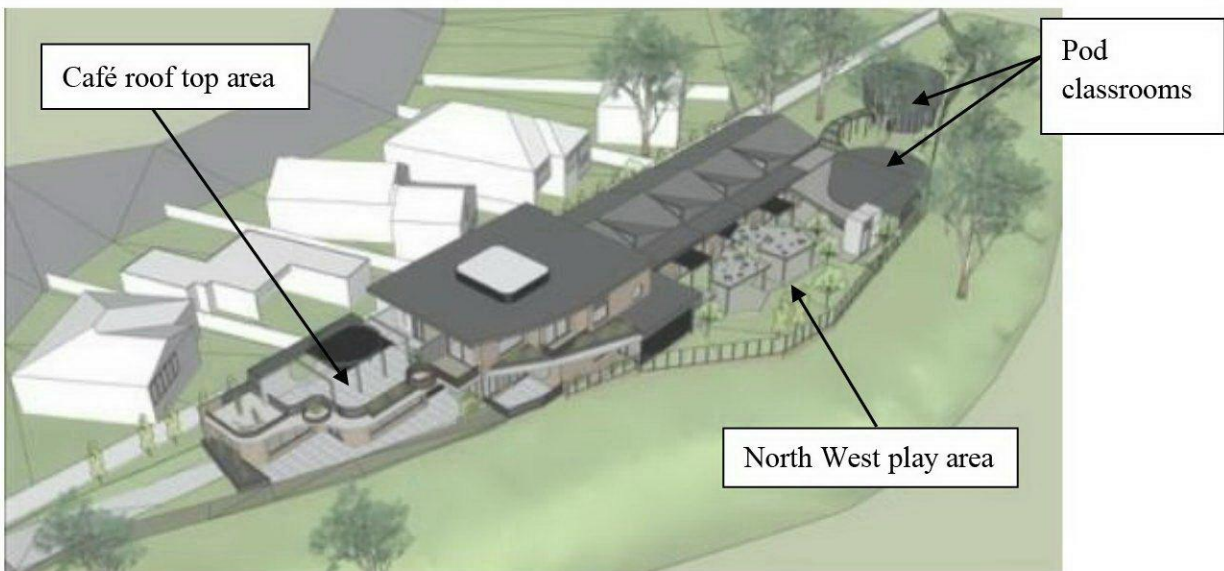


Figure 3.9 – aerial view of the north elevation



Figure 3.10 – aerial view of the east elevation

The children age group breakdown for the playrooms will be as follows:

Ground floor

| | | |
|------------|-------------|-----------------|
| Playroom 1 | 16 children | aged 0-1 Babies |
| Playroom 2 | 20 children | aged 0-1 Babies |
| Playroom 3 | 20 children | aged 1-3 |
| Playroom 4 | 20 children | aged 1-3 |
| Playroom 5 | 22 children | aged 3+ |
| Playroom 6 | 33 children | aged 3+ |
| Playroom 7 | 33 children | aged 3+ |

First floor

| | | |
|-------------|-------------|---------|
| Performance | 12 children | various |
| Wellness | 8 children | various |

Total 184

Typical outdoor play times and duration

The outdoor programme must meet the NQF standards. This means planned activities for children must include the appropriate mix of indoor and outdoor activity for the relevant age group. Outdoor play programs will not be planned until close to the centre’s opening when the staff have been engaged.

However, in line with other child care centres in the Melbourne Metro area, the duration of time the children spend outside will depend on the time of year (e.g. summer versus winter) and weather conditions. It is common for the older children (3-5 year olds) to have morning, lunch and afternoon playtime (3 sessions, each lasting 1-2 hours typically).

4 BACKGROUND NOISE LEVELS

Short term (attended) noise monitoring was carried out at the subject site using 2 x hand held precision sound level meter (2 x Svan 979 sound level meter) on the following day/time:

- Friday 12th March 2021 between approximately 10:00am and 11:15am

The results were as follows:

Table 4.1 attended/manned survey results

| Location # | Description | Date | Time | Duration (min.) | L _{Aeq} | L _{A10} | L _{A90} |
|------------|--|---------|-------|-----------------|------------------|------------------|------------------|
| 1 | South East boundary, adj. to #3a Anthony Drive | 12/3/21 | 9:59 | 15 | 54 | 55 | 46 |
| 1 | South East boundary, adj. to #3a Anthony Drive | 12/3/21 | 10:14 | 12 | 51 | 53 | 46 |
| 2 | Aged care facility car park | 12/3/21 | 10:28 | 14 | 53 | 53 | 45 |
| 3 | West side of subject site | 12/3/21 | 10:43 | 14 | 50 | 52 | 45 |
| 4 | South East boundary, adj. to #3 Anthony Drive | 12/3/21 | 10:59 | 14 | 53 | 54 | 47 |
| 5 | South end of subject site | 12/3/21 | 10:02 | 15 | 54 | 57 | 46 |
| 6 | Far south end of subject site | 12/3/21 | 10:23 | 11 | 50 | 52 | 45 |
| 7 | Far south end of subject site | 12/3/21 | 10:37 | 10 | 51 | 53 | 46 |
| 8 | South East boundary, adj. to #5 Anthony Drive | 12/3/21 | 10:48 | 15 | 53 | 54 | 46 |

Readings were sampled over a 10-15 minute period, long enough to establish a steady, non-fluctuating L₉₀ reading.

Background noise monitoring

Unattended long term noise monitoring was carried out at the Blue Cross aged care facility using a type 2 noise logging device (RTA Technology RTA-02) measuring 15minute statistics continuously over a 24 hour period. The noise logger was placed at the southern end of the site in an outdoor patio area. Logging was carried out from Thursday 20th May 2021 (11:15am start) to Thursday 27th May 2021 (12pm finish). The results were as follows:

Table 4.2 – background noise monitoring results

| | Typical daytime L ₉₀ (15min) | Day L ₉₀ | Eve. | Night |
|----------------|--|------------------------|------|-------|
| Thurs, 20/5/21 | 45-50 | 49* | 49 | 45 |
| Fri, 21/5/21 | 43-49 | 47 | 53 | 44 |
| Sat, 22/5/21 | 43-46 | 45 | 43 | 41 |
| Sun, 23/5/21 | 42-46 | 45 | 45 | 40 |
| Mon, 24/5/21 | 45-48 | 47 | 43 | 43 |

| | | | | |
|----------------|-------|------|----|----|
| Tues, 25/5/21 | 47-52 | 51 | 49 | 47 |
| Wed, 26/5/21 | 48-51 | 49 | 45 | 43 |
| Thurs, 27/5/21 | 47-51 | 49** | | |
| Lowest ave | | 45 | 43 | 40 |

*11:5am – 6pm

**7am – 12pm

Note: Permission was granted to conduct noise logging at the Blue Cross aged care facility. This location was chosen due to the subject site not being secure enough to leave noise monitoring equipment unattended. The selected location was deemed an acceptable ‘derived point’ measurement location in accordance with SEPP N-1 background noise assessment methodology.

All equipment calibration was checked prior to and subsequent to all noise measurements to ensure accuracy.

Since the noise logger was located adjacent to a reflecting surface (façade wall), a -2dB must be applied to the above values for the purpose of determining the SEPP N-1 permissible noise limits. Therefore, the following adjusted background levels shall apply:

Daytime – 42 dB(A)L90

Evening - 41 dB(A)L90

Night - 38 dB(A)L90

Refer to figure 4.1 below showing all attended noise reading locations and the location of the noise logger.



Figure 4.1 – Background noise measurement locations

5 NOISE CRITERIA

5.1 Children outdoor areas

There are no regulations in Victoria governing noise from children play areas at child care centres.

From a review of previous VCAT determinations, sound associated with children playing in outdoor areas of childcare centres is considered an acceptable day time noise source in residential areas. In addition, the noise levels are only generally audible during the time the children play outside and for this site, there will be no weekend or public holiday childcare related activity. The Victorian Civil and Administrative Tribunal have consistently considered the sound of children playing as acceptable within residential areas.

Association of Australian Acoustical Consultants guideline for Child Care Centre Acoustic Assessment (AAAC guidelines, version 3.0)

The AAAC guidelines 3.0 provide a useful guide (but are not statutory guidelines) to noise criteria, building design considerations, boundary fence requirements and noise management planning for new childcare centre applications. The noise goals in the guideline are stated below:

| Use of outdoor area | Noise target |
|-----------------------|---|
| More than 4 hours/day | LAeq, 15min noise level from outdoor play not to exceed <i>background noise level</i> $L_{90} \text{ dB(A)} + 5 \text{ dB(A)}$ ('BG+5dB') |
| 4 hours/day | LAeq, 15min noise level from outdoor play not to exceed <i>background noise level</i> $L_{90} \text{ dB(A)} + 10 \text{ dB(A)}$ ('BG+10dB') |

The general consensus among Victoria acoustic consultants is that the 'BG+5dB' criterion may be unnecessarily stringent for some residential areas (particularly low background areas), resulting in excessive barrier heights for residential settings.

In previous tribunal determinations¹, the 'BG+10dB' criterion has been ruled over the 'BG+5 dB' criterion as the appropriate noise target for the design of acoustic fence treatments. For this site, adopting the BG+10 dB criterion would result in a design limit of 55 dB(A) based on the lowest weekday daytime average recorded over the logging period (see section 4). Adopting the BG+5 dB criterion would result in a design limit in the order of 50 dB(A).

5.2 Mechanical plant

Noise emissions from mechanical plant such as air conditioning units must comply with State Environment Protection Policy No. N-1 "Control of Noise from Commerce, Industry and Trade" (SEPP N-1). This policy sets limits for noise that must be met outside the nearest residential property.

¹ PHHH Investments Pty Ltd v Bayside CC [2015] VCAT 922

SEPP N-1 sets noise limits for three different time periods – day, evening and night, as defined below:

| | | |
|----------------|--------------------|------------|
| <u>Day</u> | Monday-Friday | 7am - 6pm |
| | Saturday | 7am - 1pm |
| <u>Evening</u> | Saturday | 1pm - 6pm |
| | Sunday, Pub. Hols. | 7am - 6pm |
| | All days | 6pm - 10pm |
| <u>Night</u> | All days | 10pm - 7am |

For this site, the permissible noise limits for the day, evening and night periods have been determined to be 51, 45 and 41 dB(A) respectively based on long term monitoring results. For a more detailed explanation of the SEPP N-1 policy, refer to appendix 2.

5.3 Music Noise

Music noise from the centre will be required to comply with State Environment Protection Policy No. N-2 "Control of Music Noise from Public Premises" (SEPP N-2). This policy sets limits for music noise that must be met at the adjoining residential properties.

For the day period, the L_{Aeq} dB(A) effective music noise level must not exceed L_{A90} background level + 5 dB(A). For this site, the limit will be in the order of $50L_{Aeq}$ dB(A) depending on the assessment location.

5.4 Car park

There is no statutory noise regulation for controlling on-site vehicle noise. Typically, when assessing noise from car parks, consideration is given to sleep disturbance criteria if this is relevant to the site. This situation may arise during staff arrivals or early children drop offs before 7am.

There is no universally accepted criterion for sleep disturbance, however the NSW EPA criteria is widely used by acoustic consultants and accepted by VCAT for the assessment for the potential of sleep disturbance. The criteria are as follows:

- Maximum internal noise levels below 50-55 dB(A) are unlikely to cause awakening reaction
- One or two noise events per night with maximum noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Note the above levels are *internal* values. It is generally accepted that external noise levels can be approximately 10 dB higher at the façade of a habitable room, based on a 10 dB noise reduction through an open window (a worst case scenario).

5.5 Patron Noise (café)

Victoria does not have specific regulatory requirements for assessing patron noise. Therefore, patron activity noise from the proposed outdoor dining areas associated with the café shall be assessed in accordance with ‘best practice’.

In the absence of legislation, it is proposed that patron noise be based on recent Victorian Civil and Administrative Tribunal (VCAT) decisions related to outdoor patron noise.

For day and evening time operation, the following limits are recommended:

- Day time – L_{Aeq} patron noise not to exceed L_{A90} background plus 10 dB
- Evening – L_{Aeq} patron noise not to exceed L_{A90} background plus 10 dB

It is proposed the time periods are based on the SEPP N-1 time periods outlined in section 5.2.

6 SOURCE LEVELS (SOUND POWER LEVELS)

Children in outdoor play areas

The AAAC guidelines provide sound power level data for children playing outdoors. Refer to the table below outlining the recommended sound power levels to be used for modelling/barrier design purposes.

| Number and Age of Children | Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz] | | | | | | | | |
|----------------------------|---|----|-----|-----|-----|----|----|----|----|
| | dB(A) | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| 10 Children - 0 to 2 years | 78 | 54 | 60 | 66 | 72 | 74 | 71 | 67 | 64 |
| 10 Children - 2 to 3 years | 85 | 61 | 67 | 73 | 79 | 81 | 78 | 74 | 70 |
| 10 Children - 3 to 5 years | 87 | 64 | 70 | 75 | 81 | 83 | 80 | 76 | 72 |

Notes:

- 1 If applicable, an adjustment to the above sound power levels of -6 dB could be applied in each age group for children involved in passive play.
- 2 For simplicity, based upon a review of World Health Organization (WHO) data, a single recommended source height of 1metre is suggested as the source heights.

Mechanical plant

A typical range of sound power levels for mechanical plant is given below:

- Small (single fan) condenser (outdoor unit) 65 dB(A) L_w
- Medium (double fan) condenser (outdoor unit) 66-70 dB(A) L_w
- Large (double fan) condenser (outdoor unit) 80 dB(A) L_w
- Small exhaust fan (toilet, garbage room) 60-65 dB(A) L_w
- Small kitchen exhaust fan (roof mounted) 65-75 dB(A) L_w

Car movement noise based on previous surveys conducted by Acoustic Control Pty Ltd

| | $L_{Aeq(30s)}$ | L_{Amax} |
|--------------------------------|----------------|------------|
| Car start-up & drive out @ 10m | 50-55 | 64-67 |

7 NOISE CONTROL RECOMMENDATIONS

7.1 Acoustic fence treatments

The recommended acoustic fence treatments are shown on the coloured marked-up plan below (figure 7.1.1). Referring to the notations on the plans, the treatments are as follows:

Figure 7.1.1 ground floor

- Yellow – Open mesh fencing to architectural requirements (non acoustic)
- Blue – 2.4m high acoustic fence, timber palings to detail below
- Red – 3m high Modularwall Acoustimax acoustic barrier, 2.4m solid plus 0.6m clear section on top.

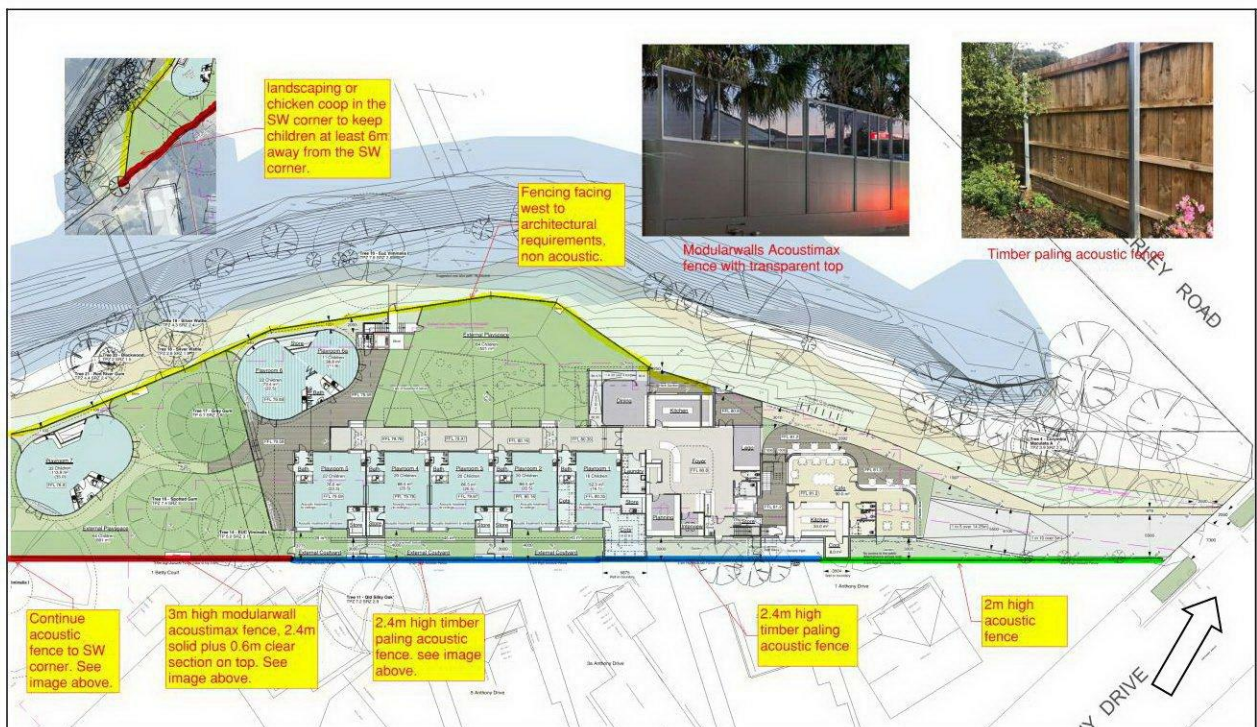


Figure 7.1.1 – Acoustic Treatments (Ground Level)

Acoustic fence construction

The acoustic fence should be constructed from a panel material with a mass of 10-12 kg/m² and be free of gaps and cracks. Constructions that meet these requirements include:

- Light duty timber acoustic fence consisting of 150x25mm treated pine palings butt joined together with a 50x20mm cover strips over the joins.
- Proprietary acoustic wall/fence such as VogueWall Modular Wall System (using AcustiMax 75 panel) with or without transparent top as required.

Transparent barrier - min. 6mm toughened or 6.38mm laminated glass (clear, frosted or coloured as specified by the architect) or 10mm perspex.

The attached sketches in appendix 3 show an acceptable construction method using 25mm treated pine palings for fence heights up to approximately 2.4m.

7.2 Mechanical plant noise control

Mechanical plant area

The centre will require a mechanical plant area for the following outdoor plant items:

- Air conditioning condenser units
- Kitchen exhaust fan (café)

A mechanical plant area will be provided on the roof above the ground floor café kitchen adjacent to the south east boundary. The plant area is proposed to be screened on all four sides measuring approximately 12.5m long x 2.6m wide. For noise control purposes, the following must be provided:

- Concrete slab flooring/roof area
- 2.7m high solid wall on the north west side
- 2.4m high acoustic metal screening on the SE, NE and SW sides. The screens must be 2.4m high acoustic panel screening, nominally 100mm thick, powder coated steel finish outer (1.6mm steel) and perforated steel inner, cavity filled with insulation (32kg/m³ glasswool).

Refer to figures 7.2.1 and 7.2.2 below.

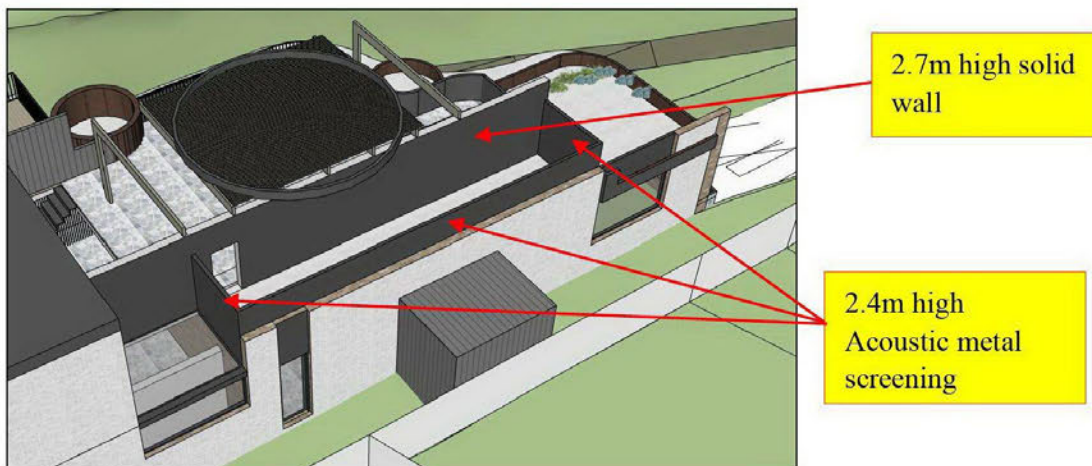


Figure 7.2.1 – Mechanical plant area



Figure 7.2.2 – Acoustic metal screen

Air conditioning condenser units

The centre will require a number of air conditioning condenser units. Based on other similar developments, there will be a requirement of approximately 8-10 small-medium air conditioning condenser units ranging from 2Kw – 10 Kw. Locate a maximum of ten (10) air conditioning condenser units (2.5KW-12Kw) in the mechanical plant area.

Kitchen fan (café)

The café kitchen exhaust fan shall be located in the mechanical plant area to mechanical consultants requirement, ducted to the ground floor kitchen as required. The fan can be a roof mounted style fan, but the sound power level must not exceed 75 dB(A) Lw. If the fan cannot meet this requirement, it must be an inline exhaust fan with acoustic (internally lined) ductwork.

Refer to figure 7.2.3 below.

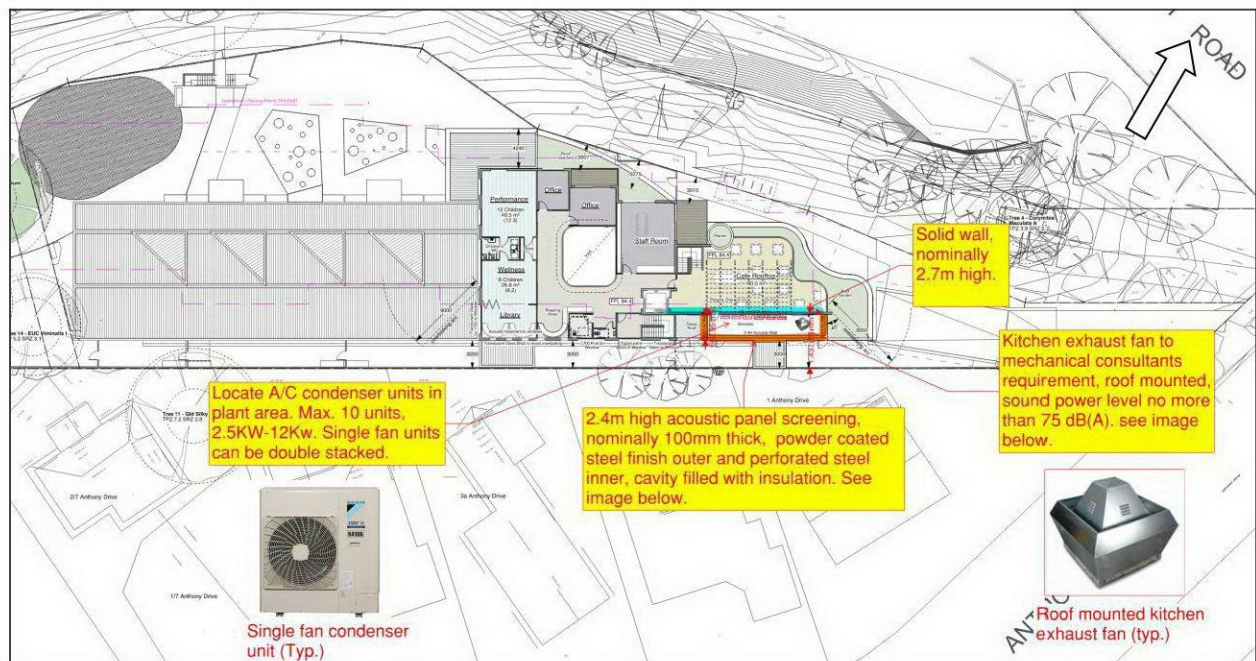


Figure 7.2.3 – Mechanical plant

Basement car park ventilation

The basement car park will be mechanically ventilated. The car park exhaust fan should be an inline axial fan located in the basement car park exhausting air up to a discharge plenum/planner box at ground level. The discharge point will be adjacent to the basement staircase near the north west boundary.

The fan should be an inline axial fan, fitted with sound attenuating ductwork upstream and downstream of the fan to meet required noise levels. The proposed basement ventilation system/fans should be reviewed and approved by an acoustic consultant prior to installation to ensure compliance with the SEPP N-1 limits.

Refer to figure 7.3.1 below.

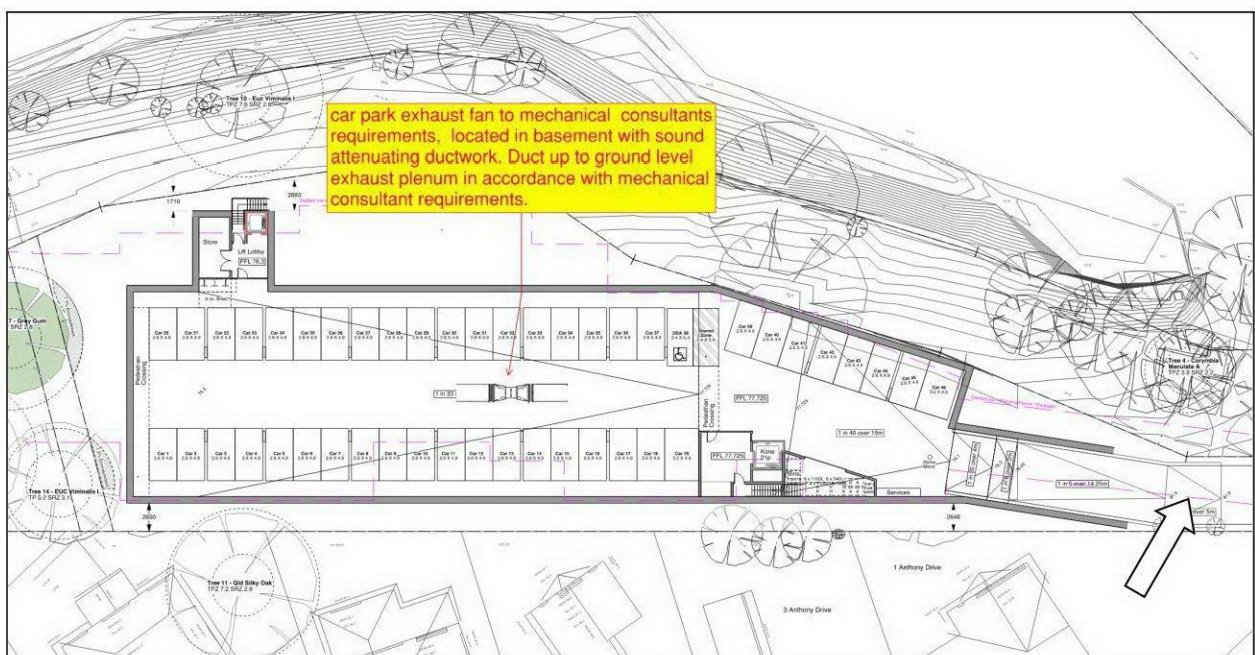


Figure 7.3.1– Basement car park exhaust fan

Kitchen fan (childcare centre)

The kitchen servicing the childcare centre component may require a commercial sized exhaust fan. The kitchen will be located on the north west side of the entrance foyer on the ground floor. The exhaust fan can be a roof mounted style fan, but the sound power level should not exceed 75 dB(A) Lw. The details and location of the fan is yet to be designed, but its location should be as least 20m from the south east boundary/residential interface.

Review by Acoustic Consultant

Prior to installation, proposed equipment selections and drawings showing proposed locations and acoustic treatment of A/C units, kitchen exhaust fans and car park exhaust fan should be forwarded to an acoustic consultant for review and approval to ensure compliance with SEPP N-1 requirements.

7.3 Music noise control

Complaints of music noise emissions from child care centres are not common in Victoria. No specific acoustic treatments are required however the following measures should be followed:

- Where it is used, amplified music conducted inside children’s rooms.
- Musical instruments should not be used in outdoor areas.
- Interactive music elements in the outdoor play areas must be located away from residential interfaces/boundaries.

7.4 Car park noise

Staff and customer car parking is proposed in the basement with driveway ramp access off Anthony Drive. Acoustic fencing (2m high) is proposed along the south east boundary adjacent to the car park ramp to reduce vehicle to the adjoining property (1 Anthony Drive).

Children drop offs will be typically during the daytime after 7am (typical am & pm peaks being 7-8am & 5-6pm respectively).

As patron and staff car parking on site will be contained within the basement space, there will be no acoustic impact to the adjoining residences as a result of car park vehicle movements and activities.

7.5 Acoustic glazing to children’s rooms

Acoustic rated windows are recommended as follows:

- Ground floor playrooms 1-5, south east facing sliders – Rw32 acoustic sliders
- First floor library and reading nook, south east and south west facing windows – Rw32

Glazing in both cases to be single 6.38mm lam. or double glazed 6/12/6.38mm lam IGU).

Refer to figures 7.5.1 and 7.5.2 below.

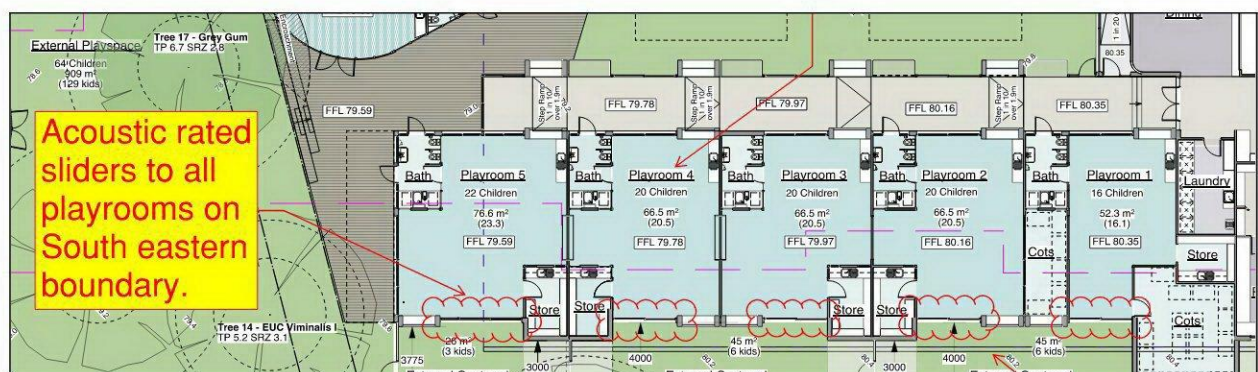


Figure 7.5.1 – ground floor acoustic rated sliding doors

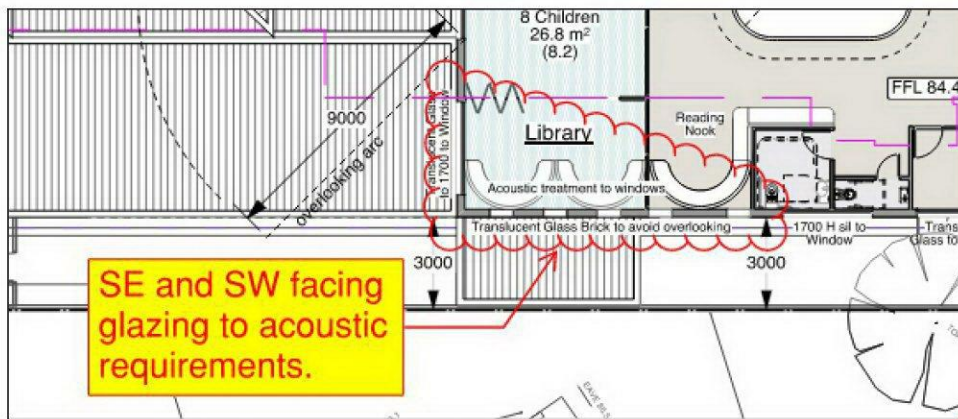


Figure 7.5.2 – First floor acoustic rated windows

7.6 Acoustic treatment to children’s rooms

Sound absorptive ceilings such as perforated plasterboard or suspended acoustic tile ceilings are recommended for all children rooms for general noise and reverberation control in accordance with Australian Standard AS2107. The ceilings should have an NRC rating of 0.7 or higher.

7.7 Café noise control

The café will be situated at the northern end of the site and will consist of a ground floor internal dining area, kitchen area, outdoor deck area (NW side) and a roof top dining area. The opening hours are proposed as follows:

Café: 6am – 7pm, Monday to Friday.
7am – 4pm, Saturday to Sunday.

The following patron numbers are proposed:

| | |
|----------|----|
| Internal | 50 |
| External | 76 |

The following noise control measures will be required to meet SEPP N-1 requirements:

Mechanical plant – kitchen exhaust fan(s), make up air fan, air conditioning condenser units, package refrigeration units etc are to be located within the proposed mechanical plant area (refer to section 7.2). All equipment proposed by the mechanical contractor must be reviewed by an acoustic consultant prior to installation to ensure compliance with SEPP N-1 limits.

Patron noise (roof top) – this area is 90m² and is proposed to be a seated dining area for café patrons. The following noise control measures are recommended:

- Acoustic/barrier wall – provide a 2.7m high (min.) solid wall on the SE side of the outdoor area. The wall must be solid (e.g. masonry or framed cement sheet wall with no gaps or openings).
- Limit of 50 patrons

- Hours of operation: Weekdays – 7am to 6pm
 Saturday – 7am – 4pm
 Sunday – 9am – 4pm
- Music – background level only, Speakers (max. 2) mounted on the barrier wall facing NW (aiming downwards), at a height not more than 2.4m above the first floor level
- Speakers to be small, two-way outdoor speaker (no subwoofer)
- The music system must incorporate an electronic limiting device to limit the maximum sound level to 70dB(A) Leq @ 3m from the speaker (directly in front).
- Music should not be played before 7am, Monday to Saturday and 9am on Sundays
- Amplified live music not permitted.

8 PREDICTED NOISE LEVELS FROM THE OUTDOOR PLAY AREAS

Noise calculations were carried out using a software programme called SoundPlan *essential* to predict noise from the outdoor play areas to the residential interface on the south east side with the acoustic fences proposed in this report. This programme calculates noise levels based on the international standard ISO 9613-2, 1996 Acoustics – Attenuation of sound during propagation outdoors.

For assessment purposes, the noise from the two main play areas were considered:

- Children aged 0-3 playing in the NW play area, max 72 children (babies and toddlers)
- Children aged 3-5 playing in the SW play area, max. 80 children (preschool)

Note: The SW play area is over 900m², with a theoretical maximum of 129 children (1 child/7m²), but a maximum of 80 children playing in the area at any one time is recommended. The NW area is just over 500m² and a maximum of 72 children at any one time is permitted in this section. The courtyards (3 off) along the SE boundary provide for an additional 15 children at the 1/7m² density rule, but these areas should not be used for noisy play and should only be used by children under 2 years old (non speaking age) accompanied by a carer at all times. All play areas will need to be managed accordingly to ensure children are playing in their respective areas.

Landscaping or a chicken coop is planned in the SW corner to keep children at least 6m away from the SW corner. Refer to figure 8.1 below.

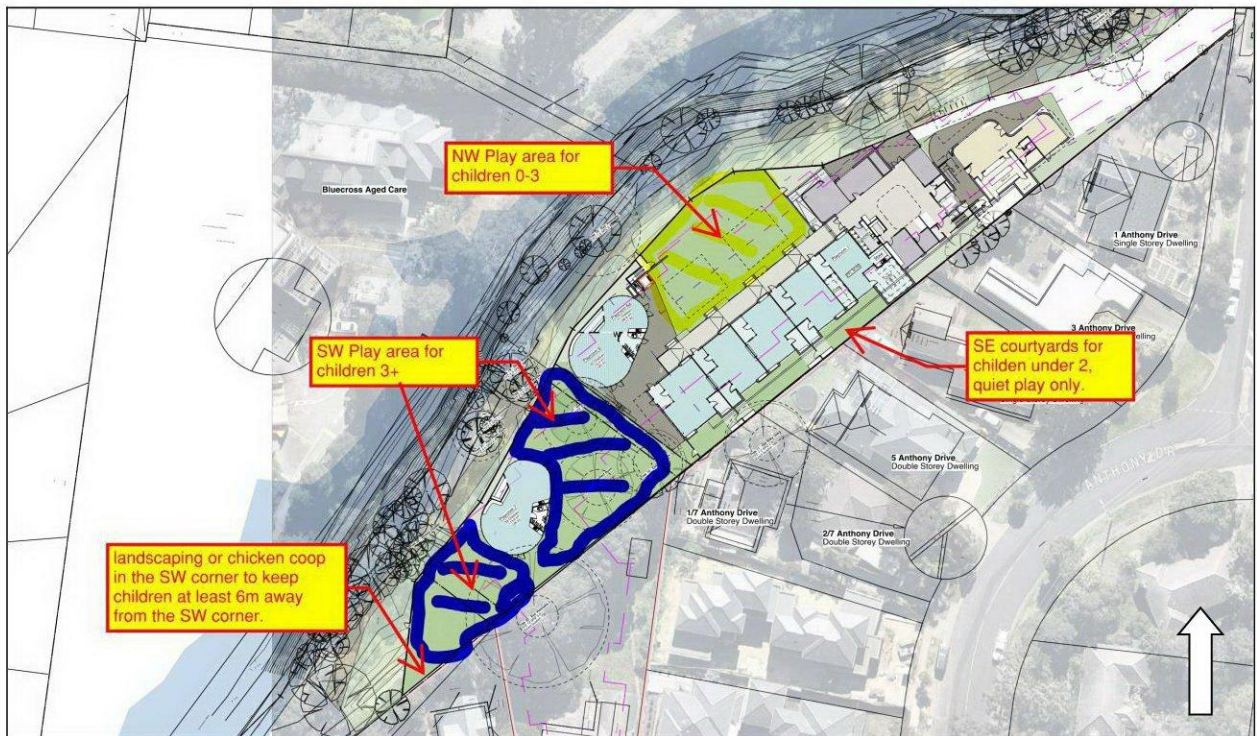


Figure 8.1 – play areas

The following receiver locations were considered relevant for play yard noise assessment purposes:

| Location | Address | Description |
|----------|-------------------|---|
| 1 | 3A Anthony Drive | Single story dwelling |
| 2 | 5 Anthony Drive | Double story dwelling with north facing balcony (1 st floor) |
| 3 | 2/7 Anthony Drive | Single story dwelling* with raised deck to rear (facing NW) |
| 4 | 9 Anthony Drive | Double story dwelling |
| 5 | 1 Betty Court | Single story dwelling |
| 6 | 2 Betty Court | Single story dwelling, with attic window facing north |

*Incorrectly labelled as 1/7 Anthony Drive & double story

Refer to figure 8.1 below showing the predicted noise levels.

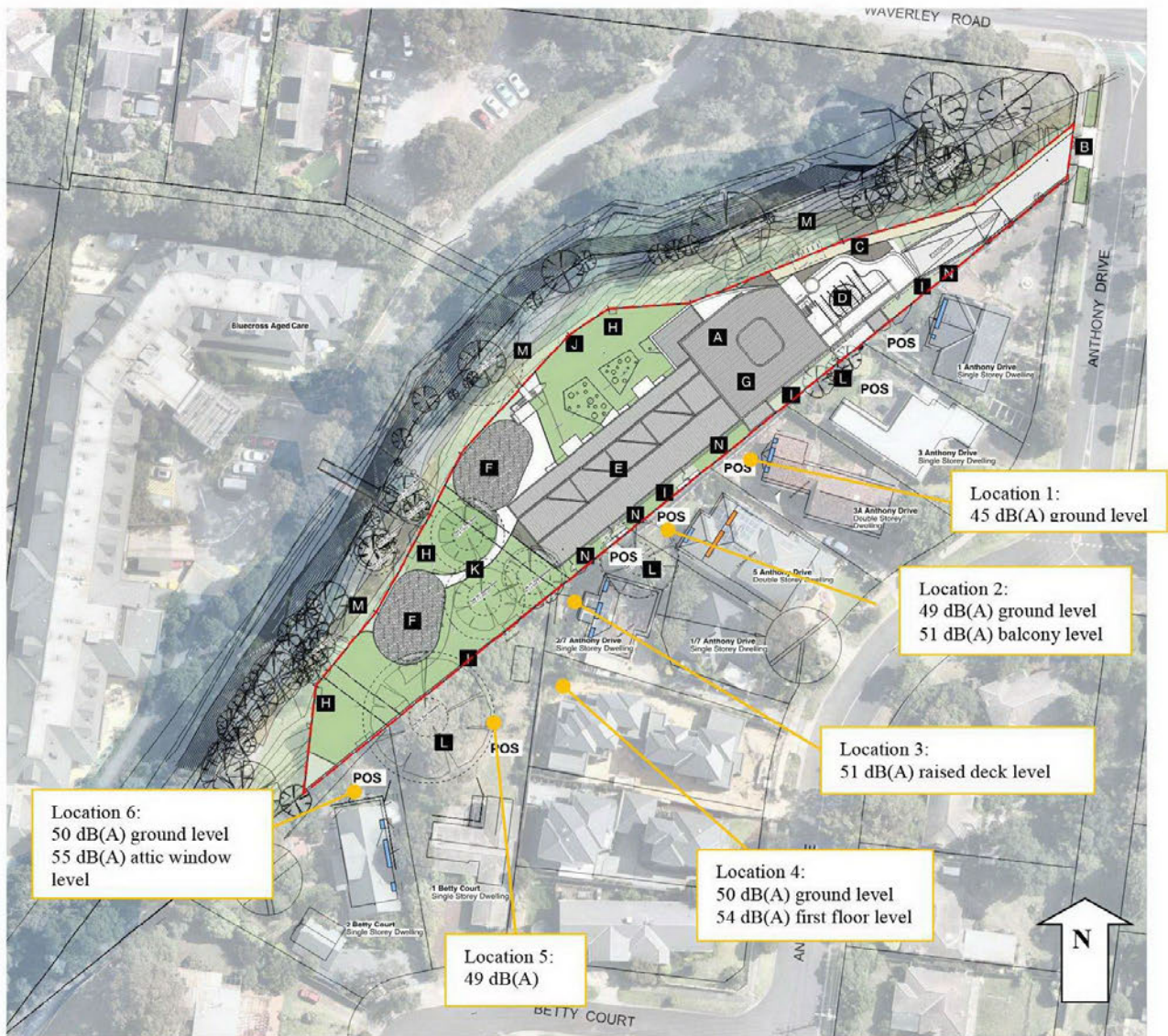


Figure 8.1 – predicted noise levels at adjoining residences

The noise modelling indicates that typical noise levels emanating from the proposed play areas with the proposed acoustic treatments will be limited to 50 dB(A) L_{eq} (ground floor level) at the private open spaces of the adjoining properties. At elevated locations 4 and 6 adjacent to the main SW play area, the levels are predicted to be limited to 55 dB(A) L_{eq} .

The predicted levels will be within the AAAC criterion of BG+10 dB and therefore the proposed acoustic treatments are expected to provide a satisfactory and acceptable outcome for the amenity of the adjoining residences.

Noise levels at the age care facility

The noise modelling indicates that typical noise levels at the aged care facility to the west will be in the order of 55 dB(A) L_{eq} at ground and elevated receiver locations. This is considered an acceptable outcome for the amenity of the aged care facility.

9 CONCLUSION

Based on the findings of this study, the following is concluded/recommended:

- Acoustic fences detailed in section 7.1 of this report are recommended to minimise outdoor play area noise to the adjoining residential properties along the south east interface. The recommended acoustic fence types and heights are outlined in figure 7.1.1 of this report.
- Noise emissions from mechanical plant and equipment are required to comply with limits prescribed under State Environment Protection Policy No. N-1 "Control of Noise from Commerce, Industry and Trade" (SEPP N-1). Noise control guidelines for mechanical plant are contained within section 7.2 of this report.
- No specific acoustic treatments will be required for music noise control other than administrative measures outlined in section 7.3 of this report.
- No specific acoustic treatments will be required for the basement car park.
- Recommendations for acoustic glazing and sound absorptive ceilings to children's rooms are provided in sections 7.5 and 7.6 respectively.
- Noise control measures for the proposed café are outlined in section 7.7.

The acoustic treatments recommended in this report which have a bearing on town planning aspects (e.g. boundary acoustic fences and mechanical plant screening) have been incorporated into the town planning drawings.

ACOUSTIC CONTROL




Principal Consultant

APPENDICES

APPENDIX 1: ACOUSTIC TERMINOLOGY

Definitions and Descriptions

| | |
|------------------------------|--|
| dB(A) | Decibels recorded on a sound level meter which has had its frequency response modified electronically to an international standard to quantify the average human loudness response. |
| L₉₀ dB(A) | The noise level exceeded for 90% of the measurement duration. The L ₉₀ noise level is indicative of the lower noise levels in a fluctuating noise environment and is often used to describe the background noise level in noise assessments. |
| L₁₀ dB(A) | The noise level exceeded for 10% of the measurement duration. The L ₁₀ noise level is indicative of the upper noise levels in a fluctuating noise environment and is often used to describe the typical maximum noise events. |
| L₁ dB(A) | Commonly described as a value close to the maximum noise level observed but not the actual highest. It is the noise level exceeded for 1% of the measurement duration. |
| L_{eq} dB(A) | L _{eq} is defined as the equivalent sound level and is the continuous steady state sound level that would contain the same sound energy as the time-varying sound level being measured. It is often the noise parameter used to assess environmental noise. |
| L_{max} dB(A) | The maximum noise level observed in the environment. |

APPENDIX 2: EPA POLICY EXPLANATION (SEPP N-1)

Environmental noise emissions from commercial premises must comply with State Environment Protection Policy No. N-1 "Control of Noise from Commerce, Industry and Trade" (SEPP N-1). This policy sets limits for noise that must be met at the nearest residential area.

The method specified in SEPP N-1 for determining the noise limits takes into account the type of area in which the noise sensitive area is located, the time of day and the background noise level of the area.

The day, evening and night periods, as defined by SEPP N-1, are:

| | | |
|----------------|--------------------|------------|
| <u>Day</u> | Monday-Friday | 7am - 6pm |
| | Saturday | 7am - 1pm |
| <u>Evening</u> | Saturday | 1pm - 6pm |
| | Sunday, Pub. Hols. | 7am - 6pm |
| | All days | 6pm - 10pm |
| <u>Night</u> | All days | 10pm - 7am |

For this site, the permissible noise limits have been determined as follows:

Table 1

| period | Zoning level | Neutral background range | Measured background level | Noise limit |
|---------|--------------|--------------------------|---------------------------|-------------|
| Day | 51 | 39-45 | 42 (neutral) | 51 |
| Evening | 45 | 36-42 | 41 (neutral) | 45 |
| Night | 40 | 31-37 | 38 (high) | 41 |

*assuming neutral background level

The assessment of noise emission levels involves assessing the equivalent (energy average) noise level, referred to as the “L_{Aeq} noise level”, over a continuous 30 minute time period. The assessment point is taken within a distance of 10 metres from the affected house(s) or at an alternative point deemed representative of the noise received at the nearest noise sensitive area (derived point).

The L_{Aeq} noise level is the adjusted for duration of audibility and various aspects of noise character such as intermittency, impulsiveness and/or tonality.

After the L_{Aeq} noise level is adjusted, the resultant noise level is known as the “Effective Noise Level” which can then be directly compared with the permissible noise limits.

APPENDIX 3: ACOUSTIC FENCE DETAILS

Typical detail for a light duty acoustic paling fence (2.0-2.4m in height) using 150mmx25mm treated timber palings incorporating a horizontal bottom base board. Note: seek specialist advice for acoustic fences higher than 2.4m.

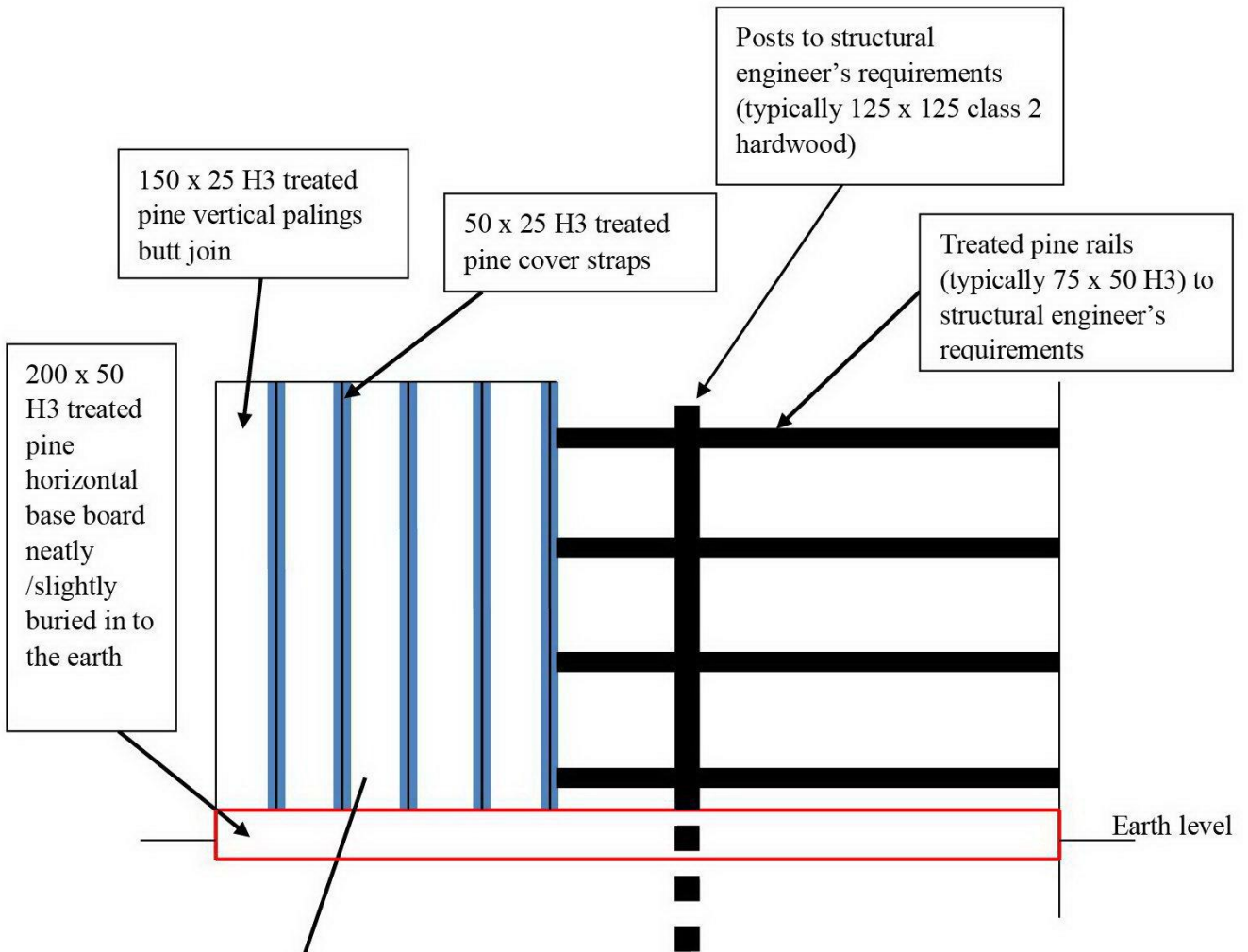
Design Requirements

The palings fence should be constructed in the following manner:

- 1) 200x50mm treated pine base board running horizontally and buried 25-50mm into the earth.
- 2) 150x25mm treated pine vertical palings butt joined together, in alignment with the bottom horizontal base board 1).
- 3) Use 50x25mm treated timber cover straps over the joins between vertical palings 2).

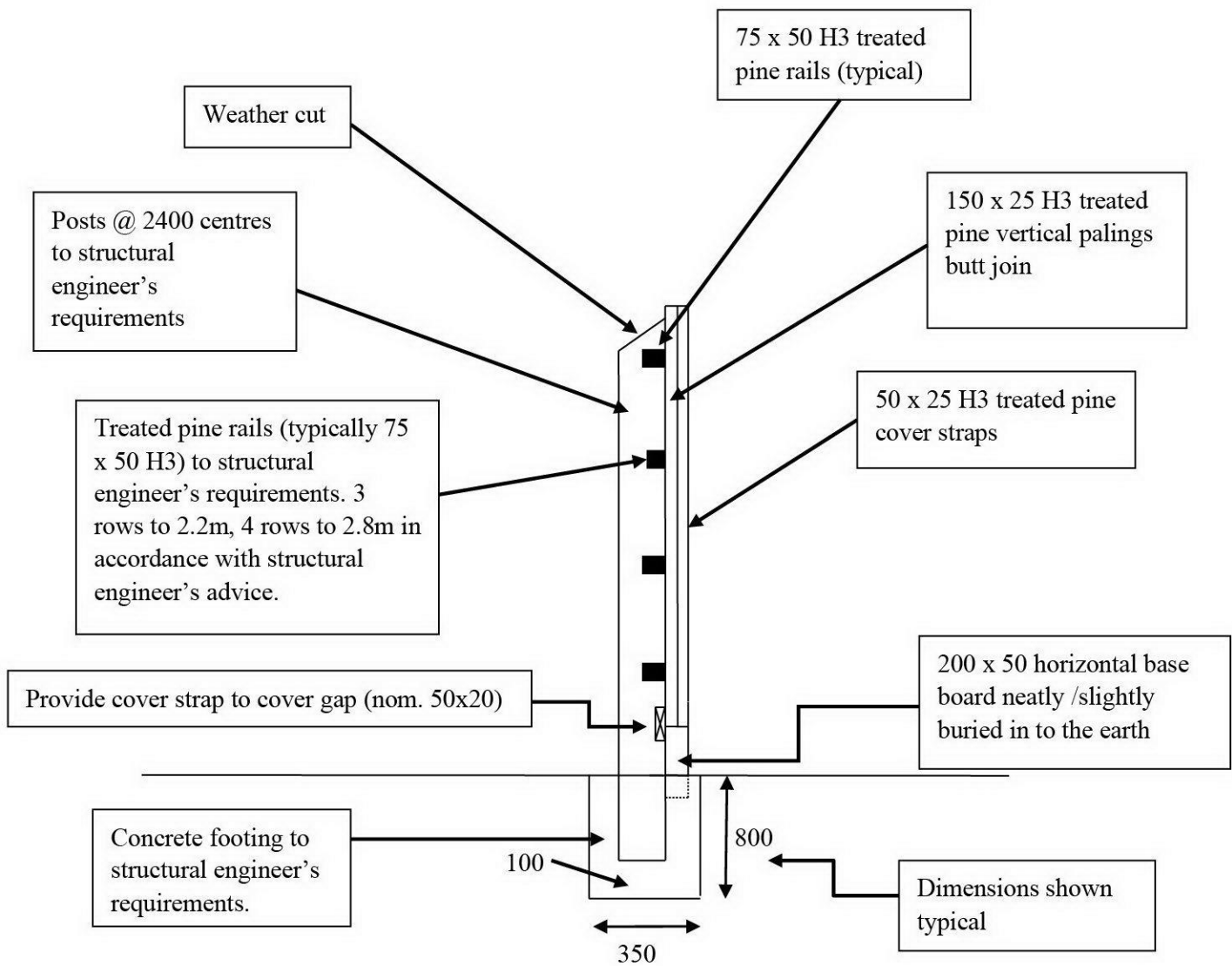
Support posts and rails to be designed in accordance with structural engineers details.

Refer to the sketches below.



Front elevation view (not to scale)
All dimensions in millimeters





Side elevation view (not to scale)

All dimensions in millimeters

Notes:

Rails fixed to posts with class 3 galvanised 100x14 batten screws
 All palings fixed with 65x2.8 galvanised screw shank nails