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# Noise Impact Assessment
# Proposed Seniors Multi-Dwelling Living Development
# Charmhaven, NSW

Prepared for:
Capital Property Solutions
C/- Interface Planning.
PO Box 192
TERRIGAL NSW 2260

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| | |
|---|---|
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| PROJECT PERSONNEL | | | | |
|---|---|---|---|---|
| **Name** | **Qualifications** | **Associations*** | **Position** | **Signature** |
| Neil Pennington | B.Sc.(Phys.), B.Math. (Hons) | MAIP, MAAS, MASA | Principal/Director | **DRAFT** |

*MAIP: Member, Australian Institute of Physics
MAAS: Member, Australian Acoustical Society
MASA: Member, Acoustical Society of America

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The information contained herein pertains to acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and BCA ventilation requirements. Supplementary professional advice should be sought in respect of these issues.

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# EXECUTIVE SUMMARY

A Traffic Noise Impact Assessment (TNIA) for a proposed multi-dwelling Seniors Living Housing development at 2216 – 234 Pacific Highway, Charmhaven, NSW, has been conducted.

The site is impacted by high noise levels from the Pacific Highway but the building footprint is set back from the road approximately 40m. The assessment has found that Category 1 minimum construction requirements will satisfy the internal traffic noise criteria given in Section 3.5 of the Interim Guideline.

Based on the results of this assessment, it is our professional opinion that adoption of the recommendations within this report will result in compliance with noise conditions as set out in the SEPP (Infrastructure) 2007.

# 1.0 INTRODUCTION

## 1.1 The Proposal

Interface Planning has commissioned Spectrum Acoustics, on behalf of the proponent Capital Property Solutions, to prepare a Traffic Noise Impact Assessment (TNIA) for a proposed multi-dwelling Seniors Living development at 216 – 234 Pacific Highway, Charmhaven, NSW. This study was commissioned to accompany a Site Compatibility Certificate (SCC) Application to NSW Department of Planning, Industry and Environment (DPIE).

## 1.2 Project Description

Under the proposal there would be 71 dwellings constructed over one level with associated internal access roads, car parking, administration building & associated facilities. The site's eastern boundary is facing the Pacific Highway and being a noise sensitive development, an assessment of traffic noise impacts is required. The assessment is based on the typical regulatory requirements as contained in the SEPP (Infrastructure) 2007.

## 1.3 Description of Terms

**Table 1** contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

**Table 1: Definition of acoustical terms**

| Term | Definition |
|---|---|
| dB(A) | The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB). |
| SPL | Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard. |
| STL | Sound Transmission Loss. The ability of a partition to attenuate sound, in dB. |
| Lw | Sound Power Level radiated by a noise source per unit time re 1pW. |
| Leq | Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period. |
| L1 | Average Peak Noise Level - the level exceeded for 1% of the monitoring period. |
| L10 | Average Maximum Noise Level - the level exceeded for 10% of the monitoring period. |
| L90 | Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area. |

# 2.0 NOISE ASSESSMENT

## 2.1 Ambient Noise Levels

Existing road traffic noise levels were measured on site on 22nd February 2022 at one location using a Bruel & Kjær Type 2250 Sound Level Meter. The measurements were conducted in accordance with relevant EPA guidelines and AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise". The sound level meter used complies with the requirements of AS 1259.2-1990 "Acoustics – Sound Level Meters", and has current NATA calibration certification.

The sound level meter was programmed to continuously register environmental noise levels over a 1-hour period in one-second intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. A current NATA certification is included in **Appendix A**.

The monitoring location at the site was setback approximately 40m from the Pacific Highway at the approximate location of the eastern façade of the proposed row of dwellings facing the Pacific Highway, as shown in **Figure 1**.

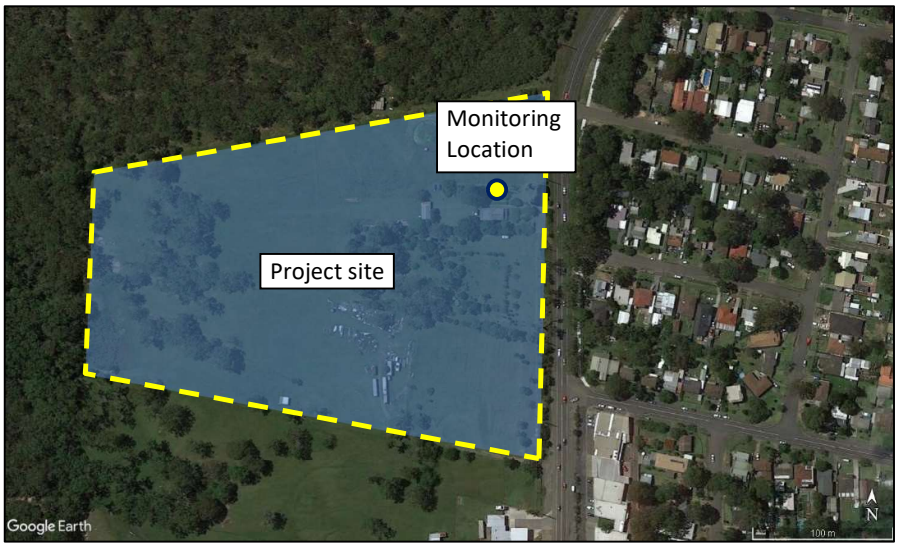



**Figure 1: Site location and monitoring location**

The total measured noise level during a 60-minute period from 4:37pm – 5:37pm was 56 dB(A),Leq. This was dominated by road traffic noise from the Pacific Highway and high frequency insect noise. It has been determined from the measured noise levels, shown graphically in **Appendix C**, that the measured noise level resulting from the traffic on the Pacific Highway is 55 dB(A),Leq.

Given that the monitoring period only captures traffic noise levels during 'peak hour' traffic volume, the measured noise level will be adopted to apply to both day and night. This results in an assessment of the worst possible traffic noise conditions under the most stringent noise criteria, i.e. night time period.

## 2.2 Noise criteria

### 2.2.1 Traffic noise impacts

The development is for residential use and as such the internal traffic noise criteria given in Section 3.5 of the Interim Guideline are:

- In any bedroom in the building: **35 dB(A),$L_{eq}$** at any time 10pm – 7am, and
- Anywhere else in the building (other than a garage, kitchen, bathroom or hallway): **40dB(A),$L_{eq}$** at any time.

These criteria originated from the Rail Infrastructure Corporation (RIC) publication "Consideration of Rail Noise and Vibration in the Planning Process" (2003) where it is explicit that the criteria apply with windows and doors closed. The criteria correspond to those in AS/NZS 2107, where the noise is considered to be "quasi-continuous" in nature.

## 2.3 Assessment Methodology

**Figure 2** is a reproduction of Figure B2 from the Interim Guideline (2008) showing a typical situation of a dwelling adjacent to a busy road and calculated internal noise levels relative to external noise levels using the UK Calculation of Road Traffic Noise (CoRTN) methodology. Figure 2 shows a traffic noise level of 68 dB(A) at windows W1 and W2 directly facing the road. Windows W3 and W4 are on facades perpendicular to the road, thereby being shielded from 50% of the traffic noise by the building structure, and noise levels are 2-3 dB below the traffic noise level at W1 and W2. Window W5 is approximately twice the distance from the road as W4 and experiences an external traffic noise level 4 dB below the level at W4.

Figure 2 also gives the traffic noise loss for three construction scenarios labelled A, B and C. The following specifications for these construction scenarios are reproduced from the Guideline. The specification for walls includes insulation in the wall cavity, however brick veneer achieves Rw >45 without insulation, which will not reduce the overall noise insulation of the room as a whole, since windows are the acoustically weakest elements. Any recommendations regarding the following construction specifications assume no insulation in facade walls.

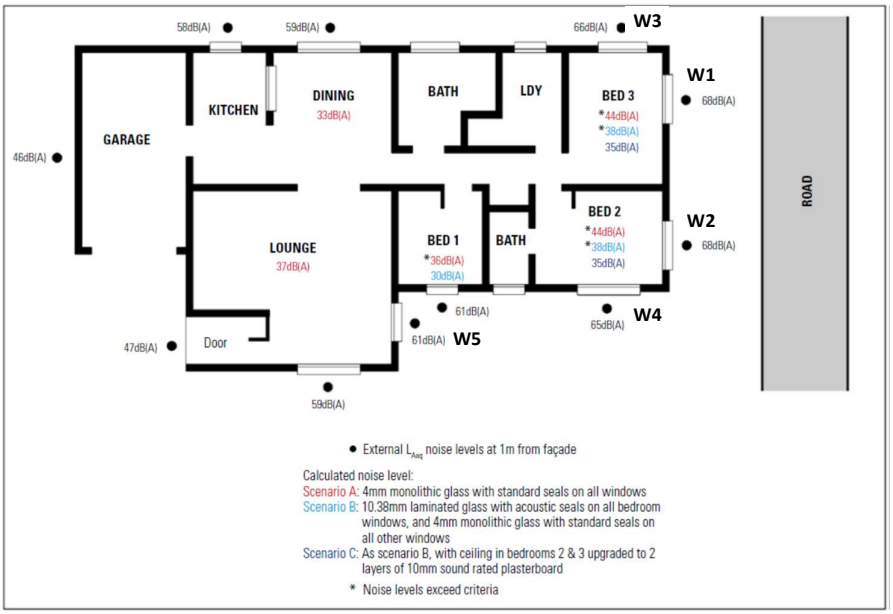



**Figure 2: Traffic noise reduction for various construction types.**

**Specification A**

| | | |
|---|---|---|
| Windows | standard 4mm monolithic glass with standard weather seals on all windows | (Rw 25) |
| Doors | 30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms | (Rw 24) |
| Walls | brick-veneer and standard plasterboard on timber studs with insulation in cavity | (Rw 52) |
| Roof | tiled roof and standard plasterboard ceiling with insulation | (Rw 43) |
| Floor | concrete slab | |

Note: 'Rw' is the weighted sound reduction index of a building element

**Specification B**

| | | |
|---|---|---|
| Windows | 10.38mm laminated glass with acoustic seals on all bedroom windows, standard 4mm monolithic glass with standard seals on all other windows | (Rw 35) |
| Doors | 30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms | (Rw 24) |
| Walls | brick-veneer and standard plasterboard on timber studs with insulation in cavity | (Rw 52) |
| Roof | tiled roof and standard plasterboard ceiling with insulation | (Rw 43) |
| Floor | concrete slab | |

Note: 'Rw' is the weighted sound reduction index of a building element

**Specification C**

| | | |
|---|---|---|
| Windows | 10.38mm laminated glass with acoustic seals on all bedroom windows, standard 4mm monolithic glass with standard seals on all other windows | (Rw 35) |
| Doors | 30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms | (Rw 24) |
| Walls | brick-veneer and standard plasterboard on timber studs with insulation in cavity | (Rw 52) |
| Roof | as per Specification B, except the single layer of standard plasterboard ceiling is replaced with a double-layer of 10mm sound-rated plasterboard ceiling | (Rw 52) |
| Floor | concrete slab | |

Note: 'Rw' is the weighted sound reduction index of a building element

**Table 3** summarises the traffic noise reduction provided by each construction scenario for the cases in Figure 2 where a room contains either one or two windows.

**Table 2: Traffic Noise reduction levels**

| Construction scenario | Noise reduction (2 windows) | Noise reduction (1 window) |
|---|---|---|
| Scenario A | 23 | 25 |
| Scenario B | 29 | 31 |
| Scenario C | 32 | 34 (estimated) |

Between the minimum 23 dB reduction for Scenario A and minimum 29 dB reduction for Scenario B lies what will be called Scenario A/B in which 23-28 dB traffic noise reduction is required[1]. This will be achieved with the same construction as scenario B except using 6.5mm Vlam Hush (or equivalent) in lieu of the 10.38mm glazing (8.5mm Vlam Hush provides the same acoustic rating as 10.38mm). This conservative measure is based on adopting the 23 dB noise reduction for 4mm glass, whether there are one or two windows in the room.

# 3.0 RESULTS AND RECOMMENDATIONS

## 3.1 Traffic Noise Impacts

**Figure 3** shows measured day time and night time traffic noise levels applied at the building facades of the row of dwellings along the eastern boundary of the subject site.

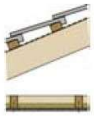
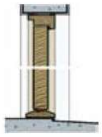
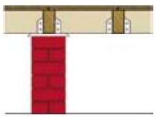

**Figure 3: Traffic noise levels at facades facing highway.**

The required noise loss through the building facade on the assessed Lot is no more than 15 dB for living rooms and 20 dB for bedrooms, without the consideration of any acoustic barriers or intervening structures between the development and the Pacific Highway.

A fully worked noise intrusion calculation in Section B2 from the Interim Guideline (2008) finds that standard building construction achieves 24 dB noise reduction. This is significantly greater than the noise reduction required of the worst affected dwellings. Consequently, the internal noise levels in the SEPP (Infrastructure) 2007 will be achieved by Category 1 minimum construction requirements as per the Interim Guideline (2008).

Category 1 minimum construction requirements from Appendix C of the Guideline are reproduced in **Figure 4**.

[1] The value of 23dB has been included in the Scenario A/B category as a measure of conservatism.

| Category No. | Building Element | Standard Constructions | sample |
|---|---|---|---|
| 1 | **Windows/Sliding Doors** | Openable with minimum 4mm monolithic glass and standard weather seals |  |
| | **Frontage Facade** | **Timber Frame or Cladding:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally |  |
| | | **Brick Veneer:** 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally |  |
| | | **Double Brick Cavity:** 2 leaves of 110mm brickwork separated by 50mm gap |  |
| | **Roof** | Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R1.5 insulation batts in roof cavity. |  |
| | **Entry Door** | 35mm solid core timber door fitted with full perimeter acoustic seals |  |
| | **Floor** | 1 layer of 19mm structural floor boards, timber joist on piers |  |
| | | Concrete slab floor on ground |  |

NOTES:

1. Some of the samples are indicative only and exceed the required Rw rating. For walls, the required Rw rating will be achieved by 70mm timber studs in lieu of the 90mm timber or 92mm metal studs mentioned in the examples.
2. The spacing of cavity brick walls can be any industry value standard and not necessarily 50mm.

**Figure 4: Category 1 minimum construction requirements.**

# APPENDIX A

# CALIBRATION CERTIFICATE

HBK HOTTINGER BRÜEL & KJÆR

NATA WORLD RECOGNISED ACCREDITATION

Australian Calibration Laboratory
Suite 4.03, Level 4, 3 Thomas Holt Drive, Macquarie Park NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

# CERTIFICATE OF CALIBRATION

Certificate No: CAU2100868



## CALIBRATION OF:

| | | | |
|---|---|---|---|
| Sound Level Meter: | Bruel & Kjaer | 2250 | No: 2747794 |
| Microphone: | Bruel & Kjaer | 4189 | No: 2733511 |
| Preamplifier: | Bruel & Kjaer | ZC-0032 | No: 15339 |
| Supplied Calibrator: | Bruel & Kjaer | 4231 | No: 2466354 |
| Software version: | BZ7224 Version 4.6 | Pattern Approval: | PTB |
| Instruction manual: | BE1712-22 | Identification: | N/A |

## CUSTOMER:

Spectrum Acoustics Pty Ltd
Suite 1, 12 Alma Road
New Lambton NSW 2305

## CALIBRATION CONDITIONS:

| | |
|---|---|
| Preconditioning: | 4 hours at 23 °C |
| Environment conditions: | *see actual values in **Environmental conditions** sections* |

## SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

## PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.3 - DB: 8.30) and test procedure 2250-4189.

## RESULTS:

| | | | |
|---|---|---|---|
| | Initial calibration | | Calibration prior to repair/adjustment |
| X | Calibration without repair/adjustment | | Calibration after repair/adjustment |

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 06/12/2021

Sajeeb Tharayil
Calibration Technician

Certificate issued: 06/12/2021

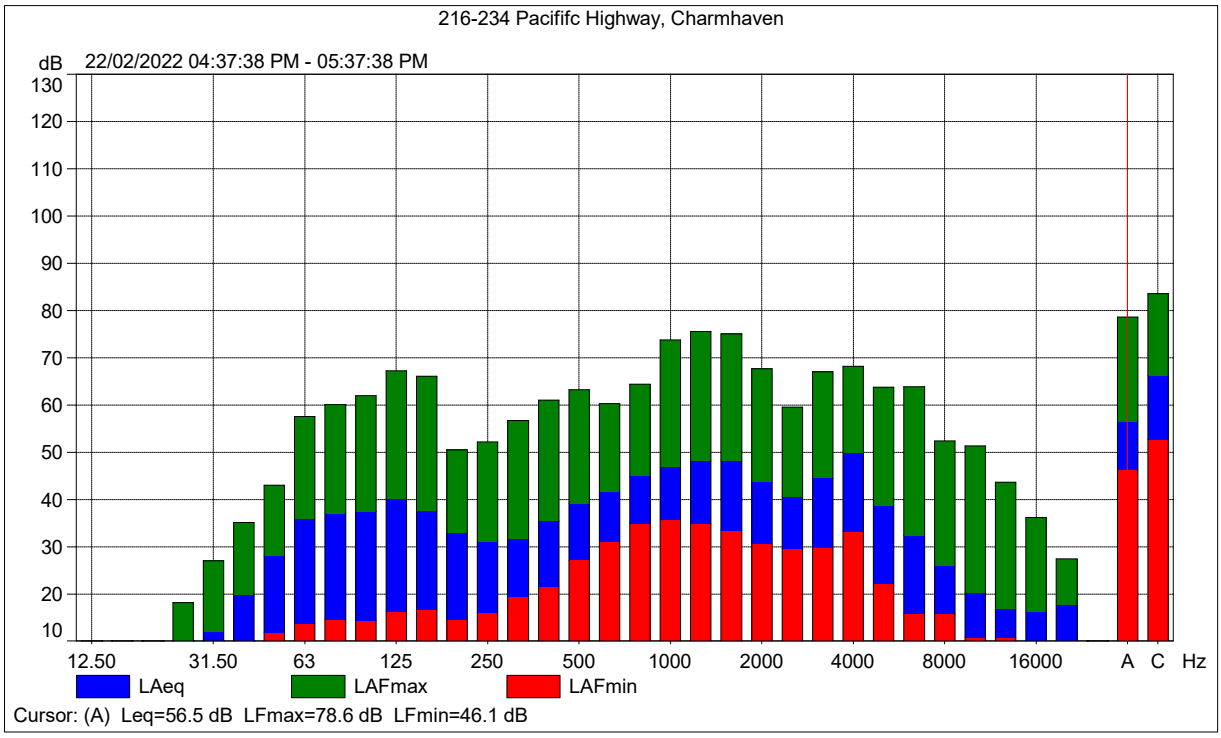
Craig Patrick
Approved signatory

# APPENDIX B

# MONITORING APPARATUS & LOCATION

# APPENDIX C

# MONITORING RESULTS


216-234 Pacifc Highway, Charmhaven
dB
22/02/2022 04:37:38 PM - 05:37:38 PM
130
120
110
100
90
80
70
60
50
40
30
20
10
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LAeq
LAFmax
LAFmin
Cursor: (A) Leq=56.5 dB LFmax=78.6 dB LFmin=46.1 dB