

AJ and Bush & Sons Pty Ltd

42-46 Parramatta Road, Homebush

## Acoustic Assessment of Planning Proposal

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## 1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of AJ and Bush & Sons Pty Ltd to assess the potential for noise impact associated with the 42-46 Parramatta Road, Homebush. The mixed use development will include:

- Basement carpark.
- Commercial space located on ground floor.
- Communal outdoor space on level 1 podium.
- Residential apartments on level 1 to level 24.

The proposed mixed-use development is located on a block bounded by Parramatta Road, Knight Street and Station Street. The currently approved development (eight storeys) is proposing to increase building height to a maximum of 80, the increased exposure of external noise onto the building façade would need to be assessed and ensure the internal noise criteria is achieved.

The site is surrounded by existing commercial and residential buildings. Traffic noise along Parramatta Road dominates the ambient noise levels. 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:

- Strathfield Council DCP 2005 and DCP 20 Parramatta Road Corridor Area.
- NSW Department of Planning “Development Near Rail Corridors and Busy Roads”.
- NCC/BCA Part F5.
- NSW EPA “Noise Guide for Local Government” (NGLG).
- Australian standard AS/NZS 2107-2015: Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian standard AS 1055.1-1997: Acoustics – Description and measurement of environmental noise - General procedures.

### 2.1 Internal Noise Levels

The Strathfield DCP refers AS/NZS 2107-2015 and AS3671-1989 when assessing development near a major road or rail. However, a more up to date and relevant requirements is to implement the Department of Planning (DoP) “Development near Rail Corridors and Busy Roads – Interim Guideline”, which requires that for a residential development, the following  $L_{Aeq}$  levels as given in Table 1 are not exceeded.

**Table 1— Development near Rail Corridors and Busy Roads – Interim Guideline**

Residential Space	Internal Noise Criteria
in any bedroom in the building	35dB(A) at any time 10pm–7am
anywhere else in the building (other than a garage, kitchen, bathroom or hallway)	40dB(A) at any time

If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

For all other spaces, the Strathfield Council DCP specifies the AS/NZS 2107-2015 which outlines the acceptable internal noise levels such that a satisfactory acoustic environment within occupied spaces in new and existing buildings can be achieved. Table 2 presents the recommended internal design noise levels.

**Table 2— Recommended Internal Design Noise Levels (AS/NZS 2107)**

Type of occupancy/activity	Design sound level, $L_{eq}$ in dB(A)
Apartment common areas	45 to 50
General Office Areas	40 to 45
Small Retail Stores (General)	< 50

## 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 3.

**Table 3 - NCC Part F5 Requirements (Class 2 or 3)**

Building Element	Minimum NCC Part F5 Requirements
<b>Sound Insulation Rating of Walls (Class 2 or 3)</b>	
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
<b>Sound Insulation Rating of Floors (Class 2 or 3)</b>	
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 + CI < 62 (impact)
<b>Apartment Entry Doors (Class 2 or 3)</b>	
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)
<b>Services (Class 2, 3 or 9c)</b>	
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  $R_w + C_{tr}$  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 9 mm thick; or
      - (cc) other suitable material with a mass per unit area not less than 24.4 kg/m<sup>2</sup>
  - (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 Environmental Noise Survey

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Background noise monitoring was conducted between Wednesday 16<sup>th</sup> to 23<sup>rd</sup> October 2013, it is unlikely the background noise level has decreased since the last survey.

Additional traffic noise survey has been conducted to between the Thursday 9<sup>th</sup> to Wednesday 16<sup>th</sup> November 2017 to determine any change in traffic noise levels from Parramatta Road and from the M4 Widening (Westconnex).

The monitor was positioned in two locations (refer to Figure 1), these were:

- Noise Logger 1 – At the southern boundary.
- Noise logger 2 – On Parramatta Road.

Measurements were conducted using the following equipment:

- SVAN 977 Type 1 Real time Analyser/Noise Logger. Serial No. 34135.
- 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 comply with Australian standard AS1259.2: 1990.

### 2.3.1 Traffic Noise

Table 4 presents a summary of the measured ambient noise level and traffic noise on the adjacent Parramatta Road impacting the development. From our visit to the site and experience from other projects within the vicinity, the dominate traffic noise source is from the adjacent Parramatta Road. At the time of the additional traffic test (November 2017), the M4 Widening, which is part of the Westconnex project had just recently opened and the traffic noise levels given in Table 4 would include any additional traffic noise from the motorway upgrade.

**Table 4 – Parramatta Road Measured Traffic Noise and Levels, dBA**

Location	Period	Average $L_{eq}$	Highest $L_{eq}$ 1hr
2	Day (07:00-22:00)	71	74
	Night (22:00-07:00)	69	71



## 2.3.2 Project Specific Limits

The DCP does not have any specific guide for controlling noise emission from the operation of mechanical equipment associated with the residential development. However, the EPA Noise Guide for Local Government (NGLG) does provides a guide into considering intrusive impact to nearby receivers from this residential development. The assessment of intrusive noise levels has been conducted in general accordance with the procedures as set out in the NSW Industrial Noise Policy, which defines intrusive noise as 5 decibels above the background noise level. For the purpose of the assessment, the background noise level has been determined using the RBL. In addition to the intrusive noise criteria, noise from this equipment must not be able to be heard in a habitable room in a neighbouring residence during the restricted hours.

For commercial and retail spaces located within the development, the NSW Industrial Noise Policy provides detailed guidance guidelines for the assessment of noise impacts from commercial operations.

Table 5 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project.

**Table 5—Noise Survey Summary and Project Limits, dBA**

Location	Time Period	Existing Noise Levels		NGLG Noise Limits, $L_{eq}$	NSW Industrial Noise Policy	
		$L_{eq}$ (period)	RBL		Amenity Criteria Recommended Noise Level (acceptable), $L_{eq}$	Project Specific Limit $L_{eq}$
1	Day	57	48	53	60	53
	Evening	56	48	53	50	46
	Night	52	42	47	45	42
2	Day	71	59	64	60	61
	Evening	70	58	63	50	60
	Night	69	51	56	45	56

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

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



## 2.3.3 Railway Noise

For this proposed development, the NSW Department of Planning “Development Near Rail Corridors and Busy Roads-Interim Guideline” provides the appropriate procedure and screening method in determining the likelihood of noise from rail corridors. For railway noise, the DOP guideline outlines in Section 3.5.1 (Figure 3.1) the assessment zone for a noise affected building is to be within 60m of the nearest rail corridor. The subject site is located more than 80m from the nearest rail corridor and therefore an assessment of railway noise is not required.

However, noise measurements taken from another development close to the railway line (western/inner west lines) is summarised in Table 6 below. The measurements were taken at 80m from the nearest rail line with direct line of sight. The noise measurements have been used to confirm the glazing requirements for the upper levels of the development.

**Table 6 – Railway Vehicle Noise Levels, dBA**

Period	Average	Highest
Day (07:00-22:00)	L <sub>eq</sub> (15hr) 62	L <sub>eq</sub> 1hr 63
Night (22:00-07:00)	L <sub>eq</sub> (9hr) 55	L <sub>eq</sub> 1hr 58

### 3 Assessment and Recommendations

#### 3.1 Façade Glazing Requirements

Acoustic glazing for the apartments are given in Table 7 is required to reduce traffic noise impact on the internal occupants and should result in noise levels within such units in accordance with the Department of Planning Noise Guidelines and AS/NZS 2107:2015. Calculations are based on carpeted living and bedroom areas.

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.

**Table 7 – Schedule of Window and Glazing (R<sub>w</sub>)**

Level	Façade	Space	Glazing Thickness	Minimum R <sub>w</sub> (Glazing+Frame)	Alternate Ventilation <sup>1</sup>
G	-	Meeting Rooms	6.38mm laminated	30	N/A
	-	Private Office	6.38mm laminated	30	N/A
1 to 24	North	Living & Bedroom	12.5mm lam (Viridian Acoustic)	40	Y
	East	Living & Bedroom	10.38mm laminated	32	N
	West & South	Living & Bedroom	6.38mm laminated	30	Y

<sup>1</sup> In accordance with Building Code of Australia ventilation requirements.

### 3.2 Building Façade Construction

To provide sufficient acoustic attention of aircraft noise, the general external construction of the proposed building would need to be constructed as detailed in Table 8.

**Table 8 – External Façade Construction ( $R_w$ )**

Building Element	Proposed Construction	Minimum $R_w$
External Wall	Precast concrete panels with internal plasterboard cavity lining. Insulation as per thermal requirements	50
Roof and ceiling	Concrete slab with plasterboard cavity ceiling. Insulation as per thermal requirements	45

### 3.3 Apartment Ventilation

For apartments that are exposed to high noise levels and if internal noise levels with windows or doors open exceed the criteria by more than 10dBA, alternate ventilation systems maybe be required to meet the BCA requirements as indicated in Table 7. Recommendations on appropriate systems are to be implemented during the Construction Certificate and detailed design phase of the project.

All occupants have the option of having the window to be open for natural cross ventilation, or to close the window and achieve a quieter internal environment. In this situation where the windows adjacent to external noise sources are closed Cross ventilation to the unit can still be achieved through openings in another room as shown in the detailed in the ventilation diagrams (DA9500-9509).

### 3.4 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 Strathfield Council DCP.

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 INP. The limits are presented in Table 5.

Based on the site visit, the site ambient noise levels is dominated by traffic noise from Parramatta Road. Traffic noise from the M4 motorway and the railway line to the south have also been considered for the upper levels. 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 0.

Providing the recommendations in this report are implemented, the noise from the proposed development is predicted to comply with acoustic requirements of the Strathfield Council DCP, EPA noise limits, BCA Part F5 and relevant Australian standards.

## 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.

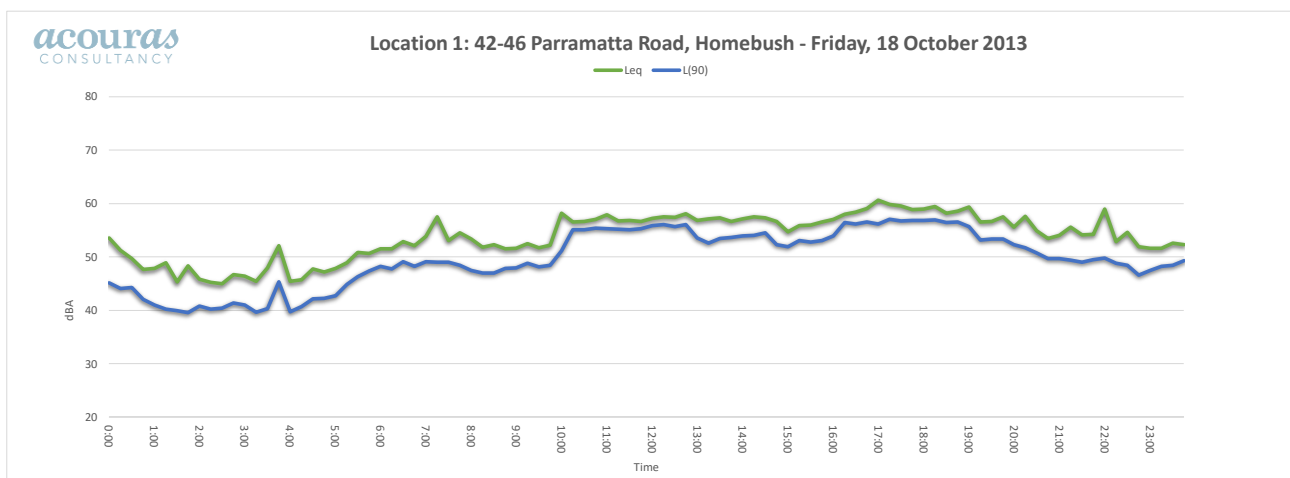
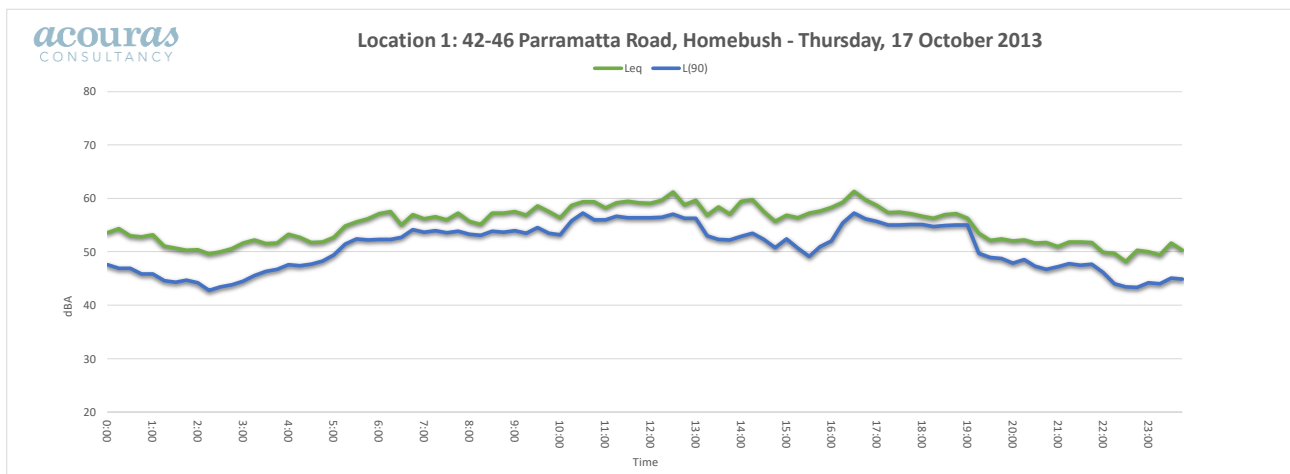
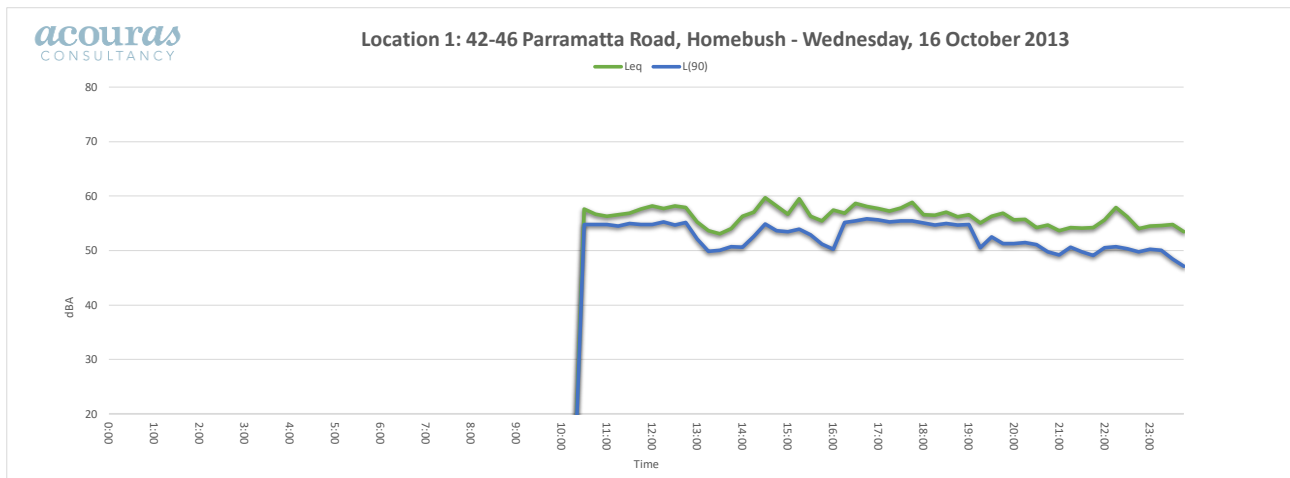
**$L_{AEQ,T}$ :** Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

## Appendix B – Architectural Drawings

This assessment was based on the following architectural drawings provided by Integrated Design Group.

Drawing	Issue	Date	Description
SK	A	3/11/17	Cover Page
SK0100	A	3/11/17	Site Analysis/Location Plan
SK0101	A	3/11/17	Site Plan
SK0102	A	3/11/17	Typical Floor Plates
SK2000	A	3/11/17	North Elevation
SK2001	A	3/11/17	South Elevation
SK2002	A	3/11/17	East Elevation

## Appendix C – Noise Logger Results



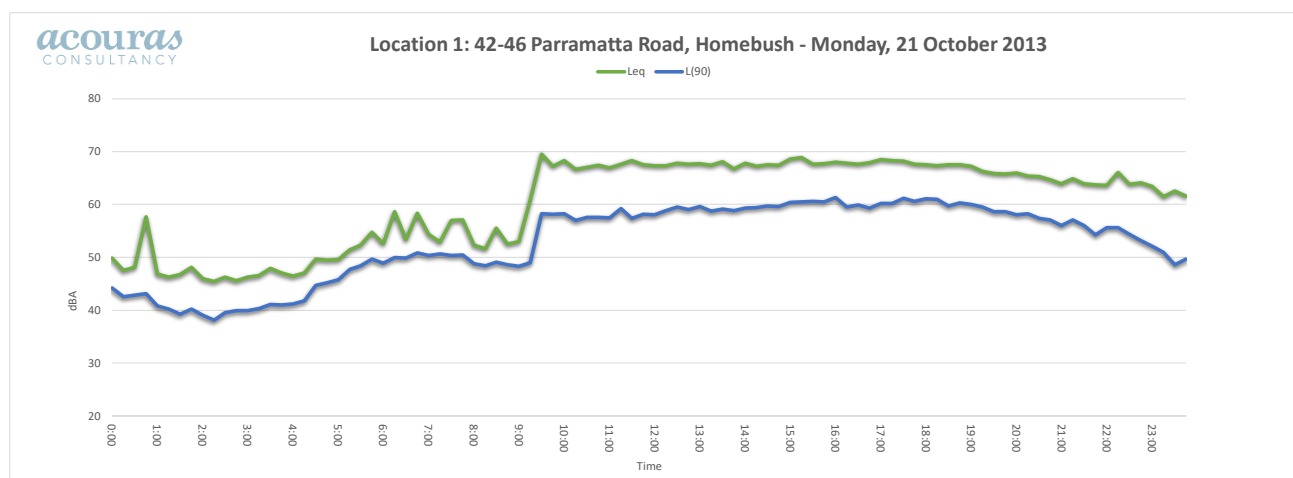
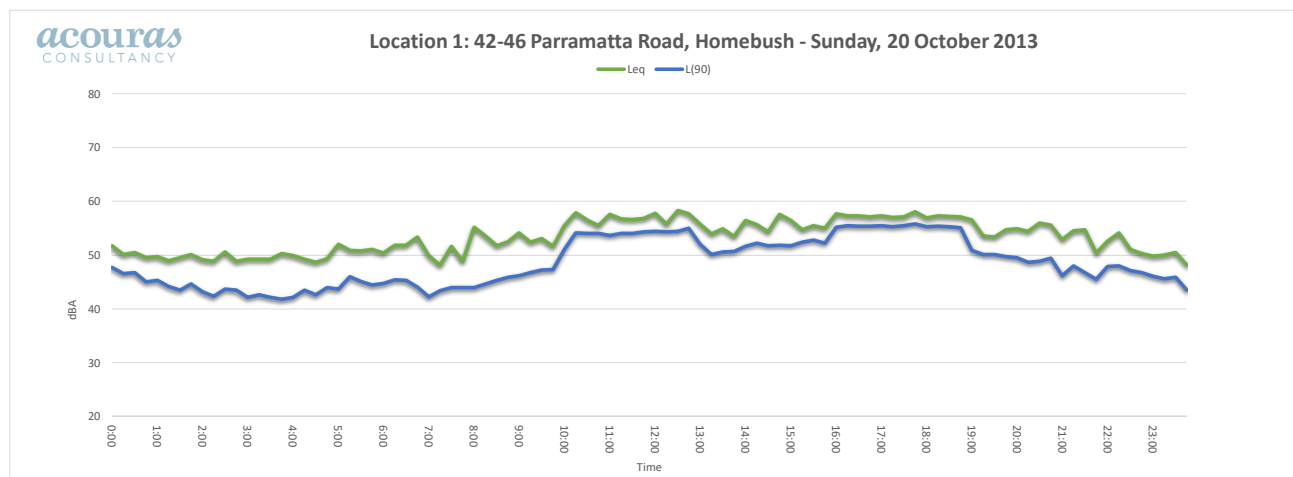
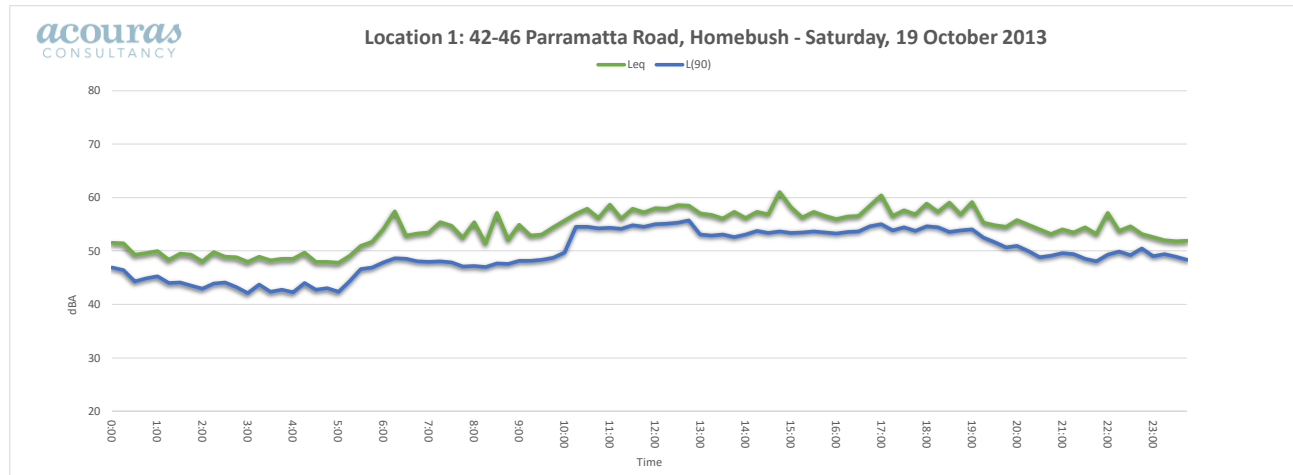


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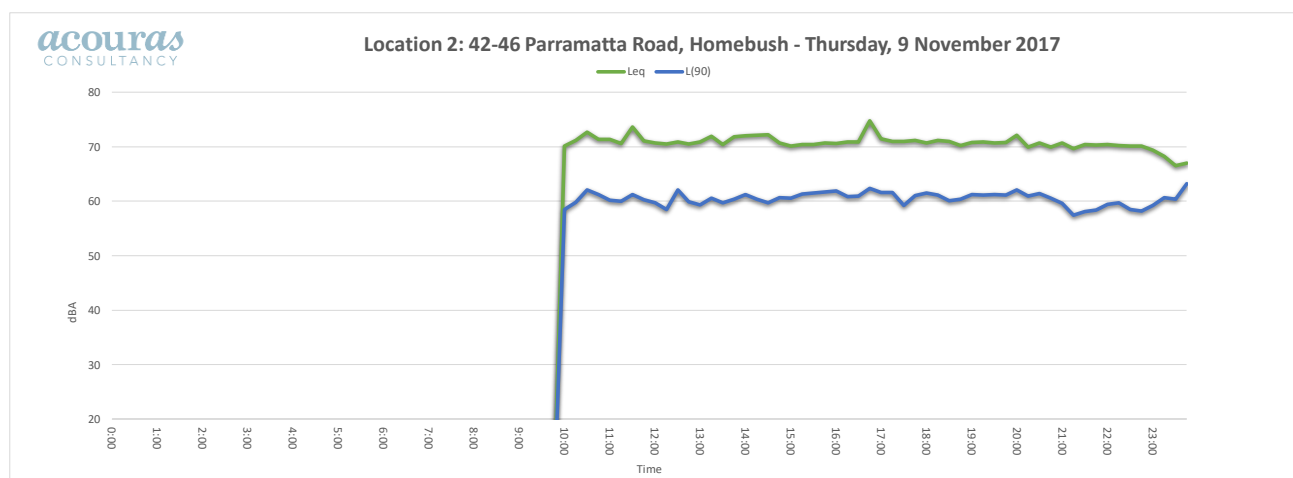
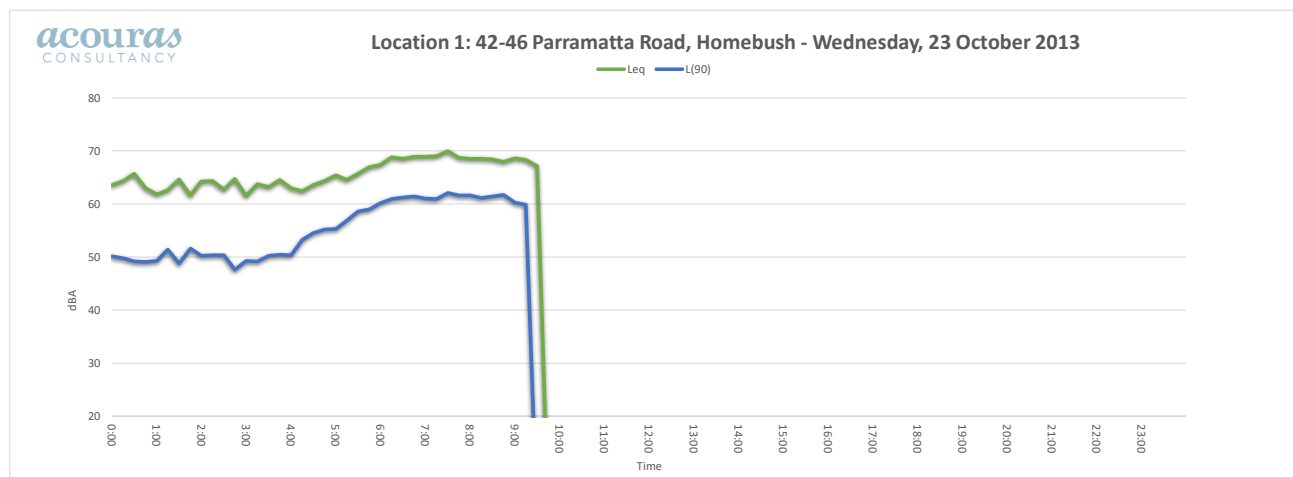
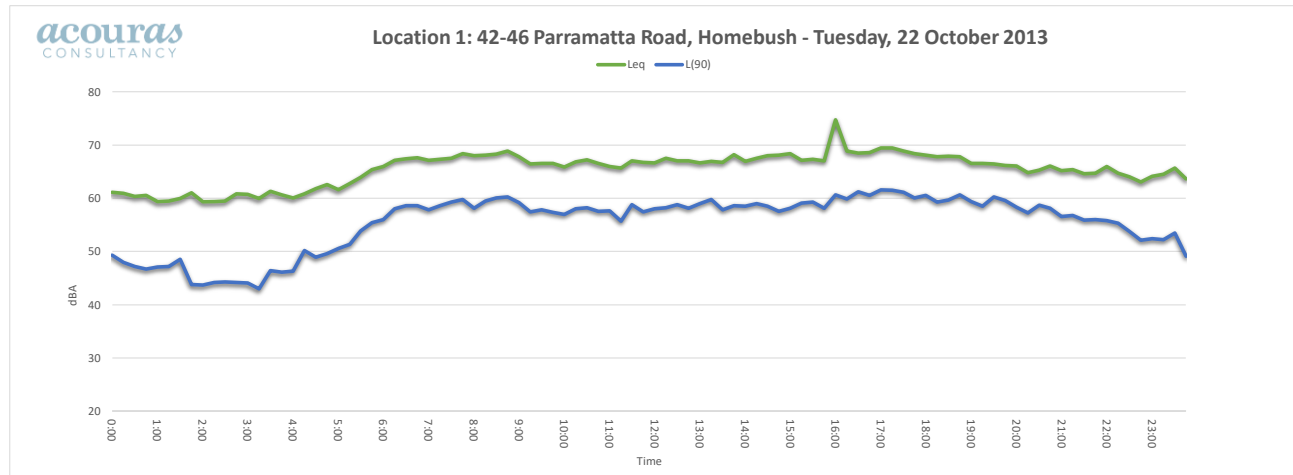


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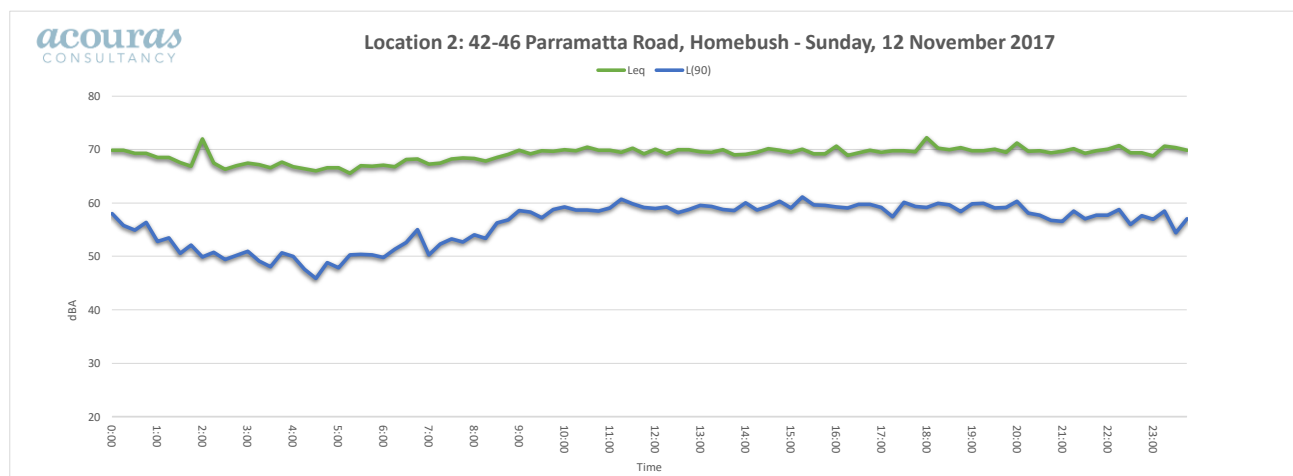
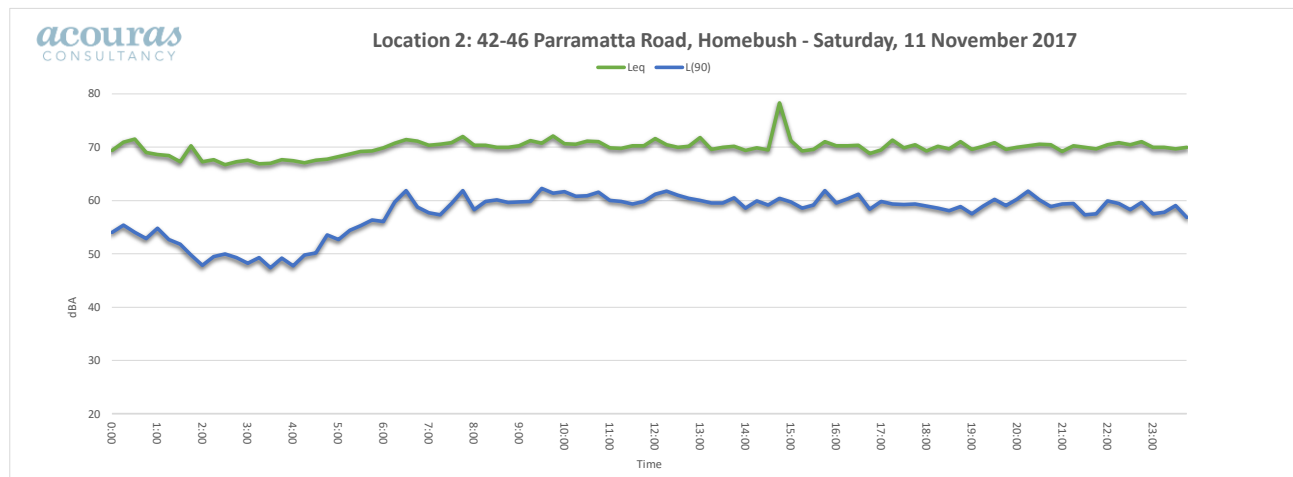
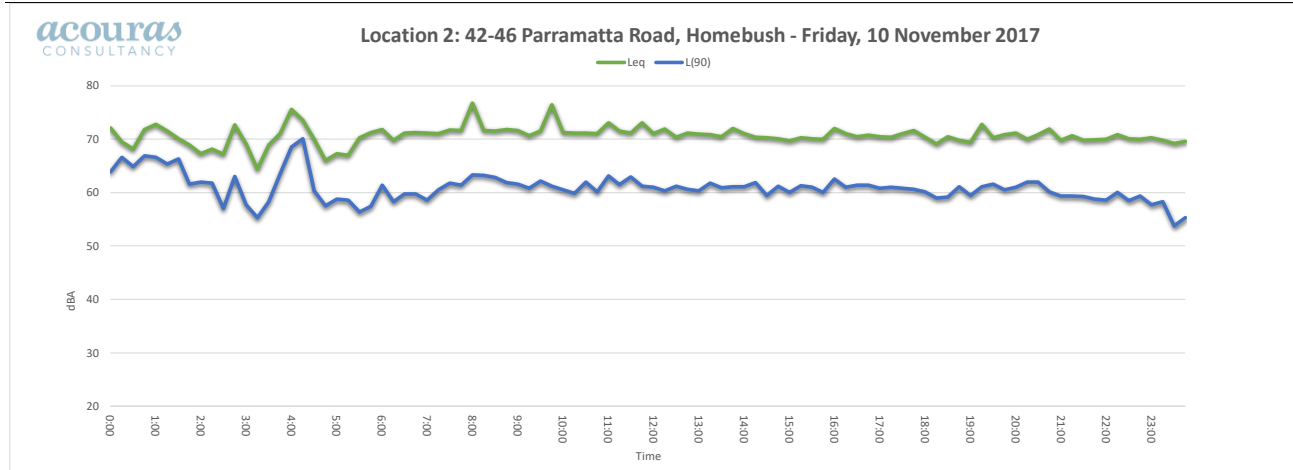


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