



41 MONBULK ROAD, MOUNT EVELYN
ENVIRONMENTAL NOISE ASSESSMENT

Rp 001 R01 20200675 | 2 February 2022

Project: 41 MONBULK ROAD, MOUNT EVELYN
ENVIRONMENTAL NOISE ASSESSMENT

Report No.: Rp 001 R01 20200675

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1.0 INTRODUCTION

undertake an environmental noise assessment of a proposed service station, convenience store with drive through service, manual and auto carwash facilities.

The development is proposed to be located at 41 Monbulk Road, Mount Evelyn.

This report provides details of the relevant regulatory environmental noise requirements, predicted noise levels from proposed site operations and the noise mitigation recommendations for the development.

A glossary of acoustic terminology is provided in Appendix A.

2.0 PROJECT DESCRIPTION

2.1 Site location

The subject site is located at 41 Monbulk Road, Mount Evelyn with existing commercial use.

The site is bounded as follows:

- North: Existing industrial premises, with a primary school beyond
- South: Existing residential dwellings
- East: Existing residential dwellings
- West: Monbulk Road

An aerial photograph of the subject site and surrounds is provided in Figure 1.

The subject site is zoned Industrial 3 Zone (IN3Z). The immediate surrounds, including nearest noise sensitive receptors are zoned Low Density Residential Zone (LDRZ), Public Park and Recreation (PPRZ) and Transport Zone 2 (TRZ2). A zoning map is provided in Appendix B.

A summary of the nearest residential receptors identified and considered in the assessment is provided in Table 1.

Table 1: Nearest residential receptors

Reference	Address	Description
R1	43 Monbulk Road	Existing single storey residential dwelling
R2	5 Renouf Court	Existing single storey residential dwelling
R3	7 Renouf Court	Existing single storey residential dwelling
R4	4 Renouf Court	Existing single storey residential dwelling
R5	26 Monbulk Road	Existing single storey residential dwelling
R6	33-37 Monbulk Road	Mt Evelyn Primary School

Figure 1: Site location and surrounds



2.2 Proposed development

The development proposes to operate 24-hours a day, 7 days a week. The proposed site operations and activities are summarised as follows:

Customer Services

- Fuel filling area at the west of the site
- Convenience store with drive through service counter/window at the south of the site
- Carwash and vacuum facilities in the centre of the site

Commercial delivery and waste vehicles expected to access the site:

- Site ingress and egress via a single driveway on Monbulk Road
- Fuel delivery by semi-trailer
- Store deliveries by Small Rigid vehicle (SRV)
- Waste collection by Medium Rigid vehicle (MRV)

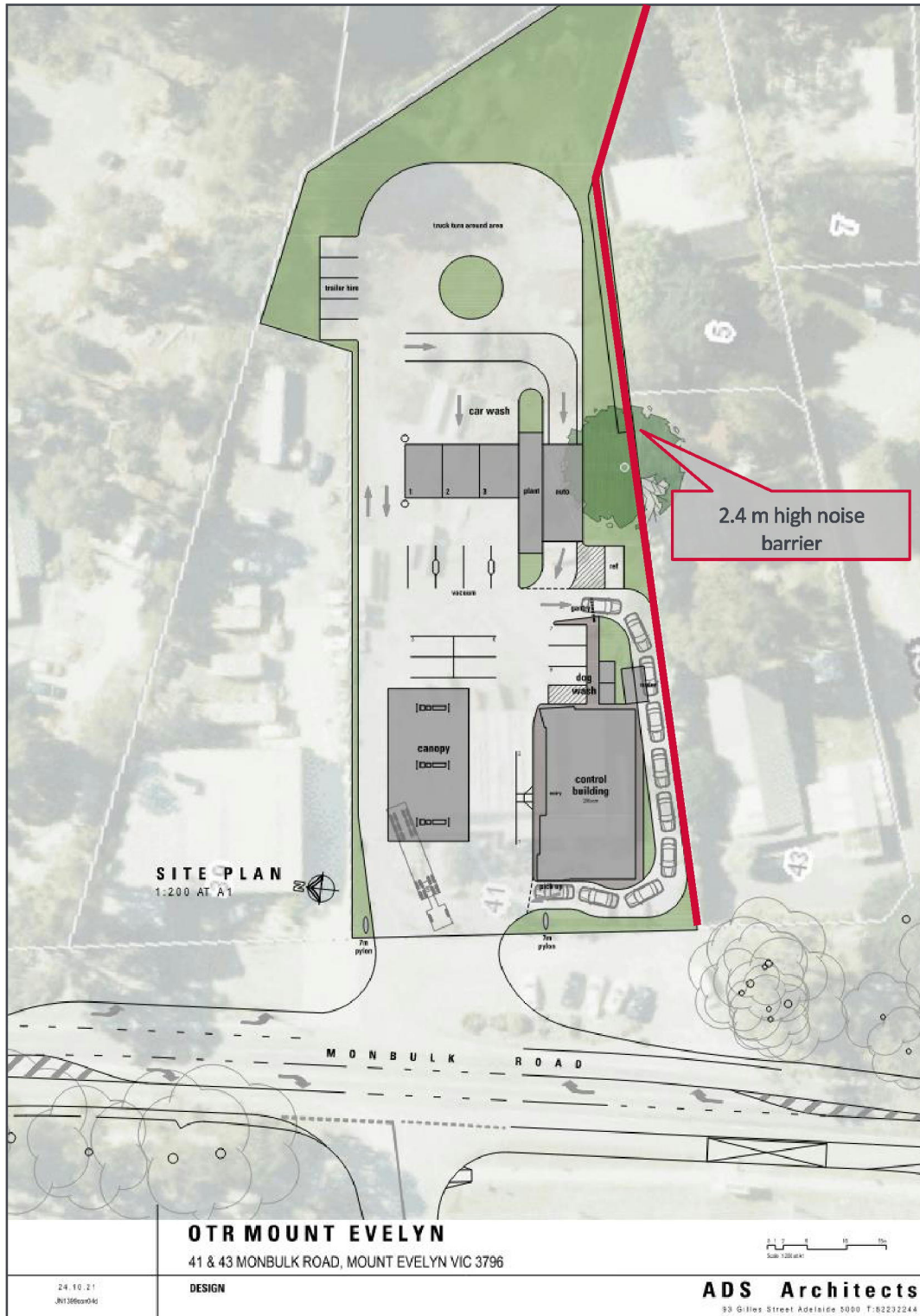
Major mechanical services and plant equipment as follows:

- Air conditioning, refrigeration and ventilation systems situated on the roof of the convenience store surrounded by roof deck screening
- Plant room for the auto carwash.

Based on the above proposed site operations, the significant noise sources considered in this assessment include on site commercial vehicle movements (delivery and waste) and associated activity, use of the drive through/customer ordering device, auto carwash, manual wash bays, vacuums and mechanical services. Night-time activity associated with patrons and vehicles is also considered.

This assessment has been based on drawings prepared by ADS Architects (reference JN1399con04d, dated 24.10.21). A layout of the proposed development is provided in Figure 2.

Figure 2: Proposed site layout



3.0 ENVIRONMENTAL NOISE REQUIREMENTS

3.1 Legislation and guidelines

A summary of the relevant Victorian legislation and guidelines is provided in Table 2, with further details contained in Appendix D.

Table 2: Summary of relevant legislation and guidelines

Document	Overview
<i>Environment Protection Act 2017</i> (the EP Act)	<p>The EP Act provides the overarching legislative framework for the protection of the environment in Victoria. It establishes a general environmental duty to minimise the risks of harm to human health or the environment from pollution or waste, including noise, so far as reasonably practicable.</p> <p>The EP Act does not specify noise limit values but prohibits the emission of unreasonable noise from non-residential premises.</p> <p>The EP Act provides general definitions of unreasonable noise; definitions that are specific to commercial, industrial and trade premises are provided in supporting publications (see below).</p> <p>Part 3.2 of the EP Act outlines the General Environmental Duty (see below), which requires anyone engaging in an activity posing a risk of harm to human health and/or the environment from pollution to minimise those risks to prevent harm as far as reasonably practicable.</p>
<i>Environment Protection Regulations 2021</i> (the Regulations)	<p>The objectives of the Regulations are to further the purposes of, and give effect to the EP Act. The Regulations also define outdoor sensitive areas, commercial, industrial and trade premises, as well as indoor, outdoor and live entertainment venues and events.</p> <p>Part 5.3 of the Regulations sets out requirements that are specific to environmental noise. Division 1 states that the prediction, measurement, assessment, or analysis of noise within a noise sensitive area for the purposes of the EP Act or the Regulations must be conducted in accordance with the Noise Protocol (see below). Division 3 stipulates requirements that are specific to commercial, industrial and trade premises. Division 4 applies to music noise from entertainment venues and events.</p> <p>Noise from these types of premises is prescribed as unreasonable if it exceeds a noise limit or alternative criterion determined in accordance with the Noise Protocol (see below). Additional matters addressed in Divisions 3 and 4 include assessment time periods, minimum noise limit values, management of cumulative noise from multiple premises, noise sensitive areas where assessment requirements apply, definition of frequency spectrum as a prescribed factor, and a definition for aggravated noise.</p>
EPA Publication 1826.4 <i>Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues</i> (Noise Protocol)	<p>The Noise Protocol defines the method for setting the noise limits for new and existing commercial, industrial and trade premises and entertainment venues in Victoria.</p> <p>It also outlines the steps that must be followed to undertake an assessment (measurement or prediction) of the effective noise level within a noise sensitive area or at an alternative assessment location. A comparison between the effective noise level and the relevant noise limit or the relevant alternative assessment criterion will determine whether the noise that is emitted from the premises is unreasonable under the Regulations.</p> <p>The noise limits for commercial, industrial and trade premises are determined on the basis of land zoning and background noise levels, and are separately designated for day, evening and night periods.</p>

Document	Overview
Environment Reference Standard dated 25 May 2021 (ERS)	<p>The ERS is made under section 93 of the Act. The ERS sets out environmental values for ambient sound that are sought to be achieved and maintained in Victoria and includes standards to support those values. The indicators and objectives within the standard provide a benchmark for comparing desired outcomes to the actual state of the environment and a basis for assessing actual and potential risks to the environmental values.</p> <p>The ERS is not a compliance standard, and the values listed within the ERS for different land uses are explicitly not noise limits nor design criteria. The primary function of the ERS is to provide assessment and reporting benchmarks for environmental values.</p>
General Environmental Duty (GED)	<p>The General Environmental Duty (GED) is outlined in Part 3.2 of the Environmental Protection Act 2017 (the EP Act) and came into effect 1 July 2021.</p> <p>The GED requires anyone engaging in an activity posing a risk of harm to human health and/or the environment from pollution (including noise) and waste, to minimise those risks to prevent harm as far as reasonably practicable.</p> <p>The GED applies wherever there is a risk of harm, regardless of whether the noise emitted has caused complaints or caused harm to people or the environment.</p> <p>The GED is applied first to eliminate or reduce the risk of harm to human health and the environment from noise so far as reasonably practicable. Any residual noise remaining after actions are taken to meet the GED is then managed as per the unreasonable noise definitions in section 166 of the Act (i.e. complying with the Noise Protocol).</p>
EPA Publication 1254.2 <i>Noise Control Guidelines</i> dated May 2021 (EPA Publication 1254)	<p>EPA Publication 1254 provides advice for the management of noise from a range of activities and noise sources. The guidelines are primarily intended to be used by municipal officers to assist in the resolution of complaints or to avert a possible noise nuisance. Some elements of the guidelines have been prepared so that they could be incorporated into a permit condition of a development or embodied as a local law.</p>

A range of Victorian EPA publications provide advice on matters of interpretation and technical assessment requirements the application of the legislation and guidance referred in Table 2. These include:

- EPA Publication 1996 *Noise guideline – assessing low frequency noise* dated June 2021 (EPA Publication 1996)
- EPA Publication 1997 *Technical guide: Measuring and analysing industry noise and music noise* dated June 2021 (EPA Publication 1997).

3.2 Supplementary guidelines

The legislation and guidelines set out in Section 3.1 address a wide range of noise sources and considerations. In situations where objective noise assessments are required for sources that are not directly addressed by the legislation and guidelines, reference is made to supplementary guidelines from a range of sources such as interstate publications and established assessment precedents.

Supplementary guidance relevant to the assessment is detailed in Table 3, and although do not represent mandatory assessment requirements or limits, are primarily used to inform risk and effect-based assessments.

Table 3: Supplementary guidance

Noise consideration	Supplementary guidance
Sleep disturbance	<p>NSW <i>Road Noise Policy</i> (the NSW policy) published in 2011 by the NSW Department of Environment, Climate Change and Water</p> <p>The provisions of this document are often referred to in Victoria for general guidance on potential sleep disturbance.</p> <p>Based on a review of research into sleep disturbance, the NSW policy nominates maximum external night-time noise levels at noise sensitive locations which are unlikely to disturb sleep.</p>

3.3 Summary of applicable noise limits

This section presents the derived noise limits/targets relevant for the assessment of noise from the site. Further information is provided in Appendix D.

3.3.1 Noise Protocol noise limits

Noise protocol noise limits are determined based on local land use zoning and existing background noise levels. The average measured background noise levels per period in the vicinity of the site are summarised in Table 4, with further details of the survey provided in Appendix C.

Table 4: Measured background noise levels, dB LA90

Period	Day	Evening	Night
Background noise level	43	36	34

The derived noise limits are shown in Table 5.

Table 5: Noise Protocol noise limits, dB

Period	Day of week	Start time	End time	Noise limit
Day	Monday – Saturday	7 am	6 pm	54
Evening	Monday – Saturday	6 pm	10 pm	45
	Sunday, Public holidays	7 am	10 pm	
Night	Monday – Sunday	10 pm	7 am	43

3.3.2 Sleep disturbance

The sleep disturbance design target for night-time activity associated with the proposed development is shown in Table 6.

Table 6: Sleep disturbance criterion

Description	Design target, dB LAmax
Short-term maximum noise levels	60 – 65

4.0 NOISE MITIGATION - DESIGN

4.1 Physical controls

The following mitigation design features have been included in the assessment of noise from the site:

- 2.4 m high fence (relative to ground) to south site boundary (refer Figure 2). The construction of the fence may vary but would need to meet a surface density requirement of 12 kg/m² minimum. Design recommendations and an example construction are provided in Appendix G.
- Full perimeter screening of all mechanical services installed on the roof of the convenience store (packaged air conditioning units, refrigeration condenser units and exhaust cowls etc). The screening is required to extend a minimum of 0.75 m above the highest point on any given unit. The construction of the screening may vary but would need to meet a surface density requirement of 12 kg/m² minimum. The inside of the screening should be lined around the full perimeter with a suitable weatherproof sound absorbing material (minimum NRC 0.7).
- The auto carwash includes the following design features:
 - Shutter doors at the exit and entry to the auto wash tunnel which remain closed at all times when in use. The doors to meet a minimum sound insulation rating of R_w 33. As an example, articulated shutter door design constructed of 10 mm laminate glass that incorporates full perimeter compression seals so as there are no gaps at the building junction.
 - The walls of the auto carwash enclosure and plantroom precast concrete panel
 - The roof of the auto carwash enclosure constructed from sheet metal (minimum 0.5 mm BMT) with a 9 mm thick fibre cement ceiling at minimum 100 mm cavity.

4.2 Managerial controls

The following noise mitigation measures are assumed to be included in the operation of the development:

- Waste collections are to occur during the day defined period only:
 - Monday to Saturday, 7 am – 6 pm (not including public holidays)
- Fuel deliveries to occur during the day or evening defined periods only:
 - Monday to Sunday, 7 am – 10 pm

This is generally consistent with the schedule of allowable hours for deliveries as outlined in EPA (VIC) Publication 1254 *Noise Control Guidelines*. The following recommended best practices should be applied for waste collections and deliveries:

- Refuse bins should be located at sites that provide minimal annoyance to residential premises
- Compaction should be carried out while the vehicle is moving
- Bottles should not be broken up at the collection site
- Routes which service predominantly residential areas should be altered regularly to reduce early morning disturbances
- Noisy verbal communication between drivers and operators should be avoided where possible

Further, any truck mounted refrigeration motors on delivery trucks/vehicles must be turned off whilst the vehicle is on site.

The following is recommended with respect to the operation of carwash facilities:

- Manual wash bay to occur during the day defined period only:
 - Monday to Saturday, 7 am – 6 pm (not including public holidays)
- Vacuums to occur during the day or evening defined periods only:
 - Monday to Sunday, 7 am – 10 pm.

In addition to the above managerial controls, it is recommended signage for patrons to consider neighbours and leave the premises as quietly as possible, most especially during the night be provided. Any amplified music played on the premises should be set to a level which is inaudible at the property boundary.

5.0 NOISE ASSESSMENT

5.1 Operational scenarios and assumptions

The procedures of noise protocol require that the “typical worst-case noise scenario” over any given 30-minute period is considered for the respective day, evening and night operations. Accordingly, the assessment assumes the following 30-minute operational scenarios:

Day period typical worst case 30-minute operational scenario

- 1 x fuel delivery
- 1 x waste collection
- 1 x store delivery, including unloading
- Auto carwash operation
- Manual carwash operation
- Vacuum operation
- Drive through operation and associated use of customer ordering device (COD)
- Continuous operation of all mechanical services

Evening period typical worst case 30-minute operational scenario

- 1 x fuel delivery
- 1 x store delivery, including unloading
- Auto carwash operation
- Vacuum operation
- Drive through operation and associated use of customer ordering device (COD)
- Continuous operation of all mechanical services

Night period typical worst case 30-minute operational scenario

- 1 x store delivery, including unloading
- Auto carwash operation
- Drive through operation and associated use of customer ordering device (COD)
- Continuous operation of all mechanical services

The following assumptions have been made with respect to the various activities:

- On site vehicle movements at 10 km/h
- An allowance of 2 minutes for the waste collection operation
- Auto carwash operation for up to 20 minutes in any given 30 minute period (3 cycles)
- Manual wash bays for up to 18 minutes in a given 30 minute day or evening period (3 bays, 6 minutes each)
- Vacuum operation for up to 12 minutes in a given 30 minute day or evening period (2 vacuum units, 3 cycles at 2 minutes each)
- Unloading operations associated with store deliveries utilises electric pallet jack only (no motorised forklift)
- The small dogwash facility is partially enclosed and due to the limited/expected use is not considered a significant noise source in this assessment

From experience with other similar developments, the estimated drive through patronage and associated use of COD unit patterns is as follows:

- Peak drive-through rates are approximately 38 vehicles per hour between 7 am and 10 pm, and 7 vehicles per hour between 10 pm and 7 am
- The average time that the COD is in operation per order is approximately 16 seconds.
- A 30-minute day and evening period (based on above peak drive-through rates) will therefore include a total of 5 minutes of COD activity
- A 30-minute night period (based on above peak drive-through rates) will therefore include a total of 1 minute of COD activity.

Based on the above operational scenarios/assumptions and the noise mitigation considered in the design (Section 4.0), noise levels have been determined and the results summarised in the following sections.

Details regarding the noise modelling method and the source noise data are provided in Appendix E and Appendix F respectively.

5.2 Predicted noise levels

5.2.1 Deliveries and waste collection

The predicted noise levels for delivery and waste vehicles on site movements and related activities are summarised in Table 7.

Table 7: Predicted deliveries and waste collection noise levels over 30-minute period, dB

Noise source	R1	R2	R3	R4	R5	R6
Fuel delivery truck	36	33	34	36	43	44
Waste truck and collection	41	41	37	38	39	44
Store delivery and unloading	23	20	21	22	32	34

5.2.2 Drive through

The predicted noise levels for drive through related activities are summarised in Table 8.

Table 8: Predicted drive through noise levels over 30-minute period, dB

Noise source	R1	R2	R3	R4	R5	R6
Drive through COD (day/evening)	24	18	14	13	13	21
Drive through COD (night)	17	11	<10	<10	<10	14

5.2.3 Carwash

The predicted noise levels for the carwash facilities are summarised in Table 10.

Table 9: Predicted carwash noise levels over 30-minute period, dB

Noise source	R1	R2	R3	R4	R5	R6
Auto carwash (inc plantroom)	15	18	15	15	13	12
Manual carwash	32	40	39	21	42	45
Vacuum	19	18	20	21	27	31

5.2.4 Mechanical services

The predicted noise levels for mechanical services are summarised in Table 10.

Table 10: Predicted mechanical services noise levels over 30-minute period, dB

Noise source	R1	R2	R3	R4	R5	R6
Mechanical services	40	35	34	33	38	37

5.3 Cumulative noise assessment

Table 11, Table 12 and Table 13 detail the assessment of the cumulative effective noise levels (ENL) expected from the proposed site with respect to the day, evening and night noise limits. A +2 dB adjustment has been included for the day period as a provision to account for potential tonality from commercial site vehicles (e.g. reversing beepers on waste truck movement).

Table 11: Day period cumulative noise assessment, dB

Item	R1	R2	R3	R4	R5	R6
Fuel delivery, store delivery, unloading, waste collection	42	42	39	40	45	47
Drive through COD	24	18	14	13	13	21
Carwash (auto, manual, vacuums)	32	40	39	25	42	45
Mechanical services	40	35	34	33	38	37
ENL (incl + 2 dB)	46	47	45	43	49	52
Day limit	54	54	54	54	54	54
Complies	✓	✓	✓	✓	✓	✓

Table 11 shows that noise levels from the proposed day operations are predicted to meet the day noise limit.

Table 12: Evening period cumulative noise assessment, dB

Item	R1	R2	R3	R4	R5	R6
Fuel delivery, store delivery, unloading	36	33	35	36	44	44
Drive through COD	24	18	14	13	13	21
Carwash (auto, vacuums)	21	21	21	22	27	31
Mechanical services	40	35	34	33	38	37
ENL	41	38	37	38	45	45
Evening limit	45	45	45	45	45	45
Complies	✓	✓	✓	✓	✓	✓

Table 12 shows that noise levels from the proposed evening operations are predicted to meet the evening noise limit. Predicted noise levels at R6 (school) are provided for reference only, although not strictly relevant for the evening assessment period.

Table 13: Night period cumulative noise assessment, dB

Item	R1	R2	R3	R4	R5	R6
Store delivery, unloading	23	20	21	22	32	34
Drive through COD	17	11	<10	<10	<10	14
Carwash (auto)	15	18	15	15	13	12
Mechanical services	40	35	34	33	38	37
ENL	40	36	34	34	39	39
Night limit	43	43	43	43	43	43
Complies	✓	✓	✓	✓	✓	✓

Table 13 shows that noise levels from the proposed night operations are predicted to meet the night noise limit. Predicted noise levels at R6 (school) are provided for reference only, although not strictly relevant for the night assessment period.

6.0 SLEEP DISTURBANCE ASSESSMENT

Based on the incorporation of the recommended noise control treatments detailed in Section 5.0, the predicted maximum noise level at the nearest noise sensitive receivers from expected short-term activities on-site are provided in Table 14.

Table 14: Predicted maximum noise levels at nearest noise sensitive receivers, dB L_{Amax}

Source	R1	R2	R3	R4	R5	Meets target
Normal car pass by	51	46	39	39	43	✓
Normal car door slam	48	45	42	40	45	✓
Conversation	56	53	50	47	53	✓
Worst case car activity (e.g. high-powered vehicle driven in a reckless manner)	51	48	46	43	49	✓
Drive through Customer Order speaker	45	38	34	34	22	✓

The predicted levels meet the recommended sleep disturbance levels, 60-65 dB L_{Amax}, outside an open bedroom window of the nearest residential noise sensitive receivers.

7.0 SUMMARY

PC Infrastructure Pty Ltd propose to develop a service station at 41 Monbulk Road, Mount Evelyn.

MDA has undertaken an environmental noise assessment from the proposed development in accordance with the relevant Victorian EPA legislation, guidelines, and accepted industry practice.

This assessment is based on:

- Noise source data obtained from the Client and previous noise level measurements by MDA; and
- A detailed 3-dimensional acoustic model of the site and surrounding environment, accounting for typical worst-case day, evening and night operational scenarios and atmospheric conditions which favour the propagation of sound.

The development is expected to meet the relevant Victorian EPA legislation and guidelines, based on the following recommendations:

- Noise mitigation features included in the design, as outlined in Section 5.0
- Waste collections are to occur during the day defined period only, i.e., Monday to Saturday, 7 am – 6 pm (not including public holidays)
- Fuel deliveries to occur during the day or evening defined periods only, i.e., Monday to Sunday, 7 am – 10 pm
- Manual wash bay to occur during the day defined period only, i.e., Monday to Saturday, 7 am – 6 pm (not including public holidays)
- Vacuums to occur during the day or evening defined periods only, i.e., Monday to Sunday, 7 am – 10 pm.

APPENDIX A GLOSSARY OF TERMINOLOGY

Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
dB	Decibel: The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
ENL	The effective noise level of commercial or industrial noise determined in accordance with EPA publication 1826 – <i>Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues</i> (Noise protocol) This is the L_{Aeq} noise level over a half-hour period, adjusted for the character of the noise.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
L_{A90}	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
$L_{Aeq}(t)$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_w	Sound Power Level A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
NRC	Noise Reduction Coefficient A single number rating between 0 and 1 of the ability of a material to absorb sound. It is the average of the absorption coefficients in the 250 - 2000 Hz octave bands rounded to the nearest 0.05. The larger the number, the more absorptive the material.

APPENDIX B ZONING MAP

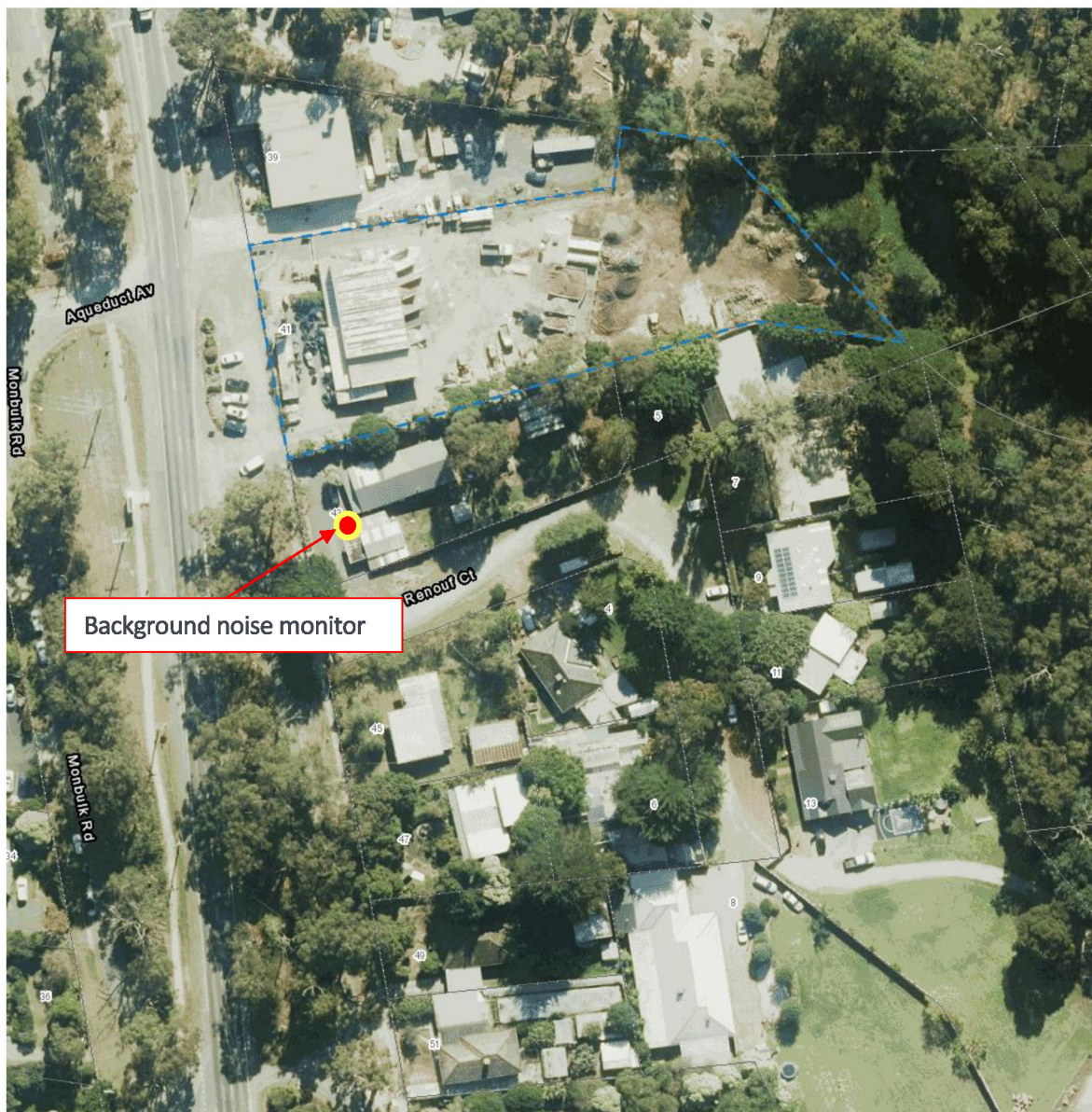


APPENDIX C BACKGROUND NOISE MONITORING

Unattended background noise measurements were obtained Tuesday 4 August – Wednesday 12 August 2020, using a Rion Type 1 NL-31 noise monitor. Measurements were obtained at the east boundary of the proposed development site, as shown in Figure 3.

The microphone was fitted with a weatherproof windshield, with measurements conducted at 1.5 m above local ground level under free field condition and obtained using the 'F' (fast) response time and A-weighting frequency network. A calibration check of the noise equipment was carried out before and after the measurements, to confirm no significant measurement drift.

Figure 3: Background noise monitor location



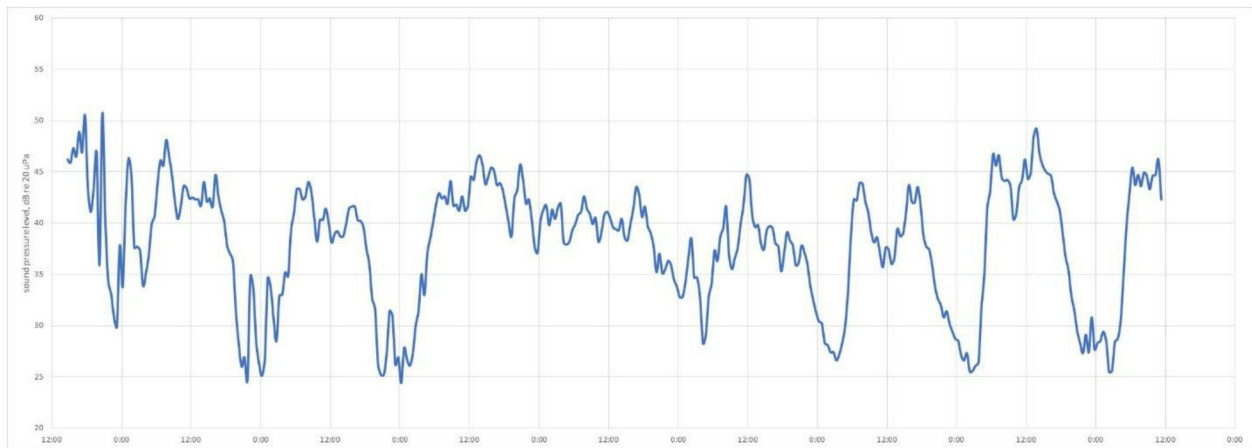
An MDA consultant attended the site to install the noise monitor, with noise from local traffic on Monbulk Road and more distant from Glegg Road, audible.

A summary of the measured background noise levels is provided Table 15 and shown graphically in Figure 4.

Table 15: Average measured background noise levels per period, dB LA90

Date	Day	Evening	Night
Tuesday, 4 August 2019	47	42	38
Wednesday, 5 August 2020	43	31	34
Thursday, 6 August 2020	41	30	32
Friday, 7 August 2020	44	42	40
Saturday, 8 August 2020	40	38	34
Sunday, 9 August 2020	N/A	39	32
Monday, 10 August 2020	40	35	32
Tuesday, 11 August 2020	44	33	32
Wednesday, 12 August 2020	44	-	-
Average	43	36	34

Figure 4: Measured background noise levels



APPENDIX D LEGISLATION AND GUIDELINES

D1 General Environmental Duty

The Regulations and the Noise Protocol set noise limits that must not be exceeded. The noise limits are not intended to be levels one can 'pollute up to' and must not be interpreted as noise levels below which no action is required. This is because the duty holder is required under the GED to minimise risks so far as reasonably practicable.

D2 Environment Protection Regulations 2021

The Act does not specify noise limit values or technical aspects of environmental noise but sets out legal requirements to comply with the Environment Protection Regulations described below. Clause 166 of the Act essentially places the onus of achieving compliance with noise limits on the commercial premises.

The Environment Protection Regulations 2021 (the Regulations) are made under section 465 of the Act and impose obligations in relation to environmental protection, including noise. The Regulations state that a person who conducts a prediction, measurement, assessment or analysis of noise within a noise sensitive area must do so in accordance with the Noise Protocol. In particular, noise from industrial, commercial and trade premises or entertainment venues or events is prescribed as unreasonable if it exceeds a noise limit or alternative criterion determined in accordance with the Noise Protocol.

Key matters addressed in the regulations include:

- Definition of commercial, industrial and trade premises, which is essentially any premises that is not a residential premises, a road or a railway. It is noted that noise from common building services equipment (such as shared condensing units and kitchen exhaust fans) is assessable
- Definition of an indoor music entertainment venue
- Definition of noise sensitive areas where the noise limits are assessed, which broadly include:
 - a residential building
 - temporary accommodation
 - hospital corrective institution
 - retirement or residential village
 - A room for learning in a child care centre, kindergarten or school
 - A tourist establishment, campground or caravan park
- Assessment time periods
- Noise sources that must not be taken into account
- Minimum noise limit values
- Management of cumulative noise from multiple premises.

Table 16 presents a summary of the relevant Divisions and Regulations from Part 5.3 – Noise.

Table 16: Summary of Part 5.3 – Noise

Section	Description
Division 1, Regulation 113	States that <i>a person who conducts a prediction, measurement, assessment or analysis of noise within a noise sensitive area for the purposes of the Act or these Regulations, must conduct the prediction, measurement, assessment or analysis in accordance with the Noise Protocol.</i>
Division 3	Applies to noise from commercial, industrial and trade premises
Regulation 116	Defines the day, evening and night period as follows: <ul style="list-style-type: none"> • Day: 0700 to 1800 hrs, Monday – Saturday • Evening: 1800 to 2200 hrs, Monday – Saturday 0700 to 2200 hrs, Sunday and Public Holidays • Night: 2200 to 0700 hrs the next day, Monday – Sunday
Regulation 117	In this Division, when the level of noise emitted from commercial, industrial and trade premises is assessed, the following sources of noise that could be expected at the proposed facility must not be taken into account: <ul style="list-style-type: none"> • Voices • Construction or demolition activity on building sites • Intruder, emergency or safety alarms or sirens • Equipment used in relation to an emergency • Non-commercial vehicles (except for maintenance activities).
Regulation 118	Defines noise as being unreasonable if it exceeds the Noise Protocol limits or the alternative assessment criteria that apply at an alternative assessment location. Defines the lowest base noise limits as follows: <ul style="list-style-type: none"> • Major urban area: Day: 45 dB L_{eff} Evening: 40 dB L_{eff} Night: 35 dB L_{eff} • Rural area: Day: 45 dB L_{eff} Evening: 37 dB L_{eff} Night: 32 dB L_{eff} <p>The noise limit for commercial, industrial and trade premises for the night period must not exceed 55 dB L_{eff}.</p>
Regulation 119	If multiple existing or proposed premises emit noise that contributes to the effective noise level at a noise sensitive receiver, all reasonable steps must be taken by the premises' management to ensure the combined noise level does not exceed the noise limit.
Regulation 120	This regulation essentially identifies that tonal aspects of noise must be considered when considering unreasonable noise for section 3(1)(a)(v) of the Act. The Noise Protocol provides a method of assessing tonal characteristics of noise from commercial, industrial and trade premises, with additional guidance on low frequency noise available in EPA Victoria Publication 1996 <i>Noise guideline – assessing low frequency noise</i> .
Regulation 121	Noise emitted from commercial, industrial and trade premises is prescribed to be aggravated noise if it exceeds the noise limits by more than 15 dB, or the following if lower: <ul style="list-style-type: none"> • 75 dB L_{eff} during the day, • 70 dB L_{eff} during the evening, or • 65 dB L_{eff} during the night.

D3 EPA Victoria Publication 1826 – The Noise Protocol

As per the Division 1, Regulation 113 of the Regulations, assessment of noise within a sensitive area must be conducted in accordance with EPA Victoria Publication 1826 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (the Noise Protocol). The Noise Protocol outlines the EPA’s required approach to the determination of noise limits and to the measurement, prediction and analysis of noise.

D3.1 Section A – Determining noise limits for commercial, industrial and trade premises

The Noise Protocol provides two methods for deriving the relevant noise limits, the Urban area method, and the Rural area method. The proposed development is within the Melbourne major urban area and therefore the Urban area method is applicable.

The noise limits are calculated taking into account planning scheme land ‘zoning types’ within a 70 m and 200 m radius of a noise sensitive receiver. The Noise Protocol categorises land zones as type 1, 2 or 3. Zone type designations consider the nature of the permitted land uses and are generally as follows:

- areas such as residential, rural and open space are type 1;
- areas such as commercial, business and light industry are type 2; and
- areas such as general industry and major roads are type 3.

A prescribed formula is used to calculate a corresponding Zoning Level. Greater areas of type 2 and 3 land within a 200 m radius of a noise sensitive site result in higher Zoning Levels than a site with respectively larger areas of type 1 land.

The noise limit is equal to the ‘zoning level’ unless the background level at the noise sensitive site is categorised as low or high according to clause 4 of the Policy. If the background level is low or high, the Noise Limit is calculated from a formula taking into account both the Zoning Level and the Background Level.

The current land use zones around the subject site are shown in the planning map, refer Appendix B. Background noise levels have been measured at a location representative of those at the most affected noise sensitive areas, refer Appendix C.

The limits are separately defined for the day, evening and night periods as defined by Regulation 116. The relevant noise limits applicable to this development are shown in Table 17.

Table 17: Noise Protocol limits

Period	Day	Time	Zoning level, dB	Background noise level, dB LA90	Background relative to zoning level	Noise Limit
Day	Monday – Saturday	7 am – 6 pm	54	43	Neutral	54
Evening	Monday – Saturday	6 pm – 10 pm	48	36	Low	45
	Sunday and Public Holidays	7 am – 10 pm				
Night	Monday – Sunday	10 pm – 7 am the next day	43	34	Neutral	43

D3.2 Section B – Assessing noise from commercial, industrial and trade premises

Noise from the facility that exceeds the noise limits is prescribed to be unreasonable by the Regulations. Part 7.6 of the Act in conjunction with Regulation 166 places the onus of compliance on industry by prohibiting the emission of unreasonable or aggravated noise.

For the purposes of this report and assessments of predicted noise levels, the noise limits apply up to 10 m from a dwelling, but within the property boundary.

Once a noise limit is established, an equivalent noise level (L_{Aeq}) due to the operation of the commercial premises is measured or predicted for a 30 minute operating period during the day, evening and night period as appropriate. If necessary, the L_{Aeq} noise level is adjusted for duration and noise character (tonality, impulsiveness and intermittency) to give the effective noise level (L_{eff}). If the L_{eff} level exceeds the noise limit, then remedial action will be required.

Consideration must be given to existing and future noise sensitive areas, factors that influence the propagation of sound (including atmospheric effects) and the cumulative contribution of noise from multiple existing and proposed sites.

D4 Waste collection

EPA Victoria Publication 1254.2, *Noise Control Guidelines* provides the following recommendations for industrial waste collections:

- *Refuse bins should be located at sites that provide minimal annoyance to residential premises*
- *Compaction should be carried out while the vehicle is moving*
- *Bottles should not be broken up at the collection site*
- *Routes which service predominantly residential areas should be altered regularly to reduce early morning disturbances*
- *Noisy verbal communication between operators should be avoided where possible.*

The guidelines state:

Early-morning collections should be restricted to non-residential areas to minimise early morning disturbances. Where a residential area is impacted by noise from the collection of refuse, then collections should be restricted to the times contained within the schedule.

Schedule: Industrial waste collection

One collection per week

6:30am-8pm Monday to Saturday

9am-8pm Sunday and Public Holidays

Two or more collections per week

7am-8pm Monday to Saturday

9am-8pm Sunday and Public Holidays.

D5 Deliveries

EPA Victoria Publication 1254.2, *Noise Control Guidelines* states the following concerning deliveries to shops, supermarkets and service stations:

Where a residential area will be impacted by noise from deliveries, the deliveries should be inaudible in a habitable room of any residential premises (regardless of whether any door or window giving access to the room is open) outside the hours contained in the schedule

Schedule: Deliveries to shops, supermarkets & service stations

7am - 10pm Monday to Saturday

9am - 10pm Sunday and Public Holidays.

D6 Sleep Disturbance

The NSW Road Noise Policy 2011 produced by the NSW EPA, provides guidance on potential for sleep disturbance. While the Policy applies strictly only in NSW, the provisions of the document are often referred to in Victoria for general guidance on potential sleep disturbance.

The NSW policy notes that from the research on sleep disturbance to date it can be concluded that:

- *maximum internal noise levels below 50–55 dB L_{Amax} are unlikely to awaken people from sleep*
- *one or two noise events per night, with maximum internal noise levels of 65–70 dB L_{Amax} , are not likely to affect health and wellbeing significantly.*

APPENDIX E MODELLING METHOD

A 3-dimensional computer acoustic model of the site was created in the environmental noise modelling program SoundPLAN v8.2 to predict noise levels from the proposed operations to the noise affected premises in the vicinity of the site. The noise model has been used to calculate noise levels in accordance with ISO-9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2). The noise model enables the calculation of noise levels over a wide area, and accounts for key considerations including site arrangement, terrain and atmospheric conditions.

The ISO 9613-2 standard specifies an engineering method for calculating noise at a known distance from a variety of sources under meteorological conditions that are favourable to sound propagation. The standard defines favourable conditions as downwind propagation where the source blows from the source to the receiver within an angle of +/-45 degrees from a line connecting the source to the receiver, at wind speeds between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground. Equivalently, the method accounts for average propagation under a well-developed moderate ground based thermal inversion.

Accordingly, predictions based on ISO 9613-2 account for the instances when local atmospheric conditions at the site favour the propagation of sound to surrounding receptor locations. Under alternative atmospheric conditions, such as when the wind is blowing from a receiver location to the development site, the noise levels would be lower than calculated.

To calculate far-field noise levels according to the ISO 9613-2, the noise levels of each source are firstly characterised in the form of octave band frequency levels. A series of octave band attenuation factors are then calculated for a range of effects including:

- Geometric divergence
- Air absorption
- Reflecting obstacles
- Screening
- Ground reflections.

The octave band attenuation factors are then applied to the noise data to determine the corresponding octave band and total calculated noise level at relevant receiver locations.

Geometry data for the model has been sourced from public aerial photography, visual inspections of the area, and building heights defined on the basis of standard assumed heights per floor level. The geometries in the model are simplified representations of the built environment that have been configured to a level of detail that is appropriate for noise calculation purposes.

The following inputs have been referenced in the noise model to predict noise levels from onsite activities.

- Receivers at 1.5 m (single storey) and 4.5 m (two storey) above ground level.
- Receiver locations positioned according to public aerial imagery (imagery sourced from Google Earth and Nearmap)
- Noise source data as detailed in Appendix F
- Noise levels calculated to the receiver building facade, i.e. free-field noise levels in accordance with EPA Guidelines

APPENDIX F NOISE SOURCE DATA

The noise source data utilised for the assessment has been based on the following:

- Mechanical Services including convenience store plant, drive through speaker, car wash facilities: Data supplied by the client, based on noise measurements from other OTR developments
- Commercial vehicles and related activities: Previously measured by MDA

Table 18: Noise source data utilised for assessment

Category	Source	Sound Power Level/unit, dB L _{WA}	Parameter
Carpark activity	Normal patron car (incl car door slam)	95	L _{max}
	Worst-case patron car (incl car door slam)	103	L _{max}
	Patron voices	98	L _{max}
	Patron vehicle pass-by	92	L _{max}
Mechanical	3 x Large Exhaust fan with attenuator	72	L _{eq}
	2 x Small PAC unit OPA201RKTYH	76	L _{eq}
	Large PAC unit OPA370RKTBH	81	L _{eq}
	Evaporative cooling unit RPA500D	80	L _{eq}
	Large Freezer condenser unit	85	L _{eq}
	Small freezer condenser unit	75	L _{eq}
	Large cool room condenser unit	80	L _{eq}
	Small cool room condenser unit	76	L _{eq}
	Amenity exhaust fan	67	L _{eq}
Truck movements	Fuel delivery truck	106	L _{eq}
	Waste collection	96	L _{eq}
	Small Rigid Vehicle (SRV)	93	L _{eq}
Activities	Garbage collection	96	L _{eq}
	Unloading operation	80	L _{eq}
Carwash	Auto wash – wash and blow dry full cycle	92 (Reverberant sound pressure level inside)	L _{eq}
	Plant room	78 (Reverberant sound pressure level inside)	L _{eq}
	Manual wash bay	96	L _{eq}
	Vacuum unit in loaded operation	82	L _{eq}
Drive through	Customer Order speaker (COD)	78	L _{eq}
	Customer Order speaker (COD)	100	L _{max}

APPENDIX G BOUNDARY ACOUSTIC FENCE CONSTRUCTION

The proposed boundary acoustic fencing must be constructed to provide adequate noise attenuation. The fence material should be constructed from a material of minimum surface density of 12 kg/m² and must be free of holes or gaps. Some suitable materials include the following:

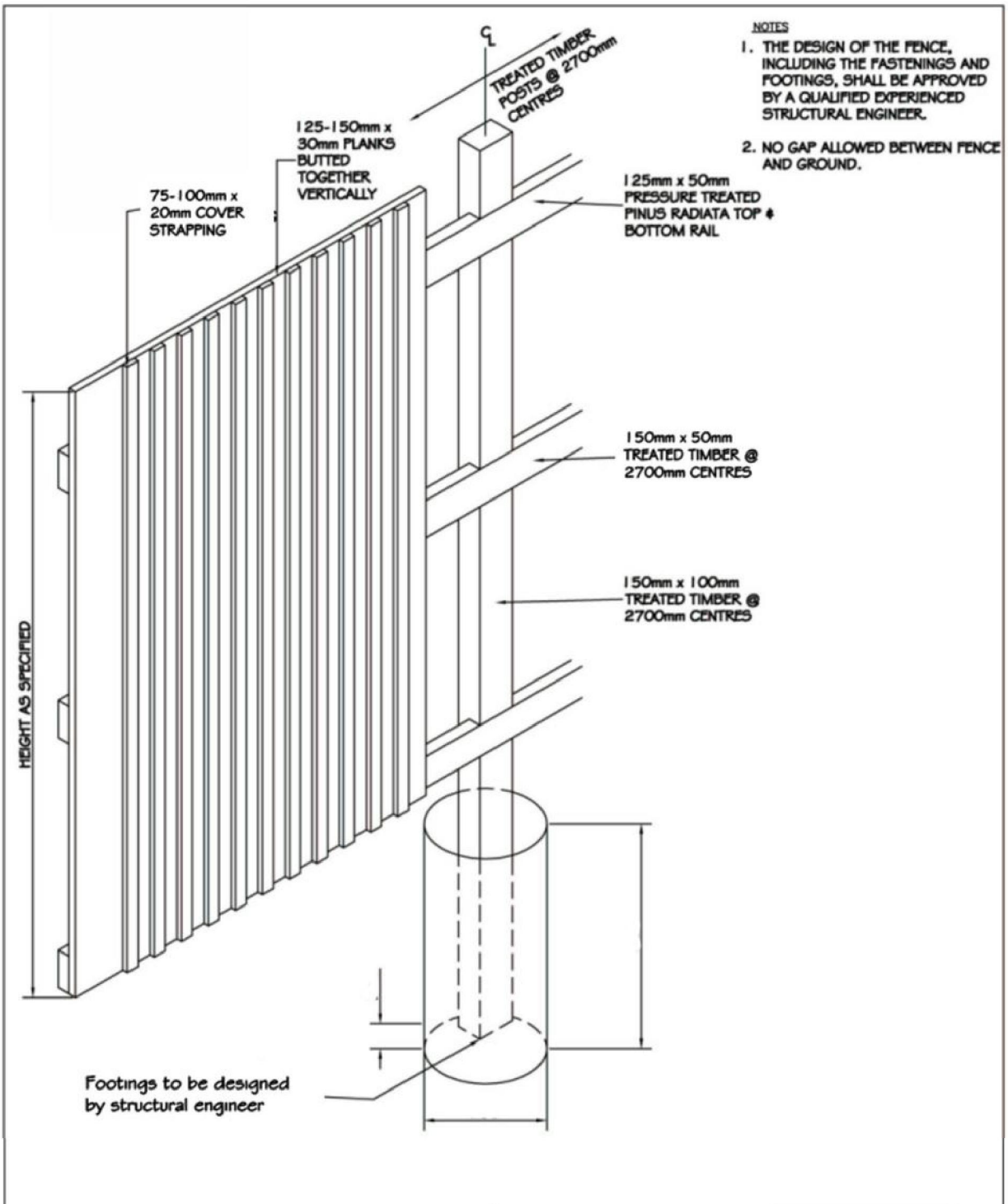
- 30 mm thick timber
- 10 mm laminate glass
- 18 mm thick Perspex
- 9 mm thick compressed fibre-cement sheet
- Concrete, brick, proprietary wall panels or any other material that meets the minimum surface density can also be used.

It is particularly important to ensure that there is no gap at the bottom of the noise barrier. It is common practice to require that a portion of the bottom of the barrier (10-20 cm) be buried in the ground.

Other considerations include, but are not limited to:

- Life expectancy
- Wind loading: assessed by a suitably qualified engineer
- Resistance to vandalism, including graffiti
- Maintenance requirements
- Flammability.

An example of one type of timber noise barrier is provided below.



A	PRELIMINARY	JT	12/12/99
REV	AMENDMENT	BY	DATE

TITLE: Acoustic Timber Fence - Vertical Planks	
SCALE: NA	CAD FILE: MD0030
DRAWN: JT	DRAWING: MD0030
CHECKED: NS	REV: A