acoustics consultants AUSTRALIA

BLASTA BREWING CO 98-104 GOODWOOD PD, BURSWOOD NOISE ASSESSMENT

Report 10.00388R-01

prepared on 03/02/2022

BLASTA BREWING Co

REPORT PREPARED BY

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BASIS OF REPORT

This report has been prepared by **Acoustics Consultants Australia (ACA)** with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

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1. INTRODUCTION

This report presents the findings of the noise assessment conducted by Acoustics Consultants Australia (ACA) for the proposed café, restaurant and brewery to be located at 98-104 Goodwood Parade, Burswood.

The aims of this assessment are:

- To identify the main sources of noise from the proposal and the nearest noise sensitive receivers;
- to conduct an objective noise assessment based on a 3D noise model; and
- to provide recommendations that will set basis for a Noise Management Plan, where required.

Noise has been identified as a potential source of annoyance to surrounding sensitive receivers. The locality is surrounded by lots of commercial, residential and mixed use, which are located in close proximity of the site.

The methodology and standards used to conduct the assessment, as well as the numeric assessment results are presented in the following sections of this report.

This assessment has been prepared in accordance with the WA Environmental Protection (Noise) Regulations 1997 (EPNR).

Acoustic terms used in this report are defined in the Glossary of **Appendix A**.

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2. BACKGROUND INFORMATION

Blasta Brewing Company is located at 84-88 Goodwood Parade, Burswood since 2017. Due to the end of lease contract of the current site, the proponent has sought to secure an alternative site to relocated the business.

The proposal is for the refurbishment and expansion of an existing warehouse to allow for a restaurant, café and brewery, relocating the venue from its original location. New car parking, outdoor dining and alfresco areas are proposed within the subject development.

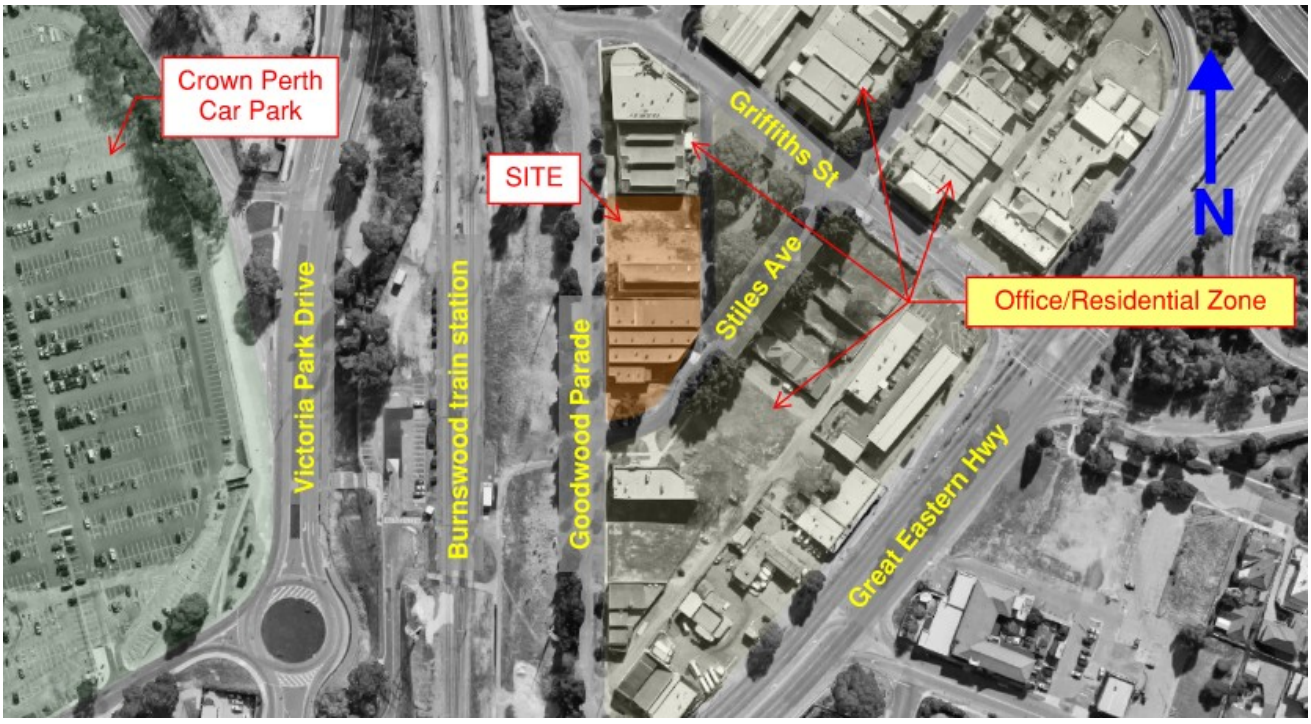
This noise impact assessment includes scenarios of crowd noise emission from the venue that would be dominant at the nearest sensitive receivers. Internal background music played within the proposed bar will not be expected to be dominant in comparison with crowd noise.

It is understood that the Town of Victoria Park requested a review of operations to ensure they are compliant with the State Noise Regulations, due to closeness to existing and potential future residential premises. Further details of the proposed operations are provided in the following sections.

2.1. Location

The proposed site will be a single-storey commercial warehouse-type located at Lots 1 – 5 (No. 98 – 106) Goodwood Parade, Burswood. The building is within mixed-use zone. The main entry to the site is via Goodwood Parade. Towards the west of the site is Burswood Train Station, to the North and South of the proposed site are commercial units and to the East is the Stiles Griffiths Reserve. **Figure 1** depicts an annotated aerial view of the site and its surroundings.

Figure 1 Site location



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The nearest receivers are existing residential building on Goodwood Parade, towards south of the site. The nearest residential noise sensitive receivers are as close as approximately 50 m away from the site. Other sensitive receivers located further north, south and east of the site are commercial premises, which may be potentially exposed to noise from the site. The nearest and most exposed noise sensitive receivers (residential – R1; commercial – R2, R3 and R4) have been identified and labelled in **Figure 2**.

Figure 2 Noise sensitive receivers

The most exposed noise sensitive receivers abovementioned are:

- R1 – 118 Goodwood Parade (residential apartments)
- R2 – 110 Goodwood Parade (commercial unit)
- R3 – 12 Stiles Avenue (commercial unit)
- R4 – 94-96 Goodwood Parade (commercial unit)

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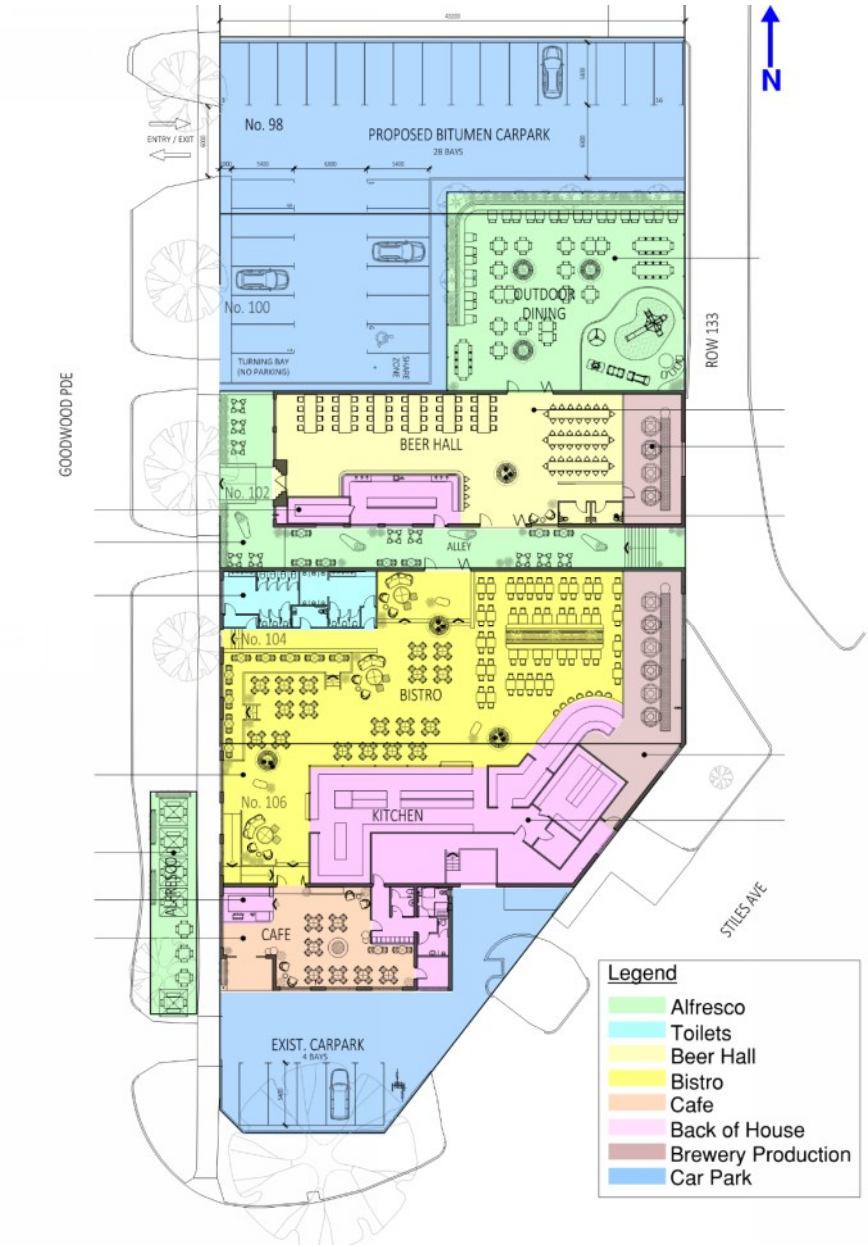
It is noted that potential redevelopment to residential use could take place in the area; however, ACA has been advised by the Town of Victoria Park that there are no current plans for residential developments surrounding the site.

Noise emitted from the proposed premises and received at the residential premises are to be assessed for highly sensitive receivers, as per the WA Noise Regulations (**Section 3**). Other commercial units are also considered noise sensitive receivers.

2.2. Site layout

Figure 3 shows the proposed layout of the site.

Figure 3 Proposed layout



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The site layout, which is planned across multiple lots, is described below (north to south):

Lots 4 and 5

- New patron car parking area (28 bays), accessible from Goodwood Parade;
- An outdoor dining area with an adjacent kids' playground.

Lot 3

- Beer Hall with internal bar, cool room, brewery production area and patron seating;
- An alley/alfresco in the southern portion of the lot, which provides further patron seating.

Lots 1 and 2

- The northern and middle section incorporates the main Bistro area with patron seating, amenity facilities, main restaurant area, kitchen, cool rooms, storeroom, bar and a second brewery production area;
- Access to back of house, delivery dock and bin store facilities are located facing Stiles Avenue.
- The southern section incorporates a café, a staff room and more amenity facilities;
- The existing car park (4 bays plus bike bays) located to the south of Lot 1 will be retained.

2.3. Operations and noise sources

The proposal is for a restaurant, bar, brewery and cafe. The venue capacity has been calculated based on venue's spacious area, subjected to council approval. The calculated venue's capacity is 950 patrons (300 patrons within the Beer Hall, 300 patrons within the Bistro, 200 patrons within the Outdoor Dining, 50 patrons within the Alley/alfresco (north), 50 patrons within the café and 50 patrons within the Alfresco (south).

The identified key noise sources associated with the site are:

- Patrons within the indoor areas;
- Patrons within the outdoor/alfresco areas;
- Background music played indoor or outdoor.
- Mechanical plant located on the rooftop of the building.

Other noise contributors identified from typical operations on site may be linked to:

- Cafe operations.
- Goods' deliveries.
- Waste disposal.

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Deliveries will occur through the delivery dock located on Stiles Avenue. Waste disposal will take place through the bin store accessible via Stiles Avenue.

This assessment focuses on the noise sources of primary relevance to typical operations of the site.

The café has not been considered a noise source of primary relevance due to its expected noise profile, cafe's capacity and the proposed operational hours in caparison with the restaurant, bar and brewery.

The proposed trading hours for the proposed restaurant, café and brewery are:

Cafe:

- Monday to Friday: 7:00am - 2:00pm
- Saturday and Sunday: 08:00am – 12:00pm (midday)

Bistro, Beer Hall & alfresco:

- Monday to Thursday: 10:30am – 09:00pm (last orders)
- Thursday to Saturday: 10:30am – midnight
- Sunday: 10:30am – 10:00pm

The estimated peak days/times for each of the identified areas are described below:

Cafe:

- Monday to Thursday: 9:30am – 10:30am.
- Friday to Sunday: 08:30am – 10:30am.

Bistro, Beer Hall & alfresco:

- Friday: 11:30am – 01:30pm.
- Saturday: 11:30am – 02:00pm / 05:00pm – 08:00pm
- Sunday: 11:30am – 03:00pm

2.4. Assessment Scenarios

The key noise sources identified in the previous section define the following worst-case operational assessment scenario when the venue operates at full capacity within all internal and alfresco areas. This scenario is built upon the basis that:

- Noise emissions occur during steady operations from the site when all operable doors and windows are open. This does not include fixed windows or service/back of house doors.

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- Break-out of crowd noise and background music from internal spaces of the venue through the building façade. As advised by the proponent, an internal seated capacity of 600 patrons (300 patrons at the beer hall and 300 patrons at the bistro) and an external seated capacity of 250 patrons (200 patrons at the outdoor dining and 50 patrons at the alley/alfresco) has been considered.
- Mechanical plant in continuous operation.
    - Air conditioning unit(s).
    - Toilet and kitchen air extraction fans.
    - Cooling equipment.

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3. NOISE CRITERIA

The noise criteria have been determined from a review of the following documents:

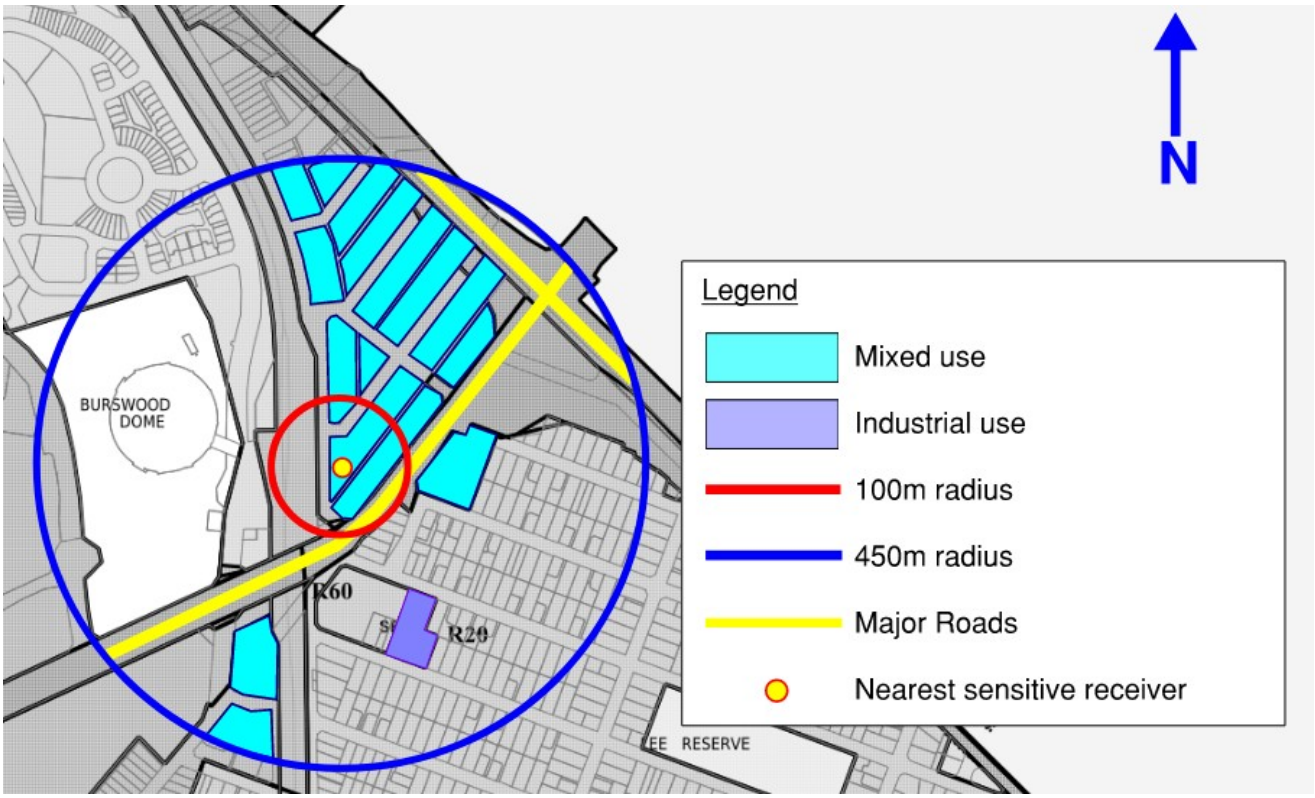
- State requirements: Western Australia *Environmental Protection (Noise) Regulations 1997*; and
- Australian Standard AS/NZS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors* (AS 2107).

3.1. WA Environmental Protection (Noise) Regulations 1997

Noise emissions from commercial premises to nearby residential properties are covered by state noise policy in the form of the Western Australia Environmental Protection (Noise) Regulations of 1997 (EPNR). To achieve compliance with this policy, noise levels at nearby residential areas are not to exceed defined limits. These limits are determined from consideration of prevailing background noise levels and 'influencing factors' that consider the level of commercial and industrial zoning in the locality.

The influencing factor considers zoning and road traffic volumes around the sensitive receiver of interest, within a 100 and 450 m radius (see **Figure 4**). This is represented by the nearest resident.

Figure 4 Influencing factor calculation map



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The resulting influencing factor is 9 dB, based on:

- A transport factor of 6 dB due to a major road (Great Eastern Hwy) within the inner circle.
- A commercial zoning factor of 3 dB due to 39% commercial/mixed use area within the inner circle, 14% commercial/mixed use area in the outer circle and 1% industrial use area in the outer circle.

A summary of the applicable outdoor noise criteria is provided in the following table.

Table 1 WA EPNR Assigned Noise Levels

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday	54	64	74
	0900 to 1900 hours Sunday and public holidays	49	59	74
	1900 to 2200 hours All days	49	59	64
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	44	54	64
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80

A series of adjustments must be added to the noise source levels if noise received at the sensitive premises cannot reasonably be free of intrusive characteristics of tonality, modulation and impulsiveness, and the adjusted level must comply with the assigned level. Definition of these terms (tonality, modulation and impulsiveness) can be read from Regulation 9(1) of the EPNR. **Table 2** summarises the adjustments, as defined by the Regulations.

Table 2 Noise character adjustments

Adjustment where noise emission is not music			Adjustment where noise emission is music	
Where tonality is present	Where tonality is present	Where tonality is present	Where impulsiveness is not present	Where impulsiveness is present
+5 dB	+5 dB	+5 dB	+10 dB	+15 dB

The proposal aims to have the levels of music played at strictly background levels, so as not to exceed the levels of crowd noise when the site is reasonably busy. No adjustment is applied when the dominant noise source is expected to be crowd noise or if the music is not expected to be audible.

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Therefore, based on the proposed trading hours, expected operations and the relevant periods of the day, the most stringent noise criteria are:

- For the **evening periods** (all days between 19:00 and 22:00 hrs)**, Sunday and public holidays daytime**: outdoor noise limit of L_{A10} 49 dB at the residential sensitive receivers' location.

- For the **night-time periods** (after 22:00 hrs every day): outdoor noise limit of L_{A10} 44 dB at the residential sensitive receivers' location.

3.2. Australian Standard 2107:2016

For internal spaces, Australian Standard 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors* (AS/NZS 2107) and the World Health Organisation Guidelines for Community Noise 1999 (The WHO Guidelines) documents provide recommended noise limits for specific room usages.

Indoor targets are considered more appropriate to noise sensitive activities such as sleep and residential living since they generally occur indoors. Therefore, where it can be shown that the *outdoor* Assigned Noise Levels are impracticable to achieve, consideration is usually given to appropriate application of industry guidelines such as Australian Standard 2107:2016.

The following table presents recommended internal noise levels recommended for residential houses and apartments near entertainment districts or major roads in Table 1 of AS/NZS 2107.

Table 3 AS/NZS 2107 Recommended design sound levels

Type of occupancy	Design sound levels ($L_{Aeq,t}$ range) – dB
Houses and apartments in inner city areas or entertainment districts or near major roads	
Living areas	35-45
Sleeping areas (night-time)	35-40
Work areas	35-45
Shop buildings	
Small retail stores (general)	< 50
Industrial buildings	
Assembly lines – light machinery	<70

From this table an internal noise target of L_{Aeq} 40 dB is considered reasonable for living areas facing the site. The recommended sound levels given are not necessarily appropriate in all circumstances and may not reflect each occupant's expectations of quality; this is particularly the case when the noise content has considerable low frequency energy or when the levels do not correspond to a quasi-steady noise source (i.e. sound fluctuates by a significant range in a short period of time).

The WHO Guidelines (World Health Organisation) provide internal noise limits recommended to avoid negative health impacts based on sleep disturbance scenarios. The guidelines are not specific to entertainment noise; however, acknowledges that when a significant low frequency component is

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present, then a 10 dB safety factor may be applied. The recommended limits by the WHO Guidelines are shown in **Table 4**.

Table 4 WHO Guidelines, sleep disturbance recommended noise limits

Noise metric	Recommended indoor levels – dB
Sleep disturbance, inside bedrooms	
$L_{Aeq,8hour}$	35
L_{Amax}	50

Note: The WHO Guidelines set out outdoor limits based on assumptions of 10dB indoor-outdoor difference. For windows closed, indoor to outdoor level difference may be 5-15 dB higher than with windows open. We summarise the indoor goals, as the façade transmission would vary from resident to resident.

Recommended external noise limits may vary between 10 and 25 dB higher than the figures of **Table 4**, depending on the façade transmission loss specific to each case (i.e. some houses/apartments attenuate sound better than others).

3.3. Where the environmental standard cannot be met

The Regulations are intended to be flexible enough to allow for reasonable economic, cultural and social activity to occur. There will be genuine cases where the assigned levels cannot reasonably or practicably be met. This could be an existing industry which is very close to residences. Or it could be a proposed industry which cannot be located far enough away from residences.

In such cases, a Noise Management Plan is a logical starting point for a reasonable effort to minimise noise from the site and potential annoyance to sensitive receivers by maintaining the cultural and community value of the proposed premises. The Noise Management Plan shall be directive and specific as to the required mitigations that are required to minimise noise impacts.

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4. ASSESSMENT

4.1. Approach

The assessment has been conducted based on the following steps:

- A review of a set of drawings of the proposed venue;
- A review of the proposed activities to identify the key noise emissions;
- Field measurements conducted by ACA at similar venues to quantify potential noise impacts;
- Noise modelling to predict noise levels at surrounding noise sensitive receivers; and
- Assessment of predictions against the applicable noise criteria.

Two variables have been assumed under this assessment to optimise internal acoustics in the venue:

- '*Acoustical Capacity*' of the proposed venue; defined initially for use of restaurants by Rindel[1]; however, used as a reference to estimate reasonable level of absorption required for this project. The recommended maximum number of patrons for 'sufficient verbal communication' in the internal areas of the venue will indicatively be defined by:

$$N_{max} \approx \frac{Volume\ of\ the\ venue\ in\ m^3}{20 \times (Reverberation\ time\ in\ seconds)}$$

  Based on preliminary design i.e. internal volume of the venue's beer hall of approximately 1,425 m^3 and approximately 2,603 m^3 at the Bistro, with a reverberation time of approximately 1.0 second at the beer hall and 1.5 seconds at the bistro for mid frequencies assumed, an indicative 'acoustic capacity' (N_{max}) of 71 patrons at the beer hall and 87 patrons at the bistro is calculated. This number is, however, expected to be higher on a ratio of 2-2.2 for bars.

- The above assumptions lead to a maximum internal reverberation time of 1.0 seconds at the beer hall and 1.5 seconds at the bistro required for the venue (when unoccupied) to minimise noise build-up and breakout noise through facades, doors and windows.

Crowd noise has been estimated using the Rindel method under the following assumptions:

- One third of the patrons may be talking at any given time with raised vocal effort (G = 3).
- Absorption of the rooms as per the previous section (to match reverberation time of 1.0 seconds at the beer hall and 1.5 seconds at the bistro).

Mechanical plant noise data have been extracted from standard libraries provided by manufacturers.

[1] Acoustical Capacity as a means of noise control in eating establishments. Jens H. Rindel. Baltic-Nordic Acoustics Meeting, Denmark, 2012.

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4.2. Noise Levels

The above leads to the source noise levels summarised in **Table 5**.

Table 5 Noise Source Levels

1/1 Octave Band Sound Level – dB									
Metric	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dBA**
Entertainment Noise									
Beer Hall with background music and 300 patrons (crowd noise dominant) – Reverberant Sound Pressure Level (RT_{60} not higher than 1.0s)									
L_{10}	n/a	79	85	88	84	78	72	64	89
Bistro with background music and 300 patrons (crowd noise dominant) – Reverberant Sound Pressure Level (RT_{60} not higher than 1.5s)									
L_{10}	n/a	77	83	87	83	76	70	62	87
Outdoor Dining/Alfresco area with 200 patrons – Sound Power Levels									
L_{W10}	n/a	85	91	94	90	84	78	69	94
Alley/Alfresco area with 50 patrons – Sound Power Levels									
L_{W10}	n/a	76	82	85	81	75	69	60	85
Mechanical Plant									
Air conditioning unit – Typical Sound Power Level									
L_W	n/a	72	68	68	72	69	58	50	75
Toilet extraction fan – Typical Sound Power Level									
L_W	61	63	55	56	54	51	42	32	58
Kitchen extraction fan (including silencer) – Typical Sound Power Level									
L_W	63	60	69	63	60	58	52	49	66
Cool room compressor unit – Typical Sound Power Level									
L_W	76	77	69	70	68	66	56	46	73

These noise source levels in combination with sound transmission data for each of the existing and proposed building materials have been used to estimate the noise levels breaking out of the building.

4.3. Noise Modelling

4.3.1. 3D Model

Geometry from the site and surroundings, surfaces, existing buildings, barriers and sound sources from the site were modelled using internationally recognised noise prediction algorithms. A three-dimensional noise model was developed using a software called SoundPLAN Essential V5.1. An adaptation of the algorithm contained within ISO 9613:1996 *Acoustics – Attenuation of sound during propagation outdoors* was used in this instance.

The following items are considered:

- Three-dimensional location, height and orientation;

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- shielding/reflection effects due to surrounding structures (such as awnings, parapets and roofs); and

- meteorological/thermal effects. However, since propagation distances in this case are less than 50 m, such influences are considered insignificant with use of ISO 9613 methodologies.

It is noted that these noise predictions are considered reasonably representative of 'worst case' scenarios and it is expected that actual noise levels would typically be less than that predicted for the majority of adjacent receivers.

Figures 5 and 6 show depicted details of the noise model, including the points of assessment (receivers) and the key noise generating sources (i.e. doors, windows, mechanical plant and crowd).

Figure 5 Noise model 3D setup: West elevation

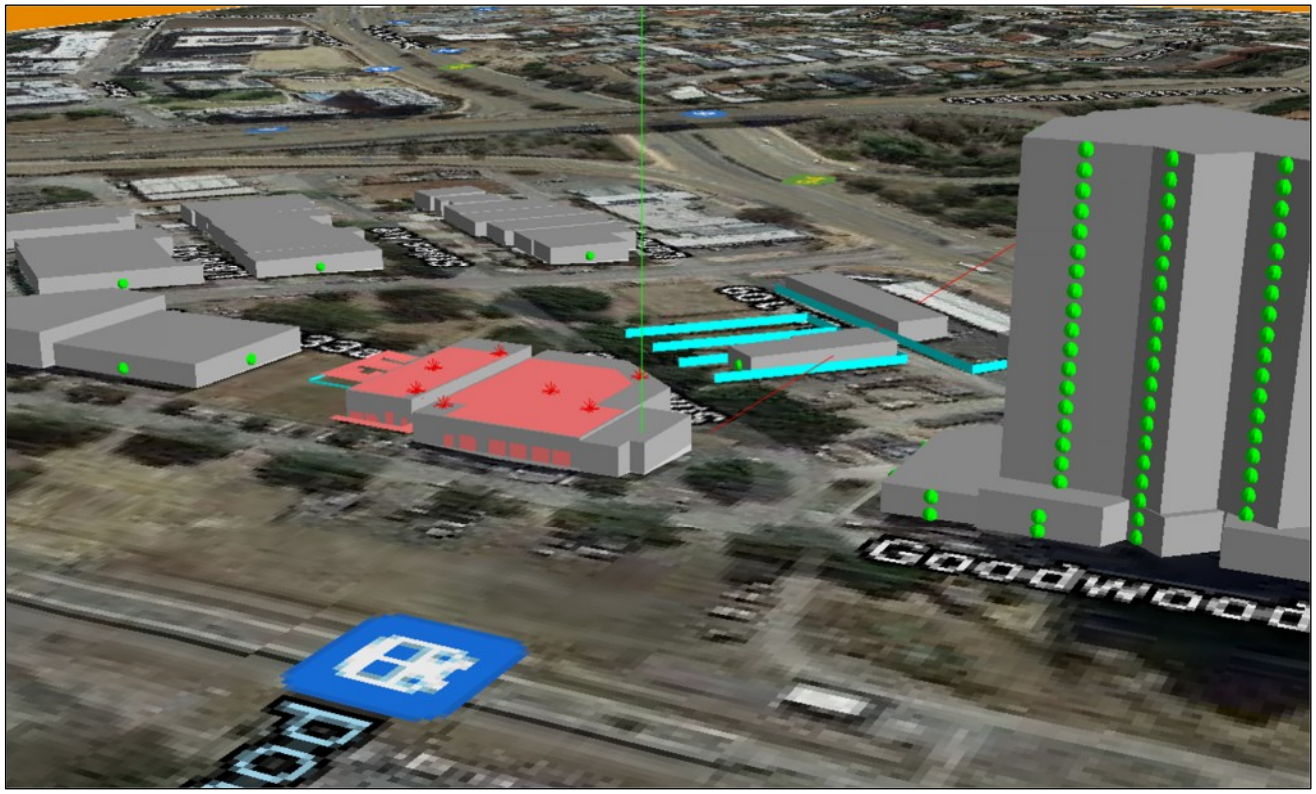

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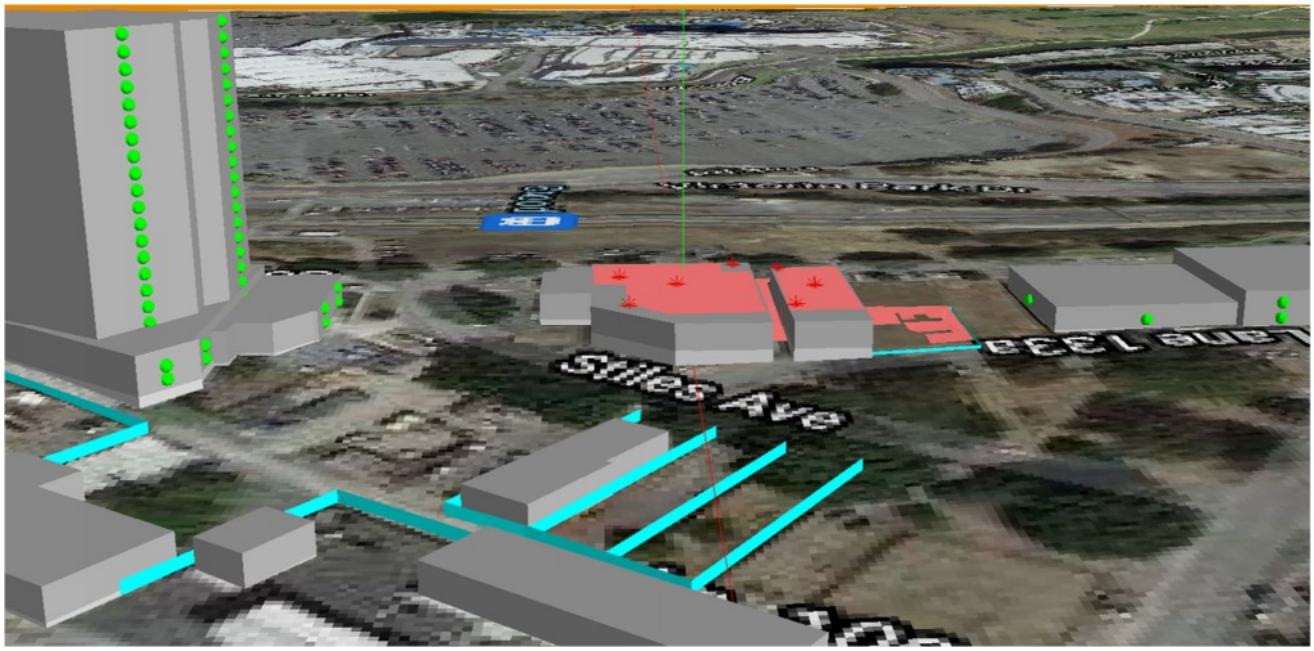
Figure 6 **Noise model 3D setup: East elevation**



4.3.2. Results

Noise contour maps have been generated in SoundPLAN V5.1 (See **Appendix B**). The results from the noise model at outdoor locations is presented in **Table 6**.

Table 6 **Outdoor noise level predictions**

Receiver / Location	Predicted L_{A10} Noise Levels – dB
R1 – 118 Goodwood Parade (residential apartments)	48
R2 – 110 Goodwood Parade (commercial unit)	45
R3 – 12 Stiles Avenue (commercial unit)	45
R4 – 94-96 Goodwood Parade (commercial unit)	48

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4.4. Assessment and Discussion

The results presented in the previous section have been assessed to the noise criteria (per **Section 3**) and the results are presented in **Table 7**.

Table 7 Assessment of results

Type of Receiver	Receiver	Noise L_{A10} Prediction (dB)	Noise Criteria (dB)		Difference (dB)	Comments
Residential	R1 (apartments facing north)	48	**Daytime**	L_{A10} 54	-6	Compliance
			Evening, Sunday and public holidays	L_{A10} 49	-1	Compliance
			Night-time	L_{A10} 44	+4	Marginal exceedance
Commercial	R2	45	**At all times**	L_{A10} 60	-15	Compliance
	R3	45			-15	Compliance
	R4	48			-12	Compliance

The assessment suggests that the venue will be generally compliant with the EPNR assigned noise levels. It was predicted that when the venue operates at full capacity and the doors remain open, no noise exceedances are predicted for daytime and evening periods. For night-time, a 4 dB exceedance is predicted. However, this is based on the full operational patron capacity after 10pm, which based on the forecasted operational peak hours, it is highly unlikely to occur.

A reasonable reduction in patron numbers is expected after 10pm, which would further reduce noise levels by 3 to 4 dB at the residential receiver (R1). Under this assumption a residual exceedance of around 1 dB is predicted. Considering the location's existing ambient noise levels which is dominated by nearby major transportation infrastructure (rail and road), it is unlikely that noise emissions from the venue at 48 dBA or below would be dominant or intrusive.

The following must be noted:

- In order to meet all of the above:
  - A reverberation time of 1.0 seconds at the beer hall and 1.5 seconds at the bistro (occupied) has been assumed in the assessment.
  - Glazing elements to perform R_w 35 dB or more, throughout the venue's building envelope.
  - Review the mechanical services to minimise noise from external areas (e.g. rooftop).

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- Minimize gaps and openings throughout the roof/ceiling.

Other considerations set by the assessment basis:

- Music will be played at background listening levels at all times and should not be dominant of noise emissions (5-8 dB below the overall crowd noise). Further, background music levels:
  - Should not contain significant low frequency components;
  - Be played through distributed speakers to avoid larger speakers pointing away from front doors and windows, mounted on rigid structures with vibration isolation pads.
- With regards to the mechanical plant, it was determined that these noise sources do not dominate the overall predictions; however, they do contribute cumulatively within 2-3 dB of the results. This indicates that by using short barriers of a surface density of 10 kg/m^2 to break the line of sight between the noise sensitive receivers and the exhaust fans/air conditioning/compressor units would minimise the mechanical noise and marginally reduce the overall levels. It is recommended that barriers are installed on the roof, next to mechanical plant units. Larger units (e.g. Kitchen exhaust fan) should not exceed L_w 75 dBA or L_w 66 dBA (including silencer).

The following section summarises the analysis above into a set of recommendations. Further, **Appendix C** presents a mark up with recommendations

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5. RECOMMENDATIONS

Table 8 outlines the considerations of various noise mitigation options to reduce impact on residents from operations at the proposed venue. The table is divided in 3 sections:

- Treating the source: This refers to ways of reducing emissions directly at the source of sound generation (i.e. sound system, speakers, mechanical plant).
- Treating the path: This refers to treatment to the medium that is physically in between the source and the receivers (i.e. air paths, buildings, reflective surfaces, supporting structures).
- Management: This refers to measures that will be required by the bar management to minimise noise from operations.

Table 8 Noise mitigation options

Item #	Recommendation	Reasoning
Treating the Source		
1	Indoors: Music to be played at background levels only. Indicatively, not over L_{AeqS} 74 dB at listeners' locations. Minimise low frequency emissions, below 100 Hz.	To avoid music as a conditional dominant source.
2	Loudspeakers shall be installed with appropriate resilient mounts to stop vibration or resonances being transmitted to the building structure and pointing inwards to the centre of the indoor bar.	
3	All mechanical services, kitchen equipment and furniture shall be disconnected off the building structure with resilient anti vibration mounts.	Reduce risk of vibration induced noise.
4	Toilet exhaust fan: Install an axial/in-line exhaust fan with 1 m of 25 mm internal lining to each side of the ducting. Where a roof mounted fan is desired, follow Item #8 of this table.	To minimise mechanical noise.
5	Kitchen exhaust fan: Unit shal not exceed L_w 75 dBA. If necessary, a silencer shall be installed and ducts/unit be treated.	To minimise mechanical noise.
6	Restaurant and alfresco furniture to be fitted sliding panels or felt.	To avoid impact noise.
Treating the Path		
7	Fit sound absorption panelling to the internal beer hall to achieve reverberation time of 1.0 seconds and 1.5 seconds at the bistro. It is recommended the use of products rated NRC 1.0 (e.g. Autex Quiestspace 50mm). Absorptive furniture, floors and ceiling are recommended (e.g. textiles and cushioned furniture).	To minimise reverberation and noise build-up indoors.

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Item #	Recommendation	Reasoning
8	Where required, install short barriers on the roof next to each of the mechanical plant units. Material: The barriers may be built with compressed fibre cement with a minimum surface density of 10 kg/m^2 (9 mm panels) and Location and extent: The barriers shall be installed in such a way to break the line of sight between the residential receivers and the mechanical units, as close as possible and at least 0.5 m taller than the top edge of the associated mechanical plant.	To reduce overall noise levels at sensitive receivers.
9	The building glass elements on the façade shall perform to a minimum R_w 35 dB (e.g. 8.5mm Vlam Hush Glass)	To minimise breakout noise from the indoor bar
10	The roof/ceiling shall be treated. Minimizing the gaps and openings throughout the roof/ceiling. Treat the gaps and openings with fire rated mastic.	To minimise breakout noise through the ceiling
Management		
11	Limit waste disposal to daytime hours (i.e. between 7am and 7pm, Monday to Saturday).	To reduce risk of excessive noise at night-time.
12	Limit goods' delivery to daytime hours (i.e. between 7am and 7pm, Monday to Saturday).	To reduce risk of excessive noise at night-time.

It is expected that with the thorough implementation of these noise control measures, noise levels at sensitive receivers may be within compliance margin of the EPNR noise criteria.

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APPENDICES

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APPENDIX A: Glossary of Acoustic Terms

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1 Sound Level or Noise Level

Sound consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. Noise is often used to refer to unwanted sound.

The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable range by using logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level.

The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 "A" Weighted Sound Levels

The overall level of a sound is usually expressed in terms of dB(A), which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter with a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dB(A) is a good measure of the loudness of that sound. Different sources having the same dB(A) level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB(A) change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels:

Typical noise levels and subjective scale

Sound Pressure Level dB(A)	Noise Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely loud
110	Grinding on steel	
100	Loud car horn at 3 m	Very loud
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (e.g. B, C and D) are less commonly used than A-weighting in environmental acoustics. Sound Levels measured without any weighting are referred to as "linear" and the units are expressed as dB(Lin) or dB.

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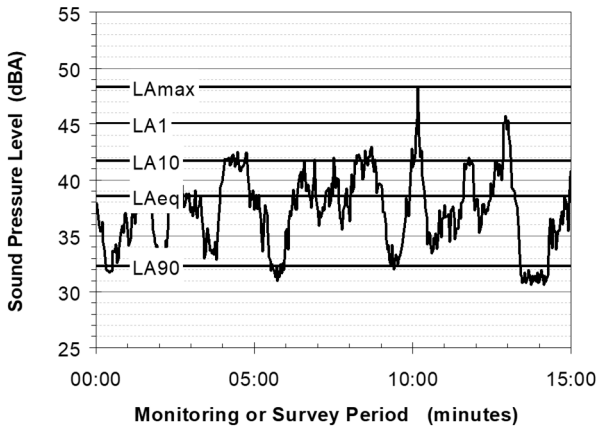
3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units, and these may be identified by the symbols SWL or L_W. The Sound Power definitions expressed in dB are typically referenced to the acoustic energy unit 10^{-12} W.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time.

The following figure presents a hypothetical 15-minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. Standardised methods are available for determining these representative levels. Different jurisdictions would choose to define their own preferred Standard.

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APPENDIX B: NOISE MODELLING CONTOURS

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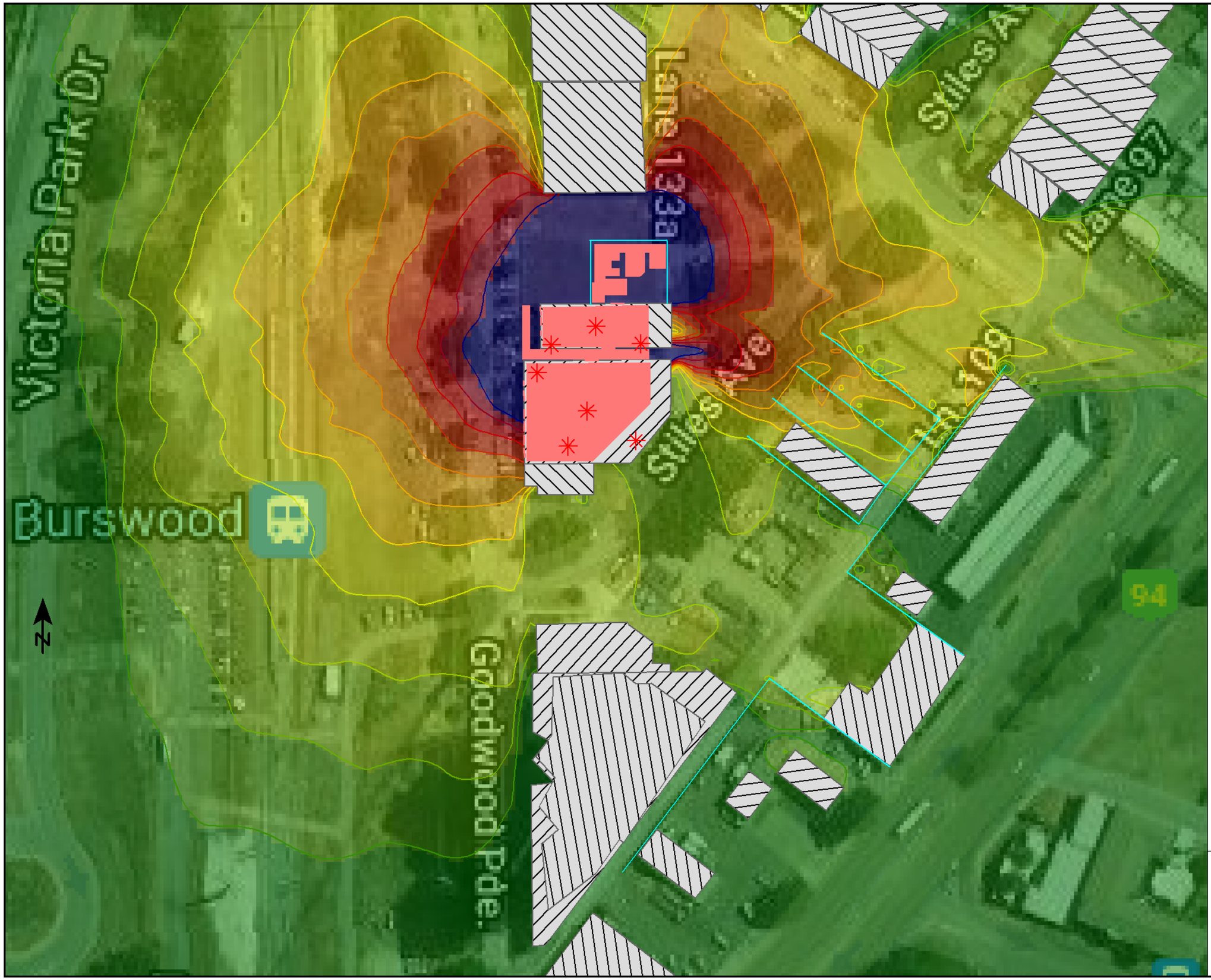

Blasta Brewing Co
98 - 106 Goodwood Parade, Burswood

Acoustic Assessment

Predicted crowd noise levels

Contours at 1.5m above the ground

V1S1
Scenario 1:
- 300 patrons Beer Hall
- 300 patrons Bistro
- 200 patrons Outdoor Dining
- 50 patrons Alley/Alfresco
- Doors and windows opened
- Mechanical plant in use

Job No.: 10.00388

Consultant: TGD
Date: 14/01/2022

File:
J:\01 PER\02 MODELLING\JOBS SOUNDPLAN\
10.00388 Goodwood Pd, Burswood Venue\
10.00388 Goodwood Pd, Burswood Venue V1S1

Signs and symbols

- Ground effects
- Wall
- Point source
- Area source

Levels in dB(A)

< 40
40 - 42
42 - 44
44 - 46
46 - 48
48 - 50
50 - 52
52 - 54
54 - 56
56 - 58
58 - 60
>= 60

1 : 1000

0 5 10 20 30 40 m

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APPENDIX C: MARK UP

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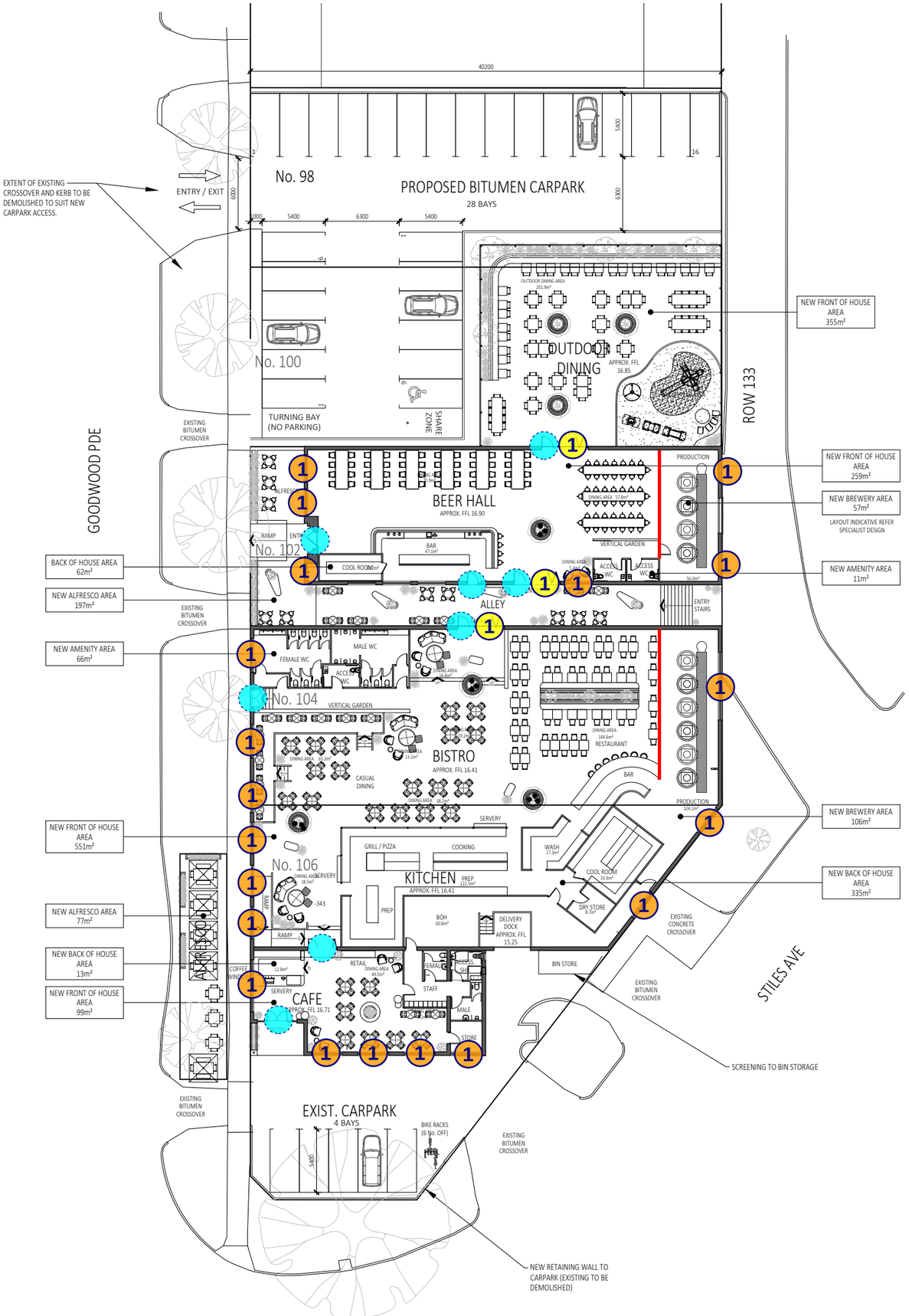
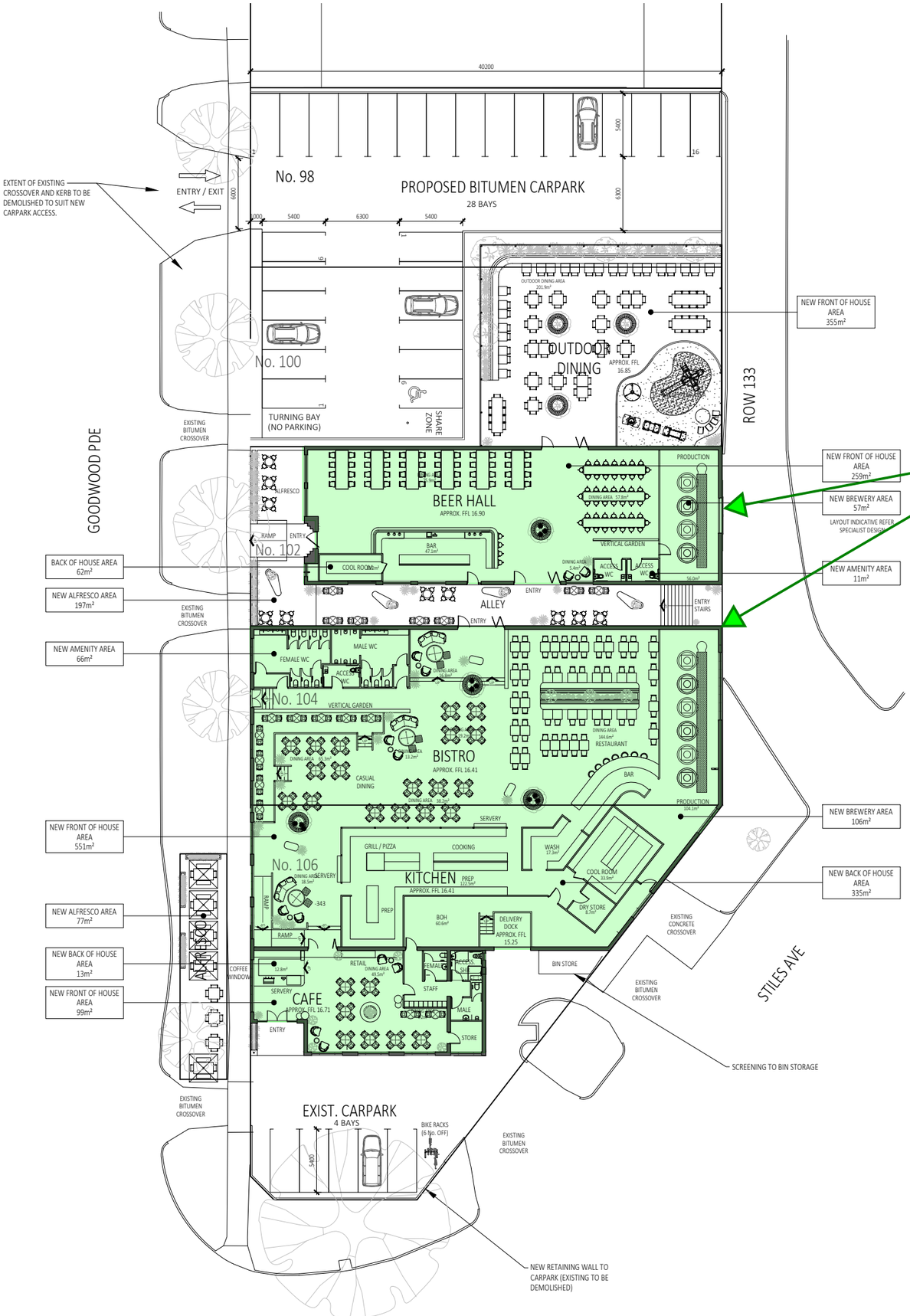
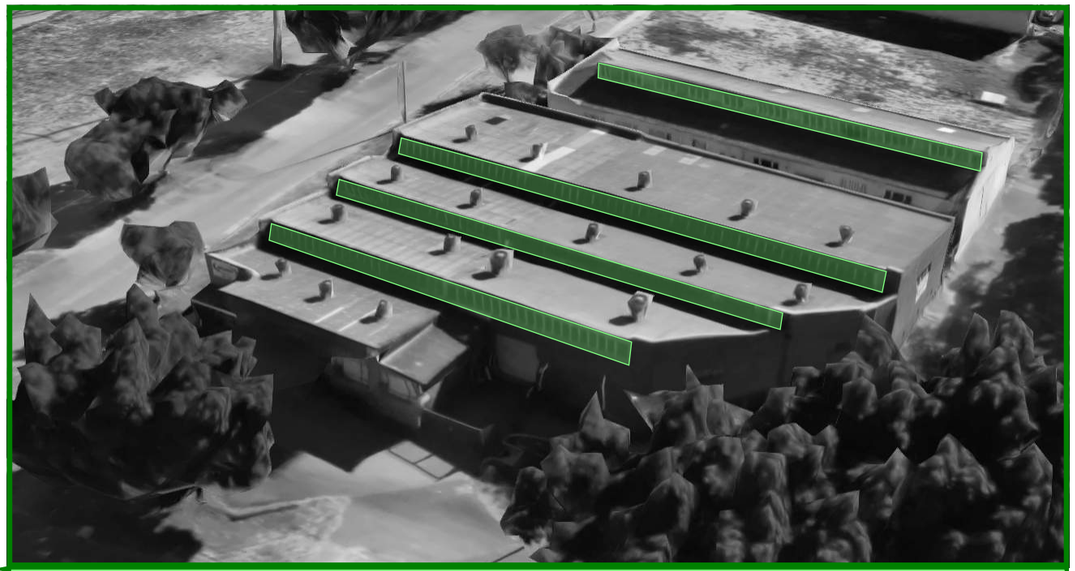
Legend :

- 1 — Rw 35 dB glass (i.e 8.5 mm VLam Hush)
- Sliding
- Fixed Sash / Awning or Casement type only
- Door with certified frame with seals system
- Light weight, full height construction Rw 35 dB (i.e. 1 x 16mm Fire rated plaster board on each side, 88mm soundcheck insulation on steel stud)







Glazing roof section recommended to be composed with minimum sound insulation rating of Rw 35 dB glass (i.e. 8.5mm Vlam hush)

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