MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

Bonnyrigg Greens

DA Acoustic Assessment

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 98 145 324 714
www.acousticlogic.com.au

Project ID	20230563.1
Document Title	DA Acoustic Assessment
Attention To	Bonnyrigg Greens Unit Trust

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	28/06/2023	20230563.1/2806A/R0/SW	SW		SN
1	30/06/2023	20230563.1/3006A/R1/SW	SW		SN

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic (AL) has been engaged to provide an acoustic assessment for the SSDA development application for the residential development located at Lot 80 Bonnyrigg Greens. This document will be discussing the following noise impacts associated with the development:

- Potential traffic noise from Cabramatta Road West and Humphries Road intruding into the development.
- External noise emissions from mechanical plant in principle.

This assessment was based on the architectural plans provided by AJH-A dated 18th July 2023.

2 REFERENCED DOCUMENTS

This report will be referencing the following documents for the assessment:

- Acoustic report by Renzo Tonin Associated (*ref: Proposed Subdivision Concept at Humphries Road Bonnyrigg dated 6th November 2020*).
- Fairfield City Council Development Control Plan 2013.
- Australian Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian Standard AS/NZS 3671:1989 Acoustics – Road traffic noise intrusion – Building siting and construction.
- NSW EPA Noise Policy for Industry 2017.

3 SITE DESCRIPTION

The surrounding sensitive receivers have been identified in Figure 1 below.

Project Site

Residential Receivers

Active Recreational Receivers

- **R1**: 2 storey residential dwellings along the east of Rosella Street.
- **R2**: 2 and 3 storey residential dwellings along the west of Rosella Street.
- **R3**: Residential dwellings part of the same development.
- **A1**: Bunker Park on the northwest boundary of the project site.

4 NOISE MONITORING SURVEY

Based on the acoustic report by Renzo Tonin Associated (*ref: Proposed Subdivision Concept at Humphries Road Bonnyrigg dated 6th November 2020*), the unattended noise monitoring was conducted which have established the rating background noise levels as well as traffic noise levels affecting the whole project development. An excerpt from the referenced document is shown in Figure 2 below.

Table 2: Long-term noise monitoring results

Monitoring location	L_{A90} background noise levels			L_{Aeq} traffic noise levels[3]	
	Day[1]	Evening[1]	Night[1]	Day[2]	Night[2]
L1 - 4 Laycock Place, Bonnyrigg	49	47	37	65	60
L2 - 16 Sandilands Road, Bonnyrigg	45	44	36	66	60

Notes:
1. Day: 07:00-18:00, Evening: 18:00-22:00, Night: 22:00-07:00
2. Day: 07:00-22:00; Night: 10:00-07:00
3. At-facade noise levels presented

Figure 2: Measured results from the unattended noise monitoring from previous acoustic report.

The current project site is located within a larger residential development and is approximately 250m from any SEPP roads. The associated road Newleaf Parade does not carry more than 40,000 vehicles annually which is not considered a SEPP road. Therefore, for the following assessment we will be referencing the NSW NPfI 2017 to establish external noise emission criteria and AS2107:2016 to establish internal noise level criteria from traffic noise intrusion.

Notwithstanding, for our assessment we will be utilising background noise levels obtained in L1 highlighted above, to establish the noise criteria.

5 NOISE INTRUSION ASSESSMENT

5.1 PROJECT CRITERIA

5.1.1 Fairfield City Development Control Plan 2013 – Amendment 4

Acoustic and Vibration Amenity

(f) Provide a noise impact assessment with each Development Application submission.

(g) Design the internal layouts of apartments and the location of courtyards, terraces / balconies, and openings to minimise noise transmission.

(h) The development must comply with the requirements of the Building Code of Australia 2004 in relation to noise transmission issues.

(i) Incorporate noise attenuation measures in all new development along major roads, The Horsley Drive, Railway Street, Lawson Road and properties in proximity to the Railway line. The RMS requires developments located within 100m of a major arterial road or transit way provide a noise and vibration assessment. This is to provide an assessment of the existing and expected future noise and vibration levels together with a mitigation strategy.

(j) Development within 60m of a railway line will be required to submit a noise and vibration assessment in accordance with RailCorp's Interim Guidelines for Councils – consideration of rail noise and vibration in the planning process. This is to ensure that the resulting development will not be adversely affected by noise and vibration impacts stemming from developing sites in close proximity to the rail way line (Note: More information can be attained from the Interim Guidelines for Applicants – consideration of rail noise and vibration which can be downloaded from RailCorp's website, www.railcorp.info).

The DCP mentions that only SEPP assessment is required when the project site is within 100m from major roads. Thus, the current project site does not fall into this category.

5.1.2 Australian Standard AS/NZS 3671:1989

Australian Standard AS/NZS 3671:1989 *'Acoustics—Road traffic noise intrusion—Building siting and construction'* notes the following in relation to traffic noise:

- Internal noise levels should be determined in accordance with AS/NZS 2107:2016 'Acoustics – Recommended design sound levels and reverberation times for building interiors'.
- A suitable descriptor should be adopted relevant to the use of the development. As AS2107:2016 adopts the L_{eq} descriptor, Acoustic Logic shall also use this descriptor.
- AS3671 does not specifically recommend a time interval. On this basis, Acoustic Logic have adopted the interval used by the EPA Road Noise Policy for main/arterial roads, that being:
    - Day – 7am to 10pm (15 hour); and
    - Night – 10pm to 7am (9 hour).
- Acoustic Logic have applied the daytime interval to the living/dining areas and the night time interval to the bedrooms of residential spaces.

Internal noise levels have been selected in accordance with AS 2107:2016, as presented in the below section.

5.1.3 Australian Standard AS/NZS 2107:2016

The Australian Standard AS/NZS 2107:2016 provides a recommendation of design sound levels and reverberation times for various types of building. For this development, it would be classified as residential building in suburban areas or near minor roads. The recommended design sound levels for this development adopts the upper limit of the recommended design levels which are presented in the Table below.

Table 1 – AS/NZS 2107:2016 Recommended Design Sound Levels

Type of occupancy / activity	Design Sound Level ($L_{Aeq,t}$) range
Common Areas	50
Living Areas	40
Sleeping Areas (night-time)	35

5.1.4 Summarised Internal Noise Criteria

The following maximum internal noise criteria is summarised below.

Table 2 – Summarised Maximum Internal Noise Criteria

Space /Activity Type	Maximum Internal Noise Criteria
Sleeping Areas	35 dB(A)$L_{eq(9hour)}$
Living Areas	40 dB(A)$L_{eq(15hour)}$
Common Areas	50dB(A)L_{eq}

6 COMPLYING CONSTRUCTIONS

Internal noise levels will primarily be a result of noise transfer through windows, doors, and roof, as these are expected to be relatively light building elements which offer less resistance to the transmission of sound.

Calculations were performed taking into account the orientation of windows, barrier effects (where applicable), the total area of glazing, façade transmission loss and the likely room sound absorption characteristics. In this way, the likely internal noise level can be predicted.

6.1.1 Glazed Windows and Doors

The following constructions are required to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-Lon type acoustic seals. (**Mohair Seals are not considered acoustic seals**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

Table 3 – Minimum Glazing Constructions

Location	Level	Space	Minimum Complying Glazing Construction	Acoustic Seals
Lot 80 Bonnyrigg Greens	All Levels	Bedroom	6mm	**Yes**
		Living/Common Areas	4mm	**Yes**

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 4 for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 4 - Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
4mm	27
6mm	29

6.1.2 External Wall Construction

Any external walls constructed from masonry systems will not require further acoustic upgrading. In the event any penetrations are required through the external lining of any of the system for other building services, gaps should be filled with acoustic sealant (Selley's Pro Series Fire Block or CSR FireSeal) to ensure compliance with acoustic criteria stipulated within this report.

For external wall constructions which are constructed from lightweight materials the following construction is recommended.

Table 5 – External Light Weight Wall Construction

Site	Space	Internal Lining	Studwork System	External Lining
Lot 80 Bonnyrigg Greens	All External Walls	1 x 13mm Plasterboard	Minimum 64mm thick stud cavity with 50mm thick 14kg/m^3 glasswool insulation	1x 6mm fibre cement sheet (equivalent to James Hardie 18mm thick FC Scyon Linea weatherboard)

6.1.3 External Roof/Ceiling Construction

Based on the architectural plans referenced, the roof construction is to be of masonry systems, therefore it will not require further acoustic upgrading.

In the event that the proposed roof is to be constructed from lightweight elements, further acoustic upgrading will be required. A complying roof construction for lightweight roof/ceiling constructions is detailed below in the figure below. The following roof construction is recommended:

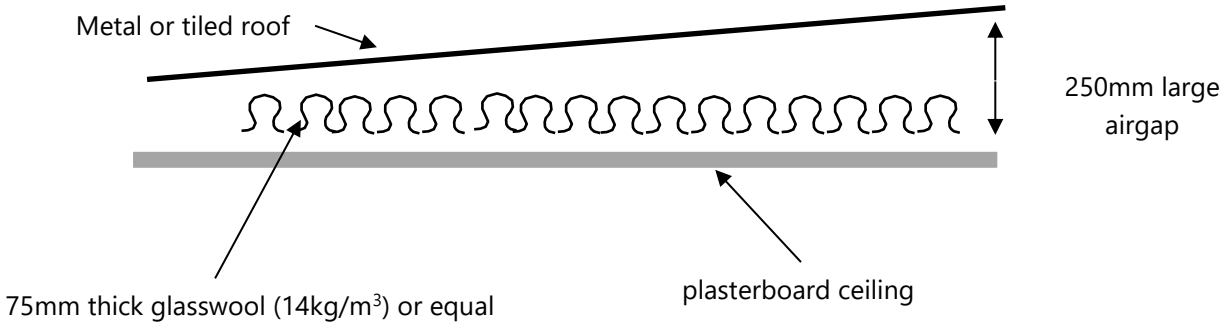

Figure 3 – Roof/ Ceiling Construction

Table 6 – Recommended Light Weight Roof Construction

Site	Space	Internal Lining	Truss System	External Lining
Lot 80 Bonnyrigg Greens	Level 4	1 x 13mm Plasterboard	Minimum 250mm Truss with 75mm thick 14kg/m^3 glasswool insulation in truss cavity	Concrete tile roof **or** 0.5mm Steel Sheet

In the event that any penetrations are required through the external skin, an acoustic sealant should be used to minimise all gaps.

7 NOISE EMISSION ASSESSMENT

7.1 NOISE EMISSION CRITERIA

7.1.1 Fairfield City Development Control Plan - Amendment 4

Acoustic and Vibration Amenity

(k) Air conditioning units are to be approved and installed in accordance with the requirements of Council.
(l) In mixed-use developments the design should seek to minimise the transfer of noise between business/commercial/City centre activities and residential development by maximising the distance between conflicting uses or via noise mitigation measures. Land uses/activities that can result in nuisance conflicts include:-

i. *Noise associated with goods and service deliveries as well as waste and garbage collections, particularly if this is occurring early in the morning;*
ii. *Noise associated with restaurants and cafes particularly those operating at night or those with outdoor seating; and*
iii. *Noise associated with extraction fans and air conditioning units.*

7.1.2 NSW EPA Noise Policy for Industry (NPfI) 2017

The NSW EPA Noise Policy for Industry (NPfI) 2017, has two criteria which need to be satisfied; namely the Intrusiveness noise level criteria and the project amenity noise level criteria. The project noise trigger level is then established based on the lower of the intrusiveness and project amenity levels.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

7.1.2.1 Intrusiveness Noise Level Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 4. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 7 – Intrusiveness Noise Level Criteria

Location	Period/Time	Rating Background Noise Level dB(A)$L_{90(Period)}$	Intrusiveness Noise Level Criteria dB(A)$L_{Aeq(15min)}$
Residential Receivers R1, R2 and R3	Day (7am-6pm)	49	54
	Evening (6pm-10pm)	47	52
	Night (10pm-7am)	37	42

7.1.2.2 Project Amenity Noise Level Criteria

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The NSW EPA Noise Policy for Industry sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 3 categories to distinguish different residential areas. They are rural, suburban, urban. This site is categorised as suburban receivers.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

The project amenity noise level is calculated by taking the recommended amenity noise level (as presented in table 2.2 of the policy), subtracting 5dB(A) and then adding 3dB(A) to convert from $L_{Aeq,\ period}$ to a $L_{Aeq,\ 15\text{-}minute}$ descriptor. The project aenity noise level criteria are presented in the table below.

Table 8 – Project Amenity Noise Level Criteria

Location	Period/Time	Project Amenity Noise Level Criteria dB(A)$L_{Aeq(15min)}$
Nearby residences – suburban receivers	Day (7am-6pm)	53
	Evening (6pm-10pm)	43
	Night (10pm-7am)	38
Active Recreation Receivers	When in Use	55

7.1.2.3 Project Noise Trigger Level

The project noise trigger level (as outlined in section 2.1 of the policy) is the lower of the intrusiveness and project amenity noise levels. The project noise trigger levels are presented in the table below.

Table 9 – Project Noise Trigger Level Criteria

Location	Period/Time	Rating Background Noise Level dB(A)$L_{90(Period)}$	Intrusiveness Noise Level Criteria dB(A)$L_{Aeq(15min)}$	Project Amenity Noise Level Criteria dB(A)$L_{Aeq(15min)}$	Project Noise Trigger Level Criteria dB(A)$L_{Aeq(15min)}$
Residential Receivers- R1, R2 and R3	Day (7am-6pm)	49	54	53	**53**
	Evening (6pm-10pm)	47	52	43	**43**
	Night (10pm-7am)	37	42	38	**38**
Active Recreation Receivers	When in Use	N/A	N/A	55	**55**

7.2 MECHANICAL PLANT NOISE

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers, and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of Section7.1.

8 BCA /NCC ACOUSTIC REQUIREMENTS

The following acoustic isolation is required by the current NCC Building Code of Australia 2022:

8.1 SOUND TRANSMISSION THROUGH FLOORS

BCA Clause F7P1

A floor separating sole-occupancy units or a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification, must minimise the transmission of airborne and impact generated sound such that the separating floor, including the effect of services and their penetrations, has—

(a) a weighted standardised level difference with spectrum adaptation term ($D_{nTw + Ctr}$) not less than 45 for airborne sound; and

(b) a weighted standardised impact sound pressure level ($L_{nT,w}$) not more than 62 for impact generated sound.

8.2 SOUND TRANSMISSION THROUGH WALLS

BCA Clause F7 P2

A wall, including services and their penetrations, must minimise the transmission of sound such that—

(a) for airborne sound—

(i) a wall separating sole-occupancy units has a weighted standardised level difference with spectrum adaptation term ($D_{nT,w + Ctr}$) not less than 45; and a wall separating a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby,

(ii)or the like, or parts of a different classification, has a weighted standardised level difference ($D_{nT,w}$) not less than 45; and

(iii) any door assembly located in a wall that separates a sole-occupancy unit from a stairway, public corridor, public lobby, or the like, has a weighted standardised level difference ($D_{nT,w}$) not less than 25; and

(b) for impact generated sound, a wall must have sufficient sound insulation to prevent illness or loss of amenity to the occupants if the wall separates—

(i)a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining sole-occupancy unit; or

(ii) a sole-occupancy unit from a plant room or lift shaft.

8.3 HEALTH AND AMENITY – SOUND INSULATION

(1) Walls separating dwellings must, to provide insulation against the transmission of airborne sound, have a weighted standardised level difference with spectrum adaptation term ($D_{nT,w+Ctr}$) not less than 45.

(2) Walls separating a bathroom, sanitary compartment, laundry or kitchen in a dwelling from a habitable room (other than a kitchen) in an adjoining dwelling, must provide insulation against impact generated sound sufficient to prevent illness or loss of amenity to the occupants.

(3) The required sound insulation of walls must not be compromised by the incorporation or penetration of a pipe or other service element.

8.4 UNDUE NOISE

A plumbing and drainage system must not create undue noise.

8.5 EXCESSIVE NOISE

(1) A plumbing and drainage system must reduce the transmission of airborne and/or impact generated sound which may cause illness or loss of amenity to occupants.
(2) The required sound insulation of a floor or wall must not be compromised by the incorporation or penetration of a plumbing or drainage system.

Table 10 – Minimum Acoustic Requirements - Walls

Wall Type	NCC Requirement
SOU Wet Areas (and Kitchen) to SOU Habitable areas	R_w+C_{tr} ≥50 / D_{nTw} + C_{tr} ≥45 *Discontinuous Construction (slab to slab)*
SOU Habitable areas to SOU Habitable areas	R_w+C_{tr} 50 / D_{nTw} + C_{tr} ≥ 45
SOU Wet (and Kitchen) areas to SOU Wet (and Kitchen) areas	R_w+C_{tr} ≥50 / D_{nTw} + C_{tr} ≥ 45
SOU to Common Corridors	R_w ≥ 50 / D_{nTw} ≥ 45
SOU to Public Stairwells, etc.	R_w ≥ 50 / D_{nTw} ≥ 45
SOU to Plant Areas/Lift Shaft	R_w ≥ 50 / D_{nTw} ≥ 45, *Discontinuous Construction*
Services Ducts/Risers within Bathrooms and Laundries (Wet Areas)	R_w+C_{tr} ≥ 25 (slab to slab) *
Services Ducts/Risers adjoining Bedrooms and Living Areas (Habitable Areas)	R_w+C_{tr} ≥ 40 (slab to slab) *

Note: *or equivalent performance-based solution.

Table 11 – Minimum Acoustic Requirements - Floor/Ceilings

Floor Type	NCC Required Rating
SOU Habitable areas to SOU Habitable areas	R_w+C_{tr} 50 / $D_{nTw}+C_{tr}$ ≥45
SOU Wet (and Kitchen) areas to SOU Habitable areas	R_w+C_{tr} 50 / $D_{nTw}+C_{tr}$ ≥45
SOU Wet (and Kitchen) areas to SOU Wet (and Kitchen) Areas	R_w+C_{tr} 50 / $D_{nTw}+C_{tr}$ ≥45
Habitable room below: Habitable room, bathroom, toilet, laundry, kitchen	L_{nTw} ≤ 62
Wet area below wet area	L_{nTw} ≤ 62
Balconies/Terraces over a habitable room of another unit	L_{nTw} ≤ 62

9 CONCLUSION

Acoustic Logic (AL) has conducted an acoustic assessment for the subdivision development applicated for the project locate at Lot 80 Bonnyrigg Greens. In this document, the following have been discussed and established:

- Identifying the nearest sensitive receivers.
- Internal noise goals have been established in Section 5.1.4 and complying construction has been recommended in Section 6.
- Noise emitting from the development to nearby sensitive receivers have been shown in Section 7.1.2.3.
- A brief outline of BCA/NCC 2022 acoustic requirements have been listed in Section 8.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Samantha Wong

APPENDIX 1: NOISE DESCRIPTORS

Environmental noise constantly varies in level from moment to moment, so it is not possible to accurately determine prevailing noise conditions by measuring a single, instantaneous noise level.

To quantify environmental noise, a 15-minute measurement interval is typically utilised. Noise levels are monitored continuously during this period, and then statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters obtained from the data are:

L_{eq} - represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of noise impact as it closely corresponds with how humans perceive the loudness of time-varying noise sources (such as traffic noise).

L_{90} – This is commonly used as a measure of the background noise level as it represents the noise level heard in the typical, quiet periods during the measurement interval. The L_{90} parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

L_{10} is used in some guidelines to measure noise produced by an intrusive noise source since it represents the average of the loudest noise levels produced at the source. Typically, this is used to assess noise from licenced venues.

L_{max} is the highest noise level produced during a noise event, and is typically used to assess sleep arousal impacts from short term noise events during the night. It is also used to assess internal noise levels resulting from aircraft and railway ground vibration induced noise.

L_1 is sometimes used in place of L_{max} to represent a typical noise level from a number of high level, short term noise events.