

**Noise Impact Assessment
Additions & Alterations
HomeCo Belrose
4-6 Niangala Close
Belrose NSW**

August 2022

**Prepared for HomeCo Pty Ltd
Report No. 22-2771-R1**

Building Acoustics-Council/EPA Submissions-Modelling-Compliance-Certification

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1 INTRODUCTION

Reverb Acoustics has been commissioned to conduct a noise impact assessment for additions and alterations at HomeCo Belrose, 4-6 Niangala Close, Belrose. The proposal includes extension of existing buildings on Level 2 to facilitate new tenancies. As part of the proposal new air conditioning plant will be required on the roof of the development. This assessment will consider the cumulative noise impact from new and existing roof-top mechanical plant, to confirm compliance at nearby receivers.

The assessment was requested by HomeCo Pty Ltd in support of and to accompany a Development Application to Northern Beaches Council (NBC) and to ensure any noise control measures required for the new plant are incorporated during the design stages.

2 TECHNICAL REFERENCE / DOCUMENTS

Beranek, L.L and Istvan, L.V. (1992). *Noise and Vibration Control Engineering*. John Wiley and Sons, Inc.

Bies, D.A. and Hansen, C.H. (1996). *Engineering Noise Control: Theory and Practice*. London, E & F.N. Spon.

Gréhan B. (1996). *Acoustics in Buildings*. Thomas Telford Publishing.

Templeton, D. (1997). *Acoustics in the Built Environment*. Reed Education and Professional Publishing Ltd.

AS 2107-2016 “*Acoustics-Recommended Design Sound Levels and Reverberation Times for Building Interiors*”.

AS 1276.1-1999 “*Acoustics – Rating of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation*”.

NSW Environment Protection Authority (2017). *Noise Policy for Industry*

Plans supplied by Buchan Pty Ltd, Rev C, dated 25 August 2022. Note that variations from the design supplied to us may affect the acoustic recommendations.

A Glossary of commonly used acoustical terms is presented in Appendix A to aid the reader in understanding the Report.

3 DESCRIPTION OF PROPOSAL

Home Co Pty Ltd seeks consent for additions and alterations at HomeCo Belrose, 4-6 Niangala Close, Belrose. As part of the proposal new air conditioning plant will be required on the roof of the development, with no significant changes proposed for roof-top carparking.

The assessment includes measurement of the existing acoustic environment in the receiver area to provide baseline data and enable establishment of noise assessment criteria. Plans supplied by Buchan Pty Ltd show the layout of existing and proposed plant. Nearest receivers identified during our site visits are shown on Figure 1.

[illegible][illegible]

3 EXISTING ACOUSTIC ENVIRONMENT

Attended background noise level measurements were taken in July 2022 at nearest residential receivers (See Figure 1). Results of our noise surveys are shown below.

Table 1: Measured Noise Levels July 2022

Location	Time	Date	L90	Leq
R1. South Residence	23:00	17/07/22	34.0	83.0
"	11:00	"	44.0	84.5
R3.North Residence	23:30	"	38.5	85.0
"	11:45	"	42.5	85.5

4 CRITERIA

4.1 Site Activities / Mechanical Plant

Noise from industrial noise sources scheduled under the Protection of Environment Operations Act is assessed using the NSW Environment Protection Authority's (EPA's) Noise Policy for Industry (NPfI). However, local Councils and Government Departments may also apply the criteria for land use planning, compliance, and complaints management. The NPfI specifies two separate criteria designed to ensure existing and future developments meet environmental noise objectives. The first limits intrusive noise to 5dB(A) above the background noise level and the other is based on the total industrial noise in an area in relation to the noise levels from the development to be assessed. Project Noise Trigger Levels are established for new developments by applying both criteria to the situation and adopting the more stringent of the two.

The existing L(A)eq for the receiver areas is dominated by traffic on nearby roads, and commercial/light industrial activity during the day, evening and night. Reference to Table 2.2 of the NPfI shows that all receiver areas are classified as urban. The Project Amenity Level is derived by subtracting 5dB(A) from the recommended amenity level shown in Table 2.2. A further +3dB(A) adjustment is required to standardise the time periods to LAeq,15 minute. The adjustments are carried out as follows:

Recommended Amenity Noise Level (Table 2.2) – 5dB(A) +3dB(A)

In high traffic areas where the existing traffic noise levels are 10dB or more above the recommended amenity level, the Amenity Level is derived by subtracting 15dB(A) from the existing traffic noise level. Table 2 below specifies the applicable project intrusiveness and amenity noise trigger levels for the proposed redevelopment.

Table 2: - Base Noise Level Objectives

Period	Intrusiveness Criteria	Amenity Criteria
Day	48 (43+5)	58 (60-5+3)
Evening	39 (34+5)	48 (50-5+3)
Night	39 (34+5)	43 (45-5+3)
Receiver Type: Urban (See EPA's NPfI - Table 2.2)		

Project specific noise levels, determined as the more stringent of the intrusiveness criteria and the amenity / high traffic criteria, are as follows:

Day **48dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **39dB LAeq,15 Minute** 6pm to 10pm
Night **39dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

NOTE: Compliance with the criteria during the more stringent night period (10pm-7am) ensures compliance during the day and evening when background noise levels are higher.

Commercial Premises:

62dB LAeq when in use

School:

35dB LAeq when in use (busiest 1 hour period) Classroom

55dB LAeq when in use School Playground

5 METHODOLOGY

5.1 Mechanical Plant/Site Noise

Noise emission levels for the new condenser have been sourced from manufacturers' data for similar sized plant.

Theoretical predictions of noise from new plant have been propagated to nearest receivers. The Sound Pressure Level (SPL) of the plant is then compared to the criteria. Where noise impacts above the criteria are identified, suitable noise control measures are implemented and reassessed to demonstrate satisfactory received noise levels.

Manufacturer's acoustic data for the proposed condensers are shown below:

Table 3: Lw Roof-Top Air Conditioning Condensers x2

Octave Band Centre Frequency, Hz dB(A)								
dB(A)	63	125	250	500	1k	2k	4k	8k
88	69	76	82	83	81	76	70	64

6 ANALYSIS AND DISCUSSION

6.1 Acoustic Audit – Existing Mechanical Plant

Near-field measurements of existing mechanical plant on the roof-top carpark were measured during our site visit on 17 July 2022. The sound power level of the plant item was determined according to the procedures described in AS IEC 61672-2004 as appropriate, and theoretically propagated to nearest receivers using an equation¹ giving the sound field due to an incoherent plane radiator. The following Table shows calculations to predict noise from existing roof-top plant, propagated south to nearest residential apartments (R1/R2).

**Table 4: Calculated SPL, Existing Roof-Top Mechanical Plant
Propagated South to Nearest Residences (R1)**

		Octave Band Centre Frequency, Hz							
Item	dB(A)	63	125	250	500	1k	2k	4k	8k
Lw plant	92	75	82	85	87	86	83	77	68
Barrier loss ¹		2	2	2	3	4	5	6	8
SPL at Receiver	23	7	14	17	18	16	12	5	-
Criteria (night)	39								
Impact	-								

1. Intervening structures.

¹ Equation (5.104), DA Bies and CH Hansen, *Engineering Noise Control*, E & FN Spon, 1996.

As can be seen by the above results, noise emissions from existing roof-top mechanical plant items are currently operating below the night criterion of 39dB(A),Leq at nearest receivers, implying compliance.

6.2 Noise Impact – New Mechanical Plant

Calculations to predict the noise impact from new condensers on the roof are shown in the following Table, propagated south to nearest residences (R1).

**Table 5: Calculated SPL, New Roof-Top Mechanical Plant
Propagated South to Nearest Residences (R1)**

Item	dB(A)	Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
Lw plant	88	69	76	82	83	81	76	70	64
Barrier loss ¹		2	2	2	1	1	0	0	0
SPL at Receiver, 65m	21	1	8	14	16	14	10	4	-
Criteria (night)	39								
Impact	-								

1. Intervening structures.

As can be seen by the above results, noise emissions from new roof-top plant condensers are predicted to be compliant with the night criterion of 39dB(A),Leq at nearest residential receivers.

6.3 Cumulative Noise Impact – All Existing & New Plant

The cumulative noise impact from all existing mechanical plant and new mechanical plant on the roof-top must be considered to confirm compliance. Table 6 shows a summary of predictions of the combined noise impact from all existing and new plant at nearest residences.

**Table 6: Cumulative Noise Impact - New & Existing Roof-Top Plant
Propagated to all Nearby Receivers dB(A),Leq**

Impact/Receiver	Residence (South) R1	School (South) R2	Checkers (North) R3
Rec dB(A),Leq	25	15	28
Criteria	39 (external)	35 (internal)	39 (external)
Impact	0	0	0

As can be seen by the above results, the noise impact from existing mechanical plant and new mechanical plant, located on the roof of the development are predicted to be compliant with the criteria during all times at all nearby residential receivers.

7 RECOMMEDATIONS AND CONCLUSION

7.1 No acoustic treatment is required for new plant located in specified locations (roof-top), that satisfies the following noise emission limits:

	<i>L_w, dB(A)</i>	<i>SPL at 1m dB(A)</i>
Air conditioning Plant	102	96

7.2 If noise emissions from individual items of air conditioning plant exceed the limits shown in Item 7.1 above acoustic barriers must be constructed between the plant and residences. Barrier construction should consist of either Acoustisorb panels (available through Modular Walls) or an outer layer of one sheet of 12mm fibre cement sheeting (Villaboard, Hardiflex), or 19mm marine plywood. The inside (plant side) is to be lined with an absorbent foam to reduce reverberant sound (fibrous infills are not recommended as they will deteriorate if wet), and must be minimum 300mm above the top of the plant item.

7.3 The contractor responsible for supplying and installing the plant should be asked to supply evidence that installed plant meets specified noise emission limits, or that noise control included with the plant is effective in reducing the sound level to the specified limit. Once selection and location of plant has been finalised, details should be forwarded to the acoustic consultant for approval.

A noise impact assessment for existing and new mechanical plant on the roof of HomeCo Belrose, has been completed. This assessment has shown that, based on supplied information and measurements conducted at the site, the noise impact from all new and existing plant is predicted to be compliant with the criteria at all nearby residential receivers.

In conclusion, providing the recommendations given in this report are implemented, noise impacts from mechanical plant on the roof of HomeCo Belrose will comply with the requirements of the EPA and NBC at nearest receivers. We therefore see no acoustic reason why the proposal should be denied.

Steve Brady M.A.S.A. A.A.A.S.
Principal Consultant

APPENDIX A

Definition of Acoustic Terms

Definition of Acoustic Terms

Term	Definition
dB(A)	A unit of measurement in decibels (A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
ABL	<i>Assessment Background Level</i> – A single figure representing each individual assessment period (day, evening, night). Determined as the L90 of the L90's for each separate period.
RBL	<i>Rating Background Level</i> – The overall single figure background level for each assessment period (day, evening, night) over the entire monitoring period.
Leq	Equivalent Continuous Noise Level - which, lasting for as long as a given noise event has the same amount of acoustic energy as the given event.
L90	The noise level which is equalled or exceeded for 90% of the measurement period. An indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L10	The noise level which is equalled or exceeded for 10% of the measurement period. L ₁₀ is an indicator of the mean maximum noise level, and was previously used in Australia as the descriptor for intrusive noise (usually in dBA).

The graph illustrates the variation of noise levels over time. The y-axis represents Noise Level in dBA, and the x-axis represents Time. The noise profile shows several peaks and troughs. Horizontal dashed lines indicate specific statistical noise levels: L_{min} (minimum), L_{max} (maximum), L₁₀ (mean maximum), L_{eq} (equivalent continuous), and L_{90,95} (mean minimum).