koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

Commercial 1 (Unit 27)
637-645 Forest Road
Bexley NSW 2207

+612 9587 9702
office@koikasacoustics.com
www.koikasacoustics.com

DELIVERING SOUND ADVICE

ABN: 12 058 524 771

ACOUSTICAL REPORT

PROPOSED MIXED-USE DEVELOPMENT

31 SANTLEY CRESCENT &

2A BRINGELLY ROAD KINGSWOOD, NSW

Date: Monday, 11th October 2021

File Reference: 5052R20211008mj31SantleyCrescent&2ABringellyRoadKingswood_DA.docx

DOCUMENT CONTROL

Project title	Acoustical Report Proposed Mixed-Use Development 31 Santley Crescent & 2a Bringelly Road Kingswood, NSW
Project number	5052
Document reference	5052R20211008mj31SantleyCrescent&2ABringellyRoadKingswood_DA.docx
Document path	G:\Shared drives\KA Acoustics 2021\REPORT\Boarding House\5052 (mj) 31 Santley Crescent & 2A Bringelly Road Kingswood\5052R20211008mj31SantleyCrescent&2ABringellyRoadKingswood_DA.docx

Version	Date	Author	Review	Notes
V1	11/10/2021	MJ	NK	Report version 1 available for issue

Approved by	Nick Koikas M.A.A.S Director
Client	Danabina Pty Ltd & Midpoint Investments Pty Ltd Attention: Rashid Bhuiyan Attention: Gus Fares Architects Pty Ltd - Sam Li

ACOUSTICAL REPORT

PROPOSED MIXED-USE DEVELOPMENT

31 SANTLEY CRESCENT & 2A BRINGELLY ROAD KINGSWOOD, NSW

CONTENTS

TABLE OF APPENDICES

1.0 INTRODUCTION

Koikas Acoustics Pty Ltd was commissioned to prepare a noise impact assessment for the proposed development at 31 Santley Crescent & 2A Bringelly Road, Kingswood seeking approval for the construction of:

- A new 96 room boarding house building, with
- Retail/commercial premises on the ground and first-floor levels, and
- Associated basement level parking.

For this DA, the acoustical adequacy of the proposed design must be assessed in terms of standard planning guidelines issued by the Council in their Local Environment Plan (LEP), Development Control Plan (DCP), and other standard planning guidelines related to common sources of noise.

As per the Council guidelines and other standard planning instruments, Koikas Acoustics has determined the following acoustical components require an assessment at the current DA stage:

- Road traffic noise intrusion associated with the Great Western Highway and its impact on future occupants of the subject development;
- Mechanical plant noise emission from the proposed development to neighbouring dwellings.
- Inter-tenancy sound-insulation requirements for shared partitions within the building.

This report presents the results and findings of an acoustical assessment for the subject proposal.

In-principle acoustic treatments and noise control recommendations are included (where required) so that the premises may operate in compliance with the nominated acoustical planning levels/project noise objectives.

2.0 THE PROPOSED DEVELOPMENT

The development is proposed to occupy the site at 31 Santley Crescent & 2A Bringelly Road, Kingswood.

This location is situated in a primarily urban residential area classified as B4 'Mixed-Use' as per relevant land zoning maps included in the Penrith City Council Local Environment Plan 2010. Surrounding properties are also predominantly residential in classification, also located within B4 'Mixed-Use' and R4 'High-Density Residential' Zoning.

The subject site and surrounding properties are identified in the aerial photograph in Figure 1.

Figure 1. Aerial photo of the subject site and surrounding area – Image from SixMaps

Prevailing ambient noise conditions on-site and in the local area are generally the result of typical environmental noise such as distant traffic and localised domestic noise sources.

This acoustic report and any associated recommendations are based solely on the architectural design and drawings by Gus Fares Architects (Project No. 2020-22, dated Feb 2021). Any unapproved

changes to the design may impact the findings of this report and associated noise control recommendations.

As per the architectural drawings prepared by Gus Fares Architects, the proposed development will include:

- 2 basement parking levels;
- 96 boarding rooms within 7 above-ground floor levels;
- Commercial premises on the ground and first-floor levels, and
- Internal and external communal areas.

3.0 AMBIENT NOISE SURVEY

Two unattended noise logging surveys were conducted between 25th September 2021 and 1st October 2021.

One microphone was placed on the boundary of 2A and 2 Bringelly Road, Kingswood at approximately 1.5 metres above the natural ground level (Site Location 1). The other microphone was placed in the rear yard of 2A Bringelly Road, Kingswood at approximately 1.5 metres above the natural ground level (Site Location 2).

A Type 1 Svantek 977 and a Type 1 Noise Sentry noise logger was used for the survey. The instrument was set up to measure sound pressure levels as 'A' frequency weighting and 'Fast' time response. Noise levels were stored within the logger memory at recurring 15 minutes intervals.

A NATA calibrated and certified Larson Davis CAL200 precision acoustic calibrator was used to field calibrate the sound level meter before and after the noise survey. No system drift was observed for this sound level meter.

A review of the weather records from the Bureau of Meteorology shows that adverse weather conditions did not influence the noise environment during the measurement period. Observable short-duration extraneous noise events were removed from the survey data. A summary of the noise survey data is presented below.

Table 1. Summary of noise logger results [dB]

Location	Period, T [1]	Ambient noise level L_{Aeq}	Rating background level L_{A90}	Traffic noise level[2] $L_{Aeq, Period}$
2A Bringelly Road Kingswood (Location 1)	Day	60	47	59
	Evening	56	43	
	Night	54	35	54
31 Santley Crescent (Location 2)	Day	54	44	54
	Evening	50	40	
	Night	48	34	48
Notes 1.	The **NSW EPA Noise Policy for Industry (NPfI)** refers to: **Daytime**: 7 am – 6 pm Monday to Saturday and 8 am to 6 pm Sunday and public holidays. **Evening**: 6 pm – 10 pm Monday to Sunday **Night**: 10 pm - 7 am Monday to Saturday and 10 pm to 8 am Sunday and public holidays.			
2.	The **EPA/RMS/NSW DoP** refers to: **Daytime**: 7 am – 10 pm seven days per week. **Night**: 10 pm - 7 am seven days per week			

Daily logger graphs are attached in **Appendix A**.

4.0 ACOUSTIC REQUIREMENTS

4.1 ROAD TRAFFIC NOISE – SEPPI/DOP

As per Clause 102 of the State Environmental Planning Policy (Infrastructure) 2007, hereafter referred to as SEPPI, development for a residential, place of public worship, hospital, educational facility or child care centre use must be designed to consider the indoor noise amenity of future occupants.

Where the development is for residential use, and the site is adjacent to a classified road that carries an annual daily traffic volume of more than 20,000 vehicles, and that the consent authority considers is likely to be impacted by road noise or vibration, maximum allowable indoor traffic noise levels are defined as:

- L_{Aeq} 35 dB in any bedroom in the building between the hours of 10 pm and 7 am
- L_{Aeq} 40 dB elsewhere in the building (excluding a garage, kitchen bathroom or hallway) at any other time.

Additional guidelines were prepared by the NSW Department of Planning to support the application of the SEPPI and were gazetted by the NSW Government in December 2008. The document (Development near rail corridors and busy roads – Interim guidelines) established the noise metrics to be used to define rail noise levels (Day – $L_{Aeq,\ 15\ hours\ (7\ am\ to\ 10\ pm)}$ / Night $L_{Aeq,\ 9\ hours\ (10\ pm\ to\ 7\ am)}$ and provided guidance on assessing indoor noise levels in rooms that are naturally ventilated, whereby an allowance of 10 dB above the indoor design noise level is acceptable for naturally ventilated rooms.

Neither the SEPPI nor DoP guidelines specifically define a target level for sleeping areas during daytime hours. To maintain a level of consistency between indoor noise amenity in living and sleeping areas during daytime hours, an $L_{Aeq,\ 15\ hours}$ limit of 40 dB is adopted by Koikas Acoustics.

Table 2. Indoor design noise level [dB]

Design condition	Area	Noise metric	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Windows/doors **closed**	Bedroom	L_{Aeq}	40	35
	Living area	L_{Aeq}	40	40
Windows/doors **open**	Bedroom	L_{Aeq}	50	45
	Living area	L_{Aeq}	50	50

4.2 EPA NOISE POLICY FOR INDUSTRY

Noise emission design targets have been referenced from the NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPfI).

The NPfI is designed to assess environmental noise impacts associated with scheduled activities prescribed within the Protection of the Environment Operations Act 1997, Schedule 1. It is also used as a reference tool for establishing suitable planning levels for noise generated by mechanical plant and equipment and noise emission from commercial operations.

For residential receivers, the guideline applies limits on the short-term intrusive nature of a noise or noise-generating development (project intrusive noise level), as well as applying an upper limit on cumulative industrial noise emissions from all surrounding development/industry (project amenity noise level). The most stringent of the project intrusive noise level and project amenity noise level is applied as the **project noise trigger level (PNTL)**. To determine which of the intrusive and amenity noise criteria is more stringent, the underlying noise metrics must be the same. As the intrusive noise level is defined in terms of an $L_{Aeq,\ 15\ minutes}$ and the amenity noise level is defined in terms of an $L_{Aeq,\ Period}$, a correction +3 dB correction is applied to the project amenity noise level to equate the $L_{Aeq\ Period}$ to $L_{Aeq,\ 15\ minutes}$.

Non-residential receivers are assessed to project amenity noise levels relevant to the applicable receiver category (commercial).

Where noise is measured or predicted below the project noise trigger level, the noise outcome is deemed acceptable. Above the project noise trigger level, management responses such as applying reasonable and feasible noise mitigation measures are to be recommended, along with assessing any residual noise impacts once noise mitigation has been considered.

The policy is designed in such a way that the assessing authority would consider the project noise trigger levels, reasonable and feasible mitigation measures, and any residual noise impacts when deciding on acceptable noise outcomes.

The site-specific project noise trigger levels need only be considered for the hours under which the noise or activity occurs.

Table 3. NPfI planning levels – $L_{Aeq,\ 15\ minutes}$ [dB]								
Period, T (Note 1)	**Intrusive**		**Amenity**					**Project noise trigger level**
	RBL	**RBL + 5**	**Area classification**	**Recommended amenity noise level**	**High traffic area**	**Project amenity noise level**	**+3dB correction**	
Day	54	59	Urban	60	No	55	58	58
Evening	50	55	Urban	50	No	45	48	48
Night	48	53	Urban	45	No	40	43	43
Notes: 1. 2.	**EPA** defines the following periods: **Day**: 7 am to 6 pm Mon to Sat and 8 am to 6 pm Sun and public holidays, **Evening**: 6 pm to 10 pm Mon to Sun, **Night**: 10 pm to 7 am Mon to Sat and 10 pm to 8 am Sun and public holidays. Project noise amenity level = recommended noise amenity level – 5 dB, except where specific circumstances are met, such as high traffic.							

4.3 PROTECTION OF THE ENVIRONMENT OPERATIONS (NOISE CONTROL) REGULATION 2017

Clause 45 of the regulation requires that air conditioning units installed on residential premises must not emit noise that is audible within a habitable room in any other residential premises between the hours of 10 pm and 7 am (Monday to Friday) or 10 pm and 8 am (Saturday, Sunday and public holidays).

4.4 INTER-TENANCY PARTITIONS: BCA VOL. 1

The BCA acoustical Performance Requirements state that relevant partitions in Class 2, 3, and/or 9c buildings must provide insulation against the transmission of airborne or impact generated sound sufficient to prevent illness or loss of amenity for the occupants.

The BCA Performance Requirements may be satisfied through either a Performance Solution or Deemed to Satisfy Solution.

Table 4. Compliance with BCA Performance Requirements	
Performance Solution	**Deemed to Satisfy Solution**
• Evidence of suitability (laboratory test) [1] • Verification Methods (field test) [2] • Expert Judgement • Comparison with Deemed to Satisfy Provisions	• Evidence of Suitability (laboratory test) [1] • Expert Judgement • Compliance with an acceptable form of construction (Specification F5.2)
Notes: 1. 2.	Accredited Testing Laboratory as defined in the BCA Schedule 3 Verification Methods – BCA Parts FV5.1 to FV5.4

The Deemed-to-Satisfy provisions applying to this specific development are summarised below:

Table 5. BCA acoustic design requirements			
Partition	**Detail**	**Airborne sound**	**Impact sound**
Floor	Separating SOU's, or an SOU from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or different classification	$R_w + C_{tr} \geq 50$	$L_{n,w} \leq 62$
Walls Notes 1 & 2	Separating SOU's	$R_w + C_{tr} \geq 50$	Not applicable
	Separating a habitable room (other than a kitchen) in one SOU from a bathroom, sanitary compartment, laundry, kitchen in another SOU	$R_w + C_{tr} \geq 50$	Discontinuous
	Separating an SOU from a plant room or lift shaft	$R_w \geq 50$	Discontinuous
	Separating an SOU from a stairway, public corridor, public lobby or the like, or part of a different classification	$R_w \geq 50$	Not applicable
Door	Located in a wall separating an SOU from a stairway, public corridor, public lobby or the like	$R_w \geq 30$	Not applicable
Services	Duct, soil, waste or water supply pipes located in a wall or floor cavity and serves or passes through more than one SOU (including a stormwater pipe)	$R_w + C_{tr} \geq 40$ (habitable) $R_w + C_{tr} \geq 25$ (other)	Not applicable
Pumps	A flexible coupling must be used at the point of connection between the service's pipes in a building and any circulating or another pump.		
Notes: 1. 2. 3.	Where a wall is to achieve a sound insulation rating and has a floor above, the wall must continue to either the underside of the floor or to the ceiling which has a comparable sound insulation rating to the wall. Where a wall is to achieve a sound insulation rating and has a roof above, the wall must continue to either the underside of the roof or to the ceiling which has a comparable sound insulation rating to the wall. A 'habitable room' means a room used for normal domestic activities such as bedroom, living room, lounge room, music room, television room, kitchen dining room, study, playroom, family room, home theatre and sunroom.		

5.0 TRAFFIC NOISE INTRUSION ASSESSMENT

Calculating the level of traffic noise that is transmitted through a façade and into a room is dependent upon the external façade noise level, the sound insulation performance of the building façade (inclusive of all building components), and the level of acoustic absorption that is present within the subject room.

5.1 FAÇADE TRAFFIC NOISE LEVELS

A combined approach utilising noise survey data and noise modelling have been adopted to establish the resultant traffic noise levels around the building facades. It is standard assessment procedure to conduct the assessment to ensure continued compliance over an appropriate planning period, taken as 10 years from the date of the assessment to accord with *AS3671-1989 Acoustics – Road traffic noise intrusion*,

In the absence of RMS traffic volume data for the specific road corridor, Koikas Acoustics has adopted a forecast 2% p.a. increase in traffic volumes over 10 years.

The maximum calculated external noise levels at the new building facades are:

- $L_{Aeq\ 15\ hours\ (day)}$ 71 dB and $L_{Aeq\ 9\ hours\ (night)}$ 65 dB on Level 5 of the building facing The Great Western Highway.

The side and rear facades of the building are less exposed to the road corridor and thus have lower façade noise levels.

5.2 REQUIRED NOISE REDUCTION

To meet the indoor target noise levels, the following noise reductions are required of the building facades:

- Up to 31 dB for boarding rooms adjacent to The Great Western Highway

5.3 RECOMMENDED CONSTRUCTION MATERIALS

Indoor noise levels were calculated to determine the acoustic performance of the proposed building facade. The noise modelling and subsequent analysis conclude the following:

5.3.1 External walls

Table 6. External walls recommendations	
Recommended construction	**Area to which the recommendation applies**
Hebel veneer system comprising of; • 75 mm Hebel power panel • 50 mm cavity • 64 mm steel stud • 75 mm Earthwool glasswool insulation (14 kg/m^3) • One layer of 13 mm standard plasterboard	All external walls

5.3.2 Ceiling/roof

Table 7. Ceiling/roof recommendations	
Recommended construction	**Area to which the recommendation applies**
Concrete slab ceiling (200 mm)	All roof areas

5.3.3 Glass windows and doors

Table 8. Glazing recommendations		
Room	**Glass recommendation**	**Seals**
Boarding Rooms • 5 – 6 • 16 – 19 • 29 – 32 • 34 – 36 • 47 – 53 • 64 – 70 • 80 – 85 • 94 – 96	10.38 mm laminated glass	Q-lon and fin
All other boarding rooms	6.38 mm laminated glass	

In addition to the minimum glass recommendation, the installed window/glazed door systems (inclusive or framing and seals) must achieve a minimum acoustic rating of:

- R_w 32 for 6.38 mm laminated glass;
- R_w 34 for 10.38 mm laminated glass;
- and comply with the 'Notes' below.

Notes:

1. The recommendations provided in this report are for the minimum required glazing predicted to achieve satisfactory acoustic performance.
2. Design factors such as safety, thermal or energy efficiency are outside the scope of this report and should be assessed accordingly.

3. It is the Client's responsibility to ensure all glazed windows and sliding doors are installed on-site to meet all building design requirements.
4. All glazing systems should be built into an appropriate frame.
5. Windows/doors must be accurately sized and fitted to the wall opening. Any air gaps around the window/door frames may degrade the acoustic performance of the window/door system. Any air gaps must be packed with timber and fully sealed with an appropriate acrylic sealant such as Knauf Bindex or the likes.
6. All open-able windows and glazed door systems should be airtight when closed.
7. Q-lon type seals or the equivalent should be fitted along the perimeter of all glazing systems to minimise air gaps. For sliding glass systems that cannot incorporate Q-lon seals, heavy-duty fin-type seals such as Schlegel SilentFin could be used. If the windows/doors are not designed to be air-tight when closed, the reduced performance of the windows/doors could compromise the acoustic integrity of the building facade.
8. Recommended glass systems have been calculated based on current architectural drawings as established within this report.
9. High performing glazed window/door systems can be supplied and installed by Eco Aluminium. Mob 0475 770 272. Web: www.ecoaluminium.com.au. Other reputable suppliers can also be considered.

Koikas Acoustics notes that the recommendations provided in this report are for the minimum required glazing that is predicted to achieve satisfactory acoustic performance. No consideration has been given to other factors such as safety, thermal or energy efficiency that may render the recommended glazing not compliant with other standards or guidelines. It is, therefore, the responsibility of the client to ensure all glazed windows and sliding doors are installed on-site to meet all building design requirements.

Additionally, it is the opinion of Koikas Acoustics that the recommended building materials outlined in the tables above will be sufficient to mitigate noise emanating from the Kingswood Hotel. If additional façade mitigation is to be considered, Koikas Acoustics recommends any of the following:

- Additional internal layers of plasterboard for the external walls
- More dense internal plasterboard layers – e.g. 13 mm – 16 mm Fyrchek/soundcheck plasterboard
- Thicker windows e.g. 10.38 mm laminated glass (Rw 34) or 6.38mm laminated + 46 mm air gap + 8.38 mm laminated (Rw 45).

5.3.4 Ventilation

Boarding rooms 1-4, 7-10, 20, 21-24, 33, 38-41, 55-58, 72-74 and 89-88 may be naturally ventilated through open windows/doors.

All other boarding rooms will need to have windows and doors closed to achieve the indoor target noise levels. The design of the ventilation for these rooms should consider windows and doors being closed.

For rooms requiring an alternate source of ventilation other than open windows/doors, the following options may be considered (subject to review by a ventilation expert):

- Borrowed air from elsewhere in the dwelling/unit.
- Incorporating a component of fresh air into a ducted air conditioning system.
- Installing a wall-mounted ventilator such as the Acoustica Aeropac or similar.
- Installing a small air supply fan and acoustically treated duct. This could include a ceiling-mounted fan (DuctTech – 02 9674 1577 / salesnsw@ducttech.com.au) attached to a minimum of 3 metres of acoustically-lined sheet metal duct located within a suspended ceiling or bulkhead.

Any penetrations in the walls or roof to accommodate ventilation system/s should not impact the acoustic integrity of the building façade. An acoustical engineer should review any proposed ventilation solution that proposes a penetration of the building façade.

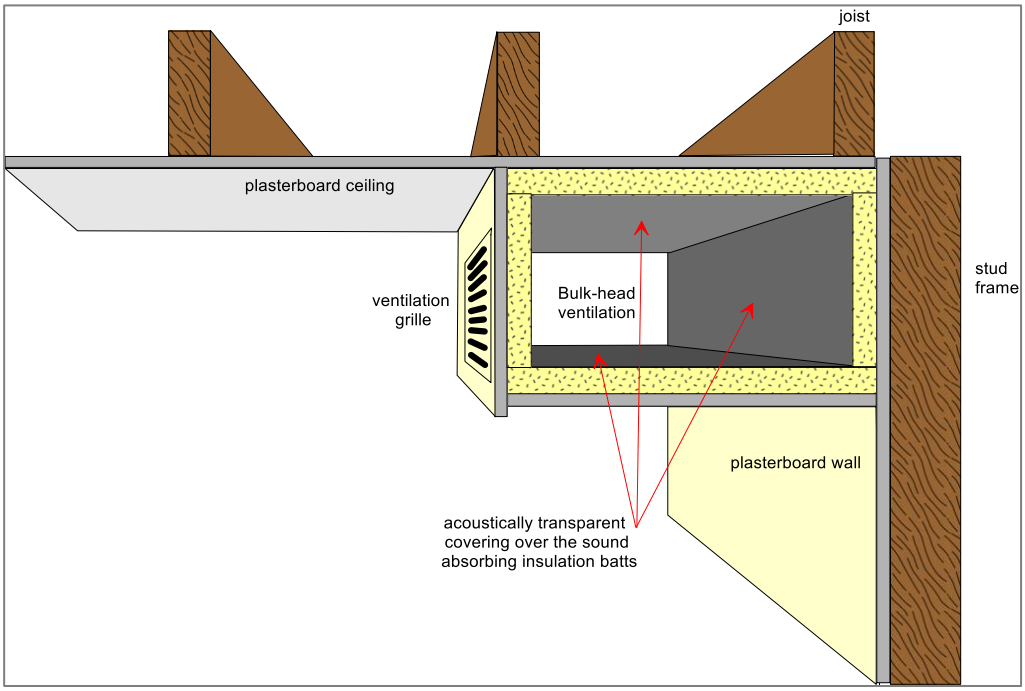


Figure 2. Acoustically lined bulkhead duct for a ceiling/wall fan

Figure 3. Acoustica Aeropac wall ventilator

6.0 MECHANICAL PLANT AND BUILDING USE NOISE ASSESSMENT

Outdoor common areas such as the outdoor communal area are considered to be noise generating areas associated with 'building use'.

6.1 ASSESSMENT SCENARIOS

The following design scenarios are assessed. Assumptions included in the design are also noted for reference.

Table 9. Design scenarios and assumptions

Scenario	Description	Design assumptions
1	Ten boarders occupying the outdoor communal area. Forty-six boarders occupying the internal communal area Cars entering/exiting the car park	50% of all the boarders are speaking with a raised vocal effort 50% speaking with a raised vocal effort with all windows and doors fully open There will be an average maximum of 15 cars entering and 15 cars exiting the car park in a 15-minute period.
2	Fifty-two boarders occupying the outdoor communal area. Forty-six boarders occupying the internal communal area Cars entering/exiting the car park	50% of all the boarders are speaking with a raised vocal effort 50% speaking with a raised vocal effort with all windows and doors fully open There will be an average maximum of 5 cars entering and 5 cars exiting the car park in a 15-minute period.

6.2 NOISE LEVELS

The following noise source levels have been used in the assessment:

Table 10. Noise Source and noise levels

Noise Source	Descriptor	Noise level [dB]	Location
A person talking with a normal vocal effort	L_{WAeq}	68	Communal Open Spaces
Car entering/leaving the car park	L_{WAeq}	78	Carpark/Driveway

6.3 CALCULATED RECEIVER LEVELS

Building use noise levels have been predicted to nearby residential and commercial receivers by way of preparing an acoustic model and conducting point-to-point calculations based on standard sound propagation algorithms. All calculations consider the equipment as selected in the mechanical services plans, the associated sound levels and corresponding attenuators.

Reference should also be made to additional noise control recommendations included within Section 6.4 of this report, which also govern the calculated receiver noise levels.

Due to the size of the development, several potentially affected receiver locations must be assessed in terms of their respective noise exposure from mechanical plant and equipment associated with the development. The most noise-sensitive receiver locations are summarised below.

Table 11. Assessment locations

ID	Receiver type and address	Assessment location
R1	Residential / 176 Great Western Highway	Upper floor level
R2	Residential / 174 Great Western Highway	Upper floor level
R3	Residential / 29 Santley Crescent	Upper floor level
R4	Residential / 29 Santley Crescent	Upper floor level
R5	Residential / 20 Santley Crescent	Upper floor level
R6	Residential / 24 Santley Crescent	Upper floor level
R7	Residential / 3 Bringelly Road	Nearest boundary
R8	Residential / 33 Santley Crescent	Upper floor level
C1	Commercial / 1 Bringelly Road	Nearest boundary

Predicted building use noise levels are as follows:

Table 12. Calculated receiver noise levels [dB]

Receiver location	Night
Residential receivers	
Project noise criteria	**43**
R1:	43
R2:	34
R3:	42
R4:	36
R5:	36
R6:	22
R7:	12
R8:	14
Commercial receivers	
Project noise criteria	**63**
C1:	10

Table 13. Calculated receiver noise levels [dB]	
Receiver location	**Day**
Residential receivers	
Project noise criteria	**58**
R1:	50
R2:	41
R3:	49
R4:	43
R5:	29
R6:	22
R7:	13
R8:	15
Commercial receivers	
Project noise criteria	**63**
C1:	21

Compliance with the more stringent nighttime criteria implies compliance at all other times with a less stringent noise criterion. Building use noise levels have been assessed to comply with the limiting NPfI criteria, pending the inclusion of noise control measures as detailed in the following section of this report.

6.4 RECOMMENDATIONS

- All windows and doors in the indoor communal area must be kept shut during nighttime hours.
- A maximum of 10 people may occupy the outdoor communal area during nighttime hours.
- Nighttime hours are defined as the following:
    - Mondays – Saturdays: 10 pm – 7 am
    - Sundays – Public Holidays: 10 pm – 8 am
- The boundary fence of the property must be a minimum of 1.8 m high

6.5 MECHANICAL PLANT NOISE IMPACTS

Mechanical plant and equipment on this project could include air conditioning condensers units where they are installed in the development and other ventilation plant required for basement levels and garbage rooms etc.

Noise emitted from the mechanical systems should comply with the limits imposed under the relevant Council guidelines and/or standard EPA planning guidelines whereby noise levels should not exceed the background level by more than 5 dB at any residential boundary and be within set amenity noise limits. Furthermore, the POEO (Noise Control) Regulation requires that residential air conditioners must not generate audible noise within any habitable room of any other residence during nighttime hours otherwise that noise may be considered offensive.

Section 4.2 of this report establishes the project noise limits for mechanical plant and equipment.

The design of the mechanical systems is not typically completed at the DA stage and thus an assessment of noise emission cannot yet be completed. A detailed review of mechanical plant noise emission is often conditioned within the development consent as a requirement for the Construction Certificate. A detailed review of mechanical noise emission from the development should be completed.

7.0 INTER-TENANCY PARTITIONS

The following recommendations are deemed suitable to meet the BCA minimum acoustical requirements. Several options are provided which cover a range of standard constructions.

All partition systems should be installed as per the general installation guidelines included in the BCA and as per relevant manufacturer installation guidelines/requirements.

Alternate systems and design may be considered to those recommended within this report provided that they are approved by an appropriately qualified acoustical engineer/consultant.

7.1 RECOMMENDED PARTITION WALLS

The following partition wall systems are capable of achieving the required acoustical performance.

Table 14. Recommended partition wall systems		
Wall type	**BCA design standard**	**Construction**
Inter-tenancy wall	Rw + Ctr ≥ 50 Discontinuous	*Partition wall between sole-occupancy units – Separating a habitable room (other than a kitchen) in one unit from a bathroom, sanitary compartment, laundry or kitchen in an adjoining unit* **[AFS]** AFS 162 Logicwall, 20mm cavity, 64mm steel studs with 75mm thick Tontine TSB4 insulation within the stud cavity, 10mm Soundcheck. **[Masonry]** Two leaves of 110mm clay brick masonry, 50mm cavity between the leaves (where brick ties are used they are to be of the resilient type), 13mm cement render to each side. *BCA D.T.S.* **[Concrete]** 125mm concrete panel, 20mm cavity, 64mm steel studs, 70mm polyester insulation (9kg/m^3) between the studs, 13mm plasterboard fixed to studs. *BCA D.T.S.* **[Hebel]** 13mm Fyrchek, 75mm Hebel Powerpanel, 35mm cavity, 64mm steel studs with 100mm S6 polyester insulation, 13mm Fyrchek/Aquachek. **[Lightweight]** 2x64mm steel studs, 20mm cavity, 60mm polyester insulation (11kg/m3) positioned between one row of studs, 2x13mm fire-resistant plasterboard each side.
	Rw + Ctr ≥ 50	*Partition wall between sole-occupancy units* **[AFS]** AFS 162 Logicwall panel, paint or render finish. **[AFS]** AFS 162 Logicwall panel, 28mm furring channel, Tontine TSB2 insulation within the framing cavity, 13mm plasterboard. **[Masonry / Hebel / Lightweight]** As above. **[Concrete]** 200mm concrete panel, 13mm cement render of each face. *BCA D.T.S.*
Common wall	Rw ≥ 50 Discontinuous	*Partition wall between the sole-occupancy unit and plant room or lift shaft* As above for inter-tenancy wall partitions that satisfy discontinuous construction
	Rw ≥ 50	*Partition wall between sole-occupancy unit and stairway, public corridor, public lobby or the like or part of a different classification* **[AFS]** AFS 150 Logicwall panel, paint or render finish. **[AFS]** AFS 162 Logicwall panel, paint or render finish. **[Masonry]** Single leaf 150mm brick masonry with 13mm cement render on each face. **[Concrete]** 125mm thick concrete panel. **[Hebel]** 13mm Gyprock CD, 75mm Hebel Powerpanel, minimum 20mm cavity, 64mm steel framing with 50mm glass wool insulation, 13mm Gyprock CD. **[Lightweight]** 92mm steel studs, 60mm polyester insulation (11kg/m3) positioned between the studs, 2x13mm fire-resistant plasterboard on each side.
Services shaft wall	Rw+Ctr ≥40	*Services shaft wall to habitable room within the unit* **[Masonry]** 110mm brick masonry with 13mm cement render on each face. *BCA D.T.S.* **[Concrete]** 100mm thick concrete panel. *BCA D.T.S.* **[Lightweight]** 2x13mm plasterboard, pipe lagging (Soundlag 4525C, Acoustilag 45)
	Rw+Ctr ≥25	*Services shaft wall to non-habitable room within the unit* **[Lightweight]** 2 layers of 13mm plasterboard

Notes:

1. Recommendations within the above table are based on published acoustic data obtained from the manufacturer.
2. Laboratory tests of the AFS 162 Logicwall on its own showed non-compliance with the BCA requirement of Rw + Ctr 50. However, an investigation by PKA Consulting concludes that the poor acoustic performance was due to factors not related to the wall system, but rather the test facility. It is expected that the acoustic performance will satisfy the BCA condition.
3. This conclusion is supported by numerous field tests that indicate compliance with the BCA verification methods rating.
4. All installation of proprietary type wall systems must be as per the relevant installation guidelines and manuals.

BCA D.T.S. = BCA Deemed-to-Satisfy construction. These wall systems are to be installed as per "Construction Deemed-to-Satisfy" notes included within Specification F5.2 of Volume One of the BCA. Where these systems are installed correctly as per the BCA they do not require compliance testing to verify acoustic performance.

7.2 RECOMMENDED PARTITION FLOOR/CEILING

The following floor/ceiling assemblies are recommended to achieve the BCA minimum acoustic rating requirements.

Table 15. Typical acoustical performance achieved with Uniroll underlays

Floor-type	Construction details or underlay type
Carpet $L'_{nTw} \leq 40$	• Carpet • Carpet underlay • ≥ 150 mm concrete slab
Direct-stick tiles $L'_{nTw} \leq 50$	• 9 or 10 mm ceramic tiles • 5 mm adhesive over a composite underlay RFC750 (4.5 mm) RF700 (4- 5- 10 mm) RF700 • 200 mm thick concrete slab • 100 mm ceiling cavity • 13 mm plasterboard ceiling
Tiles over screed $L'_{nTw} \leq 50$	• 9 or 10 mm ceramic tiles • 5 mm glue • 30 mm screed over RFC750 (4.5mm) or RF700 (5mm) • 200 mm concrete slab • 100 mm ceiling cavity • 13 mm plasterboard ceiling
Direct-stick timber $L'_{nTw} \leq 50$	• 19 mm strip timber • Adhesive • 15 mm ply + RFC700 (4, 5 or 10 mm) • 200 mm concrete slab • 100 mm ceiling cavity • 13 mm plasterboard ceiling
Floating floor $L'_{nTw} \leq 50$	• Engineered floating floor • 2 mm foam slip layer + RF700 (4, 5mm) • 200 mm concrete slab • 100 mm ceiling cavity • 13 mm plasterboard ceiling
Direct-stick vinyl $L'_{nTw} \leq 55$	• Vinyl flooring • RF700 (3, 4, 5 or 10 mm) • 200 mm concrete slab • 100 mm ceiling cavity • 13 mm plasterboard ceiling

Notes:

1. RF: Rubber foam composite.
2. RFC: Rubber foam cork composite.
3. Alternate underlay suppliers may be considered.
4. If there is no suspended ceiling beneath the concrete slab, the impact noise rating may reduce by up to 8 rating points.
5. Insulation may be required in ceiling cavities less than 100 mm.

7.2.1 Additional recommendations/information

- Acoustic underlays may not be required on the ground floor level and/or in apartments that are not located above apartments below.
- The above recommendations will apply to balconies/terraces situated above indoor areas of apartments below.
- All flooring and acoustic underlays should be installed as per relevant manufacturers installation and design guides.

- Hard floor coverings such as tiles must not make contact with any walls or joinery such as kitchen benches, cupboards etc.

  During the installation of hard floor coverings, temporary spacers of 5 - 10 mm should be used to isolate the floor covering from walls and/or joinery with the resulting gaps filled with a suitable mastic type sealant or off-cut of rubber-underlay material. Most acoustic underlay manufacturers include a construction detail in this regard that involves an upturn of the rubber underlay material at the wall/floor junction.

  The following diagrams show detailed installation requirements of different flooring systems in conjunction with underlays.

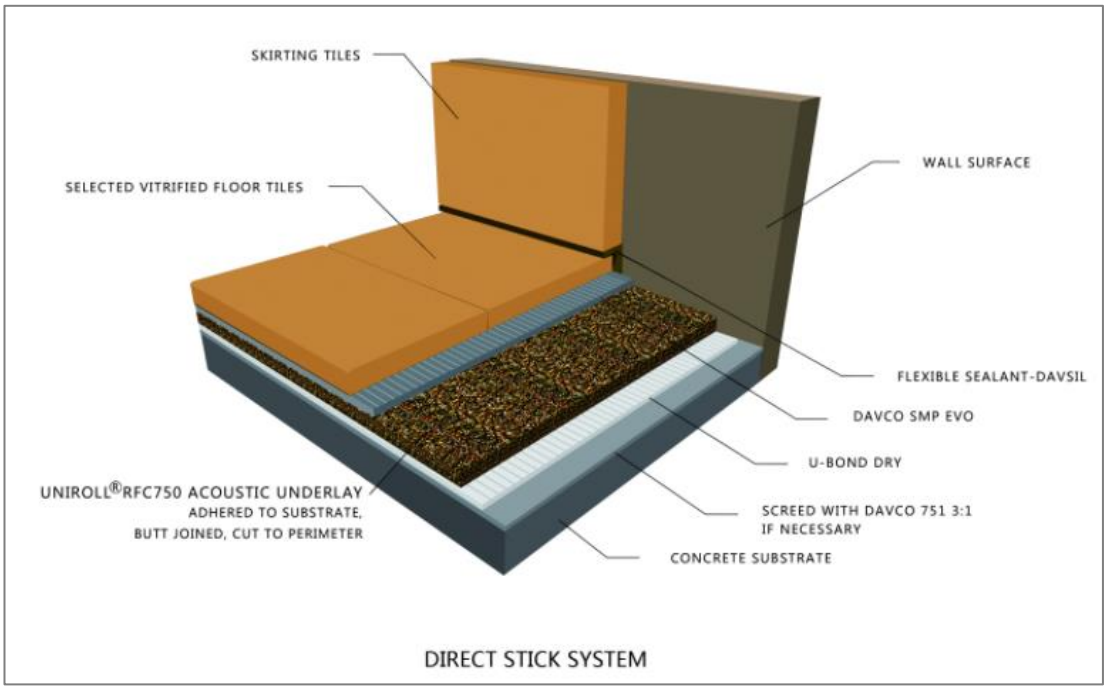


Figure 4. Isolated hard floor covering detail

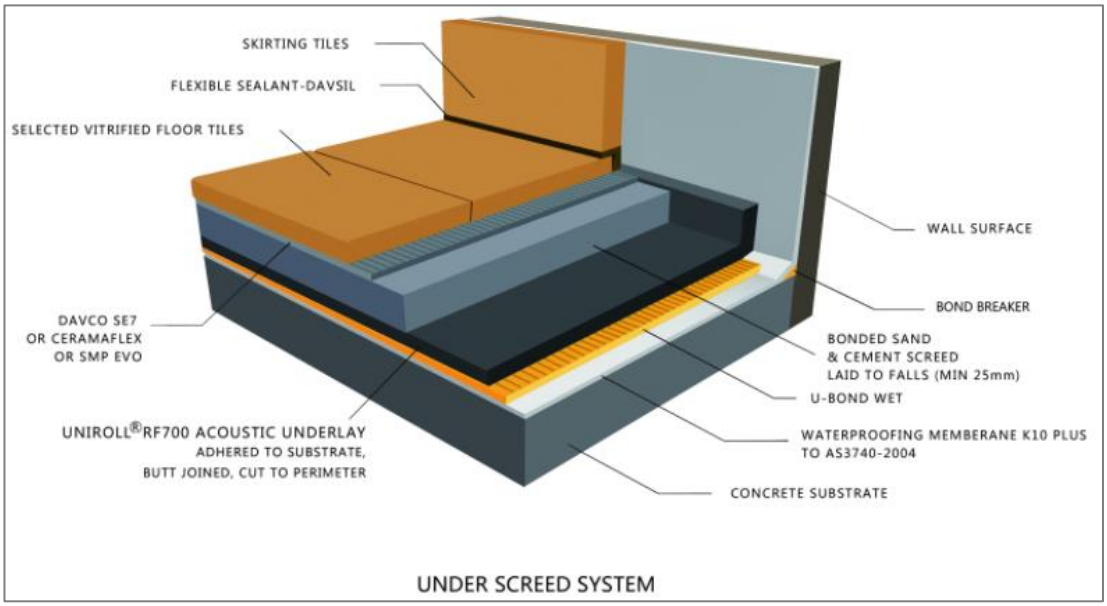


Figure 5. Isolated hard floor covering detail

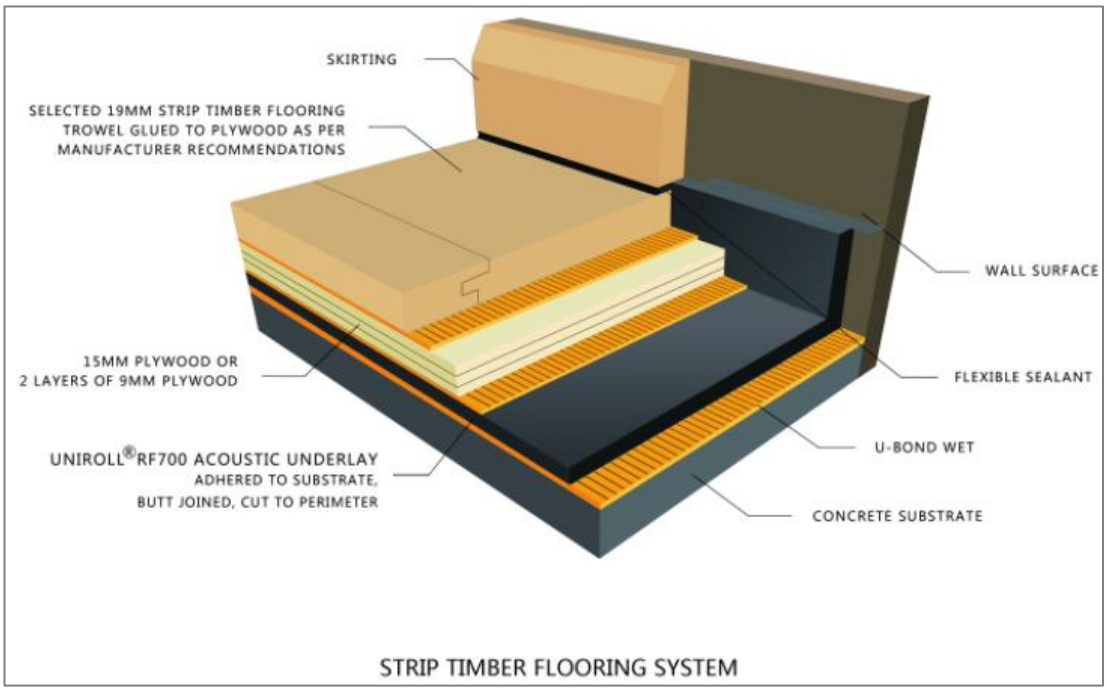


Figure 6. Isolated hard floor covering detail

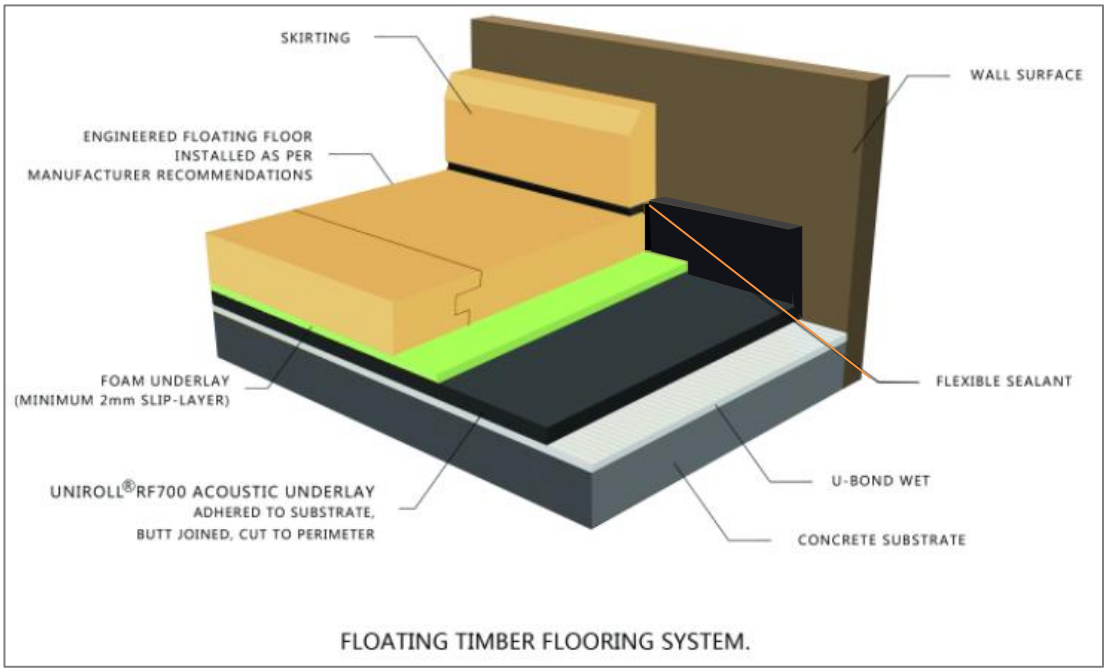


Figure 7. Isolated hard floor covering detail

- Alternative floor/ceiling systems can be considered provided that the acoustic performance is tested or assessed by a consulting acoustical engineer as being compliant with the sound insulation performance requirements of the BCA.
- The above floor systems have been assessed to comply with the BCA airborne and impact sound insulation requirements. Verification of the installed acoustic performance should be determined per subsequent recommendations of this report.

7.2.2 NATA certified ceiling/floor systems

Preliminary testing and final OC testing are not required on floor installations that have been tested in a NATA or an equivalent International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) certified laboratory and found to comply with the acoustical performance requirements of the BCA. The installation would need to match the system installed for the laboratory test, inclusive of adhesives, floor surfaces, underlays etc. A thicker slab or the addition of a suspended ceiling would generally further improve the acoustical performance of the ceiling /floor system.

7.2.3 Verification of acoustical performance

The recommendations for partition construction details included in this report are not a certification of acoustical compliance. The recommendations are based on our professional opinion of acoustic performance ratings. Several variables (listed below) can exist between development

sites that make it impossible to confirm acoustical compliance without conducting in-situ tests.

- The type of flooring installed
- Whether the flooring or the skirting boards touches the walls or the tiles respectively to allow structure-borne vibrations to bridge from the flooring to the concrete slab
- The thickness and density of the concrete slab
- Whether the concrete slab is pre or post-tensioned
- The thickness and density of the flooring
- The damping and density of the underlay
- The separation between the plasterboard ceiling and the concrete slab
- The junction between the concrete slab with the walls
- The sealing between the plasterboard ceiling to the walls in the unit below
- The thickness and density of the plasterboard ceiling
- The degree of sealing between the plasterboard ceiling and the down-lights
- The connections utilised between the suspended ceiling grid to the concrete slab
- The insulation installed or not installed in the cavity
- The surface area of the floor
- The geometry of the floor surface
- The location of beams, columns and shear walls
- Flanking paths between the concrete slab and the wall types
- The use of curtain wall systems
- The junctions between the slab and the walls

Koikas Acoustics recommends that in-situ testing is conducted on representative and fully installed partition assemblies to ensure adequate acoustic insulation and isolation is achieved before installation throughout the development.

7.3 SOIL, WASTE, WATER SUPPLY PIPES

Where a duct, soil, waste or water supply pipe is located within a wall or ceiling cavity and serves or passes through one or more SOU's, the following separation details may be used to comply with the required acoustic rating:

Table 16. Services in cavity wall or ceiling			
Option	**Rating**	**Documented source**	**System detail**
1	Rw + Ctr 25	CSR Red Book, KA opinion	2 layers of 10 mm plasterboard
2	Rw + Ctr 25	CSR Red Book	Acoustilag 45 and 13 mm plasterboard wall/ceiling lining
3	Rw + Ctr 25	CSR Red Book	Unlagged pipes and 13 mm Soundchek wall/ceiling lining. Alternatively, 2 layers of 16mm Fychek may be used as wall/ceiling lining
4	Rw + Ctr 40	CSR Red Book	Acoustilag 45 and 13 mm Soundchek wall/ceiling lining. Alternatively, 2 layers of 16 mm Fychek may be used as wall/ceiling lining
5	Rw + Ctr 40	Pyrotech Soundlag 4525C brochure	Soundlag 4525C and minimum 10 mm plasterboard wall/ceiling lining
Notes: 1. 2. 3.	The acoustic lagging material may be excluded by using Rehau Raupiano Plus pipe system. All installations are to be as per relevant manufacturers' specifications and requirements. Incorporating downlights into ceilings will impact the acoustic rating of the partition system. Consultation should be made with an acoustic consultant in the event of downlights being proposed in the ceiling. The CSR Red Book provides some guidance on downlights being installed in a services partition system.		

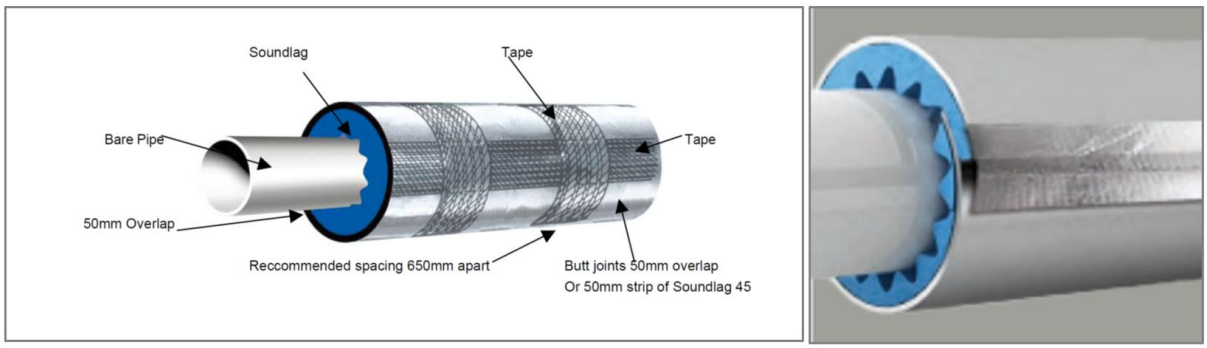


Figure 8. Acoustic lagging details (image from Pyrotech)

7.3.1 Additional BCA requirements

The BCA further qualifies the acoustic requirements of services partitions with the following:

- Services must not be chased into concrete or masonry elements,
- An access door or panel must be firmly fixed to overlap the frame or rebate the frame by not less than 10 mm and be fitted with proper sealing gasket along all edges and constructed of:
- Wood, particle board or block board not less than 38 mm thick; or
- Compressed fibre reinforced cement sheeting not less than 9 mm thick; or
- Other suitable material with a mass per unit area not less than 24 kg/m^2.

- A water supply pipe must only be installed in the cavity of discontinuous construction, and in the case of a pipe that serves only one SOU, must not be fixed to the wall leaf on the side adjoining any other SOU and have a clearance not less than 10 mm to the other wall leaf.

7.4 SOUND ISOLATION OF PUMPS

A flexible coupling must be used at the point of connection between the service's pipes in a building and any circulation or another pump. Examples are provided below:

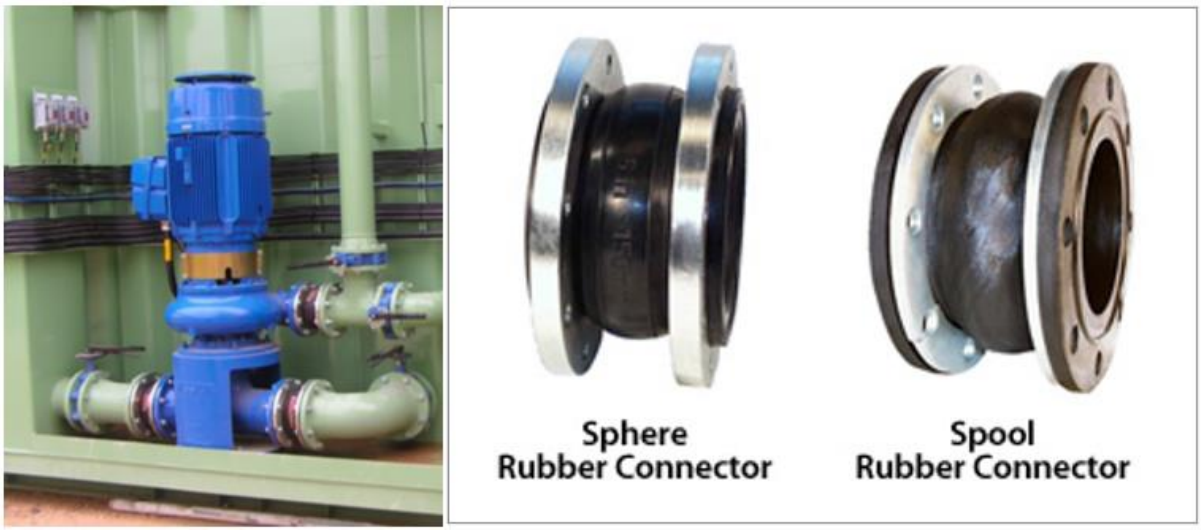


Figure 9. Indicative flexible coupling (Image from IADG)

7.5 UNIT ENTRY DOORS

Where an entry door is incorporated into a wall that separates a tenancy from a common area such as a Lobby/Foyer, that door must achieve an acoustic rating of no less than R_w 30. Install a solid core timber door no less than 35 mm thick with Raven RP10 Si (perimeter) and RP99 Si (door bottom) acoustic seals or an approved equivalent.

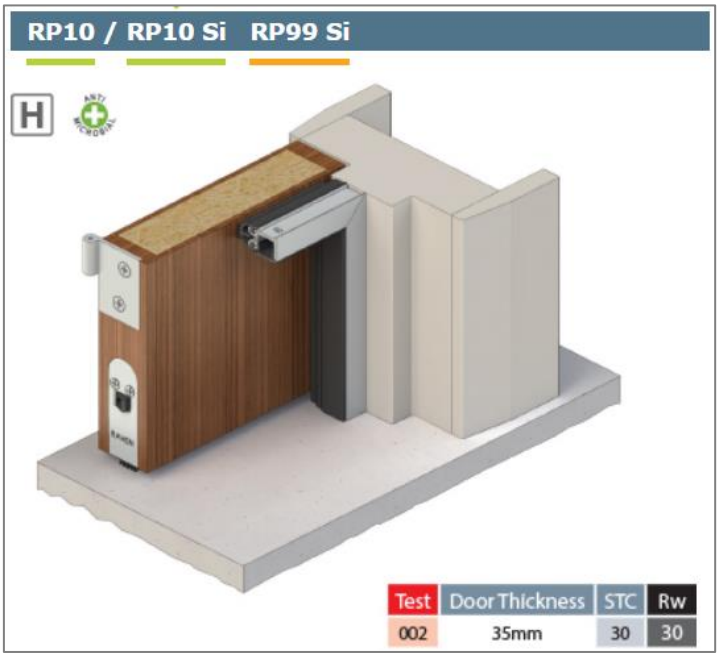


Figure 10. Indicative door and sealing arrangement (Raven)

8.0 CONCLUSION

Koikas Acoustics was requested to conduct an acoustical assessment and prepare a report for the proposed mixed-use development at 31 Santley Crescent & 2A Bringelly Road, Kingswood NSW. The acoustical report is to accompany a development application to be submitted to Penrith City Council.

The assessment considers potential noise impacts to future occupants of the development, and to surrounding residents such that acceptable acoustic amenity is maintained.

Acoustic planning levels have been referenced from current SEPPI, NSW DoP, EPA, and BCA acoustic planning guidelines and requirements.

The included recommendations are based on designs prepared by Gus Fares Architects.

The conclusions reached in this acoustical report should assist Council in making their determination of the proposal. A further detailed acoustical report may be required for the CC submission should the building design be amended, or as required by Council.

Of the assessed components of noise, the following conclusions have been reached:

- The building can be sufficiently insulated against existing external sources of noise in the area such as road traffic through the use of acoustic glazing. Recommended glazing systems are provided in this report. These recommendations should be verified before construction.
- A detailed assessment of mechanical plant noise should be prepared for the subject development before construction. Where air conditioning and other mechanical ventilation systems are not proposed, the recommendations provided in this report would be voided.
- Acoustical treatment options for the common floors and services partitions included within this report would be adequate for satisfying the sound insulation provisions of the BCA or Council's requirements.

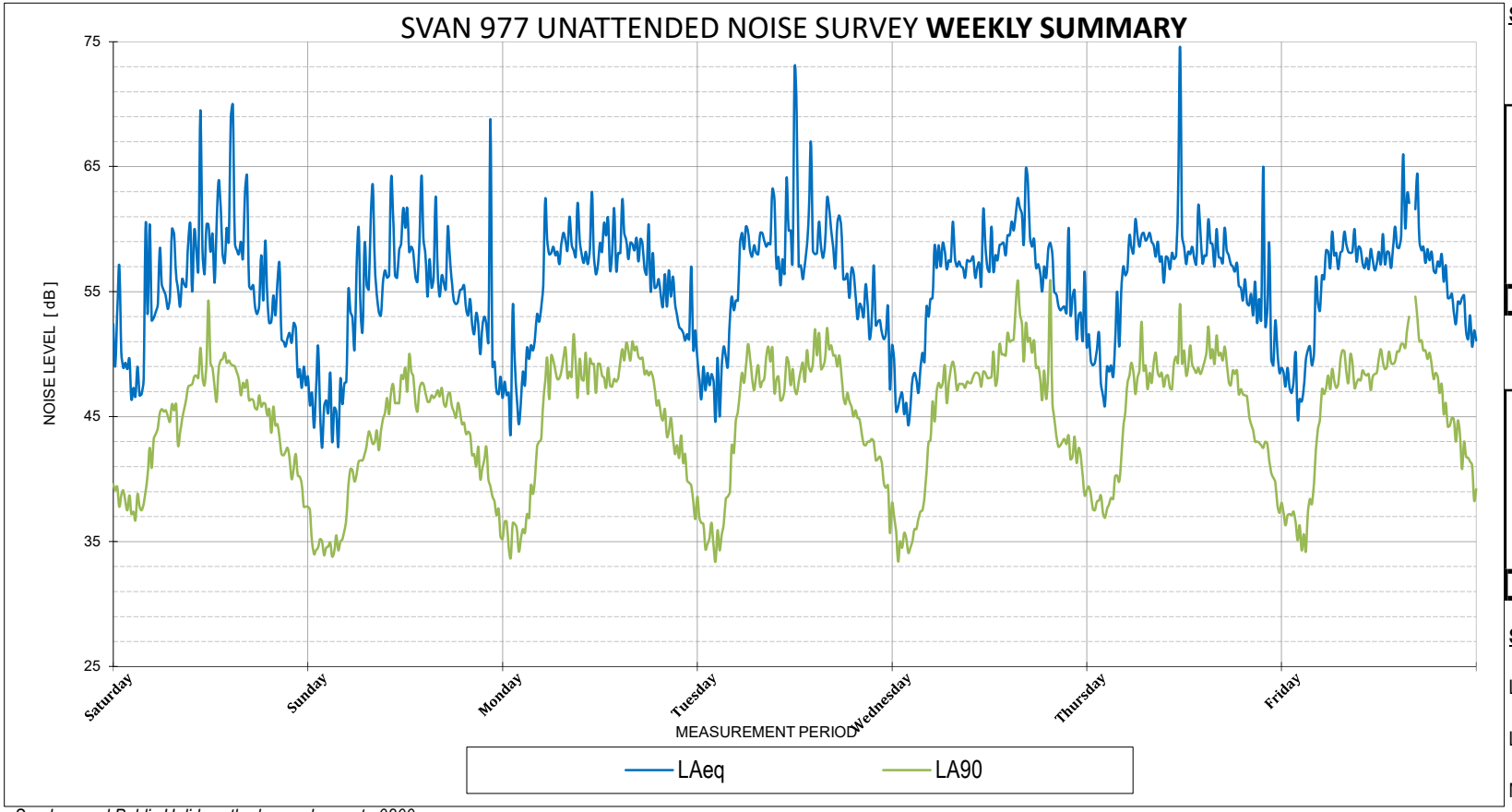
In our professional opinion, there is sufficient scope within the proposed building design to achieve the applied acoustic planning guidelines.

APPENDIX A

APPENDIX A

APPENDIX A

WEEKLY SUMMARY **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **PERIOD:** 25th September - 1st October 2021



Sundays and Public Holidays the hours change to 0800

SUMMARY OF AMBIENT LEVELS

	LA90 Daytime	*LA90* Evening	*LA90* Night-time
Day 1	46	42	38
Day 2	43	41	34
Day 3	47	42	35
Day 4	47	43	35
Day 5	48	43	35
Day 6	48	43	38
Day 7	48	44	36
RBL	**47**	**43**	**35**

	LAeq Daytime	*LAeq* Evening	*LAeq* Night-time
Day 1	61	55	54
Day 2	59	54	53
Day 3	59	56	57
Day 4	62	55	54
Day 5	59	56	54
Day 6	61	57	55
Day 7	59	56	54
Average	**60**	**56**	**54**

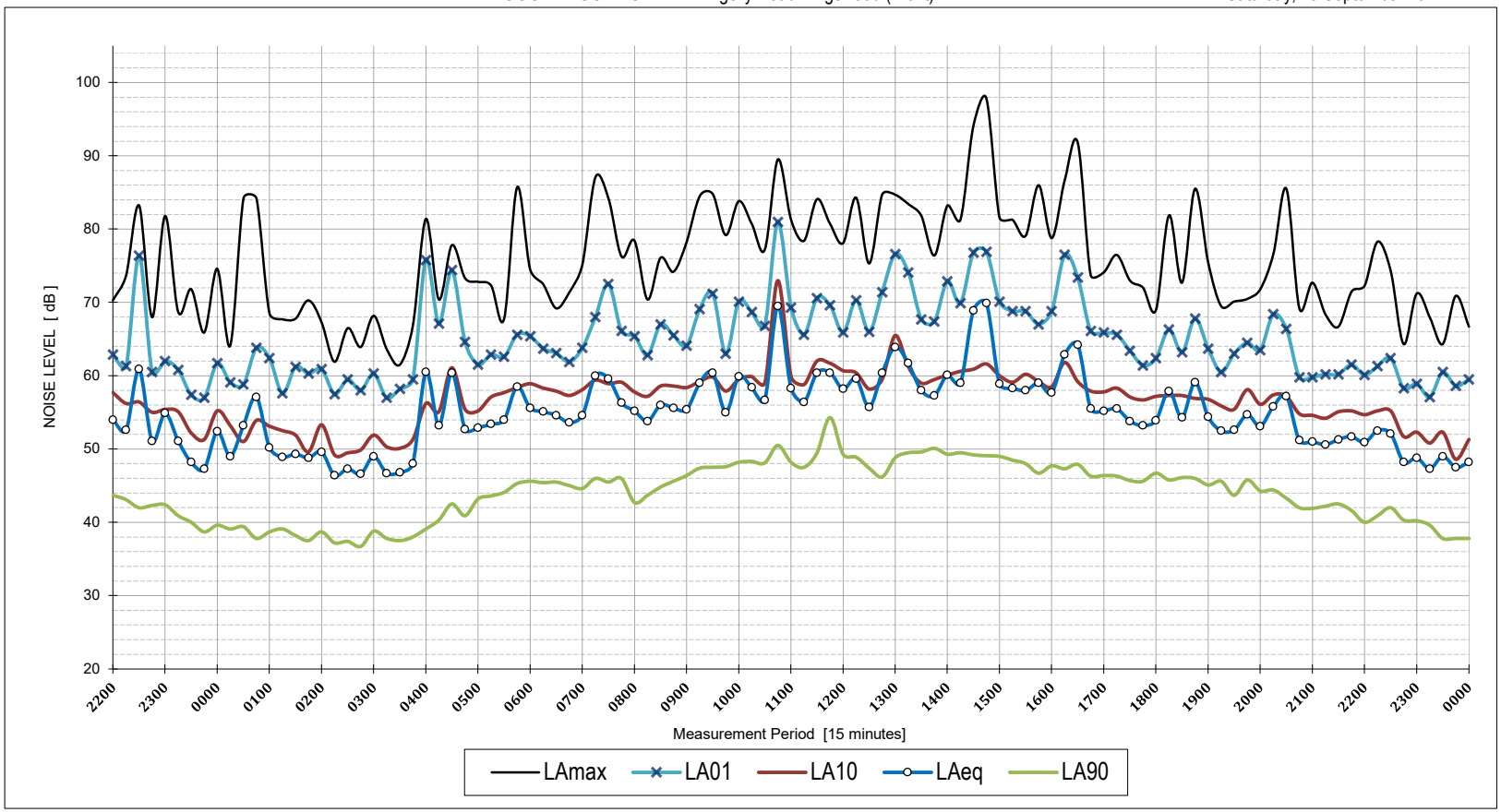
SUMMARY OF TRAFFIC LEVELS

LAeq 15 hrs	0700-2200	59	dB
LAeq 9 hrs	2200-0700	54	dB
Max LAeq 1 hr	0700-2200	61	dB
Max LAeq 1 hr	2200-0700	58	dB

Maximum noise events as defined in the Environmental Noise Management Manual 7 day average - [LAmax - LAeq ≥ 15]	32

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 1 **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **DATE:** Saturday, 25 September 2021



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	46	dB
LA90 Evening	1800-2200	42	dB
LA90 Night-time	2200-0700	38	dB
LAeq Daytime	0700-1800	61	dB
LAeq Evening	1800-2200	55	dB
LAeq Night-time	2200-0700	54	dB

TRAFFIC & MISC. NOISE METRICS

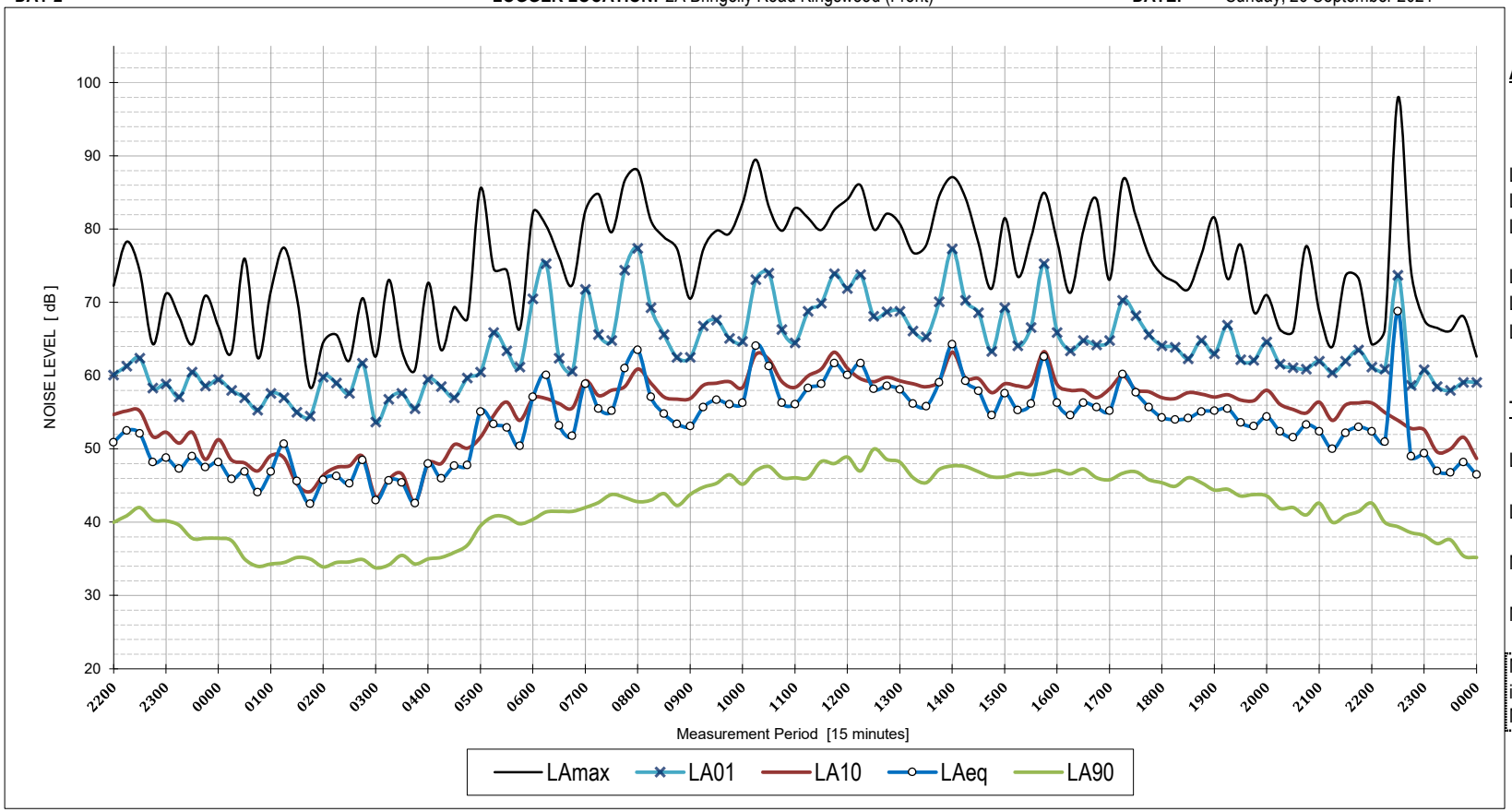
LAeq 15 hours	0700-2200	60	dB
LAeq 9 hours	2200-0700	54	dB
Max LAeq 1 hour	0700-2200	64	dB
Max LAeq 1 hour	2200-0700	57	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	33

	Period		Frequency [Hz]									
Descritpor	Start	End	31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min LA90 Daytime	7:00 AM	6:00 PM	18	31	33	34	39	42	38	31	21	46
10% min LA90 Evening	6:00 PM	10:00 PM	13	25	29	31	35	38	34	26	19	42
10% min LA90 Night	10:00 PM	7:00 AM	8	21	25	27	32	34	28	21	18	38
10% min LA90 Period	7:00 AM	10:00 PM	15	27	30	32	37	40	36	28	20	43
10% min LA90 Period	10:00 PM	7:00 AM	8	21	25	27	32	34	28	21	18	38
LAeq 15 hours	7:00 AM	10:00 PM	27	46	50	48	50	56	54	51	45	60
LAeq 9 hours	10:00 PM	7:00 AM	21	36	40	42	46	50	49	43	34	54
Max LAeq 1 hour Day	7:00 AM	10:00 PM	31	48	51	50	53	58	57	55	47	64
Max LAeq 1 hour Night	10:00 PM	7:00 AM	24	38	42	43	48	52	50	46		

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 2 **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **DATE:** Sunday, 26 September 2021



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	43	dB
LA90 Evening	1800-2200	41	dB
LA90 Night-time	2200-0700	34	dB
LAeq Daytime	0800-1800	59	dB
LAeq Evening	1800-2200	54	dB
LAeq Night-time	2200-0800	53	dB

TRAFFIC & MISC. NOISE METRICS

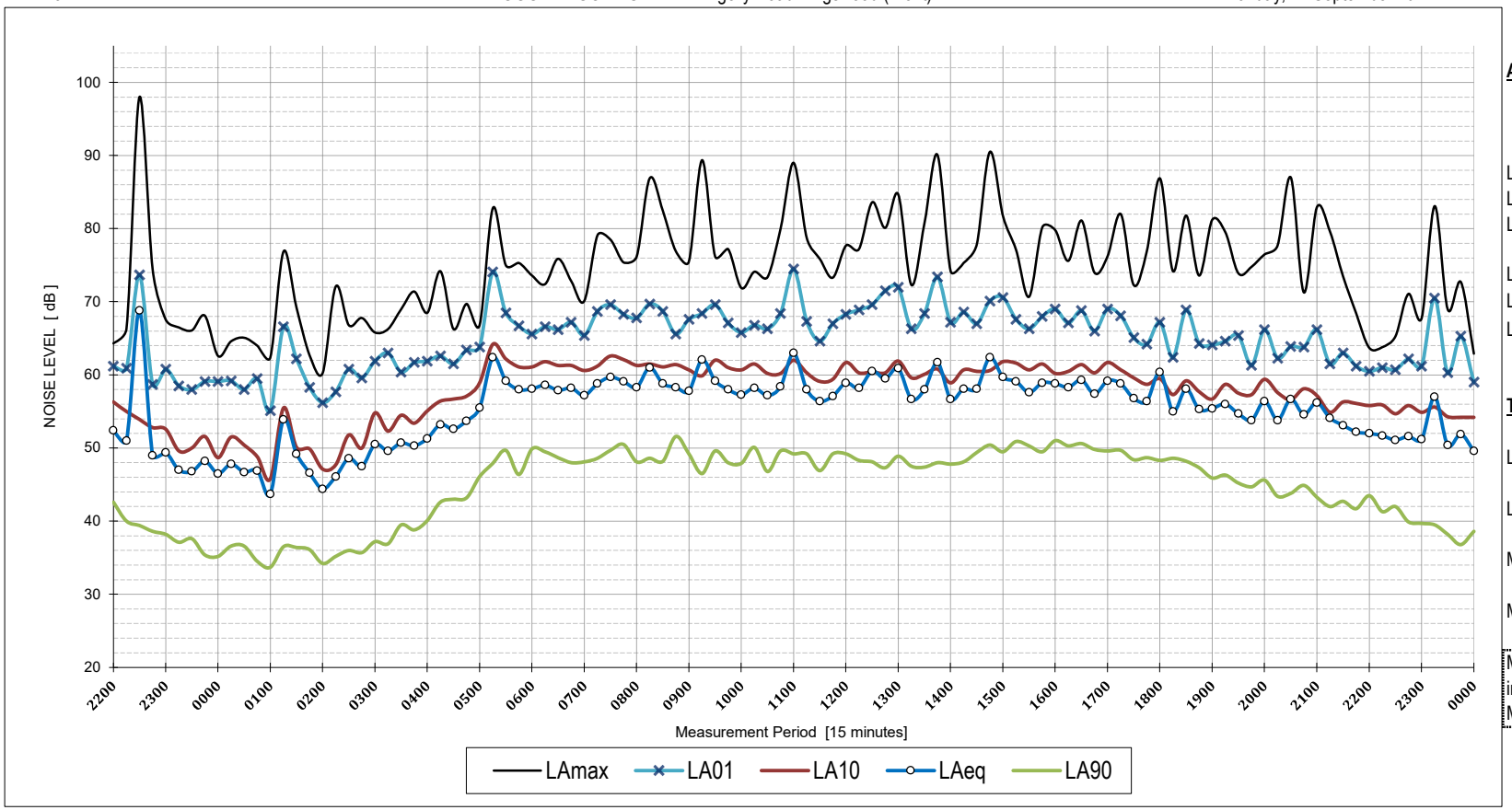
LAeq 15 hours	0700-2200	58	dB
LAeq 9 hours	2200-0700	51	dB
Max LAeq 1 hour	0700-2200	61	dB
Max LAeq 1 hour	2200-0700	54	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	36

	Period		Frequency [Hz]									
Descritpor	Start	End	31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min LA90 Daytime	7:00 AM	6:00 PM	15	28	30	31	36	39	36	29	20	43
10% min LA90 Evening	6:00 PM	10:00 PM	11	24	28	31	34	37	33	25	18	41
10% min LA90 Night	10:00 PM	7:00 AM	7	19	22	24	27	31	25	21	18	34
10% min LA90 Period	7:00 AM	10:00 PM	13	25	28	30	35	39	35	28	19	42
10% min LA90 Period	10:00 PM	7:00 AM	7	19	22	24	27	31	25	21	18	34
LAeq 15 hours	7:00 AM	10:00 PM	26	41	46	46	48	52	50	53	46	58
LAeq 9 hours	10:00 PM	7:00 AM	18	33	36	35	40	46	45	45	37	51
Max LAeq 1 hour Day	7:00 AM	10:00 PM	27	42	47	46	50	53	52	55	48	61
Max LAeq 1 hour Night	10:00 PM	7:00 AM	20	34	37	37	42	48	47	47		

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 3 **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **DATE:** Monday, 27 September 2021



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	47	dB
LA90 Evening	1800-2200	42	dB
LA90 Night-time	2200-0700	35	dB
LAeq Daytime	0700-1800	59	dB
LAeq Evening	1800-2200	56	dB
LAeq Night-time	2200-0700	57	dB

TRAFFIC & MISC. NOISE METRICS

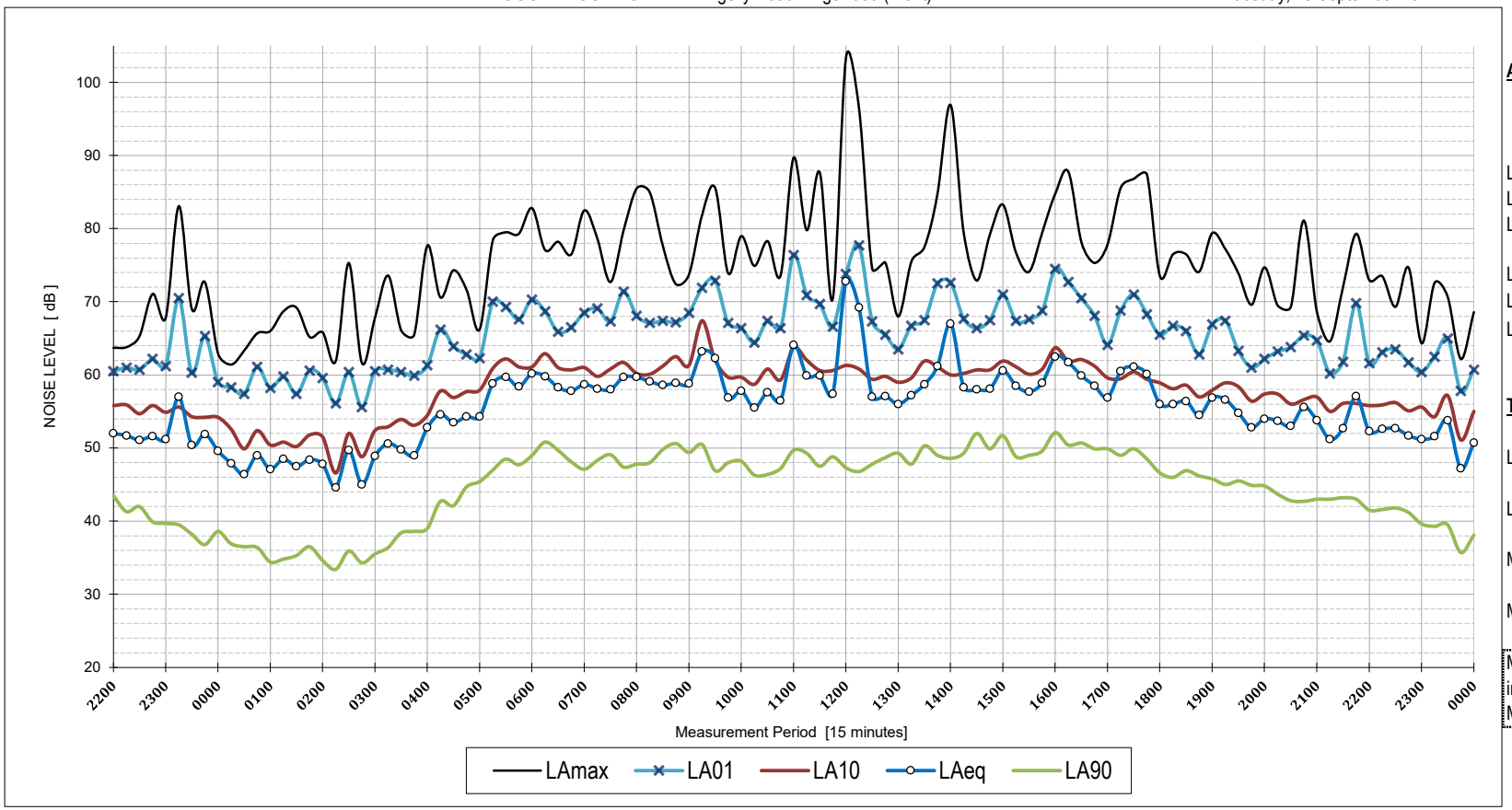
LAeq 15 hours	0700-2200	58	dB
LAeq 9 hours	2200-0700	57	dB
Max LAeq 1 hour	0700-2200	60	dB
Max LAeq 1 hour	2200-0700	60	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	31

	Period		Frequency [Hz]									
Descritpor	Start	End	31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min LA90 Daytime	7:00 AM	6:00 PM	21	33	34	36	40	44	40	33	22	47
10% min LA90 Evening	6:00 PM	10:00 PM	13	26	29	31	36	39	34	26	19	42
10% min LA90 Night	10:00 PM	7:00 AM	7	20	23	25	29	31	27	20	18	35
10% min LA90 Period	7:00 AM	10:00 PM	16	29	32	34	38	41	37	29	20	45
10% min LA90 Period	10:00 PM	7:00 AM	7	20	23	25	29	31	27	20	17	35
LAeq 15 hours	7:00 AM	10:00 PM	28	44	47	47	50	54	51	48	41	58
LAeq 9 hours	10:00 PM	7:00 AM	23	39	43	42	46	53	51	43	34	57
Max LAeq 1 hour Day	7:00 AM	10:00 PM	29	45	48	48	52	55	52	48	40	60
Max LAeq 1 hour Night	7:00 AM	10:00 PM	29	44	48	47	51	56	53	47		

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 4 **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **DATE:** Tuesday, 28 September 2021



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	47	dB
LA90 Evening	1800-2200	43	dB
LA90 Night-time	2200-0700	35	dB
LAeq Daytime	0700-1800	62	dB
LAeq Evening	1800-2200	55	dB
LAeq Night-time	2200-0700	54	dB

TRAFFIC & MISC. NOISE METRICS

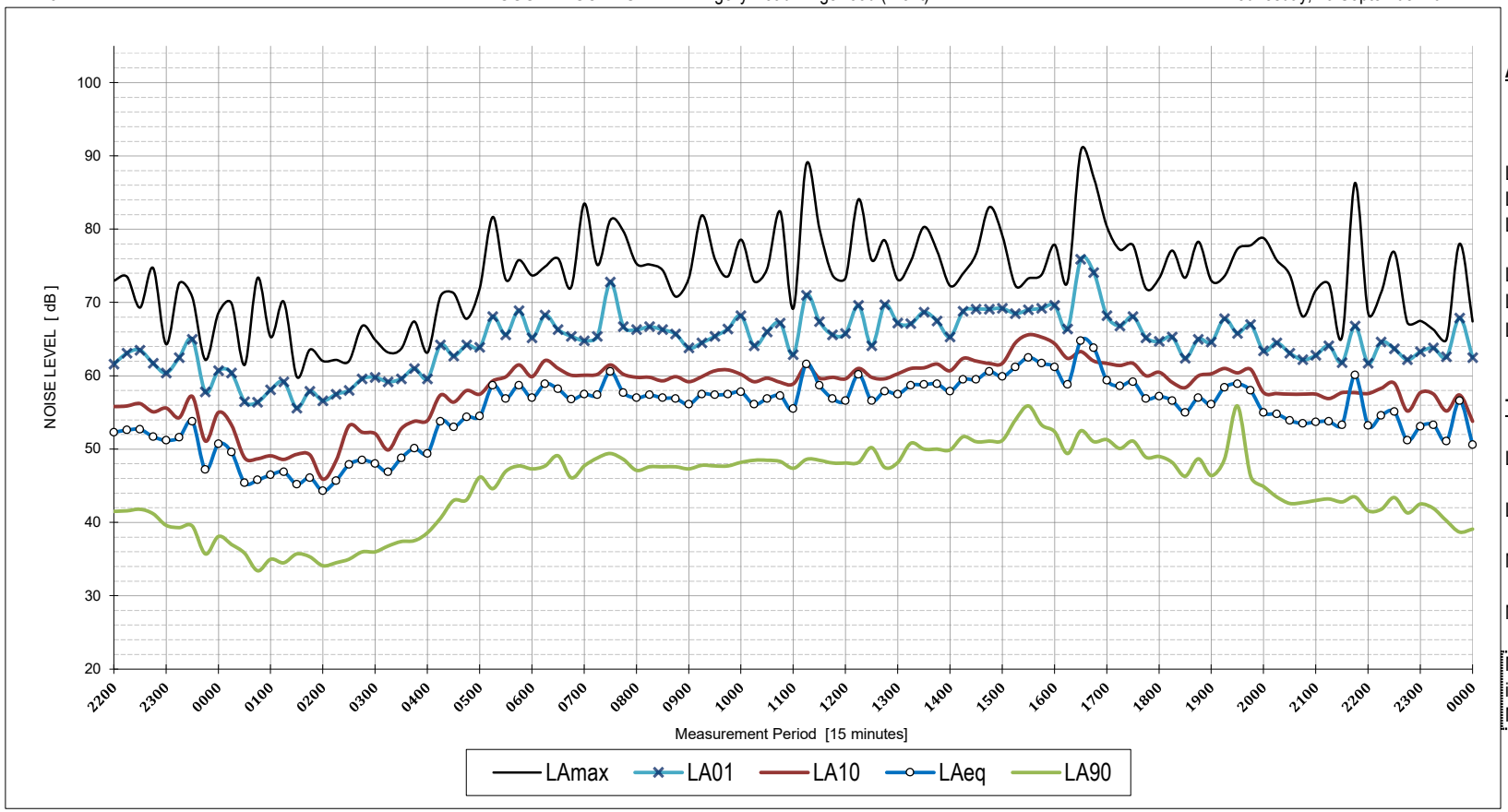
LAeq 15 hours	0700-2200	61	dB
LAeq 9 hours	2200-0700	54	dB
Max LAeq 1 hour	0700-2200	63	dB
Max LAeq 1 hour	2200-0700	59	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	30

	Period		Frequency [Hz]									
Descritpor	Start	End	31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min LA90 Daytime	7:00 AM	6:00 PM	21	33	34	35	39	43	40	34	23	47
10% min LA90 Evening	6:00 PM	10:00 PM	14	26	29	31	36	40	35	28	19	43
10% min LA90 Night	10:00 PM	7:00 AM	6	19	23	24	28	31	25	20	18	35
10% min LA90 Period	7:00 AM	10:00 PM	14	27	29	32	37	40	36	29	20	44
10% min LA90 Period	10:00 PM	7:00 AM	6	19	23	24	28	31	25	20	18	35
LAeq 15 hours	7:00 AM	10:00 PM	28	43	48	47	52	57	55	50	43	61
LAeq 9 hours	10:00 PM	7:00 AM	24	39	43	42	46	51	47	42	33	54
Max LAeq 1 hour Day	7:00 AM	10:00 PM	30	45	49	48	54	59	56	49	39	63
Max LAeq 1 hour Night	10:00 PM	7:00 AM	28	43	48	46	50	55	52	46		

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 5 **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **DATE:** Wednesday, 29 September 2021



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	48	dB
LA90 Evening	1800-2200	43	dB
LA90 Night-time	2200-0700	35	dB
LAeq Daytime	0700-1800	59	dB
LAeq Evening	1800-2200	56	dB
LAeq Night-time	2200-0700	54	dB

TRAFFIC & MISC. NOISE METRICS

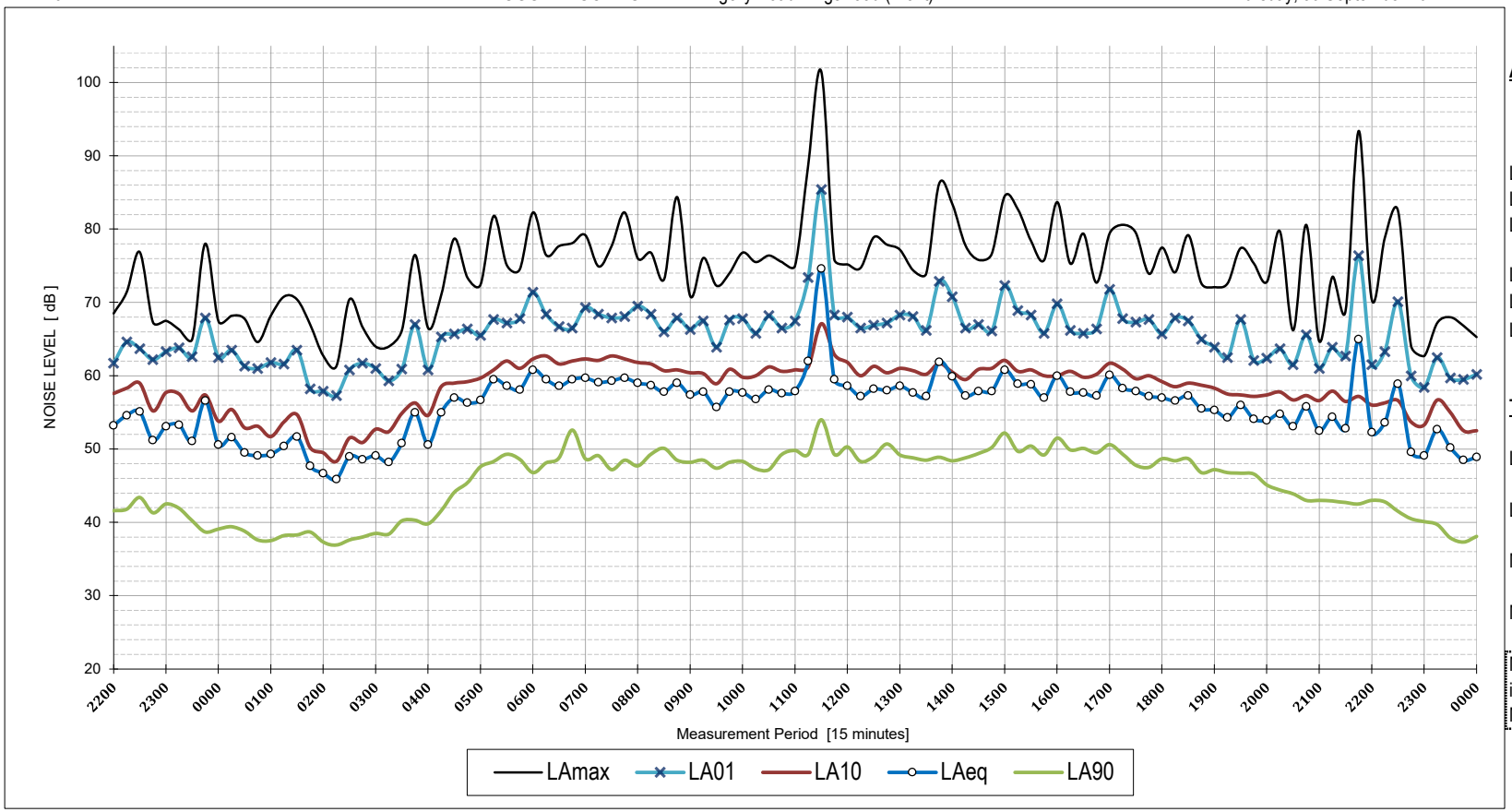
LAeq 15 hours	0700-2200	59	dB
LAeq 9 hours	2200-0700	54	dB
Max LAeq 1 hour	0700-2200	61	dB
Max LAeq 1 hour	2200-0700	58	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	30

	Period		Frequency [Hz]									
Descritpor	Start	End	31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min LA90 Daytime	7:00 AM	6:00 PM	21	32	34	35	40	44	41	35	24	48
10% min LA90 Evening	6:00 PM	10:00 PM	13	25	29	31	35	39	35	28	19	43
10% min LA90 Night	10:00 PM	7:00 AM	6	19	23	24	28	32	25	21	18	35
10% min LA90 Period	7:00 AM	10:00 PM	13	26	30	32	36	40	36	29	20	44
10% min LA90 Period	10:00 PM	7:00 AM	6	19	23	24	28	31	25	21	18	35
LAeq 15 hours	7:00 AM	10:00 PM	28	44	47	46	50	55	52	48	40	59
LAeq 9 hours	10:00 PM	7:00 AM	23	38	42	41	45	50	46	40	31	53
Max LAeq 1 hour Day	7:00 AM	10:00 PM	28	44	49	47	51	57	55	51	44	61
Max LAeq 1 hour Night	10:00 PM	7:00 AM	27	43	47	45	49	54	51	45		

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 6 **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **DATE:** Thursday, 30 September 2021



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0800-1800	48	dB
LA90 Evening	1800-2200	43	dB
LA90 Night-time	2200-0800	38	dB
LAeq Daytime	0700-1800	61	dB
LAeq Evening	1800-2200	57	dB
LAeq Night-time	2200-0700	55	dB

TRAFFIC & MISC. NOISE METRICS

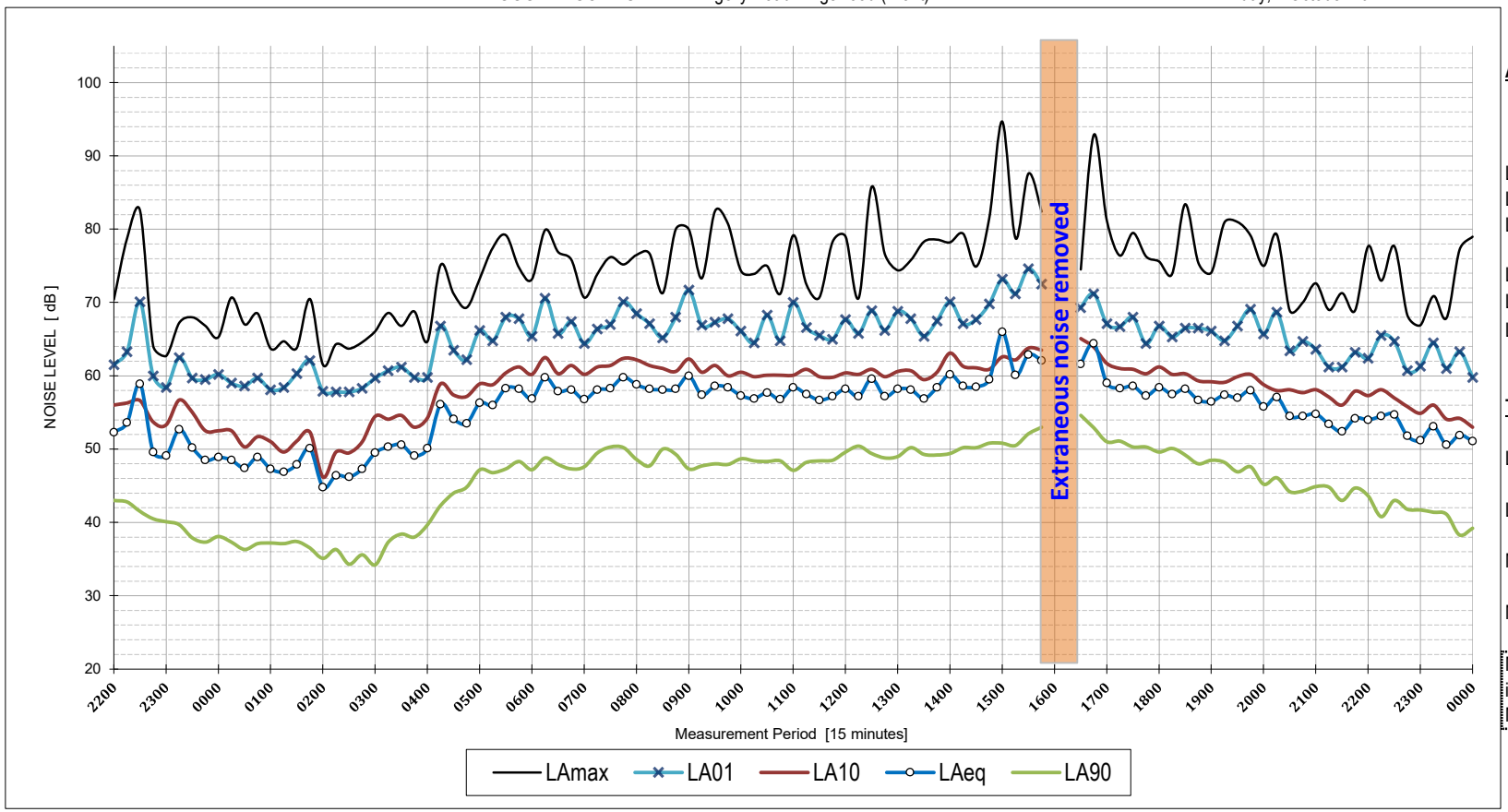
LAeq 15 hours	0700-2200	61	dB
LAeq 9 hours	2200-0700	55	dB
Max LAeq 1 hour	0700-2200	60	dB
Max LAeq 1 hour	2200-0700	59	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	32

	Period		Frequency [Hz]									
Descritpor	**Start**	**End**	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Total A**
10% min LA90 Daytime	8:00 AM	6:00 PM	21	33	35	36	40	44	41	34	24	48
10% min LA90 Evening	6:00 PM	10:00 PM	13	26	30	32	36	39	35	28	19	43
10% min LA90 Night	10:00 PM	8:00 AM	7	19	24	29	30	34	30	24	18	38
10% min LA90 Period	7:00 AM	10:00 PM	16	27	31	32	37	41	37	30	20	44
10% min LA90 Period	10:00 PM	7:00 AM	6	18	24	29	30	34	30	24	18	38
LAeq 15 hours	7:00 AM	10:00 PM	30	45	50	51	54	56	53	47	39	61
LAeq 9 hours	10:00 PM	7:00 AM	26	39	42	42	47	51	49	44	35	55
Max LAeq 1 hour Day	7:00 AM	10:00 PM	28	44	48	48	52	55	52	46	38	60
Max LAeq 1 hour Night	10:00 PM	7:00 AM	29	44	47	46	50	56	53	47		

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 7 **LOGGER LOCATION:** 2A Bringelly Road Kingswood (Front) **DATE:** Friday, 1 October 2021



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	48	dB
LA90 Evening	1800-2200	44	dB
LA90 Night-time	2200-0700	36	dB
LAeq Daytime	0700-1800	59	dB
LAeq Evening	1800-2200	56	dB
LAeq Night-time	2200-0700	54	dB

TRAFFIC & MISC. NOISE METRICS

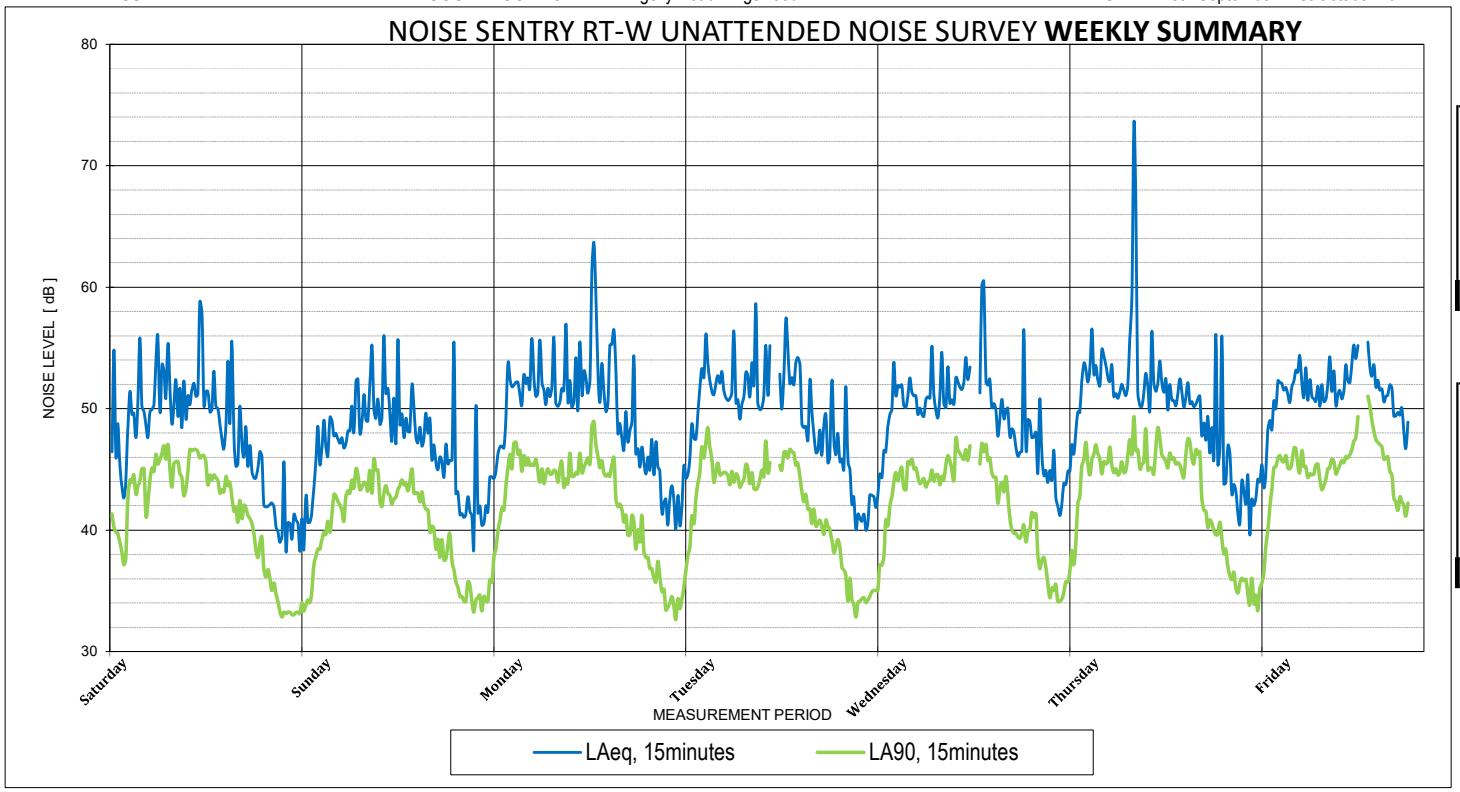
LAeq 15 hours	0700-2200	59	dB
LAeq 9 hours	2200-0700	54	dB
Max LAeq 1 hour	0700-2200	62	dB
Max LAeq 1 hour	2200-0700	57	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	32

	Period		Frequency [Hz]									
Descritpor	Start	End	31.5	63	125	250	500	1000	2000	4000	8000	Total A
10% min LA90 Daytime	7:00 AM	6:00 PM	20	32	34	36	40	44	41	34	24	48
10% min LA90 Evening	6:00 PM	10:00 PM	15	28	31	33	37	41	37	29	20	44
10% min LA90 Night	10:00 PM	7:00 AM	7	20	24	26	30	32	28	22	18	36
10% min LA90 Period	7:00 AM	10:00 PM	16	29	32	34	38	41	38	30	20	45
10% min LA90 Period	10:00 PM	7:00 AM	7	20	24	26	30	32	28	22	18	36
LAeq 15 hours	7:00 AM	10:00 PM	28	44	48	47	50	54	52	49	42	59
LAeq 9 hours	10:00 PM	7:00 AM	22	39	42	42	45	50	47	42	35	54
Max LAeq 1 hour Day	7:00 AM	10:00 PM	29	45	50	50	53	57	55	53	46	62
Max LAeq 1 hour Night	10:00 PM	7:00 AM	26	43	46	45	49	53	50	45		

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

WEEKLY SUMMARY **LOGGER LOCATION:** 2A Bringelly Road Kingswood **PERIOD:** 25th September - 1st October 2021



SUMMARY OF AMBIENT NOISE LEVELS

	LA90 Daytime	*LA90* Evening	*LA90* Night-time
Day 1	43	40	36
Day 2	42	38	33
Day 3	44	39	34
Day 4	44	40	34
Day 5	44	40	34
Day 6	45	40	35
Day 7	44	42	35
RBL	**44**	**40**	**34**

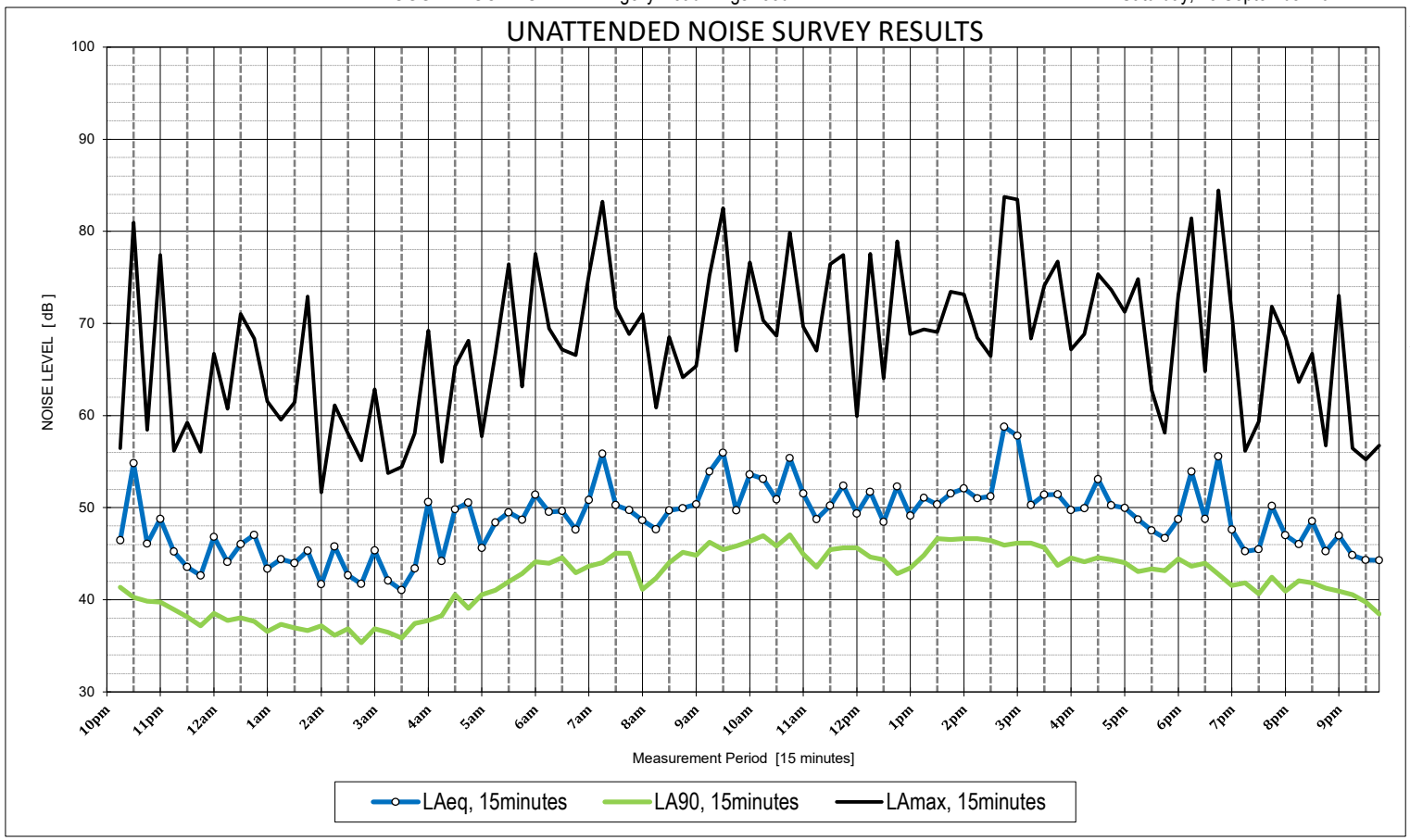
	LAeq Daytime	*LAeq* Evening	*LAeq* Night-time
Day 1	52	49	48
Day 2	50	47	44
Day 3	54	51	48
Day 4	53	49	48
Day 5	53	50	48
Day 6	59	51	49
Day 7	53	50	48
Average	**54**	**50**	**48**

SUMMARY OF TRAFFIC & MISC. NOISE LEVELS

LAeq 15 hrs	0700-2200	54	dB
LAeq 9 hrs	2200-0700	48	dB
Max LAeq 1 hr	0700-2200	54	dB
Max LAeq 1 hr	2200-0700	52	dB

* *Sundays and Public Holidays the hours change to 0800*

DAY 1 **LOGGER LOCATION:** 2A Bringelly Road Kingswood **DATE:** Saturday, 25 September 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	43	dB
LA90 Evening	1800-2200	40	dB
LA90 Night-time	2200-0700	36	dB

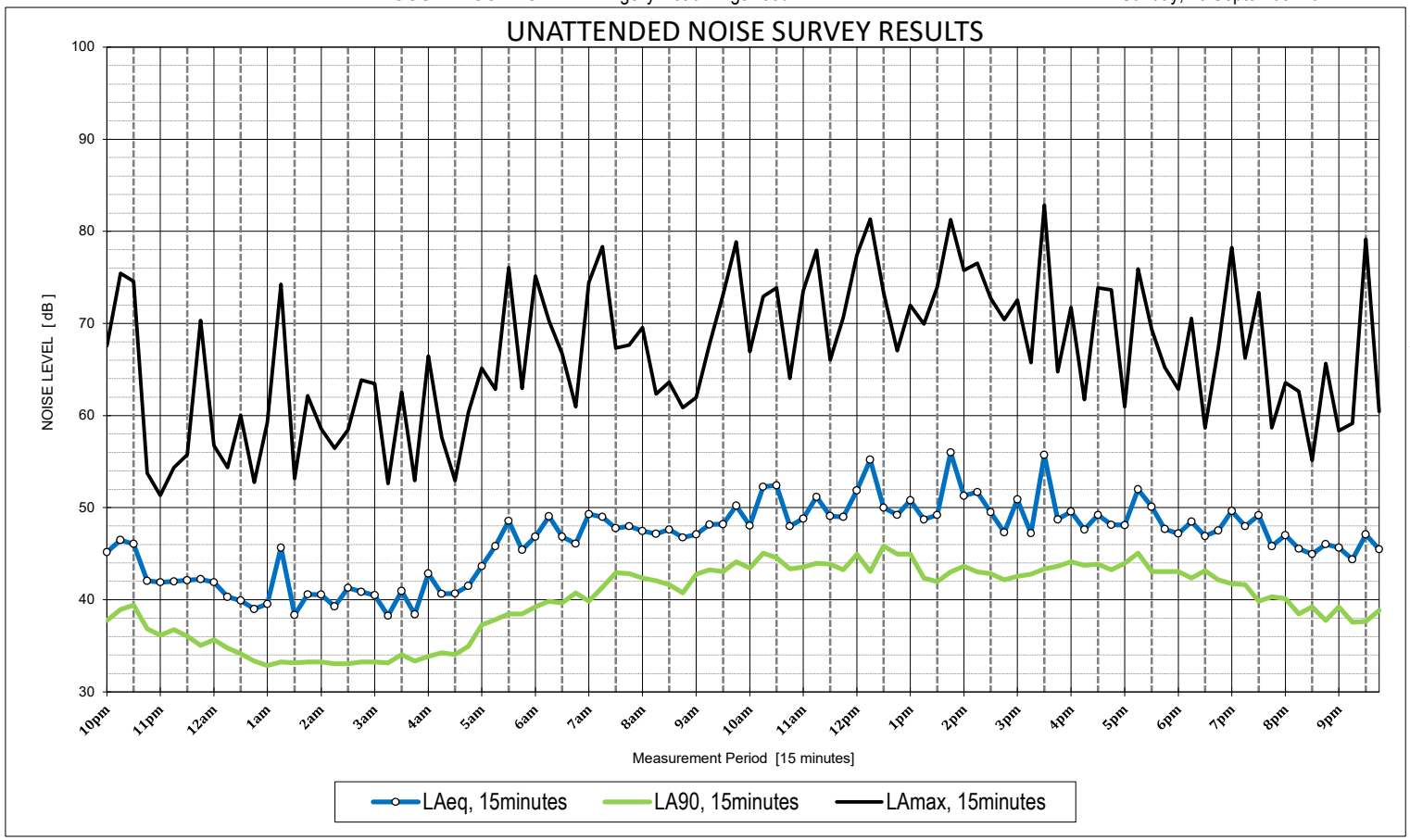
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	52	dB
LAeq Evening	1800-2200	49	dB
LAeq Night-time	2200-0700	48	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	51	dB
LAeq 9 hours	2200-0700	48	dB
Max LAeq 1 hour	0700-2200	54	dB
Max LAeq 1 hour	2200-0700	50	dB

DAY 2 **LOGGER LOCATION:** 2A Bringelly Road Kingswood **DATE:** Sunday, 26 September 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0800-1800	42	dB
LA90 Evening	1800-2200	38	dB
LA90 Night-time	2200-0800	33	dB

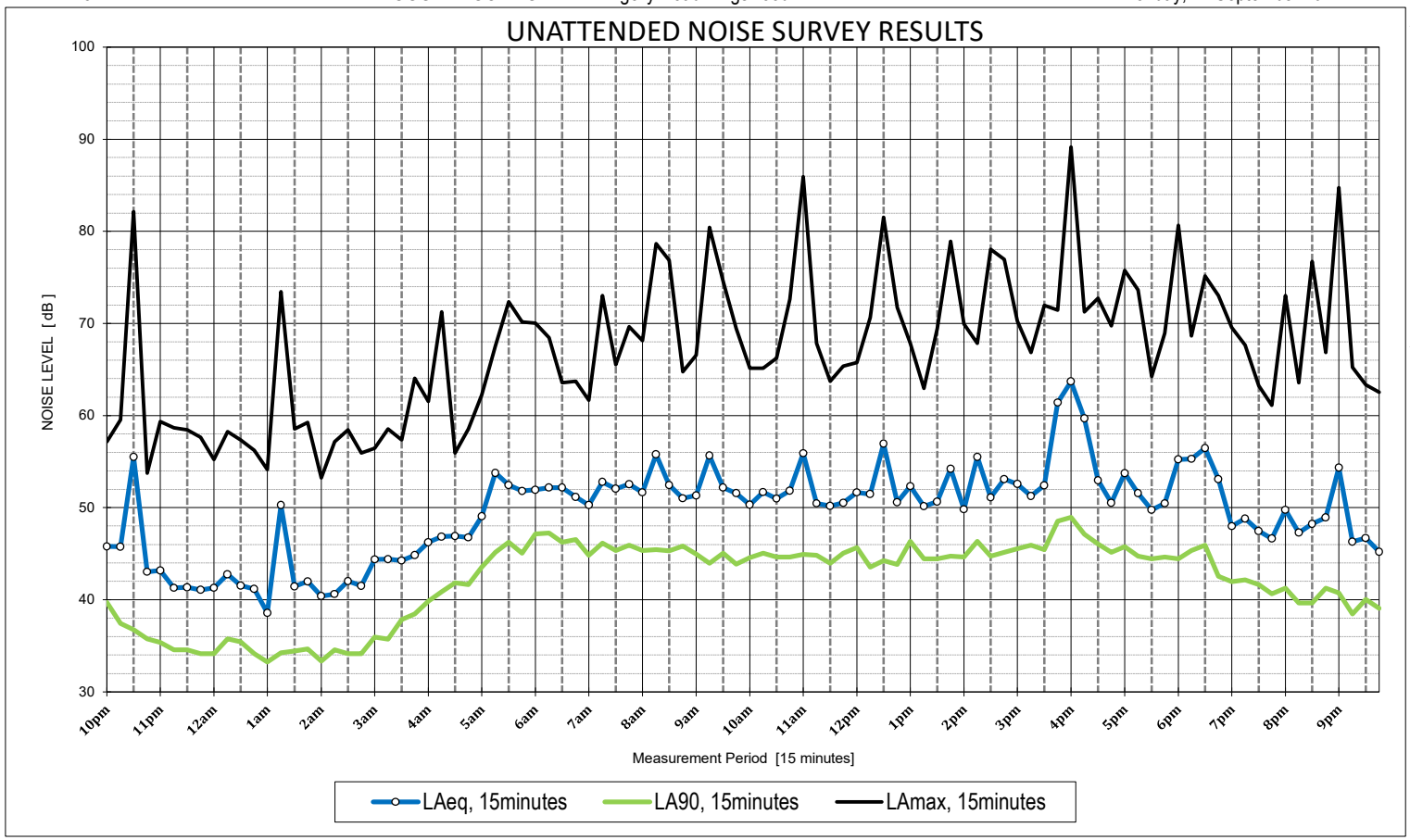
AMBIENT NOISE METRICS

LAeq Daytime	0800-1800	50	dB
LAeq Evening	1800-2200	47	dB
LAeq Night-time	2200-0800	44	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	50	dB
LAeq 9 hours	2200-0700	44	dB
Max LAeq 1 hour	0700-2200	52	dB
Max LAeq 1 hour	2200-0700	47	dB

DAY 3 **LOGGER LOCATION:** 2A Bringelly Road Kingswood **DATE:** Monday, 27 September 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	44	dB
LA90 Evening	1800-2200	39	dB
LA90 Night-time	2200-0700	34	dB

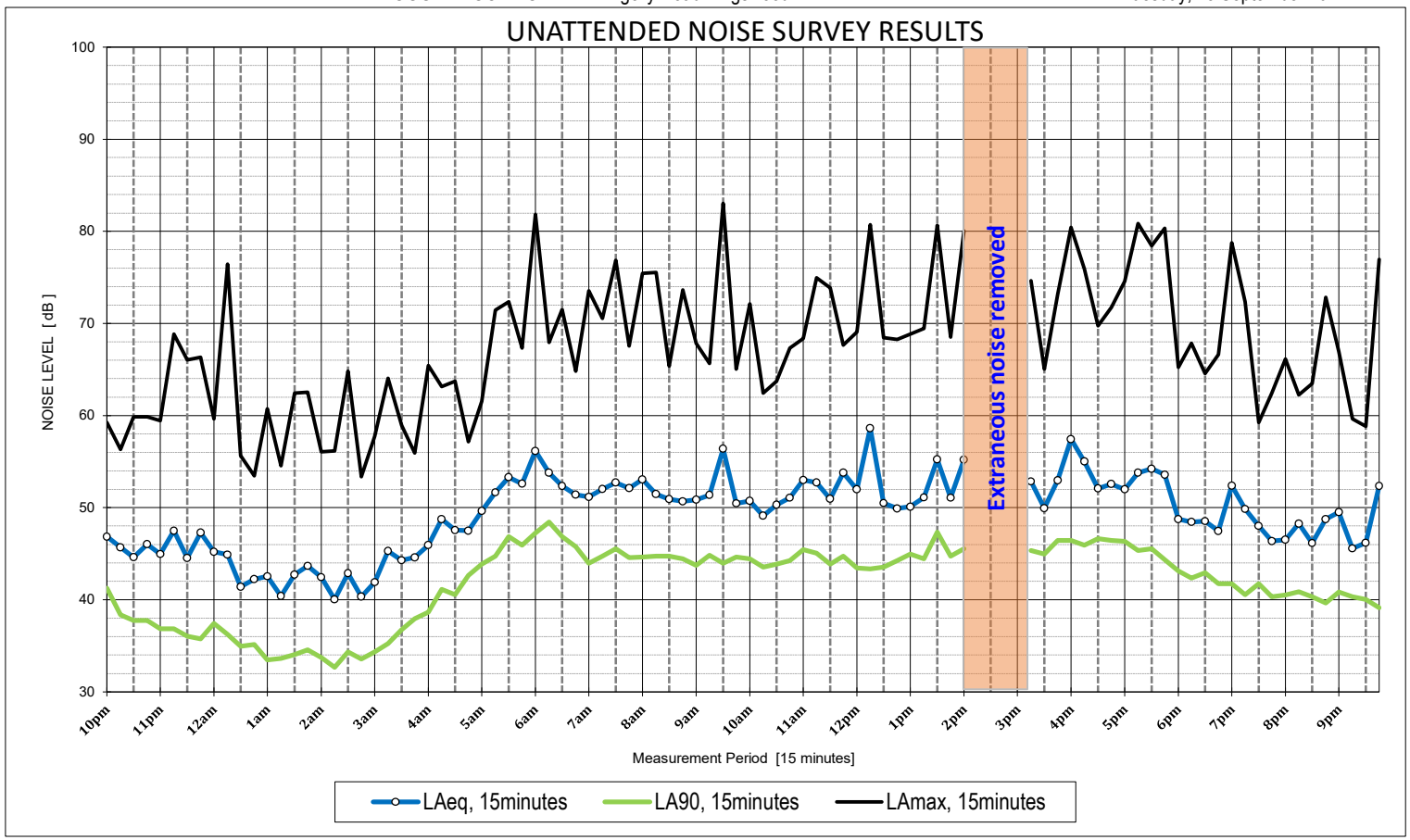
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	54	dB
LAeq Evening	1800-2200	51	dB
LAeq Night-time	2200-0700	48	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	54	dB
LAeq 9 hours	2200-0700	48	dB
Max LAeq 1 hour	0700-2200	55	dB
Max LAeq 1 hour	2200-0700	52	dB

DAY 4 **LOGGER LOCATION:** 2A Bringelly Road Kingswood **DATE:** Tuesday, 28 September 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	44	dB
LA90 Evening	1800-2200	40	dB
LA90 Night-time	2200-0700	34	dB

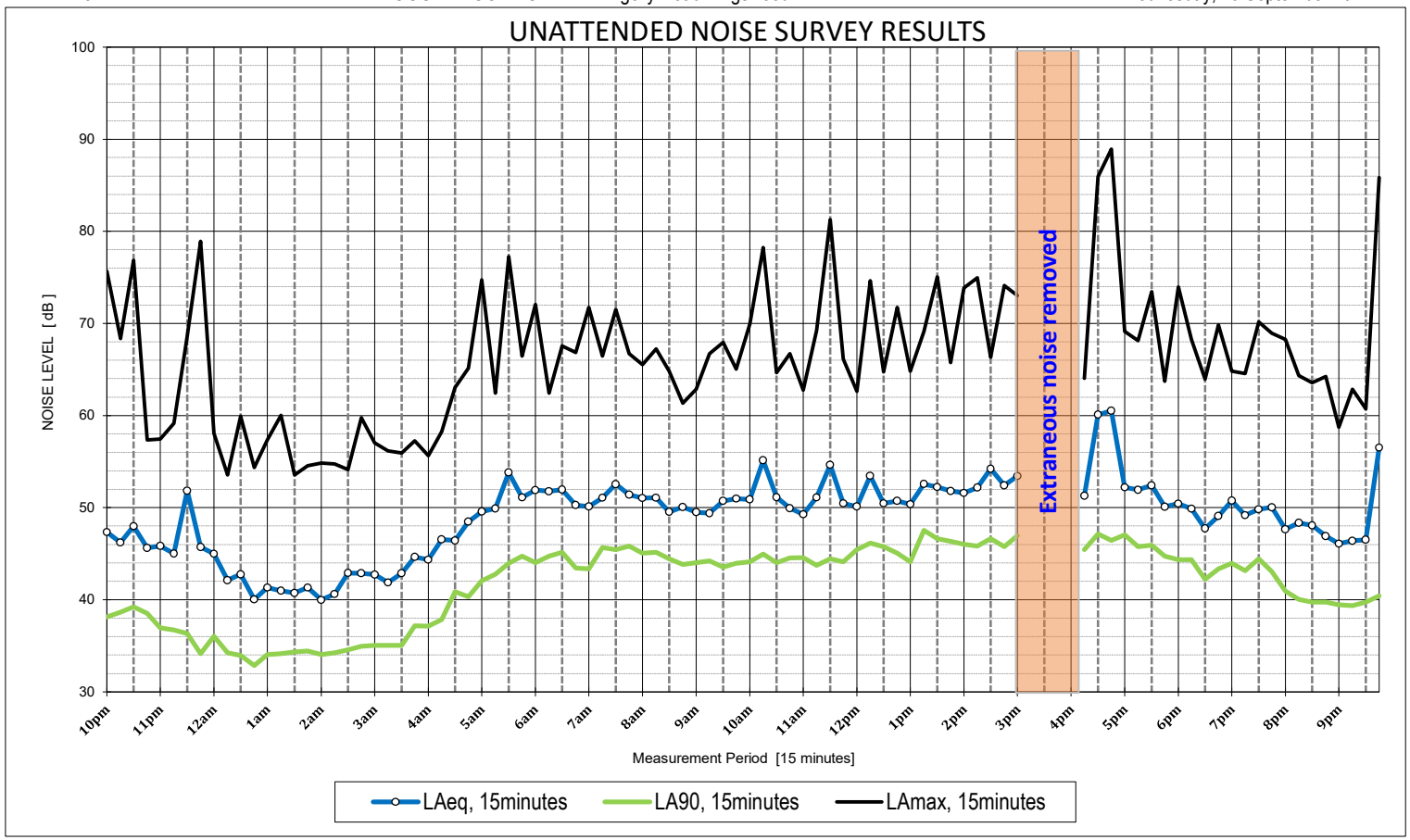
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	53	dB
LAeq Evening	1800-2200	49	dB
LAeq Night-time	2200-0700	48	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	52	dB
LAeq 9 hours	2200-0700	48	dB
Max LAeq 1 hour	0700-2200	54	dB
Max LAeq 1 hour	2200-0700	53	dB

DAY 5 **LOGGER LOCATION:** 2A Bringelly Road Kingswood **DATE:** Wednesday, 29 September 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	44	dB
LA90 Evening	1800-2200	40	dB
LA90 Night-time	2200-0700	34	dB

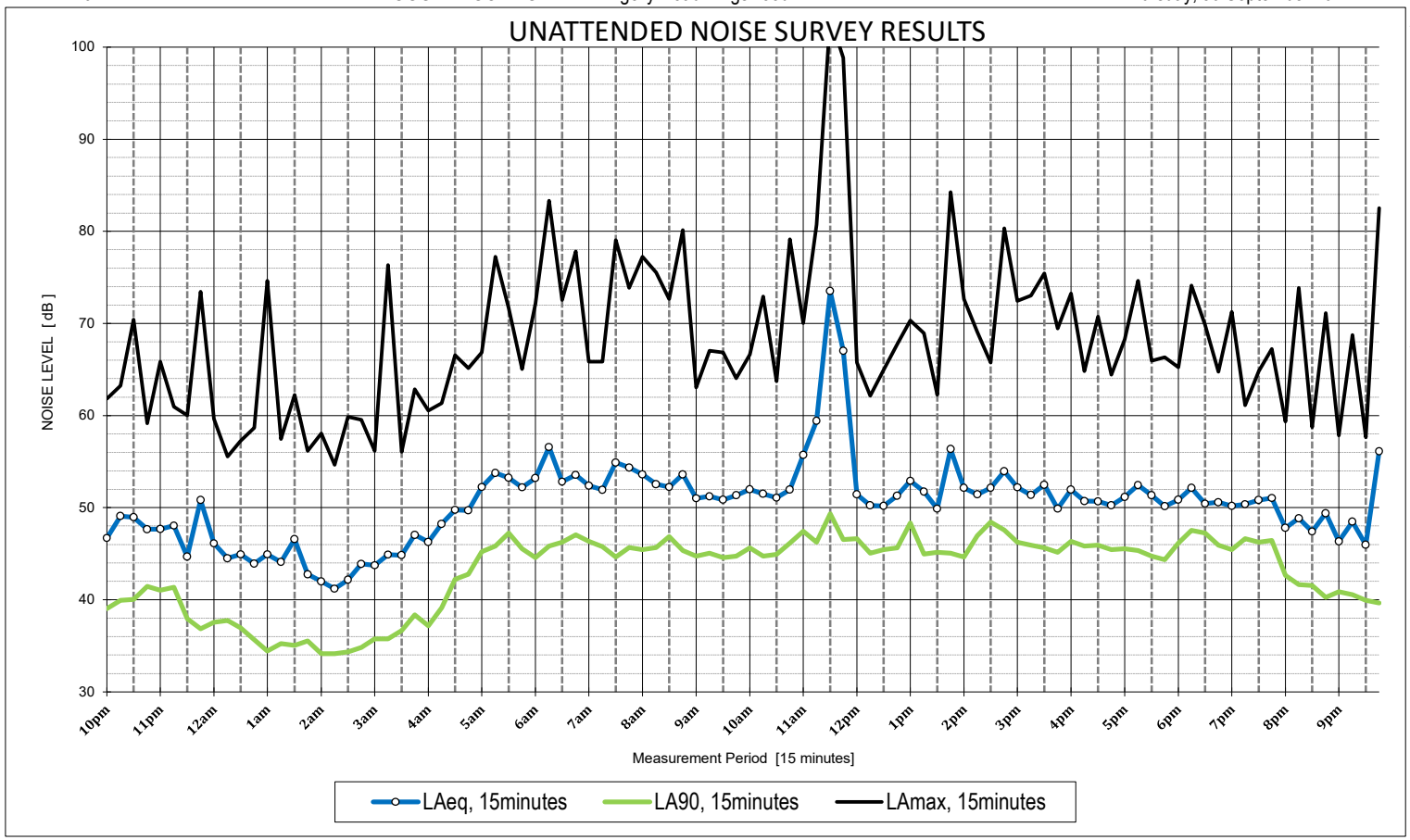
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	53	dB
LAeq Evening	1800-2200	50	dB
LAeq Night-time	2200-0700	48	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	52	dB
LAeq 9 hours	2200-0700	48	dB
Max LAeq 1 hour	0700-2200	53	dB
Max LAeq 1 hour	2200-0700	52	dB

DAY 6 **LOGGER LOCATION:** 2A Bringelly Road Kingswood **DATE:** Thursday, 30 September 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	45	dB
LA90 Evening	1800-2200	40	dB
LA90 Night-time	2200-0700	35	dB

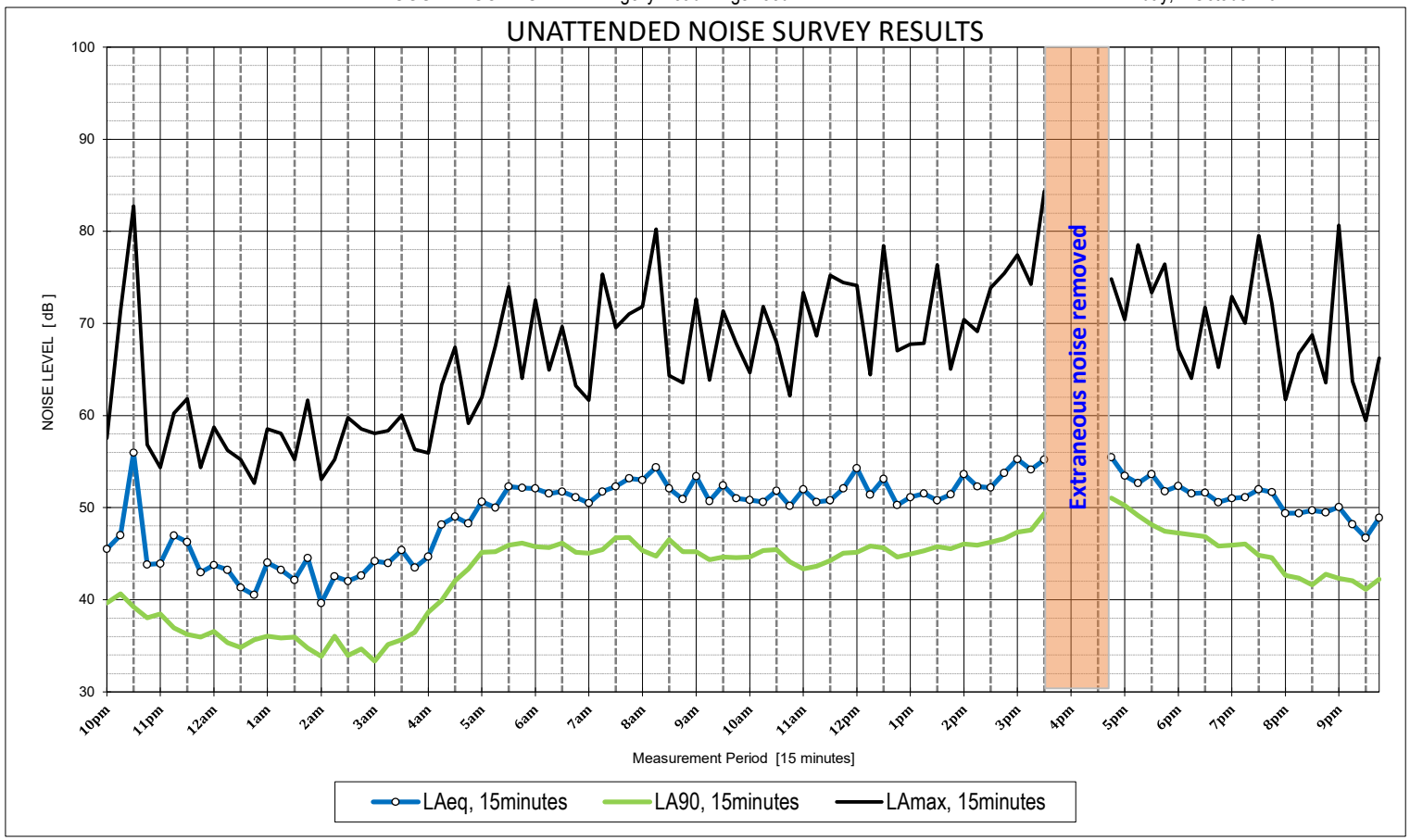
AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	59	dB
LAeq Evening	1800-2200	51	dB
LAeq Night-time	2200-0700	49	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	58	dB
LAeq 9 hours	2200-0700	49	dB
Max LAeq 1 hour	0700-2200	54	dB
Max LAeq 1 hour	2200-0700	53	dB

DAY 7 **LOGGER LOCATION:** 2A Bringelly Road Kingswood **DATE:** Friday, 1 October 2021



AMBIENT BACKGROUND NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	44	dB
LA90 Evening	1800-2200	42	dB
LA90 Night-time	2200-0700	35	dB

AMBIENT NOISE METRICS

LAeq Daytime	0700-1800	53	dB
LAeq Evening	1800-2200	50	dB
LAeq Night-time	2200-0700	48	dB

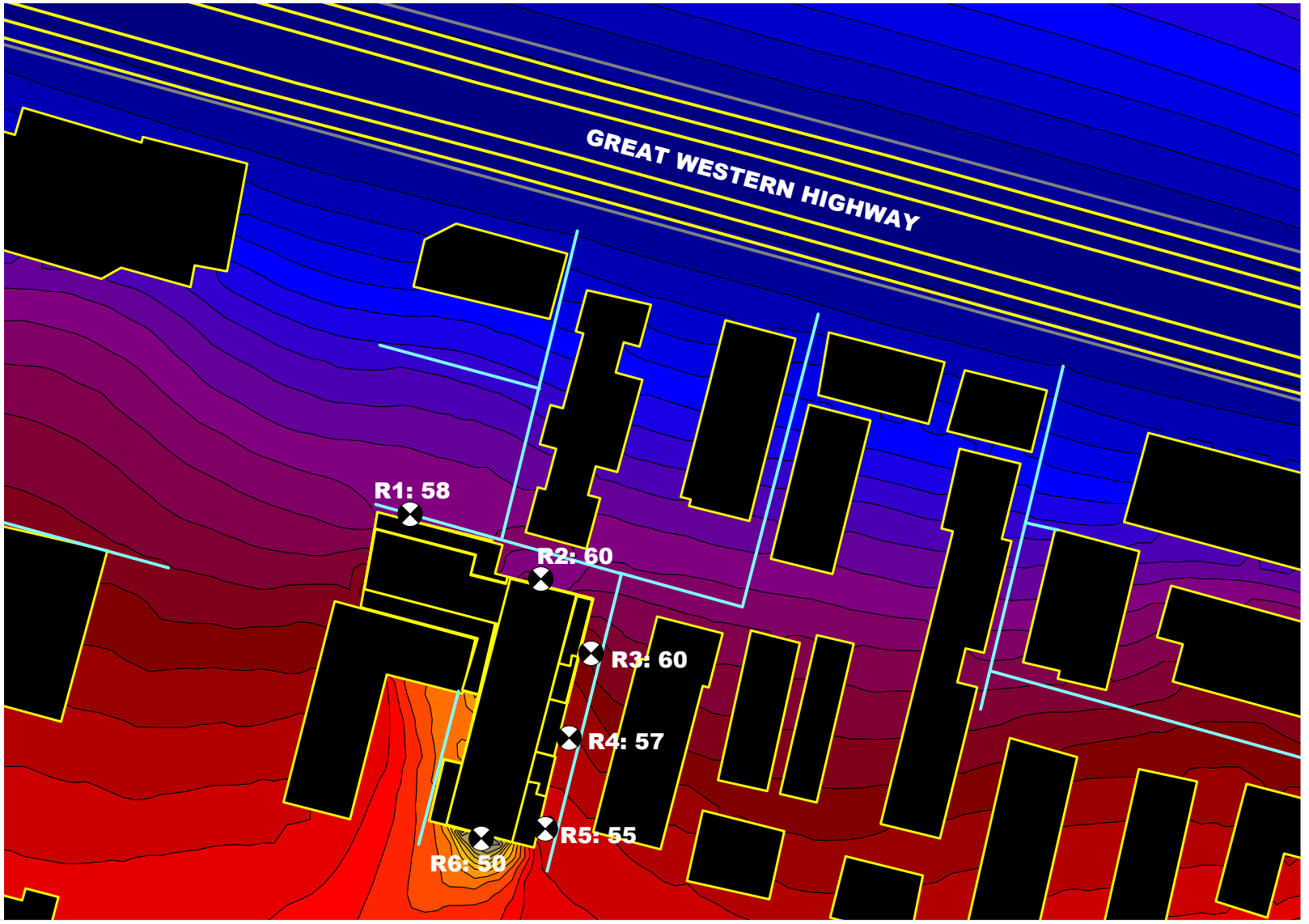
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	52	dB
LAeq 9 hours	2200-0700	48	dB
Max LAeq 1 hour	0700-2200	54	dB
Max LAeq 1 hour	2200-0700	52	dB

APPENDIX B

APPENDIX B

APPENDIX B



Scenario 1
31 Santley Crescent &
2A Bringelly Road, Kingswood

Noise Sources

~ Great Western Highway

Note:
- LAeq,15mins noise level contours and receiver points are 1.5 m above the natural ground level.

- The maximum reading at the property is 60 dB.

PRINT DATE: 12/10/21

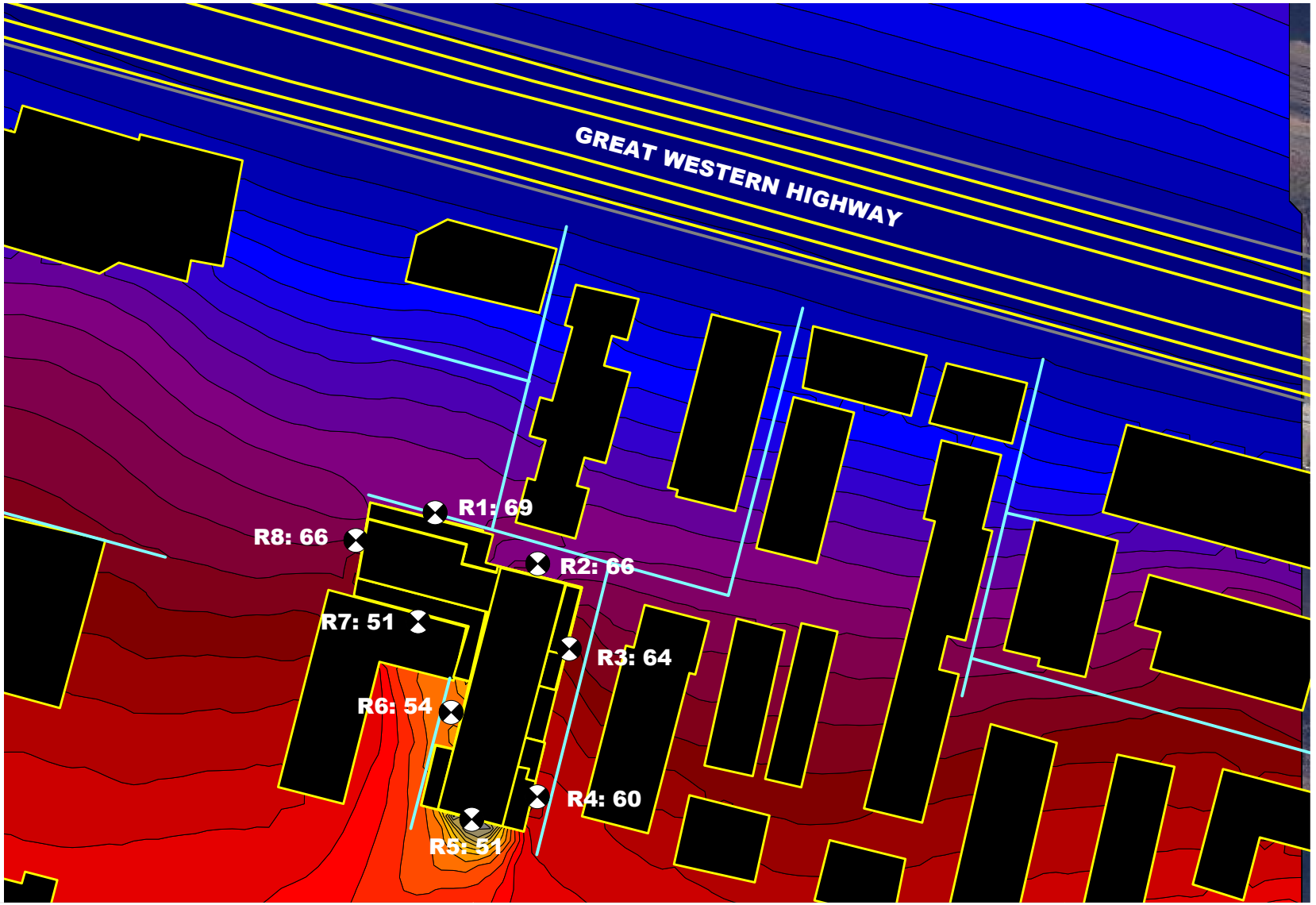
Line Source
Building
Barrier
Contour Line
Receiver
Calculation Area

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5022
CLIENT: Danabina Pty Ltd & Midpoint Investments Pty Ltd
SITE ADDRESS: 31 Santley Crescent-2A Bringelly Road Kingswood
ASSESSED TO: SEPPI/NSW DoP
LIMITING CRITERIA: 35 dB(A) - Bedrooms - Nighttime
40 dB(A) - Living Areas - Anytime

N
W
E
S



Scenario 1.1
31 Santley Crescent &
2A Bringelly Road, Kingswood

Noise Sources

~ Great Western Highway

Note:
- LAeq,15mins noise level contours and receiver points are 1.5 m above the third-floor level.

- The maximum reading at the property is 69 dB.

PRINT DATE: 12/10/21

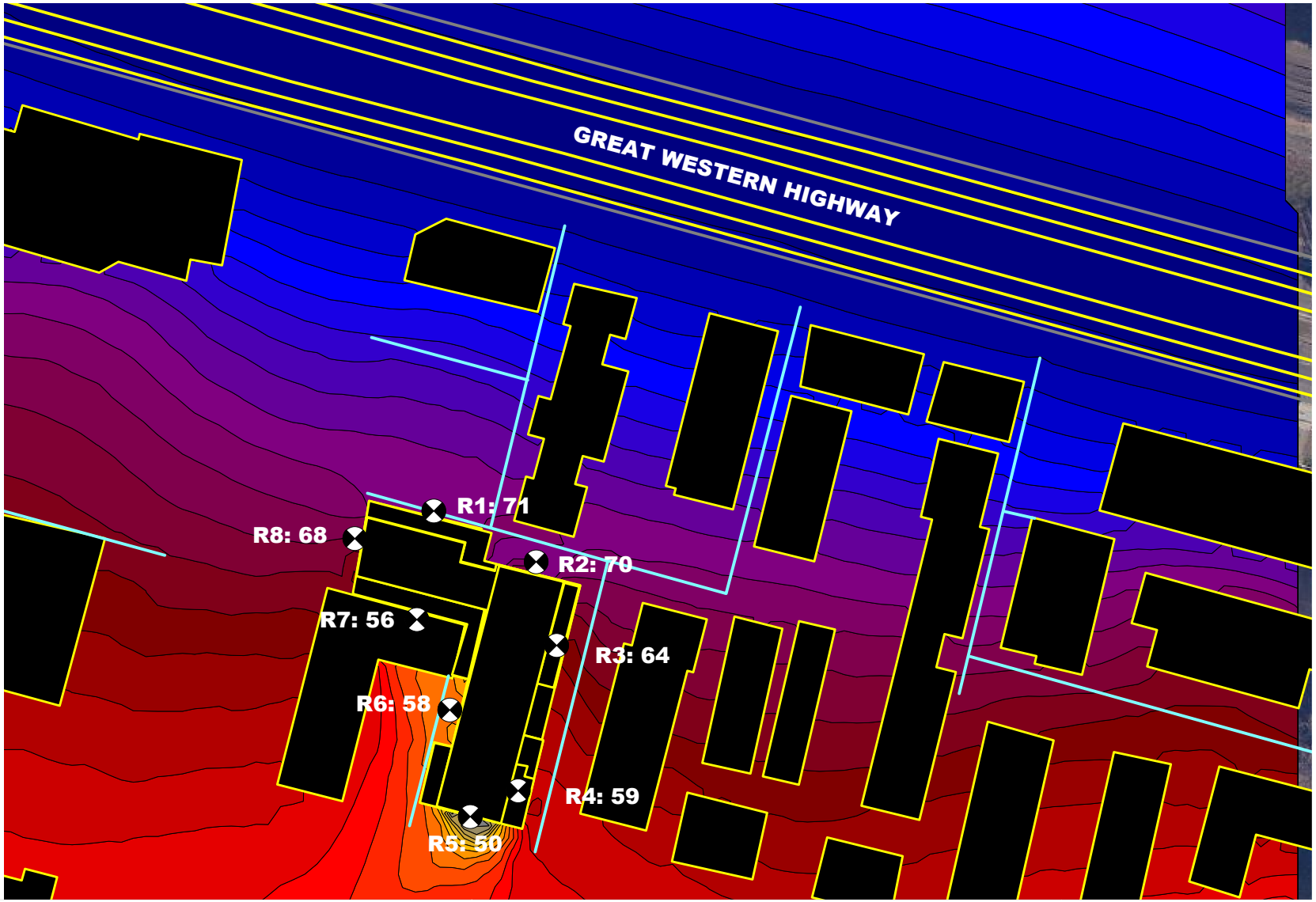
Line Source
Building
Barrier
Contour Line
Receiver
Calculation Area

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5022
CLIENT: Danabina Pty Ltd & Midpoint Investments Pty Ltd
SITE ADDRESS: 31 Santley Crescent-2A Bringelly Road Kingswood
ASSESSED TO: SEPPI/NSW DoP
LIMITING CRITERIA: 35 dB(A) - Bedrooms - Nighttime
40 dB(A) - Living Areas - Anytime

N
W E
S



Scenario 1.2
31 Santley Crescent &
2A Bringelly Road, Kingswood

Noise Sources

~ Great Western Highway

Note:
- LAeq,15mins noise level contours and receiver points are 1.5 m above the fifth-floor level.

- The maximum reading at the property is 71 dB.

PRINT DATE: 12/10/21

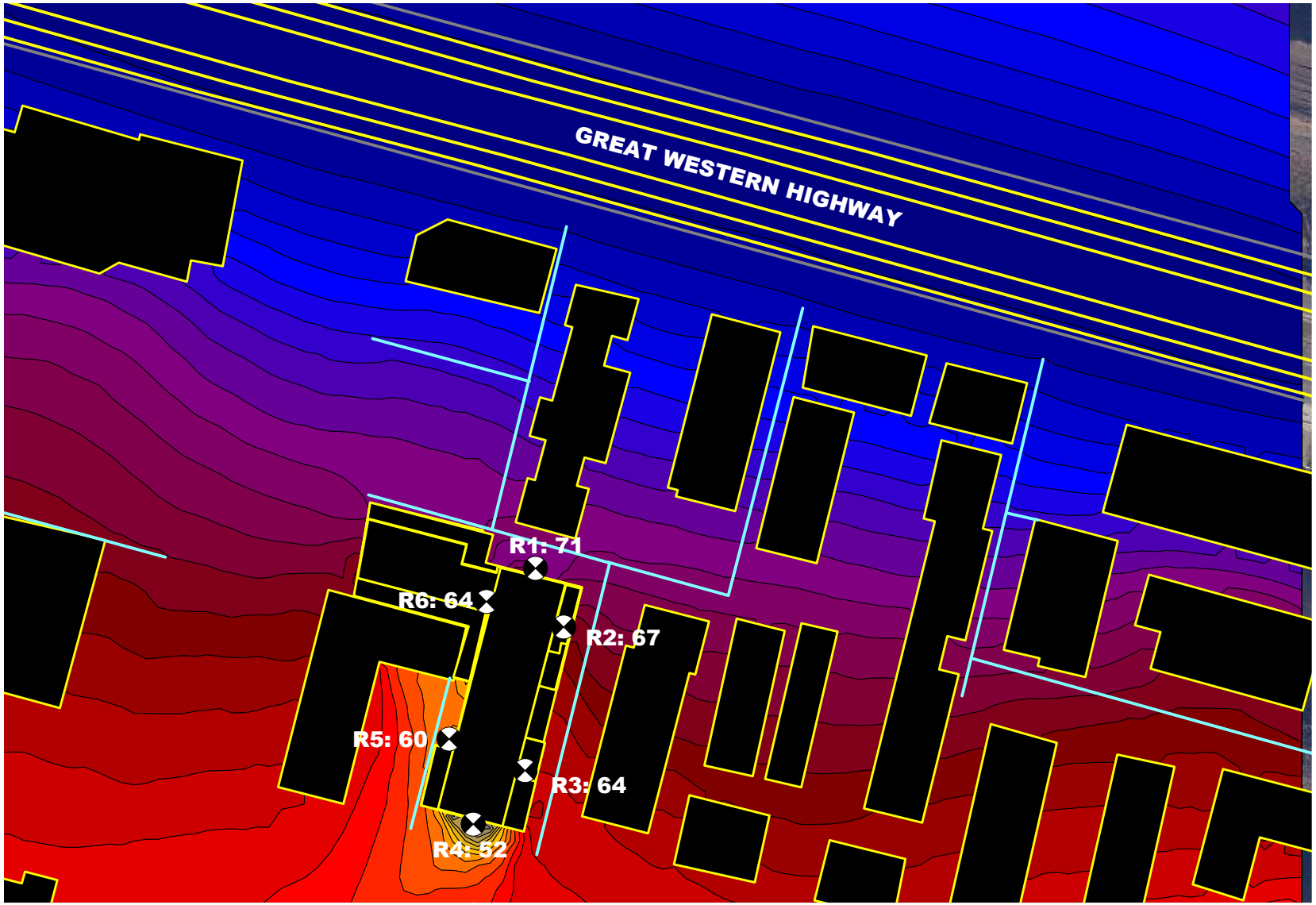
Line Source
Building
Barrier
Contour Line
Receiver
Calculation Area

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5022
CLIENT: Danabina Pty Ltd & Midpoint Investments Pty Ltd
SITE ADDRESS: 31 Santley Crescent-2A Bringelly Road Kingswood
ASSESSED TO: SEPPI/NSW DoP
LIMITING CRITERIA: 35 dB(A) - Bedrooms - Nighttime
40 dB(A) - Living Areas - Anytime

N
W E
S



Scenario 1.3
31 Santley Crescent &
2A Bringelly Road, Kingswood

Noise Sources

~ Great Western Highway

Note:
- LAeq,15mins noise level contours and receiver points are 1.5 m above the sixth-floor level.

- The maximum reading at the property is 71 dB.

PRINT DATE: 12/10/21

Line Source
Building
Barrier
Contour Line
Receiver
Calculation Area

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5022
CLIENT: Danabina Pty Ltd & Midpoint Investments Pty Ltd
SITE ADDRESS: 31 Santley Crescent-2A Bringelly Road Kingswood
ASSESSED TO: SEPPI/NSW DoP
LIMITING CRITERIA: 35 dB(A) - Bedrooms - Nighttime
40 dB(A) - Living Areas - Anytime

N
W E
S

Scenario 2
31 Santley Crescent &
2A Bringelly Road, Kingswood

Noise Sources
~ Boarders occupying the outdoor communal areas

Note:
- LAeq,15mins noise level contours and receiver points R1, R2, R6 & R9 are 1.5 m above the first-floor level.

- Receiver points R3-R4 are 1.5 m above the second floor level

- Receiver point R5 is 1.5 m above the fourth-floor level

- Receiver points C1 & R7 are 1.5 m above the natural ground level

Point Source
Line Source
vert. Area Source
Building
Barrier
Contour Line
Receiver
Calculation Area

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

JOB NUMBER: 5022
CLIENT: Danabina Pty Ltd & Midpoint Investments Pty Ltd
SITE ADDRESS: 31 Santley Crescent-2A Bringelly Road Kingswood
ASSESSED TO: SEPPI/NSW DoP
LIMITING CRITERIA: 43 dB(A) - Residential - Nighttime

N
W E
S

APPENDIX C

APPENDIX C

APPENDIX C

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *5052*
Client *Danabina Pty Ltd & Midpoint Investments Pty Ltd*
Site *31 Santley Crescent & 2A Bringelly Road, Kingswood*
Room *Room 035*

ROOM DATA
H 2.7 m D 7.1 m
W 4.1 m V 78.6 m3

	Bedroom, tile floor, furnished (RT60, sec)	63 *0.3*	125 *0.3*	250 *0.6*	500 *0.5*	1k *0.5*	2k *0.5*	4k *0.5*	8k *0.5*	Area *0.46*
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	55	56	53	53	62	61	56	43	66
STL 1	*75 mm Hebel, 50 mm cavity, 64 mm steel stud, 75 mm Earthwool, 13 mm pb*	*49*	*32*	*48*	*58*	*52*	*62*	*69*	*73*	2.9
STL 2	*10.38 mm laminated glass*	*22*	*26*	*31*	*33*	*33*	*34*	*39*	*44*	7.9
STL 3										
STL 4										
	Noise through Component 1	0	19	2	-8	7	-4	-16	-34	19
	Noise through Component 2	32	29	24	21	30	28	18	0	36
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**32**	**29**	**24**	**21**	**30**	**28**	**18**	**5**	**36**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	56	58	55	58	65	63	58	45	69
STL 1	*75 mm Hebel, 50 mm cavity, 64 mm steel stud, 75 mm Earthwool, 13 mm pb*	*49*	*32*	*48*	*58*	*52*	*62*	*69*	*73*	12.2
STL 2	*10.38 mm laminated glass*	*22*	*26*	*31*	*33*	*33*	*34*	*39*	*44*	7.0
STL 3										
STL 4										
	Noise through Component 1	7	27	11	3	16	4	-8	-25	27
	Noise through Component 2	32	30	26	25	32	29	20	2	38
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**32**	**32**	**26**	**25**	**32**	**30**	**20**	**5**	**38**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

	Noise Transmission Through Each Façade LAeq,Period [dB]								
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	32	29	24	21	30	28	18	5	36
Façade 2	32	32	26	25	32	30	20	5	38
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**35**	**34**	**28**	**27**	**34**	**32**	**22**	**9**	**40**

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *5052*
Client *Danabina Pty Ltd & Midpoint Investments Pty Ltd*
Site *31 Santley Crescent & 2A Bringelly Road, Kingswood*
Room *Room 084*

ROOM DATA

H	2.7 m	D	7.1 m
W	4.1 m	V	78.6 m3

	Bedroom, tile floor, furnished (RT60, sec)	63 *0.3*	125 *0.3*	250 *0.6*	500 *0.5*	1k *0.5*	2k *0.5*	4k *0.5*	8k *0.5*	Area *0.46*
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	56	58	55	56	63	62	57	44	68
STL 1	*75 mm Hebel, 50 mm cavity, 64 mm steel stud, 75 mm Earthwool, 13 mm pb*	*49*	*32*	*48*	*58*	*52*	*62*	*69*	*73*	3.2
STL 2	*10.38 mm laminated glass*	*22*	*26*	*31*	*33*	*33*	*34*	*39*	*44*	7.9
STL 3										
STL 4										
	Noise through Component 1	1	21	5	-5	8	-3	-15	-32	21
	Noise through Component 2	33	31	26	24	31	29	19	1	38
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**33**	**31**	**26**	**24**	**31**	**29**	**19**	**5**	**38**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	57	60	57	59	67	65	60	47	71
STL 1	*75 mm Hebel, 50 mm cavity, 64 mm steel stud, 75 mm Earthwool, 13 mm pb*	*49*	*32*	*48*	*58*	*52*	*62*	*69*	*73*	18.0
STL 2	*10.38 mm laminated glass*	*22*	*26*	*31*	*33*	*33*	*34*	*39*	*44*	1.2
STL 3										
STL 4										
	Noise through Component 1	10	31	14	6	20	8	-4	-22	31
	Noise through Component 2	26	25	20	19	27	24	14	-4	32
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**26**	**32**	**21**	**19**	**27**	**24**	**14**	**4**	**35**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]	56	58	55	56	63	62	57	44	68
STL 1	*200 mm concrete slab*	*44*	*44*	*47*	*54*	*50*	*46*	*49*	*53*	29.1
STL 2										
STL 3										
STL 4										
	Noise through Component 1	16	19	15	9	20	23	15	-3	27
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**16**	**19**	**16**	**10**	**20**	**23**	**15**	**6**	**27**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

	Noise Transmission Through Each Façade LAeq,Period [dB]								
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	33	31	26	24	31	29	19	5	38
Façade 2	26	32	21	19	27	24	14	4	35
Façade 3	16	19	16	10	20	23	15	6	27
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**34**	**35**	**28**	**25**	**33**	**31**	**22**	**10**	**40**

TRAFFIC NOISE INTRUSION CALCULATIONS

Job *5052*
Client *Danabina Pty Ltd & Midpoint Investments Pty Ltd*
Site *31 Santley Crescent & 2A Bringelly Road, Kingswood*
Room *Room 094*

ROOM DATA
H 2.7 m D 7.5 m
W 3.6 m V 72.9 m3

	Bedroom, tile floor, furnished (RT60, sec)	63 *0.3*	125 *0.3*	250 *0.6*	500 *0.5*	1k *0.5*	2k *0.5*	4k *0.5*	8k *0.5*	Area *0.46*
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	56	59	57	57	65	64	59	45	69
STL 1	*75 mm Hebel, 50 mm cavity, 64 mm steel stud, 75 mm Earthwool, 13 mm pb*	*49*	*32*	*48*	*58*	*52*	*62*	*69*	*73*	1.8
STL 2	*10.38 mm laminated glass*	*22*	*26*	*31*	*33*	*33*	*34*	*39*	*44*	7.9
STL 3										
STL 4										
	Noise through Component 1	-1	20	5	-6	8	-3	-15	-33	20
	Noise through Component 2	33	32	28	25	33	31	22	3	39
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**33**	**32**	**29**	**25**	**33**	**31**	**22**	**6**	**39**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	54	57	55	56	63	62	57	42	67
STL 1	*75 mm Hebel, 50 mm cavity, 64 mm steel stud, 75 mm Earthwool, 13 mm pb*	*49*	*32*	*48*	*58*	*52*	*62*	*69*	*73*	13.6
STL 2										
STL 3										
STL 4										
	Noise through Component 1	6	27	12	2	15	4	-8	-28	27
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**8**	**27**	**12**	**7**	**15**	**7**	**5**	**5**	**27**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]	58	61	59	59	67	66	61	47	71
STL 1	*200 mm concrete slab*	*44*	*44*	*47*	*54*	*50*	*46*	*49*	*53*	27.0
STL 2										
STL 3										
STL 4										
	Noise through Component 1	18	22	19	12	24	27	19	0	30
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**18**	**22**	**20**	**12**	**24**	**27**	**19**	**6**	**30**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

	Noise Transmission Through Each Façade LAeq,Period [dB]								
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	33	32	29	25	33	31	22	6	39
Façade 2	8	27	12	7	15	7	5	5	27
Façade 3	18	22	20	12	24	27	19	6	30
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**33**	**34**	**29**	**26**	**34**	**33**	**23**	**11**	**40**

TRAFFIC NOISE INTRUSION CALCULATIONS

Job 5052
Client Danabina Pty Ltd & Midpoint Investments Pty Ltd
Site 31 Santley Crescent & 2A Bringelly Road, Kingswood
Room Room 093

ROOM DATA
H 2.7 m D 6.15 m
W 3.75 m V 62.3 m3

	Bedroom, tile floor, furnished (RT60, sec)	63 0.3	125 0.3	250 0.6	500 0.5	1k 0.5	2k 0.5	4k 0.5	8k 0.5	Area 0.46
	EXTERNAL FAÇADE 1 - NOISE LEVEL, LAeq, Period [dB]	54	57	55	56	63	62	57	42	67
STL 1	*75 mm Hebel, 50 mm cavity, 64 mm steel stud, 75 mm Earthwool, 13 mm pb*	*49*	*32*	*48*	*58*	*52*	*62*	*69*	*73*	7.0
STL 2	*6.38 mm laminated glass*	*18*	*22*	*27*	*30*	*33*	*32*	*36*	*40*	3.1
STL 3										
STL 4										
	Noise through Component 1	4	24	9	-1	13	1	-11	-30	25
	Noise through Component 2	32	31	27	24	29	28	19	0	37
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 1	**32**	**32**	**27**	**24**	**29**	**28**	**19**	**5**	**37**
	EXTERNAL FAÇADE 2 - NOISE LEVEL, LAeq, Period [dB]	56	59	57	58	65	64	59	44	69
STL 1	*200 mm concrete slab*	*44*	*44*	*47*	*54*	*50*	*46*	*49*	*53*	23.1
STL 2										
STL 3										
STL 4										
	Noise through Component 1	15	19	17	10	21	24	16	-3	28
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 2	**16**	**19**	**17**	**11**	**21**	**24**	**16**	**5**	**28**
	EXTERNAL FAÇADE 3 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	EXTERNAL FAÇADE 4 - NOISE LEVEL, LAeq, Period [dB]									0
STL 1										
STL 2										
STL 3										
STL 4										
	Noise through Component 1	0	0	0	0	0	0	0	0	0
	Noise through Component 2	0	0	0	0	0	0	0	0	0
	Noise through Component 3	0	0	0	0	0	0	0	0	0
	Noise through Component 4	0	0	0	0	0	0	0	0	0
	NOISE THROUGH FAÇADE 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF RESULTS

	Noise Transmission Through Each Façade LAeq,Period [dB]								
Frequency	63	125	250	500	1k	2k	4k	8k	Tot
Façade 1	32	32	27	24	29	28	19	5	37
Façade 2	16	19	17	11	21	24	16	5	28
Façade 3	0	0	0	0	0	0	0	0	0
Façade 4	0	0	0	0	0	0	0	0	0
CALCULATED INDOOR TRAFFIC NOISE LEVEL, LAeq, Period [dB]	**32**	**32**	**28**	**25**	**29**	**30**	**21**	**9**	**38**