



Proposed Residential Development
Lot 18A Macarthur Avenue
Hamilton

ACOUSTIC REPORT



Client:
Silverstone Developments
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1. Introduction

This report is in response to a request by Silverstone Developments for an aircraft and environmental noise assessment of a proposed residential development to be located at Lot 18A Macarthur Avenue, Hamilton. To facilitate the assessment, noise monitoring was conducted to determine aircraft and ambient noise levels in the locality. Based on the outcomes of the assessment, recommendations for management strategies and acoustic treatments are specified.

2. Site Description

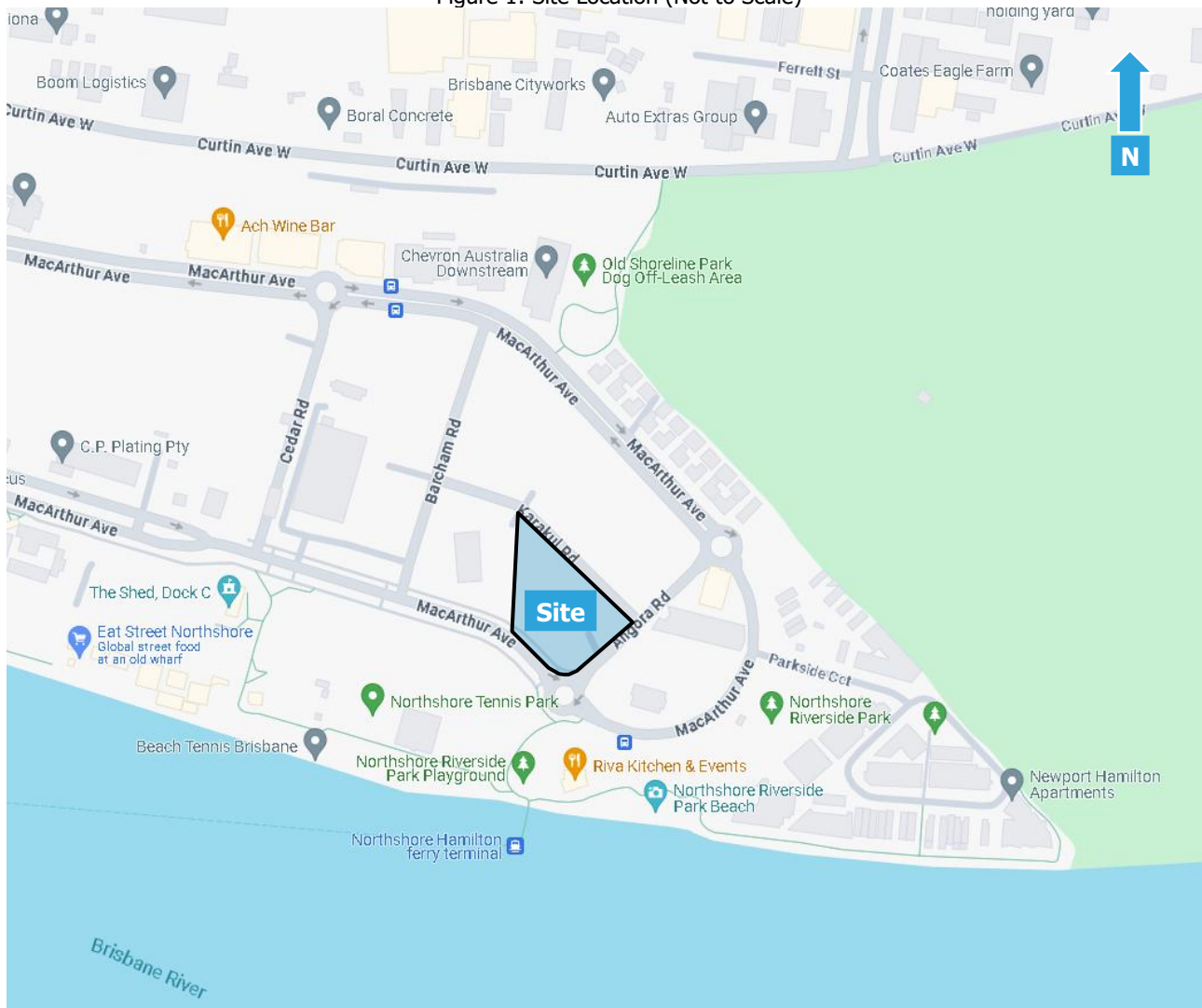
2.1 Site Location

The site is described by the following:

260 Macarthur Avenue, Hamilton
Lot 5 on SP337697

Refer to Figure 1 for site location.

Figure 1: Site Location (Not to Scale)



A comprehensive site survey was conducted on the 18th of August 2024 and identified the following:

- a) The development site is currently vacant.
- b) The surrounding area consists primarily of residential, warehousing and industrial land uses.
- c) Residential land uses are located across Macarthur Avenue to the north and across Angora Road to the southeast.

2.2 Proposal

The proposal is to construct two residential apartment buildings (174 apartments in total) as follows:

- Basement level carparking:
 - 239 spaces servicing both building 1 and building 2.
 - Storage rooms
- Ground floor:
 - Residential apartments.
 - Retail grocer, bottle shop, hairdresser and restaurant.
 - Car parking spaces (28 spaces), HRV zone, waste area and lobbies.
- Level 1:
 - Residential apartments.
 - Gym/multipurpose room, pool and spa.
- Levels 2 to 8:
 - Residential apartments.
- Levels 9 to 11:
 - Residential apartments (building one only).

Refer to the Appendices for development plans.

2.3 Acoustic Environment

The surrounding area is primarily affected local road traffic noise and aircraft noise associated with Brisbane Airport.

3. Equipment

The following equipment was used to record noise levels:

- Rion NL42 Environmental Noise Monitor.
- Norsonic NOR140 Sound Level Meter.
- BSWA Technology Co. Ltd Sound Calibrator.

The Rion NL42 Environmental Noise Monitors hold current NATA Laboratory Certification and were field calibrated before and after the monitoring period, with no significant drift from the reference signal recorded.

4. Receivers and Noise Monitoring Locations

4.1 Receiver Locations

The nearest sensitive receiver locations were identified as follows:

1. Located at 320 MacArthur Avenue to the east of the site is a residential high rise apartment building (emerging community zone).
2. A multi storey residential development is proposed at 280 Macarthur Avenue to the north of the site (emerging community zone).
3. A multi storey residential development is proposed at 280 Macarthur Avenue to the west of the site (emerging community zone).

These locations were chosen as being representative of the nearest sensitive receivers to the proposed development. Refer to Figure 2 for these locations.

Figure 2: Receivers and Noise Monitoring Locations



4.2 Unattended Ambient Noise Monitoring

A Rion NL42 environmental noise monitor was placed in the rear yard of 6/341 Macarthur Avenue to measure ambient noise levels. This location was selected as it was considered being representative of the nearest residential receivers. The monitor was located in a free field position with the microphone approximately 1.4 metres above ground surface level. The noise monitor was set to record noise levels between the 10th and 17th of July 2024.

The environmental noise monitor was set to record noise levels in "A" Weighting, Fast response using 15 minute statistical intervals. Ambient noise monitoring was conducted generally in accordance with Australian Standard AS1055:2018 *Acoustics – Description and measurement of environmental noise*.

Refer to Figure 2 for noise monitoring location.

4.3 Attended Aircraft Noise Measurements

Aircraft noise levels were measured in the immediate vicinity of the site at 351 Macarthur Avenue and at the northern site boundary at 330 Macarthur Avenue in free field locations. The attended noise monitoring was conducted on the 10th and 18th of July 2024.

The sound level meter was set to record noise levels in octave band, linear weighting, slow response, and broadband "A" weighting, slow response. The typical duration for each measurement was between 20 and 30 seconds. Aircraft noise measurements were conducted in accordance with Australian Standard AS2021:2015.

Refer to Figure 2 for the measurement locations.

5. Measured Noise Levels

The following tables present the measured background noise levels from the unattended noise survey and meteorological conditions.

5.1 Meteorological Conditions

Meteorological observations during the unattended noise monitoring survey were obtained from the Bureau of Meteorology website (<http://www.bom.gov.au/climate/data>), shown in Table 1 below.

Table 1: Meteorological Conditions – Brisbane

Day	Date	Rainfall (mm)	Wind			
			9am		3pm	
			Speed (km/h)	Direction	Speed (km/h)	Direction
Wednesday	10/07/2024	0	6	WSW	7	W
Thursday	11/07/2024	0	7	WSW	4	ESE
Friday	12/07/2024	0	4	SSW	13	W
Saturday	13/07/2024	0	7	W	17	WSW
Sunday	14/07/2024	0	11	WSW	13	WNW
Monday	15/07/2024	0	4	SW	13	W
Tuesday	16/07/2024	0	9	WSW	20	W
Wednesday	17/07/2024	0	17	W	17	W

5.2 Ambient Noise Levels

The ambient noise levels measured at the monitoring location are as follows:

Table 2: Measured Ambient Noise Levels – All Time Periods

Day	Date	L90 dB(A) (Rating Background Level)			L _{Aeq} 9hr
		Day	Evening	Night	Night
Wednesday	10/07/2024	38	44	40	-
Thursday	11/07/2024	41	42	38	51
Friday	12/07/2024	38	43	37	51
Saturday	13/07/2024	38	38	33	49
Sunday	14/07/2024	35	39	31	49
Monday	15/07/2024	40	39	34	50
Tuesday	16/07/2024	43	40	41	53
Wednesday	17/07/2024	44	-	39	-
Overall value		40	40	36	50

Refer to the appendix for a graphical representation of the measured noise levels.

6. Noise Criteria

6.1 Brisbane City Council (BCC) - Environmental Noise Criteria

To ensure a reasonable acoustic amenity is maintained, Brisbane City Council requires environmental noise be assessed in accordance with Noise Impact Assessment PSP (2014). To accurately assess environmental noise, the noise must first be classified as to the type and its duration. Sections 6.1.1 to 6.1.4 breaks down the assessment requirements in relation to the project and considers the criteria in relation to the type of noise being assessed.

6.1.1 Intrusive Noise and Acoustic Amenity

To ensure a reasonable amenity is maintained, the following criteria shall be applied for the assessment of onsite activities to sensitive receivers. The noise criteria as applied by Brisbane City Council in accordance with the Multiple Dwelling Code of the Brisbane City Plan 2014 are as follows:

Table 3: Noise (Planning) Criteria

Criteria Location	Intrusive Noise Criteria	Acoustic Amenity 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: <ul style="list-style-type: none"> • Day - 11hr • Evening - 4hr • Night - 9hr 	Day, evening and night $L_{Aeq,adj,T}$ are not greater than the values in the column below for the relevant criteria location, where T equals: <ul style="list-style-type: none"> • Day - 11hr • Evening - 4hr • Night - 9hr 		
		Day	Evening	Night
Emerging community zone boundary	5 dB(A)	55 dB(A)	50 dB(A)	45 dB(A)

Further reference is made to PO21 and AO21 of the Brisbane City Council City Plan 2014 Multiple Dwelling Code.

Table 4: Noise (Planning) Criteria – Multiple Dwelling Code

Performance Outcome	Acceptable Outcome
<p>PO21 Development in a zone in the centre zones category or Mixed use zone must:</p> <ol style="list-style-type: none"> a. be located, designed and constructed to protect bedrooms and other habitable rooms from exposure to noise arising from non-residential activities outside the building; b. be designed and constructed to achieve a minimum reduction in sound pressure level between the exterior of the building and the bedrooms or indoor primary living areas of 30dBA. <p>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. Note – Site-specific criteria will be identified in a neighbourhood plan for sites within a Special Entertainment Precinct or within the Transport noise corridor overlay.</p>	<p>AO21 Development in a zone in the centre zones category or the Mixed use zone has a minimum acoustic performance of:</p> <ol style="list-style-type: none"> a. Rw 35 for glazing (windows and doors) where total area of glazing is greater than 1.8m². b. Rw 32 for glazing (windows and doors) where total area of glazing is less than or equal to 1.8m².

The noise criteria applicable to this development are as follows:

Table 5: Intrusive Noise Criteria

Time Period	Measured RBL $L_{A90,T}$	Intrusive Criteria dB(A) (RBL $L_{A90} + 5$ dB(A))
Day 7am – 6pm	40	45
Evening 6pm – 10pm	40	45
Night 10pm – 7am	36	41

Table 6: Acoustic Amenity Criteria

Time Period	Acoustic Amenity Criteria ($L_{Aeq,adj,T}$ dB(A))
Day 7am – 6pm	55
Evening 6pm – 10pm	50
Night 10pm – 7am	45

6.1.2 Night-Time Noise

The night-time noise criteria as applied by Brisbane City Council in accordance the Brisbane City Plan 2014 are as follows:

Table 7: Night-time Noise Criteria

Criteria Location	Where the existing $L_{Aeq,9hr\ night}$ at the criteria location is:	Average of the highest 15 single L_{Amax} events over a given night (10pm-7pm) period is not greater than the following values at the relevant criteria location	The absolute highest single L_{Amax} event over a given night (10pm-7am) period is not greater than the following values at the relevant criteria location
Emerging community zone boundary	< 45dB(A)	50dB(A)	55dB(A)
	45 to 60dB(A)	$L_{Aeq,9hr\ night} + 5$ dB(A)	$L_{Aeq,9hr\ night} + 10$ dB(A)
	> 60dB(A)	65dB(A)	70dB(A)

Based on the measured noise levels in Section 5 the night-time noise criteria is as follows:

Table 8: Applicable Night-time Noise Criteria

Criteria Location	Measured $L_{Aeq,9h\ night}$ dB(A)	Criteria Average L_{Amax} dB(A)	Criteria Highest L_{Amax} dB(A)
Emerging community zone boundary	50	55	60

6.1.3 Mechanical Plant

Development that includes mechanical plant (including air-conditioning plant, heat pumps and swimming pool pumps) ensures it is located, designed and attenuated to achieve the following criteria:

$L_{Aeq,adj,T}$ emitted from mechanical plant is not greater than the rating background level plus 3 at a sensitive use not associated with the development.

Where T is:

- (7am to 6pm): 11hr
- (6pm to 10pm): 4hr
- (10pm to 7am): 9hr

Where $L_{Aeq,adj,T}$ is the A-weighted equivalent continuous sound pressure level during measurement time T , adjusted for tonal and impulsive noise characteristics, determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.

The noise criteria applicable to this development are as follows:

Table 9: Applicable Noise Criteria

Time Period	Criteria dB(A) (RBL L_{90} + 3 dB(A))
Day 7am – 6pm	43
Evening 6pm – 10pm	43
Night 10pm – 7am	39

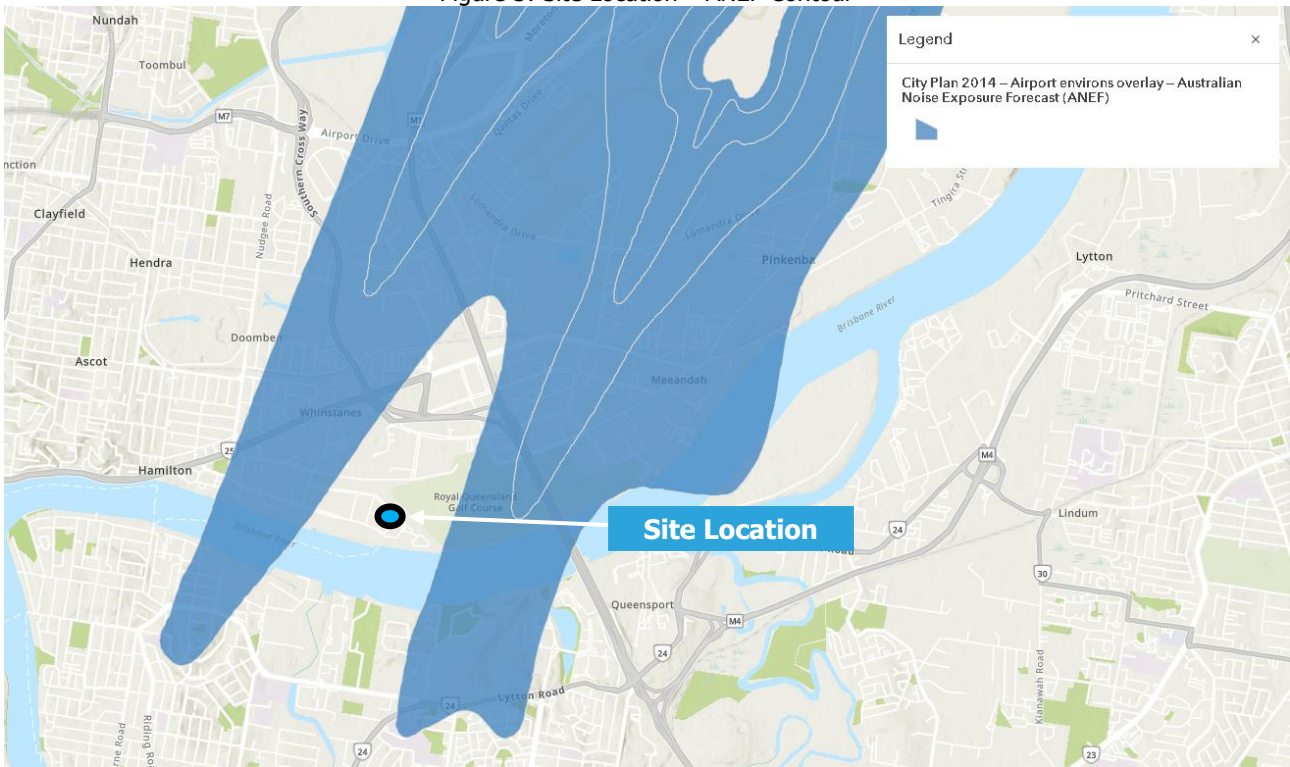
6.2 Aircraft Noise

As per AS2021:2015 "Acoustics - Aircraft Noise Intrusion - Building Siting and Construction for the Assessment of Aircraft Noise", the actual location of the 20 ANEF contour is difficult to define accurately. As a result, aircraft noise may still be assessed for building sites outside but near to the 20 ANEF contour.

The requirement for assessment of aircraft noise comes under the Brisbane City Plan 2014, in accordance with AS2021:2015 "Acoustics - Aircraft Noise Intrusion - Building Siting and Construction for the Assessment of Aircraft Noise".

As seen in Figure 3, the site is located outside the ANEF 20-25 noise contour for Brisbane Airport however, to ensure the proposed development isn't adversely impacted, aircraft noise was assessed utilising attended aircraft noise measurements.

Figure 3: Site Location – ANEF Contour



The indoor design sound levels for residential developments are contained in Table 3.3 of AS2021:2015. The indoor design sound levels are as follows:

Table 10: Aircraft Noise Internal Criteria

Use	Activity of Internal Space	Indoor Design Sound Level L_{Amax} 'S' Time Weighting
Multiple Dwelling	Sleeping areas	50dB(A)
	Other habitable rooms	55dB(A)
	Bathrooms, toilets, laundries	60dB(A)

7. Environmental Assessment

7.1 Onsite Activities

Noise associated with the development was assessed based on previous measurements of similar activities. The calculations assume that the nominated activities are located at the closest representative point to the development site. Any relevant shielding, building transmission loss or recommended acoustic screens are taken into account for these activities.

7.2 Noise Levels Due to Patrons

Noise associated with patrons is based on a technical paper '*Prediction of Noise from Small to Medium Sized Crowds*' (Hayne et al, 2011). The paper was based upon attended noise measurements conducted at a sample of premises to account for range of patron numbers. Based on the measured levels, the resulting analysis determined that the Sound Power Level (L_{Aeq, T}) of a small-medium crowd could be predicted by the following equation:

$$L_{WAeq} = 15 \log (\text{number of patrons}) + 64 \text{ dBA (approx. maximum 100 patrons)}$$

Using the above formulae, the predicted overall patron sound power level the proposed restaurant is presented in Table 11.

Table 11: Predicted Sound Power Levels of Patrons

Location	Number of Patrons Assessed	Predicted L _{Aeq} Sound Power Level dBA	Predicted L _{Aeq} Sound Pressure Level dBA
Restaurant	100	94	86

Based on omnidirectional radiation into free space, the equivalent source sound pressure levels when measured at 1m are taken to be 8dB(A) lower than the sound power levels presented. This has been calculated using the methodology contained in Chapter 6 of *Engineering Noise Control Theory and Practice* (Fourth Edition) by David A. Bies and Colin H. Hansen.

7.3 Intrusive Noise and Acoustic Amenity

The average maximum noise source levels and predicted impacts at the nearest receiver locations are shown in Table 12 as follows. LAeq results are not shown where the calculated total is less than 0dBA.

Table 12: Average Noise Levels from Site Activities

Receiver	Receivers													Intrusive Compliance LAeq						Amenity Compliance LAeq				
	Description													Day	Eve	Night	Day	Eve	Night					
	Source @1m dB(A)	Correction dB(A)*	Corrected dB(A)	Number of events day	Number of events eve	Number of events night	Duration per event	Distance (m)	No Barrier (height (m))	Barrier screening dB	Building TL or shield dB	Room Correction dB	Dist atten. @-6dB/dd	LAeqadj,T ext. dB(A) Day	LAeqadj,T ext. dB(A) Eve	LAeqadj,T ext. dB(A) Night								
1	1. 320 MacArthur Avenue (E) 2. 280 MacArthur Avenue (N) 3. 280 MacArthur Avenue (W)																							
	Criteria																45	45	41	55	50	45		
	Car door closure	75	2	77	200	100	50	2	82				-15	-38.276	4	5		Yes	Yes	Yes	Yes	Yes	Yes	
	Car passby	69		69	200	100	50	15	64					-36.124	22	23	17	Yes	Yes	Yes	Yes	Yes	Yes	
	Car start	74	2	76	200	100	50	2	82				-15	-38.276	3	4		Yes	Yes	Yes	Yes	Yes	Yes	
	Gym activities	80		80	11	4	9	3600	66				-24	-36.391	20	20	20	Yes	Yes	Yes	Yes	Yes	Yes	
	Amplified music (gym/multi purpose room)	80		80	11	4	9	3600	66				-24	-36.391	20	20	20	Yes	Yes	Yes	Yes	Yes	Yes	
	Patron noise (restaurant)	86		86	11	4	9	3600	116				-24	-41	21	21	21	Yes	Yes	Yes	Yes	Yes	Yes	
	Amplified music (restaurant)	80		80	11	4	9	3600	116				-24	-41.289	15	15	15	Yes	Yes	Yes	Yes	Yes	Yes	
	Recreation area	75		75	11	4		3600	103				-20	-40.257	15	15		Yes	Yes	n/a	Yes	Yes	n/a	
	Deliveries	88		88	1			60	65				-20	-36.258	4			Yes	n/a	n/a	Yes	Yes	Yes	
	Retail activities	73		73	11	4	9	3600	72				-10	-37.147	26	26	26	Yes	Yes	Yes	Yes	Yes	Yes	
	Trolley stacking (supermarket carpark)	87		87	11	4	9	10	82				-15	-38.276	8	8	8	Yes	Yes	Yes	Yes	Yes	Yes	
	Total																30	30	29	Yes	Yes	Yes	Yes	Yes
2	Criteria																45	45	41	55	50	45		
	Car door closure	75	2	77	200	100	50	2	59					-35.417	22	23	16	Yes	Yes	Yes	Yes	Yes	Yes	
	Car passby	69		69	200	100	50	15	20					-26.021				Yes	Yes	Yes	Yes	Yes	Yes	
	Car start	74	2	76	200	100	50	2	59					-35.417	21	22	15	Yes	Yes	Yes	Yes	Yes	Yes	
	Gym activities	80		80	11	4	9	3600	44				-24	-32.869	23	23	23	Yes	Yes	Yes	Yes	Yes	Yes	
	Amplified music (gym/multi purpose room)	80		80	11	4	9	3600	44				-24	-32.869	23	23	23	Yes	Yes	Yes	Yes	Yes	Yes	
	Patron noise (restaurant)	86		86	11	4	9	3600	76				-24	-38	24	24	24	Yes	Yes	Yes	Yes	Yes	Yes	
	Amplified music (restaurant)	80		80	11	4	9	3600	76				-24	-38	18	18	18	Yes	Yes	Yes	Yes	Yes	Yes	
	Recreation area	75		75	11	4		3600	66				-20	-36	19	19		Yes	Yes	n/a	Yes	Yes	n/a	
	Deliveries	88		88	1			60	45				-5	-33	22			Yes	n/a	n/a	Yes	Yes	Yes	
	Retail activities	73		73	11	4	9	3600	66				-10	-36	27	27	27	Yes	Yes	Yes	Yes	Yes	Yes	
	Trolley stacking (supermarket carpark)	87		87	11	4	9	10	59					-35	26	26	26	Yes	Yes	Yes	Yes	Yes	Yes	
	Total																33	33	29	Yes	Yes	Yes	Yes	Yes
3	Criteria																45	45	41	55	50	45		
	Car door closure	75	2	77	200	100	50	2	44				-20	-32.869	4	6		Yes	Yes	Yes	Yes	Yes	Yes	
	Car passby	69		69	200	100	50	15	44				-20	-32.869	5	6		Yes	Yes	Yes	Yes	Yes	Yes	
	Car start	74	2	76	200	100	50	2	44				-20	-32.869	3	5		Yes	Yes	Yes	Yes	Yes	Yes	
	Gym activities	80		80	11	4	9	3600	52				-24	-34.32	22	22	22	Yes	Yes	Yes	Yes	Yes	Yes	
	Amplified music (gym/multi purpose room)	80		80	11	4	9	3600	52				-24	-34.32	22	22	22	Yes	Yes	Yes	Yes	Yes	Yes	
	Patron noise (restaurant)	86		86	11	4	9	3600	30				-24	-30	32	32	32	Yes	Yes	Yes	Yes	Yes	Yes	
	Amplified music (restaurant)	80		80	11	4	9	3600	30				-24	-29.542	26	26	26	Yes	Yes	Yes	Yes	Yes	Yes	
	Recreation area	75		75	11	4		3600	41				-20	-32.256	43	43		Yes	Yes	n/a	Yes	Yes	n/a	
	Deliveries	88		88	1			60	79				-20	-37.953	2			Yes	n/a	n/a	Yes	Yes	Yes	
	Retail activities	73		73	11	4	9	3600	80				-15	-38.062	20	20	20	Yes	Yes	Yes	Yes	Yes	Yes	
	Trolley stacking (supermarket carpark)	87		87	11	4	9	10	44				-20	-32.869	9	9	9	Yes	Yes	Yes	Yes	Yes	Yes	
	Total																43	43	34	Yes	Yes	Yes	Yes	Yes

*Correction due to tonality and impulsiveness as per AS 1055:2018.

Compliance is predicted for all onsite activities on the condition the recommendations in Section 9 are implemented.

7.4 Night-time Noise

The maximum noise source levels were determined based on onsite measurements and previous assessments of similar activities.

Table 13: Lmax Noise Levels from Site Activities

Receiver	Receivers													LMax Compliance				
	Description																	
	Source @1m dB(A)	Correction dB(A)*	Corrected dB(A)	Number of events day	Number of events eve	Number of events night	Duration per event	Distance (m)	No Barrier (height (m))	Barrier screening dB	Building TL or shield dB	Room Correction dB	Dist atten. @ 6dB/dd	L _{eq} adj, T ext. dB(A) Day	L _{eq} adj, T ext. dB(A) Eve	Absolute L _{max} dBA		
1	1. 320 MacArthur Avenue (E) 2. 280 MacArthur Avenue (N) 3. 280 MacArthur Avenue (W)																60	
	Criteria																60	
	Car door closure	75	2	77	200	100	50	2	82				-15	-38.276	4	5	33	Yes
	Car passby	69		69	200	100	50	15	64					-36.124	22	23	42	Yes
	Car start	74	2	76	200	100	50	2	82				-15	-38.276	3	4	32	Yes
	Gym activities	80		80	11	4	9	3600	66				-24	-36.391	20	20	29	Yes
	Amplified music (gym/multi purpose room)	80		80	11	4	9	3600	66				-24	-36.391	20	20	29	Yes
	Patron noise (restaurant)	86		86	11	4	9	3600	116				-24	-41	21	21	30	Yes
	Amplified music (restaurant)	80		80	11	4	9	3600	116				-24	-41.289	15	15	24	Yes
	Recreation area	75		75	11	4		3600	103				-20	-40.257	15	15	24	n/a
	Deliveries	88		88	1			60	65				-20	-36.258	4		41	n/a
	Retail activities	73		73	11	4	9	3600	72				-10	-37.147	26	26	35	Yes
	Trolley stacking (supermarket carpark)	87		87	11	4	9	10	82				-15	-38.276	8	8	34	Yes
	Total														30	30	42	Yes
2																	60	
	Criteria																60	
	Car door closure	75	2	77	200	100	50	2	59					-35.417	22	23	51	Yes
	Car passby	69		69	200	100	50	15	20					-26.021				Yes
	Car start	74	2	76	200	100	50	2	59					-35.417	21	22	50	Yes
	Gym activities	80		80	11	4	9	3600	44				-24	-32.869	23	23	32	Yes
	Amplified music (gym/multi purpose room)	80		80	11	4	9	3600	44				-24	-32.869	23	23	32	Yes
	Patron noise (restaurant)	86		86	11	4	9	3600	76				-24	-38	24	24	33	Yes
	Amplified music (restaurant)	80		80	11	4	9	3600	76				-24	-38	18	18	27	Yes
	Recreation area	75		75	11	4		3600	66				-20	-36	19	19	28	n/a
	Deliveries	88		88	1			60	45				-5	-33	22		59	n/a
	Retail activities	73		73	11	4	9	3600	66				-10	-36	27	27	36	Yes
	Trolley stacking (supermarket carpark)	87		87	11	4	9	10	59					-35	26	26	52	Yes
	Total														33	33	59	Yes
3																	60	
	Criteria																60	
	Car door closure	75	2	77	200	100	50	2	44				-20	-32.869	4	6	33	Yes
	Car passby	69		69	200	100	50	15	44				-20	-32.869	5	6	25	Yes
	Car start	74	2	76	200	100	50	2	44				-20	-32.869	3	5	32	Yes
	Gym activities	80		80	11	4	9	3600	52				-24	-34.32	22	22	31	Yes
	Amplified music (gym/multi purpose room)	80		80	11	4	9	3600	52				-24	-34.32	22	22	31	Yes
	Patron noise (restaurant)	86		86	11	4	9	3600	30				-24	-30	32	32	41	Yes
	Amplified music (restaurant)	80		80	11	4	9	3600	30				-24	-29.542	26	26	35	Yes
	Recreation area	75		75	11	4		3600	41					-32.256	43	43	52	n/a
	Deliveries	88		88	1			60	79				-20	-37.953	2		39	n/a
	Retail activities	73		73	11	4	9	3600	80				-15	-38.062	20	20	29	Yes
	Trolley stacking (supermarket carpark)	87		87	11	4	9	10	44				-20	-32.869	9	9	34	Yes
	Total														43	43	52	Yes

*Correction due to tonality and impulsiveness as per AS1055:2018.

Compliance is predicted for all night-time onsite activities on the condition the recommendations in Section 9 are implemented.

8. Aircraft Assessment

8.1 Attended Aircraft Noise Measurements

The noise levels for the various types of aircraft recorded at the measurement location are presented in Table 14.

Table 14: Measured Aircraft Noise Levels

Date	Time 24h	Aircraft	Direction	Action	dBA Lmax slow	dB Lmax (slow)						
						Octave band centre frequency (Hz)						
						63	125	250	500	1k	2k	4k
10/07/24	14:24	Fokker 70	SW	Departing	69.6	75.8	59.9	67.3	64.2	62.6	54.0	41.3
10/07/24	14:39	Boeing 737-838	SW	Departing	59.8	55.5	56.6	52.0	51.7	52.0	43.4	35.6
10/07/24	14:40	Embraer E190AR	SW	Departing	68.4	61.4	60.2	65.6	62.2	56.6	51.2	47.2
10/07/24	14:45	Fokker 100	SW	Departing	66.8	64.3	63.0	69.3	62.2	57.5	46.5	42.0
10/07/24	14:50	Boeing 737-8SA	SW	Departing	61.2	61.7	61.9	57.1	53.0	52.6	46.7	44.9
10/07/24	14:54	E190AR	SW	Departing	68.8	65.3	60.9	69.0	65.3	57.1	53.3	43.9
10/07/24	14:56	Airbus A350-941	SW	Departing	66.1	65.3	60.4	67.6	59.4	54.8	54.2	43.7
18/07/24	9:28	Fokker 100	SW	Departing	69.6	66.4	70.6	71.0	69.8	65.6	55.3	45.3
18/07/24	9:31	Boeing 737-800	SW	Departing	73.3	72.7	75.2	76.3	73.3	67.2	60.5	47.1
18/07/24	9:35	Boeing 737-8FE	SW	Departing	63.5	70.2	68.8	64.2	64.8	55.7	45.1	37.7
18/07/24	9:38	Embraer E190AR	SW	Departing	74.5	68.3	73.2	74.9	75.3	68.9	60.7	45.0
18/07/24	9:40	Boeing 737-8FE	SW	Departing	70.7	72.0	67.2	72.5	71.4	64.4	51.6	34.8
18/07/24	9:44	Fokker 100	SW	Departing	71.3	69.2	72.5	72.4	70.4	66.9	57.8	46.7
18/07/24	9:47	Boeing 737 Max 8	SW	Departing	56.7	63.6	60.5	58.2	56.4	52.4	47.9	46.5
18/07/24	9:50	Boeing 737-838	SW	Departing	75.5	69.1	75.9	76.1	75.0	70.7	62.4	45.6
18/07/24	9:53	Boeing 737-8FE	SW	Departing	66.2	71.3	70.5	65.6	67.8	58.7	48.1	39.3
18/07/24	9:54	Embraer E190AR	SW	Departing	71.4	67.0	67.8	72.5	72.9	65.5	56.3	43.3
18/07/24	9:57	Airbus A330-202	SW	Departing	75.9	76.3	74.5	76.6	77.1	69.9	61.5	47.1
18/07/24	10:01	Embraer E190AR	SW	Departing	64.0	69.8	65.2	65.0	66.4	54.5	44.9	45.8
18/07/24	10:08	Boeing 737-8FE	SW	Departing	62.8	74.0	69.7	66.2	63	54.8	44.8	41.8
18/07/24	10:09	Boeing 737-8FE	SW	Departing	75.4	72.9	71.1	76.5	76.6	69.3	62.4	43.6
18/07/24	10:10	Airbus A330-232	SW	Departing	71.7	68.6	67.5	73.1	70.9	68.2	57.3	45.4
Maximum level in each octave band and corresponding total dBA					75.9	74.0	75.9	76.6	77.1	70.7	62.4	47.2

The maximum measured aircraft noise level was found to be 75.9dBA and therefore used for the purposes of a conservative assessment.

Based on maximum aircraft noise levels, additional façade treatments are required. Refer to Section 9 for recommendations.

9. Recommendations

9.1 Unit Façade Construction

All building treatments for aircraft noise calculated using Australian Standard 2021:2015 "Indoor Design Sound Levels for Determination of Aircraft Noise Reduction".

9.1.1 Unit Number Allocation

Proposed units were allocated numbering for the purposes of this assessment. Refer to Figure 4 to Figure 7 for allocated unit numbering.

Figure 4: Unit Number Allocation – Ground Level



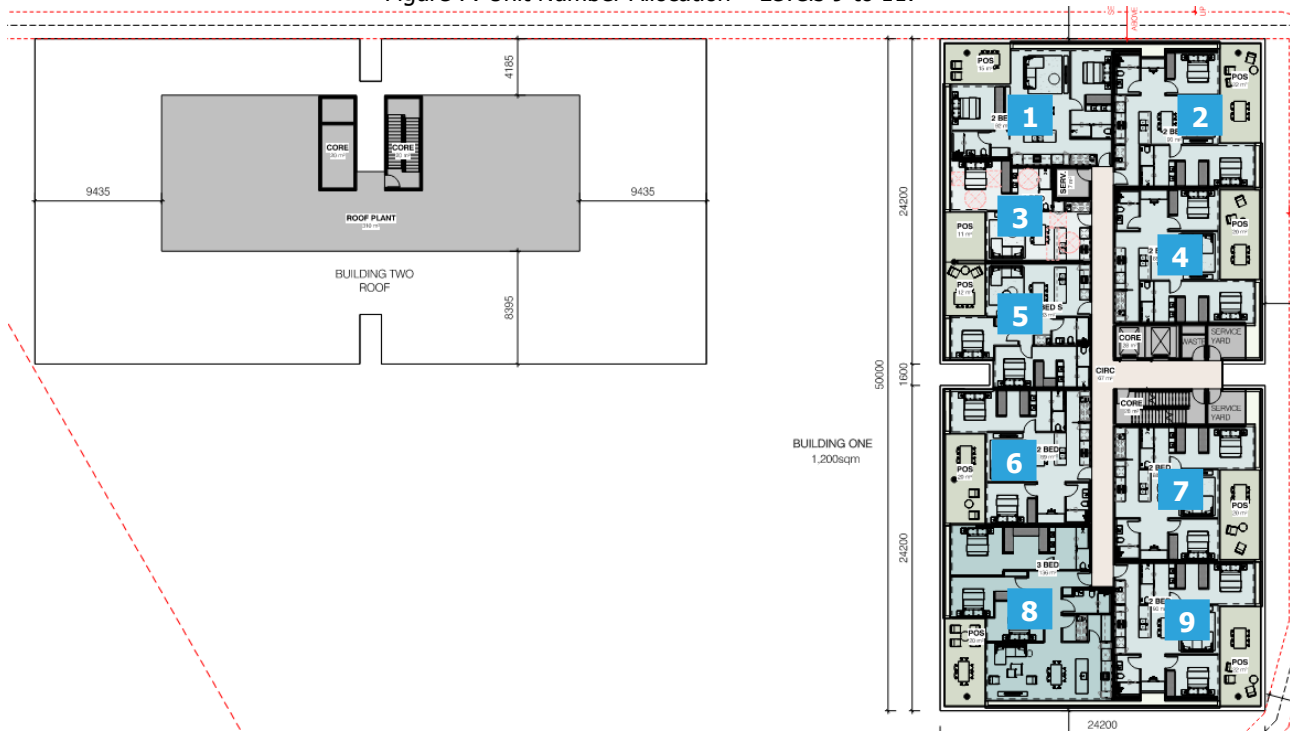
Figure 5: Unit Number Allocation – Level 1



Figure 6: Unit Number Allocation – Levels 2 to 8.



Figure 7: Unit Number Allocation – Levels 9 to 11.



9.1.2 Unit Glazing

The minimum glazing treatments are presented in Table 15, with the installed glazing system to comply with the following:

- The minimum glass thickness specified shall not be reduced regardless of the R_w performance of the glazing system.
- If compliance cannot be achieved with the minimum R_w ratings, the glazing system shall be upgraded until compliance is achieved.
- Glazing specified with acoustic seals requires a Q-lon seal or an equivalent product, mohair seals are not acceptable.
- The glazier shall provide NATA test reports on request to verify compliance with the minimum R_w ratings. Generic reports are not acceptable.

Table 15: Glazing Treatments for Aircraft Noise Impacts

Level	Location		Rw Rating	Glazing	Acoustic Seals
	Unit	Room			
G	Building 1 - Unit 1	Living Kitchen	31	6.38mm laminated	yes
G		Dining			
G		Bed 1			
G	Building 1 - Unit 2	Bed 2	34	10.38mm laminated	yes
G		Living Kitchen			
G		Dining			
G		Bed 3			
G	Building 2 - Unit 1	Living Kitchen	31	6.38mm laminated	yes
G		Dining			
G		Bed 1			
G	Building 2 - Unit 2	Bed 2	34	10.38mm laminated	yes
G		Living Kitchen			
G		Dining			
G	Building 2 - Unit 2	Bed 1	34	10.38mm laminated	yes
G		Bed 2			

Location		Rw Rating	Glazing	Acoustic Seals	
Level	Unit				Room
G		Bed 2	34	10.38mm laminated	yes
G	Building 2 - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G		Bed 2	34	10.38mm laminated	yes
G	Building 2 - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G		Bed 2	34	10.38mm laminated	yes
G		Bed 3	34	10.38mm laminated	yes
G	Building 2 - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G		Bed 2	34	10.38mm laminated	yes
G		Bed 3	34	10.38mm laminated	yes
G	Building 2 - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
1	Building 1 - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 1 - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 1 - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 1 - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 1 - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 1 - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1		Bed 3	34	10.38mm laminated	yes
1	Building 1 - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 2 - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 2 - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1		Bed 3	34	10.38mm laminated	yes
1	Building 2 - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes

Location		Rw Rating	Glazing	Acoustic Seals	
Level	Unit				Room
1	Building 2 - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 2 - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
1	Building 2 - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 8	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8		Bed 3	34	10.38mm laminated	yes
2 to 8	Building 1 - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes

Location			Rw Rating	Glazing	Acoustic Seals
Level	Unit	Room			
2 to 8	Building 2 - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 8	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8	Building 2 - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
2 to 8		Bed 1	34	10.38mm laminated	yes
2 to 8		Bed 2	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 8	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes
9 to 11		Bed 3	34	10.38mm laminated	yes
9 to 11	Building 1 - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
9 to 11		Bed 1	34	10.38mm laminated	yes
9 to 11		Bed 2	34	10.38mm laminated	yes

Any locations not identified in the Table 15 shall require 4mm float for windows (minimum R_w 22) and 5mm toughened for sliding doors (minimum R_w 23).

9.1.3 Unit Wall Construction

All masonry and blockwork wall systems will comply with the minimum R_w of 45. For lightweight wall systems, we recommend the following:

- 1 layer of 9mm FC, 90mm timber stud with 75mm glasswool batts (density 11kg/m³) and 2 layers of 13mm fire rated plasterboard.

9.1.4 Unit Roof Construction

For the roof systems, we recommend construction as follows:

- R_w 50 – The proposed concrete slab on the rooftops is predicted to achieve an R_w 50.

9.2 Gym and Restaurant Façade Construction

9.2.1 Gym and Restaurant Glazing

The minimum glazing treatments presented in Table 16 are required to comply with the following:

- The minimum glass thickness specified shall not be reduced regardless of the R_w performance of the glass unless the glazier can provide a specific (non-generic) NATA Test report proving the proposed glazing system complies (the test report must be based on the same configuration proposed for the development). Note an estimation or calculated performance will not be accepted.
- If compliance cannot be achieved with the minimum R_w ratings, the glazing system shall be upgraded until compliance is achieved.
- Glazing specified with acoustic seals requires a seal that has been tested with a glazing system or door to achieve an R_w rating in accordance with AS/NZS ISO 717.1, mohair seals are not acceptable.
- The glazier shall provide NATA test reports on request to verify compliance with the minimum R_w ratings. Generic reports are not acceptable.

Table 16: Gym and Restaurant Glazing Treatments

Location	R_w Ratings			Glazing Thickness	Acoustic Seals
	Wall	Roof	Glazing		
Gym	35	35	31	6.38mm	Yes
Restaurant	35	35	31	6.38mm	Yes

9.2.2 Gym and Restaurant Wall Construction

The wall construction recommendations are included in Table 17 below. Note that these are not the only allowable methods of construction for the development, and alternative constructions to achieve the required R_w ratings may also be provided.

Table 17: Gym & Restaurant Wall Construction

Wall R_w	Minimum Wall Treatments
35	Masonry veneer wall at least 110mm thick, 90mm timber studs at 600mm centres, 20mm gap, 10mm plasterboard internal. OR 6mm fibre cement sheeting or sheet metal external, 90mm timber studs at 600m centres, 75mm glasswool insulation (11kg/m ³) or equivalent, 13mm plasterboard internal.

9.2.3 Gym and Restaurant Roof/Ceiling Construction

The roof/ceiling construction recommendations are included in Table 18 below. Note that these are not the only allowable methods of construction for the development, and alternative constructions to achieve the required R_w ratings may also be provided.

Table 18: Gym & Restaurant Roof Construction

Roof R_w	Minimum Roof Treatments
35	Sheet metal roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity.

9.2.4 Gym and Restaurant Entry Doors

Table 19: Gym & Restaurant Entry Door Construction

Door R_w	Minimum Gym Entry Door Construction
28	Fixed so as to overlap the frame or rebate of the frame, constructed of – (i) wood, particleboard or blockboard not less than 33mm thick; or (ii) compressed fibre reinforced sheeting not less than 9mm thick; or (iii) other suitable material with a mass per unit area not less than 24.4kg/m ² ; or (iv) solid core timber door not less than 35mm thick fitted with full perimeter acoustically rated seals.

9.3 Alternative Ventilation

We recommend that the proposed gym, restaurant and units presented in Table 15 have the provision for an alternative ventilation system similar to air-conditioning or mechanical ventilation to allow doors and windows to be closed and compliance with AS3671 and NCC requirements.

9.4 Onsite Activities

Based on the predicted noise levels and subjective assessment of the site and surrounds, noise impacts at the receiver locations are predicted to comply with the assessment criteria on the condition the following management plans are implemented:

- Use of the pool area shall be limited to the day and evening periods, between 7am and 10pm.
- All gym and restaurant doors and windows are to be closed during operation.
- Deliveries and waste collection shall be limited to the daytime period, between 7am and 6pm.
- Amplified music within the restaurant and gym is to be limited to 80dB(A) measured at 1 metre from the speaker.
- Carpark and ramp finished surfaces should consist of materials which provide low tyre squeal characteristics. Any traversable drainage grates must be securely fastened.

9.4.1 Onsite Mechanical Plant

No information regarding mechanical services was available at the time of the assessment. We recommend that any new mechanical plant is designed to comply with the criteria stated in Section 6.2.2 with an assessment by qualified acoustic consultant to be conducted prior to installation.

10. Conclusion

An aircraft and environmental noise assessment was conducted for the proposed residential development to be located at Lot 18A Macarthur Avenue, Hamilton. The development is predicted to satisfy all the relevant noise assessment requirements on the condition that the recommendations in Section 9 are implemented.

If you should have any queries, please do not hesitate to contact us.

Report Prepared By



David Dadd (B.Sc. (Env.) MAAS)

Senior Acoustic Consultant

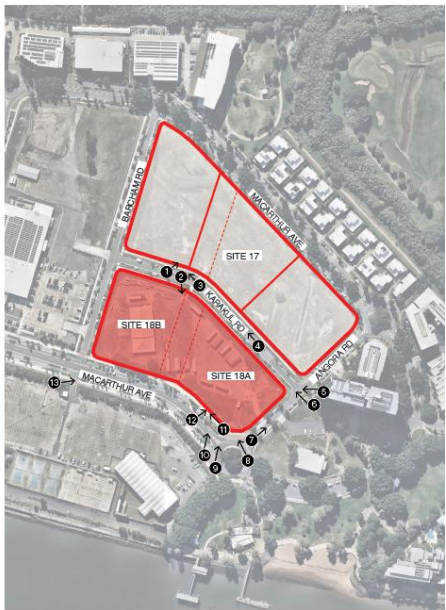
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11. Appendices

11.1 Development Plans



1.2 Existing Context
Site Photographs

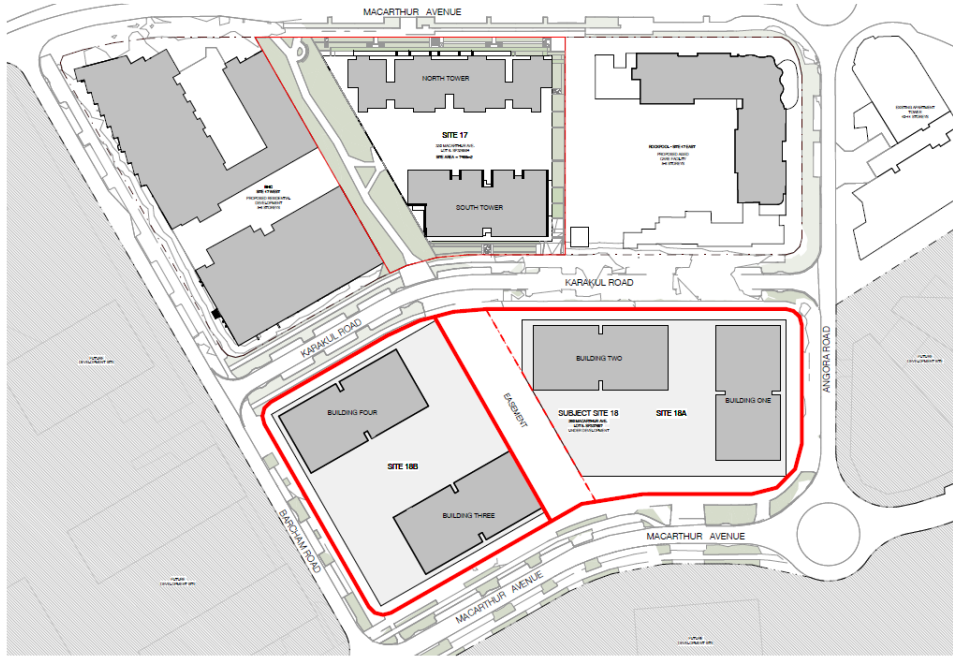


1.0 EXISTING CONTEXT

SITE 18 NORTHSHORE, HAMILTON

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2.0 Project Vision
Proposed Precinct Plan

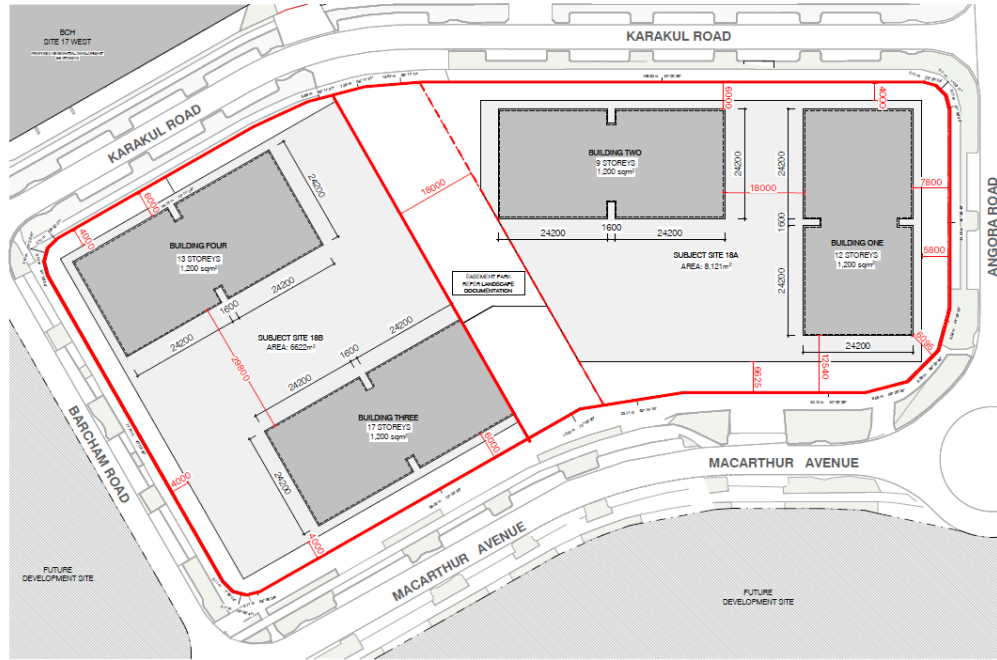


2.0 PROJECT VISION

SITE 18 NORTHSHORE, HAMILTON

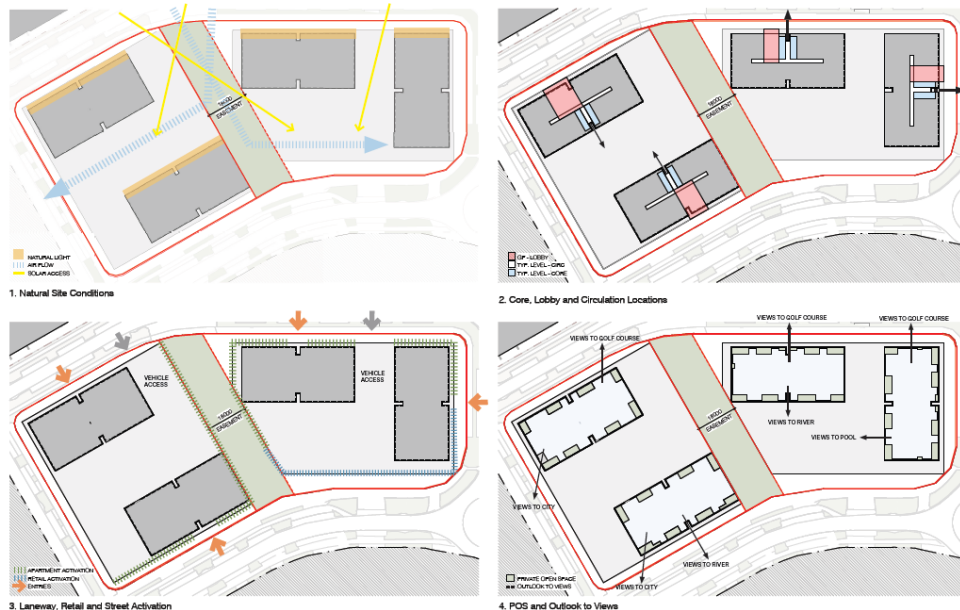
6

2.1 Project Vision
Site Plan



2.0 PROJECT VISION SITE 18 NORTHSHORE, HAMILTON 7

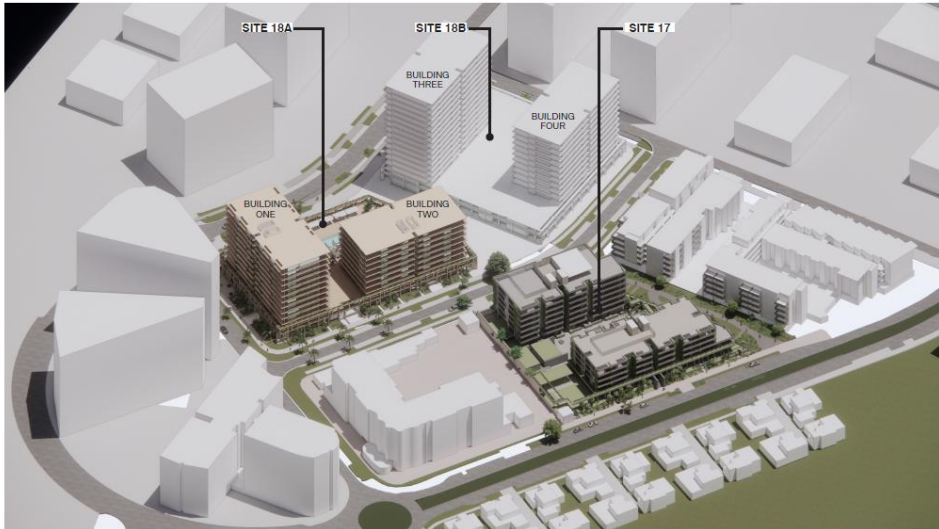
2.3 Project Vision
Diagrams



2.0 PROJECT VISION SITE 18 NORTHSHORE, HAMILTON 9

2.4 3D Massing Diagram

car



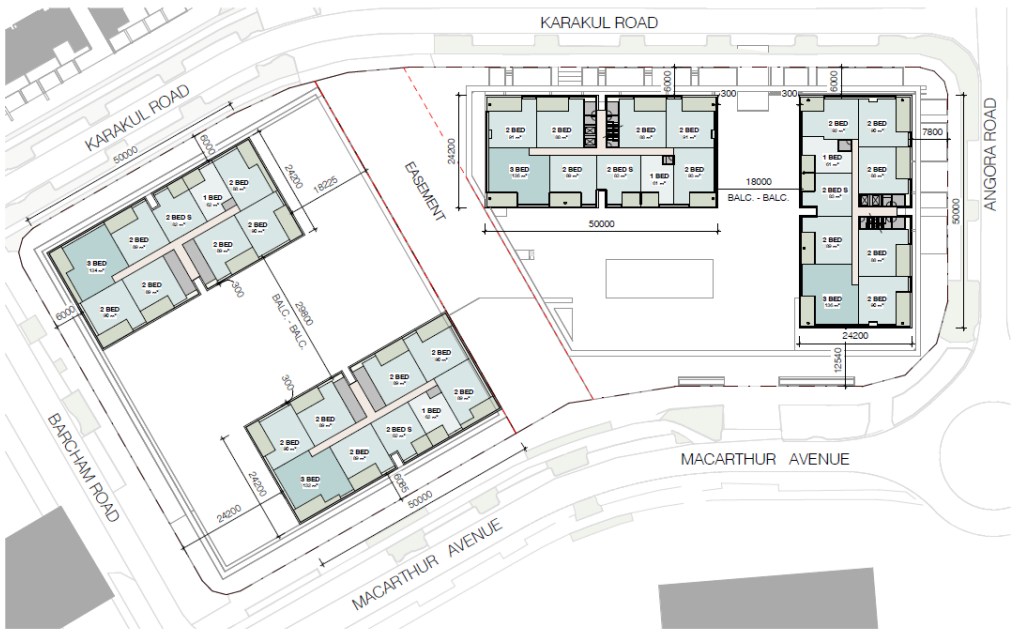
2.0 PROJECT VISION

SITE 18 NORTHSHORE, HAMILTON

10

2.5 Typical Tower Level Site 18

car



2.0 PROJECT VISION

SITE 18 NORTHSHORE, HAMILTON

11

3.0 Concept Design - Site 18a
Karakul Road

cartr



3.0 CONCEPT DESIGN SITE 18 NORTHSHORE, HAMILTON 19

3.0 Concept Design - Site 18a
Karakul Road

cartr



3.0 CONCEPT DESIGN SITE 18 NORTHSHORE, HAMILTON 19

3.0 Concept Design - Site 18a
Karakul and Angora Roads

cair



3.0 CONCEPT DESIGN

SITE 18 NORTHSHORE, HAMILTON

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3.0 Concept Design - Site 18a
Angora Road

cair



3.0 CONCEPT DESIGN

SITE 18 NORTHSHORE, HAMILTON

21

3.0 Concept Design - Site 18a
Angora Road and Macarthur Avenue

car



3.0 CONCEPT DESIGN

SITE 18 NORTHSHORE, HAMILTON

22

3.0 Concept Design - Site 18a
Macarthur Avenue

car



3.0 CONCEPT DESIGN

SITE 18 NORTHSHORE, HAMILTON

23

3.0 Concept Design - Site 18a
Retail Corner

car



3.0 CONCEPT DESIGN

SITE 18 NORTHSHORE, HAMILTON

24

3.0 Concept Design - Site 18a
Macarthur Road and Easement

car



3.0 CONCEPT DESIGN

SITE 18 NORTHSHORE, HAMILTON

25

3.0 Concept Design - Site 18a
Pool Terrace

carr



3.0 CONCEPT DESIGN

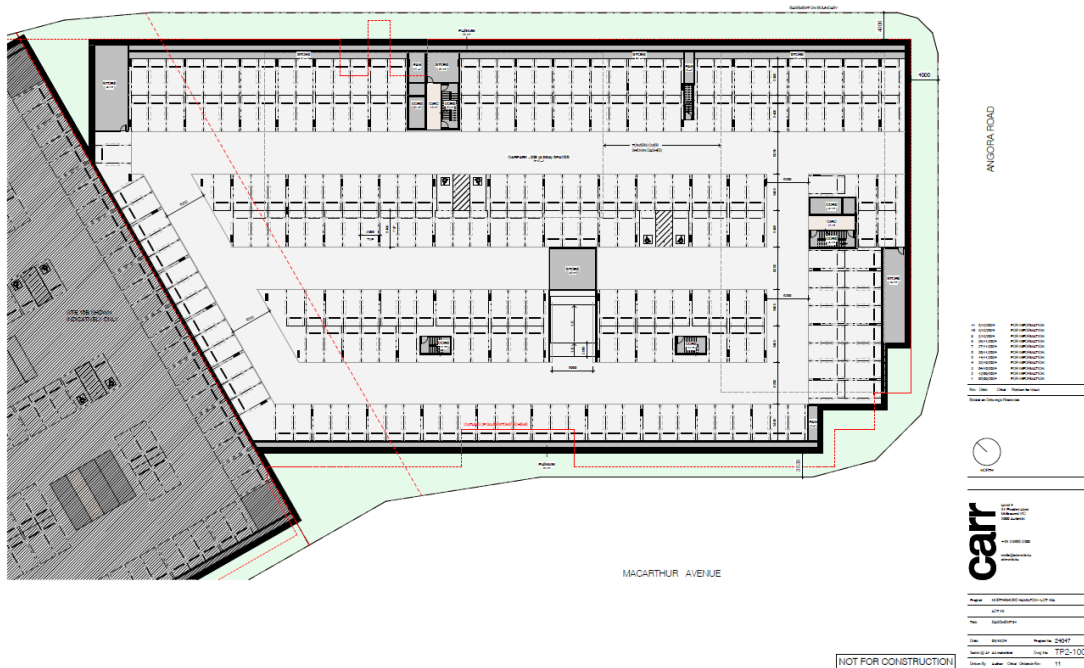
SITE 18 NORTHSHORE, HAMILTON

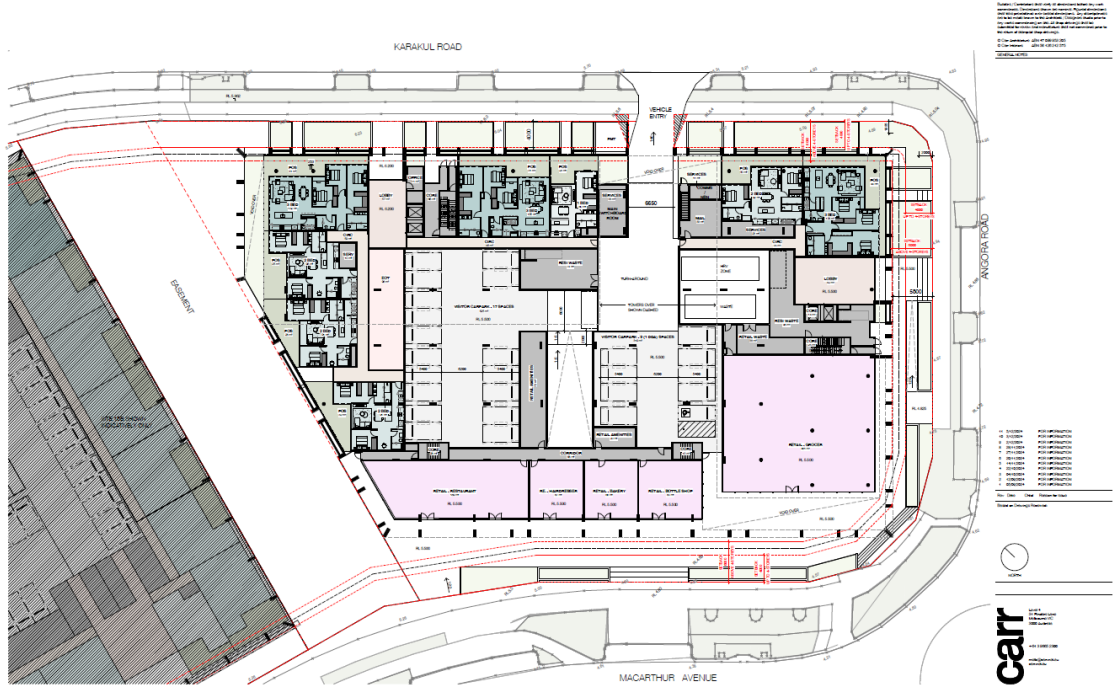
26

TRIPIC TO REVIEW
BRIEF AND CAR
FOR FINAL SCHEDULE

Item	Quantity	Unit	Rate	Total
Site Preparation	1	Lot	100,000	100,000
Foundation	1	Lot	150,000	150,000
Structure	1	Lot	200,000	200,000
Roofing	1	Lot	50,000	50,000
Interior Fit-out	1	Lot	100,000	100,000
External Works	1	Lot	50,000	50,000
Professional Fees	1	Lot	20,000	20,000
Contingency	1	Lot	100,000	100,000
Total				770,000

TBC





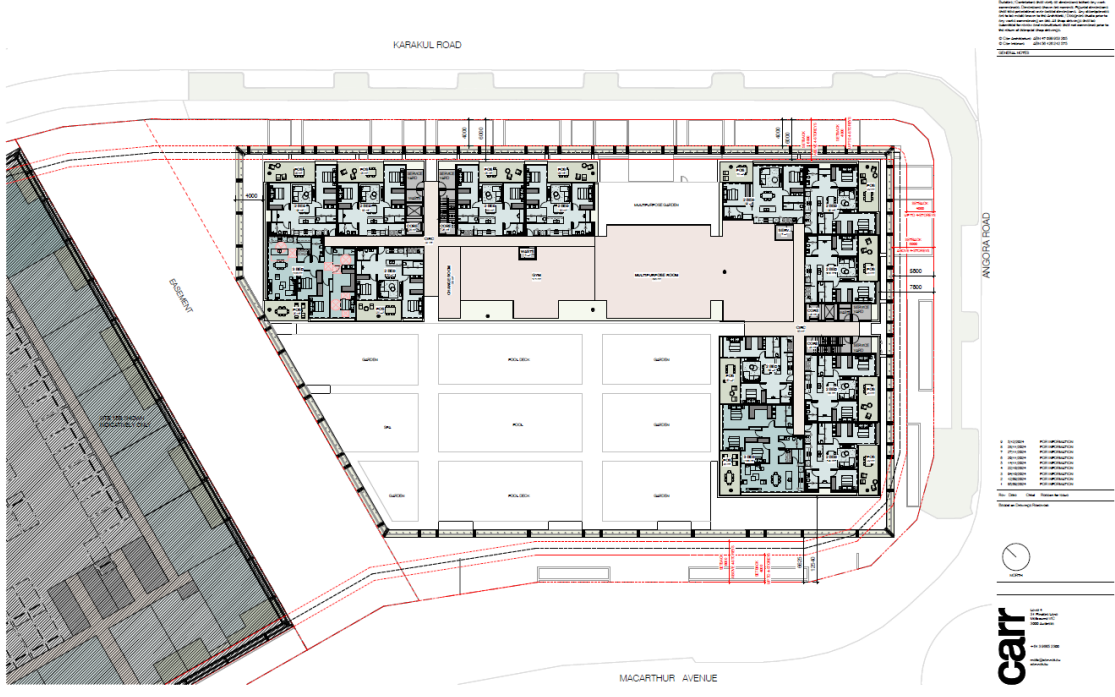
Notes: 1. All dimensions are in millimeters unless otherwise stated. 2. All dimensions are to the centerline of the wall unless otherwise stated. 3. All dimensions are to the centerline of the door unless otherwise stated. 4. All dimensions are to the centerline of the window unless otherwise stated. 5. All dimensions are to the centerline of the column unless otherwise stated. 6. All dimensions are to the centerline of the beam unless otherwise stated. 7. All dimensions are to the centerline of the slab unless otherwise stated. 8. All dimensions are to the centerline of the floor unless otherwise stated. 9. All dimensions are to the centerline of the ceiling unless otherwise stated. 10. All dimensions are to the centerline of the wall unless otherwise stated.

Room No.	Room Name	Area (m ²)	Volume (m ³)
101	Office	15.00	15.00
102	Office	15.00	15.00
103	Office	15.00	15.00
104	Office	15.00	15.00
105	Office	15.00	15.00
106	Office	15.00	15.00
107	Office	15.00	15.00
108	Office	15.00	15.00
109	Office	15.00	15.00
110	Office	15.00	15.00
111	Office	15.00	15.00
112	Office	15.00	15.00
113	Office	15.00	15.00
114	Office	15.00	15.00
115	Office	15.00	15.00
116	Office	15.00	15.00
117	Office	15.00	15.00
118	Office	15.00	15.00
119	Office	15.00	15.00
120	Office	15.00	15.00
121	Office	15.00	15.00
122	Office	15.00	15.00
123	Office	15.00	15.00
124	Office	15.00	15.00
125	Office	15.00	15.00
126	Office	15.00	15.00
127	Office	15.00	15.00
128	Office	15.00	15.00
129	Office	15.00	15.00
130	Office	15.00	15.00
131	Office	15.00	15.00
132	Office	15.00	15.00
133	Office	15.00	15.00
134	Office	15.00	15.00
135	Office	15.00	15.00
136	Office	15.00	15.00
137	Office	15.00	15.00
138	Office	15.00	15.00
139	Office	15.00	15.00
140	Office	15.00	15.00
141	Office	15.00	15.00
142	Office	15.00	15.00
143	Office	15.00	15.00
144	Office	15.00	15.00
145	Office	15.00	15.00
146	Office	15.00	15.00
147	Office	15.00	15.00
148	Office	15.00	15.00
149	Office	15.00	15.00
150	Office	15.00	15.00

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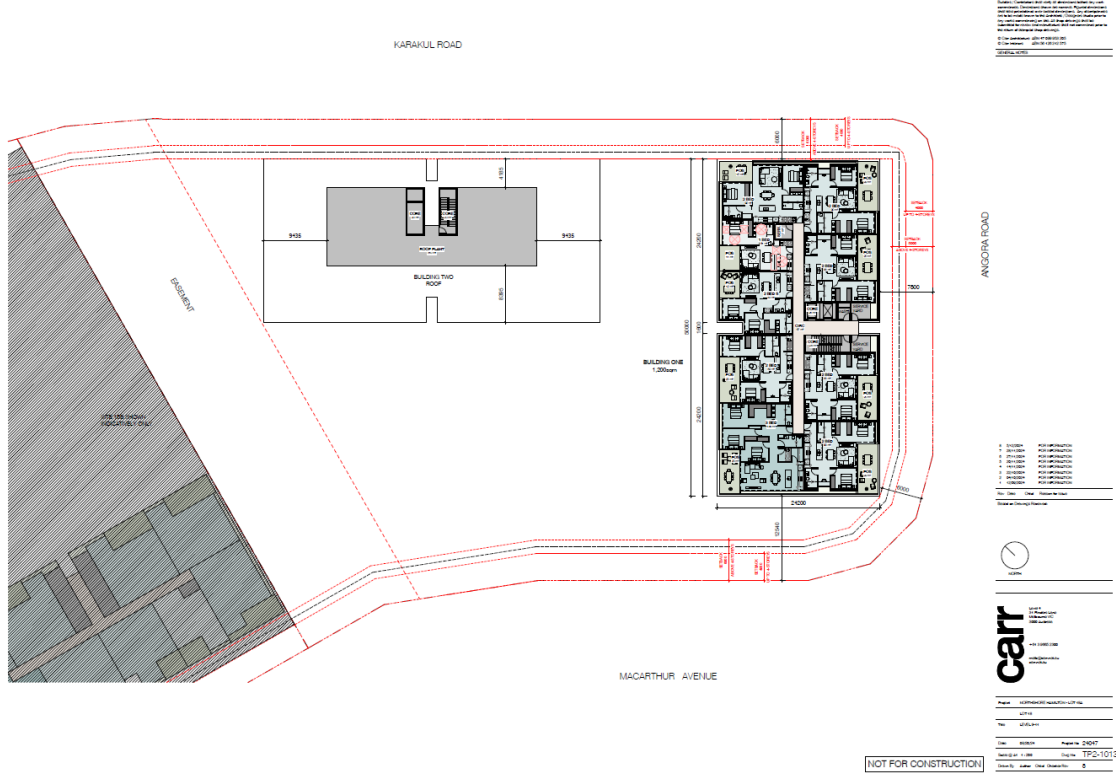
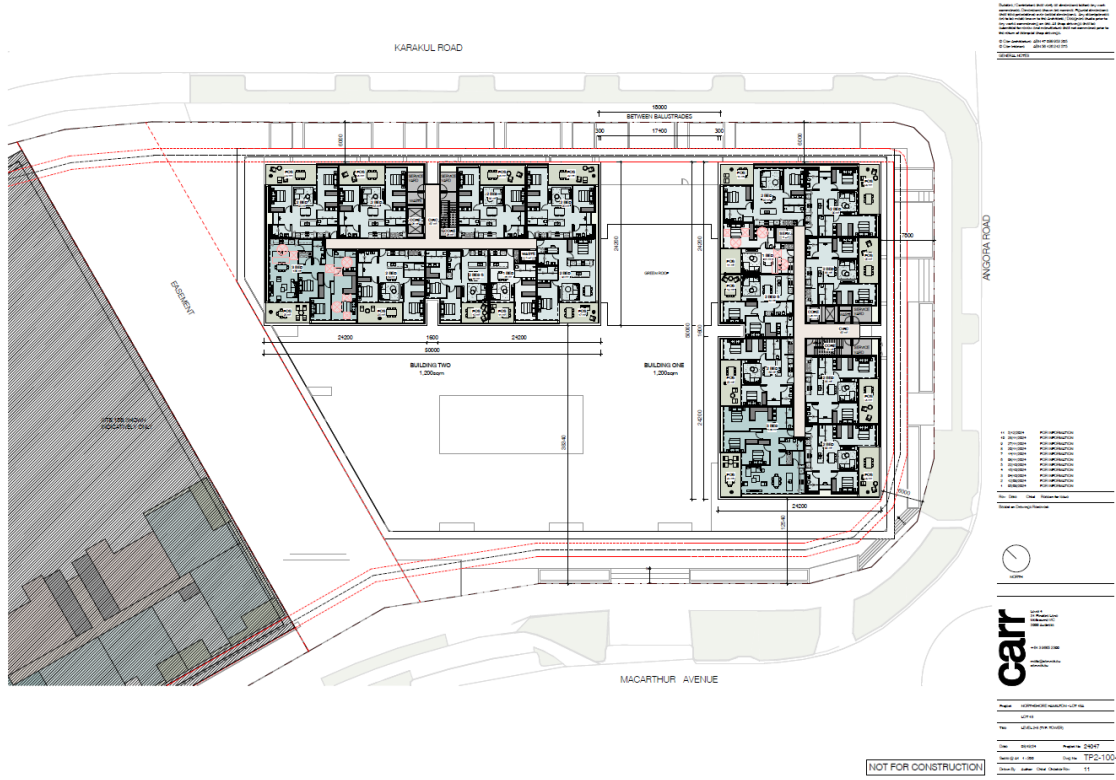
Notes: 1. All dimensions are in millimeters unless otherwise stated. 2. All dimensions are to the centerline of the wall unless otherwise stated. 3. All dimensions are to the centerline of the door unless otherwise stated. 4. All dimensions are to the centerline of the window unless otherwise stated. 5. All dimensions are to the centerline of the column unless otherwise stated. 6. All dimensions are to the centerline of the beam unless otherwise stated. 7. All dimensions are to the centerline of the slab unless otherwise stated. 8. All dimensions are to the centerline of the floor unless otherwise stated. 9. All dimensions are to the centerline of the ceiling unless otherwise stated. 10. All dimensions are to the centerline of the wall unless otherwise stated.

Room No.	Room Name	Area (m ²)	Volume (m ³)
101	Office	15.00	15.00
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130	Office	15.00	15.00
131	Office	15.00	15.00
132	Office	15.00	15.00
133	Office	15.00	15.00
134	Office	15.00	15.00
135	Office	15.00	15.00
136	Office	15.00	15.00
137	Office	15.00	15.00
138	Office	15.00	15.00
139	Office	15.00	15.00
140	Office	15.00	15.00
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142	Office	15.00	15.00
143	Office	15.00	15.00
144	Office	15.00	15.00
145	Office	15.00	15.00
146	Office	15.00	15.00
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150	Office	15.00	15.00

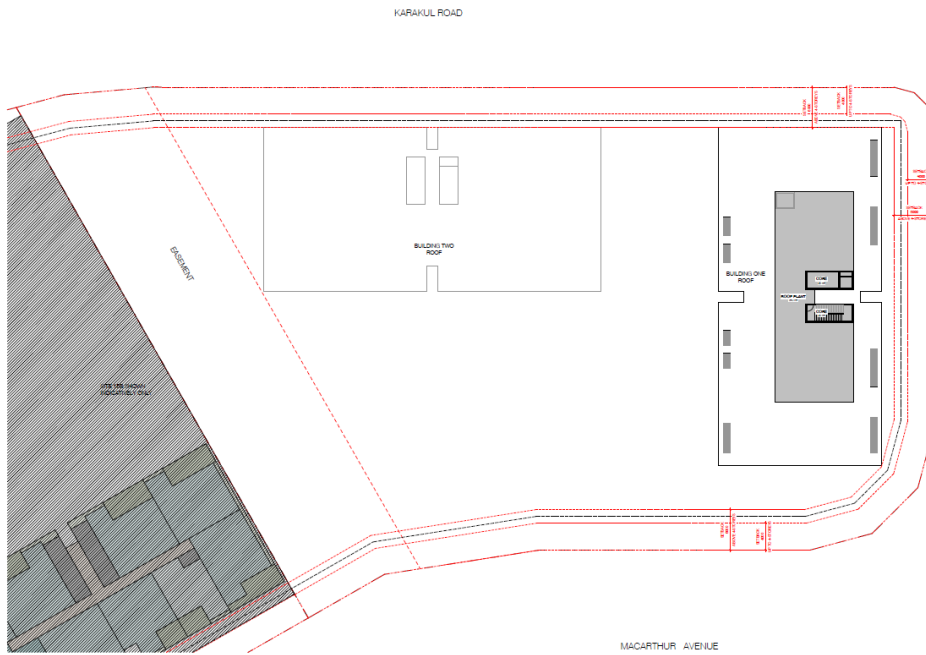
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Scale: 1:1000
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 Project: 2024503 R01B Lot 18A Macarthur Avenue Hamilton ENV ACN.docx
 Drawing: TP2-101
 Author: [Name]
 Checker: [Name]



1	PLAN	TP2-101
2	SECTION A-A	TP2-101
3	SECTION B-B	TP2-101
4	SECTION C-C	TP2-101
5	SECTION D-D	TP2-101
6	SECTION E-E	TP2-101
7	SECTION F-F	TP2-101
8	SECTION G-G	TP2-101
9	SECTION H-H	TP2-101
10	SECTION I-I	TP2-101
11	SECTION J-J	TP2-101
12	SECTION K-K	TP2-101
13	SECTION L-L	TP2-101
14	SECTION M-M	TP2-101
15	SECTION N-N	TP2-101
16	SECTION O-O	TP2-101
17	SECTION P-P	TP2-101
18	SECTION Q-Q	TP2-101
19	SECTION R-R	TP2-101
20	SECTION S-S	TP2-101
21	SECTION T-T	TP2-101
22	SECTION U-U	TP2-101
23	SECTION V-V	TP2-101
24	SECTION W-W	TP2-101
25	SECTION X-X	TP2-101
26	SECTION Y-Y	TP2-101
27	SECTION Z-Z	TP2-101

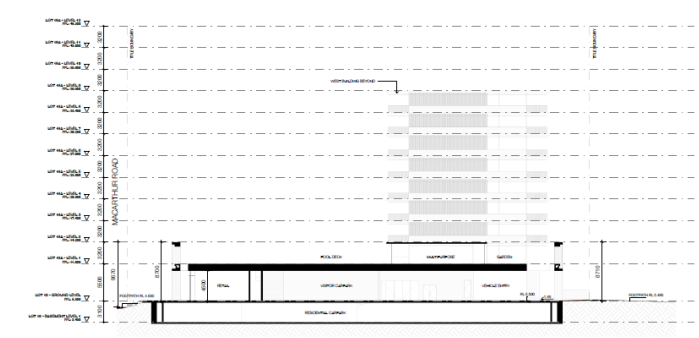
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 Checker: [Name]

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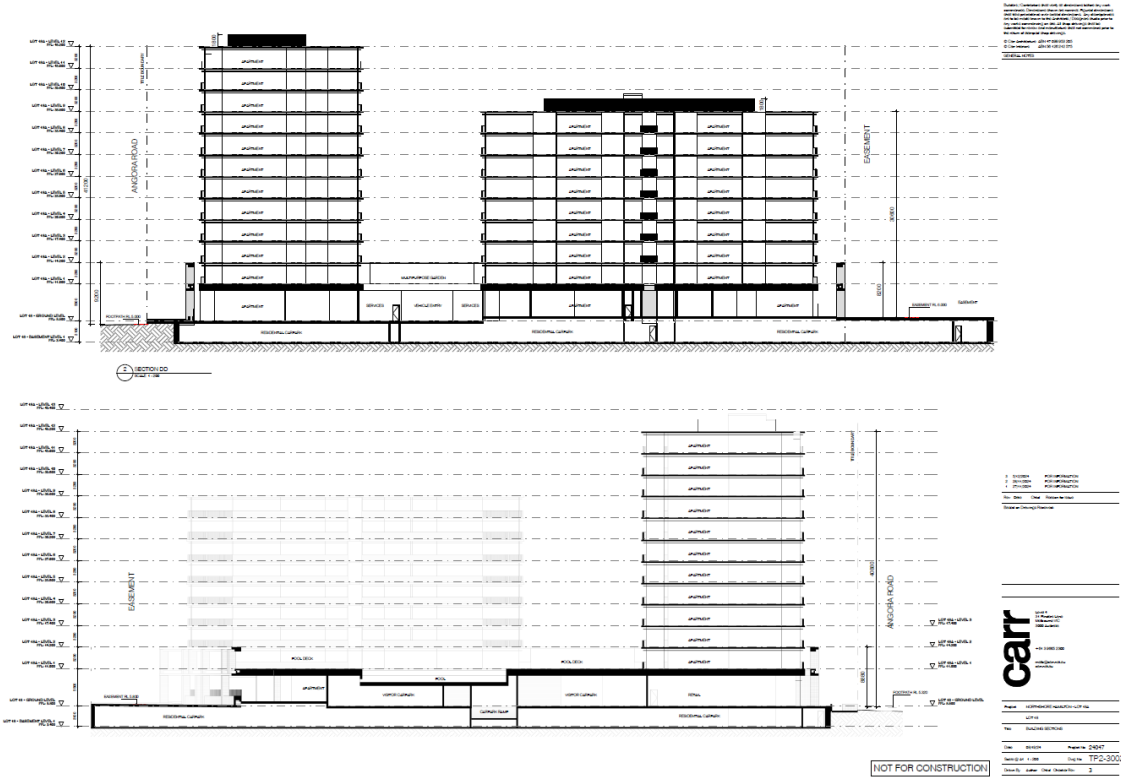
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 Drawing: TP2-101
 Author: [Name]
 Checker: [Name]



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 Drawing: TP2-101
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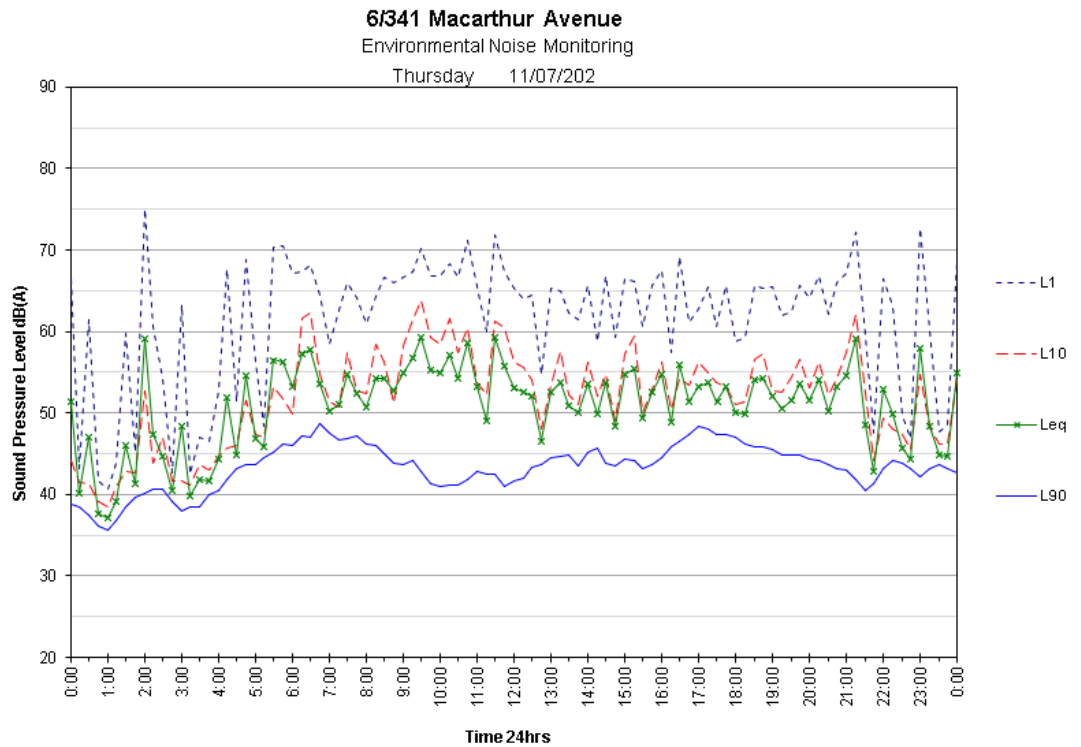
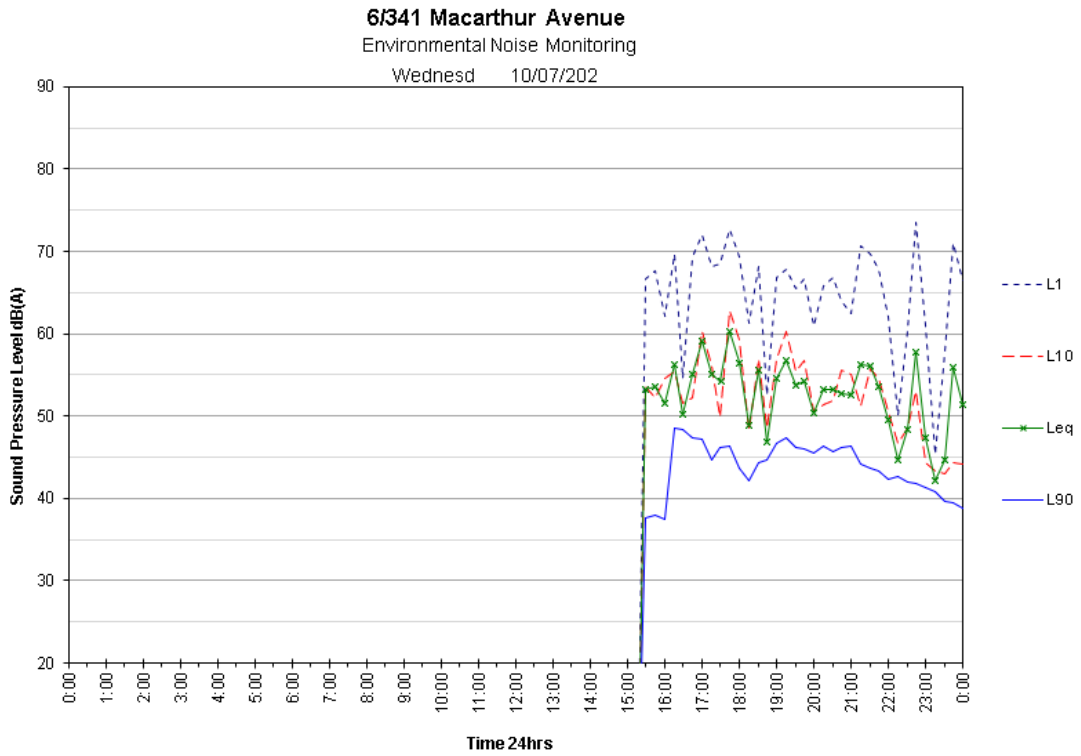
Notes: Consultant has used an acoustic model to predict the sound environment in the building. The model is based on the acoustic data provided by the client. The model is used to predict the sound environment in the building. The model is used to predict the sound environment in the building.

1. Consultant
2. Client
3. Other
4. Other
5. Other

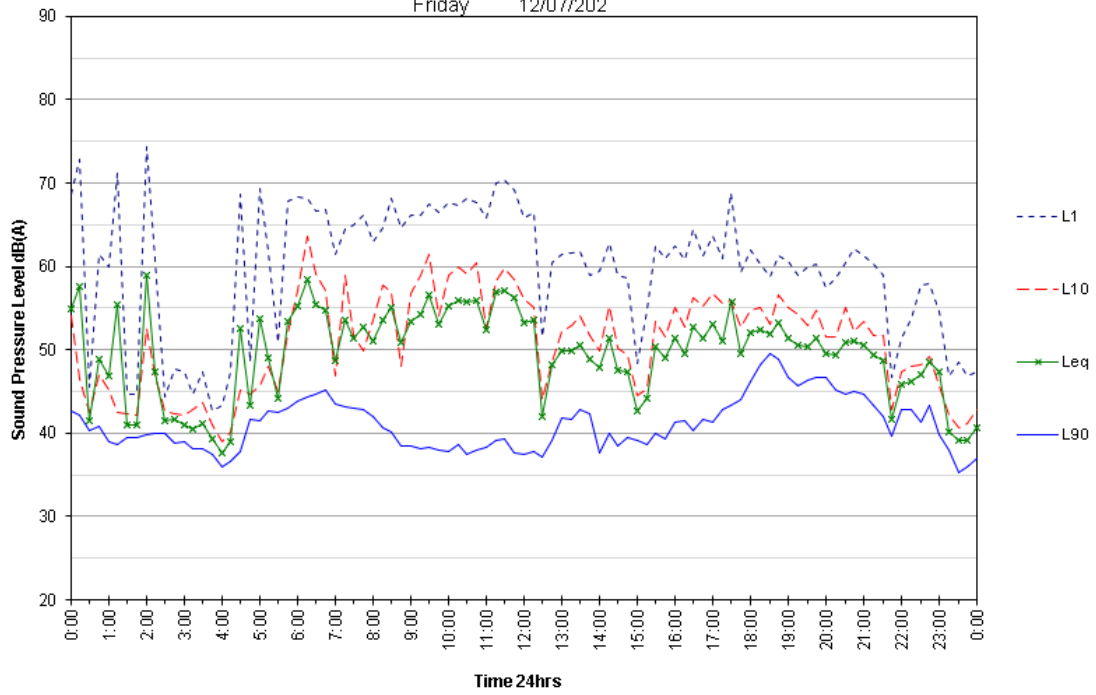
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 CONSULTANTS
 100 RIVERVIEW DRIVE
 SUITE 100
 HAMILTON ONTARIO L8N 3R7
 TEL: (905) 571-8888
 FAX: (905) 571-8889
 WWW.CARRCONSULTANTS.COM

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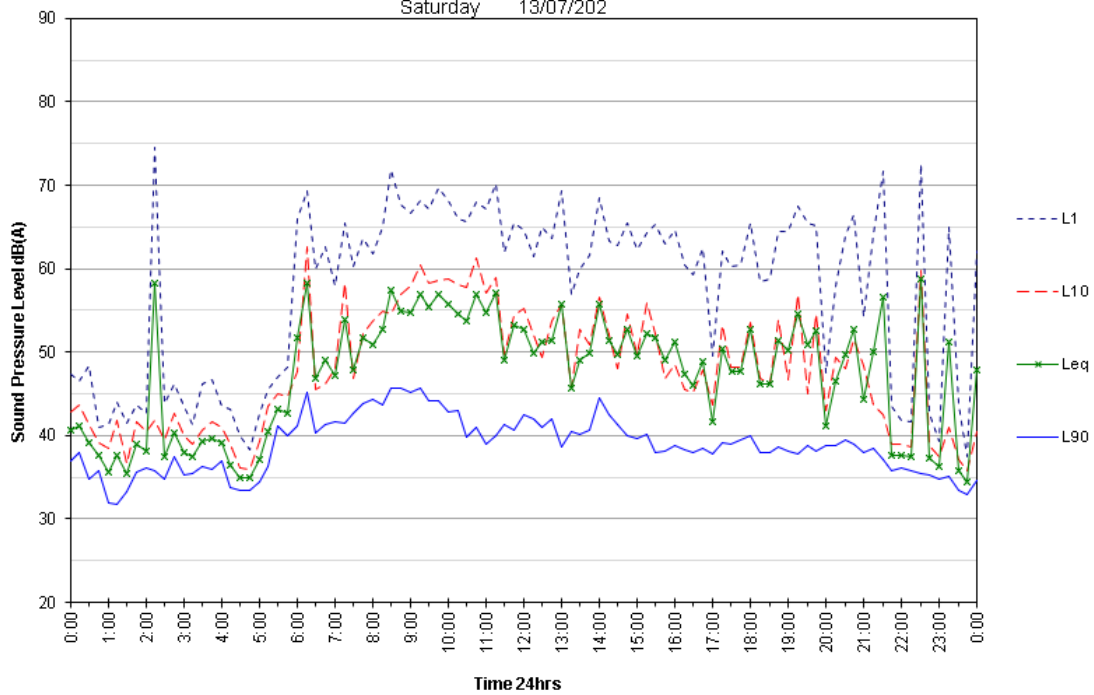
11.2 Noise Monitoring Charts



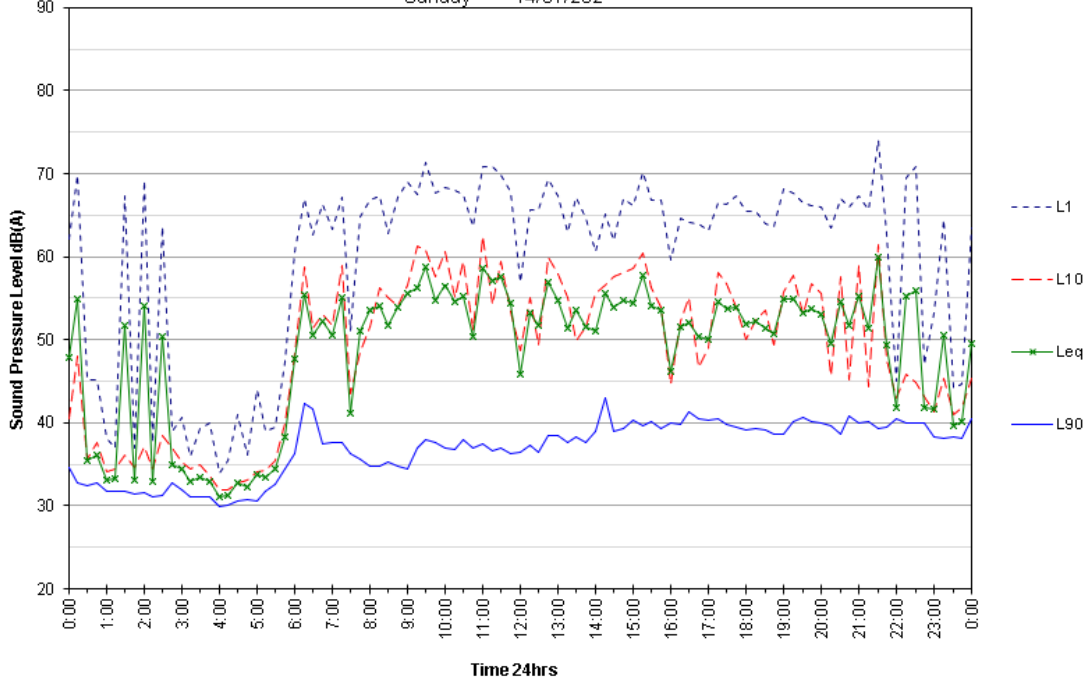
6/341 Macarthur Avenue
 Environmental Noise Monitoring
 Friday 12/07/2022



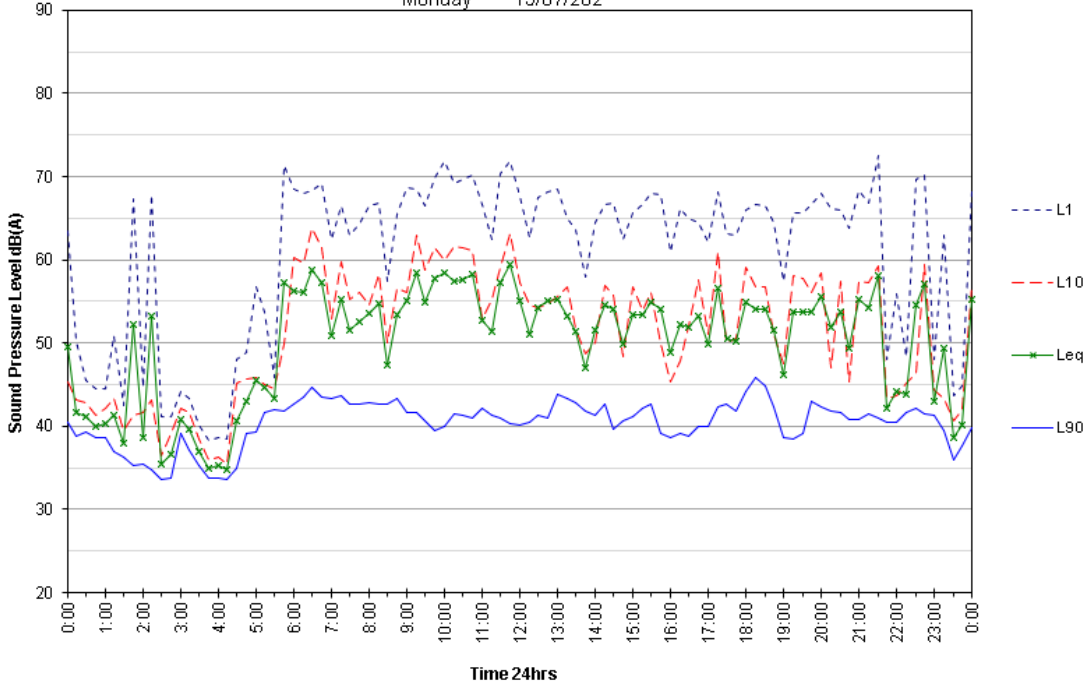
6/341 Macarthur Avenue
 Environmental Noise Monitoring
 Saturday 13/07/2022



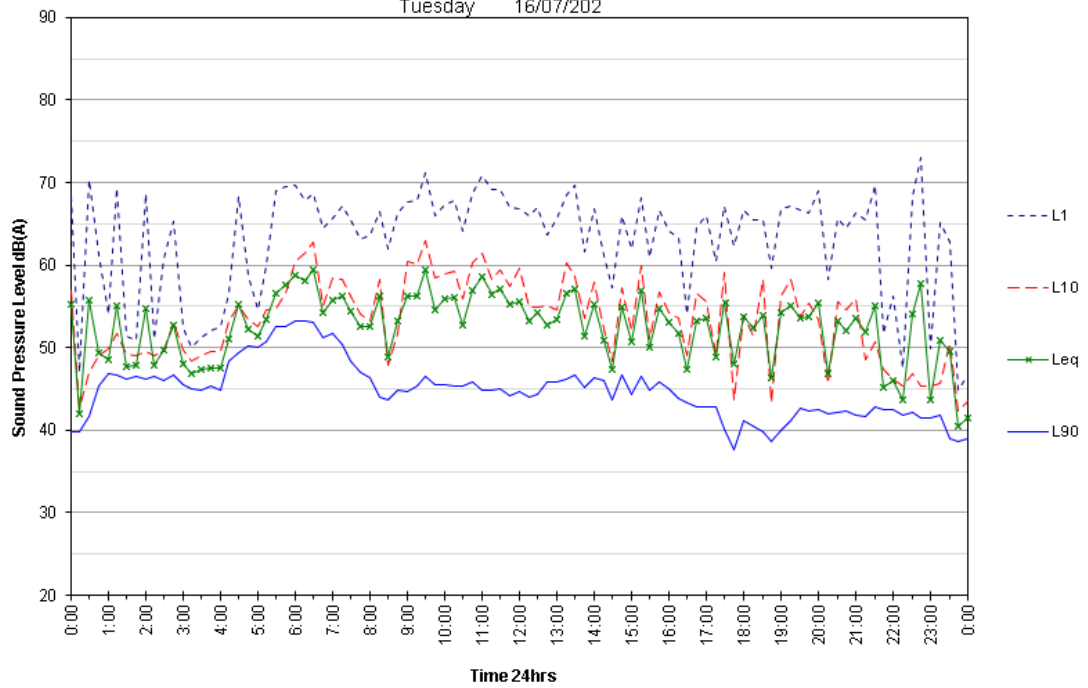
6/341 Macarthur Avenue
Environmental Noise Monitoring
Sunday 14/07/202



6/341 Macarthur Avenue
Environmental Noise Monitoring
Monday 15/07/202



6/341 Macarthur Avenue
 Environmental Noise Monitoring
 Tuesday 16/07/202



6/341 Macarthur Avenue
 Environmental Noise Monitoring
 Wednesd 17/07/202

