289-293 Beauchamp Road, Matraville

Noise Impact Assessment

Collard Maxwell Architects

Report number: 210528-289-293 Beauchanp Rd, Matraville-Noise Impact Assessment-R1
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1 INTRODUCTION

Pulse White Noise Acoustics has been engaged to undertake the Noise Impact Assessment of the proposed NSW Land and Housing Corporation seniors housing residential development located at 289-293 Beauchamp Road, Matraville.

The proposed project includes the following:

1. A two story building including residential dwellings.

This assessment includes the acoustic investigation into the potential for noise impacts from the operation of the completed project as well as potential noise impacts from existing noise sources within the vicinity of the site which predominantly includes traffic noise from surrounding roadways.

1.1 Development Description

The 289-293 Beauchamp Road, Matraville is located to the south of Beauchamp Road. The surrounding receivers to the site include existing residential receivers. The site location is detailed in Figure 1 below.

Figure 1 289-293 Beauchamp Road, Matraville Site Location

2 PROPOSED DEVELOPMENT

The proposed project is located at 289-293 Beauchamp Road, Matraville. The proposed development will include a NSW Land and Housing Corporation seniors housing residential development.

The site is located within the Randwick City Council local government area.

The site is located on Beauchamp Road which is not defined as a busy road carrying over 40,000 Annual Average Daily Traffic (AADT) number and does not carry over 20,000 AADT as defined in Map 16 of the RTA's *Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads* as detailed in the figure below.

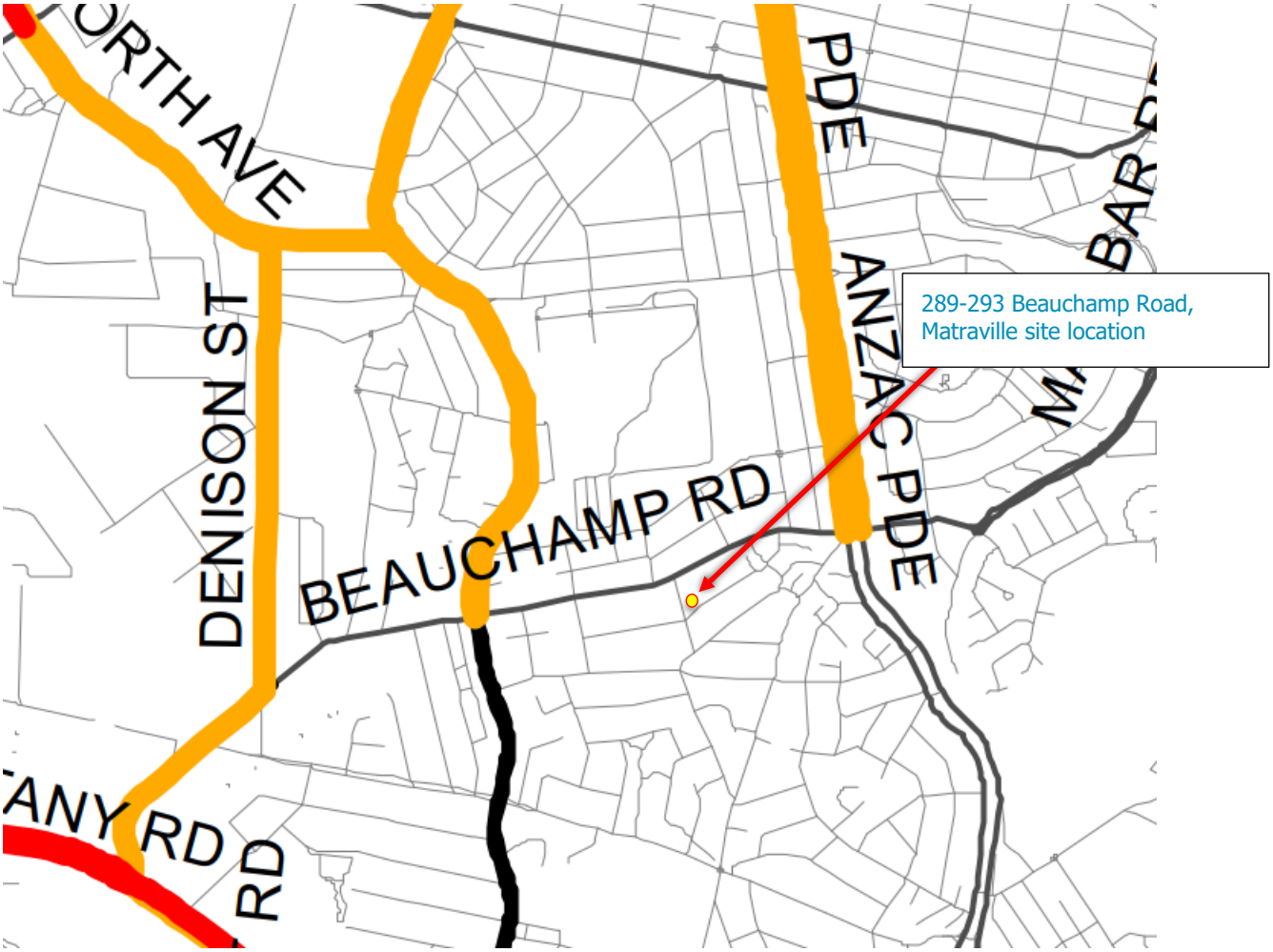

Figure 2 Site Location of Map 16 of the RTA's *Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads*

3 EXISTING ACOUSTIC ENVIRONMENT

The 289-293 Beauchamp Road, Matraville site is located to the south of Beauchamp Road which is classified as a *Suburban* area. The exiting noise levels at the site are predominantly as a result from traffic noise within the vicinity of the site. Existing receivers within the vicinity of the site include residential receivers as detailed in Figure 1 above.

During the assessment noise logging was attempted to be undertaken on the site, however based on the street frontage to Beauchamp Road a logger could not be safely located on verges or house frontages. To the rear of the site locations could not be provided on private land which had suitable access to the environment without unreasonable screening or suitable access. Based on the site conditions a number of attended noise level measurement during various period of the day evening and night have been undertaken such that an understanding of the exiting acoustic environment can be obtained.

As part of this assessment an acoustic survey of the existing acoustic environment at the site was undertaken. All measurements on the site were undertaken in accordance with the measurement requirements of AS1055. The survey included attended noise level measurements at the site, during various times of the day on the 24th, 26th and 29th November, 2021. Measurements were undertaken using a Rion NL-42EX type noise monitor with serial number 00410151 and calibration with calibration number C19279. The noise monitoring was located at the site as detailed in Figure 1 above to obtain representative background noise levels. The measurement location included a position which did not include façade corrects.

3.1 Noise Survey Results

The results of the acoustic survey undertaken at the site were selected to obtain suitable noise levels for the assessment of background noise levels ($L_{90\,(t)}$) as well as the impact from traffic movements ($Leq_{(t)}$). The results of the acoustic survey are detailed in the tables below which have been used as the basis of this assessment.

Table 1 Results of the Attended Noise Survey at the Site

Measurement Location	Date	Time of Measurement	$L_{Aeq,\ 15min}$ dB(A)	$L_{A90,\ 15min}$ dB(A)	Comments
Beauchamp Road	25th November	Daytime – 4.50pm to 5.05pm	62	49	Noise level at the site dominated by vehicle movements on the surrounding roadways
		Day time – 5.10pm to 5.25pm	61	48	
Beauchamp Road	24th November	Evening – 9.15pm to 9.30pm	58	40	
		Evening – 9.35pm to 9.50pm	58	38	
Beauchamp Road	29th November	Night – 11.45pm to 12.00am	52	33	
		Night – 12.05am to 12.20am	54	33	

Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am

Note 2: The LA90 noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.

Note 3: The LAeq is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

4 INTERNAL NOISE LEVEL CRITERIA

Internal noise levels within the future residential occupancies have been based on the relevant noise levels as detailed within the Australian Standard AS2107:2000 *Acoustics - Recommended design sound levels and reverberation times for building interiors.*

The required internal noise levels detailed within the standards are included in the sections below.

4.1 Australian Standard AS2107:2016

The Australian Standard AS2107:2016 *Acoustics - Recommended design sound levels and reverberation times for building interiors* recommended levels for various areas of a project. The recommended noise levels for residential dwellings near major roadways detailed within AS2107:2016 are detailed in the table below.

Table 2 Project Internal Noise Levels AS2107:2016

Type of Occupancy/Activity	Design sound level maximum ($L_{Aeq,t}$)
Apartment common areas (e.g. foyer, lift lobby)	50 dB(A) 24 hours
Residential - Living areas	45 dB(A) 24 hours
Residential - Sleeping areas (night time)	40[1] dB(A) 9 hours
Toilets	55 dB(A) 24 hours
Note 1: The relevant time period includes the night time period of 10pm to 7am	

5 ENVIRONMENTAL NOISE INTRUSION ASSESSMENT

This section of the report details the assessment of environmental noise intrusion into the proposed development and the recommended acoustic treatments to ensure the recommended internal noise levels detailed in the Sections above (including traffic noise intrusion) are achieved.

Internal noise levels within the future areas of the development will result from the noise intrusion into the building through the external façade including glass, masonry and other façade elements. Typically, the acoustic performance of building elements including the relatively light weight elements of the building façade, including glass and/or plasterboard constructions, will be the determining factors in the resulting internal noise levels.

Calculations of internal noise levels have been undertaken based on the measured traffic and calculated aircraft environmental noise levels at the site and the characteristics of the building, including window openings, buildings constructions and the like.

5.1 External Glass Elements

The recommended acoustic constructions to the buildings external façade glass elements are detailed in the table below to ensure the recommended internal noise levels detailed above are achieved, with the façade building openings closed.

Table 3 External Glass Acoustic Requirements

Façade Orientation	Room Type	Recommended Glass Construction	Minimum Façade Acoustic Performance[1]
Beauchamp Road	Bedrooms	6.38mm Laminated	Rw 30
	Living Rooms	6.38mm Laminated	Rw 30
	Wet areas	6mm Float/Toughened	Rw 28
All Other Façade orientations	Bedrooms	6mm Float/Toughened	Rw 28
	Living Rooms	6mm Float/Toughened	Rw 28
	Wet areas	6mm Float/Toughened	Rw 28

Note 1: The acoustic performance of the external façade includes the installed glazing and frame including (but not limited to) the façade systems seals and frame. All external glazing systems are required to be installed using acoustic bulb seals.

The recommended glass constructions detailed in the table above include those required to ensure the acoustic requirements of the project are achieved. Thicker glazing may be required to achieve other project requirements such as structural, thermal, safety or other requirements and is to be advised by others.

5.2 External Building Elements

The proposed external building elements including masonry or concrete external walls and roof are acoustically acceptable without additional acoustic treatment.

Any light-weight external pasteboard walls should be constructed from a construction with a minimum acoustic performance of Rw 45.

5.3 External Roof

The required external roof and ceiling constructions for the project are required to include the following:

1. Metal roof sheeting and foil backed blanket under + ceiling insulation – no additional treatments required.

5.4 External Opening and Penetrations

All openings and penetrations are required to be acoustically treated such that the performance of the building construction is not compromised. This may require lining of duck work behind mechanical service openings/grills, treatments to ventilation opening and the like.

6 EXTERNAL NOISE EMISSION ASSESSMENT

This section of the report details the relevant noise level criteria for noise emissions generated on the site once completed.

The relevant authority which provides the required noise level criteria for noise levels generated on the site includes the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPI).

This section contains noise criteria on the operational criteria, construction criteria and vibration criteria.

The following criteria are relevant for the assessment of noise and vibration emissions from the proposed training centre:

- For the assessment of the predicted operational noise emissions by the training facility: The criteria have been derived in accordance with the *Noise Policy for Industry* (EPA, 2017), details are included in the following sections of this report.

6.1 NSW Noise Policy for Industry

In NSW, the control of noise emissions is the responsibility of Local Government and the NSW Environment Protection Authority (NSW EPA). In October 2017, the NSW EPA released the *Noise Policy for Industry* (NSW NPI). The purpose of the policy is to ensure that noise impacts associated with particular industrial developments are evaluated and managed in a consistent and transparent manner. The policy aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

The NSW NPI criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residential receivers in the short-term; and
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

The project noise trigger level is derived from the more stringent value out of the project intrusiveness noise level and the project amenity noise level.

6.1.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NPI states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noises are generally considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (L_{Aeq}), measured over a 15 minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NSW NPI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

6.1.2 Protecting Noise Amenity (All Receivers)

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW NPI. That is, the ambient L_{Aeq} noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the 'Background Creep' or Amenity Criterion.

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

6.1.3 Area Classification

The NSW NPI characterises the "Suburban" as an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.

For the considered receptors in the Urban area, the recommended amenity noise level is shown in Table 4 below. When the existing noise level from industrial noise sources is close to the recommended "Amenity Noise Level" (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPI.

Table 4 NSW NPI – Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day[1]	Recommended Amenity Noise Level ($L_{Aeq, period}$)[2]
Residence	Suburban	Day	55
		Evening	45
		Night	40

Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am

Note 2: The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

6.1.4 Project Trigger Noise Levels

The intrusive and amenity criteria for industrial noise emissions derived from the measured data are presented in Table 5 below. The amenity and intrusive criterion are nominated for the purpose of determining the operational noise limits for noise sources associated with the development which can potentially affect noise sensitive receivers.

For each assessment period, the project trigger noise levels are the lower (i.e. the more stringent) of the amenity or intrusive criteria. The project trigger noise levels are shown in bold text in Table 5 below.

Table 5 External noise level criteria in accordance with the NSW NPI

Location	Time of Day	Project Amenity Noise Level, $L_{Aeq, period}$ [1] (dBA)	Representative Background Noise level $L_{A90, 15\ min}$ (RBL) [2] (dBA)	Measured $L_{Aeq, period}$ Noise Level (dBA)	Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [3]	Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [3, 4]
Residence (Suburban)	Day	50	48	62	**53**	**53**
	Evening	40	38	58	**43**	**43**
	Night	35	33	52	**38**	**38**

Note 1: Project Amenity Noise Levels corresponding to "Suburban" areas, equivalent to the Recommended Amenity Noise Levels minus 5 dBA

Note 2: L_{A90} Background Noise or Rating Background Level.

Note 3: Project Noise Trigger Levels are shown in bold.

Note 4: According to Section 2.2 of the NSW NPI, the LAeq, 15 minutes is equal to the LAeq, period + 3 dB.

7 OPERATIONAL ACOUSTIC ASSESSMENT

This section of the report details the assessment of potential noise generated as part of the proposed development.

The assessment of potential noise impacts from various sources of noise on the site are detailed in the following sections.

7.1 Mechanical Services Equipment

Detailed selections of the proposed mechanical plant and equipment to be used on the site are not available at this time. All future plant and equipment are to be acoustically treated to ensure the noise levels at all surrounding receivers comply with noise emission criteria detailed within this report. Experience with similar projects indicated that it is both possible and practical to treat all mechanical equipment such that the relevant noise levels are achieved. Examples of the possible acoustic treatments to mechanical equipment includes the following:

- Supply and Exhaust Fans – location of fans within the building and treated using internally lined ductwork or acoustic silencers.
- General supply and exhaust fans – general exhaust and supply fans such as toilet, kitchen, lobby and other small mechanical fans can be acoustically treated using acoustic flex ducting or internal lined ducting.

Details of the required mechanical services equipment and acoustic treatments to ensure the relevant noise level criteria is achieved will be provided as part of the CC submission of the project.

Experience with similar projects indicates that the acoustic treatment of the proposed mechanical equipment to be installed on the project is both possible and practical.

8 CONCLUSION

Pulse White Noise Acoustics Consultancy Pty Ltd (Pulse White Noise Acoustics) has been engaged to undertake the Noise Impact Assessment of the proposed NSW Land and Housing Corporation seniors housing residential development located at 289-293 Beauchamp Road, Matraville.

This report details the required acoustic constructions of the building's façade, including external windows, to ensure that the future internal noise levels comply with the relevant noise levels of the Australian Standard AS2107:2016. Providing the recommended constructions detailed in this report are included in the construction of the project the required internal noise levels will be achieved.

External noise emissions from the site have been assessed and detailed in accordance with the NSW Environmental Protection Authorities Noise Policy for Industry. The future design and treatment of all building services associated with the project can be acoustically treated to ensure all noise emissions from the site comply with the EPA NPfI criteria. Details of the equipment and associated acoustic treatments will be provided as part of the CC submission of the project.

Regards

Ben White
Director

Pulse White Noise Acoustics

9 APPENDIX A: ACOUSTIC TERMINOLOGY

The following is a brief description of the acoustic terminology used in this report.

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A])	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:

0dB(A)	Threshold of human hearing
30dB(A)	A quiet country park
40dB(A)	Whisper in a library
50dB(A)	Open office space
70dB(A)	Inside a car on a freeway
80dB(A)	Outboard motor
90dB(A)	Heavy truck pass-by
100dB(A)	Jackhammer/Subway train
110 dB(A)	Rock Concert
115dB(A)	Limit of sound permitted in industry
120dB(A)	747 take off at 250 metres

Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Ambient sound	The all-encompassing sound at a point composed of sound from all sources near and far.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
Reverberation	The persistence of sound in a space after the source of that sound has been stopped (the reverberation time is the time taken for a reverberant sound field to decrease by 60 dB)
Air-borne sound	The sound emitted directly from a source into the surrounding air, such as speech, television or music
Impact sound	The sound emitted from force of one object hitting another such as footfalls and slamming cupboards.
Air-borne sound isolation	The reduction of airborne sound between two rooms.
Sound Reduction Index [R] (Sound Transmission Loss)	The ratio the sound incident on a partition to the sound transmitted by the partition.
Weighted sound reduction index [R_w]	A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment.
Level difference [D]	The difference in sound pressure level between two rooms.

Normalised level difference [D_n]	The difference in sound pressure level between two rooms normalised for the absorption area of the receiving room.
Standardised level difference [D_{nT}]	The difference in sound pressure level between two rooms normalised for the reverberation time of the receiving room.
Weighted standardised level difference [$D_{nT,w}$]	A single figure representation of the air-borne sound insulation of a partition based upon the level difference. Generally used to present the performance of a partition when measured in situ on site.
C_{tr}	A value added to an R_w or $D_{nT,w}$ value to account for variations in the spectrum.
Impact sound isolation	The resistance of a floor or wall to transmit impact sound.
Impact sound pressure level [L_i]	The sound pressure level in the receiving room produced by impacts subjected to the adjacent floor or wall by a tapping machine.
Normalised impact sound pressure level [L_n]	The impact sound pressure level normalised for the absorption area of the receiving room.
Weighted normalised impact sound pressure level [$L_{n,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in a laboratory.
Weighted standardised impact sound pressure level [$L'_{nT,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in situ on site.
C_I	A value added to an L_{nW} or $L'_{nT,w}$ value to account for variations in the spectrum.
Energy Equivalent Sound Pressure Level [$L_{A,eq,T}$]	'A' weighted, energy averaged sound pressure level over the measurement period T.
Percentile Sound Pressure Level [$L_{Ax,T}$]	'A' weighted, sound pressure that is exceeded for percentile x of the measurement period T.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbols"*