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

BERRY HOTEL REDEVELOPMENT

120 QUEEN STREET, BERRY NSW

Date: Thursday, 6th July 2023

File Reference: 5661R20230110mjBerryHotel_DA.docx

DOCUMENT CONTROL

Project title	Acoustical Report Berry Hotel Redevelopment 120 Queen Street, Berry NSW
Project number	5661
Document reference	5661R20230110mjBerryHotel_DA.docx
Document path	G:\Shared drives\KA Acoustics 2023\REPORT\Clubs and Restaurants\5661 (mj) Berry Hotel\5661R20230110mjBerryHotel_DA.docx

Version	Date	Author	Review	Notes
V1	06/07/2023	MJ	NK	Report version 1 available for issue

Approved by:	Mason Jenkins  Acoustical Consultant (M.A.A.S.) Koikas Acoustics Pty Ltd
	Feros Hotel Group Pty Ltd Attention: Rod Pascoe - rod@bromptongroup.com.au

ACOUSTICAL REPORT

BERRY HOTEL REDEVELOPMENT

120 QUEEN STREET, BERRY NSW

CONTENTS

TABLE OF APPENDICES

1.0 INTRODUCTION

Koikas Acoustics Pty Ltd was engaged to prepare a noise impact assessment for the proposed new development of the Berry Hotel located at 120 Queen Street, Berry NSW.

Noise levels are assessed at surrounding noise-sensitive premises and site-specific noise criteria derived from the Council's current planning instruments (LEP/DCP), and other relevant planning guidelines.

The assessment covers the following scope:

- **Licensed Premises Noise Assessment**
  - Assess noise emissions from patrons and music in the licensed areas of the hotel
- **Additional Operation Noise Assessment**
  - Assess noise emissions from mechanical plant and equipment
  - Assess noise emissions from the children's play area
  - Assess noise emissions from the new car parking area/loading dock/deliveries
  - Assess noise emissions from guests using balconies/terraces/common areas in the new accommodation areas
- **Traffic Generation Assessment**
  - Assess noise emissions from on-road vehicle noise and a traffic-generating development
- **Inter-tenancy Noise Assessment**
  - Provides guidelines for the required separation between hotel rooms in the new accommodation areas

This report presents the results and findings of an acoustical assessment of 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 noise criteria.

2.0 THE PROPOSED DEVELOPMENT

The development is proposed to occupy the sites at 120 Queen Street and 79-83 Princess Street, Berry NSW.

This location is situated in a primarily residential area classified as SP2 'Infrastructure' and B2 'Local Centre' as per relevant land zoning maps included in the Shoalhaven City Council Local Environment Plan 2014. Surrounding properties are also predominantly town centre and commercial in classification, also located within SP2 'Infrastructure', B2 'Local Centre' and R2 'Low-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, monitoring locations and surrounding area – Image 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 prepared by H&E Architects (their Project No. 2709, dated 27/05/2023). Any changes to the design may impact the findings of this report and associated noise control recommendations.

As per the architectural drawings, the proposed development will include:

- New licensed areas of the hotel (*internal and outdoor areas*), and
- New accommodation rooms with associated basement parking.

Figure 2. Ground floor plans of the proposed hotel extension – Image Source: H&E Architects

3.0 NOISE SURVEYS

3.1 UNATTENDED AMBIENT NOISE SURVEY

The noise logging survey conducted at noise logger location 'A' was conducted between the 8th and the 15th of November 2022. The microphone was placed on the southern boundary of the Berry Hotel carpark at approximately 1.5 metres above the natural ground level.

A Type 1 Svantek BWSA 801 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 in consecutive 15-minute intervals.

The noise logging survey conducted at noise logger location 'B' was conducted between the 8th and 9th of November 2022. The microphone was placed on the eastern boundary of the Berry Inn carpark at approximately 1.5 metres above the natural ground level.

A Type 1 Svantek 977 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 in consecutive 15-minute intervals.

The intention was to keep the noise logger at noise logger location 'B' for seven-full days, however, the noise monitoring equipment was vandalised. The instrument was removed from the subject site as it was not safe to leave it there. To determine the background noise level at the logger "B" site location, the 24-hour uninterrupted noise survey at the logger "B" site location was compared to the logger "A" site location for the same period. The differences were applied to determine the 7-day average for the logger "B" site location.

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

BOM weather records for the nearest available weather station indicate that inclement weather conditions may have impacted the noise survey at noise logger location 'A'. Noise data from affected periods throughout the survey were removed following standard requirements of the NSW Environmental Protection Authority (EPA). Rainfall data from the Beauru of Meteorology has been

attached to the report as **Appendix A**.

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 – RBL – L_{A90}	L_{Aeq}, 1-hour
Noise Logger 'A'	Day	52	38	53
	Evening	51	40	
	Night	49	36	55
Noise Logger 'B'	Day	57	44	60
	Evening	54	35	
	Night	52	31	59

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.

1/1 octave band background noise levels ($L_{A90\ Period}$) were also derived from the survey data and are presented below.

Table 2. 1/1 octave band background noise levels [$L_{A90,\ Period}$ dB]

Description	1/1 octave band centre frequency [Hz]									Total
	31.5	63	125	250	500	1000	2000	4000	8000	
Noise Logger 'A'										
Day	14	24	30	27	30	33	31	26	19	38
Evening	12	23	29	27	32	34	32	29	21	40
Night	8	20	26	25	27	28	28	24	18	36
Noise Logger 'B'										
Day	15	28	31	32	37	40	37	30	20	44
Evening	4	18	22	22	27	31	26	26	16	35
Night	5	18	19	18	23	25	23	22	15	31

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

3.2 ATTENDED ENVIRONMENTAL NOISE MONITORING

Additional environmental noise surveys were conducted to determine noise levels at various other locations surrounding the subject site.

Noise level measurements were taken with a NATA-calibrated Type 1 NTi XL2 sound level meter. The instrument was set up to measure sound pressure levels as 'A' frequency weighting and 'Fast' time response.

Sound level measurements were taken for durations deemed sufficient to represent the underlying ambient and background noise environment without the influence of extraneous noise or noise from the subject's development.

Noise surveys were conducted in areas surrounding the proposed development such that the ambient noise levels could be quantified (See Figure 1):

- 68A Princess Street — Attended Monitoring Location 'A'
- Cnr of Queen Street and Prince Alfred Street — Attended Monitoring Location 'B'

The sound level meter microphone was placed 1.5 metres above the natural ground in 'free-field' conditions, ie. ≥ 3.5 metres from any reflective façade. A summary of the noise survey results is provided in the table below.

Table 3. 1/1 octave band attended noise monitoring results [dB]

Description	1/1 octave band centre frequency [Hz]									Total
	31.5	63	125	250	500	1000	2000	4000	8000	
Attended Monitoring Location 'A'										
L_{Aeq} (Daytime)	25	32	37	39	45	48	48	47	41	54
L_{A90} (Daytime)	13	23	29	34	40	43	41	40	34	48
Attended Monitoring Location 'B'										
L_{Aeq} (Daytime)	30	43	51	54	57	59	58	54	44	64
L_{A90} (Daytime)	18	30	37	39	44	47	45	42	33	52

The calculated difference between the attended noise survey and the noise logging data has been used to establish the noise criteria at other periods of the day, by applying the differential in noise surveys to the evening and night periods.

4.0 NOISE ASSESSMENT GUIDELINES

Separate noise assessment criteria apply to noise breakout from the use of the hotel (licensed venue), noise emissions from the carpark, and noise emissions from the new accommodation areas.

An assessment of noise emission from the car park and accommodation areas will be conducted according to the NSW EPA Noise Policy for Industry (NPfI). Noise breakout from the licensed venue will be assessed to the standard L_{A10} noise condition adopted by Liquor and Gaming NSW (L&GNSW).

4.1 LICENSED VENUE - STANDARD L_{A10} NOISE CONDITIONS

The standard noise condition that is applied to licensed venues was originally developed by the *Liquor Administration Board (LAB)* and is now adopted by *Liquor and Gaming NSW (L&GNSW)*. The criteria require an assessment of noise before and after midnight and as per the 1/1 octave band components of the noise (31.5 Hz to 8 kHz inclusive).

Before midnight (7 am to midnight), the L_{A10} noise level from licensed premises must not exceed the background by more than 5 dB in any 1/1 octave band centre frequency from (31.5 Hz to 8 kHz inclusive) at the boundary of any residential premises.

After midnight (midnight to 7 am) the L_{A10} noise level from licensed premises must not exceed the background noise level in any 1/1 octave band centre frequency (31.5 Hz to 8 kHz inclusive) at any residential boundary and must not be audible within any habitable room of any residential premises.

Determining compliance with the residential inaudibility clause would require knowledge of the internal ambient noise environment within each habitable room of each identified noise-sensitive residential premise. It is not practically achievable to obtain this data, thus the determination of compliance with the inaudibility clause is based on an external assessment of the noise, whereby noise from licensed premises is deemed to meet this standard where it is shown to be 10 dB below the external ambient background noise level at each 1/1 octave band centre frequency or below the threshold of hearing (T_f - *ISO 226:2003*) at the corresponding 1/1 octave band centre frequency.

A detailed summary of the licensed area noise criteria with associated 1/1 octave centre frequency bands is provided below.

Table 4. L&GNSW Noise Criteria, $L_{A10\ 15\ mins}$ [dB]										
	1/1 octave band centre frequency [Hz]									
Assessment Period	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Total**
Residential Properties Fronting The Hotel's Rear Carpark										
7 am to 6 pm (assessed at the boundary) Background + 5	26	29	35	32	35	38	36	31	24	**43**
6 pm to 10 pm (assessed at the boundary) Background + 5	26	28	34	32	37	39	37	34	26	**45**
10 pm to 12 am (assessed at the boundary) Background + 5	26	25	31	30	32	33	33	29	23	**41**
12 am to 7 am (assessed at the boundary) Background + 0	26	20	26	25	27	28	28	24	18	**36**
12 am to 7 am (assessed at the façade) Inaudibility: Background–10 or Tf $_{1/1\ oct}$[1]	26	17	16	15	17	18	18	14	15	**29**
Residential Properties Fronting Prince Alfred Street										
7 am to 6 pm (assessed at the boundary) Background + 5	26	33	36	37	42	45	42	35	25	**49**
6 pm to 10 pm (assessed at the boundary) Background + 5	26	23	27	27	32	36	31	31	21	**40**
10 pm to 12 am (assessed at the boundary) Background + 5	26	23	24	23	28	30	28	27	20	**36**
12 am to 7 am (assessed at the boundary) Background + 0	26	18	19	18	23	25	23	22	15	**31**
12 am to 7 am (assessed at the façade) Inaudibility: Background–10 or Tf $_{1/1\ oct}$[1]	26	17	11	8	13	15	13	12	15	**28**

Notes:

1. Inaudibility is determined as the background noise level minus 10 dB, or the threshold of hearing (Tf) as defined in ISO 226:2003, whichever is greater. Table 1 of ISO226:2003 presents a 1/3 octave band threshold of hearing values (Tf $_{1/3\ oct}$). The corresponding 1/1 octave band Tf $_{1/1\ oct}$ is taken as the minimum of the three (3) Tf $_{(1/3\ oct)}$ values within the corresponding 1/1 octave band.
2. The inaudibility level (noise criterion) at the identified frequency is set by the threshold of hearing (ISO 226:2003).
3. Where the established criteria are below the threshold of hearing as outlined in (ISO 226:2003), the threshold of hearing has been adopted as the noise control criteria.

4.2 OPERATIONAL NOISE IMPACTS – 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 are 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 +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 (industrial/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 5. 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	[2]Project amenity noise level	+3dB correction	
Residential Properties Fronting The Hotel's Car Park								
Day	38	43	Suburban	55	No	50	53	43
Evening	40	45	Suburban	45	No	40	43	43
Night	36	41	Suburban	40	No	35	38	38
Residential Properties Fronting Prince Alfred Street								
Day	44	49	Suburban	55	No	50	53	49
Evening	35	40	Suburban	45	No	40	43	40
Night	31	36	Suburban	40	No	35	38	36
Residential Properties Fronting Princess Street								
Day	48	53	Suburban	55	No	50	53	53
Evening	50	55	Suburban	45	No	40	43	43
Night	46	51	Suburban	40	No	35	38	38

Notes: **1.** **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.
2. Project noise amenity level = recommended noise amenity level – 5 dB, except where specific circumstances are met, such as high traffic.

Commercial premises must not be exposed to a noise level that exceeds **$L_{Aeq,\ 15\text{-}minutes}$ 63 dB**.

4.3 TRAFFIC GENERATING DEVELOPMENT - NSW ROAD NOISE POLICY

The document entitled "NSW Road Noise Policy" has replaced the "Environmental Criteria for Road Traffic Noise" (ECRTN) for assessment procedures and criteria for traffic noise and effective from the 1st of July 2011.

An extract of Table 3 and Table 6 of NSW Road Noise Policy from Environmental Climate Change & Water (ECCW) is provided below:

Table 3 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from **new** freeway/arterial/sub-arterial road corridors	$L_{Aeq, (15\ hour)}$ 55 (external)	$L_{Aeq, (9\ hour)}$ 50 (external)
	2. Existing residences affected by noise from **redevelopment** of existing freeway/arterial/sub-arterial roads 3. Existing residences affected by **additional traffic** on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq, (15\ hour)}$ 60 (external)	$L_{Aeq, (9\ hour)}$ 55 (external)
Local roads	4. Existing residences affected by noise from **new** local road corridors 5. Existing residences affected by noise from **redevelopment** of existing local roads 6. Existing residences affected by **additional traffic** on existing local roads generated by land use developments	$L_{Aeq, (1\ hour)}$ 55 (external)	$L_{Aeq, (1\ hour)}$ 50 (external)

Note: Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads (see **Appendix C10**).

Figure 3. Road traffic noise assessment criteria – Image from NSW Road Noise Policy

In this case, type 6 of the above for local roads will be applicable. Furthermore, Section 3.4 of the NSW Road Noise Policy states the following:

3.4 Applying the assessment and relative increase criteria

The process for applying the criteria involves firstly defining a study area. This helps ensure that noise is assessed and any necessary mitigation applied at those locations most affected. The *UK Design Manual for Roads and Bridges* (United Kingdom Highways Agency 2008) adopts a distance of 600 metres from a project as being adequate for this purpose.

Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.

In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

Section 3.4.1 provides a step-by-step procedure for applying the noise criteria to each type of project and development covered by the RNP.

Figure 4. Applying the assessment and relative increase criteria– Image from NSW Road Noise Policy

Where the existing traffic noise levels are equal to or above the NSW Road Noise Policy (ECCW) assessment criteria, the increase in traffic noise levels due to the proposed development is not to exceed **2 dB**.

4.4 ACCOMMODATION ROOMS – INTER-TENANCY PARTITIONS: BCA 2022 VOL. 1

The Building Code of Australia (BCA) is included as Volume 1 and Volume 2 of the National Construction Code (NCC) and presents the minimum performance requirements for the safety, health, amenity, accessibility and sustainability of certain buildings. It primarily applies to new buildings but may also apply to new building work. The code is periodically updated with version 2022 being current as of the preparation of this report. Hereafter, the BCA will be referred to as the BCA 2022.

The BCA 2022 sound insulation objectives for Class 2, 3, and/or 9c buildings are provided to safeguard occupants from illness or loss of amenities due to excessive sound transfer throughout certain areas of the building. Accommodation rooms for a hotel are classified as Class 3 and thus are covered under BCA 2022 Volume 1.

The sound insulation requirements of the BCA 2022 may be satisfied through either a Performance Solution or Deemed to Satisfy Solution.

Table 6. BCA 2022 Assessment Methods

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 28)

Notes:
1. Accredited Testing Laboratory as defined in the BCA 2022 Schedule 1
2. Verification Methods – BCA 2022 Parts F7V1 to F7V4

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

Table 7. BCA 2022 acoustic design requirements			
Partition	**Detail**	**Airborne sound**	**Impact sound**
Floor	Separating SOUs, 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, or 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 pass 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 a bedroom, living room, lounge room, music room, television room, kitchen dining room, study, playroom, family room, home theatre and sunroom.		

5.0 LICENSED PREMISES NOISE ASSESSMENT

Noise levels from licensed areas of the pub were assessed to the Council's noise policy/L&GNSW noise criteria. The assessment considers the proposed layout of the pub per the architectural drawings outlined in Section 2.0 of this report.

The noise predictions are based on computer simulation (CadnaA) of the site and the surrounding area. The program predicts noise levels to receiver points based on source sound power levels, source-receiver distances, the presence of any acoustic shielding objects, and the effects of acoustic absorption of the ground and other elements.

Noise propagation calculations follow *ISO 9613 Acoustics – Attenuation of sound during propagation outdoors*. Per the sound propagation algorithms adopted in the ISO standard, the output of the noise model is a downwind sound pressure level which constitutes an assessment of noise-enhancing weather conditions.

5.1 DESIGN SCENARIOS AND MODELLING ASSUMPTIONS

Noise generated by licensed areas associated with the premises may originate from the:

- The lounge bar or lounge dining area;
- A separate lounge area;
- Sports bar;
- Bistro and dining pavilion;
- Outdoor dining area;
- Sports bar terrace, and
- The private dining room.

Specific operating conditions have been assessed that consider varying occupancy levels and noise sources during specific periods throughout the day. These are summarised as follows:

Table 8. Licensed venues assessment scenarios – L&GNSW									
Design Scenario	**Assessment period**	**Sports Bar**	**Lounge Bar and Dining**	**Lounge Terrace**	**Bistro and Dining Pavillion**	**Pergola Outdoor Dining**	**Sports Bar Terrace**	**Lounge Room**	**Private Dining Room**
1	7 am – 10 am	--	105 patrons[1]	15 patrons	80 patrons[1]	80 patrons	--	--	30 patrons
1.1	10 am – 10 pm	100 patrons	105 patrons[1]	15 patrons	80 patrons[1]	80 patrons	20 patrons	20 patrons	30 patrons
1.2	10 pm – 12 am	100 patrons	105 patrons	15 patrons	80 patrons	40 patrons	--	20 patrons	30 patrons
Notes: 1.	The northern doors of the bistro and the eastern doors of the lounge bar are open in these scenarios								

The areas outlined above are further detailed in the Figure below.

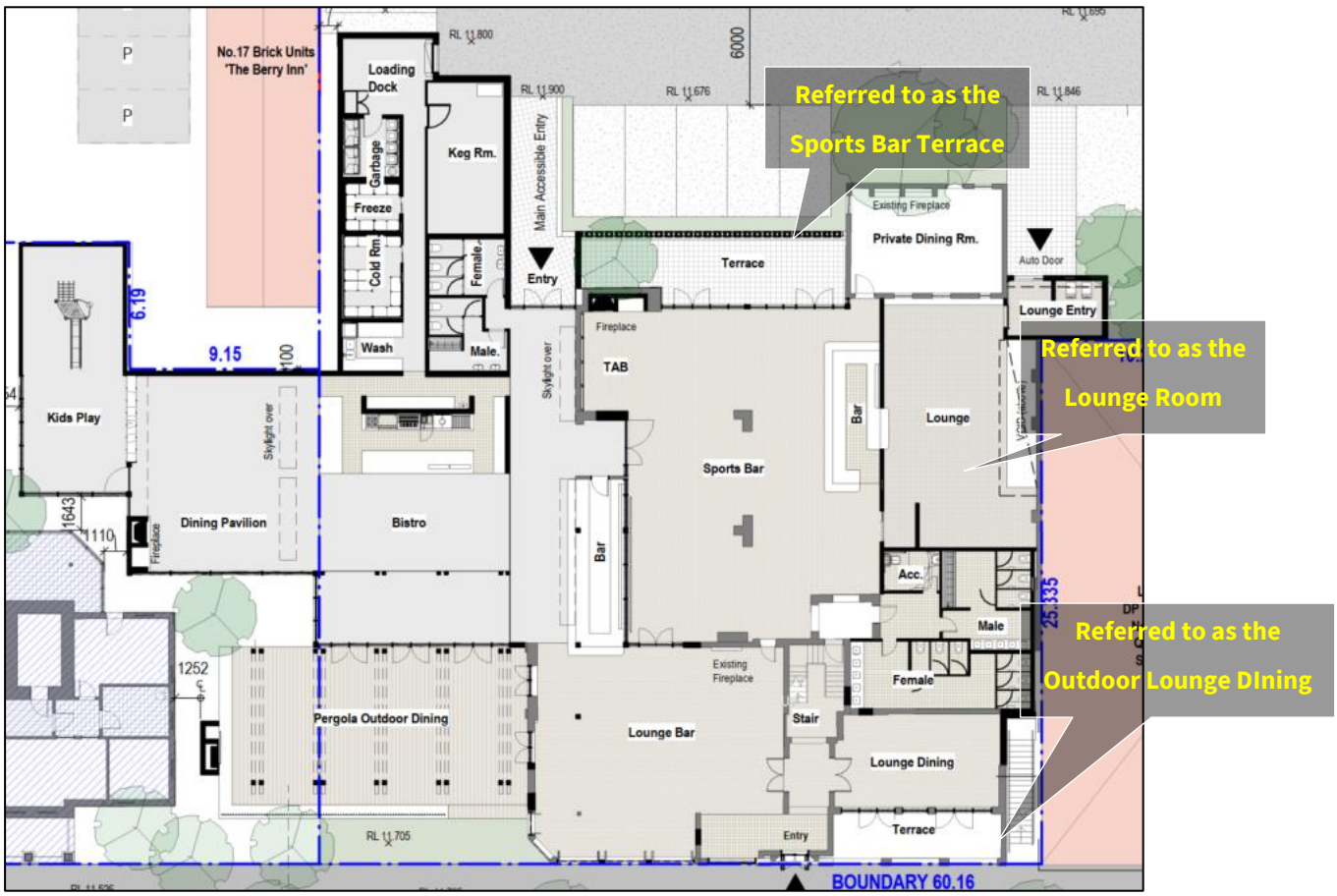


Figure 5. Hotel Ground Floor Plan – Image from H&E Architects

The above patron capacities are the maximum noise levels as provided to Koikas Acoustics by the Feros Hotel Group.

- Scenario 1 outlines some areas of the hotel operating for breakfast service, with the earliest opening time being 7 am.

- Scenario 1.1 represents the hotel operating at maximum capacity during the daytime and evening periods.
- Scenario 1.2 represents the hotel operating during the late evening period, where the L&GNSW noise criteria are much more stringent. Koikas Acoustics has been advised that the hotel will not operate past midnight.

The licensed premises noise assessment scenarios as outlined above represent the hotel operating at maximum capacity, and as such, operating with the highest anticipated noise level. When compliance is achieved with the hotel operating at maximum capacity, noise levels are also expected to comply when the hotel has fewer patrons, and in turn, lower noise levels.

5.2 SOURCE NOISE LEVELS

Noise data used in the assessment is sourced from:

- Database noise levels (measurements conducted at similar premises).
- Published noise data from other reference material such as research papers, acoustical texts etc.
- Noise levels attributed to human talkers with a normal vocal effort are sourced from ANSI S3.5.

All of the above were used to derive source noise levels for this acoustical assessment.
All measurements were taken with a NATA-certified and calibrated NTi Audio XL2 sound level meter. Additional field calibration checks were performed with a Larson Davis CAL200 calibrator with no system drift recorded.

The assessment considers the cumulative impact of the major noise-generating licensed areas of the hotel with the greatest potential to impact the surrounding residential receivers.

A summary of the base noise data as taken from measurements, database noise levels and/or other reference material is included below.

Table 9. Noise level data, L_{A10} dB

Measurement	Noise metric	1/1 octave band centre frequency [Hz]									
		31.5	63	125	250	500	1k	2k	4k	8k	Total

Approx 100 patrons in a sports bar	Lp inside	40	48	61	68	78	77	75	68	56	82
Approx 80 patrons in a bar	Lp inside	38	43	56	61	72	74	72	64	54	78
Approx 10 patrons in a gaming room	Lp inside	39	45	54	57	60	60	62	58	48	67
Human speaking with a normal vocal effort	Lw	38	42	51	60	68	65	61	56	49	71

The above noise data has been corrected to represent the specific design conditions related to the subject premises. The following noise levels have been used in the assessment.

Table 10. Adopted source noise levels for modelling, L_{A10} dB

Measurement	Noise metric	1/1 octave band centre frequency [Hz]									
		31.5	63	125	250	500	1k	2k	4k	8k	Total
Sports Bar – 100 patrons	Lp inside	40	48	61	68	78	77	75	68	56	82
Lounge Bar – 80 patrons	Lp inside	39	44	57	63	73	76	73	66	55	79
Lounge Dining – 25 patrons	Lp inside	35	39	52	58	69	71	68	61	50	74
Bistro and Dining Pavillion – 80 patrons	Lp inside	39	47	60	67	77	76	74	67	55	81
Lounge Room – 20 patrons	Lp inside	42	48	57	60	63	63	65	61	51	70
Private Dining Room – 30 patrons	Lp inside	35	40	53	58	69	71	69	61	51	75
Five People Speaking (normal vocal effort) – Lounge Terrace, Sports Bar Terrace, Pergola Outdoor Dining	Lw	44	48	57	66	74	71	67	62	55	77

5.3 IDENTIFIED NOISE-AFFECTED RECEIVERS

Noise is assessed at specific Assessment Locations within each of the identified noise-affected residential and/or commercial receiver sites. The following table and image provide a summary of the locations that have been assessed.

Table 11. Assessment locations

ID	Classification	Address / Receiver Site	Assessment Location
R1	Residential	17 Prince Alfred Street, Berry (The Berry Inn)	Upper floor level
R2	Residential	17 Prince Alfred Street, Berry (The Berry Inn)	Upper floor level
R3	Residential	17 Prince Alfred Street, Berry (The Berry Inn)	Upper floor level
R4	Residential	19 Prince Alfred Street, Berry	Most noise-affected boundary
R5	Residential	77-81 Princess Street, Berry (Proposed Accommodation Rms)	Upper floor level
R6	Residential	77-81 Princess Street, Berry (Proposed Accommodation Rms)	Upper floor level
R7	Residential	77-81 Princess Street, Berry (Proposed Accommodation Rms)	Upper floor level
R8	Residential	75 Princess Street, Berry	Upper floor level

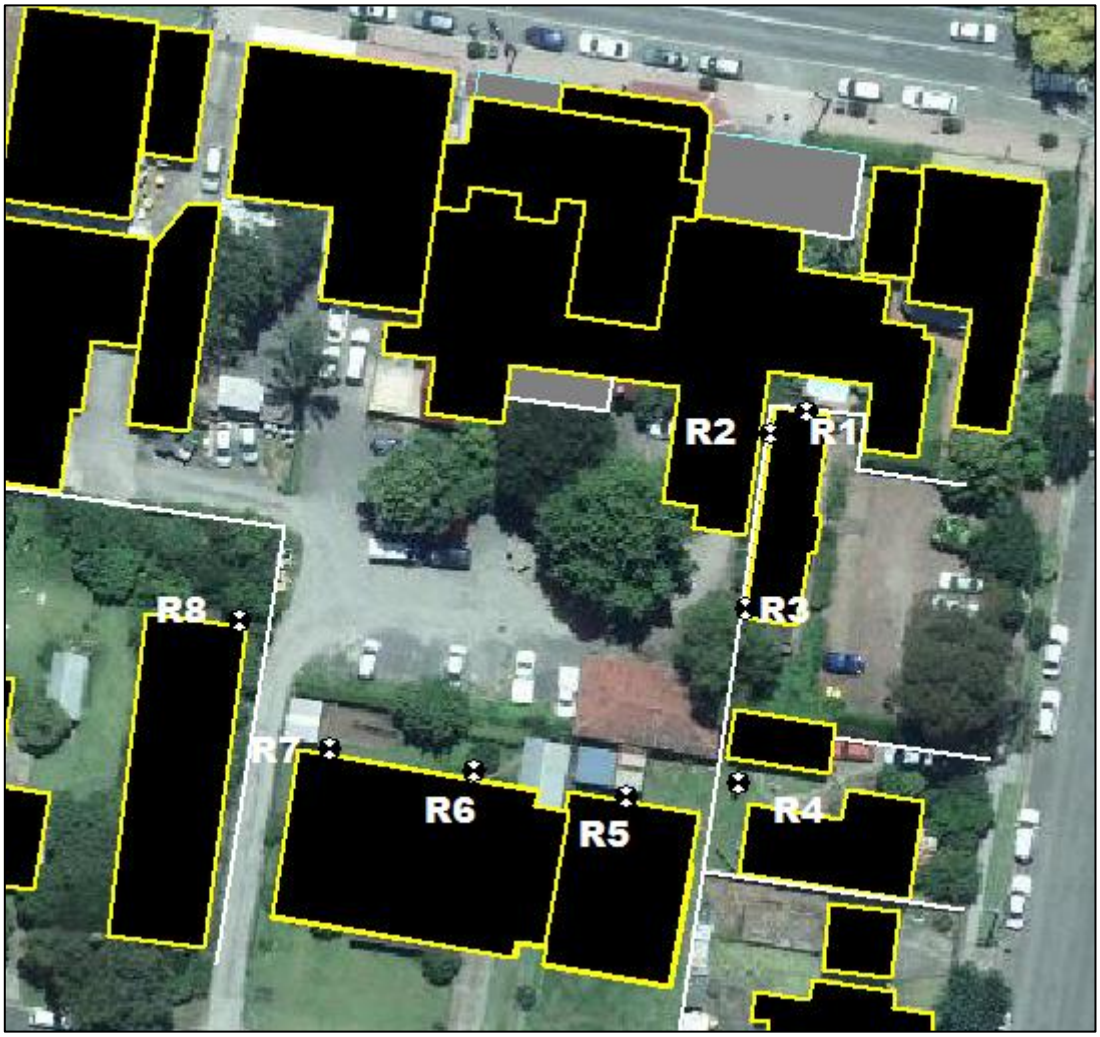


Figure 6. Receiver locations

5.4 PREDICTED RECEIVER LEVELS

The following noise levels are predicted for the identified noise-sensitive receivers before midnight:

Table 12. Receiver noise levels – Scenario 1 before midnight [7 am – 10 pm], L_{A10} [dB]										
Description	**1/1 octave band centre frequency [Hz]**									**Total**
	31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Criteria: Daytime	**26**	**29**	**35**	**32**	**35**	**38**	**36**	**31**	**24**	**43**
R1	10	17	26	32	39[1]	35	31	23	10	42
R2	7	13	23	29	37[1]	33	29	21	8	39
R3	2	8	16	24	32	30	26	17	1	35
R4	-3	2	8	14	21	17	14	5	-9	24
R5	-1	5	11	19	28	25	21	11	-8	31
R6	-2	5	13	21	28	23	18	9	-7	31
R7	-3	4	12	20	28	23	18	9	-7	30
R8	-3	3	11	19	27	24	15	9	-8	30

Table 13. Receiver noise levels – Scenario 1.1 before midnight [10 am – 12 am], L_{A10} [dB]										
Description	**1/1 octave band centre frequency [Hz]**									**Total**
	31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Criteria: Daytime	**26**	**29**	**35**	**32**	**35**	**38**	**36**	**31**	**24**	**43**
Criteria: Evening	**26**	**28**	**34**	**32**	**37**	**39**	**37**	**34**	**26**	**45**
R1	10	17	26	32	39[1]	37	32	24	10	43
R2	8	15	24	32	39[1]	36	31	23	10	42
R3	5	11	21	29	37[1]	34	29	22	10	40
R4	0	6	15	21	29	25	19	11	-4	32
R5	2	8	18	25	34	31	26	18	5	37
R6	2	9	18	26	35	31	27	21	10	38
R7	2	8	18	26	35	32	38	22	9	38
R8	2	7	17	24	34	31	26	19	6	37

Table 14. Receiver noise levels – Scenario 1.2 before midnight [10 pm – 12 am], L_{A10} [dB]										
Description	**1/1 octave band centre frequency [Hz]**									**Total**
	31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Criteria: Nighttime	**26**	**25**	**31**	**30**	**32**	**33**	**33**	**29**	**23**	**41**
R1	8	14	23	29	36[1]	31	26	18	6	38
R2	5	11	19	26	33[1]	29	24	16	3	36
R3	2	7	15	21	29	25	20	14	-3	32
R4	-3	1	8	12	19	16	10	4	-13	22
R5	0	5	12	18	27	23	19	11	-8	29
R6	0	5	13	20	28	24	20	13	-6	31
R7	0	4	13	19	28	24	20	13	-7	30
R8	-1	3	12	17	26	23	18	11	-8	29

Note 1: A 2 - 4 dB exceedance is calculated in the 500 Hz octave band at these receiver points. It is the professional opinion of Koikas Acoustics that a maximum of a 4 dB exceedance in one-octave band will typically not be perceptible to a person with normal hearing, and as such, would be deemed acceptable. Additionally, the exceedance is only calculated when the venue is operating at maximum capacity, it is unlikely that every space within the venue will be occupied to a maximum capacity, as such, noise levels are expected to be lower than what is calculated in this report.

The noise levels shown in Tables 12-14 confirm that the development complies with the L&G NSW L_{A10} noise condition.

5.5 RECOMMENDED NOISE CONTROLS

This report finds that the following noise control/noise management strategies are recommended for the proposed development:

Window/Glazing Recommendations

- The southern windows/doors of the Sports Bar that open onto the Sports Bar Terrace should be a minimum of 10.38 mm laminated glass, and achieve a minimum Rw rating of 34.
- All other windows and glass doors are required to be a minimum of 6.38 mm laminated glass and achieve a minimum Rw rating of 32.
- All windows and doors to the sports bar, dining pavilion, lounge room and kids' play area should remain closed except as used for entry and exit.

- The lounge bar and bistro windows and doors may be open during daytime and evening hours only (7 am – 10 pm). The windows and doors to these areas should remain closed after 10 pm, except as used for entry and exit.
- The lounge dining windows and doors may remain open during all operating hours.

Physical Recommendations

- The Sports Bar Terrace should have a solid barrier of at least 1.8 m in height that surrounds the terrace (see figures below).
- The solid barriers surrounding the Sports Bar Terrace should be constructed out of the following:
    - 15 mm compressed fibre cement panels with no air gaps at the joins;

      OR
    - 6 mm compressed fibre cement panels on either side of a 50mm steel frame with fibreglass insulation batts (14 kg/m;) to the cavity;

      OR
    - Double-lapped 15 mm thick timber fence palings offset so that there are no air gaps. This equates to a total barrier thickness of 30 mm;

      OR
    - Hollow or solid concrete block wall;

      OR
    - An approved equivalent wall type.

Operational Recommendations

- The outdoor dining area should not be occupied by more than 80 people during daytime or evening hours.
- The outdoor dining area should not be occupied by more than 40 people after 10 pm.
- The Sports Bar Terrace terrace should not be occupied by more than 20 people during the daytime or evening hours.
- The Sports Bar Terrace terrace should not be occupied after 10 pm.
- The outdoor lounge dining area should not be occupied by more than 15 people at any time.

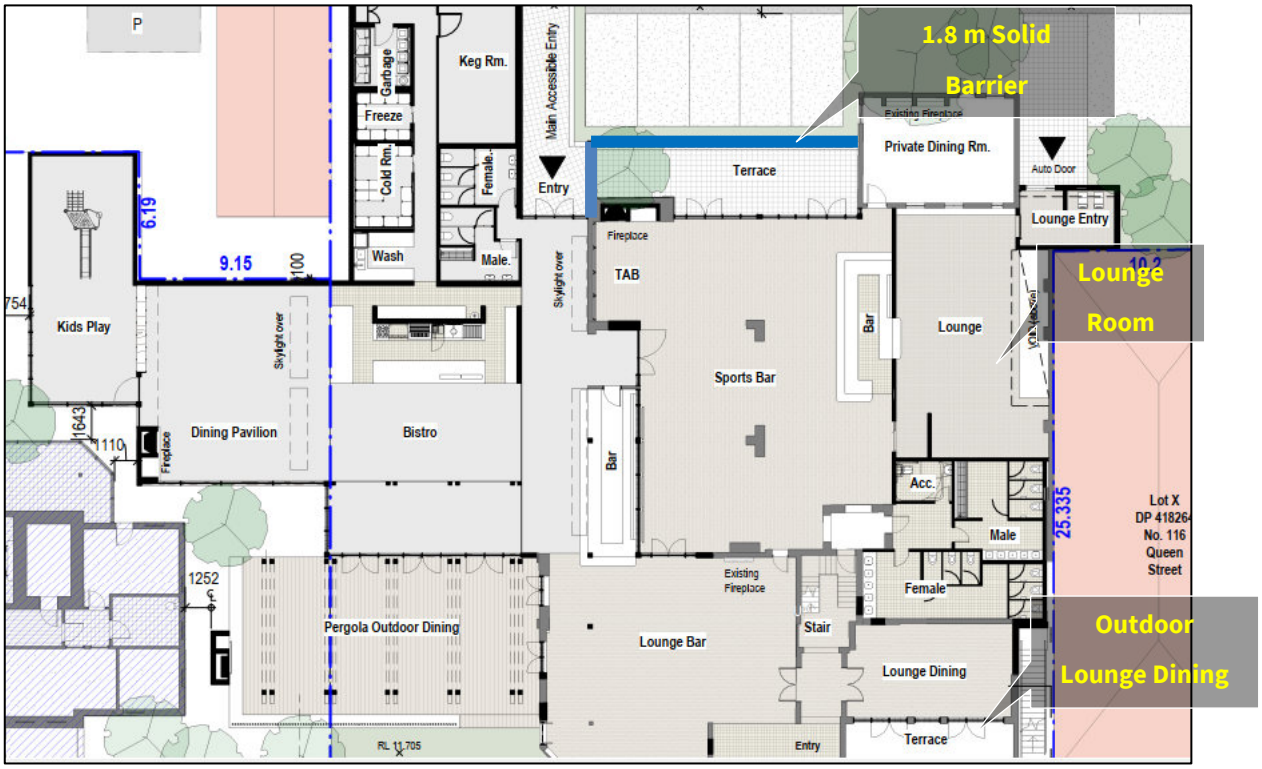


Figure 7. Barrier Recommendations – Image Source: H&E Architects

6.0 OPERATIONAL USE NOISE ASSESSMENT

Noise levels from other areas of the hotel and the proposed accommodation rooms were assessed to the Council's noise policy/EPA NPfI noise criteria. The assessment considers the proposed layout of the pub per the architectural drawings outlined in Section 2.0 of this report and the traffic report prepared by Traffix (their reference number: 22.486r01v01, Dated 04 May 2023).

6.1 ASSESSMENT SCENARIOS

The following noise sources have been considered in the noise model:

Table 15. Acoustic design scenarios and parameters	
	Operational Use
Design Scenario	**Noise Sources Considered/Design Assumptions**
Scenario 2 – Daytime [0700– 1800] Hotel and accommodation rooms' impacts on surrounding residences	**Hotel car park** • 9 x vehicles entering and leaving the car park • 9 x car door slams • 9 x car engine ignition sequences • 1 x truck delivery entering and leaving the car park • 1 x truck door slam • 1 x truck engine ignition sequence **Accommodation rooms'** • 8 x vehicles entering and leaving the car park[1] • 2 x people on every second accommodation room terrace (50% speaking) • 12 x people on the rooftop common/pool area (50% speaking) **Other hotel areas** • 25 x children aged 3-5 in the kid's play area
Scenario 2.1 – Evening [1800 – 2200] Hotel and accommodation rooms' impacts on surrounding residences	**Hotel car park** • 9 x vehicles entering and leaving the car park • 9 x car door slams • 9 x car engine ignition sequences **Accommodation rooms'** • 8 x vehicles entering and leaving the car park[1] • 2 x people on every second accommodation room terrace (50% speaking) • 12 x people on the rooftop common/pool area (50% speaking) **Other hotel areas** • 25 x children aged 3-5 in the kid's play area
Scenario 2.2 – Nighttime [2200 – 0700] Hotel and accommodation rooms' impacts on surrounding residences	**Hotel car park** • 3 x vehicles entering and leaving the car park • 3 x car door slams • 3 x car engine ignition sequences **Accommodation rooms'** • 3 x vehicles entering and leaving the car park[1]
Scenario 2.3 – Evening [1800– 2200] Hotel impacts on the accommodation rooms	**Hotel car park** • 9 x vehicles entering and leaving the car park • 9 x car door slams • 9 x car engine ignition sequences • 1 x truck delivery entering and leaving the car park • 1 x truck door slam • 1 x truck engine ignition sequence **Other hotel areas** • 25 x children aged 3-5 in the kid's play area
Scenario 2.4 – Nighttime [2200 - 0700] Hotel impacts on the accommodation rooms	**Hotel car park** • 3 x vehicles entering and leaving the car park • 3 x car door slams • 3 x car engine ignition sequences
Scenario 2.5 – Daytime [0700 – 1800] Outdoor dining area impacts on surrounding commercial premises	**Hotel** • The lounge bar, lounge dining, outdoor dining area, bistro/dining pavilion and kids' play area operating at maximum capacity as outlined in Section 5.1 of this report.
Notes: 1.	Due to the proposed basement parking level, noise emissions from car engine ignition sequences and car door slams will be shielded, and therefore their noise impacts on surrounding residences are expected to be minimal. As a result, these noise sources have not been assessed in the operation noise model.

Although the L&G NSW noise control guideline does not outline noise emission targets for nearby commercial receivers, this subject site has a lot of high noise emitting areas, in proximity to surrounding commercial premises. As a result, it is the opinion of Koikas Acoustics that a noise assessment of the areas of the hotel fronting Queen Street should be assessed to surrounding commercial receivers to ensure that noise emissions emanating from the licensed areas of the hotel do not cause offensive noise to occupants in commercial premises. The noise criteria described in the EPA NPfI were used.

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, as adequate documentation and information in the form of mechanical services drawings have not been prepared. A detailed review of mechanical plant noise emission is often conditioned within the development consent as a requirement for the Construction Certificate, as any assumptions made at this stage regarding mechanical plant, will be rendered irrelevant when the mechanical services drawings are prepared.

Mechanical plant and equipment installed within the development must not emit noise levels that exceed the EPA's NPfI project noise trigger levels at nearby residential and commercial premises when assessed cumulatively with operational noise emissions from the hotel. The adopted project noise trigger levels for the hotel are outlined in Section 4.2 of this report. A detailed review of mechanical noise emissions from the development should be completed at the CC stage and assessed cumulatively with operational noise sources from the hotel and accommodation rooms. Mechanical noise sources from any external fans, outlets, inlets, condensers and noise emissions from the plant deck will also need to be assessed.

An example of a development condition for mechanical plant noise is included below:

"Mechanical plant and equipment must be located, designed and/or acoustically attenuated so that noise emitted from the plant and equipment does not exceed the adopted Project Noise Trigger Levels as defined by the EPA's Noise Policy for Industry 2017 at surrounding residential premises. Noise emissions from mechanical plant and equipment must be assessed cumulatively with operational noise emissions".

However, based on the shielded location of the mechanical plant deck, noise emissions from the mechanical plant to surrounding residential receivers are expected to be minimal. Noise from the mechanical plant will be shielded due to the mechanical plant deck barriers and sunken position. Should noise emissions from the mechanical plant be higher than expected, some general mechanical plant noise recommendations have been outlined in Section 6.4 of this report.

6.2 SOURCE NOISE LEVELS

The following noise sources have been adopted for the noise modelling assessment. Source noise levels have been referenced from;

- Measurements conducted previously by Koikas Acoustics;
- Published noise data from ANSI S3.5 and the AAAC.

A summary of the base noise data as taken from measurements, database noise levels and/or other reference material is included below.

Table 16. Sound power levels $L_{wAeq,\ 15\ minutes}$ [dB]

Noise source	1/1 octave band centre frequency [Hz]									Total
	31.5	63	125	250	500	1k	2k	4k	8k	
Vehicle Car moving (*constant noise source*)	50	63	69	72	76	78	73	68	60	82
Vehicle Car door slam (*one event per 15-minutes*)	23	37	45	44	49	47	49	43	34	55
Vehicle Car engine ignition (*one event per 15-minutes*)	16	31	35	34	42	45	48	47	42	53
Vehicle Truck moving (*constant noise source*)	60	72	77	83	85	86	83	80	70	91
Vehicle Truck slam (*one event per 15-minutes*)	23	37	45	44	49	47	49	43	34	55
Vehicle Truck ignition (*one event per 15-minutes*)	38	41	46	53	65	70	66	65	64	74
Human Talker Human talking with a '*normal*' vocal effort	30	39	48	57	65	62	58	53	46	68
Children 10 x children aged 3-5 (*active play*)	50	64	70	75	81	83	80	76	72	87

6.3 CALCULATED NOISE LEVEL RESULTS

All calculations consider the noise sources as described in Section 6.2 of this report.

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 the operational noise associated with the development. The most noise-sensitive receiver locations are summarised below and are shown in Figure 3.

Table 17. Assessment locations [Scenarios 2 – 2.2]

ID	Receiver type and address	Assessment location
R1	122 Queen Street, Berry	Most noise-affected boundary
R2	122 Queen Street, Berry	Most noise-affected boundary
R3	17 Prince Alfred Street, Berry (The Berry Inn)	Upper floor level
R4	17 Prince Alfred Street, Berry (The Berry Inn)	Upper floor level
R5	19 Prince Alfred Street, Berry	Most noise-affected boundary
R6	21 Prince Alfred Street, Berry	Most noise-affected boundary
R7	23 Prince Alfred Street, Berry	Most noise-affected boundary
R8	72 Princess Street, Berry	Most noise-affected boundary
R9	70 Princess Street, Berry	Most noise-affected boundary
R10	68 Princess Street, Berry	Most noise-affected boundary
R11	75 Princess Street, Berry	Upper floor level
R12	75 Princess Street, Berry	Upper floor level
R13	75 Princess Street, Berry	Upper floor level
R14	118 Queen Street, Berry	Most noise-affected boundary

Figure 8. Receiver locations and Identifications

Table 18. Assessment locations [Scenarios 2.3 – 2.4]		
ID	**Receiver type and address**	**Assessment location**
R1	77-81 Princess Street, Berry (Proposed Accommodation Rooms)	Upper floor level
R2	77-81 Princess Street, Berry (Proposed Accommodation Rooms)	Upper floor level
R3	77-81 Princess Street, Berry (Proposed Accommodation Rooms)	Upper floor level
R4	77-81 Princess Street, Berry (Proposed Accommodation Rooms)	Upper floor level
R5	77-81 Princess Street, Berry (Proposed Accommodation Rooms)	Upper floor level
R6	77-81 Princess Street, Berry (Proposed Accommodation Rooms)	Upper floor level

Figure 9. Receiver locations and Identifications

Table 19. Assessment locations [Scenario 2.5]		
ID	**Receiver type and address**	**Assessment location**
R1	118 Queen Street, Berry	Most noise-affected boundary
R2	129 Queen Street, Berry	Most noise-affected boundary
R3	131 Queen Street, Berry	Most noise-affected boundary
R4	133 Queen Street, Berry	Most noise-affected boundary
R5	135 Queen Street, Berry	Most noise-affected boundary
R6	137 Queen Street, Berry	Upper floor level
R7	122 Queen Street, Berry	Most noise-affected boundary
R8	122 Queen Street, Berry	Most noise-affected boundary
R9	122 Queen Street, Berry	Most noise-affected boundary
R10	122 Queen Street, Berry	Most noise-affected boundary

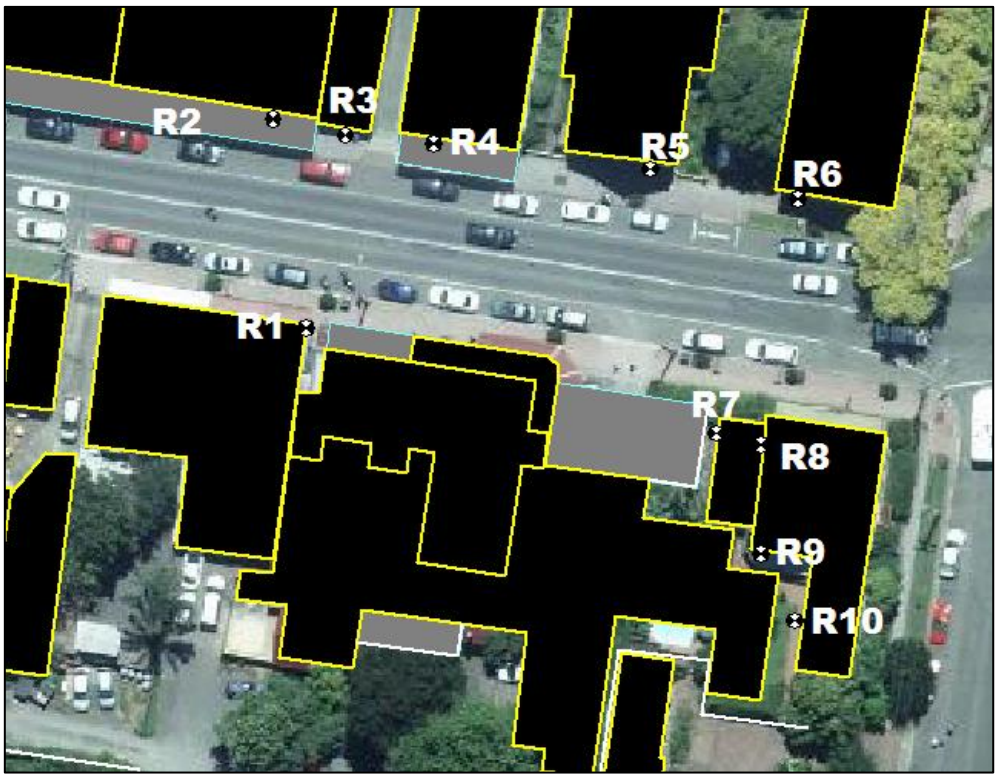


Figure 10. Receiver locations and Identifications

Predicted operational noise levels are as follows: ***Blue = Noise criterion***

Table 20. Scenarios 2-2.2 – Operational Noise Levels at the Surrounding Premises [$L_{Aeq,\ 15\text{-}minutes}$ dB]

Receivers	Calculated Noise Levels – Scenario 2	Calculated Noise Levels – Scenario 2.1	Calculated Noise Levels – Scenario 2.2
R1	43 ***63***	43 ***63***	8 ***63***
R2	41 ***63***	41 ***63***	8 ***63***
R3	43 ***43***	42 ***43***	33 ***38***
R4	42 ***43***	42 ***43***	31 ***38***
R5	42 ***43***	41 ***43***	26 ***38***
R6	41 ***43***	40 ***43***	16 ***38***
R7	40 ***53***	40 ***43***	21 ***38***
R8	40 ***53***	43 ***43***	25 ***38***
R9	43 ***53***	42 ***43***	29 ***38***
R10	42 ***53***	41 ***43***	31 ***38***
R11	41 ***53***	43 ***43***	34 ***38***
R12	48 ***53***	43 ***43***	38 ***38***
R13	45 ***53***	40 ***43***	35 ***38***
R14	41 ***63***	41 ***63***	35 ***63***

Table 21. Scenarios 2.3-2.4 – Operational Noise Levels at the Accommodation Rooms [$L_{Aeq,\ 15\text{-}minutes}$ dB]

Receivers	Calculated Noise Levels – Scenario 2.3	Calculated Noise Levels – Scenario 2.4
R1	42 ***43***	38 ***38***
R2	42 ***43***	36 ***38***
R3	40 ***43***	33 ***38***
R4	39 ***43***	33 ***38***
R5	37 ***43***	32 ***38***
R6	38 ***43***	31 ***38***

Table 22. Scenario 2.5 – Operational Noise Levels at the Surrounding Premises [$L_{Aeq,\ 15\text{-}minutes}$ dB]	
Receivers	**Calculated Noise Levels – Scenario 2.5**
R1	57 ***63***
R2	49 ***63***
R3	50 ***63***
R4	53 ***63***
R5	52 ***63***
R6	55 ***63***
R7	59 ***63***
R8	52 ***63***
R9	45 ***63***
R10	43 ***63***

Refer to **Appendix B** for the receiver locations and Cadna/A noise contour maps. The assessment predicts noise to comply with the adopted project noise trigger levels provided the noise mitigation measures as described in Section 6.4 of this report are followed.

6.4 RECOMMENDATIONS

The following noise mitigation measures are required to comply with the relevant noise control guidelines.

- The rooftop terrace/pool area should not be occupied by more than 12 people during the daytime and evening [0700 – 2200 hours].
- The rooftop terrace/pool area should not be occupied during the nighttime [2200 – 0700 hours].
- The accommodation room terraces should not be occupied after 10 pm.
- All deliveries to the hotel should occur during the daytime [0700 – 1800 hours].
- Delivery trucks and cars should be advised not to idle stationary whilst parked on delivery items to the hotel.
- A detailed mechanical plant noise assessment should be conditioned as part of the development consent as outlined in Section 6.1. Mechanical plant noise should be assessed cumulatively with operation noise emissions from the hotel.
- The solid barriers surrounding the accommodation room terraces should be at least 1.8 m high.
- A 1.2 m high solid barrier should surround the accommodation room rooftop terrace and pool area.

- The solid barriers should be constructed out of the following materials:
  - 15 mm compressed fibre cement panels with no air gaps at the joins;

    OR
  - 6 mm compressed fibre cement panels on either side of a 50mm steel frame with fibreglass insulation batts (14 kg/m) to the cavity;

    OR
  - Double-lapped 15 mm thick timber fence palings offset so that there are no air gaps. This equates to a total barrier thickness of 30 mm;

    OR
  - Solid concrete block work/solid 110 mm brick;

    OR
  - 12.38 mm laminated glass (Rw ≥ 36)

    OR
  - 15 mm solid polycarbonate

    OR
  - An approved equivalent wall type.

Figure 11. Barrier Recommendations – Image Source: H&E Architects

= 1.8 m noise barrier

Figure 12. Barrier Recommendations – Image Source: H&E Architects

= 1.2 m noise barrier

6.4.1 General Mechanical Plant Noise Recommendations

Although noise emissions from the hotel's mechanical plant are expected to be minimal, the following noise control measures could be considered to further limit mechanical plant noise from the proposed plant deck:

- Internal duct lining could be used for mechanical ductwork. Duct lining should be 50 mm thick fibreglass lining with a density of at least 24 kg/m^3.
- Air-conditioning condenser units should have a Night Quiet Mode available to operate at a reduced loading during night periods.
- Acoustic attenuators (silencers) could be installed on various mechanical equipment.
- The barriers to the plant deck could be lined with absorptive materials, held together with perforated metal with 50% open cells.
- Supawood Perforated Panels could be used as barriers for the plant deck.
- An awning over the top of the plant deck, lined with acoustic absorptive materials on the underside could be used to further limit noise emissions from this area.

Although mechanical plant noise emissions are expected to be minimal, the above noise mitigation measures could further reduce noise emissions to assist in compliant noise levels, should they be required. As stated in Section 6.1 of this report, a detailed mechanical plant noise assessment should be conducted at the CC stage.

7.0 ASSESSMENT OF ON-ROAD VEHICLE NOISE

7.1 NOISE SOURCES

On-road vehicle noise is predicted via the road noise module in CadnaA on the presumption of up to 17 cars arriving or departing during 1 hour, as per the traffic report as referenced in Section 6.0 of this report.

7.2 ASSESSMENT LOCATIONS

Noise levels are assessed at 1 metre from the residential facades most impacted by on-road vehicle noise. Each assessment location is shown in the image below and further qualified in the following table.

Table 23. Assessment locations

ID	Receiver type and address	Assessment location
R1	Residential / 69 Princess Street, Berry	Ground-level – nearest façade
R2	Residential / 71 Princess Street, Berry	Ground-level – nearest façade
R3	Residential / 73 Princess Street, Berry	Ground-level – nearest façade
R4	Residential / 75 Princess Street, Berry	Ground-level – nearest façade
R5	Residential / 21 Prince Alfred Street, Berry	Ground-level – nearest façade
R6	Residential / 23 Prince Alfred Street, Berry	Ground-level – nearest façade
R7	Residential / 72 Princess Street, Berry	Ground-level – nearest façade
R8	Residential / 70 Princess Street, Berry	Ground-level – nearest façade
Notes: 1.	Noise is assessed at 1.5 metres above the ground, or for upper-floor locations, at 1.5 metres above the floor level.	

Figure 13. Assessment locations – On-road vehicle noise

7.3 CALCULATED RECEIVER LEVELS

The following noise levels are calculated for each of the identified assessment locations:

Blue = Noise criterion

Table 24. Scenarios 2.3-2.4 – Operational Noise Levels at the Accommodation Rooms [$L_{Aeq,\ 15\text{-}minutes}$ dB]		
Receivers	**Existing Traffic Noise Levels – Scenario 3**	**Additional Traffic Noise Levels – Scenario 3.1**
R1	52 *[--]*	53 ***55***
R2	51 *[--]*	53 ***55***
R3	51 *[--]*	53 ***55***
R4	51 *[--]*	53 ***55***
R5	45 *[--]*	46 ***55***
R6	52 *[--]*	54 ***55***
R7	53 *[--]*	54 ***55***
R8	50 *[--]*	52 ***55***

Based on the calculations above, additional traffic on the local road network as a result of the hotel and accommodation room development is expected to be negligible.

8.0 ACCOMMODATION ROOMS INTER-TENANCY PARTITIONS

The following recommendations are deemed suitable to meet the BCA 2022 minimum acoustical requirements. Several options are provided that discuss a range of standard constructions.

All partition systems should be installed as per the general installation guidelines included in the BCA 2022 and as per relevant manufacturer installation guidelines/requirements.

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

8.1 RECOMMENDED PARTITION WALLS

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

Table 25. Recommended partition wall systems		
Wall type	**BCA 2022 design standard**	**Construction**
Inter-tenancy wall	Rw + Ctr ≥ 50 Discontinuous	*The 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, 20 mm cavity, 64 mm steel studs with 75 mm thick Tontine TSB4 insulation within the stud cavity, 10 mm Soundcheck. **[Masonry]** Two leaves of 110 mm clay brick masonry, a 50 mm cavity between the leaves (where brick ties are used they are to be of the resilient type), and 13 mm cement render to each side. *BCA 2022 D.T.S.* **[Concrete]** 125 mm concrete panel, 20 mm cavity, 64 mm steel studs, 70 mm polyester insulation (9 kg/m^3) between the studs, 13 mm plasterboard fixed to studs. *BCA 2022 D.T.S.* **[Hebel]** 13 mm Fyrchek, 75 mm Hebel Powerpanel, 35 mm cavity, 64 mm steel studs with 100 mm S6 polyester insulation, 13 mm Fyrchek/Aquachek. **[Lightweight]** 2x64 mm steel studs, 20 mm cavity, 60 mm polyester insulation (11 kg/m3) positioned between one row of studs, 2x13 mm fire-resistant plasterboard on each side.
	Rw + Ctr ≥ 50	*The partition wall between sole-occupancy units* **[AFS]** AFS 162 Logicwall panel, paint or render finish. **[AFS]** AFS 162 Logicwall panel, 28 mm furring channel, Tontine TSB2 insulation within the framing cavity, 13 mm plasterboard. **[Masonry / Hebel / Lightweight]** As above. **[Concrete]** 200 mm concrete panel, 13 mm cement render of each face. *BCA 2022 D.T.S.*
Common wall	Rw ≥ 50 Discontinuous	*The 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	*The partition wall between a 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 150 mm brick masonry with 13 mm cement render on each face. **[Concrete]** 125 mm thick concrete panel. **[Hebel]** 13 mm Gyprock CD, 75 mm Hebel Powerpanel, minimum 20 mm cavity, 64 mm steel framing with 50 mm glass wool insulation, 13 mm Gyprock CD. **[Lightweight]** 92 mm steel studs, 60 mm polyester insulation (11 kg/m3) positioned between the studs, 2x13 mm fire-resistant plasterboard on each side.
Services shaft wall	Rw+Ctr ≥40	*Services shaft wall to habitable room within the unit* **[Masonry]** 110 mm brick masonry with 13 mm cement render on each face. *BCA 2022 D.T.S.* **[Concrete]** 100 mm thick concrete panel. *BCA 2022 D.T.S.* **[Lightweight]** 2x13 mm plasterboard, pipe lagging (Soundlag 4525C, Acoustilag 45)
	Rw+Ctr ≥25	*Services shaft wall to non-habitable room within the unit* **[Lightweight]** 2 layers of 13 mm 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 2022 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 2022 condition. This conclusion is supported by numerous field tests that indicate compliance with the BCA 2022 verification methods rating. 3. All installation of proprietary-type wall systems must be as per the relevant installation guidelines and manuals. 4. *BCA 2022 D.T.S.* = BCA 2022 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 2022. Where these systems are installed correctly as per the BCA 2022 they do not require compliance testing to verify acoustic performance.		

8.2 RECOMMENDED PARTITION FLOOR/CEILING

The following floor/ceiling assemblies are recommended to achieve the BCA 2022 minimum acoustic rating requirements.

Table 26. 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 glue • underlay RFC750 (3, 4.5 mm) RF700 (3, 4, 5, 10 mm) • 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 adhesive glue • 30 mm screed • Underlay RFC750 (3, 4.5 mm) RF700 (3, 4, 5, 10 mm) • 200 mm concrete slab • 100 mm ceiling cavity • 13 mm plasterboard ceiling
Direct-stick timber $L'_{nTw} \leq 50$	• 19 mm strip timber nailed into 15 mm CD plywood • 5 mm Ubond Wet adhesive • 15 mm CD plywood • RF700 (3, 4, 5, 10 mm) • 200 mm concrete slab • 100 mm ceiling cavity • 13 mm plasterboard ceiling
Floating floor $L'_{nTw} \leq 50$	• Floating floor • 2 mm foam slip layer • RF700 (3, 4, 5, 10 mm) • 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.	Alternate underlay suppliers may be considered

8.2.1 Additional recommendations/information

- Acoustic underlays may not be required on the ground floor level and/or in apartments that are not located above the apartments below.
- The above recommendations will apply to balconies/terraces situated above the indoor areas of the apartments below.
- All flooring and acoustic underlays should be installed as per the relevant manufacturers' installation and design guides.
- Acoustic underlays installed below screeded floors must ensure that the joints of the underlay mats are appropriately sealed such that the screed cannot contact the concrete slab. Koikas Acoustics recommends either:
    - Butt-joining the underlay mats and filling in the gaps at the joints with Novatex Acoustapatch, OR
    - Overlap the underlay mats by a minimum of 50 mm at the joints and tape them down with approved tape.
- 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 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.

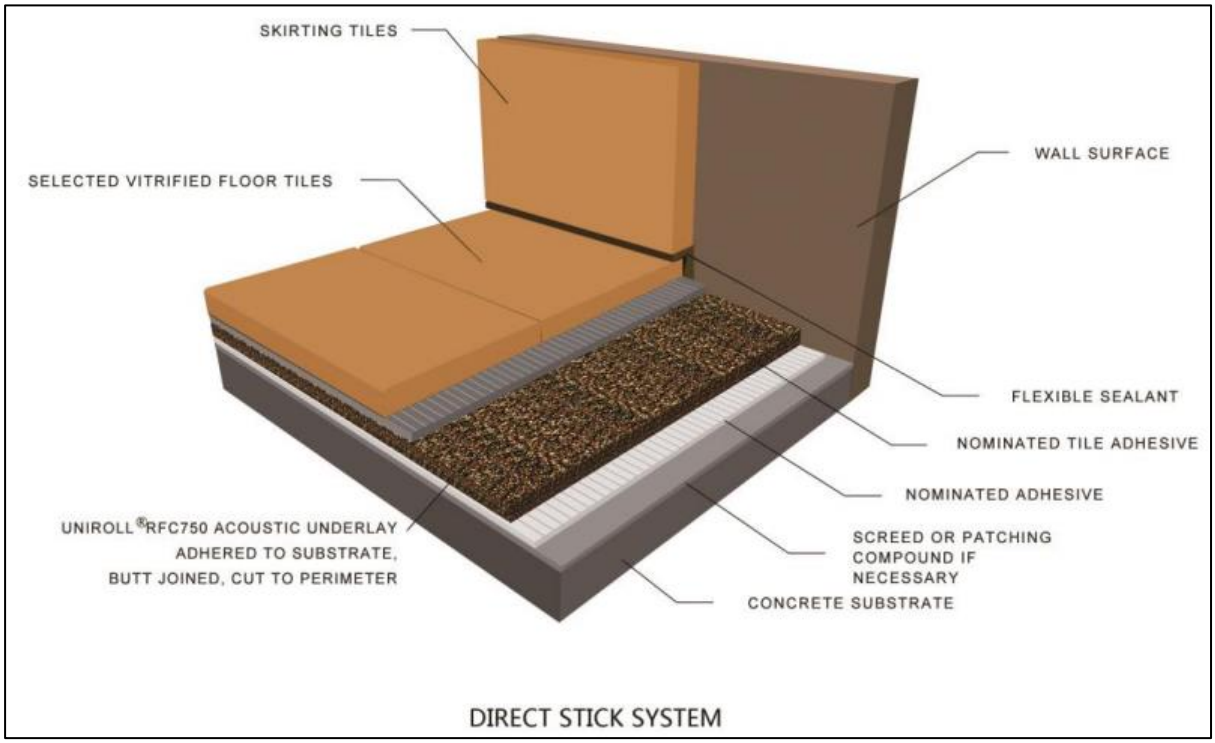


Figure 14. Indicative isolation of hard floor covering details

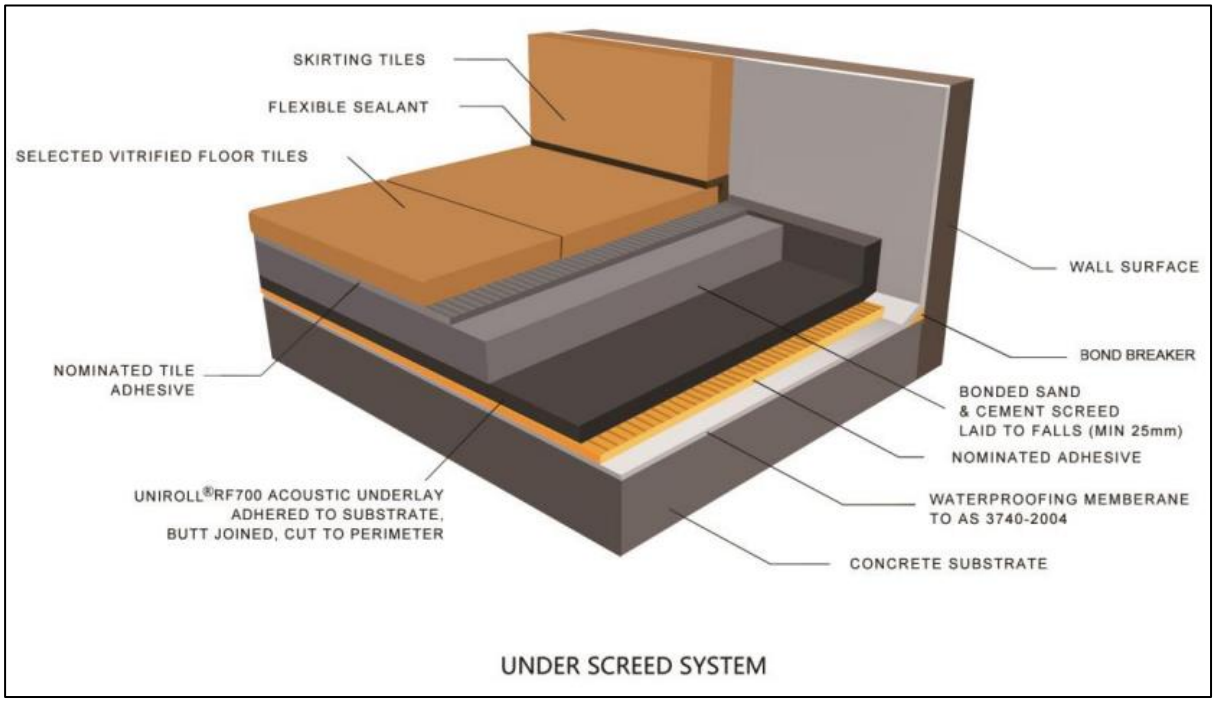


Figure 15. Indicative isolation of hard floor covering details

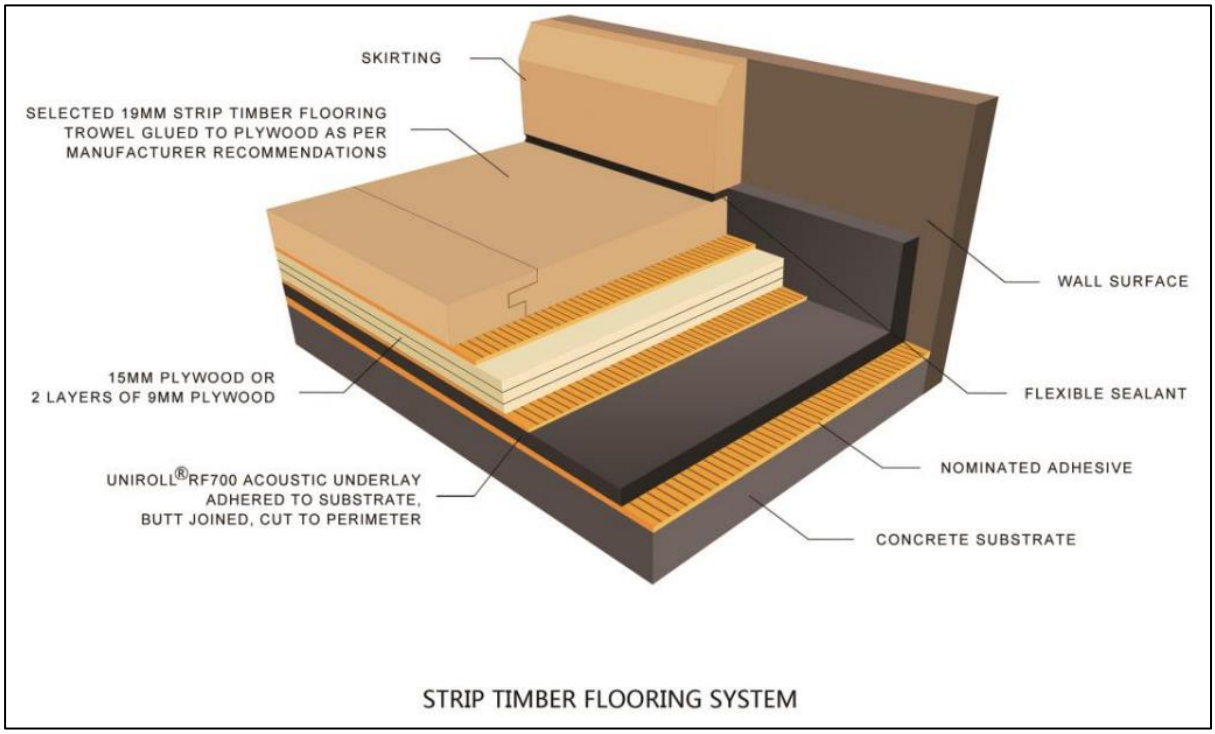


Figure 16. Indicative isolation of hard floor covering details

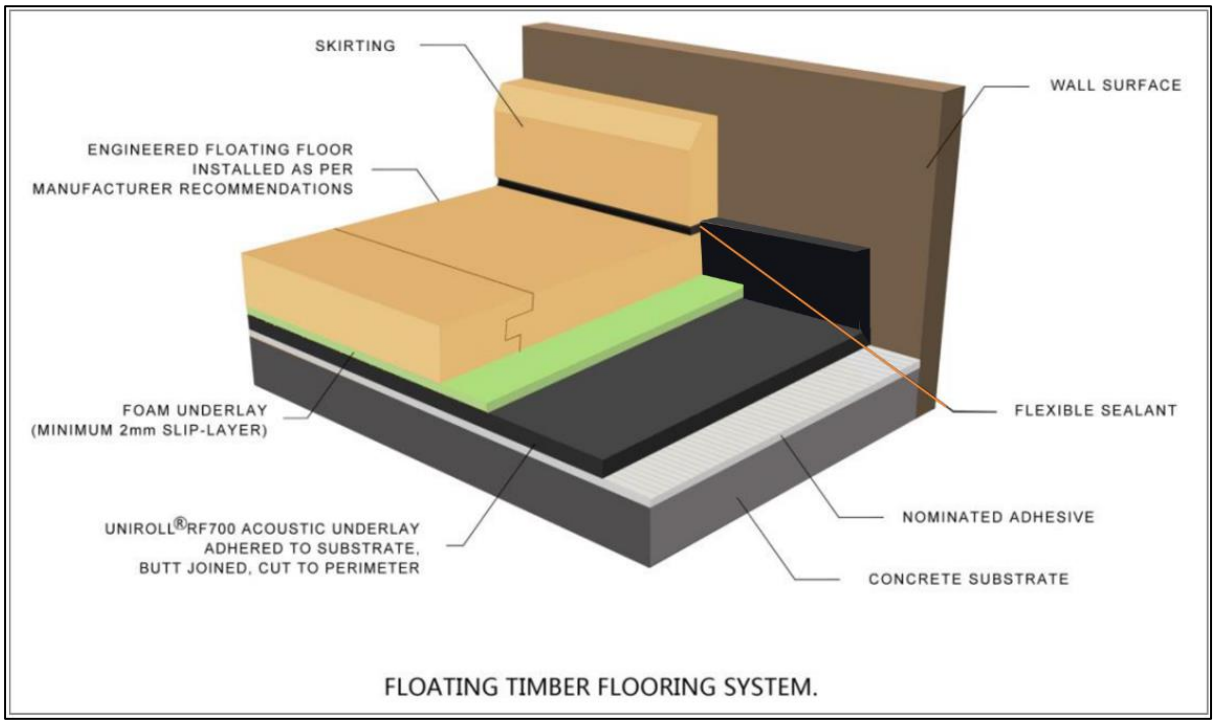


Figure 17. Indicative isolation of hard floor covering details

- 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 2022.

- The above floor systems have been assessed to comply with the BCA 2022 airborne and impact sound insulation requirements. Verification of the installed acoustic performance should be determined per subsequent recommendations of this report.

8.2.2 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 2022. The installation would need to match exactly the system installed for the laboratory test, inclusive of adhesives, floor surfaces, underlays etc. Generally, the installation of a suspended ceiling will improve the acoustical impact rating.

Certification of any construction system based on the laboratory acoustic test data, with no on-site testing, can only be considered in the event of extensive field inspections during the construction and fit-out.

8.2.3 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
- The surface area of the floor
- The geometry of the room
- The thickness and density of the flooring
- Bridging/isolation between the tiles and the skirting boards
- Bridging/isolation between the tiles/screed and the walls
- The damping, thickness and density of the underlay
- The thickness and density of the concrete slab
- Whether the concrete slab is pre or post-tensioned
- The junction between the concrete slab with the walls
- The location of beams, columns and shear walls
- Flanking paths between the concrete slab and the wall types

- The separation between the plasterboard ceiling and the concrete slab
- The connections utilised between the suspended ceiling grid to the concrete slab
- The insulation installed or not installed in the cavity
- The thickness and density of the plasterboard ceiling
- The sealing between the plasterboard ceiling to the walls in the unit below
- The degree of sealing between the plasterboard ceiling and the down-lights
- The use of curtain wall systems

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

8.3 SOIL, WASTE, AND 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 SOUs, the following separation details may be used to comply with the required acoustic rating:

Table 27. 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 OR 2 layers of 16 mm Fychek
4	Rw + Ctr 40	CSR Red Book	Acoustilag 45 and 13 mm Soundchek OR Acoustilag 45 and 2 layers of 16 mm Fychek
5	Rw + Ctr 40	Pyrotech Soundlag 4525C brochure	Soundlag 4525C and minimum 10 mm plasterboard wall/ceiling lining
Notes:	1. The acoustic lagging material may be excluded by using Rehau Raupiano Plus pipe system. 2. All installations are to be as per the relevant manufacturers' specifications and requirements. 3. 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.		

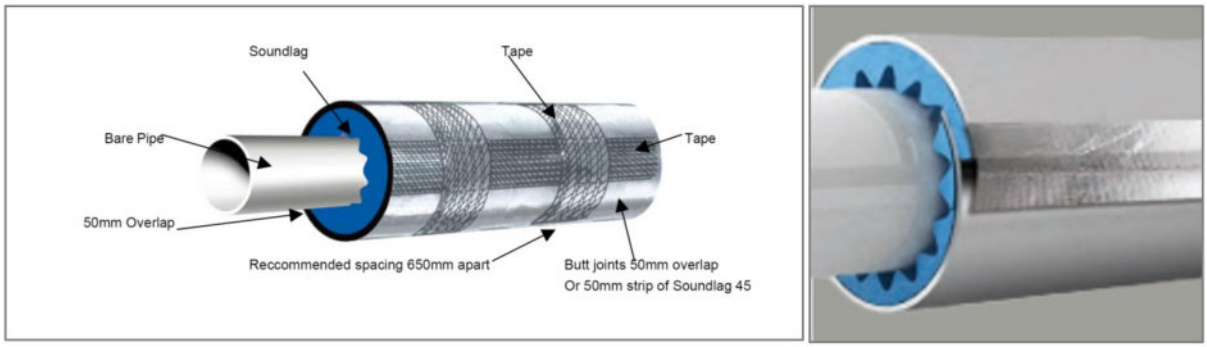


Figure 18. Acoustic lagging details (image from Pyrotech)

8.3.1 Additional BCA 2022 requirements

The BCA 2022 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 a 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 materials 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.

8.4 SOUND ISOLATION OF PUMPS

HVAC and plumbing noise may originate from large components (chillers, boilers, cooling towers, pumps, air handlers) or any of the smaller components (fans, valves, terminal units, diffusers or grilles). Pumps often give rise to structure-borne noise. This is usually the result of inadequate isolation of the pump or the attached piping. Flexible couplings 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:

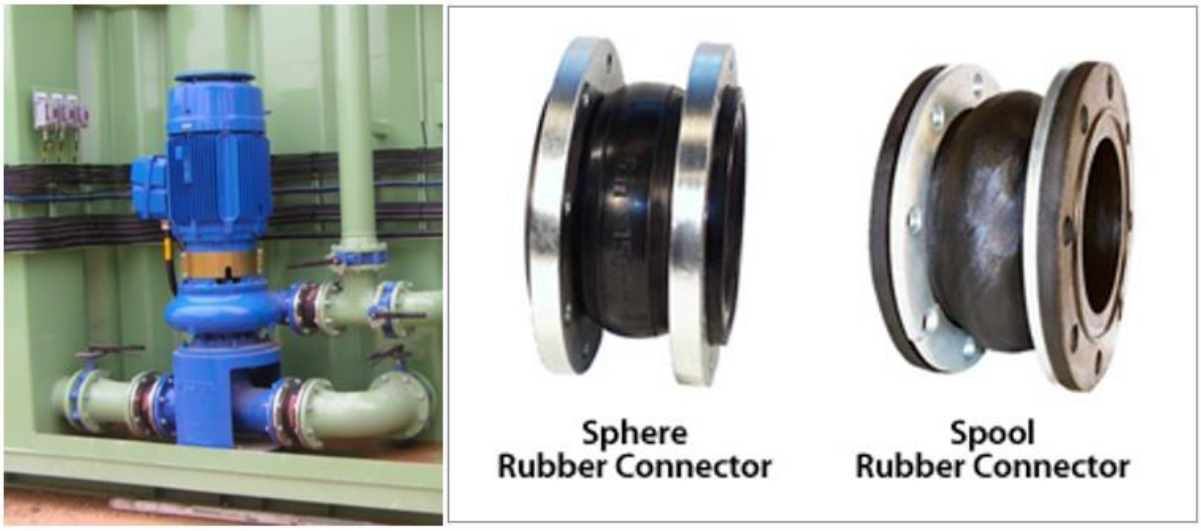


Figure 19. Indicative flexible coupling (Image from IADG)

8.5 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 20. Indicative door and sealing arrangement (Raven)

8.6 ADDITIONAL RECOMMENDATIONS FOR THE ROOFTOP POOL

The proposed rooftop pool within the building structure has the potential to generate significant structure-borne noise and vibration throughout the development. The rooftop pool system will likely need to be completely vibration-isolated from the concrete structure of the building to avoid offensive noise transmission to the accommodation rooms.

This is of particular importance, as the rooftop pool is shown to be directly above habitable areas through a common ceiling/floor system. The entirety of the pool shell, any connection points, and all pool-related services will need to be completely vibration isolated from the structure of the building. **Mason Mercer** or **Embelton** should be contacted regarding specifics for the design of the vibration isolation of the rooftop pool throughout the building. The hydraulic pipes of the pool will also need to be vibration-isolated, likely through the use of vibration hangers

Again, either **Mason Mercer** or **Embelton** should be contacted for the detailed design and implementation of the vibration isolation of the rooftop pool.

9.0 CONCLUSION

Koikas Acoustics was requested to conduct an acoustical assessment and prepare a report for the proposed hotel extension and accommodation rooms at the Berry Hote, located at 120 Queen Street, Berry NSW. The acoustical report is to accompany a development application to be submitted to Shoalhaven Council.

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

Acoustic planning levels have been referenced from current L&GNSW, EPA, NSW Road Noise Policyand BCA 2022 acoustic planning guidelines and requirements.

The included recommendations are based on designs prepared by H&E 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:

- Noise emissions from licensed areas of the hotel are predicted to comply with the relevant L&GNSW noise conditions, provided the recommendations as outlined in Section 5.5 of this report are implemented correctly.
- Operational noise emissions from the hotel and accommodation rooms are predicted to comply with the relevant EPA NPfI noise conditions, provided the recommendations as outlined in Section 6.4 of this report are implemented correctly.
- A detailed assessment of mechanical plant noise should be prepared for the subject development before construction.
- Acoustical treatments for common floors and service partitions included within this report would be adequate for satisfying the sound insulation provisions of the BCA 2022 for the accommodation rooms.

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

Daily Rainfall (millimetres)

FOXGROUND ROAD

Station Number: 068197 · State: NSW · Opened: 1972 · Status: Open · Latitude: 34.74°S · Longitude: 150.77°E · Elevation: 50 m

2022	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	*0*	*0*	*3.4*	30.0	0.2	*0*	*0*	*0.2*	*2.0*	*40.6*	*12.6*	
2nd	*0*	*6.6*	*91.0*	6.0	0	*0*	*225.4*	*0*	*0*	*9.0*	*0*	
3rd	*0.6*	*2.4*	*65.0*	0.6	0	*0*	*143.0*	*0*	*7.0*	*0*	*1.0*	
4th	*0*	*18.0*	*60.2*	0	0	*0*	*36.0*	*0*	*36.4*	*0*	*0*	
5th	*0*	*6.2*	*7.6*	0	2.2	*0*	*65.0*	*0*	*1.4*	*3.2*	*0*	
6th	*42.0*	*3.8*	*78.0*	17.0	0	*0*	*11.0*	*0*	*0*	*38.6*	*0*	
7th	*24.6*	*0*	*135.0*	85.0	0	*0*	*12.0*	*0*	*4.6*	*53.0*	*0*	
8th	*25.6*	*0*	*154.6*	10.4	0	*0*	*0.6*	*0*	*0*	*1.4*	*0*	
9th	*0.2*	*0*	*47.6*	13.2	3.0	*0*	*0*	*0.4*	*2.0*	*61.4*	*0*	
10th	*2.4*	*0*	*0*	19.6	22.0	*0*	*32.2*	*6.6*	*0.6*	*4.4*	*0*	
11th	*0*	*8.2*	*0*	0.2	22.4	*0*	*23.6*	*0*	*10.4*	*0.2*	*0*	
12th	*16.4*	*26.8*	*3.2*	9.2	30.0	*0*	*0*	*0*	*0*	*0*	*0*	
13th	*19.0*	*47.8*	*2.4*	1.0	13.4	*0*	*0.8*	*1.6*	*0.4*	*0*	*0*	
14th	*1.8*	*0*	*0*	5.0	0.2	*0*	*0*	*0*	*0.2*	*2.0*	*23.4*	
15th	*0.8*	*0*	*0.6*	0	0.4	*0*	*0*	*0*	*0*	*0*	*0*	
16th	*0.6*	*0*	*1.4*	0	0	*0*	*0*	*0*	*1.2*	*0*	*0*	
17th	*0*	*0*	*1.2*	0	0	*0*	*0*	*0*	*0*	*4.8*	*4.4*	
18th	*1.4*	*0*	*0*	0	0	*0*	*0*	*0*	*0*	*0.4*	*0*	
19th	*27.4*	*0.2*	*71.2*	0	0	*0*	*1.6*	*0*	*0*	*0*	*0*	
20th	*0*	*0*	*2.0*	5.6	0	*4.8*	*12.0*	*11.2*	*0*	*0.4*	*3.0*	
21st	*0*	*0*	*0*	0	2.0	*0*	*14.0*	*2.2*	*0*	*42.0*	*0*	
22nd	*2.6*	*11.6*	*0*	0	33.8	*0*	*5.0*	*0*	*2.0*	*8.0*	*0*	
23rd	*2.6*	*47.6*	*0*	4.0	19.0	*0*	*4.0*	*0*	*11.8*	*14.6*	*0*	
24th	*1.4*	*12.0*	*0*	4.8	0.2	*0*	*1.4*	*18.4*	*5.0*	*42.4*	*0*	
25th	*0*	*69.0*	*32.2*	6.0	15.8	*0*	*0.4*	*0*	*3.6*	*55.0*	*0*	
26th	*0*	*34.0*	*15.2*	0.4	0	*0*	*1.4*	*0*	*0.2*	*1.6*	*0.8*	
27th	*0*	*33.8*	*13.8*	1.4	0	*0*	*0*	*2.0*	*3.0*	*0*	*0*	
28th	*0*	*10.6*	*45.0*	3.2	0.6	*0*	*0*	*2.4*	*12.6*	*0*	*3.2*	
29th	*0*		*16.6*	1.2	0	*0*	*0*	*0*	*30.2*	*0*	*0*	
30th	*0.2*		*68.4*	2.0	4.4	*0*	*0*	*3.0*	*33.4*	*0*	*0*	
31st	*0*		*40.4*		0		*0*	*0.8*		*0*		
Highest daily	*42.0*	*69.0*	*154.6*	85.0	33.8	*4.8*	*225.4*	*18.4*	*36.4*	*61.4*	*23.4*	
Monthly Total	*169.6*	*338.6*	*956.0*	225.8	169.6	*4.8*	*589.4*	*48.8*	*168.0*	*383.0*	*48.4*	

↓ This day is part of an accumulated total
Quality control: 12.3 Done & acceptable, *12.3* Not completed or unknown

Product code: IDCJAC0009 reference: 92367873

Daily Rainfall (millimetres)

FOXGROUND ROAD

Station Number: 068197 · State: NSW · Opened: 1972 · Status: Open · Latitude: 34.74°S · Longitude: 150.77°E · Elevation: 50 m

Statistics for this station calculated over all years of data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	159.8	231.5	224.4	141.3	134.3	158.4	97.4	105.5	90.6	131.4	145.7	119.5
Median	143.7	174.0	153.0	92.6	89.2	109.9	62.2	49.7	64.4	93.2	117.2	94.2
Highest daily	231.8	309.6	357.6	273.1	301.4	255.8	232.2	365.2	432.8	409.4	422.4	182.4
Date of highest daily	24th 1999	19th 1959	11th 1975	7th 1950	24th 1990	5th 2016	28th 1984	1st 1990	11th 1950	21st 1959	19th 1961	14th 1991

1) Calculation of statistics

Summary statistics, other than the Highest and Lowest values, are only calculated if there are at least 20 years of data available.

2) Gaps and missing data

Gaps may be caused by a damaged instrument, a temporary change to the site operation, or due to the absence or illness of an observer.

3) Further information

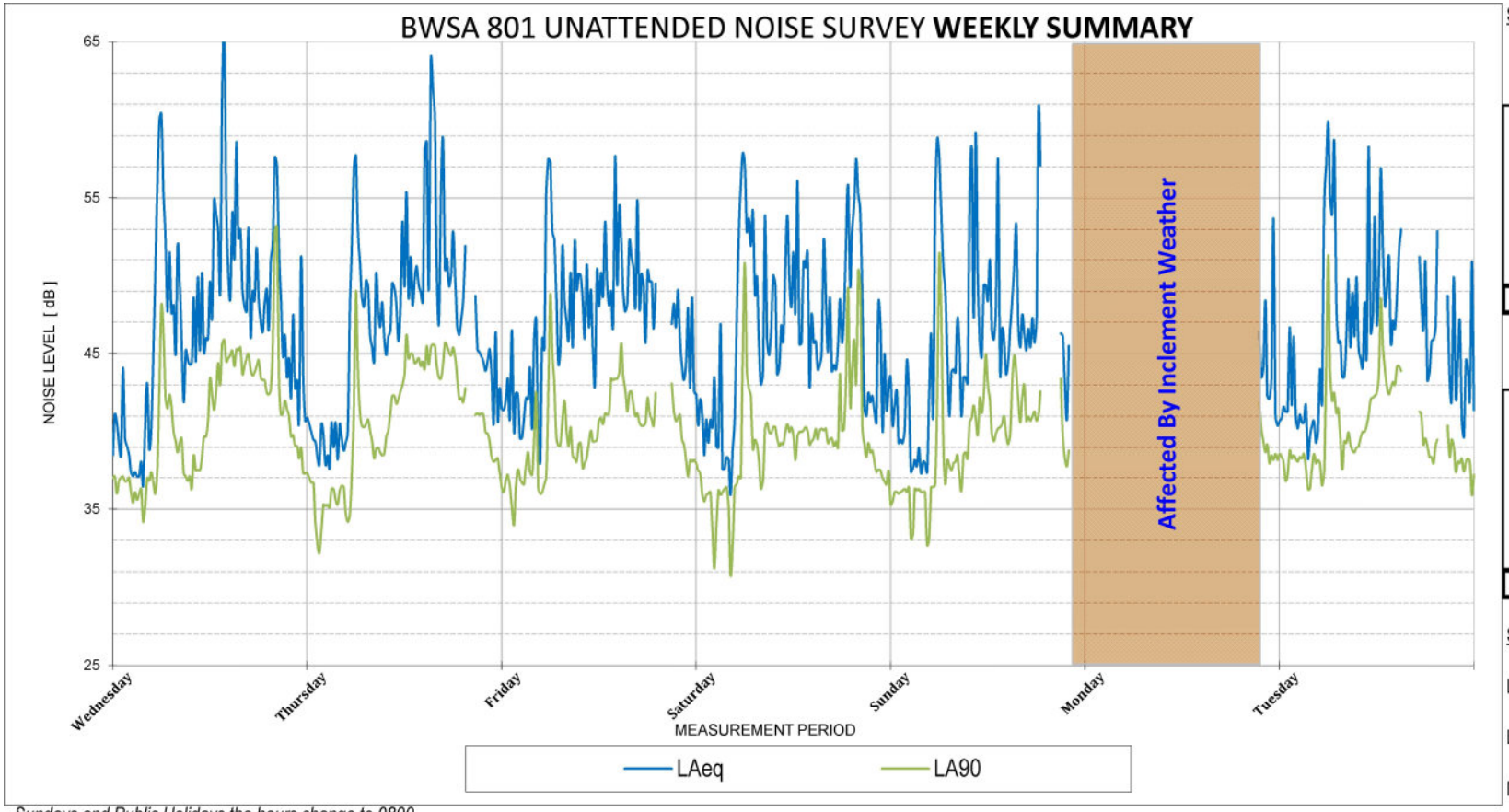
http://www.bom.gov.au/climate/cdo/about/about-rain-data.shtml.

APPENDIX B

APPENDIX B

APPENDIX B

WEEKLY SUMMARY **LOGGER LOCATION:** Berry Hotel Carpark **PERIOD:** 9th to the 15th November 2022



Sundays and Public Holidays the hours change to 0800

SUMMARY OF AMBIENT LEVELS

	LA90 Daytime	*LA90* Evening	*LA90* Night-time
Day 1	37	41	36
Day 2	39	40	34
Day 3	38	40	36
Day 4	39	38	33
Day 5	38	38	34
Day 6	N/A	40	39
Day 7	39	38	37
RBL	**38**	**40**	**36**

	LAeq Daytime	*LAeq* Evening	*LAeq* Night-time
Day 1	54	51	51
Day 2	54	49	48
Day 3	50	49	48
Day 4	49	52	49
Day 5	50	54	49
Day 6	N/A	45	46
Day 7	50	48	50
Average	**52**	**51**	**49**

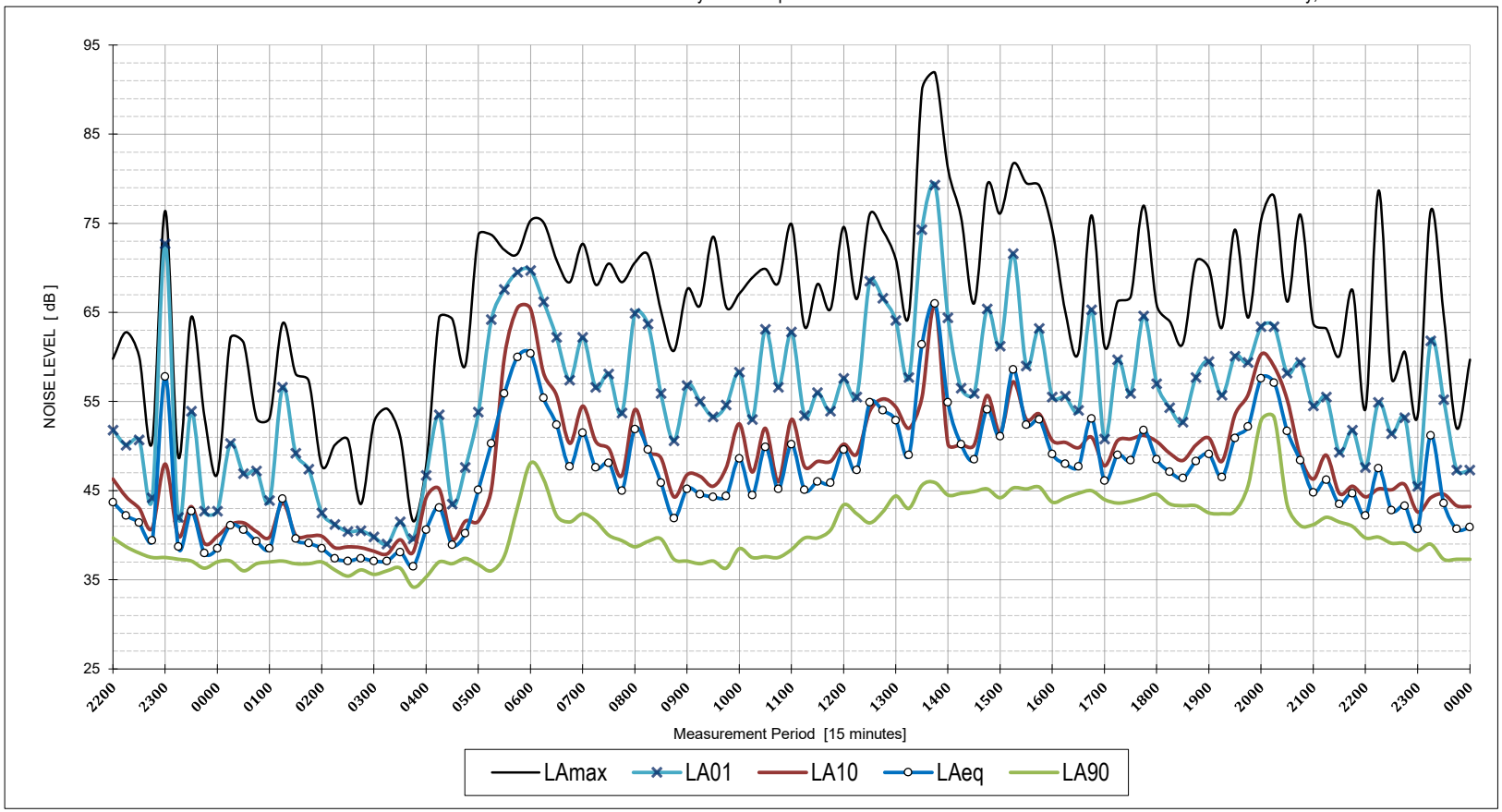
SUMMARY OF TRAFFIC LEVELS

LAeq 15 hrs	0700-2200	51	dB
LAeq 9 hrs	2200-0700	49	dB
Max LAeq 1 hr	0700-2200	53	dB
Max LAeq 1 hr	2200-0700	55	dB

Maximum noise events as defined in the Environmental Noise Management Manual 7 day average - [LAmax - LAeq ≥ 15]	19

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 1 **LOGGER LOCATION:** Berry Hotel Carpark **DATE:** Wednesday, 9 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	37	dB
LA90 Evening	1800-2200	41	dB
LA90 Night-time	2200-0700	36	dB
LAeq Daytime	0700-1800	54	dB
LAeq Evening	1800-2200	51	dB
LAeq Night-time	2200-0700	51	dB

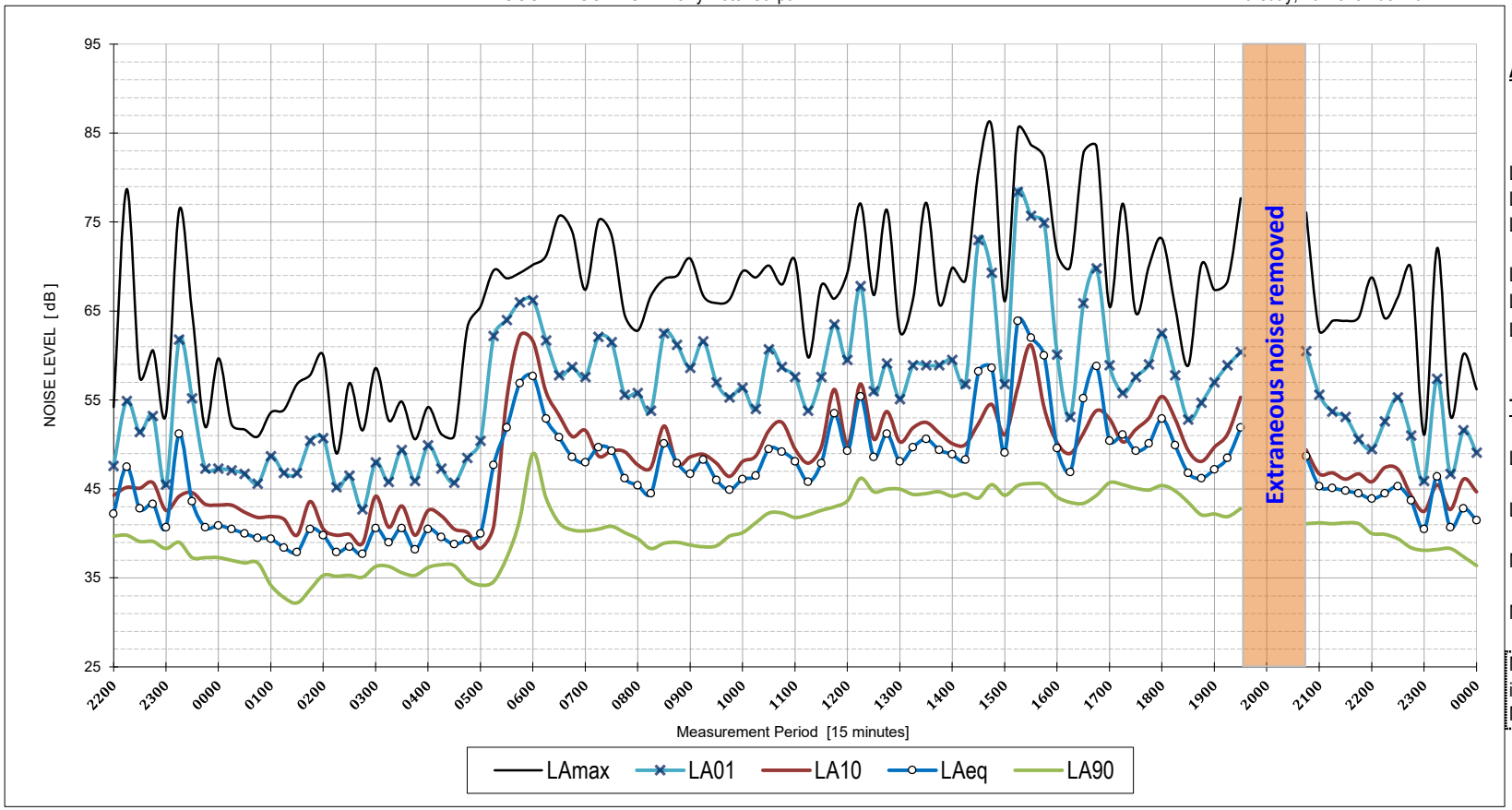
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	53	dB
LAeq 9 hours	2200-0700	51	dB
Max LAeq 1 hour	0700-2200	55	dB
Max LAeq 1 hour	2200-0700	56	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	22

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 2 **LOGGER LOCATION:** Berry Hotel Carpark **DATE:** Thursday, 10 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	39	dB
LA90 Evening	1800-2200	40	dB
LA90 Night-time	2200-0700	34	dB
LAeq Daytime	0700-1800	54	dB
LAeq Evening	1800-2200	49	dB
LAeq Night-time	2200-0700	48	dB

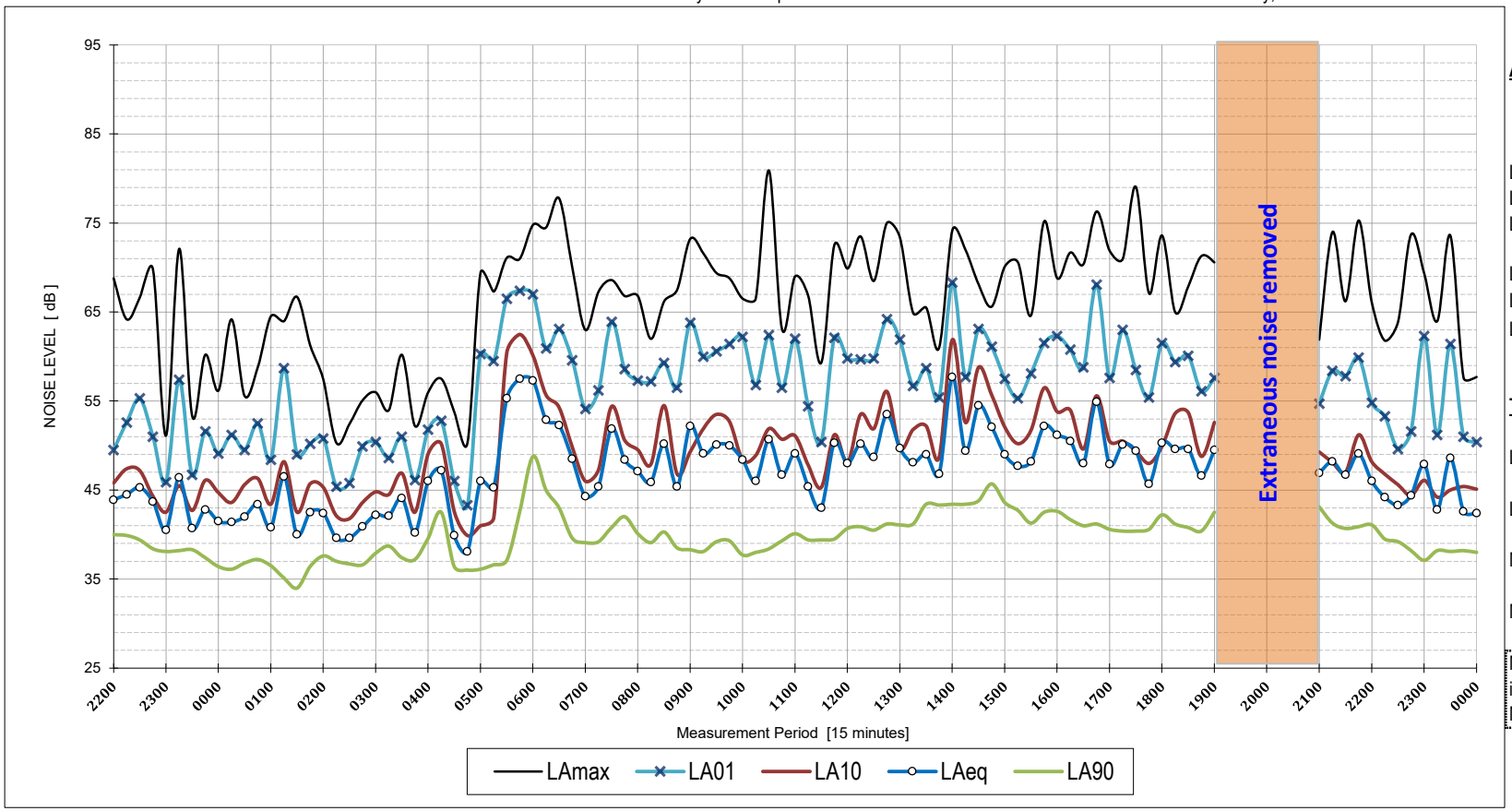
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	53	dB
LAeq 9 hours	2200-0700	48	dB
Max LAeq 1 hour	0700-2200	56	dB
Max LAeq 1 hour	2200-0700	54	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	18

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 3 **LOGGER LOCATION:** Berry Hotel Carpark **DATE:** Friday, 11 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	38	dB
LA90 Evening	1800-2200	40	dB
LA90 Night-time	2200-0700	36	dB
LAeq Daytime	0700-1800	50	dB
LAeq Evening	1800-2200	49	dB
LAeq Night-time	2200-0700	48	dB

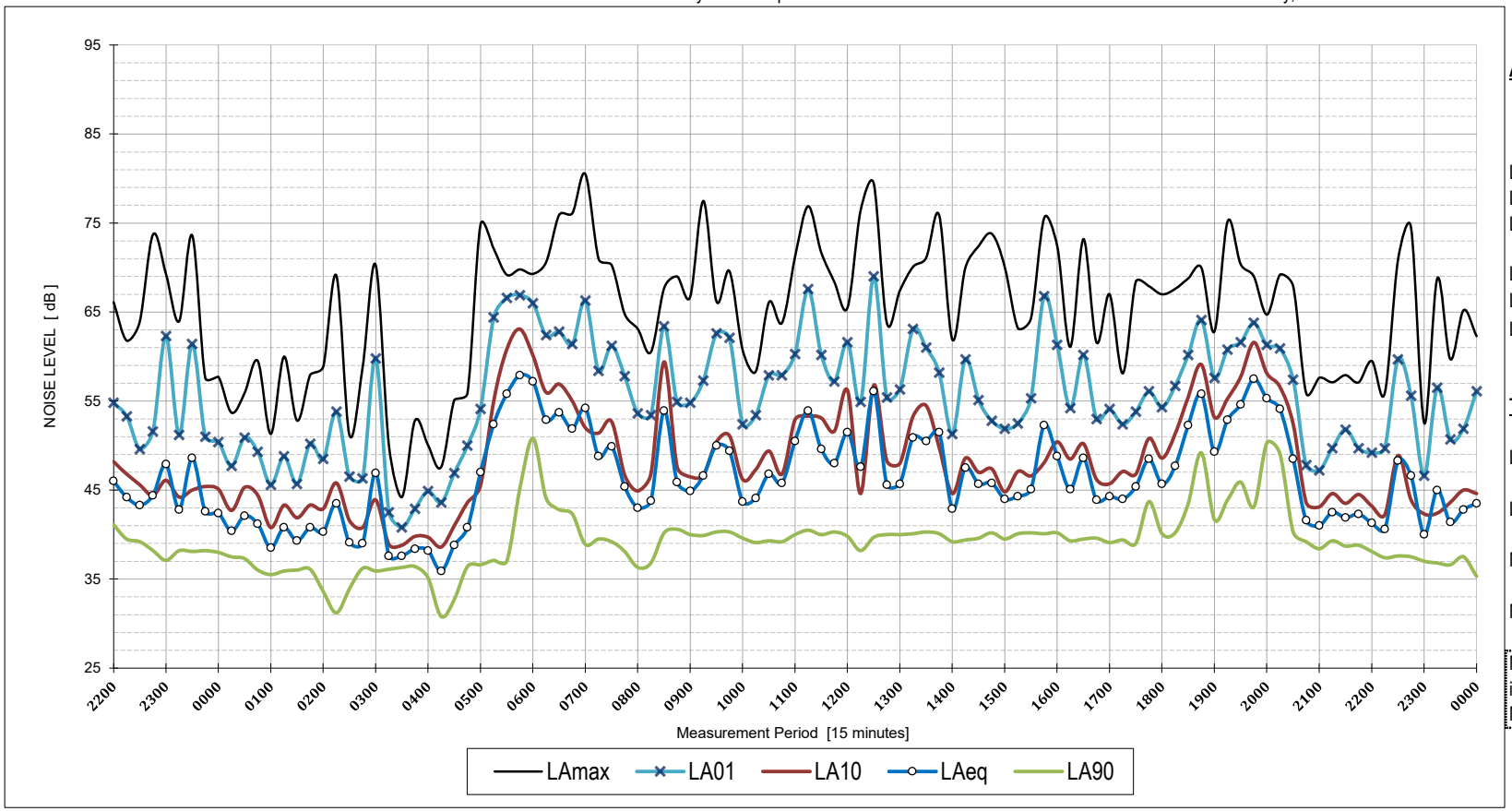
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	50	dB
LAeq 9 hours	2200-0700	48	dB
Max LAeq 1 hour	0700-2200	52	dB
Max LAeq 1 hour	2200-0700	54	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	21

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 4 **LOGGER LOCATION:** Berry Hotel Carpark **DATE:** Saturday, 12 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	39	dB
LA90 Evening	1800-2200	38	dB
LA90 Night-time	2200-0700	33	dB
LAeq Daytime	0700-1800	49	dB
LAeq Evening	1800-2200	52	dB
LAeq Night-time	2200-0700	49	dB

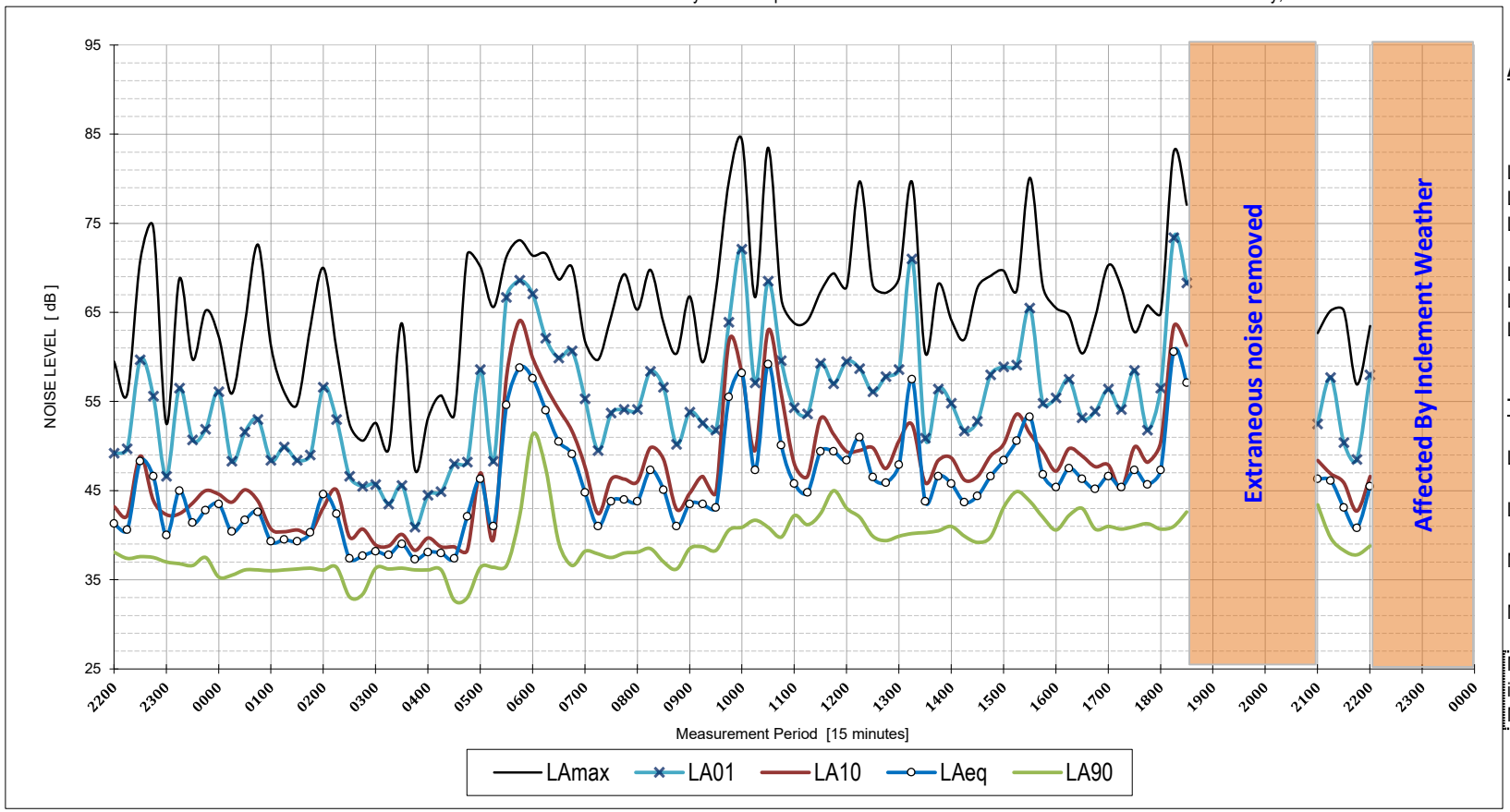
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	50	dB
LAeq 9 hours	2200-0700	49	dB
Max LAeq 1 hour	0700-2200	53	dB
Max LAeq 1 hour	2200-0700	55	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	23

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 5 **LOGGER LOCATION:** Berry Hotel Carpark **DATE:** Sunday, 13 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	38	dB
LA90 Evening	1800-2200	38	dB
LA90 Night-time	2200-0700	34	dB
LAeq Daytime	0800-1800	50	dB
LAeq Evening	1800-2200	54	dB
LAeq Night-time	2200-0800	49	dB

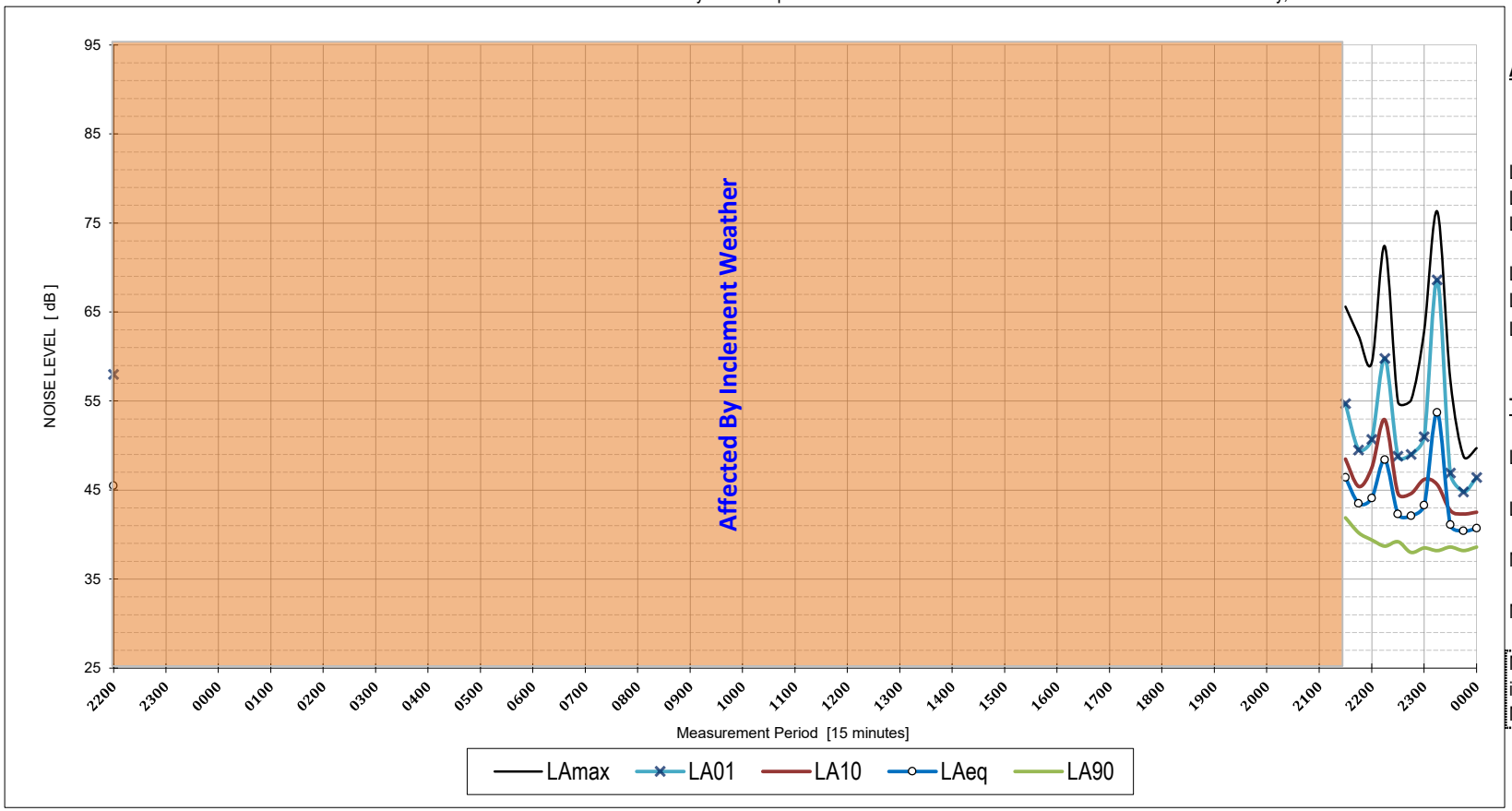
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	51	dB
LAeq 9 hours	2200-0700	49	dB
Max LAeq 1 hour	0700-2200	54	dB
Max LAeq 1 hour	2200-0700	54	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	29

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 6 **LOGGER LOCATION:** Berry Hotel Carpark **DATE:** Monday, 14 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0800-1800	#NUM!	dB
LA90 Evening	1800-2200	40	dB
LA90 Night-time	2200-0800	39	dB
LAeq Daytime	0700-1800	#DIV/0!	dB
LAeq Evening	1800-2200	45	dB
LAeq Night-time	2200-0700	46	dB

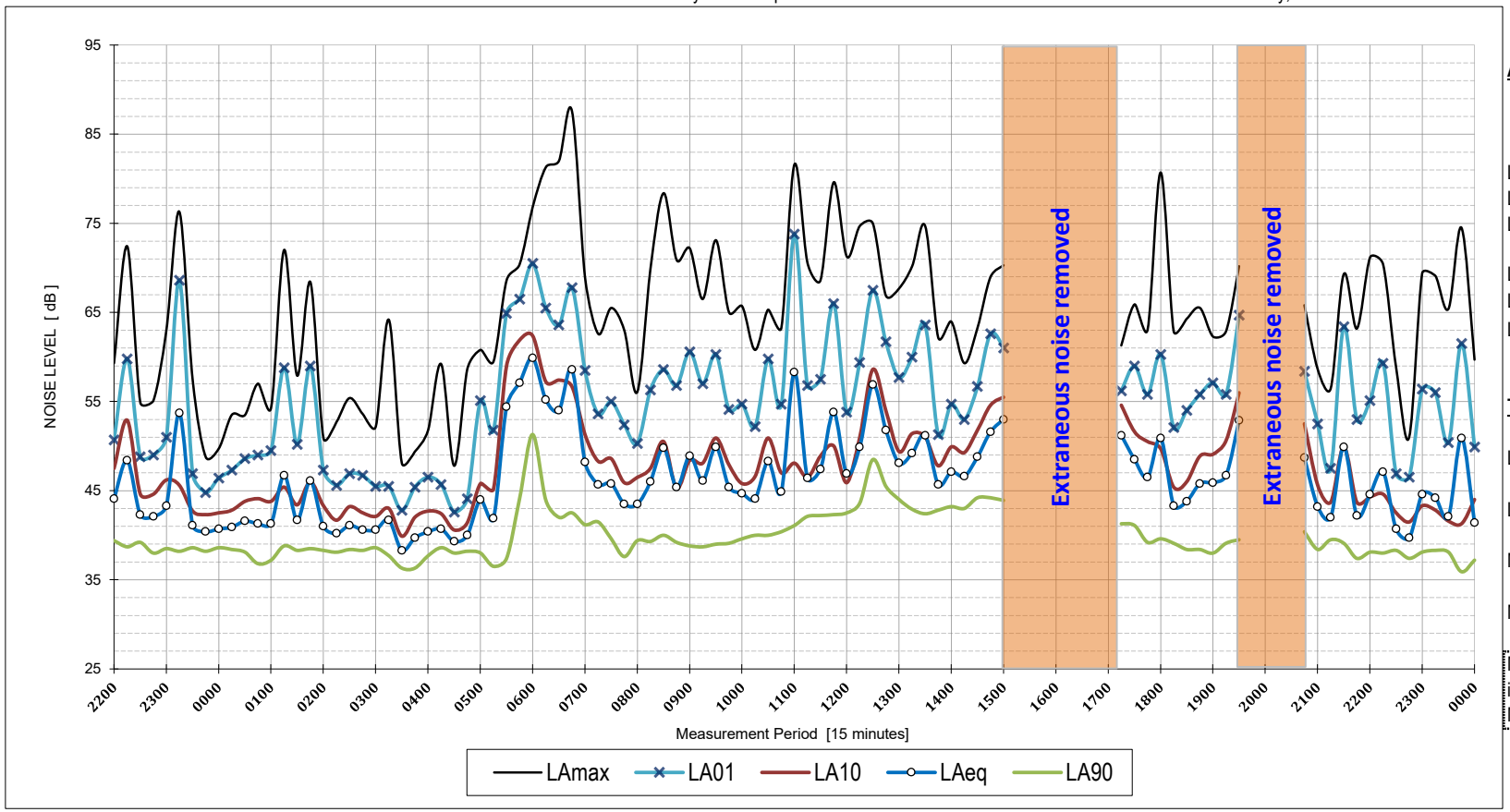
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	45	dB
LAeq 9 hours	2200-0700	46	dB
Max LAeq 1 hour	0700-2200	46	dB
Max LAeq 1 hour	2200-0700	#NUM!	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	1

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 7 **LOGGER LOCATION:** Berry Hotel Carpark **DATE:** Tuesday, 15 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	39	dB
LA90 Evening	1800-2200	38	dB
LA90 Night-time	2200-0700	37	dB
LAeq Daytime	0700-1800	50	dB
LAeq Evening	1800-2200	48	dB
LAeq Night-time	2200-0700	50	dB

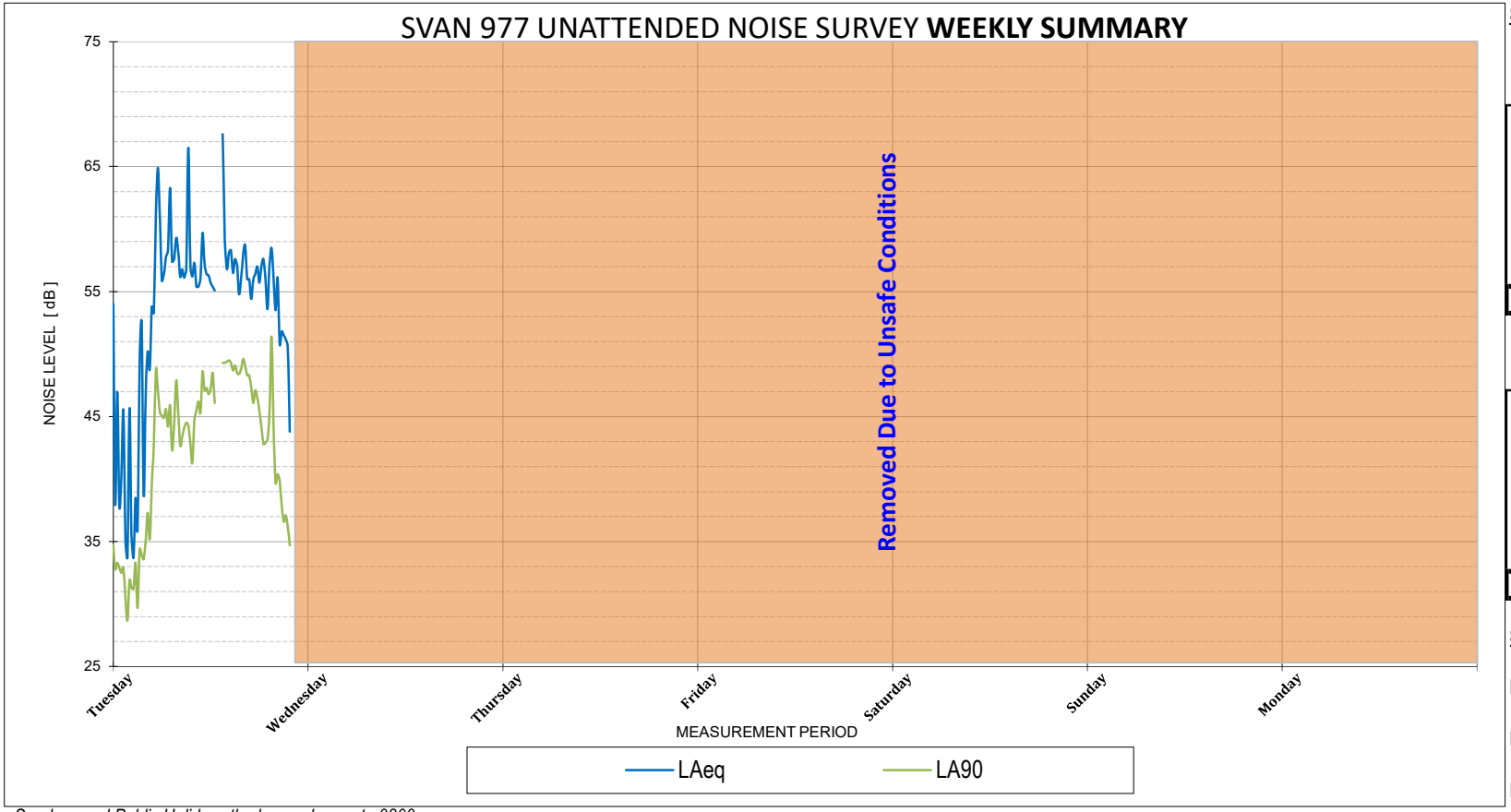
TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	50	dB
LAeq 9 hours	2200-0700	50	dB
Max LAeq 1 hour	0700-2200	53	dB
Max LAeq 1 hour	2200-0700	56	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	18

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

WEEKLY SUMMARY **LOGGER LOCATION:** Berry Inn **PERIOD:** 8th to the 9th November 2022



Sundays and Public Holidays the hours change to 0800

SUMMARY OF AMBIENT LEVELS

	LA90 Daytime	***LA90*** Evening	***LA90*** Night-time
Day 1	43	36	31
Day 2	42	N/A	31
Day 3	N/A	N/A	N/A
Day 4	N/A	N/A	N/A
Day 5	N/A	N/A	N/A
Day 6	N/A	N/A	N/A
Day 7	N/A	N/A	N/A
RBL	**42**	**36**	**31**

	LAeq Daytime	***LAeq*** Evening	***LAeq*** Night-time
Day 1	59	55	54
Day 2	N/A	N/A	N/A
Day 3	N/A	N/A	N/A
Day 4	N/A	N/A	N/A
Day 5	N/A	N/A	N/A
Day 6	N/A	N/A	N/A
Day 7	N/A	N/A	N/A
Average	**59**	**55**	**54**

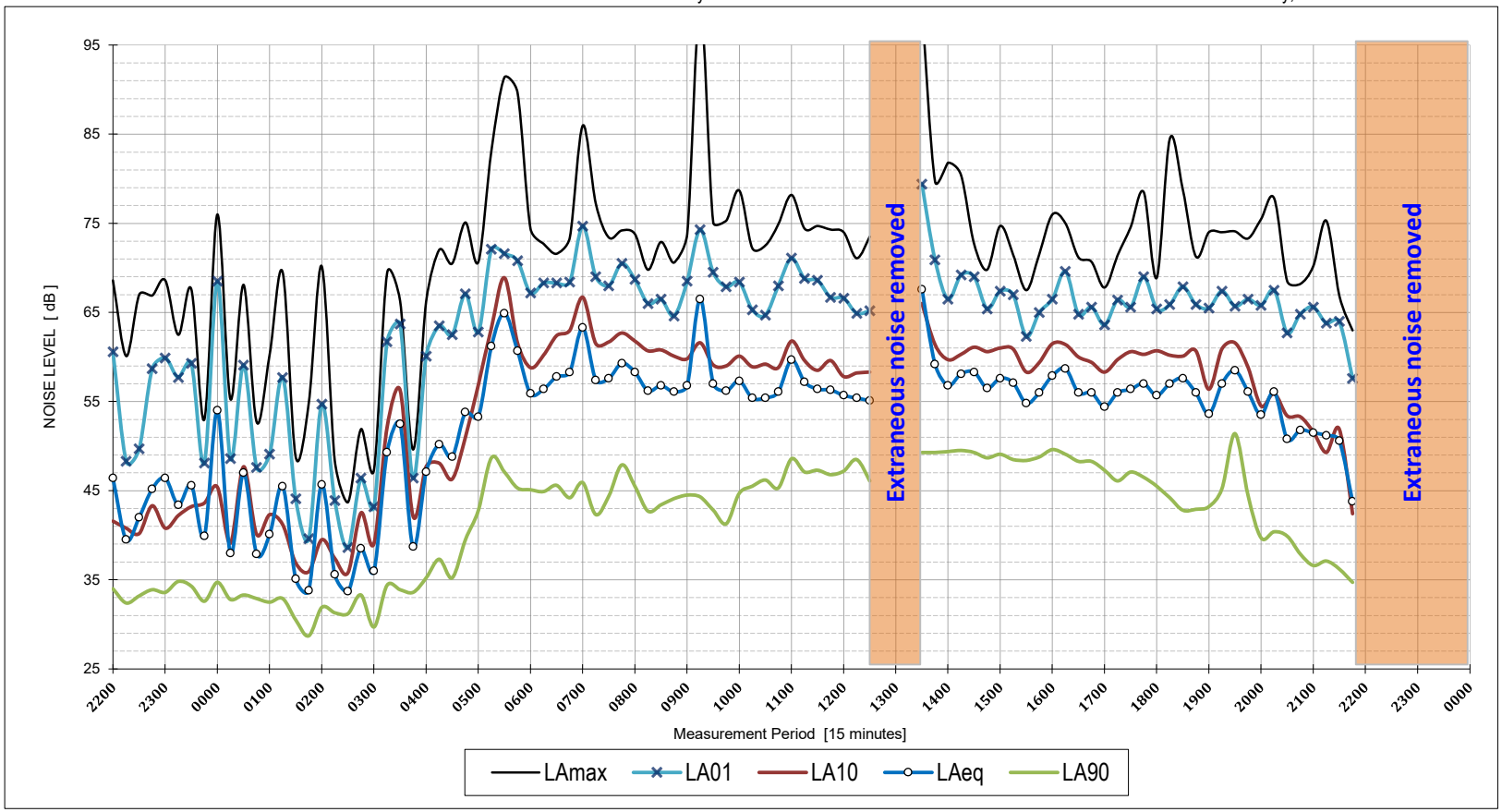
SUMMARY OF TRAFFIC LEVELS

LAeq 15 hrs	0700-2200	58	dB
LAeq 9 hrs	2200-0700	54	dB
Max LAeq 1 hr	0700-2200	62	dB
Max LAeq 1 hr	2200-0700	60	dB

Maximum noise events as defined in the Environmental Noise Management Manual 7 day average - [LAmax - LAeq ≥ 15]	4

koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

DAY 1 **LOGGER LOCATION:** Berry Inn **DATE:** Tuesday, 8 November 2022



AMBIENT NOISE METRICS

Descriptor	Period	Level	Units
LA90 Daytime	0700-1800	43	dB
LA90 Evening	1800-2200	36	dB
LA90 Night-time	2200-0700	31	dB
LAeq Daytime	0700-1800	59	dB
LAeq Evening	1800-2200	55	dB
LAeq Night-time	2200-0700	54	dB

TRAFFIC & MISC. NOISE METRICS

LAeq 15 hours	0700-2200	58	dB
LAeq 9 hours	2200-0700	54	dB
Max LAeq 1 hour	0700-2200	62	dB
Max LAeq 1 hour	2200-0700	60	dB

Maximum noise events as defined in the Environmental Noise Management Manual [LAmax - LAeq ≥ 15]	26

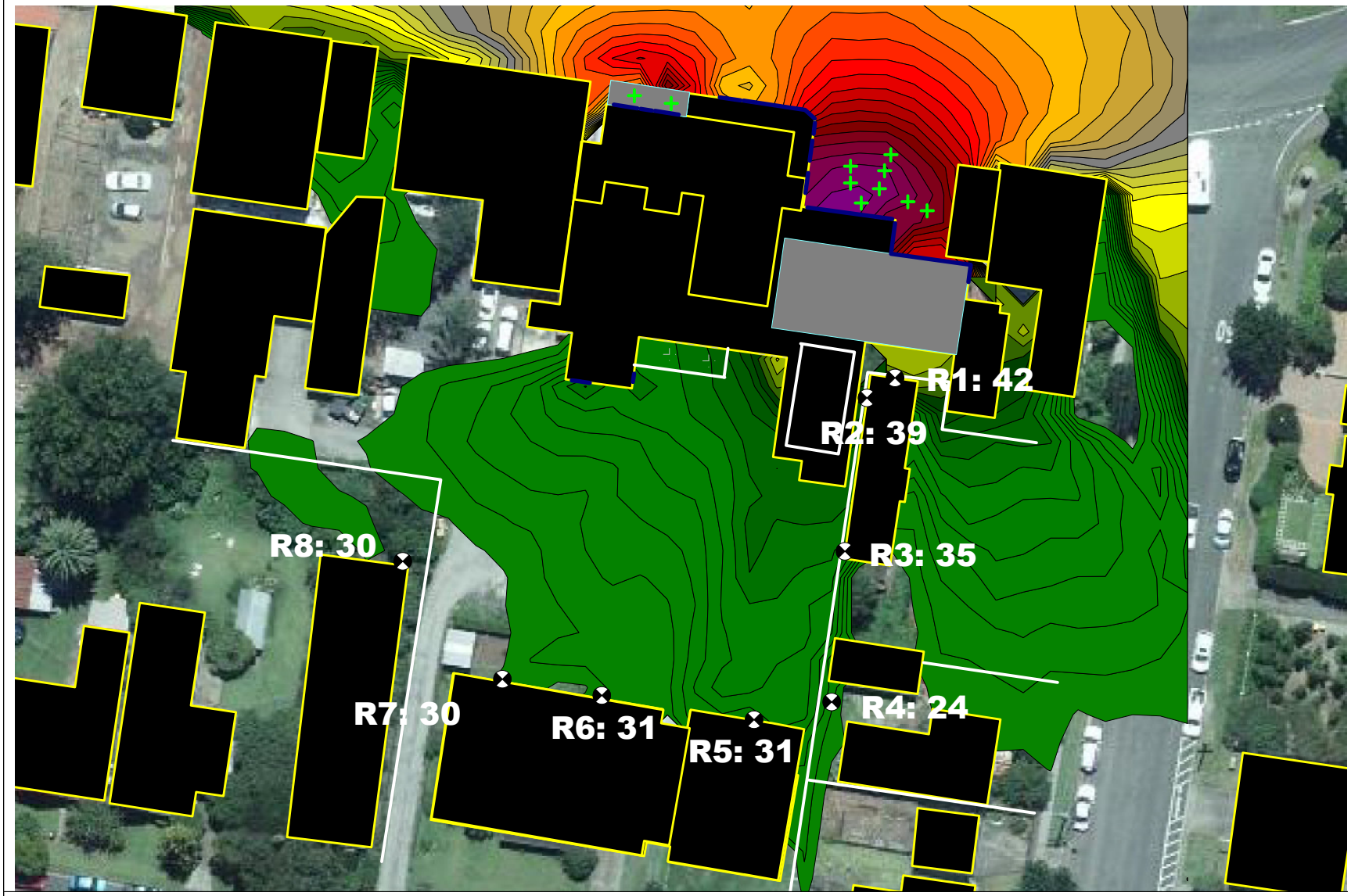
koikas acoustics PTY LTD
CONSULTANTS IN NOISE & VIBRATION

APPENDIX C

APPENDIX C

APPENDIX C

Scenario 1
Licensed Premises Noise



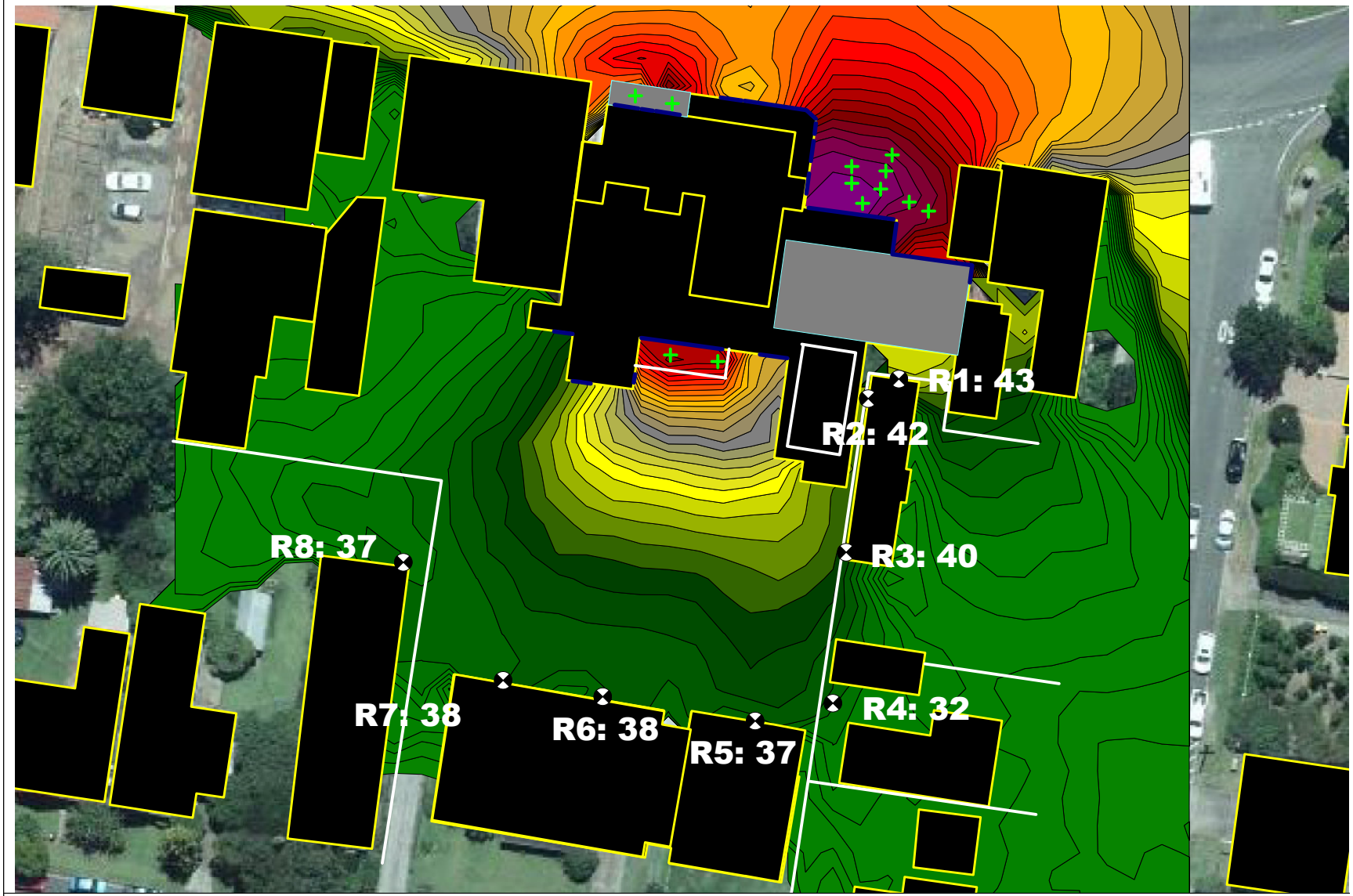
Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023

Point Source
vert. Area Source
Building
Barrier
3D-Reflector
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



Scenario 1.1
Licensed Premises Noise

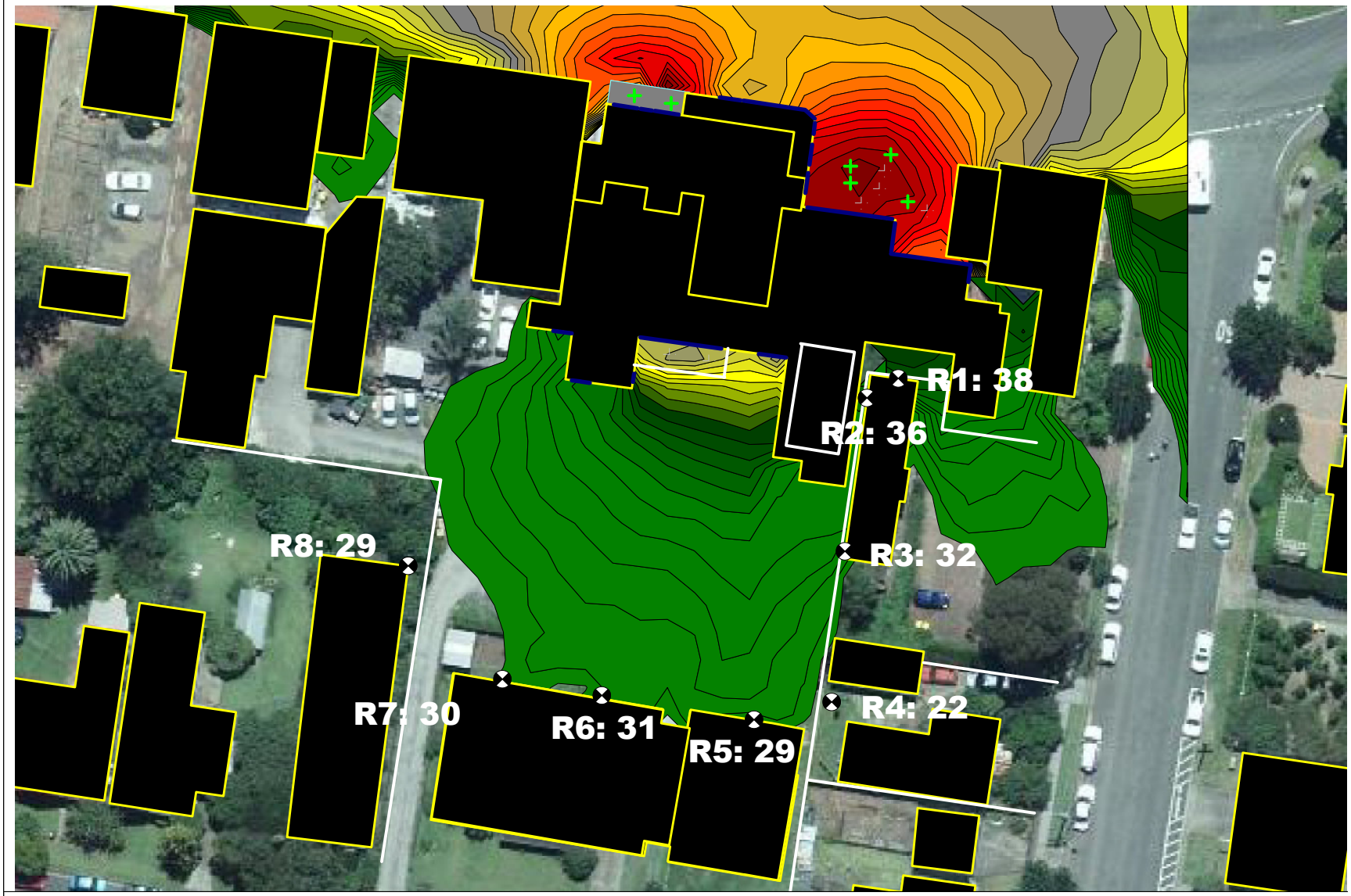
Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023

Point Source
vert. Area Source
Building
Barrier
3D-Reflector
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



Scenario 1.2
Licensed Premises Noise

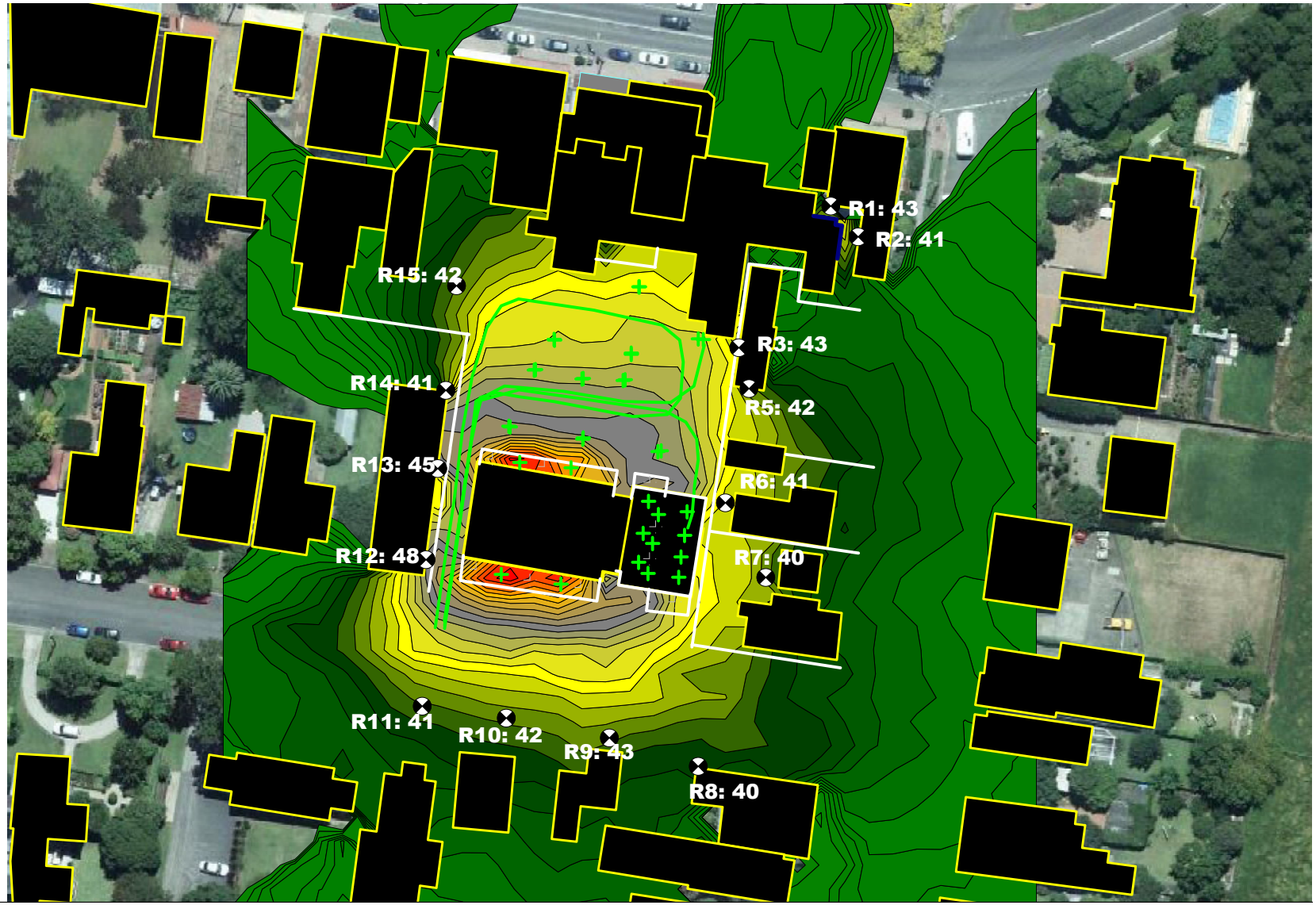
Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023

Point Source
vert. Area Source
Building
Barrier
3D-Reflector
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



Scenario 2
Operational Noise

Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023

Point Source
Line Source
vert. Area Source
Building
Barrier
3D-Reflector
Contour Line
Receiver
Calculation Area

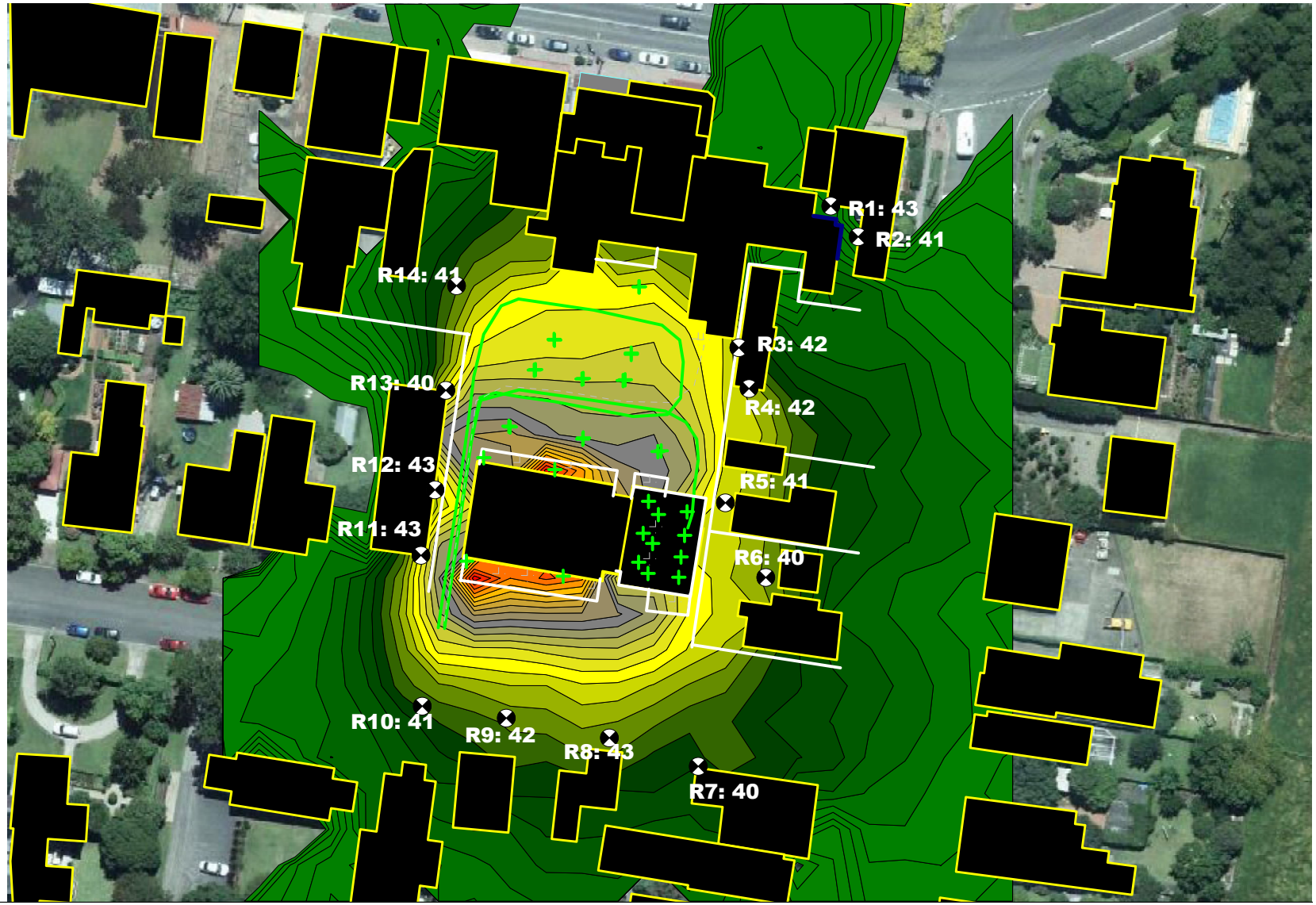
> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

Scenario 2.1
Operational Noise

Noise Sources
~ See Report

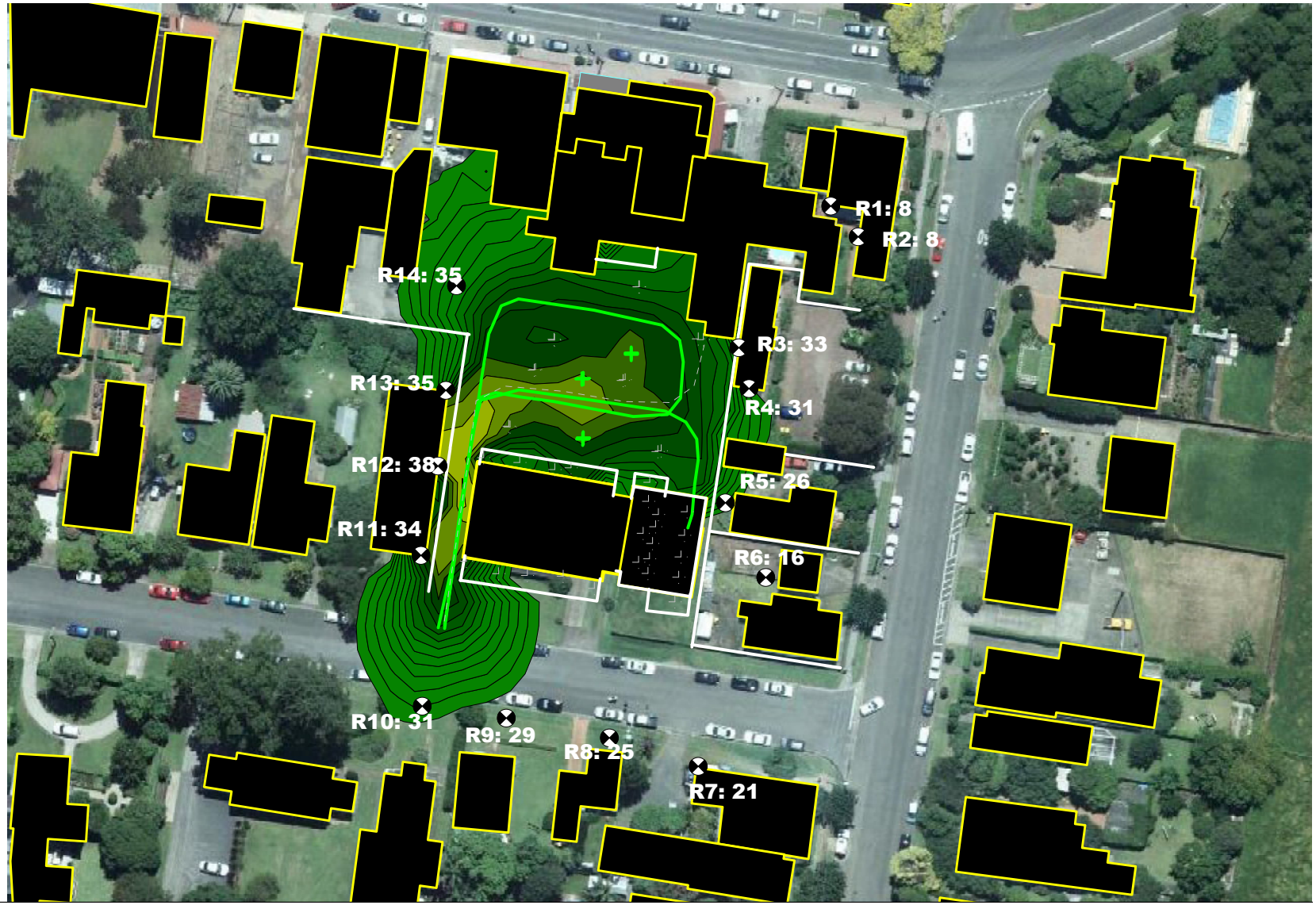
Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023



Point Source
Line Source
vert. Area Source
Building
Barrier
3D-Reflector
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



Scenario 2.2
Operational Noise

Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023

Point Source
Line Source
vert. Area Source
Building
Barrier
3D-Reflector
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

Scenario 2.3
Operational Noise

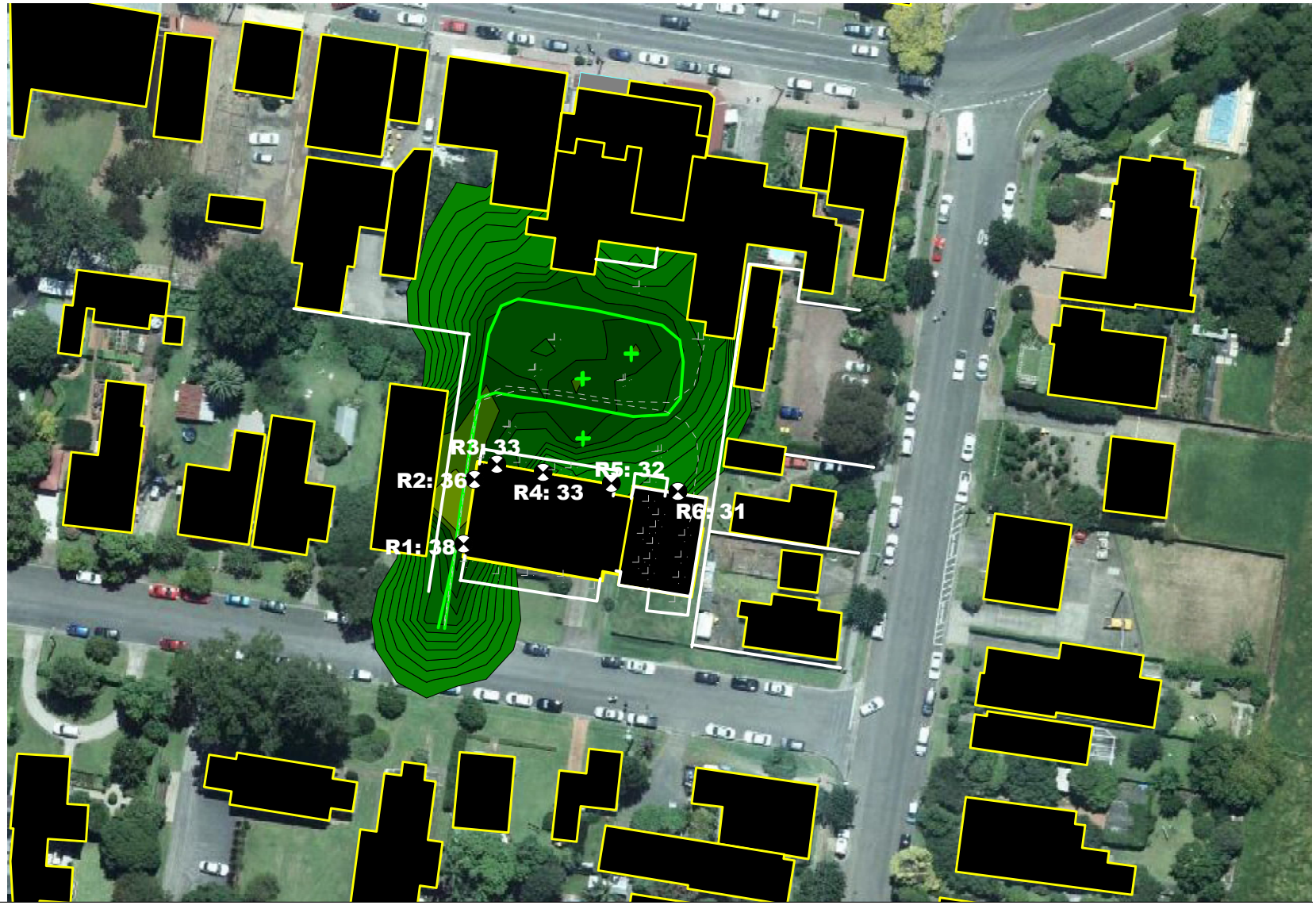
Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023

Point Source
Line Source
vert. Area Source
Building
Barrier
3D-Reflector
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



Scenario 2.4
Operational Noise

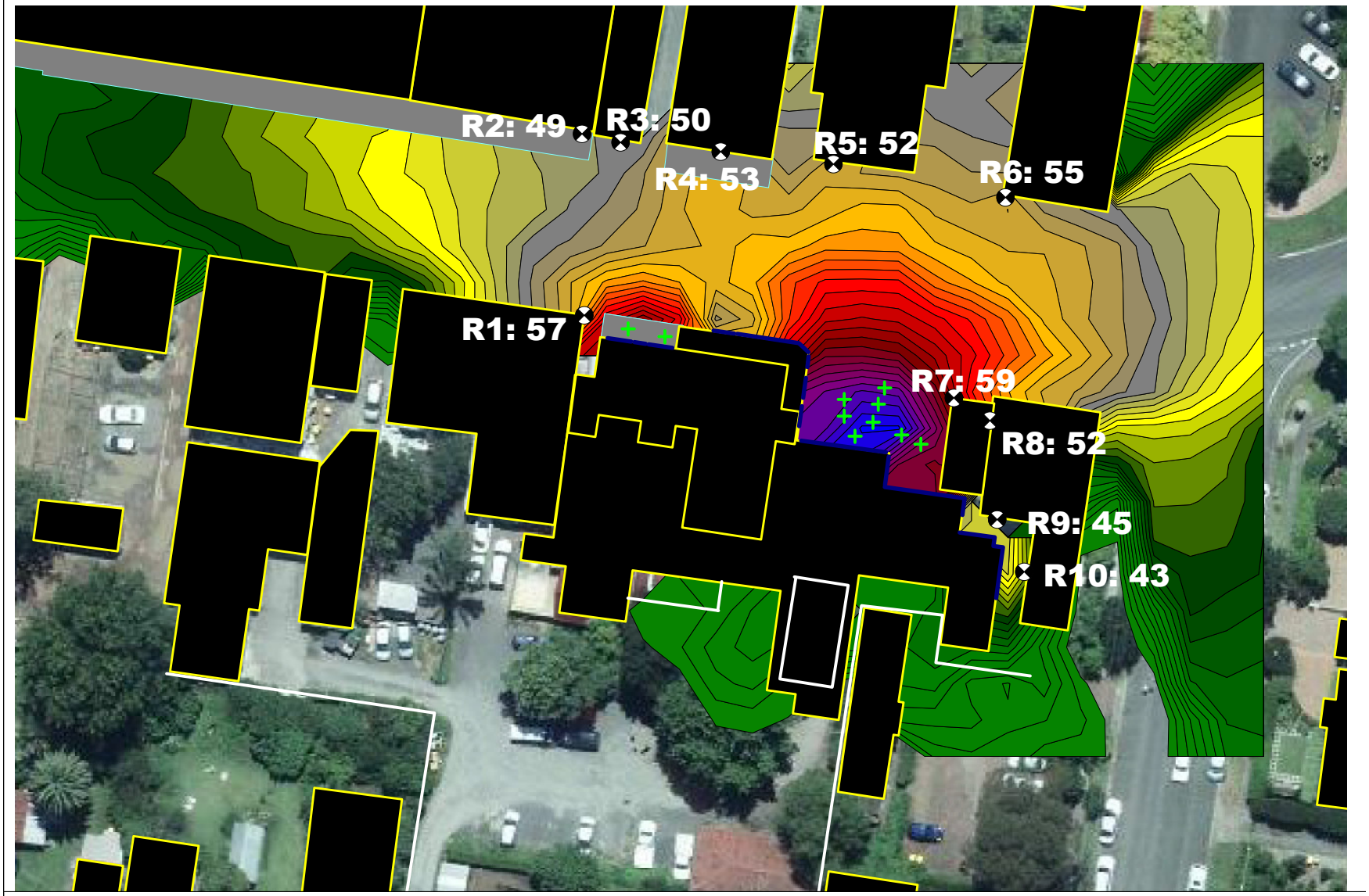
Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the first-floor level

PRINT DATE: 19/06/2023

Point Source
Line Source
vert. Area Source
Building
Barrier
3D-Reflector
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



Scenario 2.5
Operational Noise

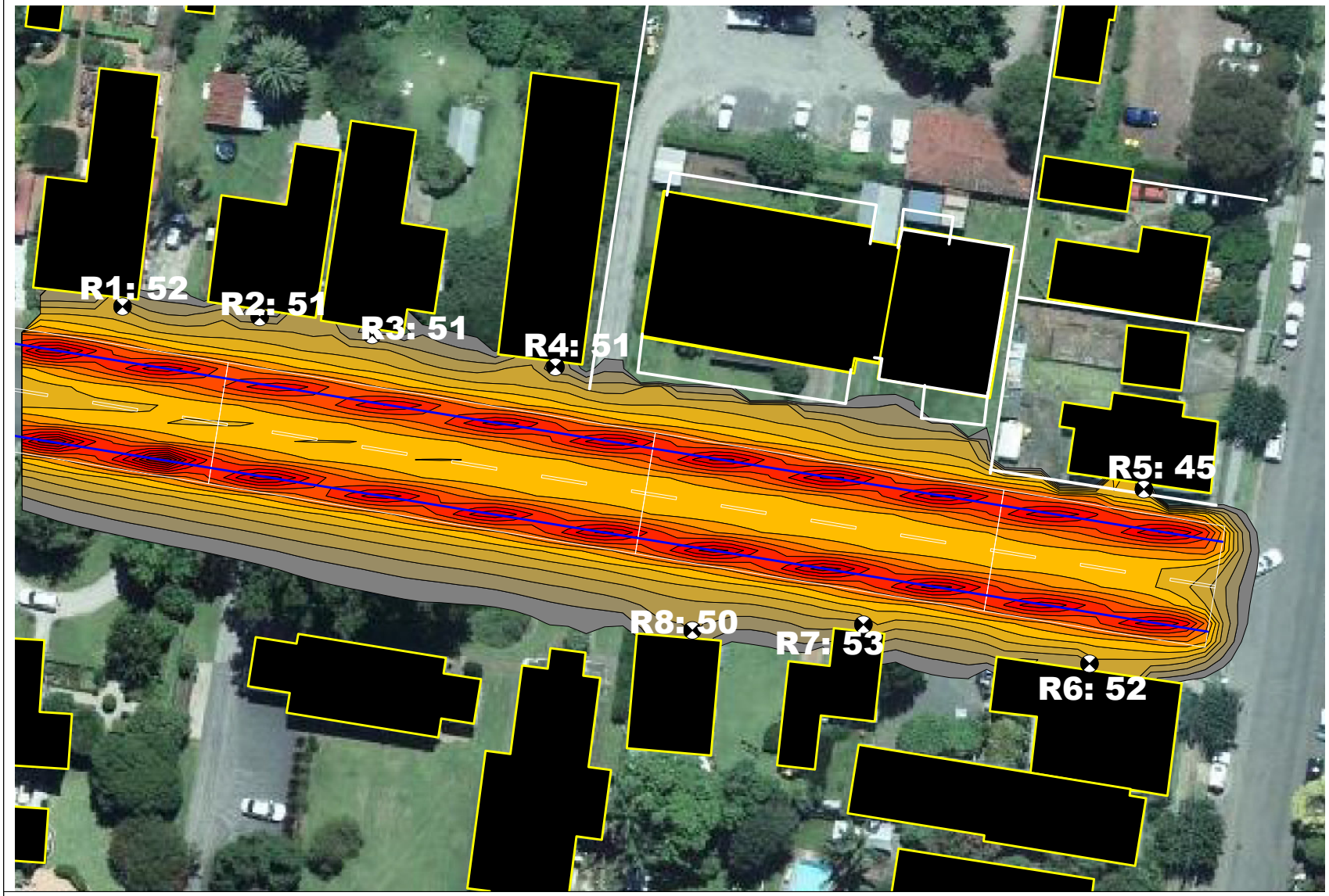
Noise Sources
~ See Report

Note:
- LAeq noise contours are 1.5 m above the natural ground level

PRINT DATE: 19/06/2023

Point Source
vert. Area Source
Building
Barrier
3D-Reflector
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



Scenario 3
On-Road Vehicle Noise

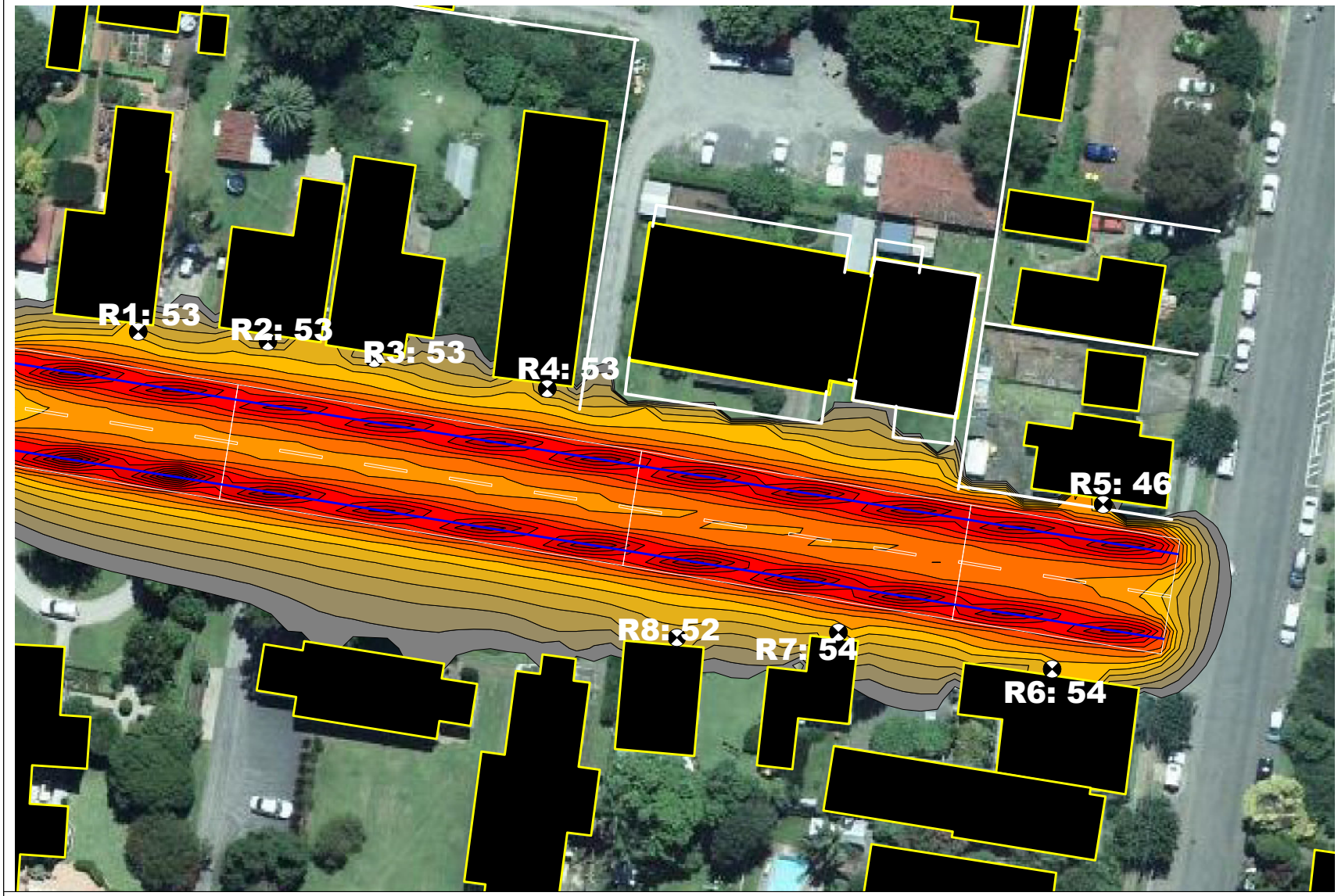
Noise Sources
~ Existing traffic on local road network

Note:
- LAeq noise contours are 1.5 m above the natural floor level

PRINT DATE: 08/06/2023

Road
Building
Barrier
3D-Reflector
Contour Line
Receiver
Calculation Area

> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB



Scenario 3.1
On-Road Vehicle Noise

Noise Sources
~ Additional traffic on local road network

Note:
- LAeq noise contours are 1.5 m above natural floor level

PRINT DATE: 08/06/2023

Road
Building
Barrier
3D-Reflector
Contour Line
Receiver

> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB