

Noise Impact Assessment

Accommodation Village, Minyip

06-May-2024

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Accommodation Village, Minyip

Client: Astron Corporation Limited

ABN: 27154924553

Prepared by

06-May-2024

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Executive Summary

AECOM Australia Pty Ltd (AECOM) has been commissioned by Astron Corporation Limited to assess the potential noise impacts from the proposed accommodation village at Minyip, including the noise associated with loading dock operations, car and truck movements, and noise emissions from mechanical services.

The proposed accommodation village will be located at 21 Church Street, Minyip, Victoria.

This noise assessment has been prepared in accordance with Victoria's Environment Protection Act and the applicable Regulations and guidelines for earth resources. The General Environmental Duty (GED) is at the centre of the new Environment legislation. The GED requires proactive steps to be taken to eliminate or reduce the risk of harm to human health and the environment from pollution or waste. The GED applies at all times, during the construction and operation of a project, for any activities posing a risk of harm to human health and the environment.

The noise assessment scope includes:

- Review of the site surroundings and the proposed site operations.
- Outlines the legislation, policies, guidelines and criteria pertinent to noise emissions from quarries:
 - Environment Protection Act 2017 including the General Environmental Duty (GED) and Environment Reference Standard 2022
 - Environment Protection Regulations including EPA Publication 1826 - Noise Protocol 2021
- Modelling of the operational noise levels for the proposed scenarios from the site to the surrounding noise sensitive receptors, utilising noise measurements conducted at the site in 2023.
- Commentary and recommendations for noise mitigation measures to comply with the General Environmental Duty.

Based on the conducted assessment, including on-site measurements, conducted calculations of proposed operations and analysis, the following is expected:

- Provided the treatment nominated in the report are implemented, noise emissions from the proposed operations will comply with the noise emissions criteria.

Further mitigation measures have been recommended to reduce the risk of adverse impact from noise emissions in order to satisfy the GED and minimise the risk of harm to human health and the environment.

1.0 Introduction

1.1 Project Description

AECOM Australia Pty Ltd (AECOM) has been commissioned by Astron Corporation Limited (Astron) to assess the potential noise impacts from the accommodation village at Minyip, including the noise associated with loading dock operations, car and truck movements, and noise emissions from mechanical services.

1.2 Project Scope

This noise assessment has been prepared in accordance with Victoria's Environment Protection Act and the requirements of the Environment Protection Authority (EPA) Regulations.

The purpose of the noise assessment is to evaluate the impacts of the proposed accommodation village on the closest noise sensitive receptors.

1.2.1 Objectives

The objectives of this noise assessment are to:

- Establish the application legislation, policies and guidelines applicable to noise emissions for this project.
- Identify noise sensitive receptors within the vicinity of the project.
- Provide details of the existing and proposed activities and hours of operation at the accommodation village.
- Provide details of the noise measurements undertaken at the site.
- Predict noise levels at nearby noise sensitive receptors.
- Assess the predicted noise levels against the applicable criteria and, where required, recommend noise mitigation measures to target compliance with the criteria and satisfy the GED.

A glossary of terminology used in this report is provided in Appendix A

1.3 Site and Surrounds

The proposed accommodation village is to be located at 21 Church Street, Minyip. The closest noise sensitive receiver is located to the northwest at Morris Street, and on the south side of Church Street. An industrial facility is located approximately 160m to the east.

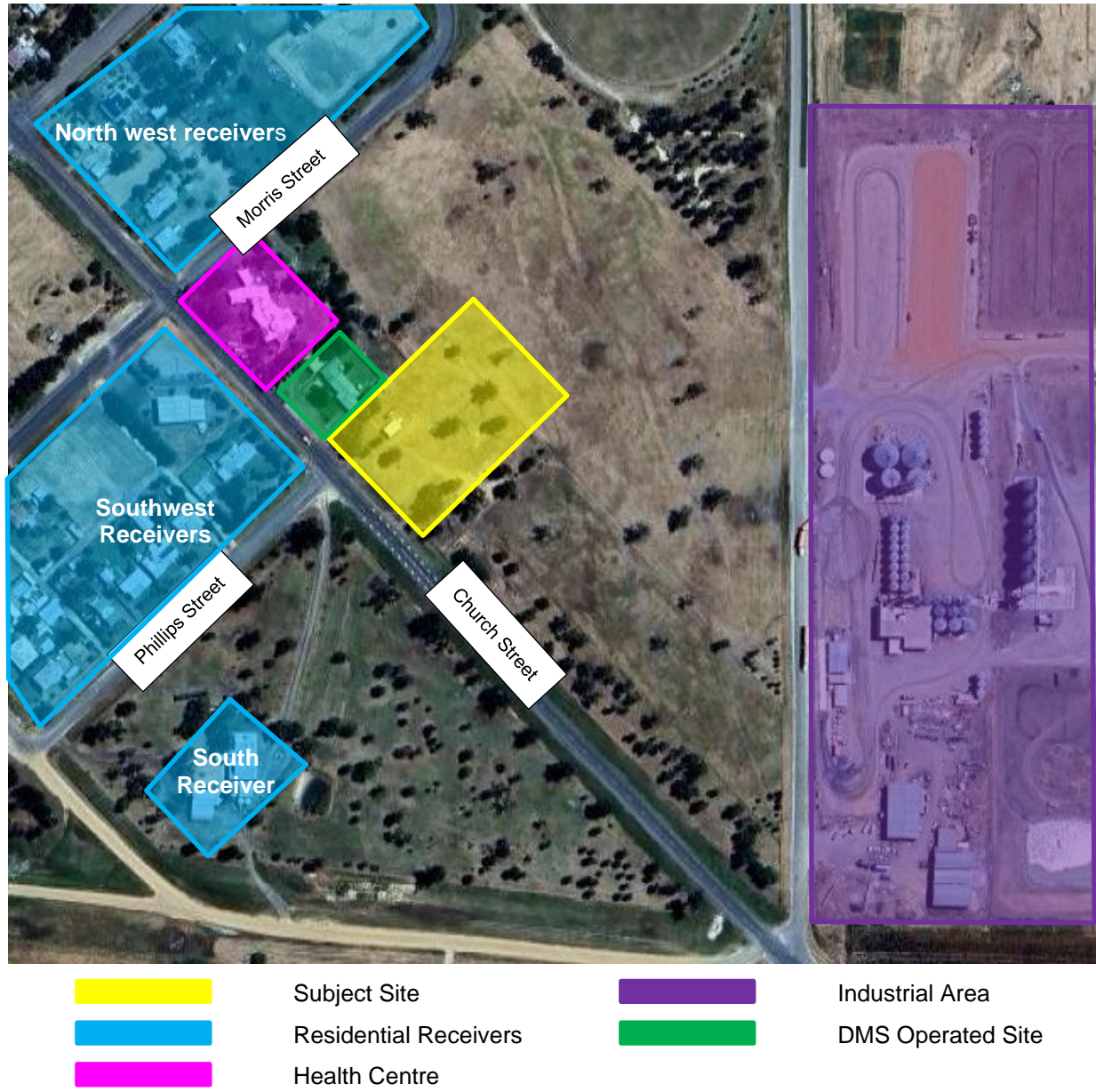









Figure 1 Noise Sensitive Receptors and Surrounds (Image accessed from Google Maps 2024)

1.4 Proposed Operations

The Accommodation Village will house up to 62 workers for the Donal Rare Earth and Mineral Sands Project (Donald Project). The following activities are expected to occur over each time period based on the EPA's definition. The operation activities have been based on information provided by DMS.

The "label" column in the table below shows the coloured legend for the site plan in Figure 2.

Table 1 Proposed Activities for the DMS Accommodation Village

Item	Label	Description and Assumptions
Cars		The site holds parking for up to 60 cars. It is assumed that up to 10 vehicle movements (car/ute) per hour between 6am and 6pm.
Trucks		Assumes the following truck movements; <ul style="list-style-type: none"> • 1 refrigerated truck up to 2 times a week • 1 waste removal truck up to 2 times a week
Loading Dock Operations	-	All truck and loading dock operations to be conducted during day time hours (7am to 6pm Mon-Fri). Truck deliveries will typically occur 1-2 times a week as per above. Manual handling of equipment only.
Buses		Assumes the following bus movements; <ul style="list-style-type: none"> • 1 x 15 seater bus operating up to 6 times between 6am and 7.30am, and • 1 x 15 seater bus operating up to 6 times between 5pm and 6pm
Mechanical Services		Outdoor condenser units serving each room
		Outdoor condenser units serving the cool room
		Heating ventilation air conditioning (HVAC) serving the changing room, e.g. fans, condensers, etc
		Exhaust fans serving the kitchen

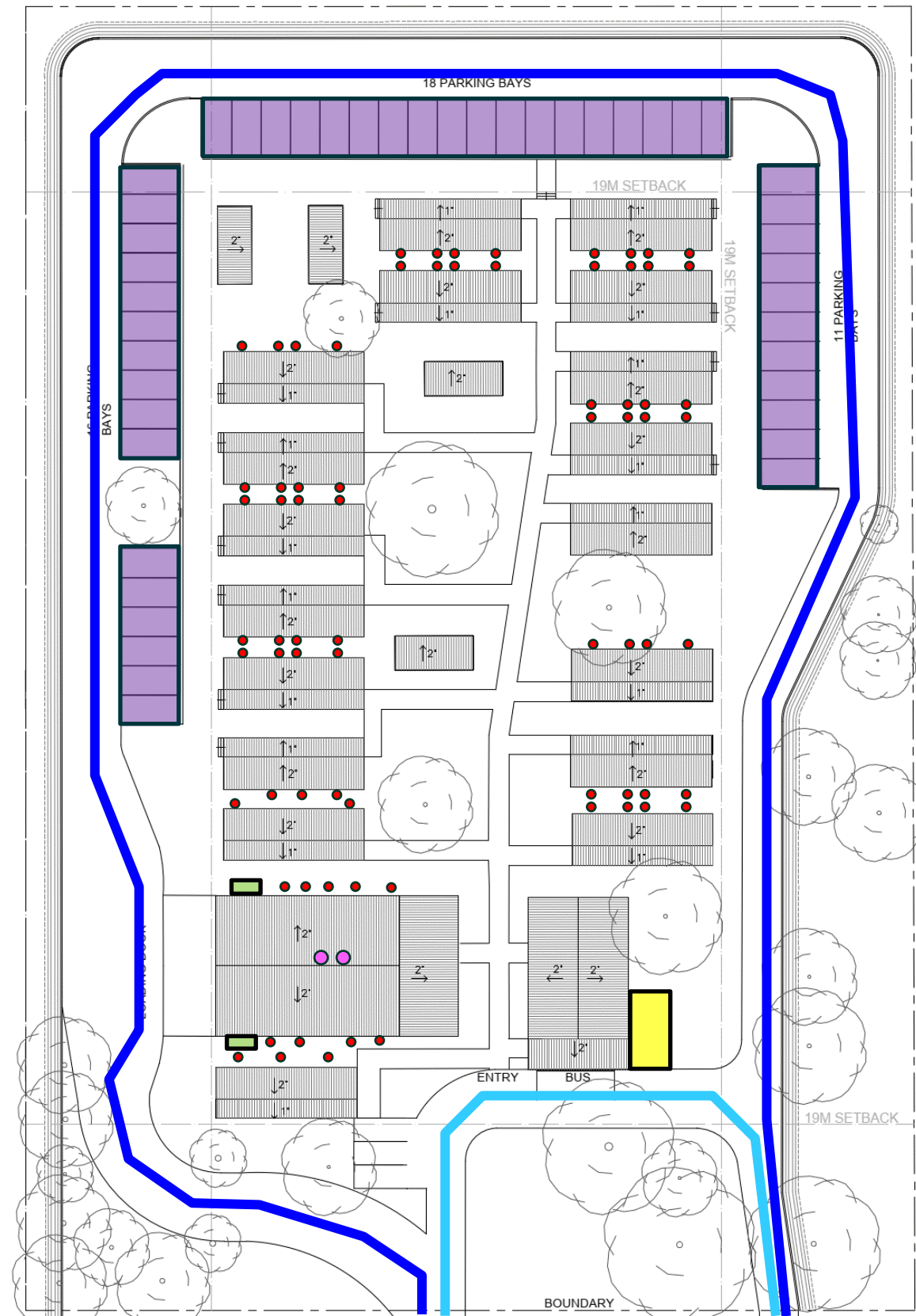


Figure 2 DMS Accommodation Village Operation Noise Sources

2.0 Legislation, Policies, Guidelines and Criteria

2.1 Environment Protection Act 2017

Noise in Victoria is managed primarily through the *Environment Protection Act 2017* (EP Act) and associated regulations. The EP Act applies to noise emissions and the air, water and land to protect the environment in Victoria.

The EP Act requires a development licence and operating licence for prescribed permission activities.

The Environment Protection Regulations are used to further the purpose and give effect to the EP Act. Provisions under the EP Act include the General Environmental Duty (GED) and the obligation not to emit or permit to emit 'unreasonable noise'. Meeting the regulatory noise limits does not mean the GED has been met. The GED requires all reasonably practicable steps to be taken to eliminate or reduce the risk from noise.

2.1.1 General Environmental Duty

The General Environmental Duty (GED) requires proactive steps to be taken to eliminate or reduce the risk of harm to human health and the environment from pollution or waste. The GED applies at all times, during construction and operation of the project, for any activities posing a risk of harm to human health and the environment. The following sections of the EP Act apply to the GED:

- Section 25(1) of the EP Act states that a person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution must minimise those risks so far as reasonably practicable.
- Section 6 of the EP Act states that minimising risks of harm to human health and the environment requires the duty holder to eliminate risks of harm to human health and the environment so far as reasonably practicable and, if it is not reasonably practicable to eliminate those risks, then reduce those risks as far as reasonably practicable.
- Section 6(2) of the EP Act states factors to give regard to when determining what is reasonably practicable in relation to the minimising of risks to harm to human health and the environment.
- Section 3(1) of the EP Act states that even if the GED is met, the noise may be unreasonable if it exceeds the noise limits considering the factors in the definition of unreasonable noise.

2.1.1.1 EPA Publication 1856 - Reasonably Practicable

EPA Victoria Publication 1856 *Reasonably Practicable* provides guidance as to the factors to consider when defining proportionate controls to minimise harm, as follows:

- Eliminate first: Can you eliminate the risk?
- Likelihood: What's the chance that harm would occur?
- Degree (consequence): How severe could the harm be on human health or the environment?
- Your knowledge about the risks: What do you know, or what can you find out, about the risks your activities pose?
- Availability and suitability: What technology, processes or equipment are available to control the risk? What controls are suitable for use in your circumstances?
- Cost: How much does the control cost to put in place compared to how effective it would be in reducing the risk?

The items above have been considered when assessing the suitability of noise mitigation measures for the project.

2.1.2 Unreasonable Noise

The Environment Protection Regulations describes unreasonable (Section 166) and aggravated noise (Section 168) from a commercial, industrial and trade premises in Regulation 118, as follows.

1. *For the purpose of paragraph (b) of the definition of unreasonable noise in section 3(1) of the Act, noise emitted from commercial, industrial and trade premises is prescribed to be unreasonable noise if the effective noise level of the noise exceeds-*
 - a. *The noise limit that applies at the time the noise is emitted; or*
 - b. *the alternative assessment criterion that applies at the time the noise is emitted if the assessment of an effective noise level is conducted at an alternative assessment location in accordance with the Noise Protocol.*

Regulation 118 also sets noise limits that apply in 'noise sensitive areas', above which noise is prescribed to be unreasonable.

The Environment Protection Regulations also proposes frequency spectrum (Regulation 120) as a prescribed factor to consider when assessing unreasonable noise for the purpose of part (a) of the definition.

Under section 166 of the EP Act, noise can be assessed as unreasonable based on the factors in paragraph (a) of the definition of unreasonable noise (Section 3(1) of the EP Act). This applies to any noise including:

- When the noise limits are met and the factors remain relevant to noise being unreasonable, such as short-term loud events and low frequency noise.

2.1.3 Environmental Reference Standard

The environment reference standard (ERS) is made under section 93 of the Environment Protection Act to support the protection of human health in Victoria. It sets out the environmental values of the ambient air, ambient sound, land and water environments that are sought to be achieved or maintained in Victoria and standards to support those values.

Environmental values are the uses, attributes and functions of the environment that Victorians value. Standards for the environmental values are comprised of objectives for supporting different uses. The ERS sets out objective noise levels based on Victoria's planning zones. The noise levels outlined in the ERS are objectives and are neither noise limits nor noise design criteria. The ERS identifies environmental values to support the following: sleep at night, child learning and development and human tranquillity and the enjoyment of outdoors in natural areas.

The ERS does not apply in situations where specific regulations apply to that part of the environment or activity, for example, those noise sources considered by the Noise Protocol. As such, the ERS does not apply to this assessment.

2.2 Operational Noise Assessment Criteria

The following guidelines are referred to for this noise assessment:

2.2.1 EPA Publication 1826 – The Noise Protocol

The Noise Protocol explains how to determine operational noise criteria for new and existing commercial, industrial and trade premises and entertainment venues as defined by the Environment Protection Regulations.

The Noise Protocol is a subordinate legislation document. It is required to be adhered to by law.

The Noise Protocol specifies the methodology to determine and assess against the regulatory noise limits applicable to operational noise. The regulatory noise limits apply at all nearby sensitive receptors during the operation of the project.

Meeting the regulatory noise limits does not mean the GED has been met. In addition to setting noise limits for industry, the Environment Protection Act requires that industry should take all reasonably practicable steps to eliminate or reduce the risk from noise.

The Noise Protocol also provides guidance for the assessment and management of cumulative noise from multiple industrial premises (existing and planned).

Table 2 Applicable Time Periods

Period	Time
Day	7am to 6pm Weekdays and Saturdays
Evening	6pm to 10pm Weekdays and Saturdays 7am to 10pm Sundays and Public Holidays
Night	10pm to 7am

Noise limits are dependent on the following factors:

- Zoning, based on the planning scheme zoning
- Time, based on time of day i.e. different limits apply at different times of the day
- Background noise level (L_{A90}) in the noise sensitive area, in the absence of noise due to commercial, industrial or trade operations
- Consideration must be given to cumulative noise from multiple current or future industries operating in the same area that can impact noise sensitive receptors.

For the accommodation village, the noise criteria are derived using Noise Protocol Section 2.1, *Noise Limits in rural areas for commercial, industrial and trade premises other than utilities and earth resources*, which applies to mines and quarries.

Table 2 presents the noise limits determined by AECOM for the nearest residents.

Table 2 Noise Protocol Noise Limits

Noise Protocol Time Period	Noise Protocol Noise Limit, dB(A) L_{Aeq}
Day	48
Evening	45
Night	38

Furthermore, it has been confirmed that the DMS Operated Site to the immediate northwest shown in Figure 1, would be operated by DMS during the entire life of the accommodation village. As such, the above noise limits will not be applicable to that site. If the site's operator were to change, an additional acoustic assessment would be required, with the potential for additional acoustic treatment.

3.0 Noise Measurements

3.1 Measured Noise Levels

Noise measurements were previously conducted to establish the typical background noise levels near the subject site. Long term measurements were used to capture the operation of a typical day. Measurements were conducted from Tuesday 28 March to Wednesday 29 March 2023.

3.2 Noise Measurement Instrumentation

The specifications and details of the instrumentation used to conduct noise measurements are presented in Table 3 below. All instrumentation has been laboratory calibrated and was calibrated for on-site use.

Table 3 Instrumentation

Instrument	Make / Model	Serial Number	Use
Noise Monitor	NL-52	720998	Noise: Long-term measurements
	NL-42	1010817	Noise: Long-term measurements
Calibrator	Bruel and Kjaer 4231	2242325	Calibration of sound level meter

3.3 Noise Measurement Locations

Figure 3 below shows an aerial map of the locations of the noise measurements conducted on site, described as follows:

- Noise Measurement Location M1: 40m from the subject site
- Noise Measurement Location M2: 170m from the subject site



Figure 3 Noise Measurement Locations

3.4 Measured Noise Levels

The noise levels that were measured are presented in Table 4 below for each of the measurement locations.

Table 4 Measured Noise Levels

Location	Noise Level	Description of events
M1	Day Period: 35 L _{A90} , dB Evening Period: 40 L _{A90} , dB Night Period: 25 L _{A90} , dB	General background noise. Noise from industrial area was slightly audible during evening period.
M2	Day Period: 31 L _{A90} , dB Evening Period: 39 L _{A90} , dB Night Period: 24 L _{A90} , dB	General background noise. Noise from industrial area was slightly audible during evening period.

4.0 Noise Assessment

4.1 Methodology

A SoundPLAN three-dimensional noise model, implementing ISO 9613-2 *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation* noise propagation algorithms, was built to calculate noise propagation from operations at the accommodation village. The following propagation effects were included in the predictive noise model:

- Attenuation of noise with distance, including geometrical spreading and air absorption
- Reflections from buildings and other acoustically-reflective structures
- Barrier effects due to obstructions between noise sources and residential receptors
- Ground absorption
- Local topographical changes (due to the close proximity of the receivers, it has been assumed there is no elevation change).

The following sections outline the operational scenarios and associated inputs that were used to predict the Accommodation village noise emissions.

4.2 Scenarios

A summary of the operations over each time period on site is as follows:

Day period (7am to 6pm) and evening (6pm to 10pm) activities:

- All plant operating
- Loading dock operating
 - 1 truck movement
- 1 x 15 seater bus operating up to 6 times in one hour
- 10 cars/utes operating over a one hour period

Night period (10pm to 7am) activities:

- All plant operating
- 1 x 15 seater bus operating up to 6 times in one hour (between 6am and 7am)
- 10 cars/utes operating over a one hour period (between 6am and 7am)

4.3 Reference Noise Level Data

The following noise data from AECOM's database of sound level data has been used in the assessment.

Table 5 Reference Noise Source Sound Power Levels

Noise Source	Description	Maximum Sound Power Level, L_{Aeq} , dB
Kitchen Exhaust Fan	2 Serving Kitchen	93
Outdoor Condensers	1 per bedroom (60 in total)	68
Cool Room Condenser	2 Condensers Serving Cool Rooms	75
HVAC	Serving Change Rooms	90
Truck – Food Delivery	2 per week	105
Truck – Waste/Laundry Delivery	2 per week	100
Truck – Other	2 per week	100
Bus (15-seater)	6 movements between 6am -7.30am, and 5pm and 6pm	105
Cars	10 movements every hour between 6am and 6pm	86

4.4 Initial Noise Modelling

The initial noise modelling results, prior to adoption of noise mitigation measures, for the proposed site operations during the Day, Evening and Night periods are presented in Table 6. The table includes an assessment of compliance in accordance with the Noise Protocol noise limits for the nearest noise sensitive receptors.

Table 6 Summary of Modelled Noise Levels (Unattenuated)

Noise Sensitive Receptor	Period	Noise limits $L_{Aeq,30min}$ dB	Calculated noise level $L_{Aeq,30min}$ dB	Complies?
R1 – Northwest	Day	48	42	✓
	Evening	45	42	✓
	Night	38	41	✗
R2 - Southwest	Day	48	41	✓
	Evening	45	41	✓
	Night	38	41	✗
R3 - South	Day	48	39	✓
	Evening	45	39	✓
	Night	38	37	✓

Key findings from the noise calculations for the proposed site operations are as follows:

- The proposed scenarios are shown to exceed the night time noise criteria for the northwest and southwest receivers.
- Compliance for all time periods is achieved at the South receiver.

5.0 Recommendations

5.1 Design Considerations

As discussed in Section 4.2, without noise mitigation the proposed operation complies only with the day and evening time criteria. To satisfy the requirements of the Noise Protocol, the following mitigation measures have been adopted by the client following AECOM's recommendation:

- Install an acoustic screen around the following;
 - HVAC serving the changing rooms,
 - Cool room condensers, and
 - Kitchen exhaust fans
- Screens to be constructed from a non-perforated material with a minimum 8kg/m² mass.
- Screens to be constructed a minimum 500mm higher than the top of HVAC serving the change rooms and cool room condensers. Minimum 800mm higher than the top of kitchen exhaust fans.
- Screens to be constructed in the locations shown below

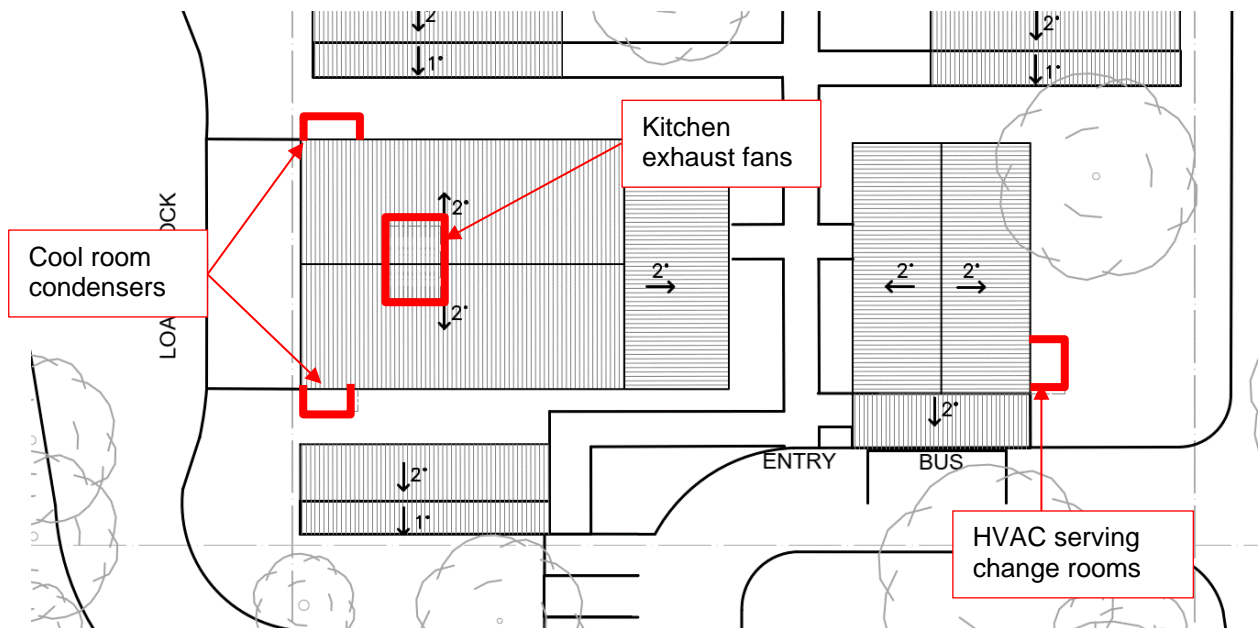


Figure 4 Acoustic Screening Locations

Note, a combination of quieter equipment and acoustic screening may be used.

5.2 General Environmental Duty

To satisfy the requirements of the General Environmental Duty (GED) by incorporating all *Reasonably Practicable* measures, the following additional noise mitigation measures have been considered:

- Light vehicle parking to be located at the rear of site, away from noise sensitive receivers.
- Positioning noisy mechanical services away from noise sensitive receivers as shown in the current design.
- Install a non-perforated fence (e.g. timber paling) around the boundary of site.
- Recreational areas located away from noise sensitive receivers with limitations of time of use.
- The selection and installation of quieter plant equipment
- Limiting the operation of the condenser units to low noise mode during the night time period.
- A site noise management plan should be implemented. It may include the following measures:
 - A maintenance plan to ensure plant is regularly serviced, and repaired or replaced if it becomes noisy.
 - Provide a contact telephone number of a nominated DMS communications representative to the surrounding residents for questions or complaints regarding noise.
 - Set out procedures to be undertaken by staff in the event of a complaint by a member of the public.
 - The maintenance of a register for any complaints.
 - Plans for measures to be taken by management and staff so that activities do not cause nuisance or annoyance beyond the land. This may include entry / exit signage to inform trucks to limit engine braking, be mindful of surrounding residents when accelerating and braking and not idle outside of DMS's land.

Additionally, it is recommended that noise measurements are conducted on site and at noise sensitive receivers following the construction of the Accommodation Camp to verify noise levels against Noise Protocol noise limits.

5.3 Updated Noise Modelling (With Mitigation)

Following the implementation of the recommended mitigation measures in Section 5.1, the predicted noise levels from the operation of the Accommodation Village are shown in Table 7.

Table 7 Summary of Modelled Noise Levels (With Mitigation)

Noise Sensitive Receptor	Period	Noise limits $L_{Aeq,30min}$ dB	Calculated noise level $L_{Aeq,30min}$ dB	Complies?
R1 – Northwest	Day	48	37	✓
	Evening	45	37	✓
	Night	38	35	✓
R2 - Southwest	Day	48	39	✓
	Evening	45	39	✓
	Night	38	37	✓
R3 - South	Day	48	37	✓
	Evening	45	37	✓
	Night	38	35	✓

6.0 Conclusion

This noise assessment has been prepared in accordance with Victoria's Environment Protection Act and the requirements of the Environment Protection Authority (EPA) Regulations.

Based on the conducted assessment, including on-site measurements, conducted calculations of proposed operations and analysis, the following is expected:

- Provided the treatment nominated in Section 5.1 of this report are implemented, noise emissions from the proposed operations will comply with the noise emissions criteria.

Mitigation measures have been recommended to achieve the noise emissions criteria and reduce the risk of adverse impact from noise emissions to satisfy the GED and minimise the risk of harm to human health and the environment.

Appendix A

Glossary

Term	Definition																	
'A' Weighted	Frequency filter designed to adjust the absolute sound pressure levels to correspond to the subjective response of the human ear. The A-weighting filter emphasises frequencies in the speech range (between 1 kHz and 4 kHz) which the human ear is most sensitive to.																	
Ambient noise	The A-weighted equivalent continuous sound pressure level L_{Aeq} , is typically the descriptor used to describe ambient noise.																	
Background level (L_{90} or L_{A90})	The L_{90} sound pressure level is used to quantify the background level. For a day, evening or night period means the arithmetic average of the L_{A90} levels for each hour of that period for which the commercial, industrial or trade premises under investigation normally operates. The background level shall include all noise sources except noise from commercial, industrial or trade premises which appears to be intrusive at the point where the background level is measured.																	
Decibel [dB]	The measurement unit of sound.																	
Decibel scale	A three decibel increase in the sound pressure level corresponds to a doubling in sound energy. An increase or decrease of three decibels is typically considered to be the smallest change in sound level that a listener can detect. A change of five decibels, however, is clearly noticeable. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. This increase is typically perceived to sound twice as loud. The table below shows the sound pressure level that would be typically experienced when exposed to different sources:																	
	<table border="1"> <tbody> <tr> <td>0 dB</td> <td>Threshold of human hearing</td> </tr> <tr> <td>40 dB</td> <td>Whisper in a library</td> </tr> <tr> <td>50 dB</td> <td>Open office space</td> </tr> <tr> <td>70 dB</td> <td>Inside a car on a freeway</td> </tr> <tr> <td>80 dB</td> <td>Outboard motor</td> </tr> <tr> <td>90 dB</td> <td>Heavy truck pass-by</td> </tr> <tr> <td>100 dB</td> <td>Pneumatic hammer</td> </tr> <tr> <td>110 dB</td> <td>Rock concert</td> </tr> <tr> <td>120 dB</td> <td>747 take off at 250 metres</td> </tr> </tbody> </table>	0 dB	Threshold of human hearing	40 dB	Whisper in a library	50 dB	Open office space	70 dB	Inside a car on a freeway	80 dB	Outboard motor	90 dB	Heavy truck pass-by	100 dB	Pneumatic hammer	110 dB	Rock concert	120 dB
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Effective Noise Level (L_{eff})	In accordance with the Noise Protocol, adjustments to the measured noise level are applied to account for the effects of duration, tonality, intermittency and impulsiveness of the noise. The adjusted 30-minute noise level is called the ' <i>Effective Noise Level</i> ', which is assessed in relation to the noise limits.																	
Frequency [f]	Frequency is measured in Hertz (Hz).																	

Term	Definition
	The frequency corresponds to the pitch of the sound: a high frequency to a high-pitched sound and a low frequency to a low-pitched sound.
L _{eq}	<p>Equivalent (energy averaged) noise level measured over a time period. This noise descriptor is commonly used in environmental noise policies and assessments.</p> <p>The time period the measurement is averaged over is included in the subscript, i.e. L_{Aeq, 30min}.</p>
L ₉₀	<p>The noise level exceeded 90% of the measurement period. This descriptor is used to represent the background noise level.</p> <p>The time period the measurement is averaged over is included in the subscript, i.e. L_{A90, 30min}</p>
Octave band	<p>The International Standards Organisation has agreed upon preferred frequency bands for sound measurement and the octave band is the widest band for frequency analysis.</p> <p>The upper frequency limit is approximately twice the lower frequency limit and each band is identified by its band centre frequency.</p> <p>Typical Octave Band frequencies for environmental noise assessments are: 31.5Hz, 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz.</p>
One-third octave band	<p>Where more detailed information about a noise is required, standardised one-third octave band analysis may be used.</p> <p>There are three one-third octave bands for each octave band. (e.g. 25Hz, 31.5Hz, 40Hz one-third octave bands cover the same frequency range as the 31.5Hz octave band).</p>
Sensitive receptor	Areas where the occupants, buildings or land use are potentially susceptible to the adverse effects of exposure to noise and vibration.
Sound power level	The total sound emitted by a source.
Sound pressure level	The amount of sound at a specified receiving point.
Tonality	<p>Noise is subjectively more annoying when it has a tonal component (a perceptible hum or whine).</p> <p>Tonality can be determined by subjective assessment or from one-third octave band analysis of the noise.</p> <p>Where a noise is tonal, an adjustment is made to allow for the additional annoyance caused by the tone.</p>

Appendix B

Environmental Noise Limits

Victorian Policies and Guidelines

In rural Victoria, the EPA Guidelines *Noise limit and assessment protocol* (Noise Protocol) applies to noise emissions from commercial premises. The Noise Protocol specifies the procedure for establishing noise criteria, and for measuring and assessing commercial noise at noise sensitive locations.

Under the Noise Protocol assessment procedures, noise from the source under consideration is measured or predicted to determine its impact over a continuous 30-minute period. Adjustments to the noise level are applied to account for the effects of duration, tonality, intermittency and impulsiveness. The resultant noise level is called the Effective Noise Level.

This section presents the assessment using the Rural Area Method of the Noise Protocol.

Time Periods

Under the Noise Protocol, noise criteria are established for the three periods; Day, Evening and Night. The Environment Protection Regulations defines the following times for each of these periods:

Table 8 Noise Protocol Time periods

Noise Protocol Time Periods	Time
Day	7am to 6pm Weekdays and Saturdays
Evening	6pm to 10pm Weekdays and Saturdays 7am to 10pm Sundays and Public Holidays
Night	10pm to 7am

Environmental noise limits

Step 1 – Zone Levels

Noise criteria for the proposed aged care facility have been established using the procedures from Part 1 of the Noise Protocol; the noise criteria are termed 'Noise limits'.

Step 1 in determining the Noise limits involves determining 'Zone Levels', based on the zoning of the land at the noise sensitive area and at the noise-emitting premises. The Zone Levels are read from Table B.1 of the Noise Protocol.

Referring to the relevant Planning Scheme the proposed site is situated on land zoned *Health & Community (PUZ3)*.

The residential dwellings located to the northwest south and southwest are situated on land zoned as *Township Zone (TZ)*.

For these land use zonings, i.e. noise-generating zone PUZ3 to receiving zone TZ, from Table B.1 of Noise Protocol, the Zone Levels are as follows:

- Day period: 48
- Evening period: 43
- Night period: 38

Step 2 – Distance-Adjusted Levels

Step 2 in determining the noise criteria is to adjust the Zone Levels based on the distance from the noise sensitive receiver to the boundary of the zone in which the noise-emitting premises is located.

The noise generator and northwest receiver are covered by the same contiguous zone so no distance adjustment applies. While the southwest and south receivers are within a different zone, the property boundary is within 100m, does not require a distance adjustment.

Step 3 – Base Noise Level Check

Step 3 in determining the criteria is the base noise level check. For each period, the greater of the *distance adjusted noise levels* and Environment Protection Regulations *base noise levels* for rural areas are to be adopted. The *base noise levels* are as follows:

- Day period: 45
- Evening period: 37
- Night period: 32

Therefore, at this step in the limit derivation the Zone Levels for each period is to be adopted.

Step 4 – Background Noise Level Check and Adjustment

Background noise levels were measured in accordance with the requirements prescribed in the Noise Protocol. Details of noise measurements conducted on site are presented in Section 3.4 of this report.

The measured background noise levels are summarised in Table 9 below.

Table 9 Measured Background Noise Levels

Noise Protocol Time Period	Measured Background Noise Level L_{A90} dB(A)
Day	35
Evening	40
Night	25

Step 5 – Noise Limits

For the day period, the noise limit is the greater of the distance-adjusted level or the measured day noise level plus 8dB.

For the evening and night periods, the noise limit is the greater of the distance-adjusted level or the measured day noise level plus 5dB.

Table 10 below presents the environmental noise limits for site

Table 10 Environmental Noise Emission Criteria

Noise Protocol Time Period	Time	Environmental Noise Limit [dB(A)]
Day	7am to 6pm Weekdays 7am to 1pm Saturdays	48
Evening	6pm to 10pm Weekdays 1pm to 10pm Saturdays 7am to 10pm Sundays and Public Holidays	45
Night	10pm to 7am	38

The noise limits presented above apply to the noise emitted from the proposed accommodation village, outdoors within 10 metres of the dwellings at the identified nearest receptors.

