

 **Broadcrest Consulting Pty Ltd**

142 Lambeth Street, Panania

Noise Impact Assessment

April 2023



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Approval and Authorisation

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1 EXECUTIVE SUMMARY

Broadcrest Pty. Ltd. were engaged by Mr S. Metry to carry out a noise impact assessment at 142 Lambeth Street, Panania ('the site'). The assessment has been requested by Council to ensure the proposed boarding house does not have an acoustic impact surrounding sensitive receivers. A site inspection was carried out on the 28/03/2023 which involved a visual assessment of the site and identification of noise producing nodes. A noise logger was set up to record the ambient noise levels for seven days.

The proposed development is located at 142 Lambeth Street, Panania within B1: Neighbourhood Centre zoning. The site is surrounded by residential dwellings with Panania Public School located to the east.

The following noise sources were identified for assessment:

- Conversations
- Vehicle movements

The adopted amenity noise levels and noise criteria for the assessment were determined based on the relevant literature.

Given the recommendations in Section 7 are followed, the development will meet the relevant acoustic requirements of the EPA Noise Policy for Industry and NSW State Environmental Planning Policy (Infrastructure) 2007.

2 INTRODUCTION

2.1 Foreword

A Noise Impact Assessment is a technical document which assess noise producing nodes, determines their impact on nearby sensitive receivers and recommends control options. A noise assessment carefully considers the environmental, social, and economic aspects of a project and its surrounds.

2.2 Background

Broadcrest Pty. Ltd. were engaged by Mr S. Metry to carry out a noise impact assessment at 142 Lambeth Street, Panania ('the site'). The assessment has been requested by Council to ensure noise from the proposed boarding house does not impact surrounding sensitive receivers. A site inspection was carried out on the 28/03/2023 which involved a visual assessment of the site and identification of noise producing nodes. A noise logger was set up to record the ambient noise levels for seven days. Due to nearby construction activities, the logger was positioned in a shielded location on the northern façade. The data has been validated to remove results exposed to extraneous noise (see section 5.4).

2.3 Objectives

The purpose of the Noise Impact Assessment is to assess the noise impact from the site on surrounding sensitive receivers and provide recommendations for mitigation.

2.4 Scope of Works

- Site assessment & installation of a temporary noise logger in the field
- Existing noise environment measurement & characterisation
- Noise level assessment
- Review & determination of relevant assessment criteria
- Review of relevant literature and material for noise management
- Mitigation measures (if required) & recommendations

3 DESCRIPTION

3.1 Site Description

The site is located at 142 Lambeth Street, Panania within B1: Neighbourhood Centre zoning. The site is surrounded by residential dwellings with Panania Public School located to the east.

3.2 Site Acoustic Concerns

The following noise sources were identified for assessment:

- Conversations
- Vehicle movements

3.3 Sensitive Receivers

The sensitive receivers represent the most vulnerable receivers likely to be impacted by the development. The sensitive receivers identified for assessment in this report consist of:

- R1 – single storey residential dwelling to the west (2 Irene Street)
- R2 – single storey residential dwelling to the north (138 Irene Street)
- R3 – two storey residential dwelling to the northeast (109A Lambeth Street)
- R4 – proposed three storey mixed use building to the south (146 Lambeth Street)
- R5 – Panania Public School located to the east (111 Lambeth Street)

Figure 3.1 shows the locations of the sensitive receivers.

3.4 Proposal

- The proposal seeks to demolish the existing two storey dwelling and construct a three storey boarding house with ground floor commercial tenancy.
- The boarding house will consist of 16 units, first floor indoor and outdoor communal spaces, and four car parking spaces.



Figure 3.1: Sensitive receivers and logger location (red)

4 NOISE CRITERIA

The following documents and policies have been reviewed for guidance and to achieve compliance during the assessment:

- NSW EPA Noise Policy for Industry 2017
- AS 2107 – 2016 ‘Acoustic – Recommended Design Sound Levels and Reverberation Times for Building Interiors’

4.1 NSW EPA Noise Policy for Industry

The NSW EPA Noise Policy for Industry 2017 (NPI) provides a robust methodology on measuring and assessing noise impacts at the most affected point on or within the property boundaries of sensitive receptors.

The NPI has two main noise criteria to be considered, Intrusive and Amenity Noise Criteria. Once the noise levels for these criteria are established, the lowest of the intrusive and amenity criteria is considered the project noise trigger level. If the predicted noise level exceeds the project noise trigger level, noise mitigation is required.

Amenity Noise Level

The amenity noise levels have been determined in accordance with Tables 2.2 and 2.3 of the NPI and are presented in Table 5.1.

Intrusive Noise Level

As per Section 2.3 of the NPI, the intrusiveness noise level is equivalent to the measured L_{A90} Rating Background Level (RBL) for each time period (day/evening/night) plus 5dB. Note the intrusiveness criteria only applied to residential receivers. The intrusive noise levels are presented in Table 5.1.

Project Noise Trigger Level

The project noise trigger level is the lower (more stringent) value of the amenity and intrusiveness noise levels for each time period. The project noise levels are presented in Table 5.1.

4.2 Sleep Disturbance

The Noise Policy for Industry Section 2.5 provides guidance on trigger levels for sleep disturbance based on maximum noise level events (L_{Amax}):

'Sleep disturbance is considered to be both awakenings and disturbance to sleep stages. Where the subject development/premises night-time noise levels at a residential location exceed:

- *L_{Aeq,15min} 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *L_{Amax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment should be undertaken. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy.

Other factors that may be important in assessing the extent of impacts on sleep include:

- *How often the high noise events will occur*
- *The distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development;*
- *Whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods);*
- *Current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.*

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response.

The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels.

Section 5.4 of the NSW Road Noise Policy states:

'From research on sleep disturbance to date it can be concluded that:

- *Maximum internal noise levels below 50 – 55 dBA are unlikely to awaken people from sleep;*
- *One or two noise events per night, with maximum internal levels of 65 – 70 dBA are not likely to affect health and wellbeing significantly'.*

4.3 Australian Standard 2107-2016

Australian Standard AS 2107 – 2016 'Acoustic – Recommended Design Sound Levels and Reverberation Times for Building Interiors' provides recommended design sound levels for different areas of occupancy in buildings. This includes recommended internal design sound levels from continuous road traffic noise for houses and apartments near major roads as shown in Table 4.1 below.

Table 4.1 – Recommended Design Sound Level for Residential Buildings (AS 2107:2016)

Type of Occupancy / Activity	Design Sound Level ($L_{Aeq,t}$) Range
Houses and apartments in inner city areas or entertainment districts or near major roads	
Apartment common areas (e.g. foyer, lift lobby)	45 to 50
Living areas	35 to 45
Sleeping areas (night time)	35 to 40
Work Areas	35 to 45

5 SITE NOISE SURVEY

5.1 Methodology

A noise logger was setup for unattended continuous monitoring of the ambient noise levels (a noise survey). It was located onsite at a secure point (see Figure 3.1). The logger was offset from any reflective structures, hard surfaces and bias noise producing sources. The microphone was maintained within a foam windshield on collapsible post 1.2m off the ground.

The noise logger was installed on the 28/03/2023 with monitoring beginning at 16:15. The logger was recovered on the 03/04/2023 at 11:00. The data was validated to ensure no extraneous noise sources biased the data (Section 5.4).

The results from the acoustic survey were extracted and analysed to convert the raw SPL data to the required statistical level(s).

5.2 Equipment

All equipment was checked and internally calibrated immediately before and after use at 94dB and 114dB (± 0.3 dB) using a 1kHz signal. The NATA calibration certificate is available on request.

For the noise survey, a Rion NL42 (serial number 00510451) acoustic logger was utilised for the assessment. The device was set using 'A' frequency weighting and 'fast' time weighting. The logger utilised conforms with the following standards:

- IEC 61672-1:2003 Class 2
- ANSI S1.4-1983 Type 2
- ANSI S1.25-1992 Type 2
- ANSI S1.43-1997 Type 2

5.3 Site Noise Survey Results

The results of the survey have been assessed based on the EPA NPI guideline. Amenity values have been adopted as follows:

- **Residential Land Uses:** suburban environment (see table 5.1)
- **School Classroom (Internal):** 35dBA when in use
- **School Playground (External):** 55dBA when in use

A summary of the calculated noise levels and criteria selected are provided in Table 5.1.

Table 5.1: Residential site noise levels and noise limits dB(A)

Time of day	LA _{EQ} ¹	RBL ²	Intrusiveness (RBL + 5db)	Amenity LA _{EQ} ³	Project Specific Levels ⁴
Day (7:00 – 18:00)	53.0	35.8	40.8	55.0	40.8
Evening (18:00 – 22:00)	55.2	33.3	38.3	45.0	38.3
Night (22:00-7:00)	46.5	28.7	33.7	40.0	35.0

- 1) LA_{eq} has been calculated using log-averages in accordance Table A2 of the NPI (1).
- 2) The Rating Background Level (RBL) has been calculating in accordance with section B1.3 of the NPI.
- 3) Amenity values taken from Table 2.2 of the NPI for residential dwellings in a suburban environment.
- 4) Project specific levels equal the lesser of the Intrusiveness, Amenity and minimum values in Table 2.1 of the NPI.

5.4 Extraneous Noise

Section A1 of the NSW EPA Noise Policy for Industry states:

“For the assessment of modifications to existing premises, the noise from the existing premises should be excluded from background noise measurements. The exception is where the premises has been operating for a significant period of time and is considered a normal part of the acoustic environment; it may be included in the background noise assessment under the following circumstances:

- *the development must have been operating for a period in excess of 10 years in the assessment period/s being considered and is considered a normal part of the acoustic environment; and,*
- *the development must be operating in accordance with noise limits and requirements imposed in a consent or licence and/or be applying best practice”.*

Extraneous noise is any breach to the above clause. Typically, these are noises resulting from activities that are not typical of the area such as construction, additional noise sources during holiday periods, sporting events or weather conditions.

Due to nearby construction activities, the logger was positioned in a shielded location on the northern façade. The data has been reviewed to remove results in compliance with the above clause.

Meteorological events must be considered during the assessment. Monitoring data acquired during the following events should be excluded from assessment:

- Where the average wind speed is over 5m/s (for a period of 15-minutes)
- During any rainfall

Climate data was monitored during the assessment period to identify potential adverse conditions. The most suitable weather station for monitoring was a private weather station located at Panania. The wind speed during the logging has been plotted on the noise graphs (see Appendix B). Exceedances were excluded from the statistical calculations when determining noise levels from the surveyed results.

6 NOISE IMPACT ASSESSMENT

6.1 Forward

Noise modelling has been conducted for this assessment to predict noise impacts using the ISO9613 calculation method. The contours and results from the noise modelling can be viewed in Appendix A.

6.2 Parking

A line source model was used to predict the noise impact from cars at the proposed parking locations. Point sources were also used to model car door slams at each of the car park locations.

We have assumed four vehicle trips occur per 15 minute period. For the car doors closing, we have assumed each slam lasts 1 second. A +5 dBA correction has also been provided to account for the impulsive nature of the door slam.

Table 6.1: Carpark noise levels (Sound Power Levels (dBA))

Noise Source	Quantity	SWL dBA	# mins / 15mins activity occurs	Single LAeq,15 min	Resultant LAeq,15
Car Parking	4	88	0.5	73.2	79.2
Car Door Slam	1	98	-	57.3	62.3 ¹

1) Includes 5dBA adjustment

6.3 Noise Levels – Communal Areas

Conversations were modelled as line sources for the first floor indoor communal living space and outdoor communal space.

Table 6.3: Communal areas noise levels (Sound Power Levels (dBA))

Noise Source	Quantity	SWL	# mins / 15mins activity occurs	Resultant LAeq,15
Conversations (Communal Living Space)	1	71.0	15	71.0
Conversations (Communal Space)	1	71.0	15	71.0

6.4 Commercial Tenancy

As the use of the commercial tenancy is not yet known. Standard office and retail environments have an internal SPL of around 60 dBA (that of a conversation). The minimum construction requirements of the NCC will prevent noise intrusion into the surrounding residences.

If during the DA process it is determined the tenancy use is likely to exceed the noise levels of an office environment, a noise impact assessment should be requested.

6.5 Cumulative Noise Impacts

Table 6.4 shows the cumulative 'worst case' noise impacts associated with operation of the site. This includes noise impacts from car parking and first floor communal areas.

Table 6.4: Noise modelling results – cumulative noise impacts

Receiving node	Receiving node LA _{EQ} dBA	Criteria (dBA)			Exceedance (dBA)			Attenuation Required
		Day	Evening	Night	Day	Evening	Night	
R1	33.2	40.8	38.3	35.0	-7.6	-5.1	-1.8	0.0
R2	34.3	40.8	38.3	35.0	-6.4	-4.0	-0.7	0.0
R3	24.3	40.8	38.3	35.0	-16.5	-14.0	-10.7	0.0
R4	16.4	40.8	38.3	35.0	-24.4	-21.9	-18.6	0.0
R5 (internal)	7.6*	35.0	-	-	-27.4	-	-	0.0
R5 (external)	17.1	55.0	-	-	-23.7	-	-	0.0

*A -10dBA reduction has been applied to predict the internal noise level.

On the condition the recommendations in Section 7 are implemented, the proposal has a low risk of impacting nearby receptors.

6.6 Sleep Disturbance

As the site has the potential to have activities occurring during the night period, an assessment of sleep disturbance has been conducted. Sleep disturbance has been assessed by modelling the L_{Amax} of car parking, car door slams, and conversations using the values in Table 6.6.

Table 6.6: Noise levels (for modelling) - L_{Amax}

Noise Source	Quantity	SWL dBA	SPL dBA (@1m)	# mins / 15mins activity occurs
Car Parking	4	78.3	67.3	0.1
Car Door Slam	1	79.3	68.3	0.016
Conversations (Communal Living Space)	1	77.0	66.0	15
Conversations (Communal Space)	1	77.0	66.0	15

Table 6.7: Noise modelling results – sleep disturbance (L_{AMAX})

Receiving node	Receiving node LA _{max} dBA	Criteria (dBA)	Exceedance (dBA)	Attenuation Required (dBA)
R1	39.2	52	-12.8	0.0
R2	40.2	52	-11.8	0.0
R3	30.3	52	-21.7	0.0
R4	22.4	52	-29.6	0.0

On the condition the recommendations in Section 7 are implemented, the proposal has a low risk of impacting nearby receptors.

7 NOISE CONTROL RECOMMENDATIONS

7.1 Noise Barrier

A minimum 1.46m high acoustic balustrade is constructed at the location shown in Figure 7.1. The balustrade shall be constructed using glass, Perspex, masonry, or other suitable materials. Any gaps or holes are to be sealed with acoustic silicon as appropriate.

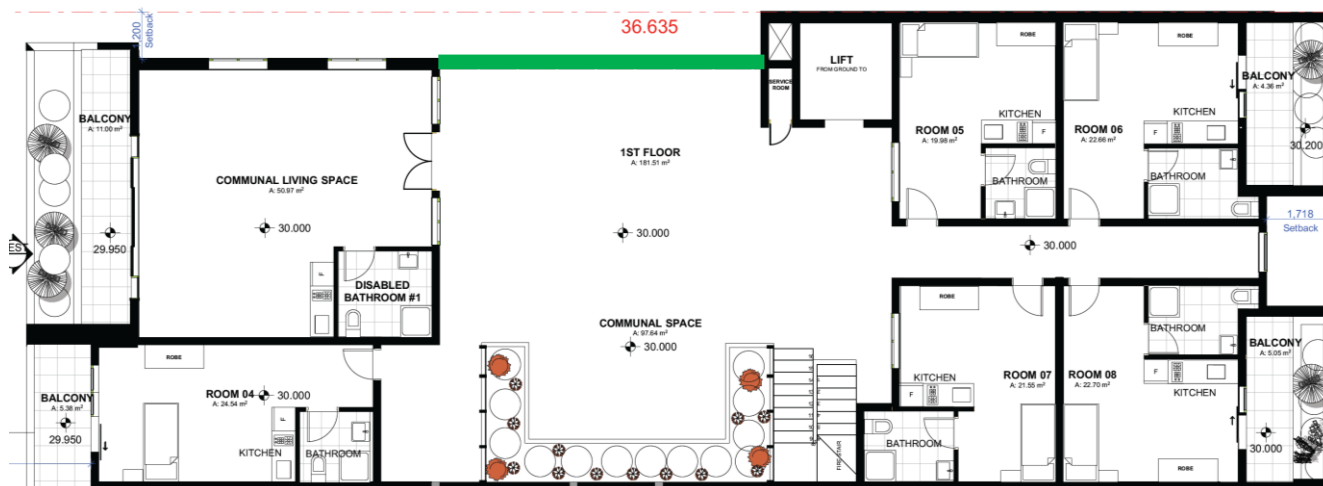


Figure 7.1: Recommended acoustic balustrade (green)

7.2 Mechanical Plant

No mechanical plant has been specified for the development. Any new noise generating equipment such as air conditioning units, mechanical ventilation, or similar must be designed to protect the acoustic privacy of residents and neighbours. The noise level generated by any equipment must not exceed an $L_{Aeq(15min)}$ of 5dB(A) above background noise at the property boundary.

Table 7.1 can be used for selecting new equipment based on the maximum acceptable sound power level. If selecting above the allowable levels below, all such noise generating equipment must be acoustically screened.

Table 7.1 Minimum distance requirements for mechanical equipment and plant

Minimum distance to boundary (m)	Acceptable sound power level (dB)		
	Day	Evening	Night
10m	68.8	66.3	63.0
20m	74.8	72.3	69.0
40m	80.8	78.3	75.0
50m	82.7	80.3	77.0

7.3 Commercial Tenancy

As the use of the commercial tenancy is not yet known. If during the DA process it is determined the tenancy use is likely to exceed the noise levels of an office environment, a noise impact assessment should be requested.

8 CONCLUSION

The site is located at 142 Lambeth Street, Panania within B1: Neighbourhood Centre zoning and is surrounded by residential dwellings with Panania Public School located to the east.

A site inspection was carried out on the 28/03/2023 which involved a visual assessment of the site and identification of noise producing nodes. A noise logger was set up to record the ambient noise levels for seven days.

Based on the predicted noise levels, the proposed boarding house is predicted to satisfy the relevant acoustic requirements of the EPA Noise Policy for Industry and NSW State Environmental Planning Policy (Infrastructure) 2007 on the condition the recommendations in Section 7 are implemented.

A-weighted sound pressure

Noise levels that have been weighted to approximate the characteristics of normal human hearing. The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic 'A-weighting' frequency filter is applied to the measured sound level dB(A) to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).

Airborne noise

Noise propagated between the source and receiver primarily through air.

Ambient noise

The total noise in a given situation, inclusive of all noise source contributions in the near and far field.

Background noise:

The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed.

Compliance

The process of checking that source noise levels meet with the noise limits in a statutory context.

Cumulative noise level

The total level of noise from all sources.

Decibel, dB:

Unit of acoustic measurement. Measurements of power, pressure and intensity. Expressed in dB relative to standard reference levels. It is weighted to approximate the sensitivity of human hearing to sound frequency. It is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

LA_{EQ,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.

Noise limits

Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.

Percentile Level - L₉₀, L₁₀, etc:

A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L₉₀ is the level which is exceeded for 90% of a measurement period. L₉₀ is commonly referred to as the "background" sound level.

Rating Background Level – RBL:

Method for determining the existing background noise level which involves calculating the 10th percentile from the LA₉₀ measurements for each day, evening and night time period. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

Receptor

The noise-sensitive land use at which noise from a development can be heard.

Sleep disturbance

Awakenings and disturbance of sleep stages.

Sound Power Level, (SWL) dB

10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 Pico Watt. Sound power level cannot be directly measured using a microphone. Sound power level does not change with distance. The sound power level of a machine may vary depending on the actual operating load.

Sound Pressure Level (SPL) dB(A)

The level of noise, usually expressed as SPL in dB(A), as measured by a standard sound level meter with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.

Statistical noise levels

See percentile Level

Threshold

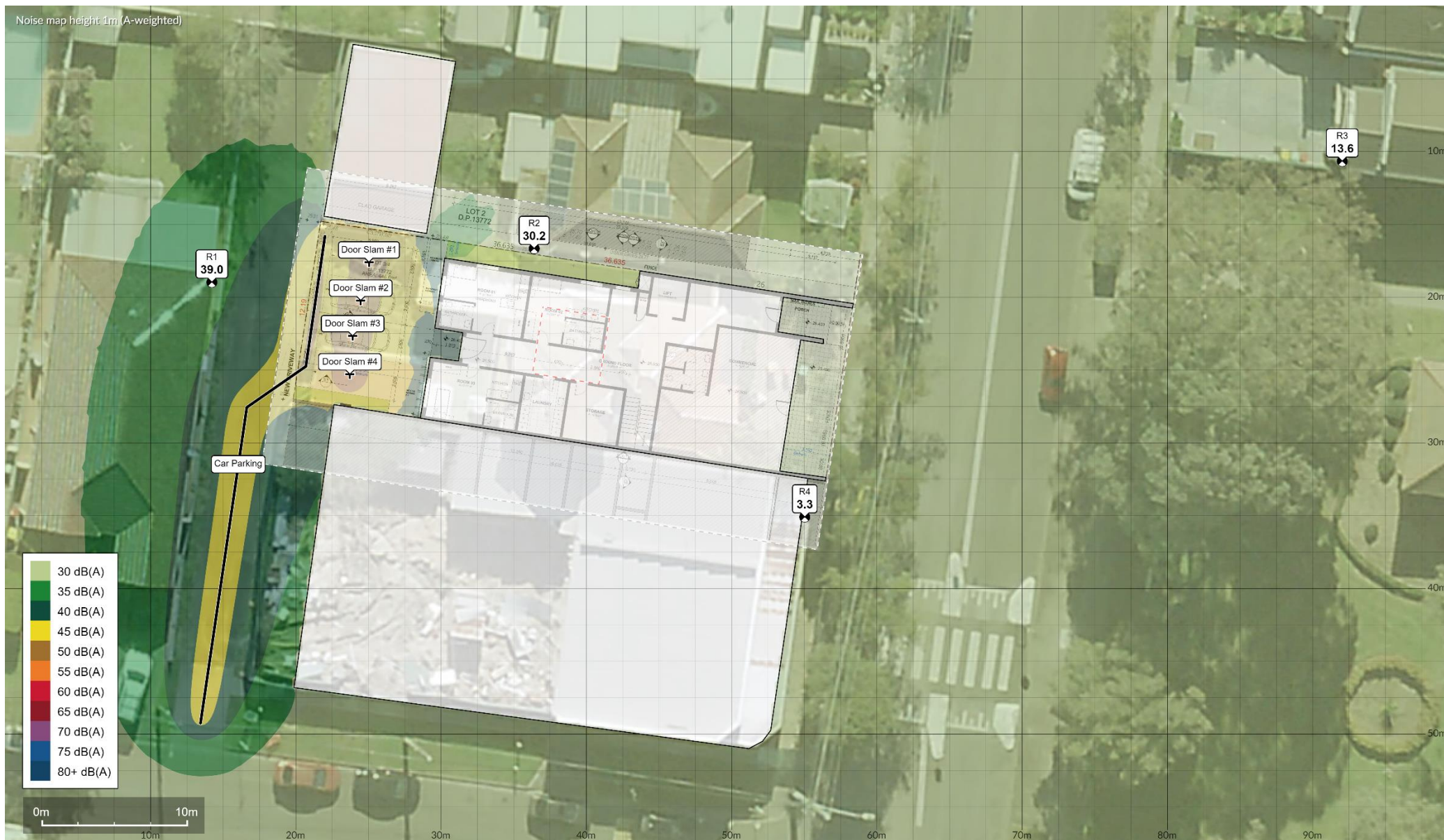
The lowest sound pressure level that produces a detectable response (in an instrument/person).

Tonality

Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dBA penalty is typically applied to noise sources with tonal characteristics.

Appendix A – Noise modelling





Appendix B - Noise logger result graphs
