Golf Simulator and Cafe Joint Tenancy

Environmental Noise Assessment

Photo Source: Microsoft Stock Images

Basis of Report

This report has been prepared by with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with . 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

Reference	Date	Prepared	Checked	Authorised
755.23150-018-R01-v1.0	24 March 2026			
755.23150-018-R01-v1.1	1 April 2026			

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1 Introduction

was commissioned by to carry out an environmental noise assessment associated with the conversion of Ground Floor Tenancy 07 (T07) located at 51 Queen Victoria Street, Fremantle an existing (vacant) Ground Floor commercial tenancy, into a recreational golf simulator tenancy with small bar and café (linked) tenancy(s) serving food and beverages.

T07 is situated in an existing mixed-use multi-storey building of commercial Ground Floor tenancies supplemented with six (6) storeys of residential apartment dwellings (Liv Apartments) situated directly over, separated by First Floor transfer slab, and basement car parking facility below Ground Floor level.

The proposed operations identify a maximum capacity of up to 100 patrons across the tenancy(s), with hours of operation and activities identified as follows:

- The Café intends to operate from 6:00am to 3:00pm, with a takeaway coffee window open from 6am onto Queen Victoria Street; The Café will have with internal sit-down dining area for food and beverages which golf simulator patrons can access directly from inside and have food/drinks delivered to their table/simulator bay;
- The Golf Simulator intends to operate from 10:00am to 10:00pm and comprises five (5) golf simulator bays and a dedicated licensed bar area serving drinks;
- A loudspeaker system is proposed intended to play background music.

Note, the Principal advises the hours of operation are proposed at this stage and not yet formally set. Presumed to be 7 days a week.

1.1 Scope of Works

understands the intention for this assessment scope of works is to submit applications for Development Approval (DA) to City of Fremantle and an Environmental Licence to the Department of Water and Environmental Regulation (DWER), noting the scope request is acknowledged as prior to receiving any specific conditions from the City or DWER.

The purpose of the environmental noise assessment is therefore to investigate anticipated noise emissions as a result of the operation of the converted facility and assess the compliance (and any impacts) at adjacent noise sensitive receptors as required under the statutory legislation and criteria contained in the *WA Environmental Protection (Noise) Regulation 1997*, (henceforth *"the Regulations"*).

Where any noise exceedances are predicted, the noise assessment is to provide relevant noise mitigation and control recommendations in order to achieve relevant compliance with *the Regulations*, such that the development may be demonstrated to comply with *the Regulations* at this stage.

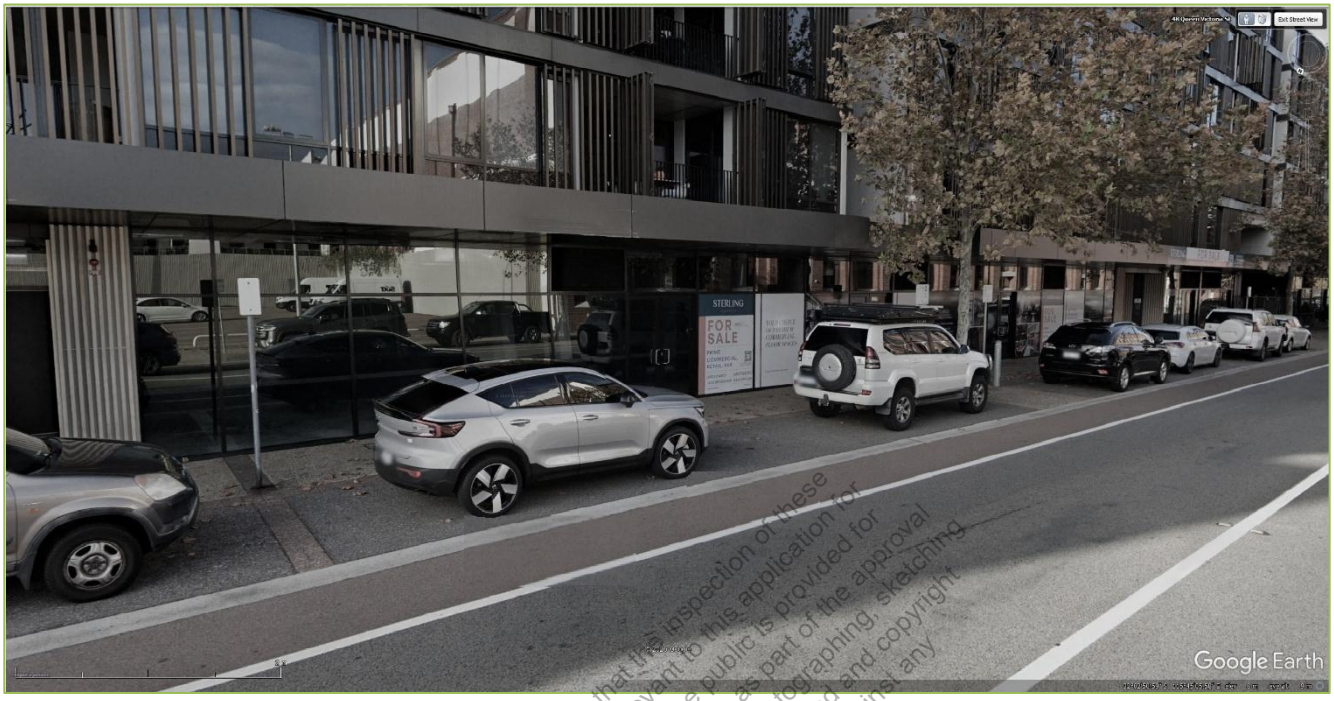
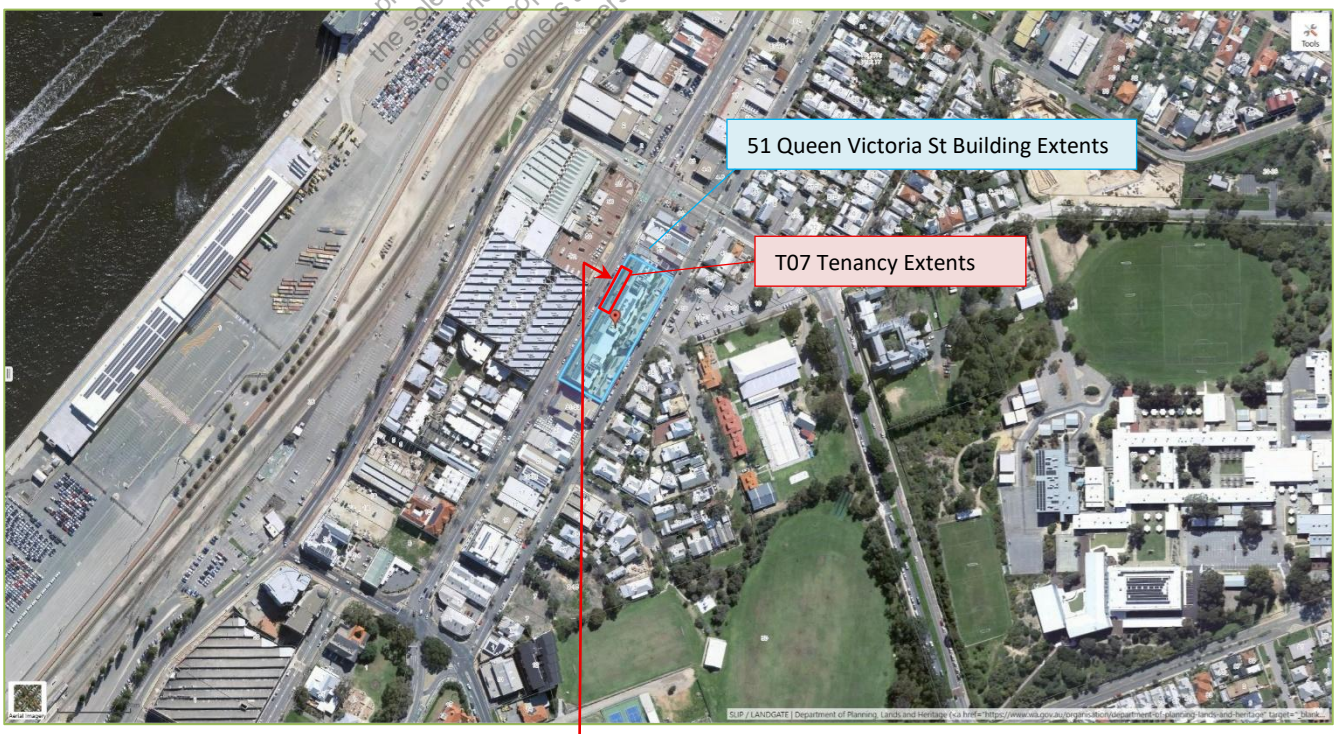


Figure 1 identifies the site area and surrounds, with T07 located within the existing building envelope;

Figure 2 shows the preliminary internal floorplan extents and proposed layout used for this assessment.

As part of the scope, ANV attended site Thursday 19th February 2026 to inspect the existing condition of T07, whereby notes of the existing façade condition, First Floor level slab over and perimeter walls were observed and reported as key conditions and assumptions underpinning the containment of golf simulator noise emissions.



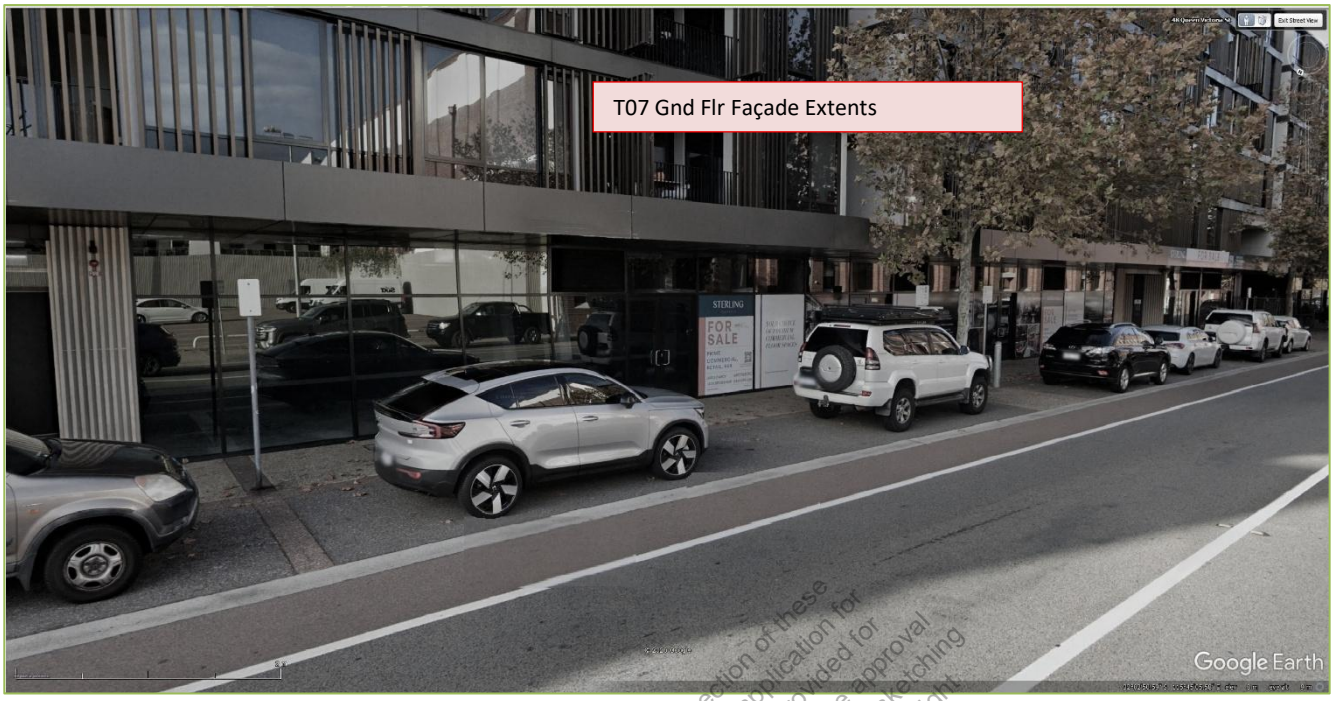


Figure 1 Site Locality (image(s) courtesy DPLH PLanWA web portal, Google Earth)

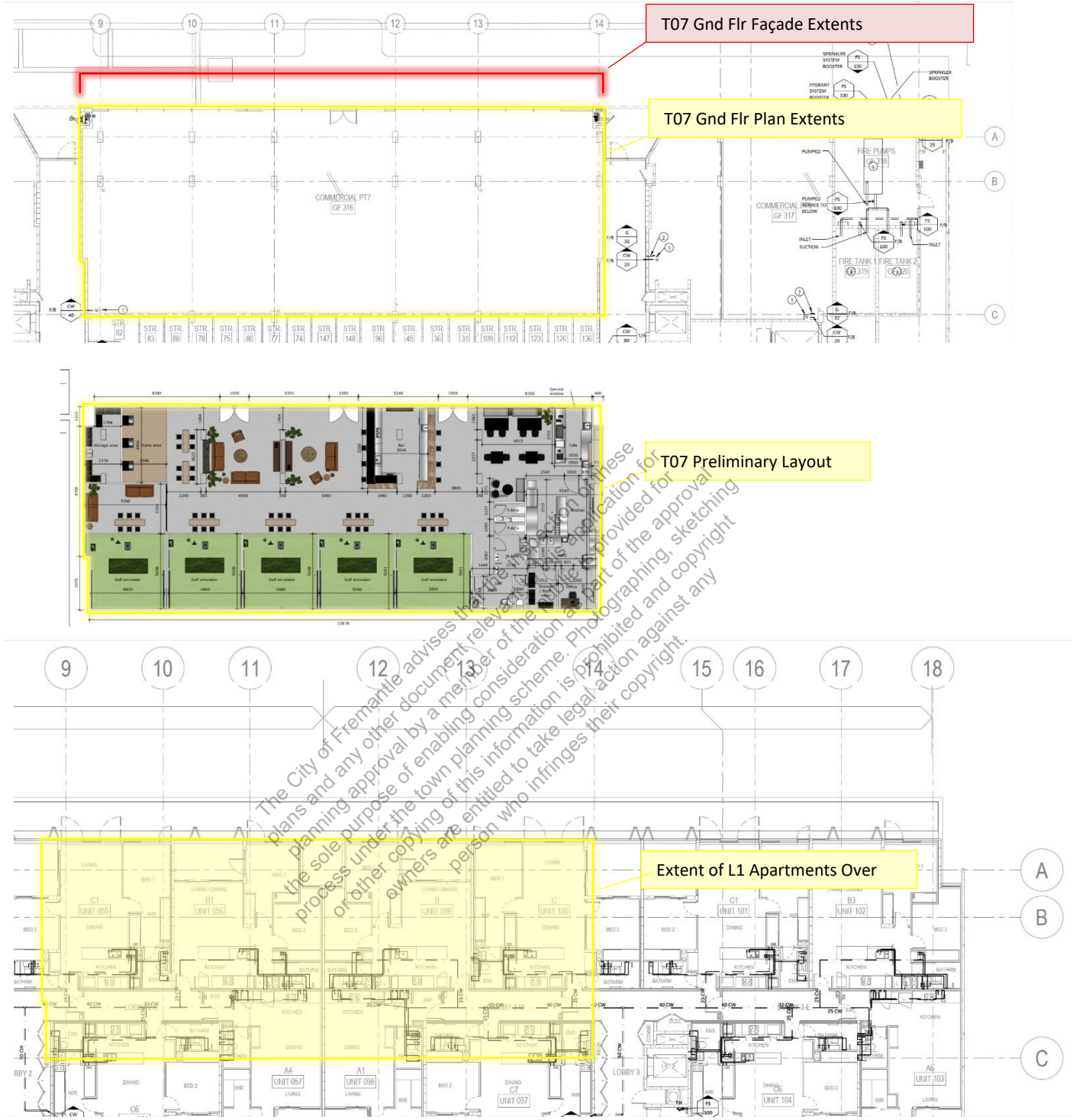


Figure 2 T07 Floor Plan (Upper); Proposed Layout (Middle) and Extent of Apartments Over (Lower)

2 Assessment Criteria

2.1 Environmental Protection (Noise) Regulations 1997

2.1.1 Regulations 7, 8 and 9

The noise emissions from the proposed recreational golf simulator, bar and café facility are governed by the state noise regulations, specifically the *WA Environmental Protection (Noise) Regulations 1997,* (“*the Regulations”*).

Regulation 7 represents the *Prescribed standard for noise emissions* and requires under *subregulation 1(a)* that:

> 7. (1) Noise emitted from any premises or public place when received at other premises —
>
> (a) must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind;
> and,
> (b) must be free of — (i) tonality; (ii) impulsiveness; and (iii) modulation, when assessed under **Regulation 9**.
>
> 7.(2) For the purposes of subregulation (1)(a), a noise emission is taken to significantly contribute to a level of noise if the noise emission as determined under subregulation (3) exceeds a value which is 5 dB below the assigned level at the point of reception.

Regulation 8 sets out the maximum allowable noise levels (‘assigned noise levels’) for various noise parameters (L_{A10}, L_{A1} and L_{Amax}) based on designated time(s) of the day and as applicable at the premises receiving the noise.

The L_{A10} assigned level is generally applicable to “steady-state” noise sources such as air conditioning units which are expected to be present for more than 10% of any representative assessment period (RAP).

The L_{A1} is for short-term noise sources present for less than 10% but more than 1% of the time in any RAP, such as logistics deliveries, temporary or occasional activities.

The L_{Amax} assigned level is applicable for very short term, incidental noise sources, such as car door closing noise, defined as present for less than 1% of the time in any RAP.

The assigned noise levels are assessed on a per receiver basis – premises deemed to be *noise sensitive* under *the Regulations’ Schedule 1 Part C* have the assigned noise level determined by the calculation of an Influencing Factor (IF), in accordance with the *Prescribed Methodology* in Schedule 3 of *the Regulations’*. The calculation takes into account the percentage area(s) of surrounding industrial and commercial land use and the presence of Major and/or Secondary Roads[1] within a 100 m and 450 m radius around the noise sensitive receiver.

A highly sensitive area means an area (if any) of noise sensitive premises comprising:

- a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
- any other part of the premises within 15 metres of that building or that part of the building.

[1] Major Roads are defined as having an Annual Average Daily Traffic (AADT) road traffic volume >15,000 vehicles; Secondary Roads are defined as having >6,000 vehicles AADT.

A summary of the assigned noise levels from **Regulation 8** is presented in **Table 1**.

Table 1 Assigned Noise Levels

Type of premises receiving noise	Time of day	Assigned noise level. dB(A)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area (i.e. noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use)	7:00 am to 7:00 pm Monday to Saturday ('Day')	45 + IF	55 + IF	65 + IF
	9:00 am to 7:00 pm Sunday and public holidays	40 + IF	50 + IF	65 + IF
	7:00 pm to 10:00 pm all days ('Evening')	40 + IF	50 + IF	55 + IF
	10:00 pm on any day to 7:00 am Monday to Saturday and 9:00 am Sunday and public holidays ('Night')	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area (i.e. Noise Sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use)	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90
Industrial and utility premises in the Kwinana Industrial Area	All hours	75	85	90

Regulation 9 further stipulates that the character of the noise received at noise sensitive receivers must be 'free' of annoying characteristics of tonality, modulation and impulsiveness. If these characteristics cannot be reasonably and practicably removed, then a series of adjustments to the measured or calculated received levels are set out, and the adjusted level must comply with the assigned level. The adjustments are summarised in **Table 2** and are further defined in **Regulation 9(1)**.

- *Tonality* is defined in **Regulation 9(1)** as being present where the difference between the A-weighted sound pressure level in any one third octave band and the arithmetic average of the A-weighted sound pressure levels in the two adjacent one third octave bands is greater than 3 dB in terms of $L_{Aeq,\,T}$ where the time period (T) is greater than 10 percent of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A,\,Slow}$ levels.
- *Modulation* is defined as a variation in the emission of noise that:
    - Is more than 3 dB $L_{A,\,Fast}$ or is more than 3 dB $L_{A,\,Fast}$ in any one third octave band
    - Is present for at least 10% of the representative assessment period, and
    - Is regular, cyclic and audible
- *Impulsiveness* is defined as present where the difference between $L_{A,\,peak}$ and $L_{Amax,\,S}$ is more than 15 dB when determined for a single representative event.

Table 2 Table of Adjustments

Adjustment where noise emission is not music (adjustments are cumulative to a maximum of 15 dB)			Adjustment where noise emission is music	
Where tonality is present	Where modulation is present	Where impulsiveness is present	Where impulsiveness is not present	Where impulsiveness is present
+5 dB	+5 dB	+10 dB	+10 dB	+15 dB

2.1.2 Regulation 14A

Regulation 14A considers noise from activities collectively referred as *specified works*, which means –

- The collection of waste; or
- The cleaning of a road or the drains for a road; or
- The cleaning of public places, including footpaths, cycle paths, car parks and beaches.

Further, *specified works* is split into two categories, **Class 1** and **Class 2** such that –

Class 1 works means *specified works* carried out between -

- 0700 hours and 1900 hours on any day that is not a Sunday or a public holiday; or
- 0900 hours and 1900 hours on a Sunday or public holiday.

Class 2 works means any *specified works* carried out outside of these times.

Regulation 14A specifies that **Regulation 7** does not apply to noise emitted in the course of carrying out **Class 1** works if:

- The works are carried out in the quietest reasonable and practicable manner; and
- The equipment used to carry out the works is the quietest reasonably available;

In the case where specified works are to be carried out outside of **Class 1** times, a noise management plan is to be prepared and approved by the CEO.

2.2 Identification of Nearest Noise Sensitive Receivers

Noise Sensitive Receivers (NSRs) anticipated to be most affected by the development are identified as two (2) residential apartment dwellings directly surrounding the development site are as follows.

- First Floor Apartments directly above Ground Floor Tenancy Unit 7 at 51 Queen Victoria Street, and representative of the nearest/most-exposed on-site apartment(s) to the Tenancy Unit 7; And,
- Heirloom Apartments, opposite the Ground Floor Tenancy Unit 7 at 51 Queen Victoria Street, representative of the nearest/most-exposed off-site apartment(s) to the Tenancy Unit 7;

Given the venue is within a mixed use building, the nearest (on-site) Noise Sensitive Receiver is taken to be the apartment immediately above the Ground Floor unit 7 as indicated in **Figure 2**. Further afield, the multi-storey Heirloom Apartments building is situated directly opposite at #36 Queen Victoria Street and is taken to be the nearest “off-site” NSR – these relationships are indicated in the schematic shown in **Figure 3**.

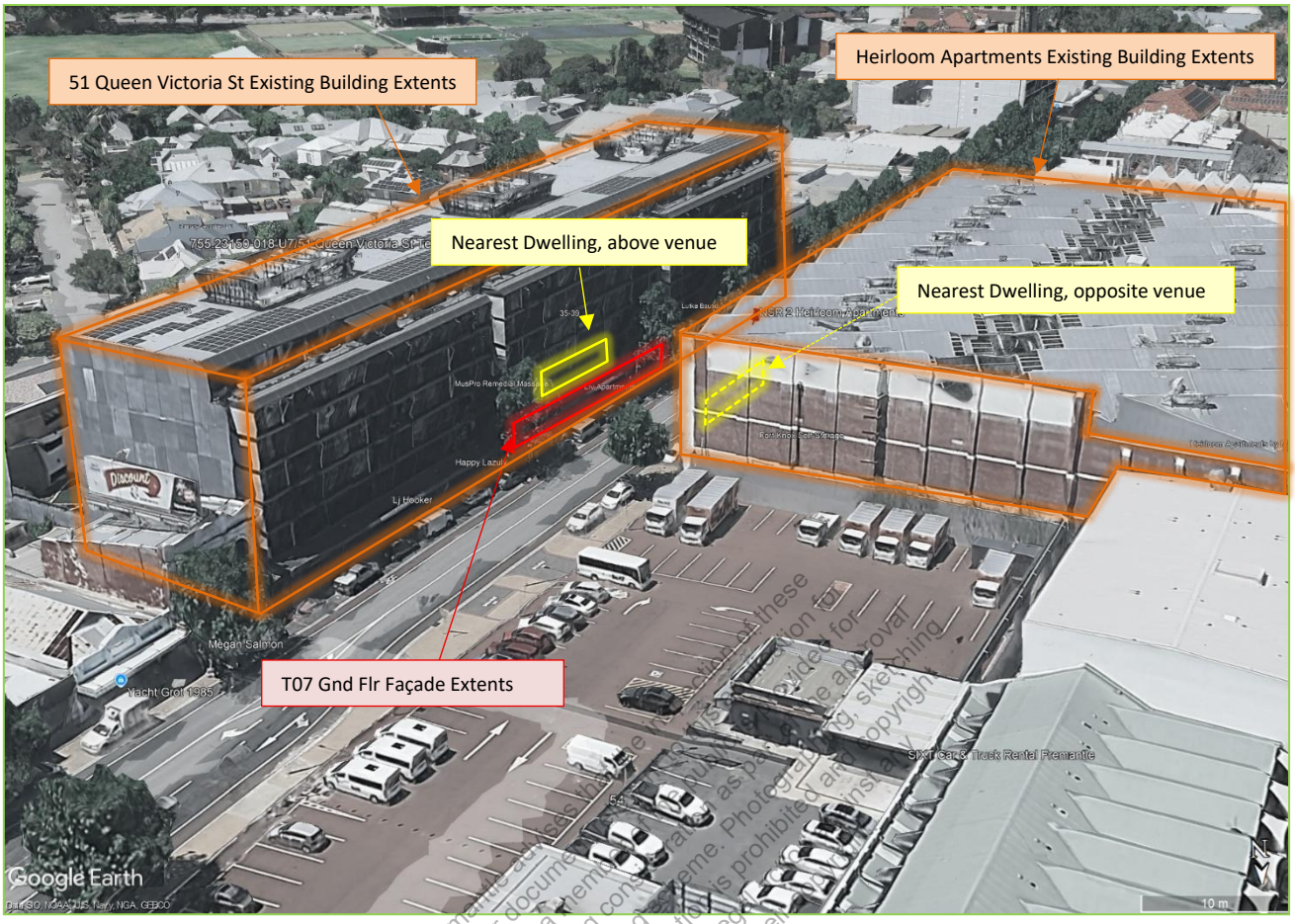


Figure 3 Representative Nearest Noise Sensitive Receivers to the Development Site (Source: Google Earth)

Details of the identified nearest NSRs and corresponding Assigned Noise Level limits are outlined in **Table 3**.

2.3 Identification of Surrounding Land Use

The Influencing Factor (IF) is determined using the *Prescribed Methodology* outlined in Schedule 3 of *the Regulations* and is calculated on a per Receiver basis based upon a combination of the percentage area(s) of surrounding Industrial ("I") and Commercial ("C") land use and the presence of Major and/or Secondary Roads within a 100m (Inner) and 450m (Outer) calculation radius around each specific Noise Sensitive Receiver.

The calculated daytime Assigned Noise Level limits are listed in **Table 3**, with the corresponding identification of surrounding land use for NSR 1 presented in **Figure 4.**

Table 3 Adjacent Noise Sensitive Receivers and Corresponding Daytime Assigned Noise Level Limits

Receiver number	Receiver address	Influencing factor, IF	Assigned Noise Level, Daytime, dB(A)		
			L_{A10}	L_{A1}	L_{Amax}
NSR1	1st Flr Apartment, Liv Apartments, 51 Queen Victoria St, Fremantle	+8	**53**	63	**73**
NSR2	Gnd Flr Apartment, Heirloom Apartments, 36 Queen Victoria St, Fremantle				

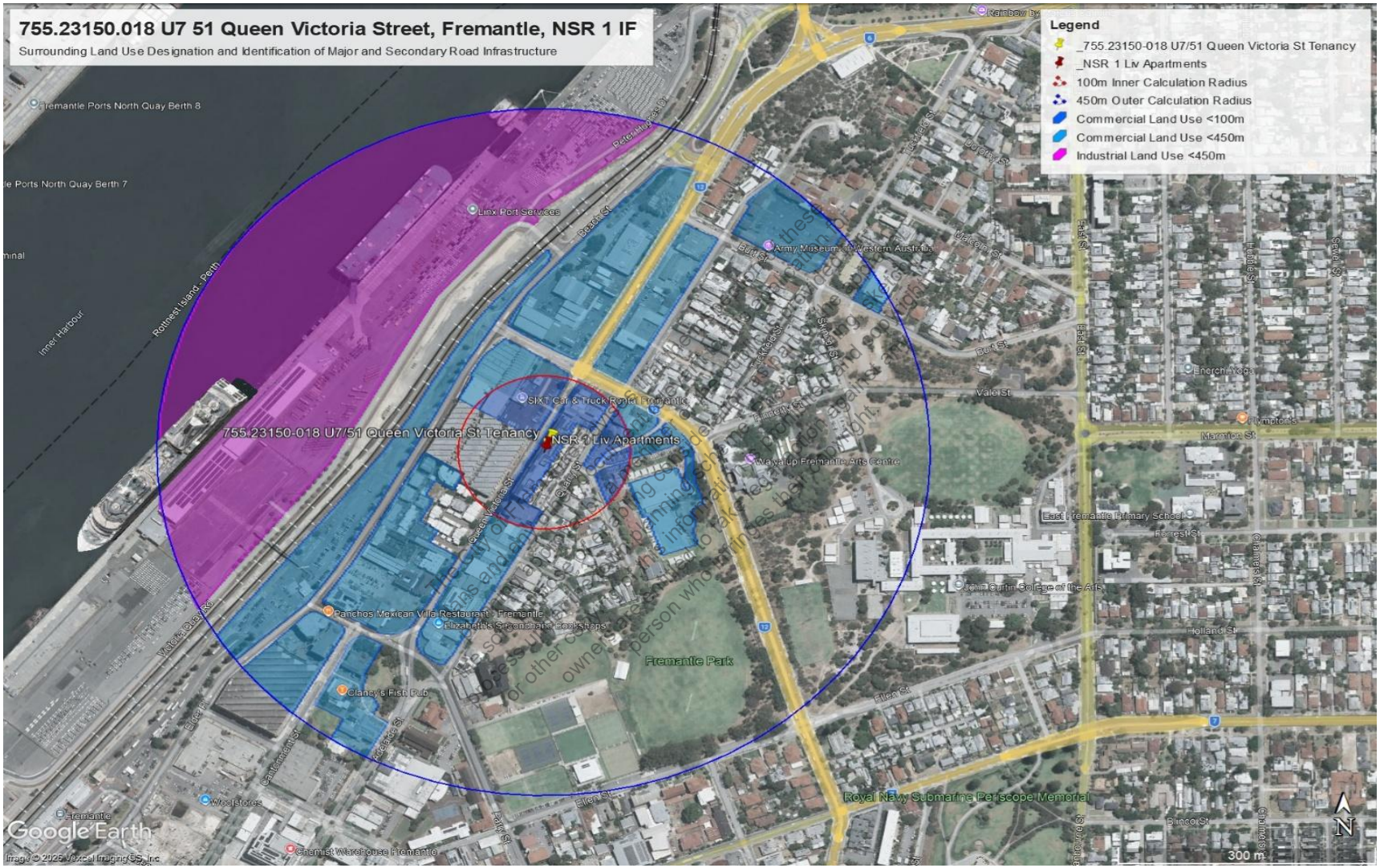


Figure 4 Calculation of Influencing Factor (I.F.) for NSR 1 re: Surrounding Land Use and Presence of Roads

3 Noise Modelling Methodology

3.1 Modelling Algorithm

A 3D noise model was developed based on the modelling platform SoundPLAN 9.1. The software allows the use of various internationally recognised noise prediction algorithms, accounting for internal noise transfer through the glazed façade, sound intensity losses due to distance attenuation, atmospheric absorption, ground absorption and shielding provided by solid structures or terrain.

The prediction method ISO 9613-2[2], as implemented in the SoundPLAN software platform, has been selected for this assessment. ISO9613-2 defines a general-purpose noise prediction method that has been well established as the primary international standard for calculating environmental noise from commercial and industrial sources. The method predicts noise levels under the conservative conditions that are in favour of sound propagation from the source to the receiver (and consequently increase receiver noise levels). Threse conditions comprise either:

- A wind direction from the noise source to the receiver, or
- A moderate ground-based thermal inversion (a condition when temperatures increase with height above ground, as may occur on clear and still night).

The general noise model parameters used within SoundPLAN platform are presented in **Table 4**.

Table 4 Noise model parameters

Variable	Parameter used
Calculation method	ISO 9613-2 prediction method
Ground absorption coefficient	0.5 – relatively soft ground for residential area (0 represents hard ground and 1 represents soft ground)
Reflections	3rd order maximum reflections
Ground topography	Open-sourced Shutter Radar Topography Mission (SRTM) elevation data imported via Google Map, with a resolution of approx. 90 meters.
Receiver heights	1.5 m above ground level
Operating scenarios	Worst case scenario with all relevant sources operating simultaneously
Temperature	20˚C
Relative humidity	50%
Stability class	E
Air pressure	1,013 mbar
Meteorological conditions	Downwind condition (from the source to receiver) in favour of sound propagation

[2] International Organization for Standardization 1996, Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation, ISO 9613- 2:1996, International Organization for Standardization, Geneva, Switzerland.

3.2 Modelling Scenarios

To simplify potential operational scenarios the worst-case (i.e. highest activity level) noise emission scenarios for the operation of the entire venue is considered, with sources comprising:

- Up to 100 patrons in the café and golf simulator areas, each patron is assumed to have a sound power level of 75dB(A), with 1-in-3 patrons talking simultaneously;
- Background music loudspeakers [3];
- Golf swing simulator ball-strike noise;
- Noise breakout from cumulative tenancy operational noise via glazed façade;

Note, Air Conditioning Condenser plant (AC CU), general supply and exhaust air ventilation plant (SAF, EF), toilet exhausts (TEF) and café Kitchen Exhaust Fan (KEF) system noise are all located on the roof as part of the existing building. As no changes are anticipated as part of existing noise emissions from the established building, these sources are omitted from the assessment at this stage.

3.3 Sound Power Levels Data for Relevant Noise Sources

The sound power level inputs for various source emissions within the noise model are provided in **Table 5** below.

Table 5 Effective source sound power levels, dB(A) re 1×10^{-12} W

Source	One Octave Band Sound Power Spectral Level, dB(A)							Overall dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	
Patron Areas – Reference 100 Patrons, 1-in-3 talking simultaneously (L_{A10})	77	88	92	94	86	84	81	**94**
Background music Loudspeaker x 10 (each) (L_{A10})	66	70	67	72	72	70	62	**76**
Golf Simulator – Driver (L_{Max})	92	82	79	86	91	93	102	**106**
Golf Simulator – Iron (L_{Max})	91	83	73	80	82	90	93	**97**

The following is noted in relation to **Table 5**:

- All noise sources are assumed to be L_{A10} unless noted otherwise;
- Patrons are modelled at 1.5m above ground. Each patron is assumed to have a sound power level of 75dB(A), with 1-in-3 patrons talking simultaneously.
- Patron areas and capacities are split based upon area and SWL calculated based upon the 100 Patron reference. It is noted that patron noise can be highly variable depending on the number of patrons, background noise level, alcohol consumption and the like;
- Regarding patron noise, areas and estimated seated patronage numbers used to determine noise levels are taken from the fitout plans indicated in **Figure 2.**
    - Noise breakout is calculated via the ground floor glazed façade to the façades of NSR 2 residences at 36 Queen Victoria Street.

[3] Background music loudspeakers - Loudspeaker sound levels represent the provision of background type music only, as defined in VCAT decision (Ref: B2/2005 Whiting v Hosier Bar Pty Ltd) and reproduced in the Liquor Control Reform Act of Victoria as *"a background level requires that music be played at a level enabling normal voice conversation at a distance of 600mm."*

- Noise breakout from the venue building is also considered through the slab to NSR 1 residences immediately above and calculated as a predicted internal noise level, with secondary contributions from noise break out via the ground floor glazed façade and reflection paths back to NSR 1 residences at all floor levels;

Referring the aerial imagery in **Figure 2**, see **Figure 5** which indicates the mirrored views south along Queen Victoria Street and the corresponding equivalent area in the SoundPLAN noise model space.

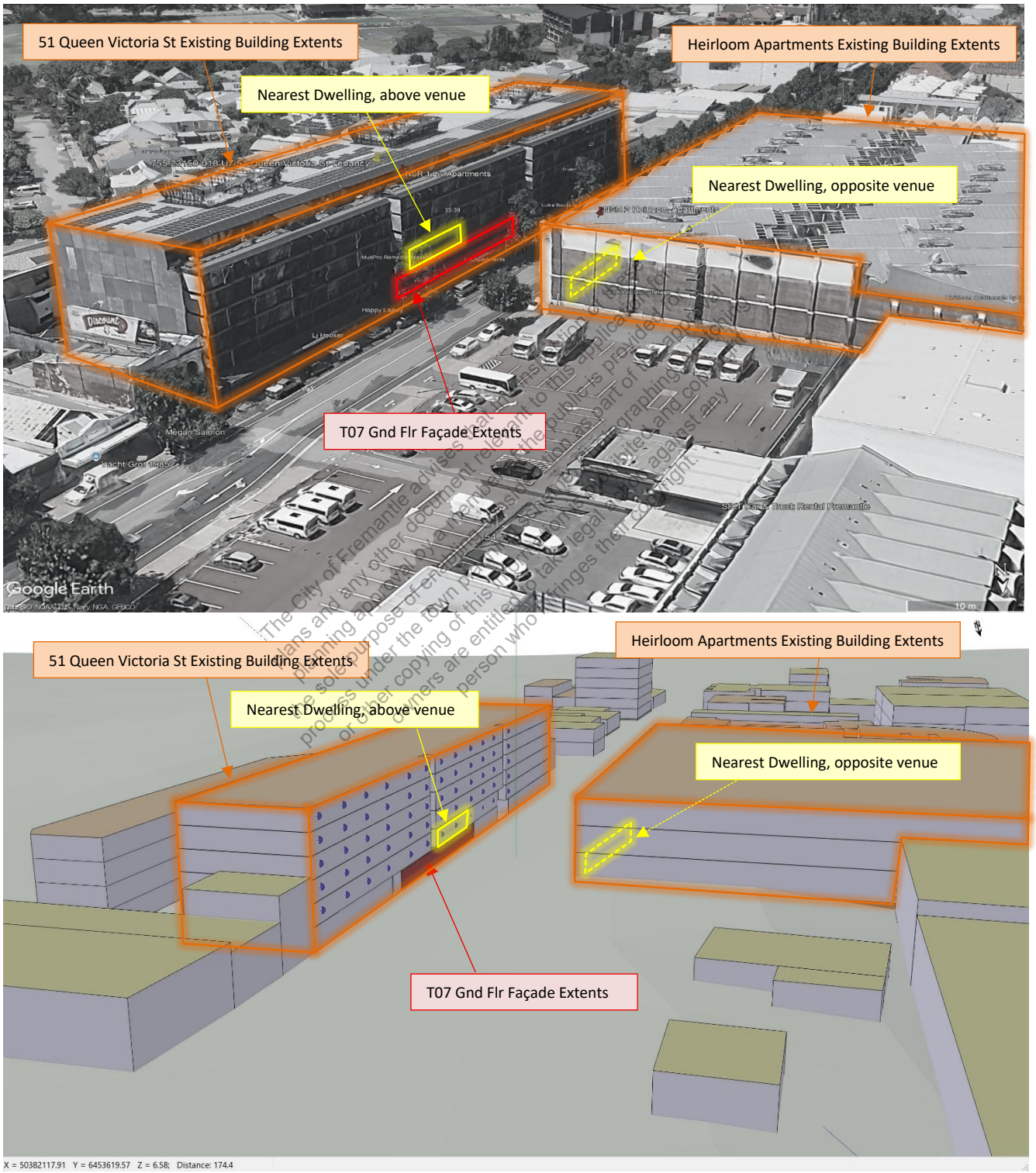


Figure 5 Comparative aerial imagery (Courtesy Google Earth) and 3D SoundPLAN model space images

Figure 6 indicates an alternative view in the SoundPLAN model space, looking north-west along Queen Victoria Street, showing the nearest receivers on NSR 2 building (Heirloom Apartments) directly opposite the T07 venue façade shown red.
Note, each blue sphere represents individual façade noise receptor points at each NSR building floor level and apartment. NSR receptors are considered in terms of Floor levels with a number of columns representing horizontal spacing, for example NSR 2 Column 1 is the northern-most extent of the Heirloom Apartments building; Similarly, NSR 1 Column 1 is representative of the northern-most extent of the Liv Apartments building. Receptor column references are indicated in **Figure 6**.

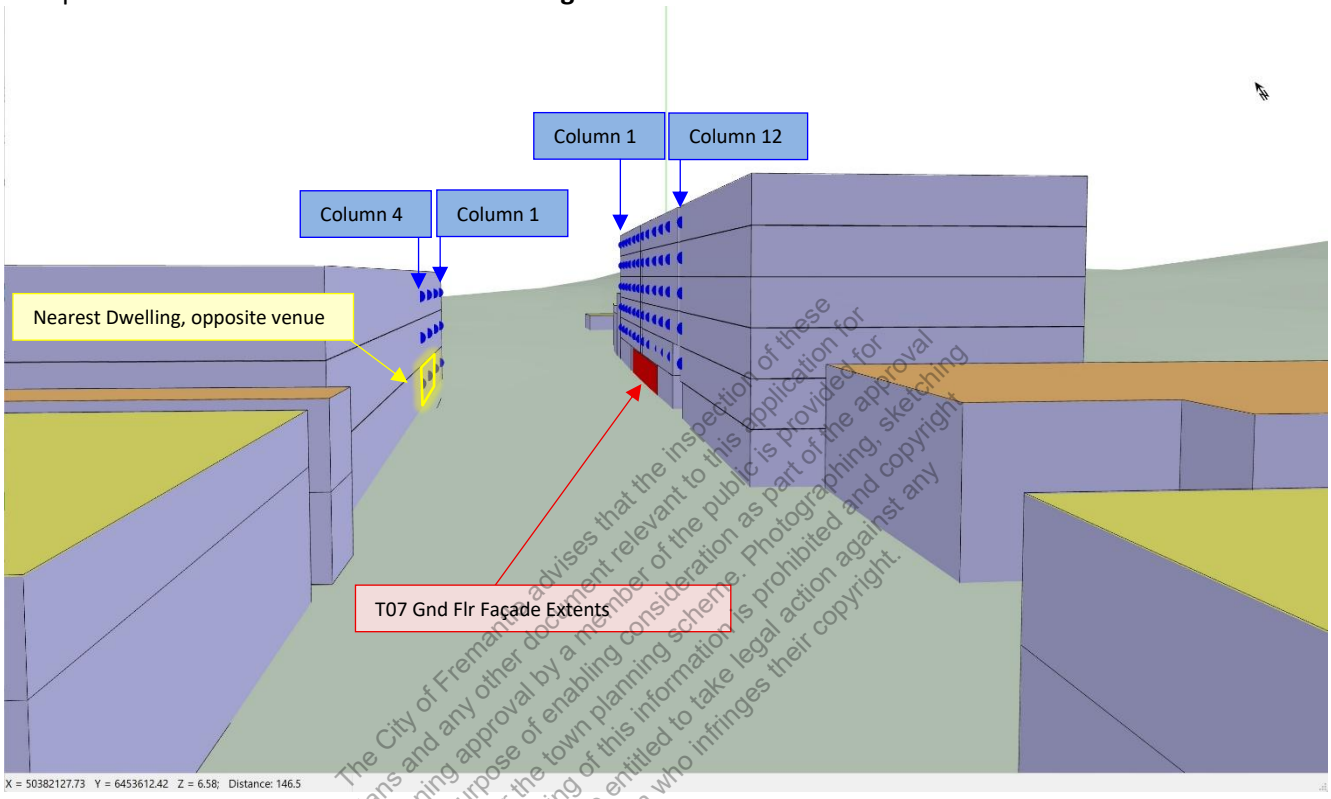


Figure 6 Alternative 3D SoundPLAN model space view of NSR 2

3.4 Noise Source Duration, Characteristics and RAPs

The *Regulations'* Assigned Noise Level limits are defined in terms of L_{A10}, L_{A1} and L_{AMAX}, which in turn defines a noise sources' characteristics in terms of duration of source. For example, the L_{A10} criterion describes the Assigned Noise Level limit for a noise source which is operating for "*more than 10%*" of the duration of any *Representative Assessment Period* (*RAP*), typically 15 minutes up to 4 hours. Similarly, the L_{A1} criterion describes the limit for a source operating for 1% of the *RAP*. L_{AMAX} is reserved for one-off, instantaneous sounds, present of <1% of the time.

Characterising the identified noise sources at the venue:

- Patron and background music noise is expected to be present for more than 10% of the time, hence is calculated against the L_{A10} criterion for Daytime (0700 – 1900) and Evening (1900 – 2200) hours.
- Golf ball strikes occur for milliseconds, which may be considered against the L_{AMAX} criterion; However as the primary use of the venue is golf ball strikes, many golf ball strike events are anticipated within any given RAP, therefore cumulatively, the strike noise is taken to be present for 1% of the time, hence results are calculated against the L_{A1} criterion for Daytime and Evening hours.

All calculations assume the glazed façade doorsets are assumed to be closed.

4 Results and Discussions

4.1 Results

Predicted noise levels at the identified nearest NSRs (Liv Apartments Level 1 to Level 5, and Heirloom Apartments Gnd to 2nd Flr Level) are presented in **Table 6** for the two modelling scenarios: L_{A10} noise sources and L_{A1} noise sources. Results and corresponding compliance is considered for each individual receptor location during Daytime (0700 – 1900), evening (1900 – 2200) and night-time hours (2200 – 0700), as defined in *the Regulations*.

The modelled noise contour plots for the two modelling scenarios are provided **Appendix B**.

Table 6 Predicted Noise Level Compliance Results

Predicted Noise Levels – Compliance Assessment								
NSR Ref	Limit, L_{A10}, dB(A)			Status	Limit, L_{A1}, dB(A)			Status
	Day	Eve	Night		Day	Eve	Night	
	53	48	43		63	58	53	
NSR 1 Liv Apartments, Level 1 to Level 5, 51 Queen Victoria Street								
Level 1, Column 1	17	17	17	Complies	26	26	26	Complies
Level 1, Column 2	18	18	18	Complies	27	27	27	Complies
Level 1, Column 3	20	20	20	Complies	28	28	28	Complies
Level 1, Column 4	23	23	23	Complies	32	32	32	Complies
Level 1, Column 5	29	29	29	Complies	37	37	37	Complies
Level 1, Column 6	37	37	37	Complies	48	48	48	Complies
Level 1, Column 7	35	35	35	Complies	46	46	46	Complies
Level 1, Column 8	32	32	32	Complies	43	43	43	Complies
Level 1, Column 9	29	29	29	Complies	40	40	40	Complies
Level 1, Column 10	24	24	24	Complies	35	35	35	Complies
Level 1, Column 11	25	25	25	Complies	36	36	36	Complies
Level 1, Column 12	24	24	24	Complies	37	37	37	Complies
Level 2, Column 1	18	18	18	Complies	26	26	26	Complies
Level 2, Column 2	19	19	19	Complies	27	27	27	Complies
Level 2, Column 3	20	20	20	Complies	29	29	29	Complies
Level 2, Column 4	23	23	23	Complies	32	32	32	Complies
Level 2, Column 5	28	28	28	Complies	38	38	38	Complies
Level 2, Column 6	35	35	35	Complies	46	46	46	Complies
Level 2, Column 7	34	34	34	Complies	46	46	46	Complies
Level 2, Column 8	30	30	30	Complies	41	41	41	Complies

Predicted Noise Levels – Compliance Assessment								
NSR Ref	Limit, L_{A10}, dB(A)			Status	Limit, L_{A1}, dB(A)			Status
	Day	Eve	Night		Day	Eve	Night	
	53	48	43		63	58	53	
Level 2, Column 9	29	29	29	Complies	40	40	40	Complies
Level 2, Column 10	24	24	24	Complies	33	33	33	Complies
Level 2, Column 11	25	17	17	Complies	38	38	38	Complies
Level 2, Column 12	24	24	24	Complies	37	37	37	Complies
Level 3, Column 1	17	18	18	Complies	26	26	26	Complies
Level 3, Column 2	18	20	20	Complies	27	27	27	Complies
Level 3, Column 3	20	29	29	Complies	29	29	29	Complies
Level 3, Column 4	23	37	37	Complies	32	32	32	Complies
Level 3, Column 5	27	35	35	Complies	37	37	37	Complies
Level 3, Column 6	33	18	18	Complies	44	44	44	Complies
Level 3, Column 7	32	24	24	Complies	43	43	43	Complies
Level 3, Column 8	29	25	25	Complies	40	40	40	Complies
Level 3, Column 9	28	24	24	Complies	39	39	39	Complies
Level 3, Column 10	25	19	19	Complies	35	35	35	Complies
Level 3, Column 11	25	20	20	Complies	38	38	38	Complies
Level 3, Column 12	23	23	23	Complies	37	37	37	Complies
Level 4, Column 1	17	28	28	Complies	27	27	27	Complies
Level 4, Column 2	18	35	35	Complies	27	27	27	Complies
Level 4, Column 3	20	34	34	Complies	29	29	29	Complies
Level 4, Column 4	22	30	30	Complies	32	32	32	Complies
Level 4, Column 5	26	29	29	Complies	37	37	37	Complies
Level 4, Column 6	31	17	17	Complies	42	42	42	Complies
Level 4, Column 7	30	25	25	Complies	41	41	41	Complies
Level 4, Column 8	29	25	25	Complies	40	40	40	Complies
Level 4, Column 9	28	23	23	Complies	39	39	39	Complies
Level 4, Column 10	24	18	18	Complies	35	35	35	Complies
Level 4, Column 11	25	20	20	Complies	38	38	38	Complies
Level 4, Column 12	23	23	23	Complies	37	37	37	Complies
Level 5, Column 1	16	26	26	Complies	25	25	25	Complies

Predicted Noise Levels – Compliance Assessment								
NSR Ref	Limit, L_{A10}, dB(A)			Status	Limit, L_{A1}, dB(A)			Status
	Day	Eve	Night		Day	Eve	Night	
	53	48	43		63	58	53	
Level 5, Column 2	17	31	31	Complies	26	26	26	Complies
Level 5, Column 3	19	30	30	Complies	28	28	28	Complies
Level 5, Column 4	21	29	29	Complies	31	31	31	Complies
Level 5, Column 5	25	28	28	Complies	36	36	36	Complies
Level 5, Column 6	29	16	16	Complies	40	40	40	Complies
Level 5, Column 7	29	23	23	Complies	40	40	40	Complies
Level 5, Column 8	28	24	24	Complies	39	39	39	Complies
Level 5, Column 9	27	23	23	Complies	39	39	39	Complies
Level 5, Column 10	23	17	17	Complies	34	34	34	Complies
Level 5, Column 11	24	19	19	Complies	37	37	37	Complies
Level 5, Column 12	23	21	21	Complies	36	36	36	Complies
NSR 2 Heirloom Apartments, Ground Level to Level 2, 36 Queen Victoria Street								
Gnd Level, Column 1	34	34	34	Complies	46	46	46	Complies
Gnd Level, Column 2	34	34	34	Complies	46	46	46	Complies
Gnd Level, Column 3	32	32	32	Complies	44	44	44	Complies
Gnd Level, Column 4	30	30	30	Complies	42	42	42	Complies
Level 1, Column 1	34	34	34	Complies	46	46	46	Complies
Level 1, Column 2	33	33	33	Complies	45	45	45	Complies
Level 1, Column 3	32	32	32	Complies	44	44	44	Complies
Level 1, Column 4	30	30	30	Complies	42	42	42	Complies
Level 2, Column 1	33	33	33	Complies	45	45	45	Complies
Level 2, Column 2	33	33	33	Complies	45	45	45	Complies
Level 2, Column 3	32	32	32	Complies	43	43	43	Complies
Level 2, Column 4	30	30	30	Complies	42	42	42	Complies

4.2 Discussion

4.2.1 Compliance Assessment Results

As can be seen from the modelling results in **Table 6**, for the nearest residential receptors at Liv Apartments and Heirloom Apartments, the predicted façade noise levels across all floors are able to comply with the applicable Assigned Noise Levels across all hours of the day, evening and night-time, as defined in *the Regulations*.

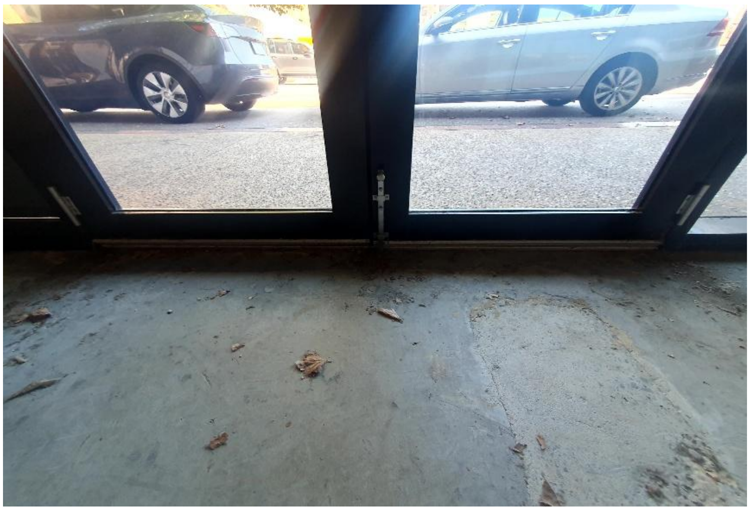
Façade noise levels are generally higher across the road at Heirloom Apartments, thought to be due to the direct transmission component; Further, reflected sound from Heirloom Apartment building façade shows a reflection pattern indicating an increase in levels around the column 6-column 7 area of the Liv Apartments building, approximately directly above the golf simulator and café tenancy. The levels are highest at Level 2, column 6 – 7.

4.2.2 Existing Façade Treatment and Condition

During site inspections 19th Feb 2026, the existing façade condition was observed to be 8 to 10mm monolithic safety glass which appeared to be well installed, fully sealed at soffit and in good general order. Two (2) double swing doorsets form part of the glazed façade, also 8-10mm safety glass and observed to be in fair working order – refer **Figure 7** for site pictures showing door in closed position and the general condition of the existing brush seals.

Figure 7 Existing Glazed Façade Doorset and Condition of Existing Brush Seals

A perimeter seal at threshold was also observed and in good working order – see image over the page.



The integrity of the doorset seals will dictate the acoustic performance of the doorset at mid to high frequency – as the repetitive golf ball strike sound has substantial high frequcny energy it is recommended to refresh the brush seals as part of the fitout.

4.2.3 Internal Transfer via Level 1 Suspended Floor Slab

Regarding the First Floor Liv Apartment units, (#055, #056, #99 and #100 – refer **Figure 2**), a direct noise transfer component is expected via the separating First Floor suspended concrete slab above the Ground Floor Tenancy T07. Review of structural drawings S302 Rev E Level 1 GA PLAN ZONE 2 dated 09.05.17; And S341 Rev B Level 1 SECTION SHEET 1, dated 13.09.17 [Fortec Australia] – Refer **Appendix C** – shows the First Floor slab is minimum 480mm thick in the area of interest:

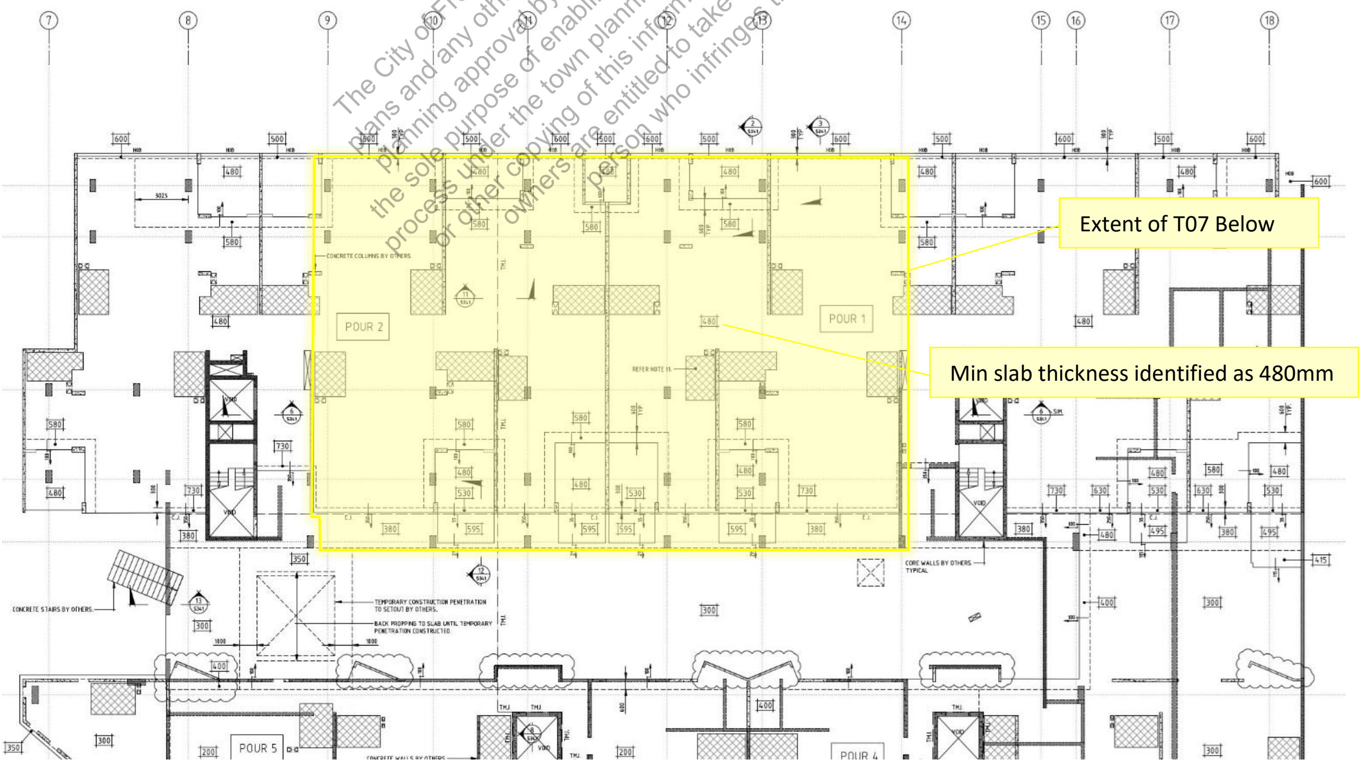


Figure 8 Extract from S302 Rev E Level 1 GA PLAN ZONE 2 dated 09.05.17: First Floor Slab Thicknesses

At 480mm thickness, the slab would ordinarily be an excellent barrier to the transmission of airborne sound with an estimated rating of ~R_W+C_{tr} 60dB - a substantial sound reduction rating which in layman's terms can be expressed as the reduction in noise level from one space to an adjacent space, where fully sealed and with no gaps, holes or penetrations.

In the context of instantaneous and activity noise levels for the golf simulator, bar and café operations, refer **Table 5**, a reduction of over 60dB(A) from tenancy to apartment units #055, #056, #99 and #100 directly above, this would be expected to mitigate noise transfer to inaudible levels.

During site inspections 19th Feb 2026, a number of hydraulic services penetrations were observed – some designated "stormwater" and some designated as "waste" – refer **Figure 9**.

Figure 9 Underside of Level 1 Slab Showing Hydraulic Penetrations

The stormwater pipes are PVC 80 – 100mm OD and will be routed/terminated outside of residential spaces. However, the waste pipes are routed to sink, toilet and shower waste(s). The current golf simulator tenancy fitout proposes no suspended ceilings – ANV understands the ceiling and waste pipes are to be painted black (or similar – in this case, the pipes will be exposed. In practice, noise will transfer into the pipes and be re-radiated into the apartment which can become audible and potentially intrusive, especially during periods of low background noise in the apartments.

To mitigate this transfer path, all waste pipes to apartment spaces are to be lagged using Soundlag 4512C to the extent of exposed pipe. Soundlag 4512C is a composite layer of loaded vinyl wrap and open cell foam – available in two thicknesses, 25mm and 14mm - the 4512C represents the thinner (14mm) variant and has been selected to ensure tradesmen can install behind pipes close up to the soffit.

4.2.4 Transfer of Impact Sound from Golf Ball Strike

Aside from airborne sound, the golf ball strike zone presents a potential source of structure-borne noise transfer to apartments and adjacent tenancies. The design for the golf simulator has been provided by the proposed contractor, Webster Built, in lieu of fitout drawings – understood to be as follows, re: email comms 09/03/2026:

- *"The simulator enclosure framing is structurally independent from the hitting surface and floor covering - while the enclosure frame may be fixed to the slab for stability, the area where golf balls are struck sits on top of the finished floor system and does not mechanically couple to the enclosure structure.*

- *The strike zone typically consists of a layered system including approximately 20mm acoustic/EVA underlay beneath a commercial practice fairway mat. This assembly sits directly on the finished floor and is not anchored or mechanically fixed to the slab. As a result, the initial ball impact energy is largely absorbed within the turf and underlay system rather than being transmitted directly into the building structure.*

- *Because the enclosure framing does not bear on the strike surface and the hitting mat system remains isolated from the structure, structure-borne vibration transfer into the slab is significantly reduced. The primary remaining sound component is airborne noise from ball-screen impact, which is mitigated through the acoustic wall finishes previously outlined."*

The 20-mm acoustic/EVA underlay is recommended to be Embleton SuperShear Flex™ which can be installed directly under the commercial practice fairway turf. 2m2 is nominal and considered to be sufficient to allow a golfer to take stance and strike the ball, however a larger area may be used if deemed necessary to keep the golfer and teeing area on the same plane.

It is anticipated that once the fitout contractor is engaged, further review of the structural couplings, acoustic surfaces and strike screen coupling to the simulator frame be examined, once these details become available.

4.3 Summary of Noise Mitigation and Management Measures for DA

The following range of noise mitigation and management measures as below are recommended to ensure any risk of excessive noise emissions from the operation of the existing and the proposed liquor licence areas could be managed to achieve noise compliance:

Noise Breakout From Existing Glazed Façade

- Façade doorsets must remain closed during all hours of operations;
- Worn brush seals to be replaced with new replacement brush seals;

Noise Transfer to Level 1 Liv Apartments

- All Waste pipes terminating in apartment units to be wrapped in SoundLag 4512C;
- Impact sound from ball strikes to be controlled using an area of 2m^2 Embleton SuperShear Flex rubber isolation matting installed below artificial turf strike area, to limit transfer of structural noise through columns to apartments above (all levels);

Patron Noise in Licenced Areas

With regard to patron activity noise levels, the basis of noise emissions compliance is defined by a direct comparison of objective sound source measurements and estimates taken from similar venues, against the calculated Assigned Noise Level (ANL) limits prescribed under *the Regulations*.

In practice, patron noise levels will be a direct consequence of the nature of patron behaviour which is variable, and may rise/fall in specific circumstances or situations. The resulting sound levels received at the nearest NSRs – above in Liv Apartments and across the street at Heirloom Apartments - will therefore be interdependent upon the management Policy and principals in operating the licenced area. The following recommendations are intended to supplement the minimum recommendations set out herein, promoting best practical noise amenity to the surrounds:

- Consider reducing occupancy after 7.00pm;

- Use of sympathetic signage to encourage alfresco patrons to self-manage noise as a means of consideration to the nearby residents – signage will also serve as a reference regards which bar staff may politely remind patrons of the nearby neighbours;

- Despite general compliance, it is recommended the venue operate a policy to actively manage potential unruly patron behaviour to limit potential noise nuisance at the nearby properties.

Background Music Noise Levels

It is recommended that background music be set to match the referenced definition put forward in Section 3 – refer **Table 5** – such that music is not the dominant source. Once more and better particulars of the PA system become known, the music noise levels may be tested in T07 to determine suitable levels for operations, balanced against compliance requirements as defined herein. It is recommended this be undertaken during Building Permit design submission stage.

5 Conclusions

have undertaken a noise emissions assessment for the proposed golf simulator and café tenancy at T07 Ground Floor at #51 Queen Victoria Street in Fremantle, WA.

The study considered worst-case operational scenarios for up to 100 patrons, background music and multiple golf simulators operating simultaneously, with glazed doorsets closed. Two principal noise sensitive premises were assessed - NSR 1, being those apartment units #055, #056, #099 and #100 located directly over the Ground Floor Tenancy T07, and subsequent upper floor apartments (5-storeys); And NSR 2, being the apartment units located directly opposite at 36 Queen Victoria Street, Heirloom Apartments (3-storeys).

The results show that the predicted received noise levels are compliant at all external façade locations at all times of the day, evening and night-time hours, as defined in *the Regulations.* Note, façade doorsets to remain closed at all times, and worn brush seals to be replaced as part of the fitout.

In addition to external noise breakout, noise transfer was assessed via the First Floor suspended slab (480mm thick) and hydraulic services penetrations. Where the hydraulic waste pipes are treated (full extents) using SoundLag 4512C, noise transfer is expected to be inaudible in the apartment units above.

In terms of impact noise from golf ball strikes in the simulators, this is to be controlled using a $2m^2$ area of 20mm thick acoustic underlay matting – ANV nominate Embleton SuperShear Flex™ as a suitable product to mitigate transfer of structural noise into the slab and columns from golf ball/club strike.

A range of practical noise mitigation and management measures is recommended to address any potential risks of excessive noise emissions from the site operation – specifically patron noise and control of unruly behaviour(s) in the licenced areas.

It is recommended these mitigation measures be reviewed at Building Permit stage, at which time it is anticipated more and better particulars will be known around the golf simulator framing and corresponding coupling to slab/structure, background music/PA system.

APPENDIX A

A Glossary of acoustics terms

A.1 Acoustics Terms

The following table describes key terms used in this report.

Table 7 Acoustics Terms and their definitions

Terms	Definition
dB	Decibel, a unit of sound or vibration which is described as a ratio of the result to a fixed reference value. All sound pressure levels (LpA, LA, LAeq etc.) quoted in this report are referenced to 20 micro Pascals (dB re 20 µPa). Vibration velocity levels (L_v) quoted in this report are referenced to 1 nanometre per second (dB re 10^{-9} m/s), noting that some US criteria use dB re 10^{-6} in/s.
Sound Power Level (SWL or L_W)	A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
Sound Pressure Level (SPL or Lp), or Noise Level	A logarithmic measure of the effective pressure of a sound relative to a reference value, defined in dB (decibel). The commonly used reference sound pressure in air is 20 µPa, which is often considered the threshold of human hearing.
A-weighting	The process by which noise levels are corrected to adjust for the non-linear frequency response of the human ear.
Time Weighting	The exponential averaging method used to adjust a measurement instrument's response to fluctuating signals over time. It essentially applies a "filter" to the signal, emphasizing or deemphasizing certain aspects of the signal based on the chosen **time constant**: - **Fast (F)**: Has a time constant set at 125 milliseconds. It provides a fast-reacting reading suitable for measuring sounds that do not fluctuate too rapidly - **Slow (S)**: With a time constant of 1 second, this is used for measuring average sound levels where the sound fluctuates rapidly, making it difficult to read with a fast response - **Impulse (I)**: Specifically designed for measuring sounds with sharp peaks (like gunshots or fireworks). It has a shorter time constant (around 35 milliseconds) than the Fast response to capture the brief, intense nature of such sounds.
L_{Amax}	The maximum A-weighted noise level associated with a sampling period.
L_{A1}	The A-weighted noise level exceeded for 1% of a given measurement period. This parameter is often used to represent the typical maximum noise level in a given period.
L_{A10}	The A-weighted noise level exceeded for 10% of a given measurement period and is utilised normally to characterise average maximum noise levels.

Terms	Definition
L_{Aeq}	The A-weighted average noise level. It is defined as the steady noise level that contains the same amount of acoustical energy as a given time-varying noise over the same measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of a given measurement period and is representative of the average minimum background noise level (in the absence of the source under consideration), or simply the "background" level.
Octave Frequency Band, One-Third Octave Frequency Band	Sound spectrums are usually represented in octave or one-third octave frequency bands rather than in narrow frequency bands. This frequency representation is linked to the perception of sound by a human ear and it allows a compression of the amount of information. An octave frequency band is defined as when the upper band frequency is twice the lower band frequency. A one-third octave band as a band whose upper band-edge frequency is the lower band frequency times the cube root of two.

A.2 Noise Chart

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 size by the use of logarithms. The symbol 'A' represents A-weighted sound pressure level (SPL): the weighting is designed to better represent the hearing ability of the average listener at each frequency.

The ability to discern a change in noise level varies between individual listeners, however it is reasonable to suggest that a change of up to 3 dB in the level of a sound is difficult for most people to detect, and a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness and is readily noticeable.

The following table presents examples of typical noise levels.

Table 8 Guide to sound pressure level ranges for selected environments (dB re 20 µPa)

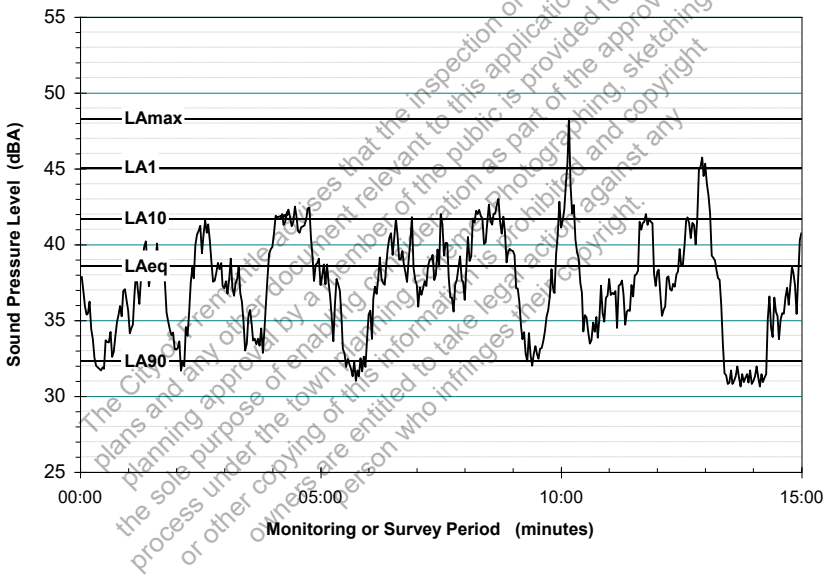
L_{Aeq}, dB	Representative noise sources	Subjective Evaluation
140	Military jet engine at 30 metres	Intolerable. Onset of pain.
130	Disaster warning siren at 1 metre	
120	Jet aircraft take-off	Very loud.
110	Rock concert	
100	Angle grinder	Loud.
90	Heavy industrial factory	
80	Kerb side of busy street	Noisy
70	Loud radio or television	
60	Department stores	Moderate
50	General office areas	

40	Boardroom or private office	Quiet
30	Bedroom at night	Very quiet
20	Recording studio	Almost silent
10	Human breathing at 3 metres	
0	Threshold of typical hearing	

L_{Aeq} values represent an energy average of sound over time and are basic indicators of loudness. However, for sounds that vary in level over time 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 monitoring, illustrating various statistical noise levels of interest.

Figure 10 Various noise parameters during a hypothetical 15-minute noise monitoring period



Relevant noise parameters 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.

APPENDIX B

B Noise Contours

50382000

50382250

6453750

6453500

13

35

14

The City of Fremantle advises that the inspection of these plans and any other documentation relevant to this application for planning approval is provided for the sole purpose of enabling consideration as part of the approval process under the town planning scheme. Photographing, sketching, copying of this information is prohibited and copyright. owners are entitled to take legal action against any person who infringes their copyright.

Figure B-1

Base Model Run 1 LA10
Result number 4
Calculation in 2 m above ground

Project engineer: DT
Created: 16 Mar 2026
Processed with SoundPLAN 9.1, Update 20/08/2025

Levels LrD
in dB(A)

	< 35.0
35.	- 37.5
37.	- 40.0
40.	- 42.5
42.	- 45.0
45.	- 47.5
47.	- 50.0
50.	- 52.5
52.	- 55.0
55.	- 57.5
57.	- 60.0
	>= 60.0

Signs and symbols

- Surface
- Wall
- Point receiver
- Noise calculation area

N

Length scale 1:1500

0 10 20 40 60 80 m

SoundPLANnoise 9.1 C:\Users\BinghuiLi\OneDrive - ANV Consultants Pty Ltd\ANV - Projects\Active\755.23150-018 U7 51 Queen Victoria St, Fremantle\02 Project Data\01 ANV Data\05 Modelling\U7 51 Queen Victoria Street Fremantle - Copy\Figure 6 Base Model LA10.sgs

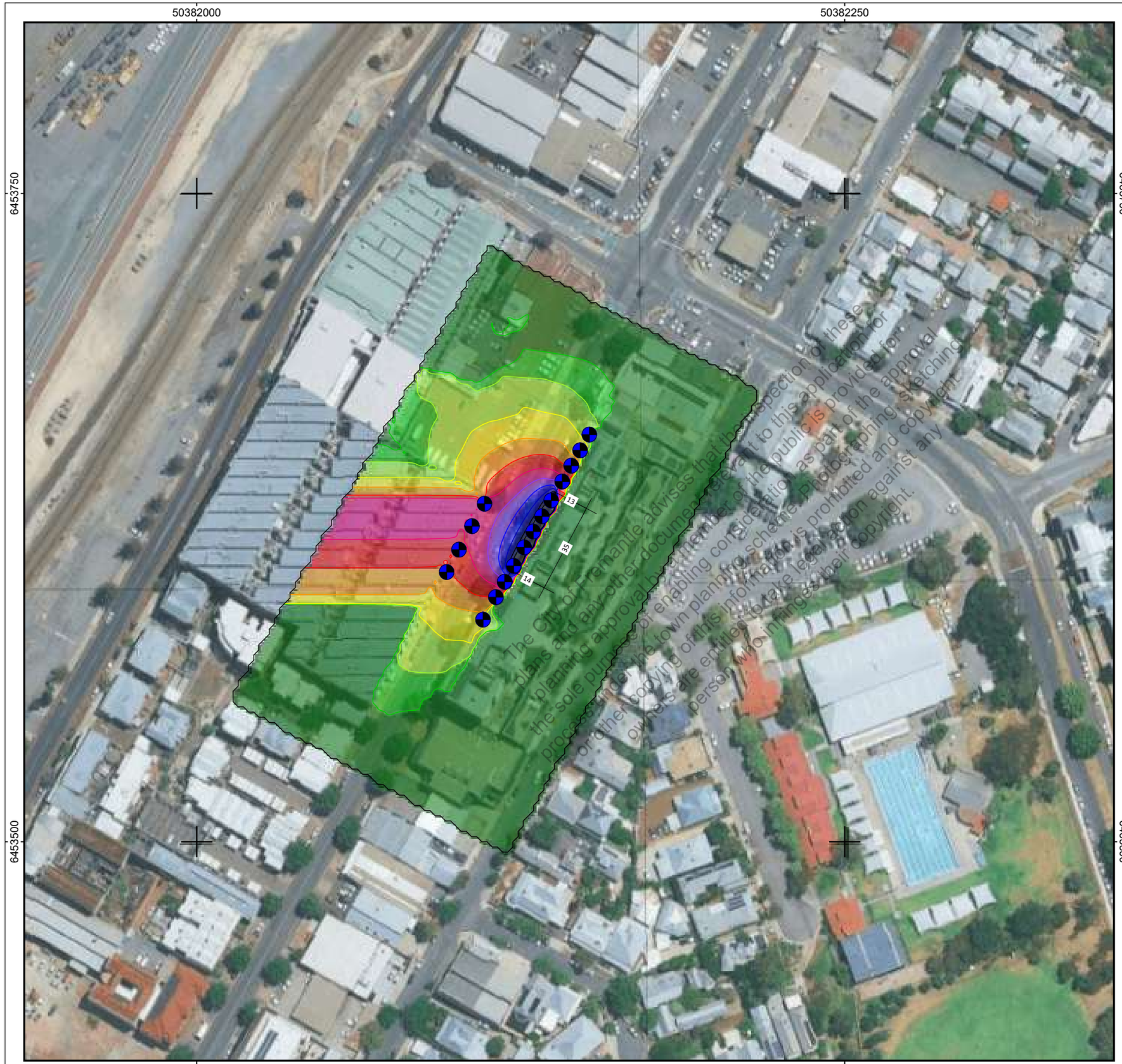


Figure B-2

Base Model Run 1 LA1
Result number 6
Calculation in 2 m above ground

Project engineer: DT
Created: 16 Mar 2026
Processed with SoundPLAN 9.1, Update 20/08/2025

Levels LrD
in dB(A)

	< 35.0
35.	- 37.5
37.	- 40.0
40.	- 42.5
42.	- 45.0
45.	- 47.5
47.	- 50.0
50.	- 52.5
52.	- 55.0
55.	- 57.5
57.	- 60.0
	>= 60.0

Signs and symbols
- Surface
- Wall
- Point receiver
- Noise calculation area

N

Length scale 1:1500
0 10 20 40 60 80 m

SoundPLANnoise 9.1 C:\Users\BinghuiLi\OneDrive - ANV Consultants Pty Ltd\ANV - Projects\Active\755.23150-018 U7 51 Queen Victoria St, Fremantle\02 Project Data\01 ANV Data\05 Modelling\U7 51 Queen Victoria Street Fremantle - Copy\Figure 6 Base Model LA1.sgs