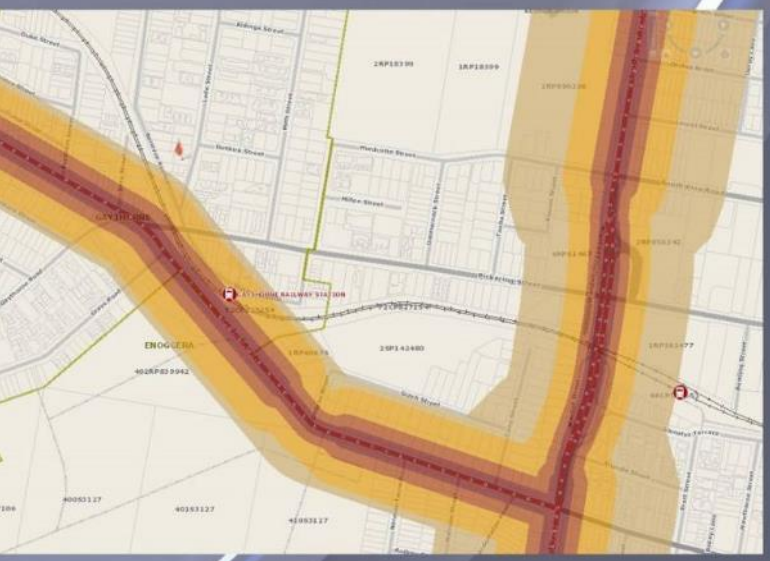
NOISE MEASUREMENT SERVICES

Noise Impact Assessment
Proposed Club
18 Fox Street
Wynnum QLD 4178

Report 7992_2 ***19th December 2025***



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1 pdf	2	Carina Leagues Club
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REPORT FOR **Carina Leagues Club**

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Signed

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Executive Summary

An environmental noise assessment has been undertaken at the request of Carina Leagues Club for a proposed Club at 18 Fox Street, Wynnum QLD 4178 (Lots 501 and 502 on SP258085 and Lot 381 on SP258084). The proposal is to construct a Club over four levels (three upper levels and a sub-floor level). The ground floor (Level 1) features a gaming area, enclosed dining areas, kids play area, and outdoor public terrace and takeaway outlet. Level 2 features indoor and terrace dining, while Level 3 features a roof bar terrace and a services building. All levels include amenities, bar/s, kitchen / back-of-house areas, and are linked by stairs and lifts.

The site is zoned by Brisbane City Council as Low Impact Industry and Open Space Zone. The site is adjacent to Character Residential, Low Density Residential, Low Medium Density Residential, Neighbourhood Centre, and Open Space zones.

This report references the following:

- Brisbane City Council City Plan 2014 *Industry Code*;
- Australian Standard AS1255:2018 - Acoustics-Description and Measurement of Environmental Noise;
- Environmental Protection (Noise) Policy 2019;
- Environmental Protection Act 1994.

It is understood that the patron capacity of the venue is in the order of 150 within Level 1, 300 within Level 2, and 200 within the roof bar terrace, plus approximately 80 staff. The proposed hours of operation are understood to be:

- Gaming area: 10am – 4am,
- Takeaway Outlet: 7am – 10pm,
- Dining Areas: 7am – 2am,
- Roof Bar Terrance: 10am – 2am

These hours of operation are reconsidered as part of the assessment.

Conclusions and Recommendations

It is concluded that:

- Cumulative noise emissions from the proposed development have been predicted to the closest sensitive uses and zone boundaries.
- The proposal includes significant acoustic screening which minimises the impacts of noise emissions from the venue. Additional operational controls and targeted mitigation measures are required to further reduce noise impacts on nearby sensitive receivers.
- The proposed development, including the recommended noise mitigation measures detailed in **Section 4.3**, and additional targeted mitigation measures, can comply with the performance outcomes of the Brisbane City Council Industry Code with regard to noise emissions;
    - Full compliance with the *Acoustic Amenity Criteria* and *Low Frequency Noise Criteria* is predicted at all sensitive uses and zone boundaries during all time periods.
    - Full compliance with the nighttime L_{Amax} criteria is predicted at all sensitive uses and zone boundaries.

  - Exceedances of the *Intrusive Noise Criteria* of up to 4 dB(A) during the evening and 2 dB(A) during the night are predicted at the Character Residential zone boundary to the south. These exceedances are low in magnitude and are considered minor, noting that the assessment is based on a cumulative prediction with all expected sources operating simultaneously, and incorporates conservative assumptions including opened doors and conservative source levels.
  - Exceedances of the *Intrusive Noise Criteria* of up to 1 dB(A) during the day, 7 dB(A) during the evening, and 4 dB(A) during the night are predicted at the Low Density Residential zone boundary to the north. Detailed modelling results confirm that the day and evening exceedances are primarily caused by patron noise at the takeaway outlet. Noise from this area is expected to be comparable in both level and character with existing noise from the nearby playground and is therefore not expected to result in any discernible or unreasonable impact. The predicted night-time exceedances are primarily attributable to patron noise from the Roof Bar Terrace, for which additional targeted mitigation is recommended in the form of acoustic screening to the north, potentially via retractable acoustic awnings.
- Noise emissions may be further mitigated with the implementation of a noise management plan.

It is recommended that:

- The development be approved on the basis that the recommended additional noise management measures are employed. These are:

  Level 2

  - Limit the capacity of the terrace dining area to 70 patrons, and
  - Close terrace dining area at 10pm to eliminate impacts from this area during the night period (no patrons or music in this area between 10pm and 7am)

  Level 3

  - Noise mitigation may be required for the plant room, depending on the final specification of the plant that will be installed. In order to demonstrate possible noise mitigation, a transmission loss is applied to the northwest facing ventilation opening representing an acoustically rated louvre (e.g. Acran Series 125).
  - Limit the capacity of the roof bar terrace area to 200 patrons, and
  - Close the roof bar terrace at midnight to reduce impacts from this area during the night period (no patrons or music in this area between midnight and the opening time of 10am), and
  - To reduce noise impacts after 10pm, include additional acoustic screening to the north of the roof bar terrace, potentially via retractable acoustic awnings (to be determined at detailed design phase).
- Deliveries and waste collection are limited to the day and evening periods (i.e. 7am – 10pm).
- Driver behaviour in the driveway and carpark is managed to restrict the use of horns and excessive idling / queuing.
- Mechanical plant be chosen, located, and screened (if necessary) to ensure compliance with the nighttime intrusive noise criteria of 35 dB(A) at the closest sensitive zone boundaries. A detailed assessment of mechanical plant noise may be undertaken at Building Approval stage, if required.
- An assessment be undertaken to the Office of Liquor and Gaming Regulation Guideline 51 to establish venue noise limits – this assessment is undertaken post-construction.
- A Noise Management Plan and complaints register be implemented. An example of a Noise Management Plan is presented in **Appendix C**.

Contents

1. Introduction

1.1 Background

An environmental noise assessment has been undertaken at the request of Carina Leagues Club for a proposed Club outlet at 18 Fox Street, Wynnum QLD 4178 (Lots 501 and 502 on SP258085 and Lot 381 on SP258084). The proposal is to construct a Club over four levels (three upper levels and a sub-floor level). The ground floor (Level 1) features a gaming area, enclosed dining areas, kids play area, and outdoor public terrace and takeaway outlet. Level 2 features indoor and terrace dining, while Level 3 features a roof bar terrace and a services building. All levels include amenities, bar/s, kitchen / back-of-house areas, and are linked by stairs and lifts.

The site is zoned by Brisbane City Council as Low Impact Industry and Open Space Zone. The site is adjacent to Character Residential, Low Density Residential, Low Medium Density Residential, Neighbourhood Centre, and Open Space zones.

This report references the following:

- Brisbane City Council City Plan 2014 *Industry Code*;
- Australian Standard AS1255:2018 - Acoustics-Description and Measurement of Environmental Noise;
- Environmental Protection (Noise) Policy 2019;
- Environmental Protection Act 1994.

It is understood that the patron capacity of the venue is in the order of 150 within Level 1, 300 within Level 2, and 200 within the roof bar terrace, plus approximately 80 staff. The proposed hours of operation are understood to be:

- Gaming area: 10am – 4am,
- Takeaway Outlet: 7am – 10pm,
- Dining Areas: 7am – 2am,
- Roof Bar Terrance: 10am – 2am.

These hours of operation are reconsidered as part of the assessment. The following **Plates** show the site and proposed development.

Plate 1.1: Showing the site plan and locality (Source: Client).

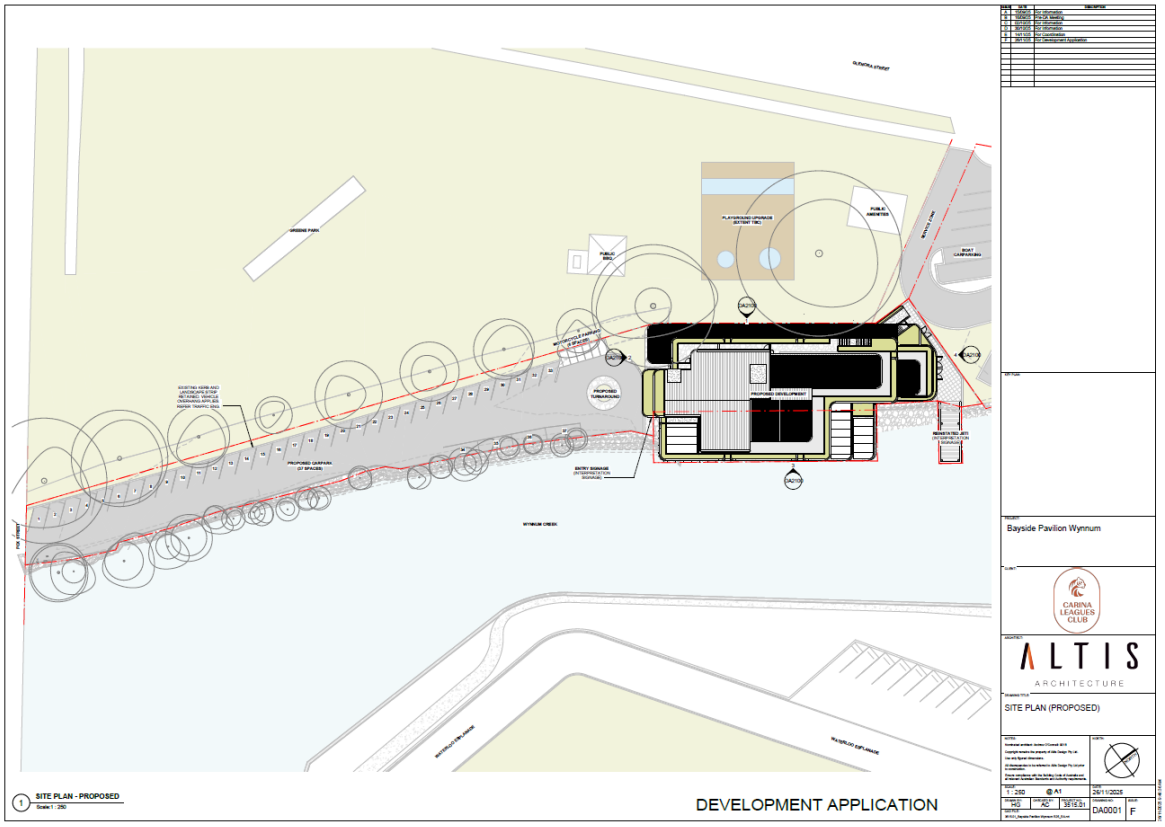


Plate 1.2: Brisbane City Council Zoning (source: Brisbane City Council City Plan 2014).

2. Noise Criteria

2.1 Brisbane City Council City Plan 2014 – Industry Code

As the site is primarily zoned Low Impact Industry, the Brisbane City Council *Industry Code* criteria are applied. The relevant criteria are reproduced (in part) in the following **Tables**.

Table 2.1: Performance outcomes and acceptable outcomes (Industry Code Table 9.3.12.3.A in part).

Performance Outcome	Acceptable Outcomes
P02 Development complies with the noise (planning) criteria in Table 9.3.12.3.E, low frequency noise criteria in Table 9.3.12.3.F and night-time noise criteria in Table 9.3.12.3.G. Note—A noise impact assessment report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	No acceptable outcomes apply to this development.

Table 2.2: Noise (planning) criteria (Industry Code Table 9.3.12.3.E in part).

Criteria Location	Intrusive Noise Criteria Day, evening and night $L_{Aeq,adj,T}$ are not greater than the RBL plus the value in this column for the relevant criteria location, where T equals: • Day: 11hr • Evening: 4hr • Night: 9hr	Acoustic Amenity Criteria Day, evening and night $L_{Aeq,adj,T}$ are not greater than the values in this column for the relevant criteria location, where T equals: • Day: 11hr • Evening: 4hr • Night: 9hr		
Low density residential zone boundary	3dB(A)	55 dB(A)	45 dB(A)	40 dB(A)
Low–medium density residential zone boundary	3dB(A)	55 dB(A)	45 dB(A)	40 dB(A)
Character residential zone boundary	3dB(A)	50 dB(A)	45 dB(A)	40 dB(A)
At a sensitive use in the Neighbourhood centre zone	5dB(A)	55 dB(A)	50 dB(A)	50 dB(A)

Table 2.3: Low frequency noise criteria (Industry Code Table 9.3.12.3.F in part).

Criteria Location	Day (7am-6pm) $L_{Ceq,adj,11hr}$ is not greater than the following values at the relevant criteria location	Evening (6am-10pm) $L_{Ceq,adj,4hr}$ is not greater than the following values at the relevant criteria location	Night (10pm-7am) $L_{Ceq,adj,9hr}$ is not greater than the following values at the relevant criteria location
Low density residential zone boundary	65 dB(C)	65 dB(C)	60 dB(C)
Low–medium density residential zone boundary	65 dB(C)	65 dB(C)	60 dB(C)
Character residential zone boundary	65 dB(C)	65 dB(C)	60 dB(C)
At a sensitive use in the Neighbourhood centre zone	70 dB(A)	65 dB(C)	65 dB(C)

Table 2.4: Night-time noise criteria (Industry Code Table 9.3.12.3.G in part).

Criteria Location	Where the existing LAeq,9hr night at the criteria location is:	Average of the highest 15 single LAmax events over a given night (10pm-7am) period is not greater than the following values at the relevant criteria location	The absolute highest single LAmax event over a given night (10pm-7am) period is not greater than the following values at the relevant criteria location
At the zone boundary of: • Low density residential zone; • Low–medium density residential zone; • Character residential zone;	< 45dB(A)	50 dB(A)	55dB(A)
	45 to 60dB(A)	$L_{Aeq,9hr\ night}$ + 5dB(A)	$L_{Aeq,9hr\ night}$ + 10dB(A)
	> 60dB(A)	65dB(A)	70dB(A)
External to a sensitive use located in a Neighbourhood centre zone	Not applicable	65 dB(A)	70 dB(A)

2.2 Environmental Protection (Noise) Policy 2019

The Environmental Protection (Noise) Policy 2019 (EPP (Noise)) establishes *acoustic quality objectives* to protect or enhance stated environmental values. The environmental values to be enhanced or protected under the policy are the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and the qualities of the acoustic environment that are conducive to human health and well-being, including ensuring a suitable acoustic environment for individual's to sleep, study and learn, to be involved in recreation including relaxation and conversation; and the qualities of the acoustic environment that are conducive to protecting the amenity of the community.

The assessment in this report applies the Brisbane City Council City Plan 2014. It is considered that compliance to the City Plan will achieve the policy intent.

2.3 AS1055 Acoustics-Description and Measurement of Environmental Noise

AS1055 requires the consideration of the noise emission as being tonal or impulsive in nature, where the criteria is denoted as being "adj, T". If either, a 2 dB (noticeable) or 5 dB (clearly identifiable) penalty is added to the measured sound level. Some, but not all, of the criteria are "adj, T'.

2.4 Air Conditioning and Mechanical Plant (Informative)

It is understood that mechanical plant will be proposed for the proposed dining areas. State requirements are set out under the *Environmental Protection Act 1994* (EPA 94); in that Act noise from air conditioning must not exceed the following noise levels when measured as the L_{A90} dB(A) level over a period of 15 minutes at an affected building:

- Between 10pm and 7am: 3 dB(A) above the background level;
- From 7am to 10pm: 5 dB(A) above the background level.

Detailed calculation of mechanical plant noise emissions can be conducted – if required – once the specific plant and installation can be determined. It is expected that the applicable criteria can be readily achieved with consideration of

the selection of plant, location and screening (if required). It is noted that the Act represents an ongoing legal obligation, and it is recommended that plant be maintained to ensure compliance at all times.

2.5 Note Regarding Liquor Licensing Guidelines

It is noted that, as a licensed venue, controls over noise emissions will be imposed on the basis of a test of the completed construction (i.e the ability of the as-constructed venue to contain sound) and will operate independently of Council requirements. Notwithstanding this it is noted that the most conservative criteria will apply to operational noise levels to ensure compliance with both Council and Liquor Licensing guidelines.

The noise model used in this assessment presents noise levels that are generally at or above the Liquor Licensing noise default limit of 75 dB(C), in order to ensure the maximum level which is allowable under a default Licence also complies with Council criteria. If levels above this default limit are desired, this is possible however a detailed design response for both Liquor Licensing and Council purposes may be required.

3. Ambient Noise Monitoring

3.1 Measurement of Rating Background Sound Levels (RBL)

Noise monitoring has been undertaken on the subject site in order to measure existing ambient noise levels a location representative of the surrounding sensitive receivers. The noise logger was located 1.5 metres above ground within the partly demolished structure that remains at the site. Although the microphone was positioned close to some reflective facades, the measured noise levels are considered to be essentially free-field due to the diffuse nature of the surrounding sources of noise. The location is approximated in **Plate 3.1**.

Plate 3.1: Showing the noise measurement location (ML1).

The instrument was field calibrated before and after the measurement session and the instrument was found to be within 0.2 dB of the reference signal. All instrumentation used in this assessment holds a current calibration certificate from a certified NATA calibration laboratory. The following instruments were used to measure the ambient noise levels-

- Rion NL21 sound level meter;
- Larson Davis CAL200 Class 1 calibrator.

Ambient sound pressure levels were measured generally in accordance with Australian Standard AS1055 2018 - '*Acoustics-Description and measurement of environmental noise*.

3.2 Measured (RBL) Ambient Sound Levels

Ambient noise levels were recorded at 15 minute intervals between the 21st and 28th of February 2025. Measured noise levels are presented graphically in **Figure 3.1** and the average ambient levels are presented in **Table 3.1**. Calculation of the Rating Background Level is presented in **Table 3.2**. Definition of terms used in this report are presented in **Appendix E**.

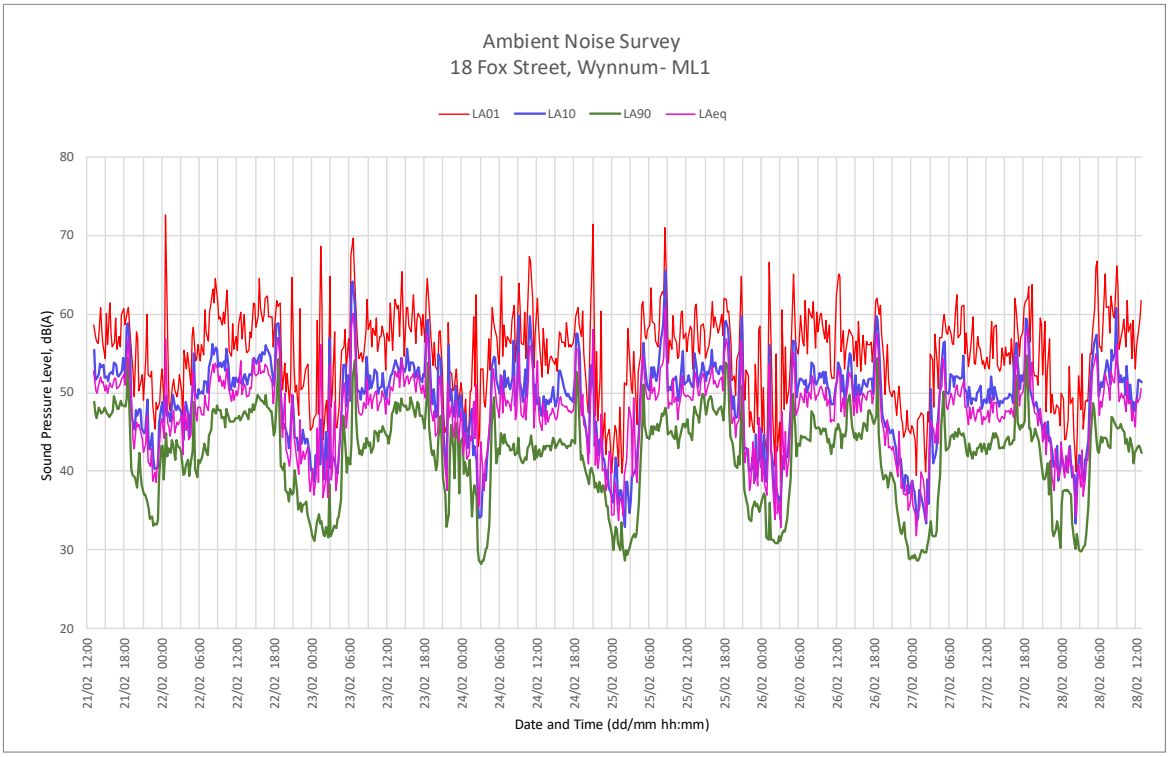


Figure 3.1: Average ambient noise levels at ML1 (levels in dB(A), free field).

Table 3.1: Average ambient noise levels recorded at ML1 (levels in dB(A), free field).

Date	Day	Time of Day	Time period	L01	L10	L90	Leq
24-Feb	Monday	Day	7:00am – 6:00pm	62.0	50.8	43.0	49.7
		Evening	6.00pm – 10pm	63.4	49.1	41.9	51.4
		Night	10pm – 7.00am	59.5	46.1	39.2	47.3
25-Feb	Tuesday	Day	7:00am – 6:00pm	61.5	52.9	46.6	51.7
		Evening	6.00pm – 10pm	62.0	50.9	43.7	51.7
		Night	10pm – 7.00am	59.8	42.7	36.3	47.0
26-Feb	Wednesday	Day	7:00am – 6:00pm	61.3	51.3	45.3	49.9
		Evening	6.00pm – 10pm	61.5	48.3	41.1	50.2
		Night	10pm – 7.00am	60.1	44.3	36.6	46.7
27-Feb	Thursday	Day	7:00am – 6:00pm	60.8	50.4	43.9	48.7
		Evening	6.00pm – 10pm	62.8	49.6	44.3	51.6
		Night	10pm – 7.00am	57.6	42.7	34.6	46.2
28-Feb & 21-Feb	Friday	Day	7:00am – 6:00pm	61.8	52.4	45.9	50.9
		Evening	6.00pm – 10pm	60.1	48.9	41.1	49.8
		Night	10pm – 7.00am	59.3	44.2	36.6	46.9
22-Feb	Saturday	Day	7:00am – 6:00pm	62.2	53.2	47.2	51.7
		Evening	6.00pm – 10pm	61.7	48.4	40.7	50.2
		Night	10pm – 7.00am	56.7	47.3	40.6	47.6
23-Feb	Sunday	Day	9:00am – 6:00pm	61.4	52.3	46.5	50.9
		Evening	6.00pm – 10pm	61.0	50.6	42.5	51.0
		Night	10pm – 9.00am	63.9	46.7	37.8	50.2
Average		**Day**		**62**	**52**	**45**	**51**
		Evening		**62**	**49**	**42**	**51**
		Night		**60**	**45**	**37**	**48**

Table 3.2: Rating Background Level (RBL) calculation (levels in dB(A), free field).

Date	Day	ABL L_{90} Day (7:00am – 6:00pm)	ABL L_{90} Evening (6:00pm – 10:00pm)	ABL L_{90} Night (10:00pm - 7:00am)
24/04	Monday	42	39	32
25/04	Tuesday	44	39	31
26/04	Wednesday	44	38	32
27/04	Thursday	43	41	29
28/04 & 21/04	Friday	43	37	31
22/04	Saturday	44	37	37
23/04	Sunday	43	38	33
RBL		**43**	**38**	**32**

3.3 Noise Emission Criteria Summary

Relevant criteria for noise assessment are derived from the noise criteria and limits presented in **Section 2** of this report and the measured ambient sound levels in **Section 3** of this report. The noise limits applied by Council (i.e. not including the Environmental Protection (Noise) Policy 2019 criteria) are summarised in **Table 3.3** below.

Table 3.3: Summary of relevant assessment criteria. Levels are in dB, free-field (controlling criteria in **bold**).

Location	Criteria		Day	Evening	Night
• Low density residential zone boundary • Low–medium density residential zone boundary	Intrusive Noise Criteria ($L_{Aeq,adj,T}$)		**46**	**41**	**35**
	Acoustic Amenity Criteria ($L_{Aeq,adj,T}$)		55	45	40
	Low frequency noise criteria ($L_{Ceq,adj,T}$)		**65**	**65**	**60**
	Night-time noise criteria	Average of the highest 15 single L_{Amax} events	N/A	N/A	**53**
		The absolute highest single L_{Amax} event	N/A	N/A	58
Character residential zone boundary	Intrusive Noise Criteria ($L_{Aeq,adj,T}$)		**46**	**41**	**35**
	Acoustic Amenity Criteria ($L_{Aeq,adj,T}$)		50	45	40
	Low frequency noise criteria ($L_{Ceq,adj,T}$)		**65**	**65**	**60**
	Night-time noise criteria	Average of the highest 15 single L_{Amax} events	N/A	N/A	**53**
		The absolute highest single L_{Amax} event	N/A	N/A	58
At a sensitive use in the Neighbourhood centre zone	Intrusive Noise Criteria ($L_{Aeq,adj,T}$)		**46**	**41**	**35**
	Acoustic Amenity Criteria ($L_{Aeq,adj,T}$)		55	50	50
	Low frequency noise criteria ($L_{Ceq,adj,T}$)		70	65	65
	Night-time noise criteria	Average of the highest 15 single L_{Amax} events	N/A	N/A	**65**
		The absolute highest single L_{Amax} event	N/A	N/A	70

Definition of terms used in this report are presented in **Appendix C**.

4. Noise Impact Assessment

4.1 Noise Sources and Assessment Methodology

Expected noise sources from the proposed development have been predicted onto the surrounding assessment locations (i.e. zone boundaries and sensitive uses within the Neighbourhood Centre zone). Noise levels are predicted using SoundPLAN v8.0 and the prediction methodology ISO 9613-2: 1996. Sources of noise emission included in the prediction model include:

- Noise breakout from inside the venue
- Outdoor patrons
- Outdoor speakers (background music)
- Mechanical plant
- Car movements
- Truck movements (deliveries / waste collection)

It is understood that the patron capacity is in the order of 150 within Level 1, 300 within Level 2, and 200 within the roof bar terrace; indoor patrons are represented by the interior noise breakout and outdoor patrons are modelled as area sources representing the expected number of patrons in each outdoor area. It is particularly noted that the L2 Terrace Dining area is modelled with 70 patrons and the Roof Bar Terrace is modelled with 200 patrons in total, which should be considered as limits for these areas.

Noise emissions from expected activities at the proposed development have been forecast using the environmental noise model presented in **Appendix B**. The sound power levels used in the noise model are summarised in **Table 4.1** with noise sources positioned as presented in **Plates 4.1** and **4.2**.

Table 4.1: Source levels used in this assessment, dB, rounded.

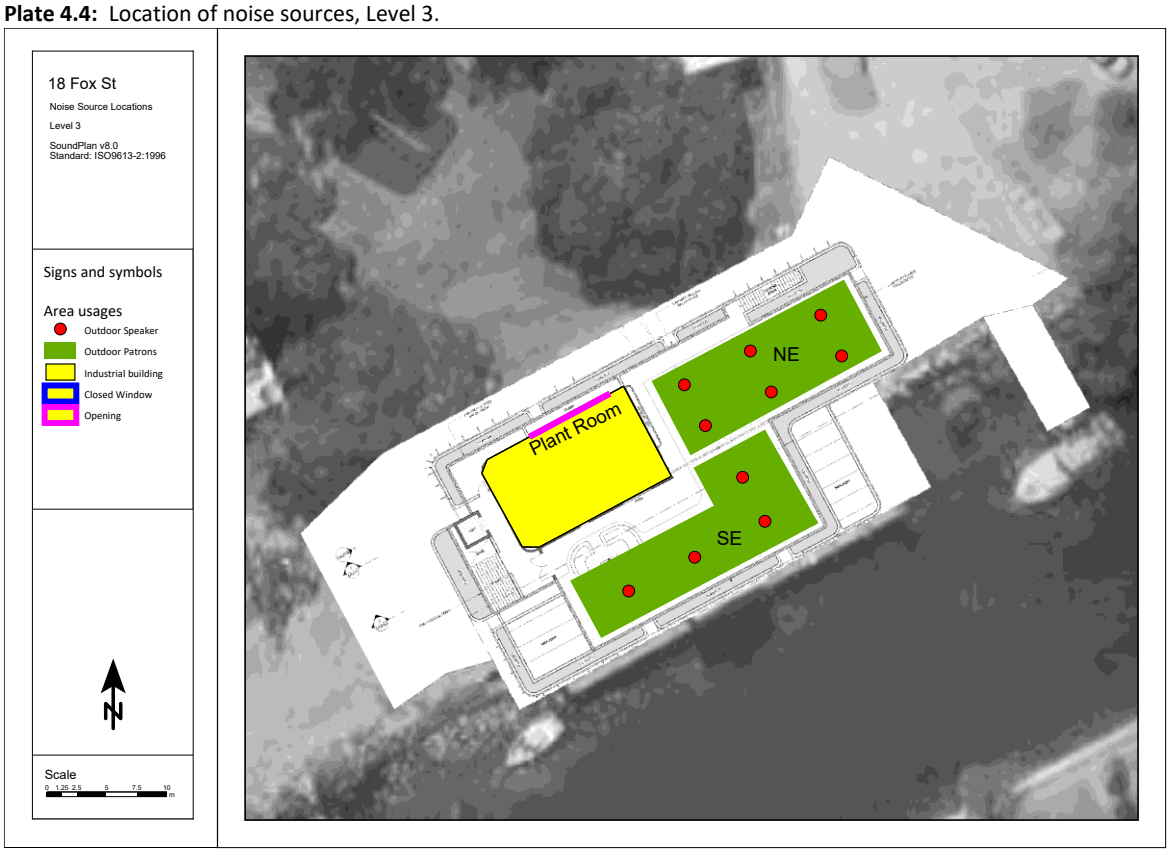
Source	Overall SWL		
	dB(C),L_{eq}	dB(A),L_{eq}	dB(A),L_{max}
Noise Breakout (interior SPL, emanates through walls, glazing, and openings)	78	70	-
Outdoor Speaker (SWL, equivalent to 70 dB(A) at 1 metre)	87	78	-
Outdoor Patrons, L1 Public Terrace (SWL, 36 patrons)	90	87	-
Outdoor Patrons, L1 Lower Seating (SWL, 24 patrons)	88	85	-
Outdoor Patrons, L1 Gaming DOSA (SWL, 16 patrons)	85	82	94
Outdoor Patrons, L2 Terrace Dining (SWL, 70 patrons)	95	92	101
Outdoor Patrons, L3 Roof Bar Terrace NE (SWL, 100 patrons)	97	94	103
Outdoor Patrons, L3 Roof Bar Terrace SE (SWL, 100 patrons)	97	94	103
Car movement (SWL, with Lmax representing door closure)	88	85	94
Truck movement (SWL)	103	94	-
Mechanical plant room (interior SPL based on 13 x 25kW AC units totalling 325kW)	84	93	-

Plate 4.1: Location of noise sources, Level 1 (zoomed out to show vehicle movements).

Plate 4.2: Location of noise sources, Level 1 (zoomed in).

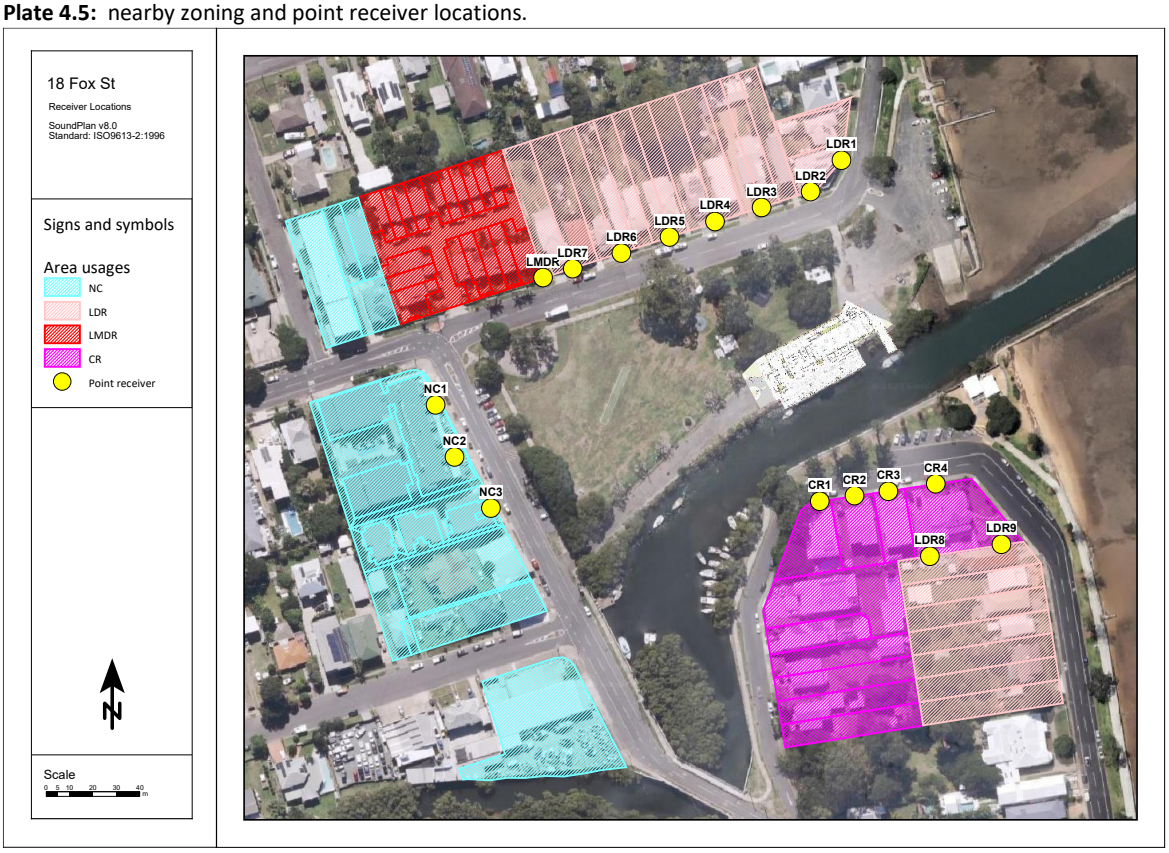
Plate 4.3: Location of noise sources, Level 2.

Plate 4.4: Location of noise sources, Level 3.



In order to present a numerical assessment against the relevant criteria, point receivers are positioned on the closest zone boundaries for LDR, LMDR, and CR zones, and at the facades of the closest sensitive uses within the NC zone. The closest sensitive zones are illustrated in **Plate 4.5**.

Plate 4.5: nearby zoning and point receiver locations.



4.2 Predicted Noise Emissions & Assessment

The noise model predicts cumulative noise levels from all sources, with timing and location as described in **Section 4.1** and further detailed in **Appendix B**. Assessment against the BCC Intrusive Noise Criteria, which is the controlling criteria for semi-continuous sound, is presented in **Table 4.2.** Assessment against the low frequency noise criteria is presented in **Table 4.3**, and assessment against the nighttime noise criteria is presented in **Table 4.4**. Further details of the noise model, including visual noise contours, are presented in **Appendix B**.

Table 4.2: Intrusive Noise Criteria noise assessment. Calculated cumulative sound levels in dB $L_{Aeq,adj,T}$, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level			Intrusive Noise Criteria			Assessment		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
CR1	N/A	44	45	41	46	41	35	Pass	+4	+6
CR2	N/A	44	45	41	46	41	35	Pass	+4	+6
CR3	N/A	44	45	41	46	41	35	Pass	+4	+6
CR4	N/A	43	44	41	46	41	35	Pass	+3	+6
LDR1	N/A	46	47	43	46	41	35	Pass	+6	+8
LDR2	N/A	48	49	45	46	41	35	+2	+8	+10
LDR3	N/A	47	48	43	46	41	35	+1	+7	+8
LDR4	N/A	46	47	42	46	41	35	Pass	+6	+7
LDR5	N/A	46	47	42	46	41	35	Pass	+6	+7
LDR6	N/A	45	46	41	46	41	35	Pass	+5	+6
LDR7	N/A	44	45	40	46	41	35	Pass	+4	+5
LDR8	N/A	32	33	30	46	41	35	Pass	Pass	Pass
LDR9	N/A	41	42	38	46	41	35	Pass	+1	+3
LMDR	N/A	41	42	38	46	41	35	Pass	+1	+3
NC1	GF	38	39	35	46	41	35	Pass	Pass	Pass
NC1	L1	39	40	36	46	41	35	Pass	Pass	+1
NC1	L2	40	40	37	46	41	35	Pass	Pass	+2
NC1	L3	40	41	37	46	41	35	Pass	Pass	+2
NC2	GF	38	39	35	46	41	35	Pass	Pass	Pass
NC2	L1	39	40	36	46	41	35	Pass	Pass	+1
NC2	L2	40	40	37	46	41	35	Pass	Pass	+2
NC2	L3	40	41	37	46	41	35	Pass	Pass	+2
NC3	GF	39	40	36	46	41	35	Pass	Pass	+1
NC3	L1	40	41	37	46	41	35	Pass	Pass	+2
NC3	L2	41	41	38	46	41	35	Pass	Pass	+3

Table 4.3: Low frequency noise assessment. Calculated cumulative sound levels in dB $L_{Ceq,adj,T}$, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level			Criteria			Assessment		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
CR1	N/A	52	53	50	65	65	60	Pass	Pass	Pass
CR2	N/A	52	53	50	65	65	60	Pass	Pass	Pass
CR3	N/A	52	53	50	65	65	60	Pass	Pass	Pass
CR4	N/A	51	51	49	65	65	60	Pass	Pass	Pass
LDR1	N/A	53	54	52	65	65	60	Pass	Pass	Pass
LDR2	N/A	56	56	54	65	65	60	Pass	Pass	Pass
LDR3	N/A	55	55	53	65	65	60	Pass	Pass	Pass
LDR4	N/A	54	55	53	65	65	60	Pass	Pass	Pass
LDR5	N/A	54	54	52	65	65	60	Pass	Pass	Pass
LDR6	N/A	52	52	51	65	65	60	Pass	Pass	Pass
LDR7	N/A	52	52	50	65	65	60	Pass	Pass	Pass
LDR8	N/A	43	44	42	65	65	60	Pass	Pass	Pass
LDR9	N/A	49	49	47	65	65	60	Pass	Pass	Pass
LMDR	N/A	50	50	48	65	65	60	Pass	Pass	Pass
NC1	GF	47	47	46	70	65	65	Pass	Pass	Pass
NC1	L1	47	47	46	70	65	65	Pass	Pass	Pass
NC1	L2	47	48	46	70	65	65	Pass	Pass	Pass
NC1	L3	48	48	47	70	65	65	Pass	Pass	Pass
NC2	GF	47	48	46	70	65	65	Pass	Pass	Pass
NC2	L1	47	48	46	70	65	65	Pass	Pass	Pass
NC2	L2	48	48	47	70	65	65	Pass	Pass	Pass
NC2	L3	48	49	47	70	65	65	Pass	Pass	Pass
NC3	GF	48	49	47	70	65	65	Pass	Pass	Pass
NC3	L1	49	49	47	70	65	65	Pass	Pass	Pass
NC3	L2	49	49	48	70	65	65	Pass	Pass	Pass

Table 4.3: Nighttime noise assessment. Calculated cumulative sound levels in dB L_{Amax}, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level	Criteria	Assessment
CR1	N/A	50	53	Pass
CR2	N/A	49	53	Pass
CR3	N/A	48	53	Pass
CR4	N/A	47	53	Pass
LDR1	N/A	50	53	Pass
LDR2	N/A	51	53	Pass
LDR3	N/A	49	53	Pass
LDR4	N/A	47	53	Pass
LDR5	N/A	47	53	Pass
LDR6	N/A	47	53	Pass
LDR7	N/A	46	53	Pass
LDR8	N/A	40	53	Pass
LDR9	N/A	46	53	Pass
LMDR	N/A	45	53	Pass
NC1	GF	45	53	Pass
NC1	L1	44	53	Pass
NC1	L2	44	53	Pass
NC1	L3	44	53	Pass
NC2	GF	47	53	Pass
NC2	L1	47	53	Pass
NC2	L2	47	53	Pass
NC2	L3	46	53	Pass
NC3	GF	51	53	Pass
NC3	L1	51	53	Pass
NC3	L2	51	53	Pass

4.3 Recommended Noise Mitigation

As presented in **Section 4.2**, exceedances of criteria are predicted during all time periods. The supplied plans include acoustic screening to all outdoor terrace areas in the form of 2.4m high solid balustrades, however additional noise mitigation is required, the recommended measures are detailed below:

- Level 2
    - Close terrace dining area at 10pm to eliminate impacts from this area during the night period (no patrons or music in this area after 10pm or before 7am).
- Level 3
    - Noise mitigation may be required for the plant room, depending on the final specification of the plant that will be installed. In order to demonstrate possible noise mitigation, a transmission loss is applied to the northwest facing ventilation opening representing an acoustically rated louvre (e.g. Acran Series 125).
    - Close the roof bar terrace at midnight to reduce impacts from this area during the night period (no patrons or music in this area after midnight or before 10am).

Predicted noise emissions including these mitigation measures are presented in **Section 4.4**, while predicted noise levels with and without the recommended mitigation measures are presented in **Appendix B**, along with further details of the noise model.

4.4 Predicted Noise Emissions & Assessment with Mitigation

The noise model is repeated with the noise mitigation measures implemented as described in **Section 4.3**. Assessment against the BCC Intrusive Noise Criteria is presented in **Table 4.5.** Assessment against the low frequency noise criteria is presented in **Table 4.6**, and assessment against the night time noise criteria is presented in **Table 4.7**. Further details of the noise model, including visual noise contours, are presented in **Appendix B**.

Table 4.5: Intrusive Noise Criteria noise assessment with noise mitigation measures. Calculated cumulative sound levels in dB $L_{Aeq,adj,T}$, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level			Intrusive Noise Criteria			Assessment		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
CR1	N/A	44	45	37	46	41	35	Pass	+4	+2
CR2	N/A	43	44	37	46	41	35	Pass	+3	+2
CR3	N/A	43	44	37	46	41	35	Pass	+3	+2
CR4	N/A	43	44	37	46	41	35	Pass	+3	+2
LDR1	N/A	45	46	38	46	41	35	Pass	+5*	+3
LDR2	N/A	47	48	39	46	41	35	+1	+7*	+4
LDR3	N/A	46	47	37	46	41	35	Pass	+6*	+2
LDR4	N/A	45	46	35	46	41	35	Pass	+5*	Pass
LDR5	N/A	45	46	34	46	41	35	Pass	+5*	Pass
LDR6	N/A	44	44	33	46	41	35	Pass	+3*	Pass
LDR7	N/A	43	43	32	46	41	35	Pass	+2*	Pass
LDR8	N/A	31	32	25	46	41	35	Pass	Pass	Pass
LDR9	N/A	40	41	34	46	41	35	Pass	Pass	Pass
LMDR	N/A	40	40	30	46	41	35	Pass	Pass	Pass
NC1	GF	36	37	28	46	41	35	Pass	Pass	Pass
NC1	L1	37	38	29	46	41	35	Pass	Pass	Pass
NC1	L2	38	39	30	46	41	35	Pass	Pass	Pass
NC1	L3	38	39	30	46	41	35	Pass	Pass	Pass
NC2	GF	37	37	29	46	41	35	Pass	Pass	Pass
NC2	L1	38	38	30	46	41	35	Pass	Pass	Pass
NC2	L2	38	39	30	46	41	35	Pass	Pass	Pass
NC2	L3	39	39	31	46	41	35	Pass	Pass	Pass
NC3	GF	38	39	30	46	41	35	Pass	Pass	Pass
NC3	L1	39	40	31	46	41	35	Pass	Pass	Pass
NC3	L2	40	40	32	46	41	35	Pass	Pass	Pass

* This exceedance is primarily caused by noise from patrons at the Public Terrace and Lower Seating Areas of the takeaway outlet.

Table 4.6: Low frequency noise assessment with noise mitigation measures. Calculated cumulative sound levels in dB $L_{Ceq,adj,T}$, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level			Criteria			Assessment		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
CR1	N/A	50	51	44	65	65	60	Pass	Pass	Pass
CR2	N/A	50	51	44	65	65	60	Pass	Pass	Pass
CR3	N/A	50	51	44	65	65	60	Pass	Pass	Pass
CR4	N/A	49	50	43	65	65	60	Pass	Pass	Pass
LDR1	N/A	50	51	44	65	65	60	Pass	Pass	Pass
LDR2	N/A	53	53	46	65	65	60	Pass	Pass	Pass
LDR3	N/A	51	52	44	65	65	60	Pass	Pass	Pass
LDR4	N/A	51	51	44	65	65	60	Pass	Pass	Pass
LDR5	N/A	50	50	43	65	65	60	Pass	Pass	Pass
LDR6	N/A	48	49	41	65	65	60	Pass	Pass	Pass
LDR7	N/A	47	48	41	65	65	60	Pass	Pass	Pass
LDR8	N/A	41	42	35	65	65	60	Pass	Pass	Pass
LDR9	N/A	47	48	41	65	65	60	Pass	Pass	Pass
LMDR	N/A	45	46	39	65	65	60	Pass	Pass	Pass
NC1	GF	42	43	37	70	65	65	Pass	Pass	Pass
NC1	L1	43	43	37	70	65	65	Pass	Pass	Pass
NC1	L2	43	43	37	70	65	65	Pass	Pass	Pass
NC1	L3	43	44	38	70	65	65	Pass	Pass	Pass
NC2	GF	43	43	37	70	65	65	Pass	Pass	Pass
NC2	L1	43	43	37	70	65	65	Pass	Pass	Pass
NC2	L2	43	44	38	70	65	65	Pass	Pass	Pass
NC2	L3	44	44	38	70	65	65	Pass	Pass	Pass
NC3	GF	43	44	36	70	65	65	Pass	Pass	Pass
NC3	L1	44	44	36	70	65	65	Pass	Pass	Pass
NC3	L2	44	45	37	70	65	65	Pass	Pass	Pass

Table 4.7: Night time noise assessment with noise mitigation measures. Calculated cumulative sound levels in dB L_{Amax}, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level	Criteria	Assessment
CR1	N/A	50	53	Pass
CR2	N/A	49	53	Pass
CR3	N/A	48	53	Pass
CR4	N/A	47	53	Pass
LDR1	N/A	50	53	Pass
LDR2	N/A	50	53	Pass
LDR3	N/A	48	53	Pass
LDR4	N/A	47	53	Pass
LDR5	N/A	47	53	Pass
LDR6	N/A	47	53	Pass
LDR7	N/A	46	53	Pass
LDR8	N/A	40	53	Pass
LDR9	N/A	46	53	Pass
LMDR	N/A	45	53	Pass
NC1	GF	45	53	Pass
NC1	L1	44	53	Pass
NC1	L2	44	53	Pass
NC1	L3	44	53	Pass
NC2	GF	47	53	Pass
NC2	L1	47	53	Pass
NC2	L2	47	53	Pass
NC2	L3	46	53	Pass
NC3	GF	51	53	Pass
NC3	L1	51	53	Pass
NC3	L2	51	53	Pass

4.5 Discussion

Noise emissions from the proposed development have been predicted at the nearest sensitive land-use boundaries and sensitive receivers. Initial modelling identifies exceedances of the relevant criteria of up to 2 dB(A) during the day, 8 dB(A) during the evening, and 10 dB(A) at night prior to the implementation of mitigation.

With the adoption of the noise mitigation measures detailed in **Section 4.3**, the assessment demonstrates the following outcomes:

- Full compliance with the *Acoustic Amenity Criteria* and *Low Frequency Noise Criteria* at all sensitive uses and zone boundaries during all assessment periods.
- Full compliance with the night time L_{Amax} criteria is predicted at all sensitive uses and zone boundaries.
- Exceedances of the *Intrusive Noise Criteria* of up to 4 dB(A) during the evening and 2 dB(A) during the night at the Character Residential zone boundary to the south. These exceedances are low in magnitude and are considered minor, noting that the assessment is based on a cumulative prediction with all expected sources operating simultaneously, and incorporates conservative assumptions including opened doors and conservative source levels.
- Exceedances of the *Intrusive Noise Criteria* of up to 1 dB(A) during the day, 7 dB(A) during the evening, and 4 dB(A) during the night remain predicted at the Low Density Residential zone boundary to the north. Detailed modelling results confirm that the day and evening exceedances are primarily caused by patron noise at the takeaway outlet. Noise from this area is expected to be comparable in both level and character with existing noise from the nearby playground and is therefore not expected to result in any discernible or unreasonable impact. The predicted night-time exceedances are primarily attributable to patron noise from the Roof Bar Terrace, for which additional targeted mitigation is recommended in the form of acoustic screening to the north, potentially via retractable acoustic awnings.

The proposal includes significant acoustic screening which minimises the impacts of noise emissions from the venue. Additional management measures are recommended to further reduce noise impacts on nearby sensitive receivers. The significant extent of the proposed acoustic screening ensures that the direct path between the noise sources and nearby sensitive uses is broken, and further acoustic screening to eliminate the small residual exceedances has not been effective.

On this basis, it is concluded that the noise impacts associated with the proposed development can be effectively managed through the proposed design, recommended operational controls, and targeted additional mitigation where required. On this basis, the development is considered to achieve an appropriate level of acoustic performance and to be suitable for approval from a noise impact perspective.

5. Conclusions and Recommendations

It is concluded that:

- Cumulative noise emissions from the proposed development have been predicted to the closest sensitive uses and zone boundaries.
- The proposal includes significant acoustic screening which minimises the impacts of noise emissions from the venue. Additional operational controls and targeted mitigation measures are required to further reduce noise impacts on nearby sensitive receivers.
- The proposed development, including the recommended noise mitigation measures detailed in **Section 4.3**, and additional targeted mitigation measures, can comply with the performance outcomes of the Brisbane City Council Industry Code with regard to noise emissions;
    - Full compliance with the *Acoustic Amenity Criteria* and *Low Frequency Noise Criteria* is predicted at all sensitive uses and zone boundaries during all time periods.
    - Full compliance with the nighttime L_{Amax} criteria is predicted at all sensitive uses and zone boundaries.
    - Exceedances of the *Intrusive Noise Criteria* of up to 4 dB(A) during the evening and 2 dB(A) during the night are predicted at the Character Residential zone boundary to the south. These exceedances are low in magnitude and are considered minor, noting that the assessment is based on a cumulative prediction with all expected sources operating simultaneously, and incorporates conservative assumptions including opened doors and conservative source levels.
    - Exceedances of the *Intrusive Noise Criteria* of up to 1 dB(A) during the day, 7 dB(A) during the evening, and 4 dB(A) during the night are predicted at the Low Density Residential zone boundary to the north. Detailed modelling results confirm that the day and evening exceedances are primarily caused by patron noise at the takeaway outlet. Noise from this area is expected to be comparable in both level and character with existing noise from the nearby playground and is therefore not expected to result in any discernible or unreasonable impact. The predicted night-time exceedances are primarily attributable to patron noise from the Roof Bar Terrace, for which additional targeted mitigation is recommended in the form of acoustic screening to the north, potentially via retractable acoustic awnings.
- Noise emissions may be further mitigated with the implementation of a noise management plan.

It is recommended that:

- The development be approved on the basis that the recommended additional noise management measures are employed. These are:

    Level 2

    - Limit the capacity of the terrace dining area to 70 patrons, and
    - Close terrace dining area at 10pm to eliminate impacts from this area during the night period (no patrons or music in this area between 10pm and 7am)

    Level 3

    - Noise mitigation may be required for the plant room, depending on the final specification of the plant that will be installed. In order to demonstrate possible noise mitigation, a transmission loss is applied

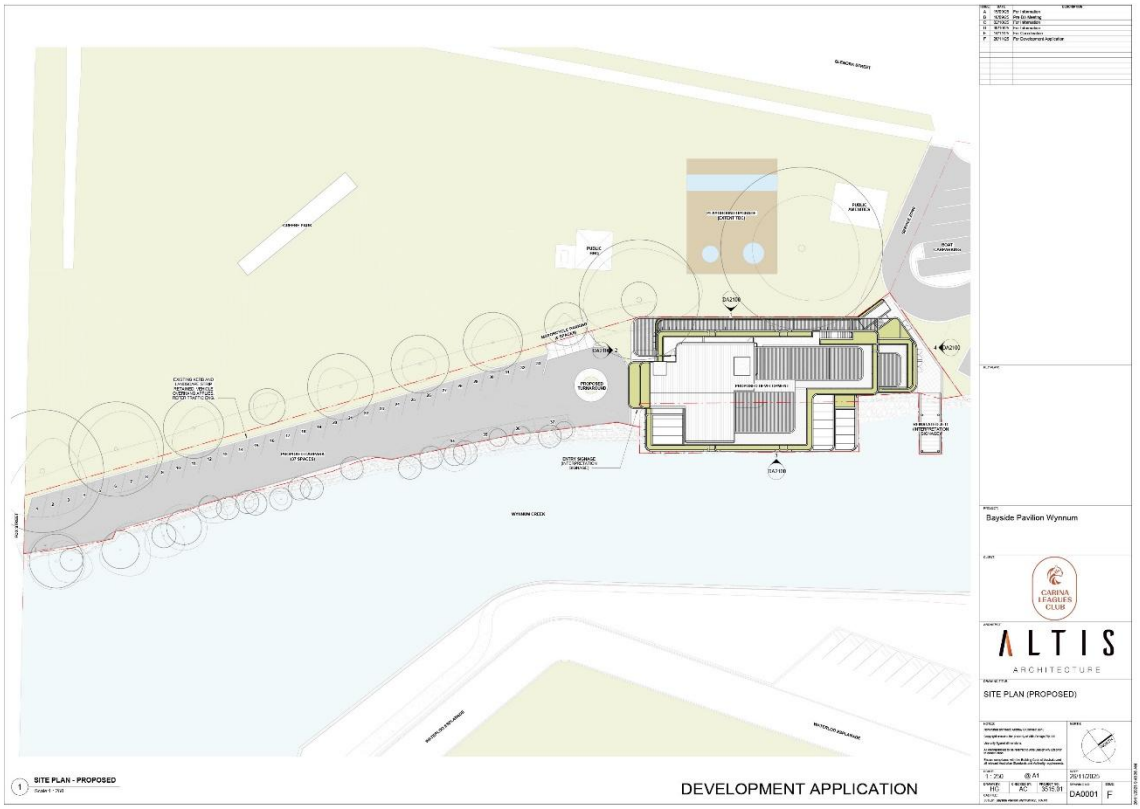
to the northwest facing ventilation opening representing an acoustically rated louvre (e.g. Acran Series 125).

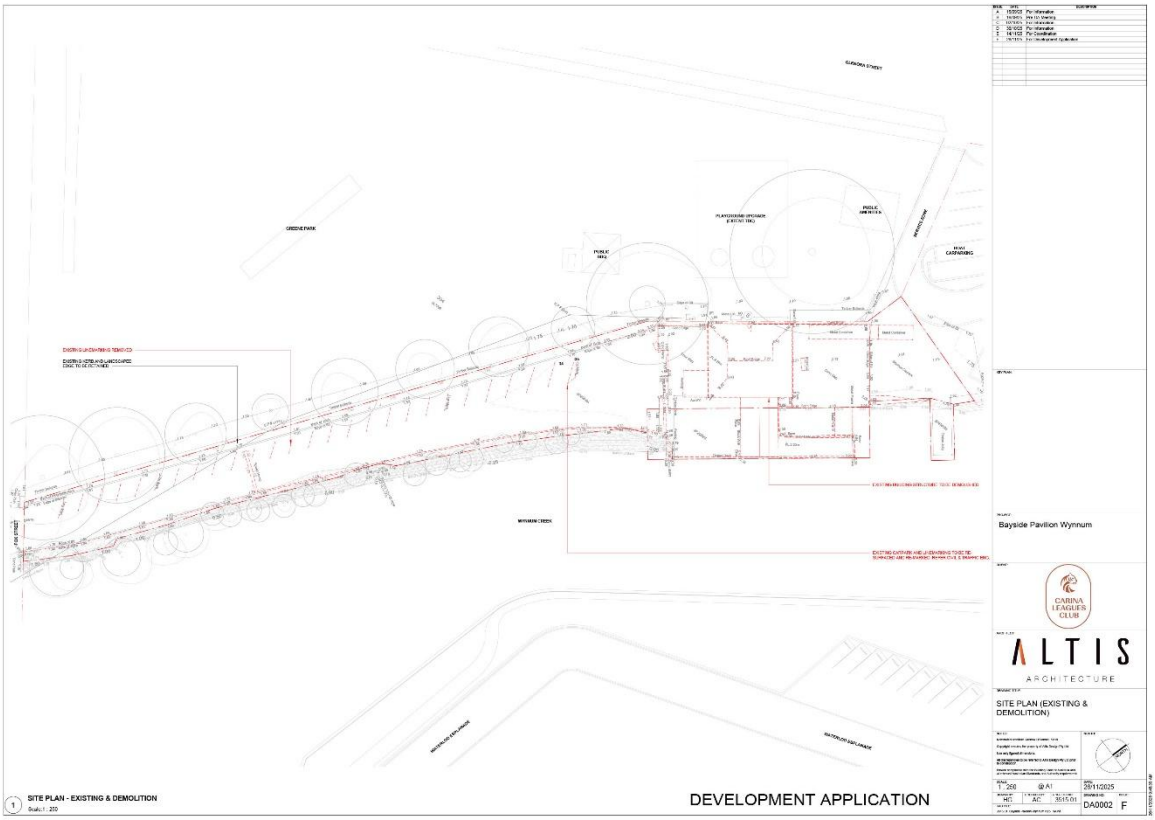
- Limit the capacity of the roof bar terrace area to 200 patrons, and
- Close the roof bar terrace at midnight to reduce impacts from this area during the night period (no patrons or music in this area between midnight and the opening time of 10am), and
- To reduce noise impacts after 10pm, include additional acoustic screening to the north of the roof bar terrace, potentially via retractable acoustic awnings (to be determined at detailed design phase).

- Deliveries and waste collection are limited to the day and evening periods (i.e. 7am – 10pm).
- Driver behaviour in the driveway and carpark is managed to restrict the use of horns and excessive idling / queuing.
- Mechanical plant be chosen, located, and screened (if necessary) to ensure compliance with the nighttime intrusive noise criteria of 35 dB(A) at the closest sensitive zone boundaries. A detailed assessment of mechanical plant noise may be undertaken at Building Approval stage, if required.
- An assessment be undertaken to the Office of Liquor and Gaming Regulation Guideline 51 to establish venue noise limits – this assessment is undertaken post-construction.

A Noise Management Plan and complaints register be implemented. An example of a Noise Management Plan is presented in **Appendix C**

Appendix A: Plans

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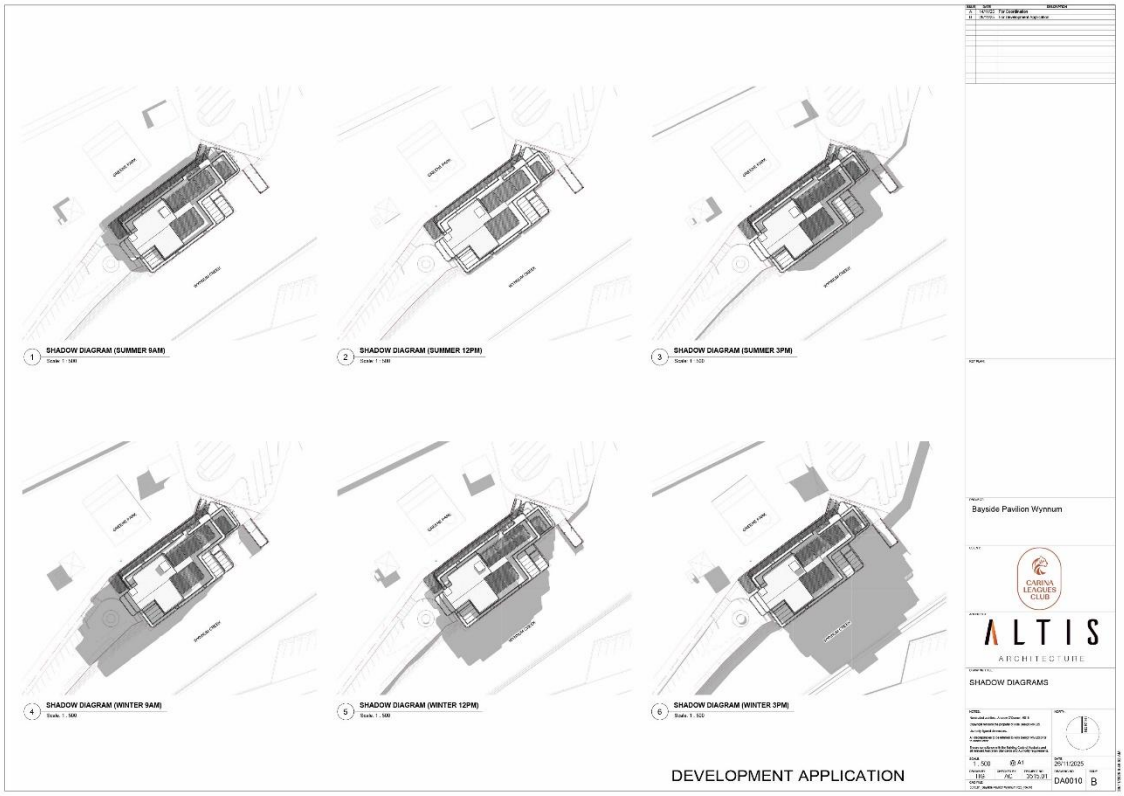
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SHADOW DIAGRAM (WINTER 3PM)
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Bayside Pavilion Wynnum
CARINA LEAGUES CLUB
ALTIS
ARCHITECTURE
SHADOW DIAGRAMS
DA0010
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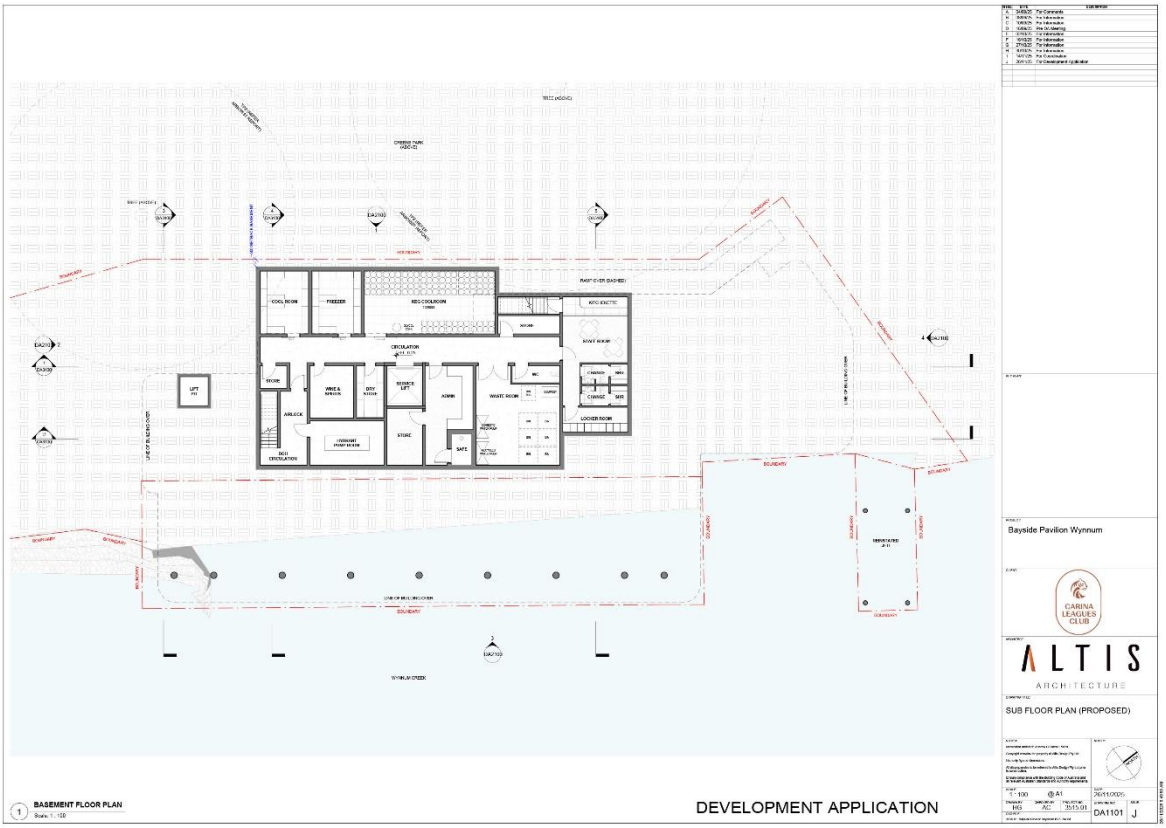
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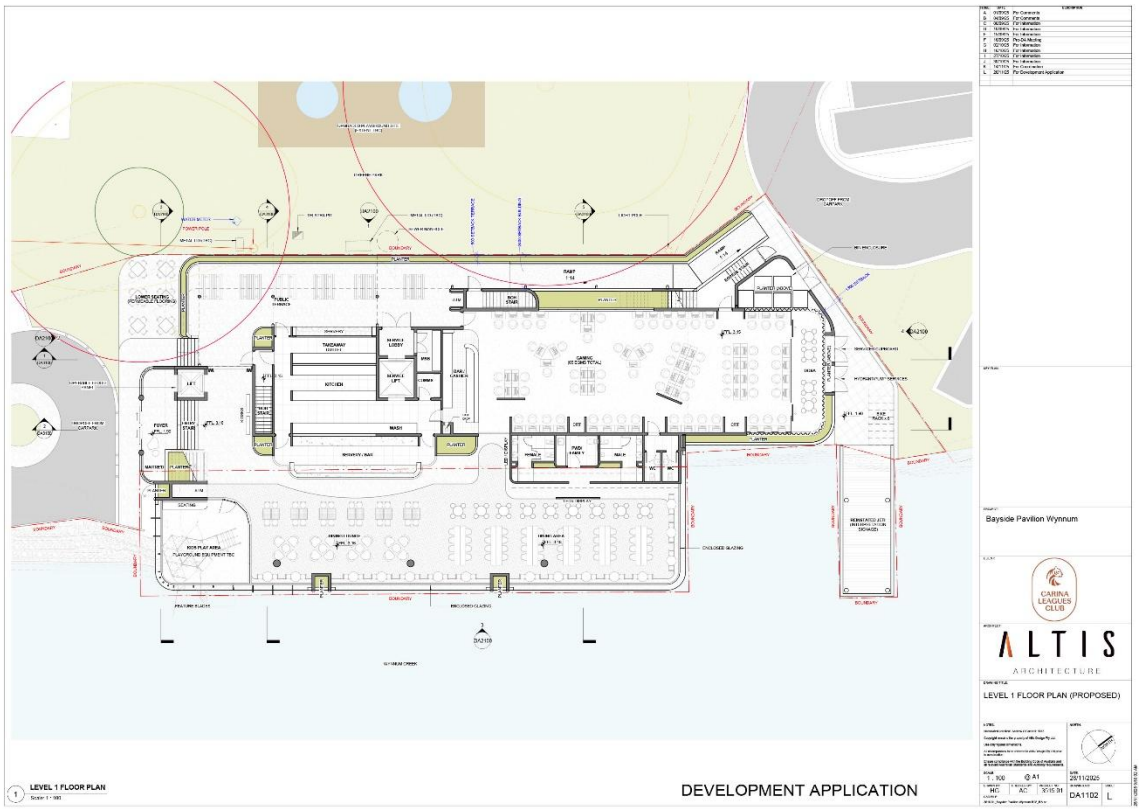
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CARINA LEAGUES CLUB
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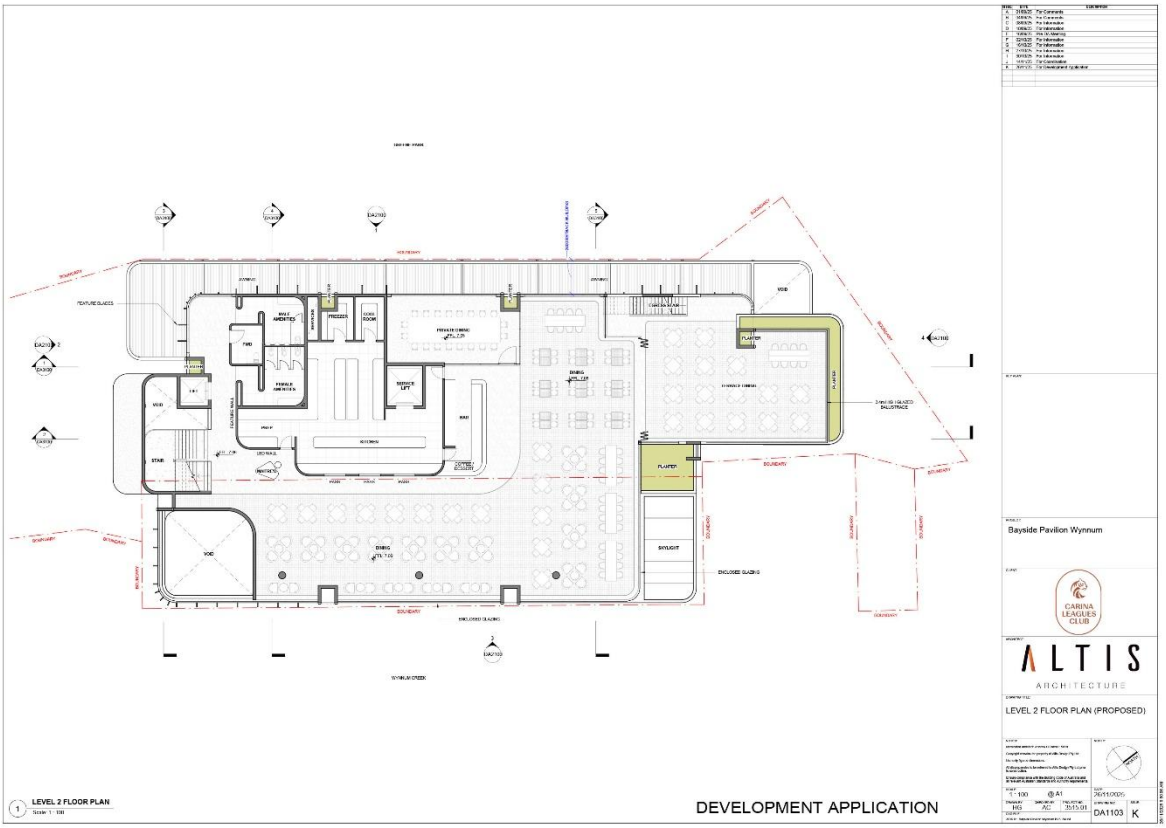
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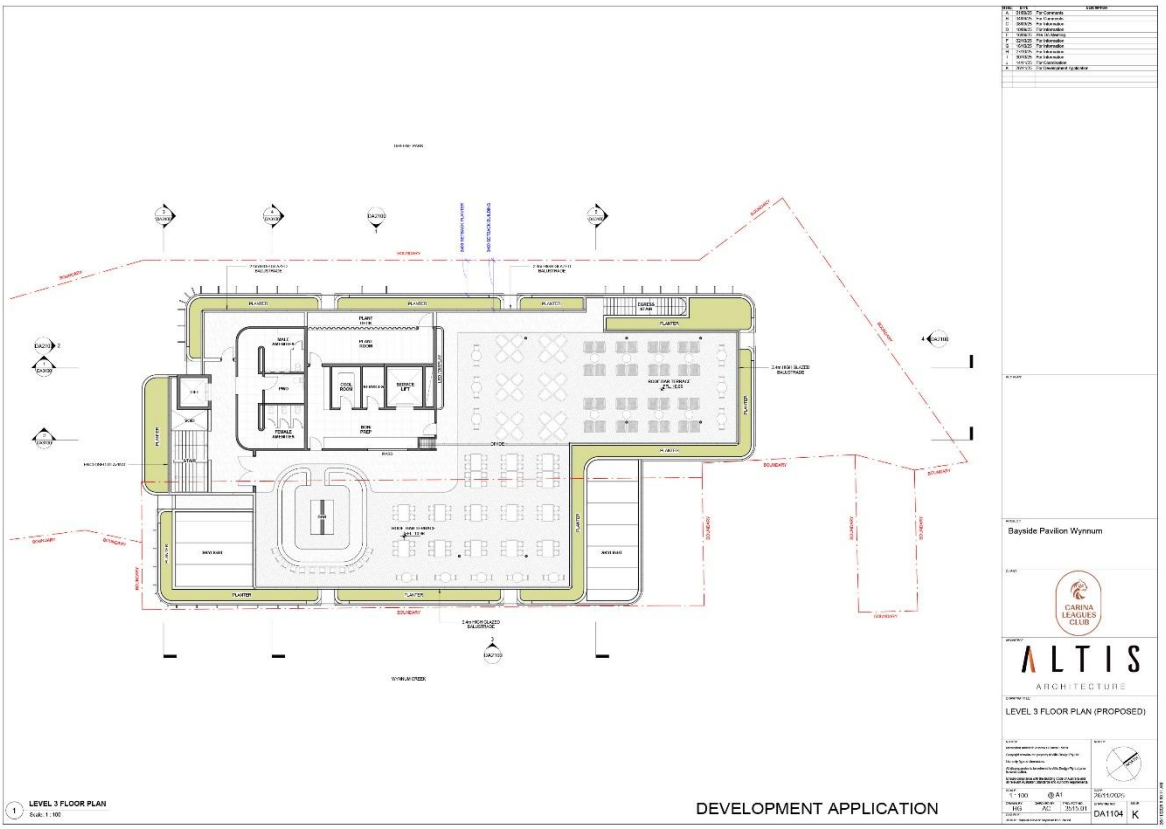
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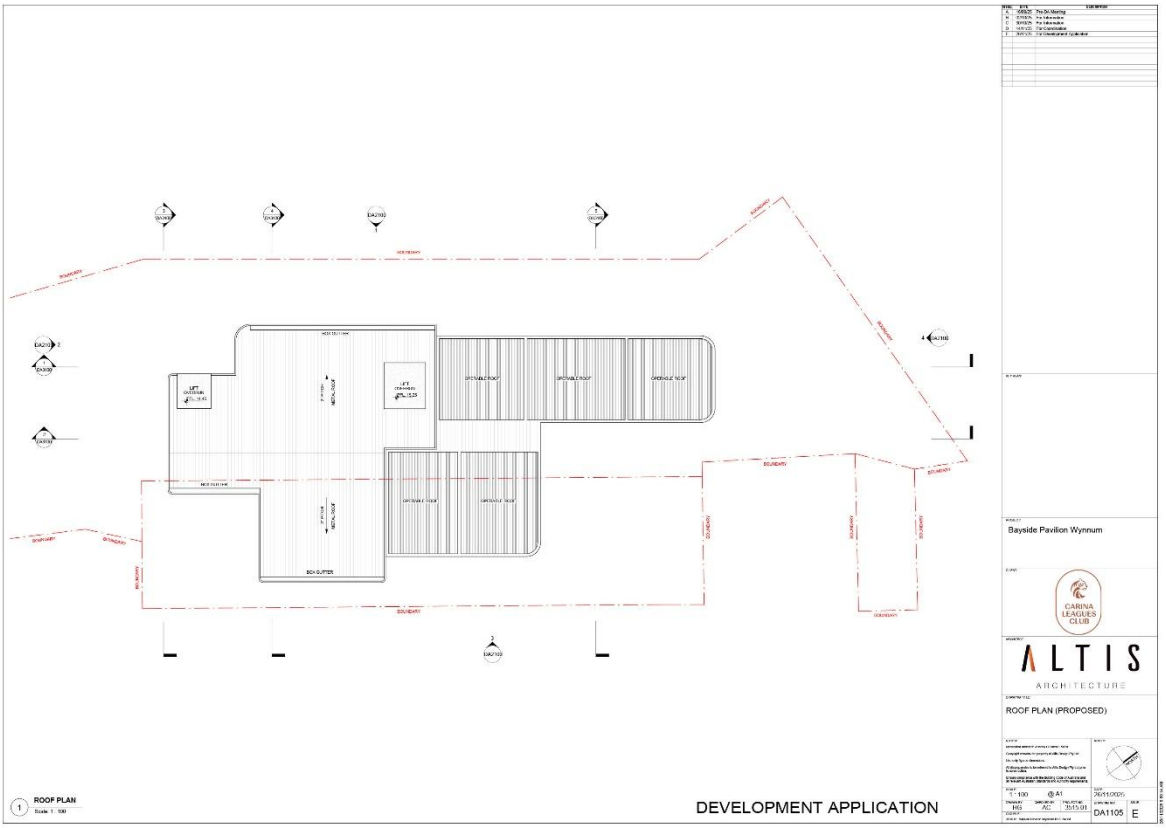
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ELEVATION NORTH (PROPOSED)
ELEVATION WEST (PROPOSED)
ELEVATION SOUTH (PROPOSED)
ELEVATION EAST (PROPOSED)
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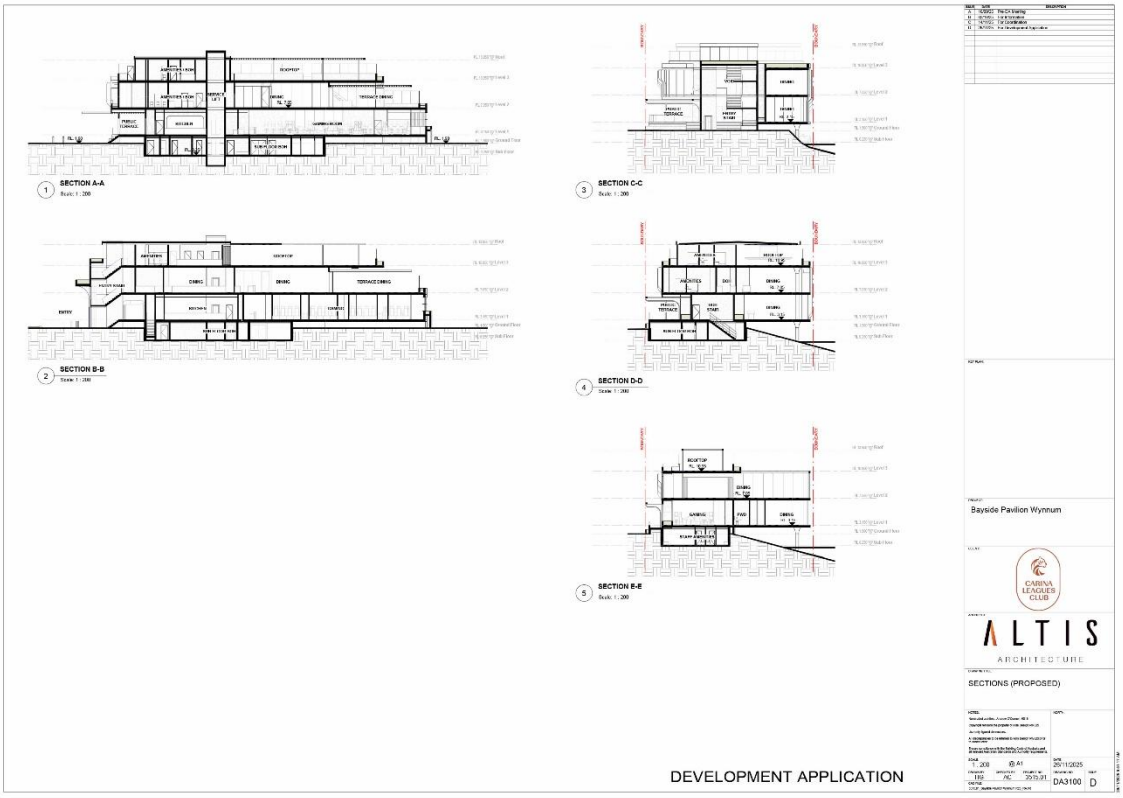
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SECTION B-B
SECTION C-C
SECTION D-D
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SECTIONS (PROPOSED)
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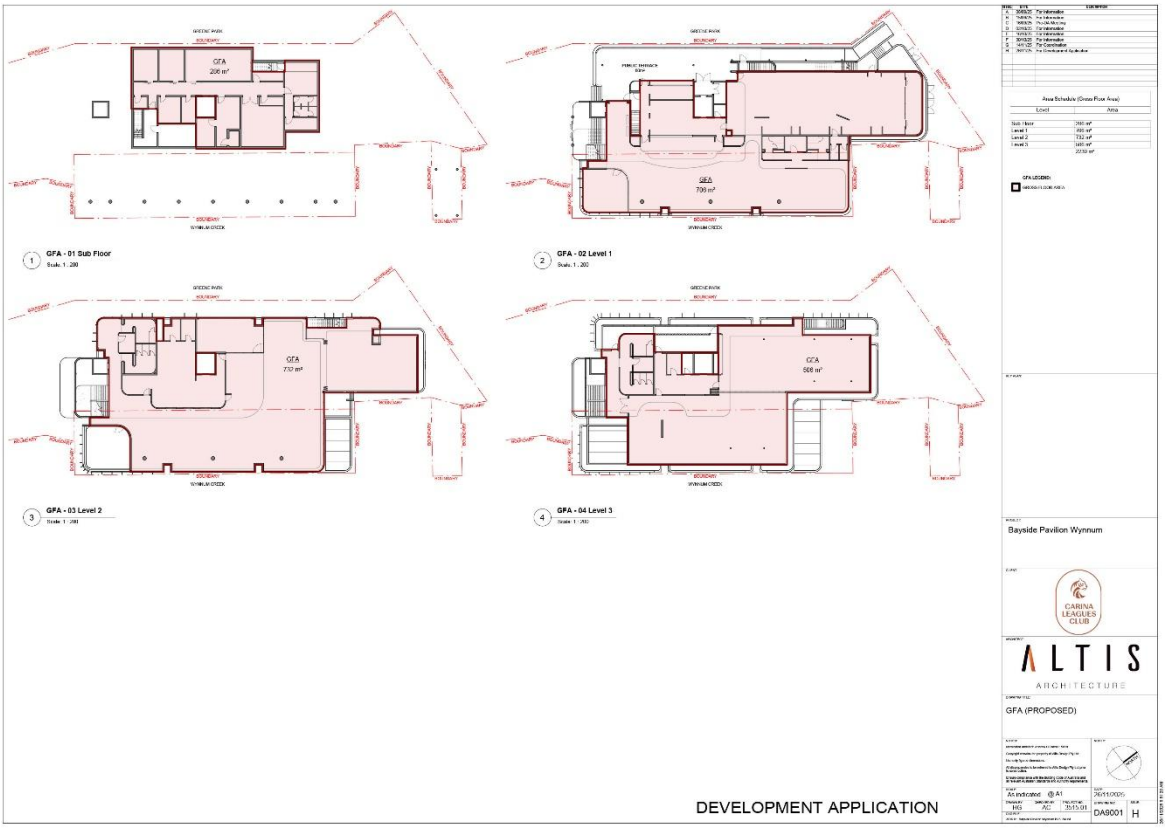
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Bayside Pavilion Wynnum
CARINA LEAGUES CLUB
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DEVELOPMENT APPLICATION
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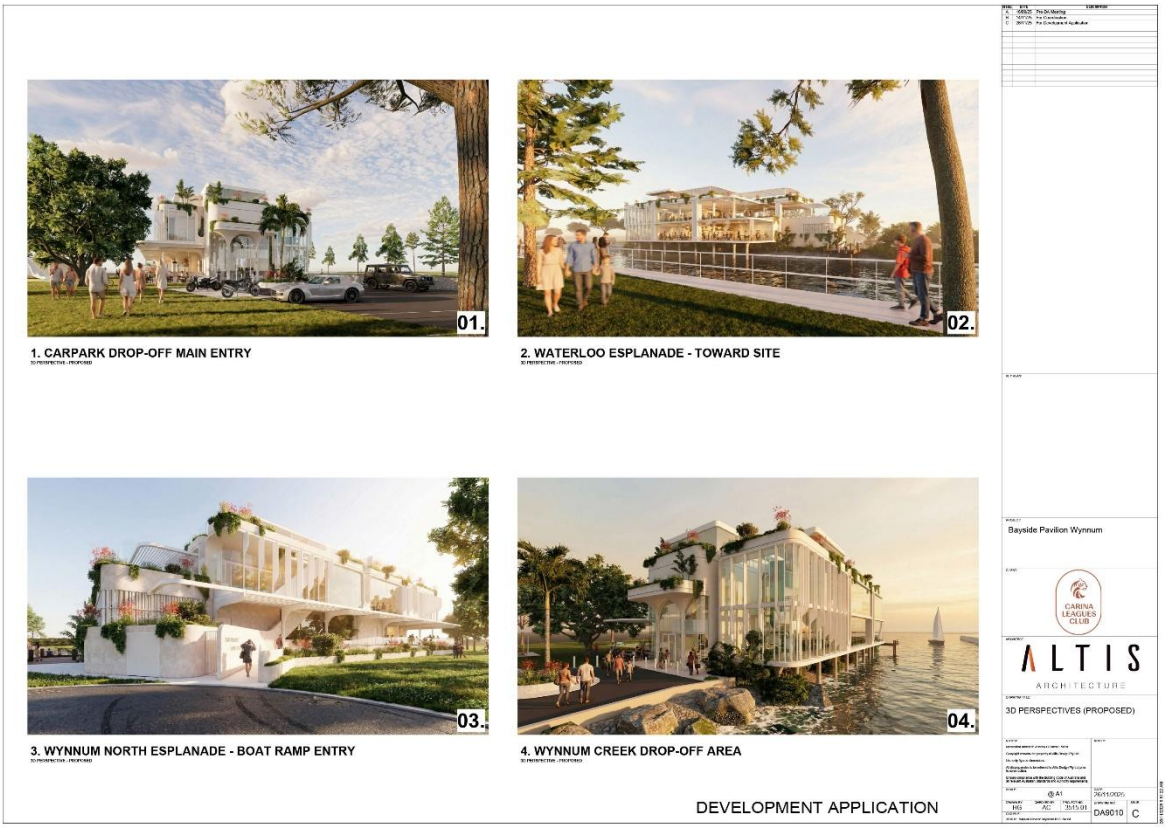
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02.
2. WATERLOO ESPLANADE - TOWARD SITE
03.
3. WYNNUM NORTH ESPLANADE - BOAT RAMP ENTRY
04.
4. WYNNUM CREEK DROP-OFF AREA
DEVELOPMENT APPLICATION
Bayside Pavilion Wynnum
CARINA LEAGUES CLUB
ALTIS
ARCHITECTURE
3D PERSPECTIVES (PROPOSED)
DA9010
C

Appendix B: Environmental Noise Model

Noise levels from the proposed development have been predicted onto the surrounding sensitive zone boundaries and uses. Noise levels are predicted using SoundPLAN v8.0 and the prediction methodology ISO 9613-2: 1996. Sound power levels used in the noise model have been sourced from the SoundPlan Emission Library, equipment specifications, previous measurements of similar equipment, and published technical papers.

All prediction models have limits to their accuracy of prediction. This is due to the inherent nature of the calculation algorithms that go into the design of the models, the assumptions made in the implementation of the model, and the availability of good source sound power data. Various researchers have suggested that an un-calibrated model has an accuracy of ±5 dB while a calibrated model has an accuracy of ±2 dB. Calibration means that the model has been established with reference to measured sound levels at a receiver, known source levels and tightly defined propagation variables (wind speed and direction, for example). Alternatively, a series of predictions with different programs but the same assumption variables can be used for verification purposes. In this case, the proposed development does not yet exist for the purposes of verification and the model is therefore considered to be un-calibrated.

B1 Noise Sources and Prediction Methodology

The noise model includes the following sources of noise emission at the proposed development:

- Noise breakout from inside the venue is modelled as an industrial building with an interior reverberant sound pressure level of 70 dB $L_{Aeq,adj,T}$. The interior noise level emanates through all external walls and roof via a nominal transmission loss of 48 R_w (representing 100mm concrete), through fixed windows with a nominal transmission loss of 30 R_w (nominally 6.38mm laminated glazing), and through openings with no transmission loss. This interior sound level is intended to represent background music, kitchen noise, and patron noise at a level that allows for conversation at normal vocal effort. The level is an average over a period of at least four hours (evening) and is an average for the entire interior space; it allows for fluctuating noise levels that may be considerably higher than 70 dB(A) for shorter durations, or in specific areas within the venue – it is not intended to be a limiting value.
- Outdoor patrons are included as an area source in each of the terrace areas. Sound power levels for outdoor patron noise are calculated in accordance with *Prediction of Noise from Small to Medium Sized Crowds (Hayne et al., 2011)*, with the number of patrons in each space based on the seating shown in the supplied plans and with reference to the supplied patron capacity details. The calculated sound power level is applied to the total area source, positioned 1.5m above floor height.
- Outdoor speakers are not shown on the supplied plans though are expected to be included in the proposed development. Outdoor speakers are modelled in nominal locations through the outdoor dining areas, with a source level equivalent to a sound pressure level of 70 dB(A) measured 1m from the speaker. This level is considered to be sufficient for background music that allows patrons to converse at normal vocal effort.
- Mechanical plant is not yet specified; however a plant room is shown on Level 3 of the supplied plans. In order to assess mechanical plant noise, the total capacity of mechanical plant required for the site has been estimated on the basis of 1.5kW per 10 square meters of indoor area, which results in a requirement of approximately 330 kW. The sound pressure level within the plant room is then calculated on the basis of 13 x 25kW air-conditioning units operating simultaneously inside the room, each with a sound power level of 77 dB(A). The resulting sound pressure level is calculated in accordance with Arup Strutt software assuming a highly reverberant space.

- Car movements are included in the noise model as a moving point source traveling at 20km/hr with a day and evening peak 1-hour volume of 100 vehicle movements, and the remaining hours from 7am – 2am having 50 vehicle movements per hour. Peak traffic flows are based on 5 vehicle movements per 100m^2 GFA, and the remaining hours are nominally half of the peak hours. These traffic flows are estimated with reference to *Guide to Traffic Generating Developments, Section 3.7.2 Restaurants* (RTA, version 2.2, 2002) as the nearest analogous use. It is assumed and recommended that drop-off and pick-up behaviour is managed to restrict the use of horns and excessive idling / queuing, and these noise sources have not been specifically included.
- Truck movements are included in the noise model as a moving point source traveling at 20km/hr with a nominal number of 2 vehicle movements per hour from 7am to 10pm. It is assumed and recommended that truck movements (deliveries and waste collection) do not occur during the night period.

The sound power levels used in the noise model are summarised in **Table B1** with noise sources positioned as presented in **Plates B1** to **B4**.

Table B1: Source levels used in this assessment, dB, rounded.

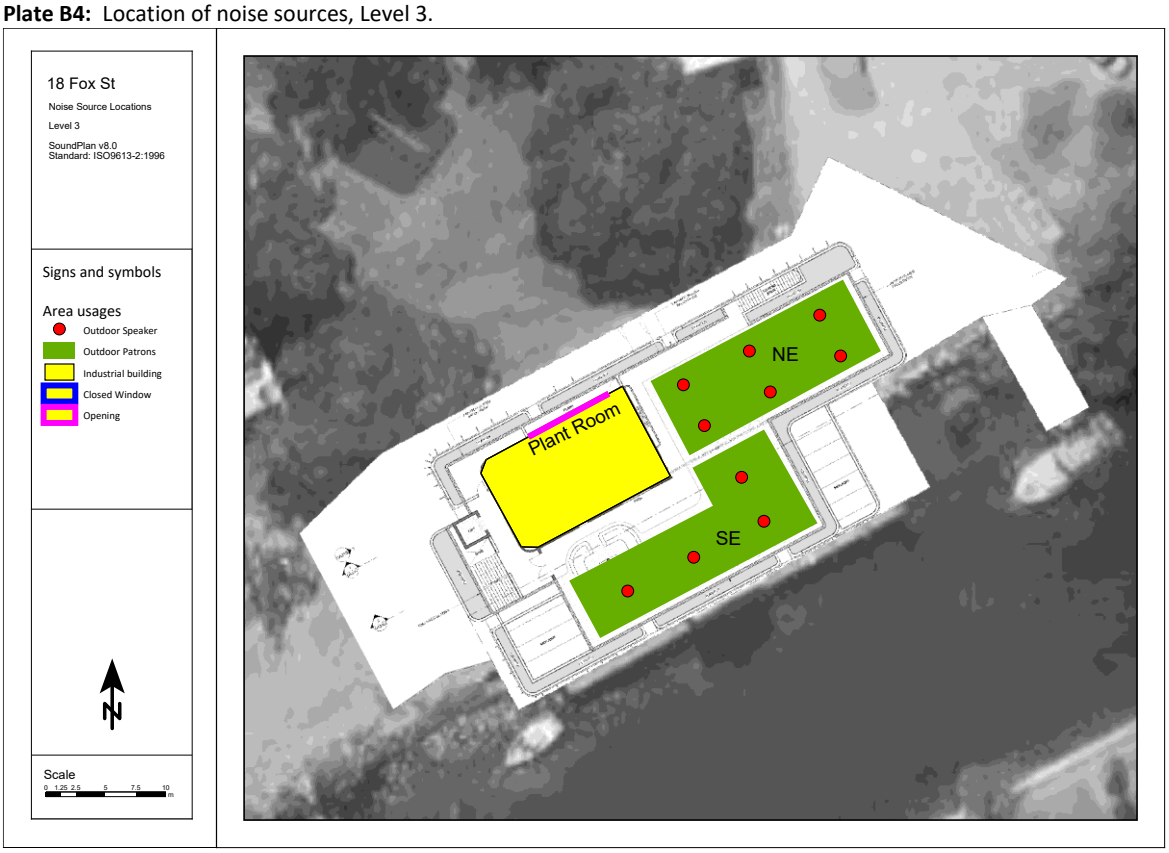
Source	Frequency Spectrum Leq dB(Lin)								Overall SWL		
	63	125	250	500	1000	2000	4000	8000	dB(C),L_{eq}	dB(A),L_{eq}	dB(A),L_{max}
Noise Breakout (interior SPL)	72	76	67	66	63	62	60	57	78	70	-
Outdoor Speaker (SWL, equivalent to 70 dB(A) at 1 metre)	80	84	75	74	71	70	68	65	87	78	-
Outdoor Patrons, L1 Public Terrace (SWL, 36 patrons)	-	77	83	86	83	78	73	67	90	87	-
Outdoor Patrons, L1 Lower Seating (SWL, 24 patrons)	-	74	81	84	80	75	70	64	88	85	-
Outdoor Patrons, L1 Gaming DOSA (SWL, 16 patrons)	-	72	78	81	77	73	68	62	85	82	94
Outdoor Patrons, L2 Terrace Dining (SWL, 70 patrons)	-	81	88	91	87	82	77	71	95	92	101
Outdoor Patrons, L3 Roof Bar Terrace NE (SWL, 100 patrons)	-	83	90	93	89	85	80	74	97	94	103
Outdoor Patrons, L3 Roof Bar Terrace SE (SWL, 100 patrons)	-	83	90	93	89	85	80	74	97	94	103
Car movement (SWL with Lmax representing door closure)	78	85	79	76	79	80	76	73	88	85	94
Truck movement (SWL)	102	96	92	90	90	86	82	79	103	94	-
Mechanical plant room (interior SPL based on 13 x 25kW AC units totalling 325kW)	86	90	81	80	77	76	74	71	84	93	-

Plate B1: Location of noise sources, Level 1 (zoomed out to show vehicle movements).

Plate B2: Location of noise sources, Level 1 (zoomed in).

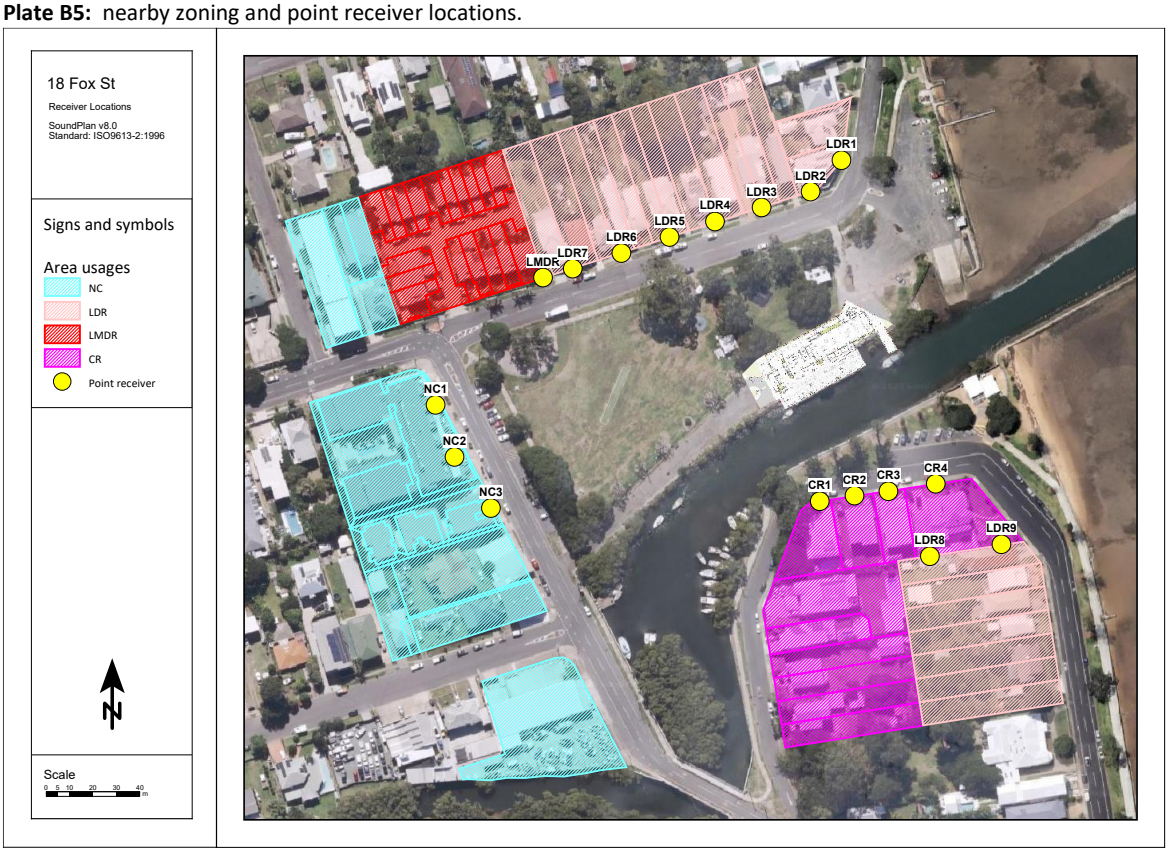
Plate B3: Location of noise sources, Level 2.

Plate B4: Location of noise sources, Level 3.



In order to present a numerical assessment against the relevant criteria, point receivers are positioned on the closest zone boundaries for LDR, LMDR, and CR zones, and at the facades of the closest sensitive uses within the NC zone. The closest sensitive zones are illustrated in **Plate B5**.

Plate B5: nearby zoning and point receiver locations.



B2 Predicted Noise Emissions (without mitigation)

The noise model predicts cumulative noise levels from all sources, with timing and location as described in **Appendix B1**. Predicted noise levels are presented numerically in **Table B2**, and as visual noise contours in **Plates B6** to **B12**. Noise contours are presented at 1.5m above ground, and are not provided for additional floor heights as noise issues are not predicted at receivers above ground floor.

Table B2: Calculated cumulative sound levels in dB $L_{Aeq,adj,T}$, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level $L_{Aeq,adj,T}$			Predicted Noise Level $L_{Ceq,adj,T}$			Predicted Noise Level L_{Amax}
		Day	Evening	Night	Day	Evening	Night	
CR1	N/A	44.0	44.8	40.6	52.1	52.7	50.3	50.4
CR2	N/A	43.6	44.5	40.9	52.1	52.7	50.3	49.2
CR3	N/A	43.6	44.5	41.2	51.9	52.5	50.0	48.3
CR4	N/A	43.2	44.1	40.7	50.6	51.2	48.6	47.2
LDR1	N/A	45.9	46.6	43.1	53.3	53.7	51.8	49.6
LDR2	N/A	48.1	48.6	44.7	55.8	56.1	54.3	50.5
LDR3	N/A	47.2	47.6	43.2	54.7	55.0	53.2	48.5
LDR4	N/A	46.2	46.6	42.1	54.3	54.5	52.8	47.2
LDR5	N/A	46.4	46.6	41.8	53.5	53.7	52.0	47.3
LDR6	N/A	45.4	45.6	41.0	52.2	52.4	50.8	46.8
LDR7	N/A	44.2	44.5	40.3	51.7	51.9	50.4	45.9
LDR8	N/A	31.8	32.6	29.7	43.2	43.6	41.6	40.3
LDR9	N/A	40.7	41.6	38.1	48.9	49.4	46.9	45.7
LMDR	N/A	41.3	41.7	37.7	49.6	49.7	48.3	45.3
NC1	GF	38.1	38.5	35.0	47.0	47.2	45.9	44.8
NC1	L1	39.3	39.8	36.3	47.0	47.2	45.8	44.4
NC1	L2	39.9	40.3	36.9	47.3	47.5	46.1	44.4
NC1	L3	40.3	40.8	37.4	47.8	48.0	46.7	43.6
NC2	GF	38.2	38.6	34.8	47.4	47.6	46.4	46.9
NC2	L1	39.4	39.8	36.0	47.4	47.6	46.3	46.7
NC2	L2	39.9	40.4	36.7	47.8	48.0	46.6	46.6
NC2	L3	40.3	40.8	37.2	48.3	48.5	47.2	46.3
NC3	GF	39.4	39.8	35.8	48.4	48.5	47.3	51.1
NC3	L1	40.4	40.8	36.9	48.5	48.7	47.3	51.2
NC3	L2	41.0	41.4	37.7	49.0	49.2	47.9	51.1

Plate B6: Noise contours at 1.5m above ground, LAeq day. Levels are in dB(A) and include façade effects where applicable.

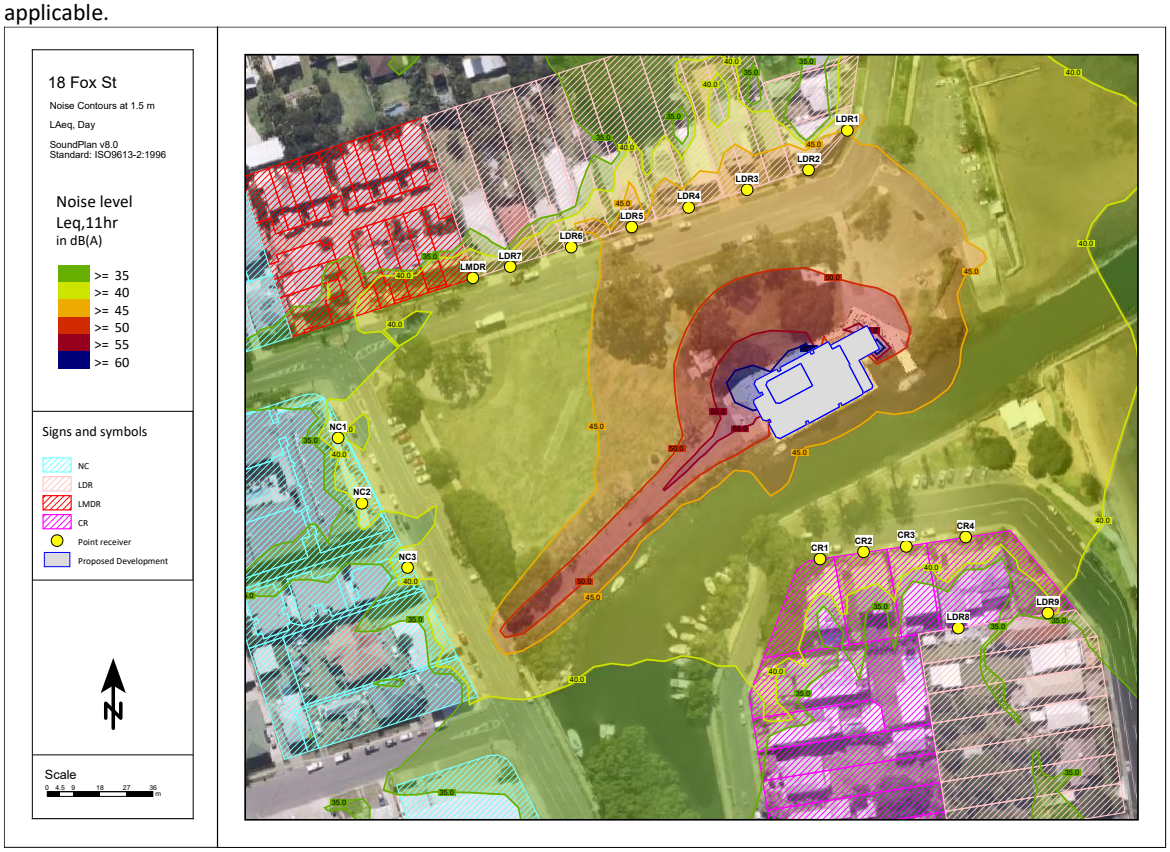


Plate B7: Noise contours at 1.5m above ground, LAeq evening. Levels are in dB(A) and include façade effects where applicable.

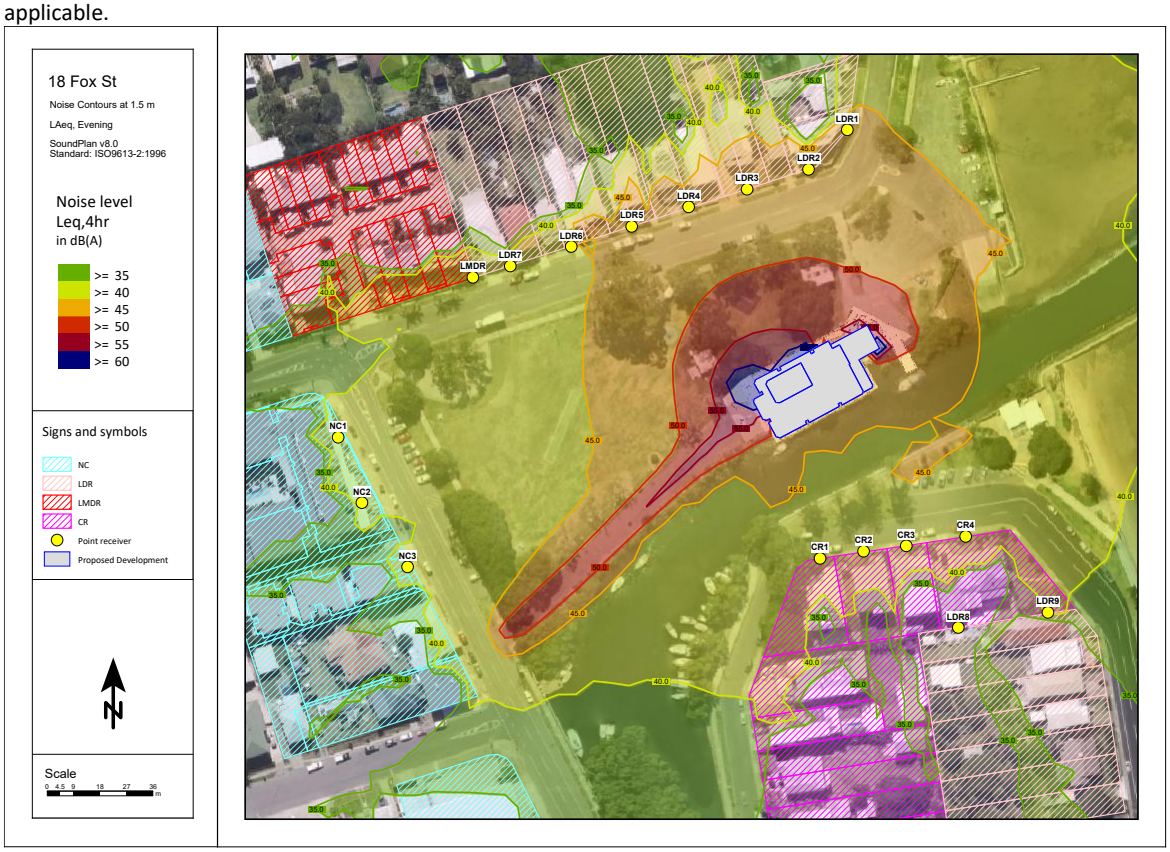


Plate B8: Noise contours at 1.5m above ground, LAeq night. Levels are in dB(A) and include façade effects where applicable.

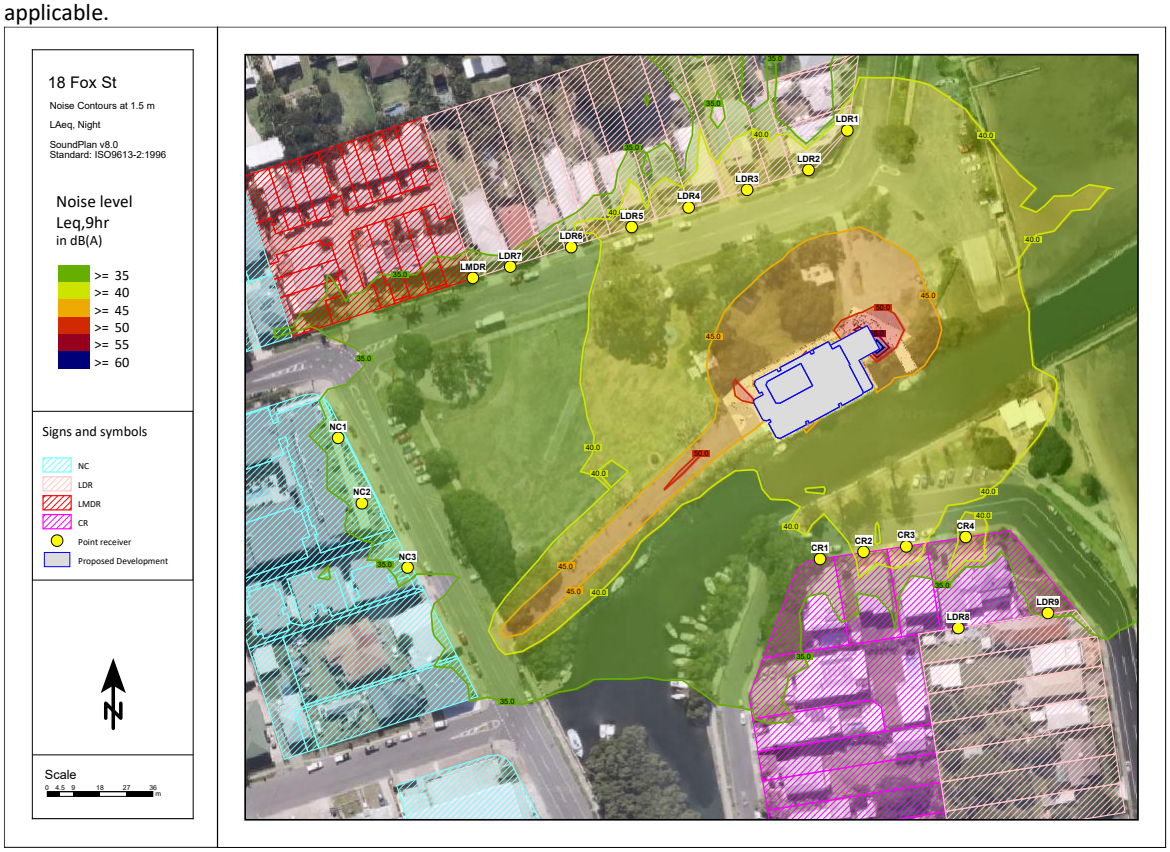


Plate B9: Noise contours at 1.5m above ground, LCeq day. Levels are in dB(C) and include façade effects where applicable.

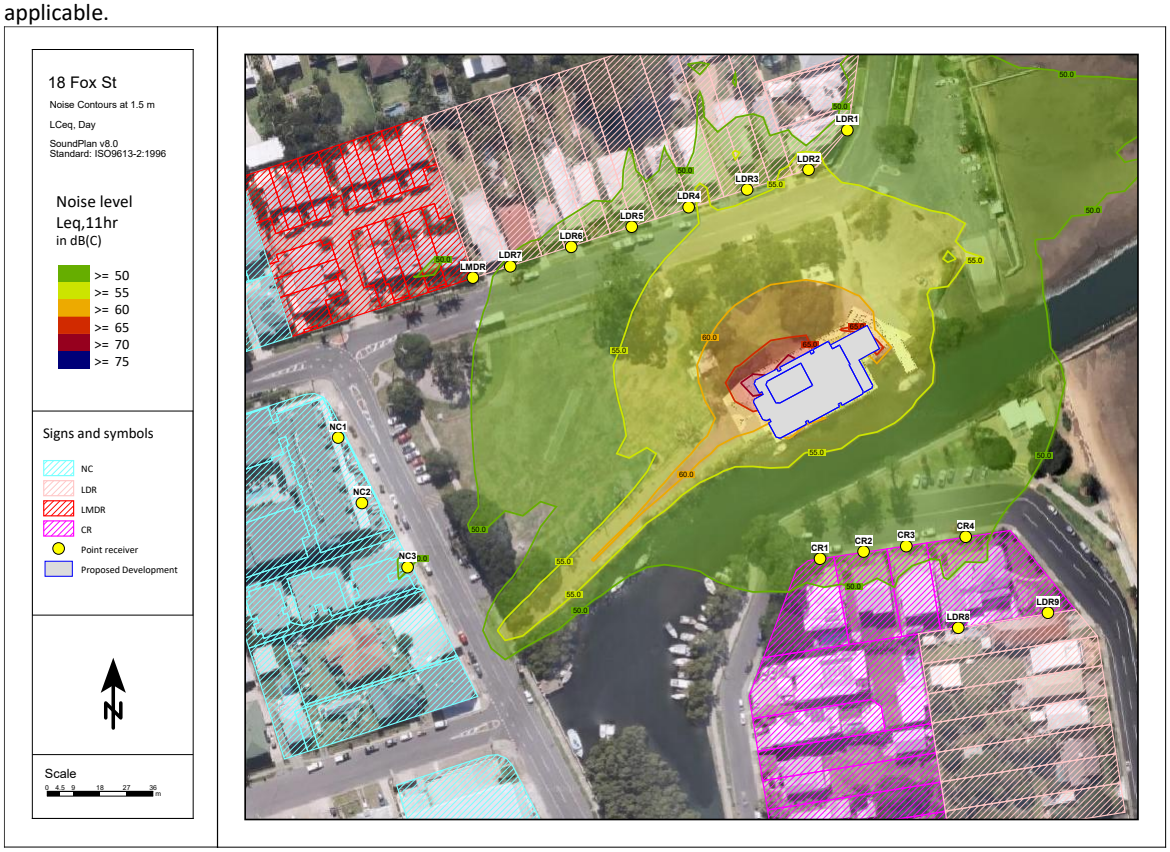


Plate B10: Noise contours at 1.5m above ground, LCeq evening. Levels are in dB(C) and include façade effects where applicable.

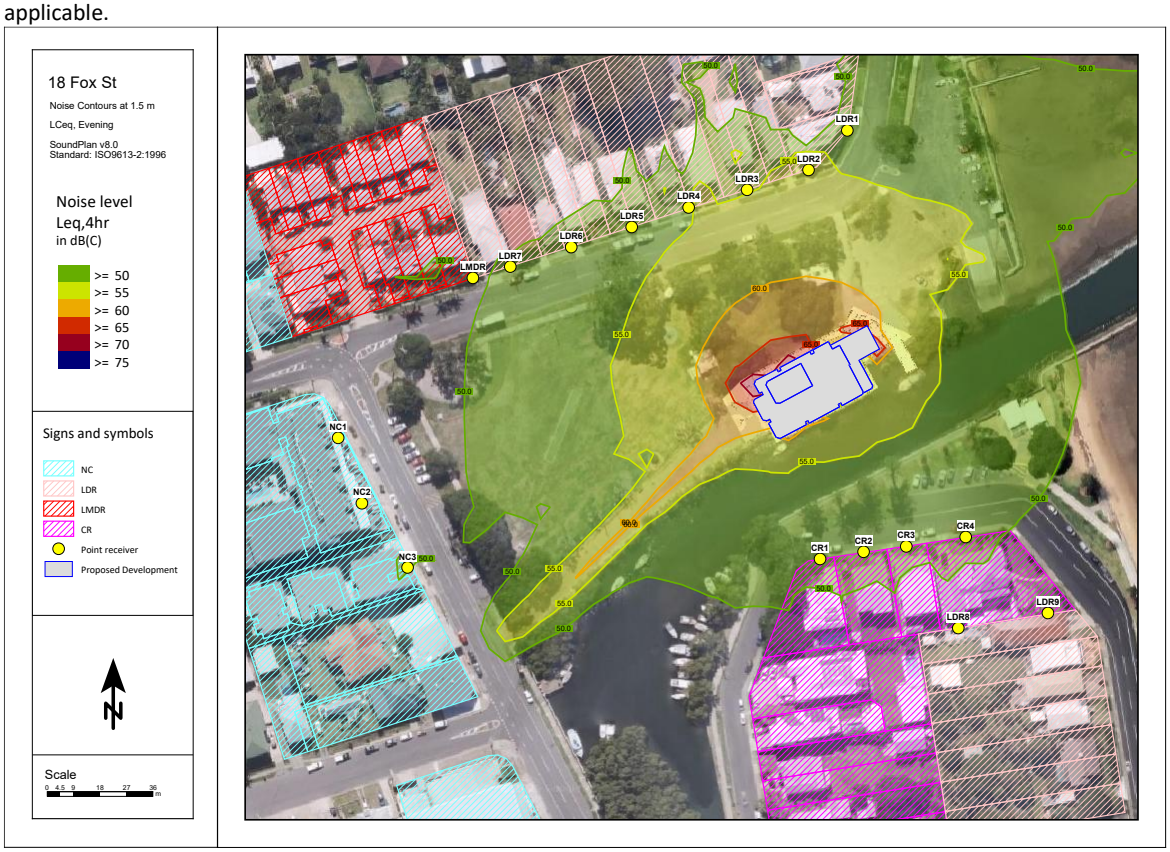


Plate B11: Noise contours at 1.5m above ground, LCeq night. Levels are in dB(C) and include façade effects where applicable.

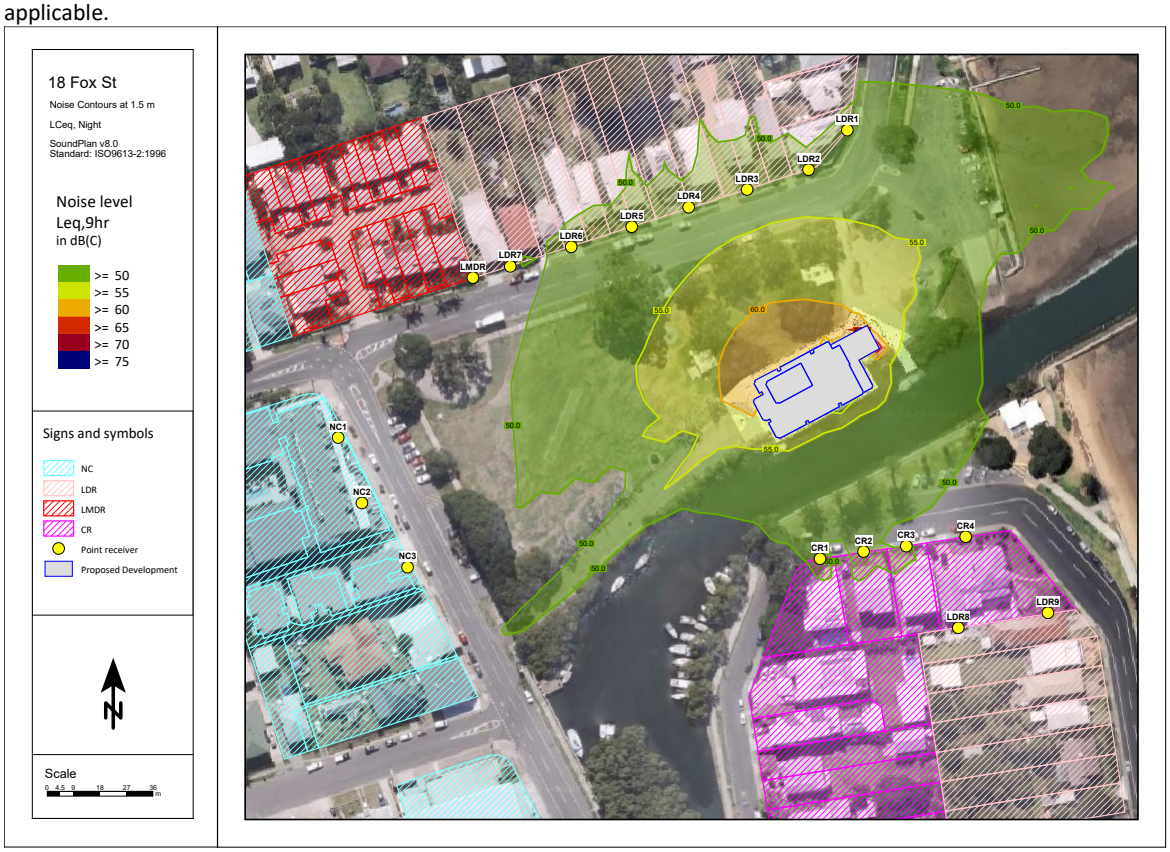
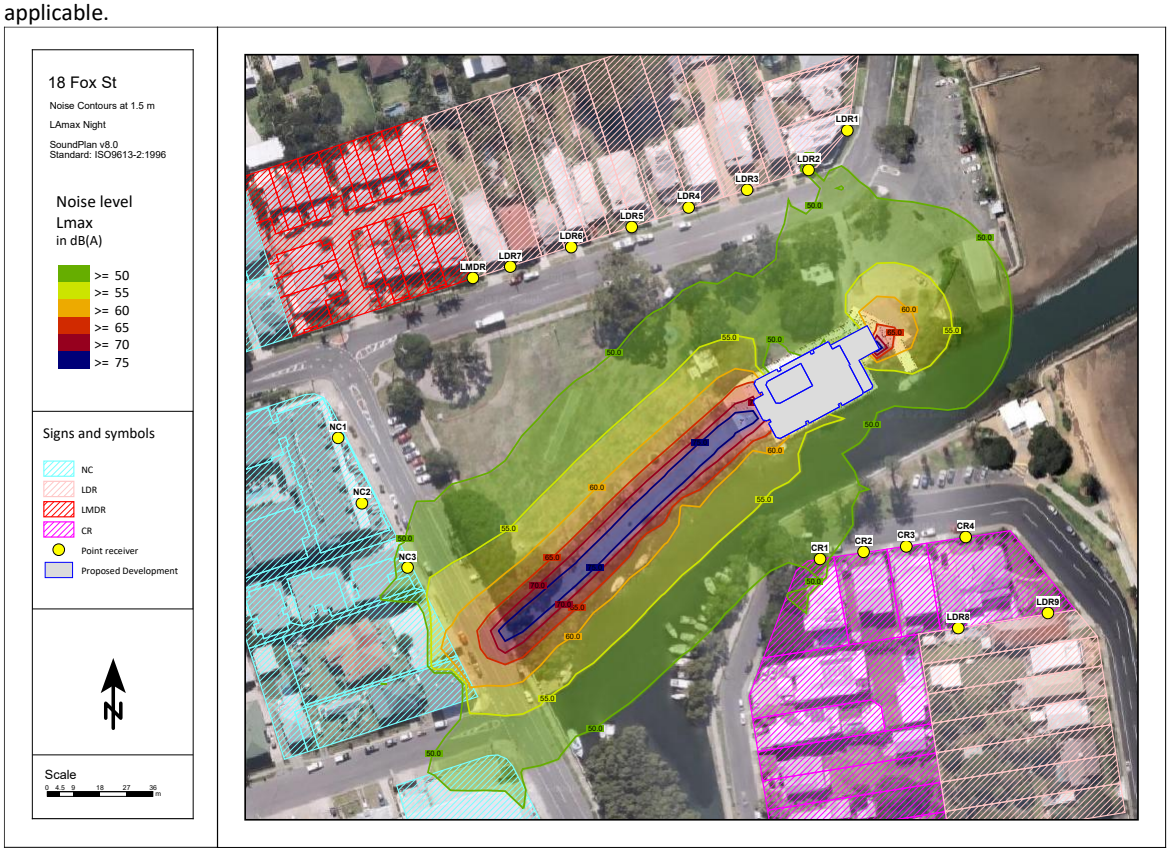


Plate B12: Noise contours at 1.5m above ground, LAmax night. Levels are in dB(A) and include façade effects where applicable.



B3 Noise Mitigation Scenario

The supplied plans include acoustic screening to all outdoor terrace areas in the form of 2.4m high solid balustrades, however additional noise mitigation is required, the following mitigation measures are included in the noise model:

- Level 2
  - Close terrace dining area at 10pm to eliminate impacts from this area during the night period (no patrons or music in this area after 10pm or before 7am).
- Level 3
  - Noise mitigation may be required for the plant room, depending on the final specification of the plant that will be installed. In order to demonstrate possible noise mitigation, a transmission loss is applied to the northwest facing ventilation opening representing an acoustically rated louvre (e.g. Acran Series 125).
  - Close the roof bar terrace at midnight to reduce impacts from this area during the night period (no patrons or music in this area after midnight or before 10am).

In order to function effectively as acoustic barriers, glass balustrades must be a minimum of 6.38mm laminate, and fencing must have a minimum surface density of 12.5kg/m^2 and be generally continuous and gap-free (other than gaps required for drainage). Predicted noise emissions including these mitigation measures are presented in **Table B3** and **Plates B13** to **B19**.

Table B3: Calculated cumulative sound levels with mitigation measures. Levels are in dB $L_{Aeq,adj,T}$, free field except for NC receivers which are façade-affected.

Receiver	Floor	Predicted Noise Level $L_{Aeq,adj,T}$			Predicted Noise Level $L_{Ceq,adj,T}$			Predicted Noise Level L_{Amax}
		Day	Evening	Night	Day	Evening	Night	
CR1	N/A	43.6	44.5	37.0	50.3	51.2	44.4	50.4
CR2	N/A	43.1	44.1	37.0	50.4	51.3	44.3	49.2
CR3	N/A	43.0	44.0	37.0	50.2	51.1	44.0	48.3
CR4	N/A	42.6	43.6	36.7	49.2	50.0	43.1	47.2
LDR1	N/A	44.8	45.6	38.1	50.4	51.1	44.1	49.5
LDR2	N/A	46.8	47.5	38.8	52.6	53.2	46.0	50.4
LDR3	N/A	46.2	46.7	36.8	51.3	51.9	44.3	48.3
LDR4	N/A	45.2	45.6	35.2	50.7	51.3	43.8	47.2
LDR5	N/A	45.1	45.5	34.3	49.7	50.2	42.7	47.3
LDR6	N/A	44.0	44.3	33.2	48.3	48.8	41.4	46.8
LDR7	N/A	42.6	43.0	32.1	47.4	47.8	40.5	45.9
LDR8	N/A	30.7	31.7	24.5	40.7	41.5	34.5	40.3
LDR9	N/A	40.1	41.1	33.8	47.3	48.0	41.0	45.7
LMDR	N/A	39.8	40.2	30.1	45.4	45.8	39.0	45.3
NC1	GF	36.2	36.7	27.8	42.3	42.8	36.9	44.8
NC1	L1	37.4	38.0	29.1	42.5	43.0	36.9	44.4
NC1	L2	37.9	38.5	29.7	42.8	43.4	37.2	44.4
NC1	L3	38.4	39.0	30.1	43.3	43.8	37.6	43.6
NC2	GF	36.5	37.0	28.6	42.9	43.3	37.3	46.9
NC2	L1	37.7	38.2	29.8	43.0	43.4	37.3	46.7
NC2	L2	38.2	38.7	30.4	43.4	43.8	37.7	46.6
NC2	L3	38.6	39.2	30.8	43.8	44.2	38.1	46.3
NC3	GF	38.1	38.5	30.2	43.4	43.9	35.6	51.1
NC3	L1	39.0	39.5	31.4	43.7	44.2	36.0	51.2
NC3	L2	39.5	40.1	31.9	44.1	44.7	36.5	51.1

Plate B13: Noise contours at 1.5m above ground, LAeq day with mitigation measures. Levels are in dB(A) and include façade effects where applicable.

Plate B14: Noise contours at 1.5m above ground, LAeq evening with mitigation measures. Levels are in dB(A) and include façade effects where applicable.

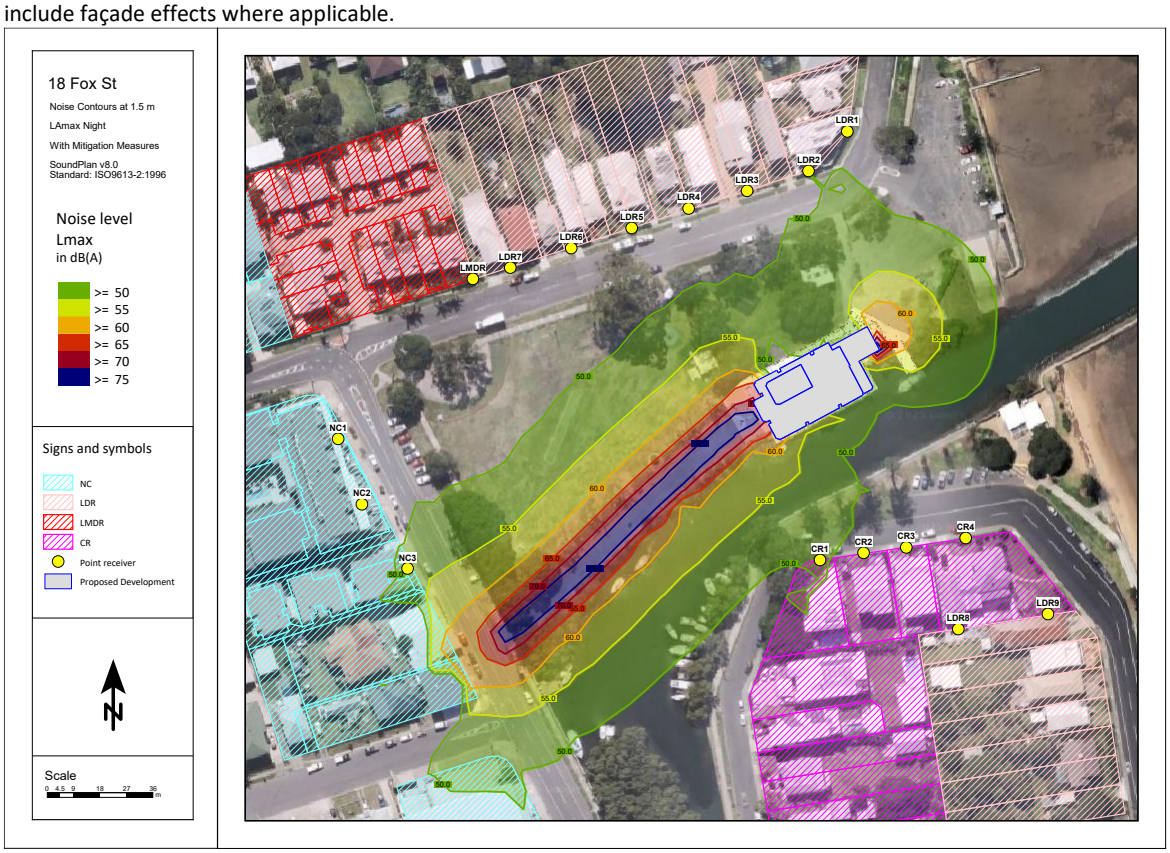
Plate B15: Noise contours at 1.5m above ground, LAeq night with mitigation measures. Levels are in dB(A) and include façade effects where applicable.

Plate B16: Noise contours at 1.5m above ground, LCeq day with mitigation measures. Levels are in dB(C) and include façade effects where applicable.

Plate B17: Noise contours at 1.5m above ground, LCeq evening with mitigation measures. Levels are in dB(C) and include façade effects where applicable.

Plate B18: Noise contours at 1.5m above ground, LCeq night with mitigation measures. Levels are in dB(C) and include façade effects where applicable.

Plate B19: Noise contours at 1.5m above ground, LAmax night <u>with mitigation measures</u>. Levels are in dB(A) and include façade effects where applicable.



Appendix C: Noise Management Plan Template

Topic	Management
Applicable Time Period	For the management of activities between the hours of 7:00 am and 4:00 am.
Objective	To limit the impact of noise from activities on site on to nearby sensitive uses.
Noise Sources	• Background music; • Patron noise, voices; • Car parking and vehicle noise.
Noise Control Measures	• Music is kept to background levels (approximately 70 dB(A) at 1m from a speaker); • High level amplified music is not permitted; • Patrons are to be encouraged to not loiter and talk loudly in the car park; • Driver behaviour is managed, no horns or excessive idling in the driveway area. • Keep doors closed whenever practical; • Outdoor speakers, if installed, should not be directed towards nearby sensitive uses – instead, aim the speakers downward and/or back into the venue. • Any noise complaints recorded.
Complaint Management	
Receiving Complaints	In the event that a noise complaint is received, the nominated complaint handler must fill in a noise complaint registry that includes as much of the following information as possible: • Name; • Address; • Date compliant was made; • Date and time of noise was observed; • Nature of the complaint; • Corrective action. Responsible Person: _____
Ongoing	• Compliance will be monitored. • This noise Management Plan will be updated as required. • Updates to this plan will be advised to affected parties. Responsible Person: _____

Appendix D: Definitions

Noise assessment terms used in this Report include-

Event maximum sound pressure level ($L_{A\%,adj,T}$), L01

The L01 level is calculated as the noise level equalled and exceeded for 1% of the measurement time, for example 9 seconds in any 15 minute interval. L01 is an appropriate level to characterise single events, such as from train bypass.

Average maximum sound pressure level ($L_{A\%,adj,T}$), L10

The "L10" level is an indicator of "steady-state" noise or intrusive noise conditions from traffic, music and other relatively non-impulsive noise sources. The L10 level is calculated as the noise level equalled and exceeded for 10% the measurement time, for example 90 seconds in any 15 minute interval. The measured L10 time-intervals for day/evening/night are arithmetically averaged to present the "average maximum" levels of the environment for day/evening/night. The level can be adjusted for tonality or impulsiveness.

Background sound pressure level ($L_{A90,T}$), L90

Commonly called the "L90" or "background" level and is an indicator of the quietest times of day, evening or night. The L90 level is calculated as the noise level equalled and exceeded for 90% the measurement time. The measured L90 time-intervals are arithmetically averaged to present the "average background" levels of the environment for day/evening/night. The level is recorded in the absence of any noise under investigation. The level is not adjusted for tonality or impulsiveness.

Rating Background Level (RBL)

The overall, single-figure, background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24-hour period used for the assessment of background level). This is defined as the median value of all the day evening or night assessment background levels.

Equivalent Continuous or time average sound pressure level ($L_{Aeq,T}$), Leq

Commonly called the "Leq" level it is the logarithmic average noise level from all sources far and near. The level can be adjusted for tonality.

Adjustments to levels

Under some circumstances, noise levels may be "adjusted" for tonal or impulsive characteristics by the addition of +2 or +5 dB. The adjustments are made in accordance with AS1055. Measured noise levels are not normally adjusted for the purposes of a traffic noise assessment.

Free-field level

A sound level that is measured at a distance of more than 3.5 metres from a wall or facade.