Moorabool
Shire Council

ATTACHMENTS

Development Assessment Committee Meeting

Under Separate Cover

Wednesday, 19 February 2025

Table of Contents

NOTES

1. Front setback = 4.0m
2. Side setback, where shown, = 1.0m
3. Street trees are Eucalyptus leucoxylon 'Rosea'

ISSUE	DESCRIPTION	DATE
A	FOR DISCUSSION	4/09/2023
B	AMENDMENTS REQUESTED BY CLIENT	4/04/2024
C	RESPONSE TO COUNCIL RFI	2/07/2024

LEGEND

- Proposed residential allotments
- Proposed road pavement
- Proposed extended driveway
- Proposed concrete footpath
- Proposed 2.7m high noise attenuation fence
- Proposed building envelopes
- Proposed street trees (indicitive only)

Quality Certified Company ISO9001:2008
REGISTRATION No. COU001 CCQ01

DESIGNED: C COUGHLAN	SCALE: 1:1500
CHECKED:	SHEET SIZE: A3
AUTHORISED: C COUGHLAN	DATE: 4/09/2023

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6 Webster Street, Ballarat Victoria 3350

PROJECT: 7 LEILA COURT BACCHUS MARSH

CLIENT: PAUL & WENDY LESKO

CIVIL REF. No.: 1079-100PL-01 | SHEET: 1 | REV: C

DRAWING TITLE: DEVELOPMENT PLAN

HEAR DATA PTY LTD ABN 39 006 317 924 Trading as
AUDIOMETRIC & ACOUSTIC SERVICES
Telephone: (03) 9817 5517
www.noiseconsult.com
28 Hilda Street, Balwyn, Victoria, 3
Email: info@noiseconsult.com

15th June 2023

Report No. 23048

Title: Traffic noise assessment for a proposed residential development located at 7 Leila Court, Bacchus Marsh, Victoria, 3340.

Brief: Assess traffic noise for a proposed residential development located at 7 Leila Court, Bacchus Marsh, Victoria, 3340 and provide recommendations as required.

Client: Axiom Consulting Engineers

Contact: Chris Coughlan
Axiom Consulting Engineers
6 Webster Street
Ballarat
VIC, 3350

Executive Summary

Audiometric and Acoustic Services (A&AS) has been commissioned by Axiom Consulting Engineers to investigate existing noise levels from traffic noise for a proposed residential development located at 7 Leila Court, Bacchus Marsh, Victoria, 3340. The incidence of noise from traffic is moderate to low with the proposed noise barrier in place.

Construction of the barrier must be non-permeable with a minimum surface density of 15 kg/m^2. No gaps, particularly at the base of the barrier should be present. Ideally the base should be dug into the ground or subsequent use of a plinth board.

The followings construction would be suitable:

- Modular Walls - AcoustiMax 75 mm panel with >15 kg/m^2 surface density.
- Wallmark – AcoustX 75 mm panel with > 15 kg/m^2 surface density.
- One layer of 8.5 mm thick Hardie Fine Texture Cladding to one side of a minimum 90 mm frame with minimum 5 kg/m^2 fibrous batts to the cavity and one layer of either 4.5 mm cement board or 24 mm thick timber to the opposite side. Note the installation may require treatment and a suitable capping for weather protection.
- Earth bunds.
- Plexiglas, Acrylic or Perspex material providing it meets the required R_w and surface density requirements.

Alternative construction can be considered providing they meet the minimum surface density of 15 kg/m^2 and achieve an R_w > 27 dB.

The barrier must be 2.7 m in height above the existing level of the project site and extend the along the subdivision boundary as per Figure 9.

The building components used in this situation must attenuate the external noise from local traffic to achieve the indoor design noise levels.

Design, layout, and siting should refer to Section 5 of the VicRoads Publication “A Guide to the Reduction of Traffic Noise”.

Mitigation measures for the proposed dwellings are required as per Section 7.

Alternatively, each Lot can be independently assessed by an acoustic engineer of the purchasers choosing. The report should assess the existing traffic noise level once the noise barrier is implemented and provide recommendations by application of AS3671 – 1989, Acoustics - Road Traffic Noise Intrusion – Building Siting and Construction and AS2107 – 2016 Acoustics - Recommended design sound levels and reverberation times for building interiors.

The proposed Lots require the following construction with the proposed noise barrier in place noting that the lots have been numbered for ease of reference as per Figure 8.

Acoustic Upgrades for Burdened Lots

<table>
<tr><th>System</th><th>Acoustic Engineering Measures</th></tr>
<tr><td>Number of Storeys</td><td>Lots 1 through 6 inclusive shall be single storey unless an independent acoustic assessment is undertaken after the noise barrier is implemented.</td></tr>
<tr><td>External Walls</td><td>External walls must be standard brick veneer construction with an air cavity, a minimum 10 mm standard plasterboard lining and minimum R1.5 fibrous insulation within the 90 mm studwork cavity.
There should be no inclusion of any lightweight sections or ventilation that would degrade the acoustic performance of the specified brick veneer wall.
Lots 7 through 12 inclusive can implement lightweight construction however this construction should be able to achieve an R_w > 44 dB. Example construction may include Hebel panels or cement board cladding.
Polystyrene foam panels should be avoided due to lack of mass.</td></tr>
<tr><td>Roof / Ceiling Assembly</td><td>Either concrete tiled or metal deck roofing with insulation of min R2.5 fibrous with internal lining of standard 10 mm plasterboard will be adequate to meet the requirements for all rooms in Lots 7 through 12 inclusive.
Lots 1 through 6 inclusive require either concrete tiled or metal deck roofing with insulation of min R2.5 fibrous with internal lining of standard 13 mm plasterboard for all habitable rooms.
Eaves are to be sealed and treated to prevent / minimise noise break-in to the roof space.
Installers should ensure the fibrous insulation extends fully into any eaves.</td></tr>
<tr><td>External Doors</td><td>External doors to habitable rooms of Lots 1 through 6 inclusive, must be minimum 38 mm solid core construction with perimeter acoustic seals and a drop seal at the base of the door. Glazed sections must achieve a minimum R_w = 28.</td></tr>
<tr><td>Ventilation</td><td>To meet attenuation requirements, all doors and windows would theoretically have to remain closed, so cooling systems such as an evaporative cooler is not suited to traffic noise exposed houses without modification.
A forced mechanical ventilation system is not necessary.
A split system or ducted heating and air conditioner would be suited, if required. Note that these installations must comply with the EPA's Environmental Protection Regulations 2021 (State of Victoria, 2021) regarding residential noise.
Any ducting within the ceiling should incorporate fibrous insulated flexi ductwork. Any Whirly Birds should not be situated over any of the bedrooms.</td></tr>
<tr><td>Glazing</td><td>Typical glazing may include the following orientations inclusive of aluminium frame however any glazing combination that achieves the minimum required R_w value will be suitable.
<table>
<tr><th>Room</th><th>Min Required R_w</th><th>Typical Glazing</th></tr>
<tr><td>Other habitable rooms</td><td>≥ 27</td><td>4 mm - 10 mm argon - 4 mm Double Glazed</td></tr>
<tr><td>Bedrooms</td><td>≥ 30</td><td>Single 6.38 mm Laminated, or 6 mm - 12 mm - 6 mm Double Glazed</td></tr>
</table>
</td></tr>
</table>

Contents

1 Introduction

Audiometric and Acoustic Services (A&AS) has been commissioned by Axiom Consulting Engineers to investigate existing noise levels from traffic noise for a proposed residential development located at 7 Leila Court, Bacchus Marsh, Victoria, 3340.

Adjacent to the project site is the existing Western Freeway and associated off ramp to C704, Gisborne Road.

The assessment therefore includes the following:

- Traffic noise assessed as an $L_{A10(18hr)}$ as per AS3671 – 1989, Acoustics - Road Traffic Noise Intrusion – Building Siting and Construction (Standards Australia, 1989)

This report presents the measured noise levels received at the project site and provides recommended mitigation measures and minimum construction to meet internal acoustic design criteria for proposed residential dwellings.

A glossary of the acoustic terminology used in this report is presented in Appendix A.

1.1 Reference Documentation

The Report is based on the following reference documentation:

Table 1 Reference Documentation

Document	Author	Issue
Email: To: Scott Henderson Subject: 7 Leila Crt, Bacchus Marsh	Chris Coughlan	1:53 am 10 May 2023

2 Site Description

The project site is located at 7 Leila Court, Bacchus Marsh, Victoria, 3340 as shown below in Figure 1.

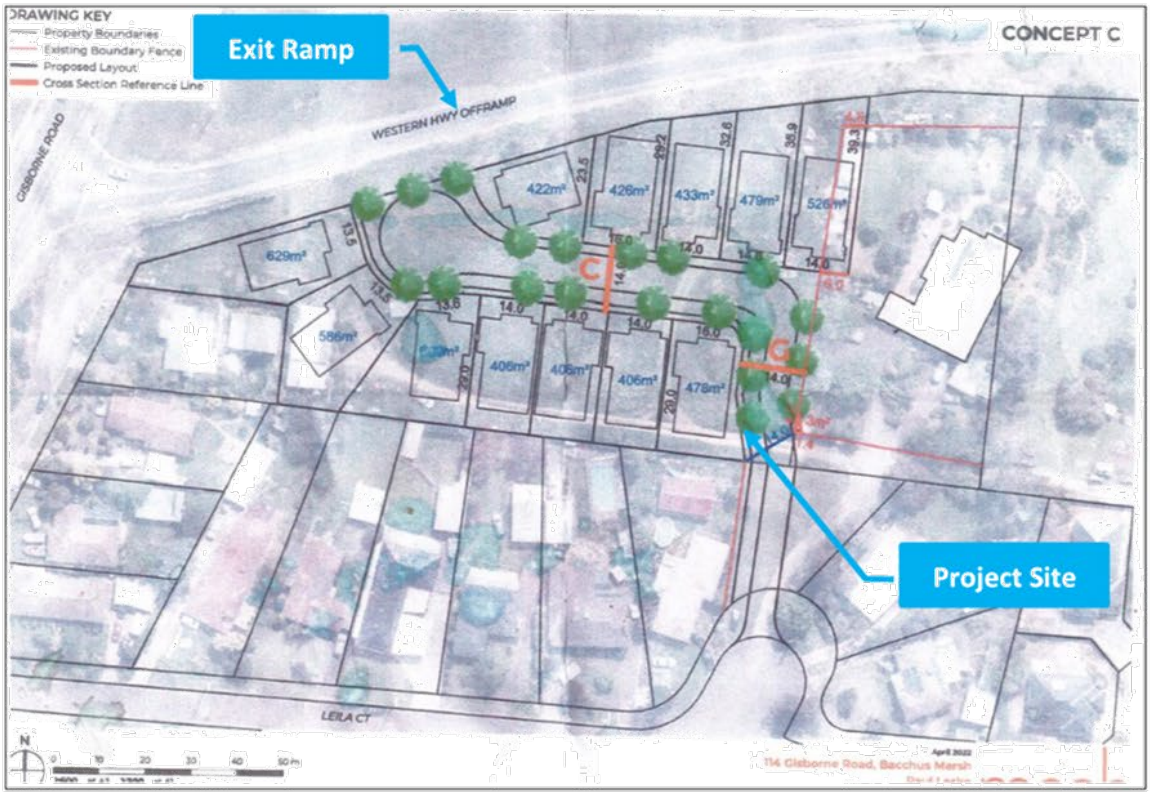

Figure 1 Location of Project Site

The topography in the immediate area of the site is relatively flat however the Western Freeway lies at a lower ground level and the nearest off ramp is sloping up towards the west (Gisborne Road).

Figure 2 Elevation Contours (Image Source: Mecone 2023)

Figure 3 below presents a view to the west of the location and change in level between the Western Freeway relative to the project site.

Figure 3 View to the West of Western Freeway at Lower Level

Figure 4 below presents a view to the east the location and change in level between the Western Freeway relative to the project site.

Figure 4 View to the East of Western Freeway at Lower Level

The noise levels received on site are observed to be generally of traffic, primarily from vehicles exiting the freeway to Gisborne Road.

It is noted that there is an existing noise barrier near to the intersection of the off ramp and Gisborne Road providing shielding to existing residences at 112 Gisborne Road. It is taken that the noise wall was erected to protect the first floor of the rear dwelling of 112 Gisborne Road.

Figure 5 Existing Nosie Barrier

3 Legislation

Section 25(1) of the Environment Protection Act (State of Victoria, 2017) sets forth the General Environmental Duty (GED), which states:

"A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable."

The GED requires all Victorians to understand and minimise their risks of harm to human health and the environment from pollution and waste, including noise. The definition of noise includes sound and vibration. Developing land that will include noise sensitive uses near existing sources of noise may be regarded as an activity that may give rise to risks of harm to human health from pollution.

As a person engaging in that activity, a developer may be required, under the GED, to minimise those risk of harm so far as reasonably practicable.

4 Design Criteria

To satisfy the requirements, all external noise should be sufficiently attenuated by the building envelope to below the design criteria levels. The design criteria are set by a combination of two Australian Standards.

4.1 Traffic Noise

The design internal noise levels are addressed by application of AS3671 – 1989, Acoustics - Road Traffic Noise Intrusion – Building Siting and Construction. Note that AS3671 requires design to sound levels specified in AS2107 – 1987 Acoustics - Recommended design sound levels and reverberation times for building interiors. This has been superseded by AS2107 – 2016.

Noise exposure levels can be measured or predicted. Where relevant and practicable, actual measurements are preferred.

For residential dwellings the $L_{A10,T}$ is the descriptor with "T" being the time period. Commonly the 18-hour period is used from 06:00 – 0:00 as required by AS3671 - 1989. This approach eliminates the dilution of the effective noise level by the quieter night period.

More commonly in recent years, Responsible Authorities request for all noise including industry, commerce and traffic to be assessed by application of the measured $L_{Aeq(16hr)}$ for the 'day' period for living spaces and $L_{Aeq(8hr)}$ for the 'night' period for bedrooms.

Where more than traffic is required to be assessed the L_{Aeq} should be used as the effective noise level. Additionally, if the 'day' period is affected by extraneous noise the $L_{Aeq(8hr)}$ for the 'night' period may be more appropriate for bedrooms.

An adjustment of 0.3 dB is applied to the $L_{A10(18hour)}$ or $L_{Aeq,T}$ for a 10% increase of noise to accommodate increases in noise levels over the next 10 years.

A façade adjustment of +2 dB(A) is applied to the effective noise level should the logger not be within 2-3 m of an acoustically reflective surface.

4.1.1 VicRoads Practices

VicRoads recommends noise amelioration to be considered where the traffic noise level exceeds $L_{A10(18hr)}$ = 63 dB for Category A.

Category A includes residential dwellings, aged persons homes, hospitals, motels, caravan parks and other buildings of a residential nature. The $L_{A10(18hr)}$ shall be measured between 6 am and midnight.

Category B includes schools, kindergartens, libraries and other noise-sensitive community buildings. The $L_{A10(12hr)}$ shall be measured between 6 am and 6pm.

4.2 Design Sound Levels

The recommended design sound levels from AS2107 – 2016 for relevant areas in residential premises near a major road are presented in Table 2.

Table 2 AS2107 – 2016 Internal Design Sound Levels for Residential Premises Near a Major Road

Activity	Design Sound Level ($L_{Aeq,t}$) Range	
Living Areas	35	45
Sleeping areas (night-time)	35	40
Work Areas	35	45

Note AS3671 and AS2107 do not specify sound levels for wet areas such as laundries and bathrooms and as such these have not been calculated.

Application of AS2107 for the purposes of traffic noise attenuation will moderately attenuate other noise sources from that may arise from local commerce, on site operations of plant and tram / rail noise if applicable to the project site.

5 Existing Environment

Audiometric and Acoustics Services undertook environmental noise logging at the property line of the project site, adjacent to the Western Freeway from 22nd May 2023 until 29th May 2023 to determine the existing traffic noise levels affecting the site.

Weather was moderately cool with intermittent wind and rain on the 24th, 26th and 27th of May 2023.

Based on 30 min observations from the nearest weather station, it is taken that the $L_{A10(18hr)}$ has not been significantly affected by the weather events.

5.1 Existing Noise Levels

The following noise levels shown in Table 3 are proposed to be used to calculate the effective noise levels.

Table 3 Noise Levels from Street Front Logging Device

Date	**$L_{A10(18hour)}$ (dB)**
Tuesday, 23 May 2023	73
Wednesday, 24 May 2023	74
Thursday, 25 May 2023	74
Friday, 26 May 2023	73
Saturday, 27 May 2023	72
Sunday, 28 May 2023	-
Monday, 29 May 2023 and Monday 22 May 2023	73
Average	73.2
Façade Adjustment	+2.5
10yr Increase	+0.3
Total (rounded to the nearest decibel)	**76**

*Weather affected.

5.1.1 Effective Noise Levels

The effective noise level has been calculated to be $L_{A10(18hr)}$ = 76 dB at the measurement point adjacent to the Western Freeway and associated offramp. This value can be distance adjusted to reflect potential noise levels as nominated proposed facades of the development.

The prevailing noise level is above the investigation thresholds of $L_{A10(18hr)}$ = 63 dB and therefore acoustic mitigation measures are required.

Short-term spot measurements have been undertaken along the most affected boundary to better understand the grading of the site and effectiveness of the existing noise barrier.

The results are presented in Table 4 and compared with the logger results having the same time period.

Table 4 Short-term Spot Measurements Along the Northern Boundary

Location	Start	Duration	L_{A10} (dB) at Measurement Point	L_{A10} at Logger (dB)
East	2023-05-22 11:16:35	0:11:34	70	73
Middle	2023-05-22 11:28:45	0:10:25	67	72
Gisborne Rd	2023-05-22 11:40:20	0:09:55	62	71

It is noted that noise from the freeway and exit ramp at the Gisborne Street measurement point is already attenuated by the existing noise barrier and that the measured level was below $L_{A10(10min)}$ = 63 dB.

The measurement locations are presented below in Figure 6.

Figure 6 Location of Measurement Points (Image Source: Google Maps 2023)

6 Assessment

Traffic noise levels at proposed dwellings including adjustments for façade reflection and future noise levels in 10 yrs time and a 2.7 m barrier along the northern boundary of the Western Freeway are calculated to be the VicRoads Investigation Threshold (IT) of $L_{A10(18hr)}$ = 63 dB.

Therefore, the situation is taken to be low risk.

Subsequent acoustic mitigation measures are recommended as per Section 7.

The receivers have been numbered as per the figure below:

Figure 7 Location of Project Site

7 Recommendations

The following mitigation measures are recommended to provide a suitable level of acoustic amenity.

The lots have been numbered for ease of reference as per the figure below:

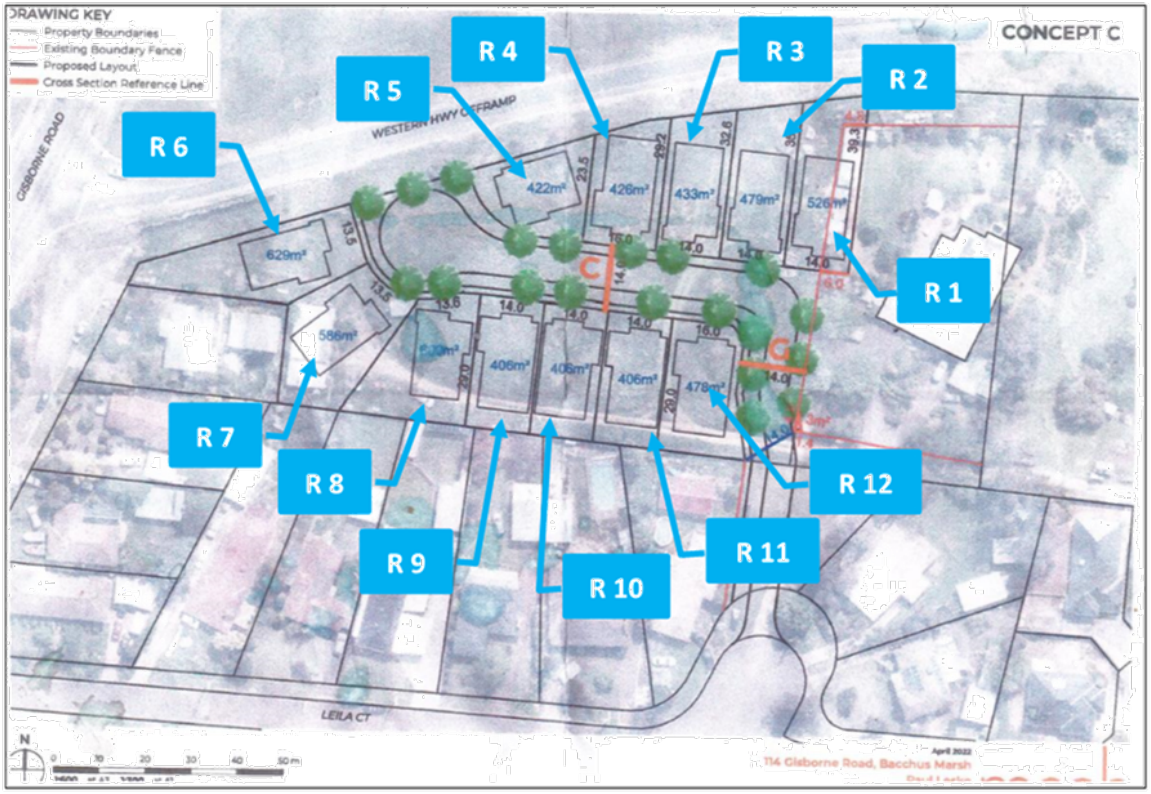

Figure 8 Numbering of Lots

7.1 Required Minimum Construction of Dwellings

The building components used in this situation must attenuate the external noise from local traffic to achieve the indoor design noise levels.

Design, layout, and siting should refer to Section 5 of the VicRoads Publication "A Guide to the Reduction of Traffic Noise".

Mitigation measures for the proposed dwellings are required as per the following subsections.

Alternatively, each Lot can be independently assessed by an acoustic engineer of their choosing. The report should assess the existing traffic noise level once the noise barrier is implemented and provide recommendations by application of AS3671 – 1989, Acoustics - Road Traffic Noise Intrusion – Building Siting and Construction and AS2107 – 2016 Acoustics - Recommended design sound levels and reverberation times for building interiors.

7.1.1 Number of Storeys

Lots 1 through 6 inclusive shall be single storey unless an independent acoustic assessment is undertaken after the noise barrier is implemented.

7.1.2 External Walls

External walls must be standard brick veneer construction with an air cavity, a minimum 10 mm standard plasterboard lining and minimum R1.5 fibrous insulation within the 90 mm studwork cavity.

There should be no inclusion of any lightweight sections or ventilation that would degrade the acoustic performance of the specified brick veneer wall.

Lots 7 through 12 inclusive can implement lightweight construction however this construction should be able to achieve an R_w >44 dB. Example construction may include Hebel panels or cement board cladding. Polystyrene foam panels should be avoided.

7.1.3 Roof and Ceiling

Either concrete tiled or metal deck roofing with insulation of min R2.5 fibrous with internal lining of standard 10 mm plasterboard will be adequate to meet the requirements for all rooms in Lots 7 through 12 inclusive.

Lots 1 through 6 inclusive require either concrete tiled or metal deck roofing with insulation of min R2.5 fibrous with internal lining of standard 13 mm plasterboard for all rooms.

Eaves are to be sealed and treated to prevent / minimise noise break-in to the roof space.

Installers should ensure the fibrous insulation extends fully into any eaves.

7.1.4 Glazing

Awning windows are preferred. Any sliding glazed units (doors or windows) must be fitted with good quality, full perimeter acoustic seals that ensure an airtight fit upon closure.

Typical glazing may include the following orientations inclusive of aluminium frame however any glazing that achieves the minimum required R_w value will be suitable. Note that Energy Rating requirements may require glazing of a similar standard.

Table 5 Typical Glazing to Achieve Design Criteria

Room	Min Required R_w Inclusive of Frame	Typical Glazing
Other habitable rooms	≥ 27	4 mm - 10 mm argon - 4 mm Double Glazed
Bedrooms	≥ 30	Single 6.38 mm Laminated, or 6 mm - 12 mm - 6 mm Double Glazed

Note the R_w rating for glazing is particularly dependent on frame material and quality of construction as well as effective resilient mounting of the glass, plus the mass of the glass and the size of the air gap in the case of double glazing. Technically an R_w rating for a glazed window or door is specific to a product which has been through a test process to obtain the R_w rating. Extrapolation of an R_w value to other products in the range is often done but is not advised, because conditions in both manufacturing and installation will vary from ideal laboratory conditions.

The main features required for good acoustic performance are an adequate glass section, a good resilient seal between glass and frame, and between fixed and openable frames. Good acoustic performance is achieved by either maximising the airgap between panes (where double glazing is used), or using panes of greater than standard thickness. Benefit is usually found using glazing of differing thickness when adopting air gaps less than 100 mm. This reduces the combined effects of the coincidence dip when 2 panes of the same thickness are used.

In addition, good quality frames with adequate mass are necessary. To gain the benefit of the rating, care should be taken with installation.

All windows must be flush fitting with the walls and any gaps filled with a suitable material, such as rubber strip or non-setting mastic. Expanding foam types of fillers are not suitable as they have little density and result in a closed cell which is not suited to acoustic absorption.

7.1.5 Doors

External doors to habitable rooms of Lots 1 through 6 inclusive, must be minimum 38 mm solid core construction with perimeter acoustic seals and a drop seal at the base of the door. Glazed sections must achieve a minimum $R_w = 28$.

7.1.6 Ventilation

To meet attenuation requirements, all doors and windows would theoretically have to remain closed, so cooling systems such as an evaporative cooler is not suited to traffic noise exposed houses without modification.

A forced mechanical ventilation system is not necessary.

A split system or ducted heating and air conditioner would be suited, if required. Note that these installations must comply with the EPA's Environment Protection Regulations 2021 (State of Victoria, 2021) regarding residential noise.

Any ducting within the ceiling should incorporate fibrous insulated flexi ductwork.

Any Whirly Birds should not be situated over any of the bedrooms.

7.2 Noise Barrier

Construction of the barrier must be non-permeable with a minimum surface density of 15 kg/m^2. No gaps, particularly at the base of the barrier should be present. Ideally the base should be dug into the ground or subsequent use of a plinth board be installed.

The followings construction would be suitable:

- Modular Walls - AcoustiMax 75 mm panel with >15 kg/m^2 surface density.
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- Earth bunds.
- Plexiglas, Acrylic or Perspex material providing it meets the required R_w and surface density requirements.

Alternative construction can be considered providing they meet the minimum surface density of 15 kg/m^2 and achieve an R_w > 27 dB.

The barrier must be 2.7 m in height above the existing level of the project site and extend the along the subdivision boundary as per Figure 9.

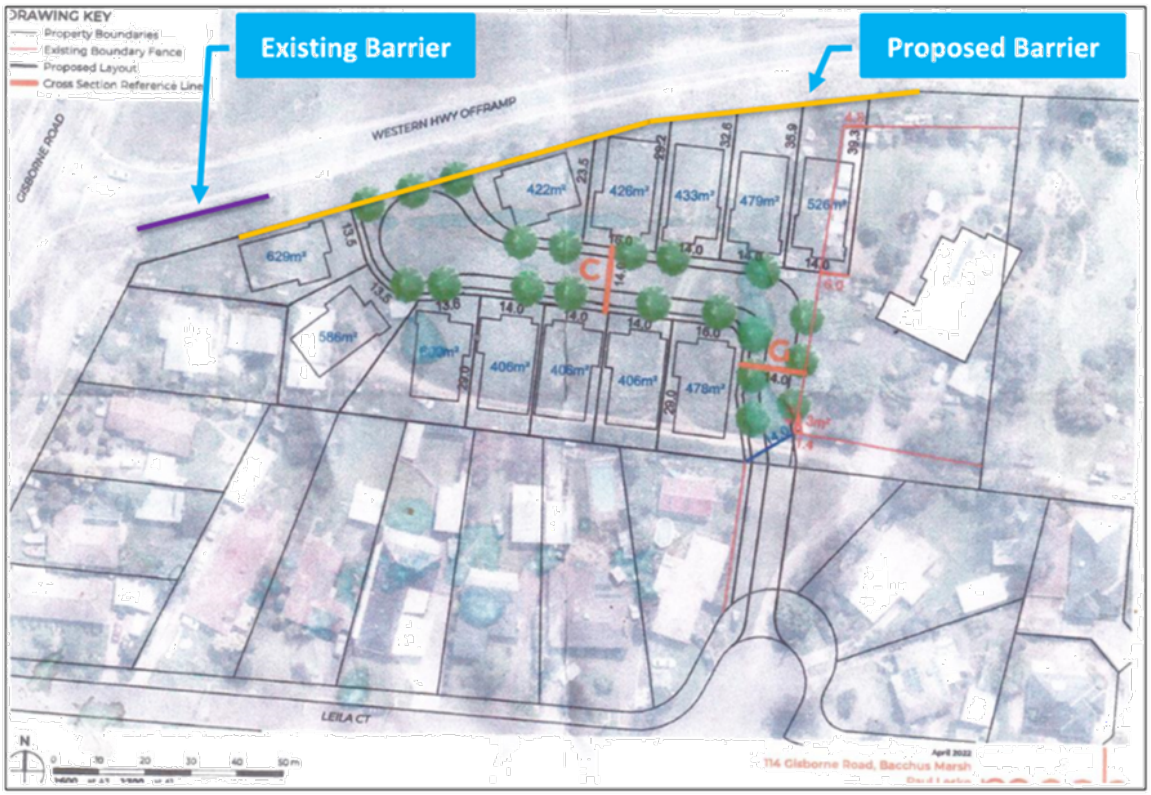

Figure 9 Location of Noise Barrier (Image Source: Axiom 2022)

8 Summary

Audiometric and Acoustic Services (A&AS) has been commissioned by Axiom Consulting Engineers to investigate existing noise levels from traffic noise for a proposed residential development located at 7 Leila Court, Bacchus Marsh, Victoria, 3340.

The incidence of noise from traffic is moderate to low with the proposed noise barrier in place.

Construction as per the recommendations in Section 7 for the burdened Lots is considered adequate for the noise attenuation requirements for external traffic noise intrusion.

Please feel free to contact us should any additional detail be required. This applies to any parties that have legitimate access to this report.

Respectfully

Scott Henderson

Senior Acoustic Consultant

M.A.A.S.

Reviewed by Richard Unkles M.A.A.S.

9 References

Standards Australia. (1989). AS 3671:1989 Acoustics – Road Traffic Noise Intrusion – Building Siting and Construction.

State of Victoria. (2017). Environment Protection Act 2017. *(Authorised Version No. 005 incorporating amendments as at 1 July 2021), No. 51 of 2017*. Victoria.

State of Victoria. (2021). Environmental Protection Regulations S.R. No. 47/2021. Victoria, Australia: EPA.

Appendix A Definitions of Terminology

Sound Pressure Level:
The root-mean-square values of the pressure fluctuations above and below atmospheric pressure caused by the passage of a sound wave, usually expressed in deci Bels (re 20 μ Pa)

decibel: Unit usually used to define sound pressure level relative to a reference pressure.

$$dB = 20 \log_{10} \left(\frac{P}{Pref} \right)$$

(A): Reference to particular weighting network within a Sound Level Meter which modifies the linear response. 'A' weighting is designed to approximate the response of the human ear.

R_w Weighted Sound Reduction Index. A single figure rating of the acoustic attenuation of materials either singly or as multiples.

L_{10} The noise level exceeded for 10% of a measurement period. Often used as a measurement of occasional interruptive noise, such as traffic.

$L_{A10(18hr)}$ The 18 hour Traffic Noise average. Arithmetic average of the A weighted L_{10} sound levels from 0600hrs to 0000hrs.

L_{90} The noise level exceeded for 90% of a measurement period. Commonly accepted as the natural Background Noise Level.

L_{eq} Equivalent Continuous Sound Level. This is calculated on the basis of average of the Sound Pressure Level (acoustic energy) over a period of time and is expressed in deci Bels.

L_{Aeq} The 'A' weighted Equivalent Continuous Sound Level.

$L_{Aeq(8hr)}$ The LAeq for the night period between 10pm and 6am.

$L_{Aeq(16hr)}$ The LAeq for the day period between 6am and 10 pm.

Fast - F: Dynamic characteristic - time averaging constant is 125m sec.

Appendix B Instrumentation

Equipment Used

Convergence	NSRT Mk3 Type I datalogger
	SN: CFj+JXWY8%c1ChNQz6jZFD
NTi Audio	Type 1 Sound Level Meter
	NTI XL2-TA Device Info:
	XL2, SNo. A2A-18268-E0, FW4.71 Type Approved
	Mic Type: NTi Audio MA220, Serial No. 8481

NATA Laboratory calibration due 13th September 2023

Quest	CA-22 Calibrator
	SN: J1060008

NATA Laboratory calibration due 10th Feb 2024

The equipment was check calibrated before and after the measurements. No significant change was found to have occurred.