Tony Owen Partners

24 Coronation Road, Congarinni North

Acoustic DA Assessment

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1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of Tony Owen Partners to undertake a noise impact assessment for the proposed seniors living and aged care development located at 24 Coronation Road, Congarinni North. The development will include:

- Residential dwellings.
- Aged care centre with lounge, dining, salon and library.
- Sports centre with café, aerobics, gym, indoor pool and outdoor bowls.

The proposed development is located on a rural property to the west of Macksville. The site location is shown in Figure 1.

Figure 1 – Site Location, Nearest Residents and Noise Logger Position

2 Noise Criteria

The following standards and guidelines are applicable to this project:

- Numbucca Valley Council Development Control Plan (DCP) 2010 Part H.
- NCC/BCA Part F5.
- NSW EPA 'Noise Guide for Local Government' (NGLG).
- NSW EPA "Noise Policy for Industry" (NPfI).
- NSW EPA 'Road Noise Policy' (RNP).
- Australian standard AS/NZS 2107-2016: Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian Standard AS 3671-1989 'Acoustics - Road traffic noise intrusion -building siting and construction'.
- Australian standard AS 1055.1-1997: Acoustics – Description and measurement of environmental noise - General procedures.

2.1 Internal Noise Levels

Part H of the Numbucca Valley Council DCP does not specify an object noise criteria for residential developments. For the residential development, the AS/NZS 2107–2016 outlines the acceptable internal noise levels such that a satisfactory acoustic environment within residential and non-residential spaces in new and existing buildings.

Table 1 presents the recommended internal design noise levels in accordance with AS 2107 – 2016.

Table 1— Recommended Internal Design Noise Levels (AS/NZS 2107)

Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range
Houses and apartments in suburban areas or near minor roads—	
Living areas	30 to 40
Sleeping areas (night time)	30 to 35
Work areas	35 to 40
Common rooms	40 to 45
Kitchens and service areas	45 to 55
General office	40 to 45
Reception areas	40 to 45

2.2 Sound Insulation Requirement (Part F5 NCC/BCA)

For sound transmission and insulation between sole occupancy units (SOU) within the same development, walls and floors to be constructed in accordance with requirements of Part F5 of the Building Code of Australia (BCA). Sound insulation requirements are summarised in Table 2.

Table 2 - NCC Part F5 Requirements (Class 2, 3 and 9c)

Building Element	Minimum NCC Part F5 Requirements
Sound Insulation Rating of Walls (Class 2 or 3)	
Walls between separate sole occupancy units.	Rw + Ctr 50 (airborne)
Walls between wet areas (bathrooms, sanitary compartment, laundry or kitchen) and a habitable room (other than kitchen) in adjoining apartments.	Rw + Ctr 50 (airborne) & of discontinuous construction
Walls between sole occupancy unit and stairway, public corridors, public lobby or the like or parts of a different classification.	Rw 50 (airborne)
Walls between a plant room or lift shaft and a sole occupancy unit.	Rw 50 (airborne) & of discontinuous construction
Sound Insulation Rating of Walls (Class 9c)	
Walls between separate sole occupancy units or a sole-occupancy unit from a kitchen, bathroom, sanitary compartment (not being an associated ensuite), laundry, plant room or utilities room. A wall in a building required to have an impact sound insulation rating must—for other than masonry, be two or more separate leaves without rigid mechanical connection except at the periphery;	Rw 45 (airborne)
Sound Insulation Rating of Floors (Class 2 or 3)	
Floors between sole occupancy units or between a sole occupancy unit and plant room, lift shaft, stairway, public corridor, public lobby or the like.	Rw + Ctr 50 (airborne) & Ln,w + Cl < 62 (impact)
Apartment Entry Doors (Class 2 or 3)	
A door incorporated in a wall that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like.	Rw 30 (airborne)

Building Element	Minimum NCC Part F5 Requirements
Sound Insulation Rating of Floors (Class 9c)	
Floors between sole occupancy units.	Rw 45
Services (Class 2, 3 or 9c)	
If a storm water pipe, a duct, soil, waste or water supply pipe including a duct or pipe that is located in a wall or floor cavity serves or passes through more than one sole occupancy unit must be separated:	
if the adjacent room is a habitable room (other than a kitchen); or	Rw + Ctr 40
if the room is a kitchen or non-habitable room	Rw + Ctr 25

Construction Deemed to Satisfy

The forms of construction must be installed as follows:

(a) Masonry—Units must be laid with all joints filled solid, including those between the masonry and any adjoining construction.

(b) Concrete slabs—Joints between concrete slabs or panels and any adjoining construction must be filled solid.

(c) Sheeting materials—

(i) if one layer is required on both sides of a wall, it must be fastened to the studs with joints staggered on opposite sides; and

(ii) if two layers are required, the second layer must be fastened over the first layer so that the joints do not coincide with those of the first layer; and

(iii) joints between sheets or between sheets and any adjoining construction must be taped and filled solid.

(d) Timber or steel-framed construction—perimeter framing members must be securely fixed to the adjoining structure and—

(i) bedded in resilient compound; or

(ii) the joints must be caulked so that there are no voids between the framing members and the adjoining structure.

(e) Services—

(i) Services must not be chased into concrete or masonry elements.

(ii) A door or panel required to have a certain Rw + Ctr that provides access to a duct, pipe or other service must—

(A) not open into any habitable room (other than a kitchen); and

(B) be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, be fitted with a sealing gasket along all edges and be constructed of—

(aa) wood, particleboard or blockboard not less than 33 mm thick; or

(bb) compressed fibre reinforced cement sheeting not less than 9Â mm thick; or

(cc) other suitable material with a mass per unit area not less than 24.4 kg/m^2

(iii) A water supply pipe must—

(A) only be installed in the cavity of discontinuous construction; and

(B) in the case of a pipe that serves only one sole-occupancy unit, not be fixed to the wall leaf on the side adjoining any other sole-occupancy unit and have a clearance not less than 10 mm to the other wall leaf.

(iv) Electrical outlets must be offset from each other—

(A) in masonry walling, not less than 100 mm; and

(B) in timber or steel framed walling, not less than 300 mm.

2.3 Noise Survey and Project Specific Limits

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Noise monitoring was conducted between Wednesday 11th to Wednesday 18th November 2020. The monitor was positioned as shown in Figure 1.

Measurements were conducted using the following equipment:

- SVAN 958A Type 1 Real time Analyser/Noise Logger. Serial No. 36624.
- SVAN SV30A Type 1 Sound Level Calibrator. Serial No. 31830.

Noise monitoring was conducted in general accordance with Australian standard AS 1055.1-1997: Acoustics-Description and measurement of environmental noise-General procedures.

The noise analyser was calibrated immediately before and after measurements were taken with no discernible differences between these two recorded levels. The sound analyser is Type 1 and complies with Australian standard AS1259.2: 1990.

During the monitoring period any adverse weather condition have been excluded. The noise logger results are presented in Appendix C.

2.3.1 Residential Project Noise Limits

Part H of the Numbucca Valley Council DCP does not specify a noise limits for new residential developments. Table 3 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project in accordance with the EPA NGLG

Table 3—Noise Survey Summary and Project Limits, dBA

Time Period	Existing Noise Levels		EPA Noise Limits, L_{eq}
	$L_{eq\ (period)}$	RBL	
Day	48	35	40
Evening	46	36	41
Night	42	33	38

During detailed design stage, the design and selection of the mechanical equipment required to service the proposed development will be required to achieve the EPA noise limits as presented in the table above.

2.3.2 EPA Noise Policy for Industry

Table 4 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project based on the requirements of the EPA's policy. The amenity criteria are based on a rural receiver.

Table 4 — EPA NPfI Noise Limits, dBA

Time Period	Existing Noise Levels		NSW EPA NPfI			Project Noise Trigger Level $L_{eq(15min)}$
	L_{eq} (period)	RBL	Recommended ANL	Project ANL[1] $L_{eq(15min)}$	Intrusiveness Criteria, $L_{eq(15min)}$	
Day	48	35	50	48	40	**40**
Evening	46	36	45	43	41	**41**
Night	42	33	40	38	38	**38**

During detailed design stage, the design and selection of the mechanical equipment required to service the proposed development will be required to achieve the EPA noise limits as presented in the table above.

2.4 Traffic Noise Generation

The development of the childcare centre has the potential to generate increased traffic noise along Beattie Street will be assessed in accordance with the NSW EPA Road Noise Policy (RNP). Table 5 sets out the assessment criteria for residences to be applied to particular types of project, road category and land use.

Table 5— Road traffic noise assessment criteria for residential land uses

Road Category	Type of project/land use	Assessment Criteria - dBA	
		Day (7am-10pm)	Night (10pm-7am)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, (1\ hour)}$ 55 (external)	$L_{Aeq, (1\ hour)}$ 50 (external)

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

[1] 2. Project ANL is recommended ANL minus 5 dB(A) and plus 3 dB(A), to convert from a period level to a 15-minute level.

2.5 Smoke Control Systems

Guidance on noise from smoke control systems guidance is contained in Australian /New Zealand Standard AS/NZS 1668.1:1998. Clause 4.6 of AS/NZS 1668:1:1998 states the following:

> *"The noise level due to operation of smoke control systems (including smoke-spill and air pressurization fans) shall not exceed 65 dB(A) in occupied spaces or 5 dBA above the ambient noise levels to a maximum level of 80 dB(A). Noise levels in fire-isolated exits shall not exceed 80 dB(A).*
>
> *During emergency egress situations, system noise levels may interfere with command conversation, which may represent a threat to safe occupant evacuation or may contribute to occupant distress in the event of a fire. For this reason, the maximum sound pressure level generated by smoke control systems should not exceed 65dB(A) and never exceed 80dB(A) in the occupied space. On reaching the safety of a fire-isolated exit, occupants can egress with considerably less verbal direction and, as such, can safely sustain higher sound levels. To this end, the maximum sound pressure level in the fire-isolated exits should not exceed 80dB(A). The designer should select mechanical equipment that will not increase noise to above these levels. Certainly, the noise generated by the supply air fan to pressurise a stair shaft should not deter people from entering the stair shaft. Noise from smoke control systems should be designed to comply with the criteria nominated above".*

Note, based on advice for the above requirements, noise levels in fire-isolated exits shall not exceed 80 dB(A)

3 Assessment and Recommendations

3.1 Façade Glazing Requirements

Acoustic glazing for the apartments are given in Table 6 are required to reduce noise impact on the internal occupants and should result in noise levels within such units in accordance with the Australian Standard AS/NZS 2107:2016.

Table 6 – Schedule of Window and Glazing (R_w)

	Space	Glazing Thickness	Minimum R_w (Glazing+Frame)
Residential and Aged Care	Living & Bedroom	6.38mm laminated	30
Sports Centre	All	6mm monolithic	28

All other non-habitable spaces, such as bathrooms and laundries require minimum 6mm monolithic glass (Rw 28).

All Windows/doors should be well sealed (air tight) when closed with good acoustic seals around the top and bottom sliders. Mohair seals are not considered to be acoustic seals.

3.2 Building Façade Construction

To provide sufficient acoustic attention of noise, the general external construction of the proposed building would need to be constructed as detailed in Table 7.

Table 7 – External Façade Construction (R_w)

Building Element	Proposed Construction	Minimum R_w
External Wall	TBA	45
Roof and ceiling	TBA	45

3.3 Mechanical Services

At the DA stage, the design and selection of mechanical equipment has not been finalised. Following the DA approval of the proposed development, during the Construction Certification Stage a detail assessment of all mechanical plant and equipment will be conducted to ensure compliance with the EPA and DCP noise criteria. Typical acoustic measures may include the construction of acoustic barriers, enclosures, attenuators and/or acoustic louvres.

4 Conclusion

An acoustic assessment of the proposed development has been carried out in accordance with the requirements of Numbucca Valley Council DCP and Australian Standards.

An environmental noise survey of the site has been conducted and the noise limiting criteria for mechanical plant/equipment noise emission has been determined based on the EPA NGLG and NPfI. The limits are presented in Table 3 and Table 4

Construction for glazing, external walls and the roof/ceiling systems have been provided to achieve the internal noise criteria and are detailed in Section 3.1 and Section 3.2

Providing the recommendations in this report are implemented, the noise from the proposed development is predicted to comply with acoustic requirements of the Numbucca Valley Council DCP, , BCA Part F5 and Australian Standard.

Appendix A – Acoustic Terminology

Decibel, dB: A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 micro Pascals.

A-WEIGHTING: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA). The A-weighted sound level is also called the noise level.

Sound Pressure Level, L p (dB), of a sound: 20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Ambient Noise/Sound: All noise level present in a given environment, usually being a composite of sounds from many sources far and near. Traffic, HVAC, masking sound or even low-level background music can contribute to ambient level of noise or sound.

Percentile Level - L 90 , L 10 , etc: A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L 90 is the level which is exceeded for 90% of a measurement period. L 90 is commonly referred to as the "background" sound level.

Background Noise (L 90): The sum total of all unwanted residual noise generated from all direct and reflected sound sources in a space that can represent an interface to, or interfere with good listening and speech intelligibility.

Rating Background Level – RBL: Method for determining the existing background noise level which involves calculating the tenth percentile from the L A90 measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

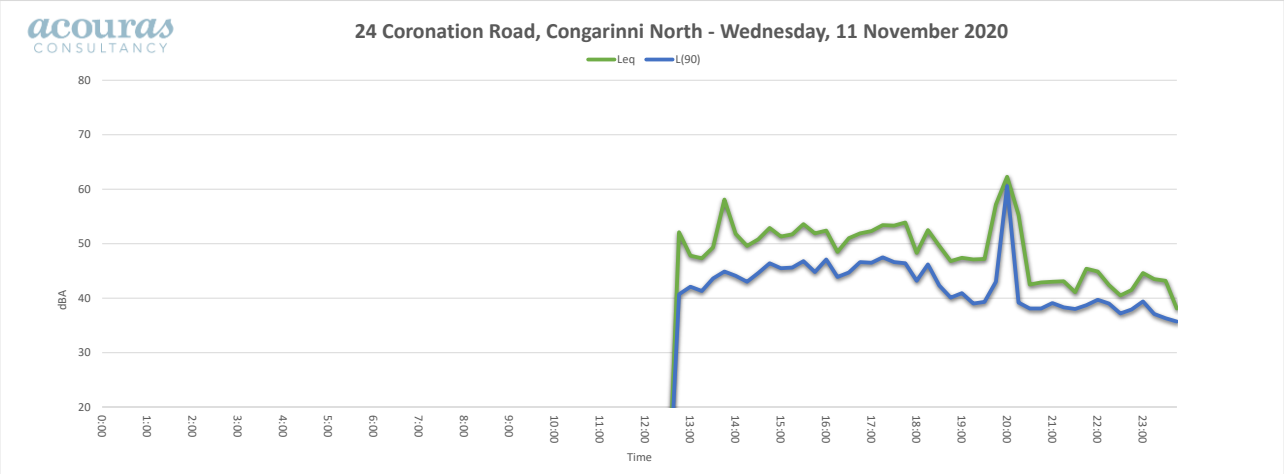
L AEQ,T : Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

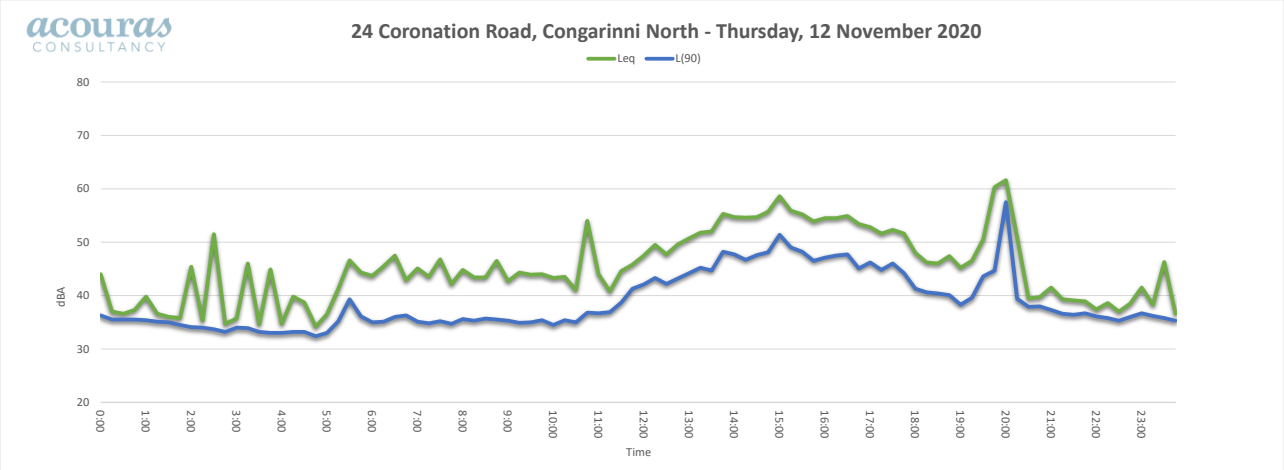
Appendix B – Architectural Drawings

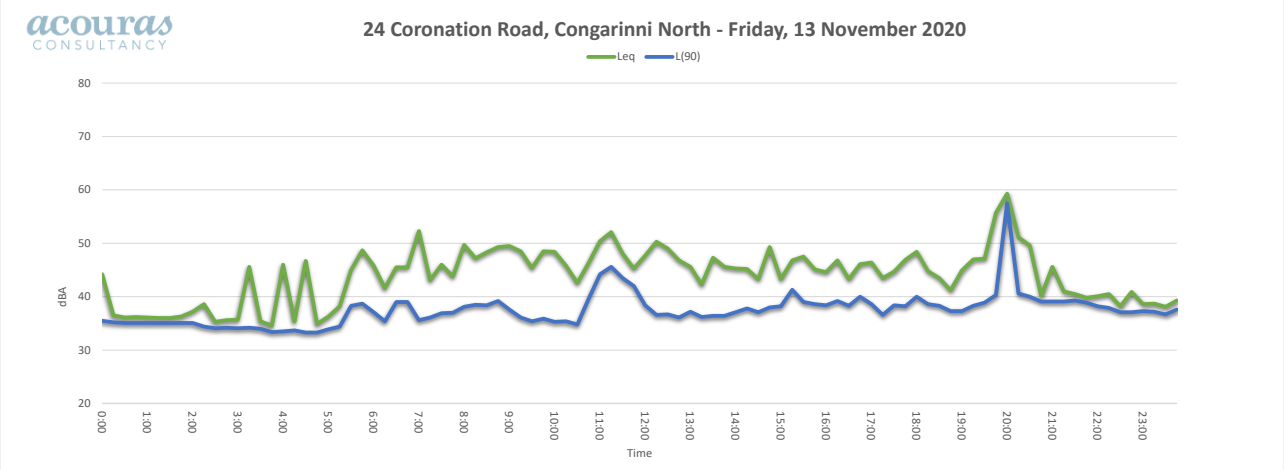
This assessment was based on the following architectural drawings provided by Tony Owen Partners.

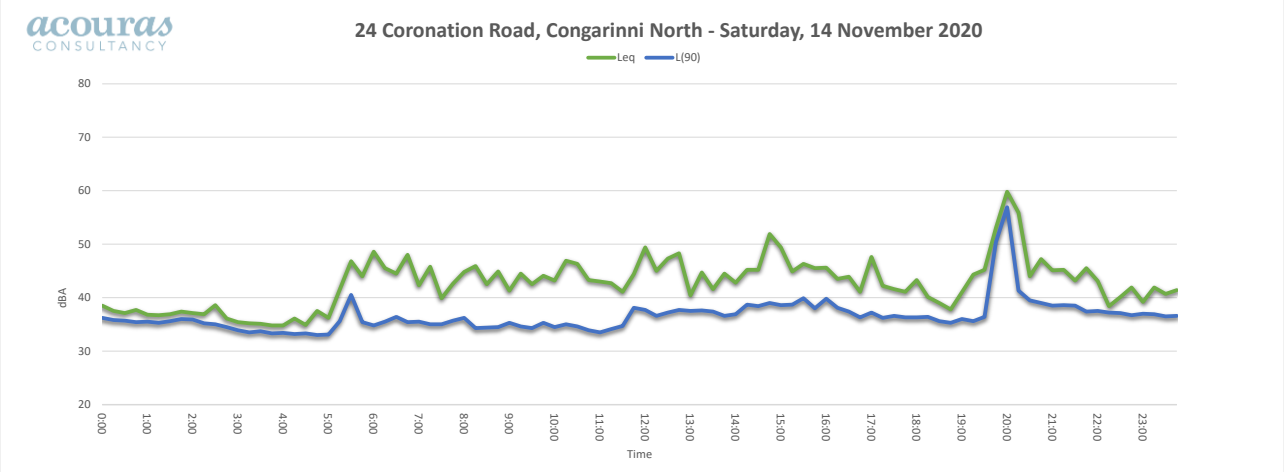
Drawing	Issue	Date	Description
A006	A	Feb 2021	Site Analysis (Marco)
A011	A	Feb 2021	Site Plan
A012	A	Feb 2021	Master Coloured
A100	A	Feb 2021	Aged Care Centre Ground Floor Plan
A101	A	Feb 2021	Aged Care Centre First Floor Plan
A102	A	Feb 2021	Aged Care Centre Roof Floor Plan
A103	A	Feb 2021	Section
A104	A	Feb 2021	Elevations
A200	A	Feb 2021	Communal Facility Ground Floor Plan
A201	A	Feb 2021	Communal Facility Roof Plan
A202	A	Feb 2021	Communal Facility Sections
A203	A	Feb 2021	Communal Facility Elevations
A300	A	Feb 2021	2 Bedroom Type 1 - Plans
A302	A	Feb 2021	2 Bedroom Type 2 - Plans
A304	A	Feb 2021	3 Bedroom - Plans

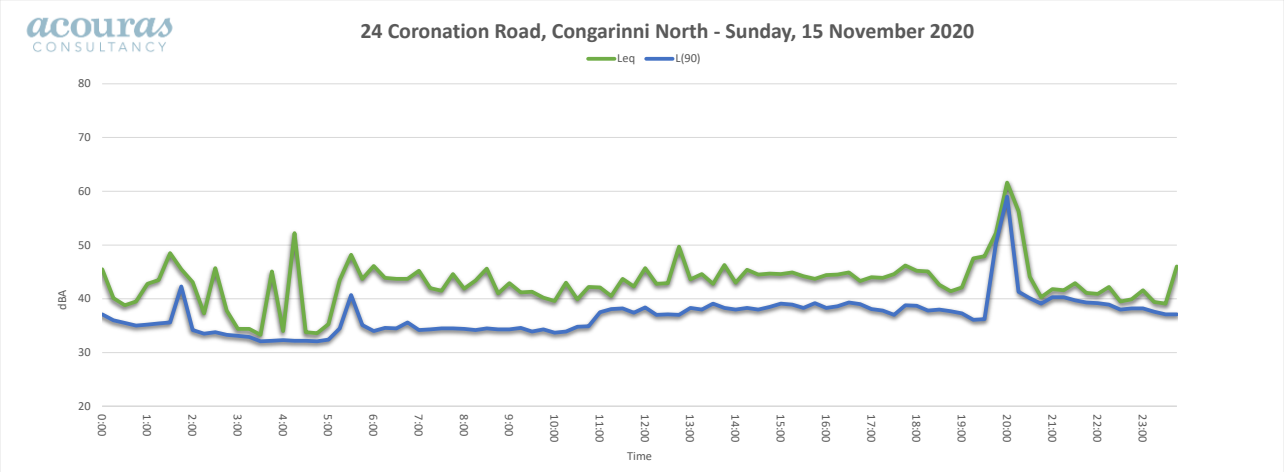
Appendix C – Noise Logger Results

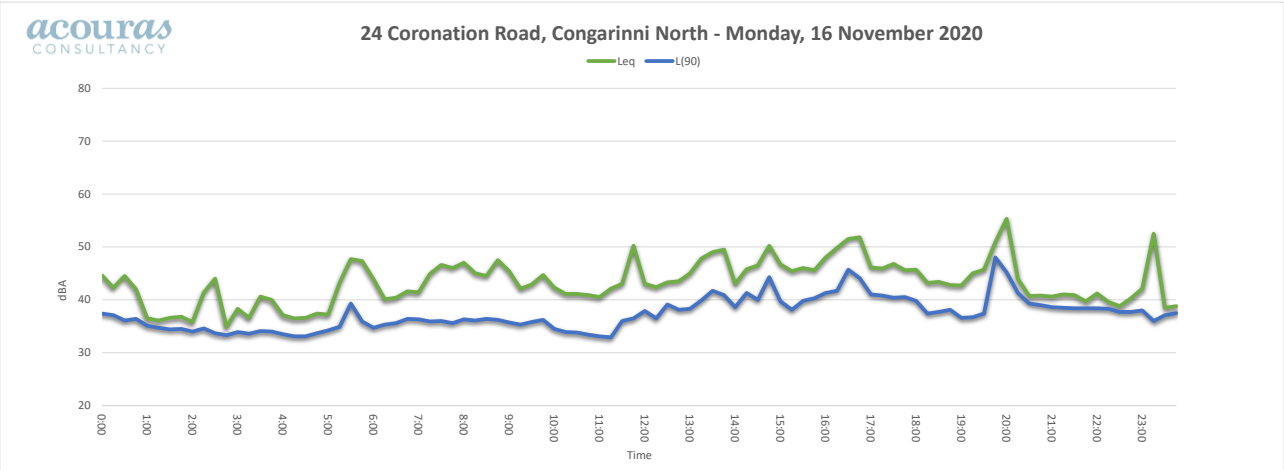


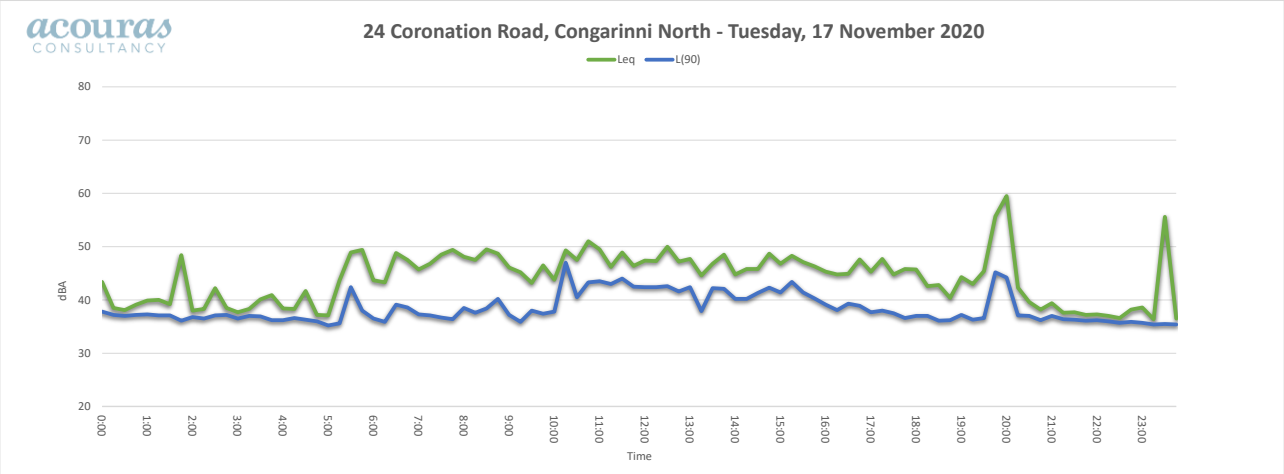


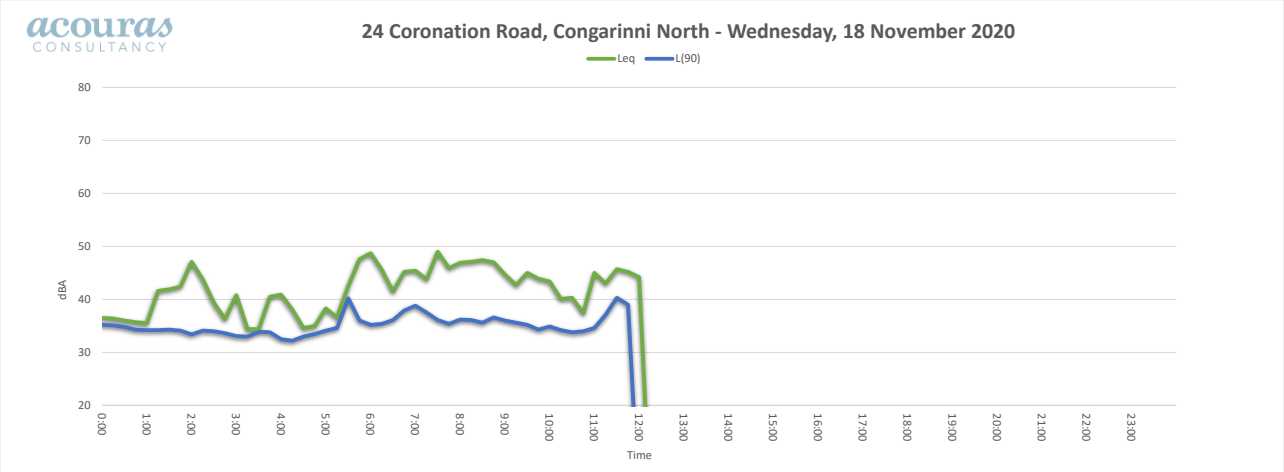



24 Coronation Road, Congarinni North - Saturday, 14 November 2020
Leq
L(90)
dBA
Time


24 Coronation Road, Congarinni North - Sunday, 15 November 2020
Leq
L(90)
dBA
Time


24 Coronation Road, Congarinni North - Monday, 16 November 2020
Leq
L(90)
dBA
Time


24 Coronation Road, Congarinni North - Tuesday, 17 November 2020
Leq
L(90)
dBA
Time


24 Coronation Road, Congarinni North - Wednesday, 18 November 2020
Leq
L(90)
dBA
Time