acousticworks

Proposed Residential Development
330 Macarthur Avenue Hamilton

ACOUSTIC REPORT




Client:
Silverstone Developments
ATTN: Andrew Stevens

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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 330 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

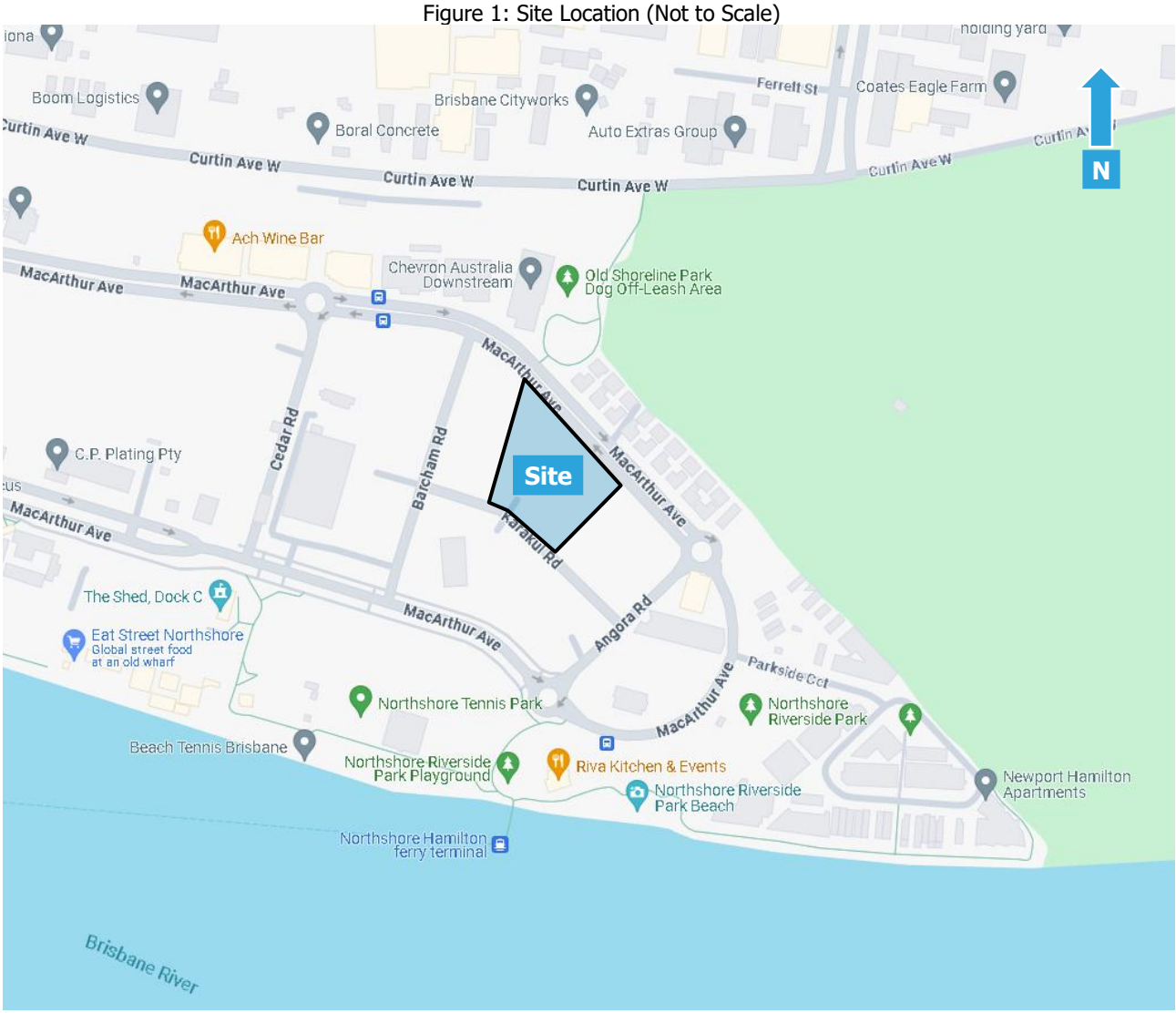
2.1 Site Location

The site is described by the following:

330 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 construct two residential apartment buildings (115 apartments in total) as follows:

- Basement level carparking:
  - 193 spaces servicing both the north tower and south tower.
  - Bike racks (144 spaces)
  - Lobby, service and loading area.
  - Bin and storage rooms
- Ground floor:
  - Residential apartments.
  - Pool, wellness area/gym and lawn areas.
  - Lobbies.
- Levels 1 to 6:
  - Residential apartments.
- Level 7:
  - Roof terrace and amenities (south tower 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

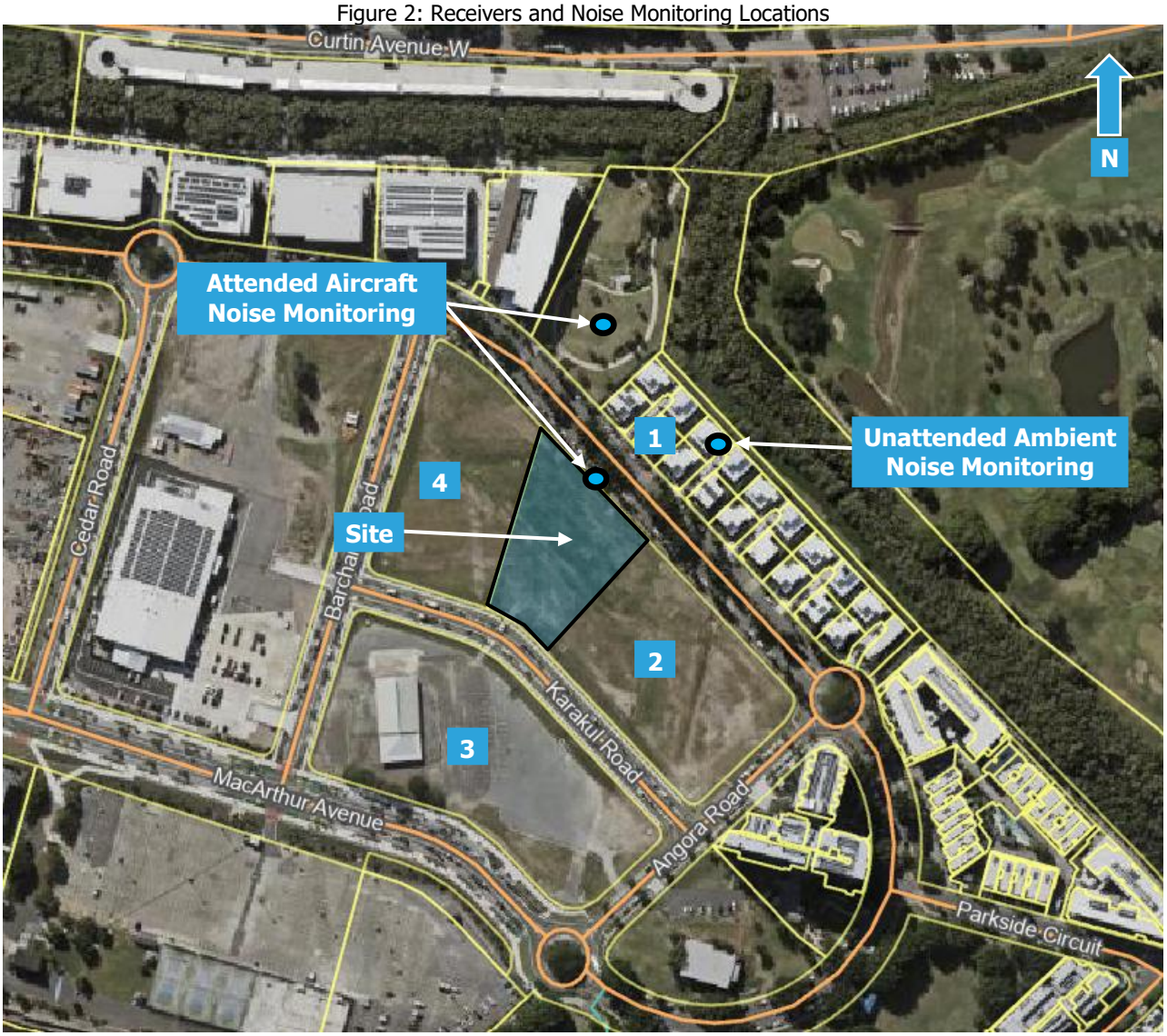
4.1 Receiver Locations

The nearest sensitive receiver locations were identified as follows:

1. Two storey residential dwellings are located to the north of the site at 341 Macarthur Avenue (emerging community zone).
2. Located to the southeast at 280 Macarthur Avenue is a proposed aged care facility (emerging community zone).
3. A residential development is currently under development to the south at 280 Macarthur Avenue (emerging community zone).
4. Located to the northwest at 280 Macarthur Avenue is a proposed residential development (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)			LAeq 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: • 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: • 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
PO21 Development in a zone in the centre zones category or Mixed use zone must: 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. 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.	**AO21** Development in a zone in the centre zones category or the Mixed use zone has a minimum acoustic performance of: a. Rw 35 for glazing (windows and doors) where total area of glazing is greater than 1.8m^2. b. Rw 32 for glazing (windows and doors) where total area of glazing is less than or equal to 1.8m^2.

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)	$L_{eq,9hr\ night}$ + 5dB(A)	$L_{eq,9hr\ night}$ + 10dB(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

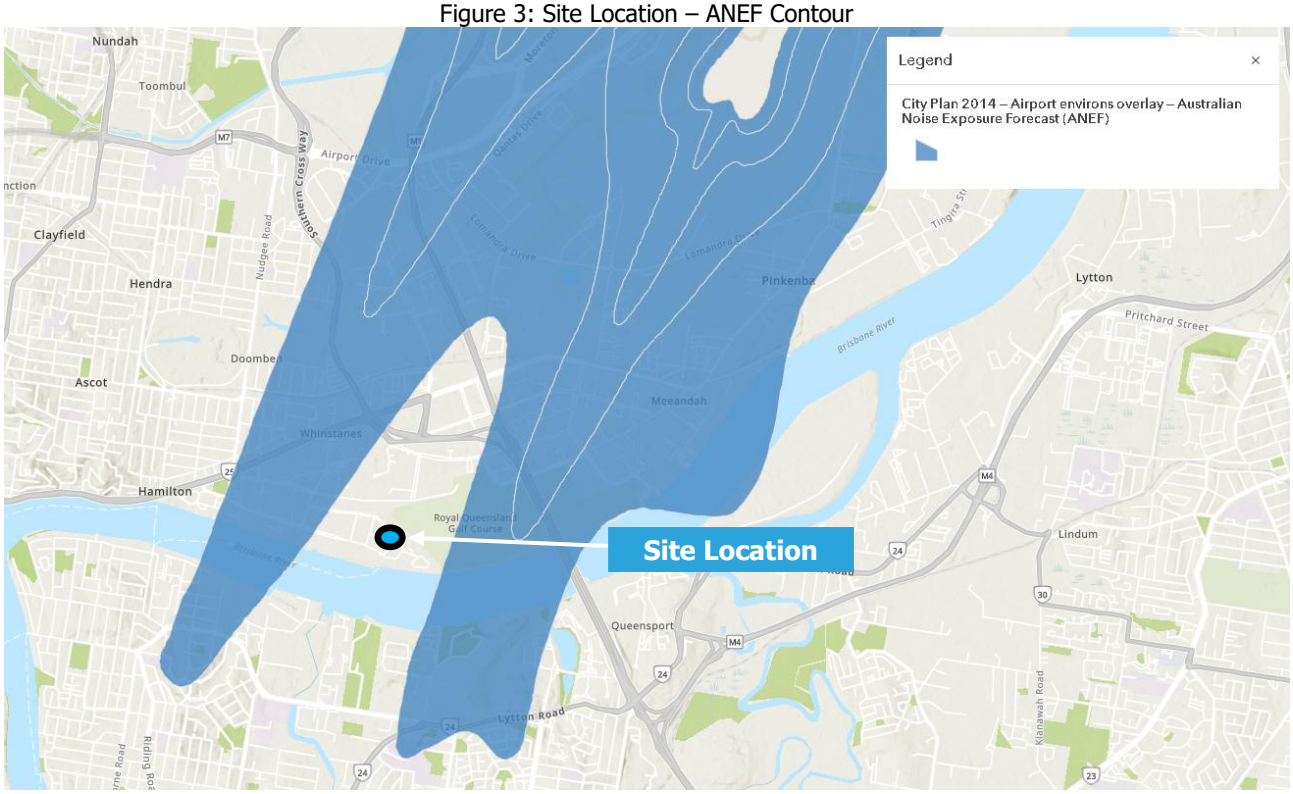
6.2 Aircraft Noise

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	60 dB(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.

7.1.1 Intrusive Noise and Acoustic Amenity

The average maximum noise source levels and predicted impacts at the nearest receiver locations are shown in Table 11 as follows. L_{Aeq} results are not shown where the calculated total is less than 0dBA.

Table 11: Average Noise Levels from Site Activities

Receiver	Receivers 1. 341 Macarthur Avenue (N) 2. 280 Macarthur Avenue (SE) 3. 280 Macarthur Avenue (S) 4.280 Macarthur Avenue (NW) 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)	Barrier (height (m)) No	Barrier screening dB	Building TL or shield dB	Room Correction dB	Dist atten. @-6dB/dd	LAeq adj, Text. dB(A) Day	LAeq adj, Text. dB(A) Eve	LAeq adj, Text. dB(A) Night	Intrusive Compliance LAeq Day	Intrusive Compliance LAeq Eve	Intrusive Compliance LAeq Night	Amenity Compliance LAeq Day	Amenity Compliance LAeq Eve	Amenity Compliance LAeq Night
	Criteria																	45	45	41	55	50	45
1	Car door closure	75	2	77	200	100	50	2	68			-15		-36.65	5	7		Yes	Yes	Yes	Yes	Yes	Yes
	Car passby	69		69	200	100	50	15	68			-15		-36.65	6	8		Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	200	100	50	2	68			-15		-36.65	4	6		Yes	Yes	Yes	Yes	Yes	Yes
	Gym activities	80		80	11	4	9	3600	68			-24		-36.65	19	19	19	Yes	Yes	Yes	Yes	Yes	Yes
	Recreation area - Include pool	78		78	11	4		3600	68			-20		-36.65	21	21		Yes	Yes	n/a	Yes	Yes	n/a
	Waste collection	94	2	96	1			240	38			-15		-31.596	27			Yes	n/a	n/a	Yes	Yes	Yes
	Deliveries	85	2	87	1			60	60			-15		-35.563	8			Yes	n/a	n/a	Yes	n/a	n/a
	Total														29	24	20	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
	Criteria																	45	45	41	55	50	45
2	Car door closure	75	2	77	200	100	50	2	38			-15		-31.596	10	12	5	Yes	Yes	Yes	Yes	Yes	Yes
	Car passby	69			200	100	50	15	38			-15		-31.596				Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	200	100	50	2	38			-15		-31.596	9	11	4	Yes	Yes	Yes	Yes	Yes	Yes
	Gym activities	80		80	11	4	9	3600	15			-24		-23.522	32	32	32	Yes	Yes	Yes	Yes	Yes	Yes
	Recreation area - Include pool	78		78	11	4		3600	42			-1		-32.465	45	45		Yes	Yes	n/a	Yes	Yes	n/a
	Waste collection	94	2	96	1			240	19			-15		-26	33			Yes	n/a	n/a	Yes	Yes	Yes
	Deliveries	85	2	87	1			60	19			-15		-26	18			Yes	n/a	n/a	Yes	n/a	n/a
	Total														45	45	33	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
	Criteria																	45	45	41	55	50	45
3	Car door closure	75	2	77	200	100	50	2	60			-10		-35.563	11	13	6	Yes	Yes	Yes	Yes	Yes	Yes
	Car passby	69			200	100	50	15	29					-29.248				Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	200	100	50	2	60			-10		-35.563	10	12	5	Yes	Yes	Yes	Yes	Yes	Yes
	Gym activities	80		80	11	4	9	3600	60			-24		-35.563	20	20	20	Yes	Yes	Yes	Yes	Yes	Yes
	Recreation area - Include pool	78		78	11	4		3600	60			-20		-35.563	22	22		Yes	Yes	n/a	Yes	Yes	n/a
	Waste collection	94			1			240	58			-10		-35.269				Yes	n/a	n/a	Yes	Yes	Yes
	Deliveries	85	2	87	1			60	58			-10		-35.269	14			Yes	n/a	n/a	Yes	n/a	n/a
	Total														25	25	21.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
	Criteria																	45	45	41	55	50	45
4	Car door closure	75	2	77	200	100	50	2	43			-15		-33	9	10	4	Yes	Yes	Yes	Yes	Yes	Yes
	Car passby	69		69	200	100	50	15	43			-15		-33	10	12	5	Yes	Yes	Yes	Yes	Yes	Yes
	Car start	74	2	76	200	100	50	2	43			-15		-33	8	10	3	Yes	Yes	Yes	Yes	Yes	Yes
	Gym activities	80		80	11	4	9	3600	70			-24		-36.902	19	19	19	Yes	Yes	Yes	Yes	Yes	Yes
	Recreation area - Include pool	78		78	11	4		3600	43			-1		-32.669	44	44		Yes	Yes	n/a	Yes	Yes	Yes
	Waste collection	94	2	96	1			240	68			-15		-36.65	22			Yes	n/a	n/a	Yes	n/a	Yes
	Deliveries	85	2	87	1			60	68			-15		-36.65	7			Yes	n/a	n/a	Yes	n/a	Yes
	Total														44	44	20	**Yes**	**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.

7.1.2 Night-time Noise

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

Table 12: Lmax Noise Levels from Site Activities

Receiver	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)	Barrier (height (m)) No	Barrier screening dB	Building TL or shield dB	Room Correction dB	Dist atten. @-6dB/dd	Absolute LAmax dBA	LAMax Compliance Night Max
	Receivers: 1. 341 Macarthur Avenue (N) 2. 280 Macarthur Avenue (SE) 3. 280 Macarthur Avenue (S) 4.280 Macarthur Avenue (NW)															
	Criteria															60
1	Car door closure	75	2	77	200	100	50	2	68			-15		-36.65	34	Yes
	Car passby	69		69	200	100	50	15	68			-15		-36.65	26	Yes
	Car start	74	2	76	200	100	50	2	68			-15		-36.65	33	Yes
	Gym activities	80		80	11	4	9	3600	68			-24		-36.65	28	Yes
	Recreation area - Include pool	78		78	11	4		3600	68			-20		-36.65	30	Yes
	Total														34	**Yes**
	Criteria															60
2	Car door closure	75	2	77	200	100	50	2	38			-15		-31.596	39	Yes
	Car passby	69			200	100	50	15	38			-15		-31.596		Yes
	Car start	74	2	76	200	100	50	2	38			-15		-31.596	38	Yes
	Gym activities	80		80	11	4	9	3600	15			-24		-23.522	41	Yes
	Recreation area - Include pool	78		78	11	4		3600	42			-1		-32.465	54	Yes
	Total														54	**Yes**
	Criteria															60
3	Car door closure	75	2	77	200	100	50	2	60			-10		-35.563	40	Yes
	Car passby	69			200	100	50	15	29			-10		-29.248		Yes
	Car start	74	2	76	200	100	50	2	60			-10		-35.563	39	Yes
	Gym activities	80		80	11	4	9	3600	60			-24		-35.563	29	Yes
	Recreation area - Include pool	78		78	11	4		3600	60			-20		-35.563	31	Yes
	Total														40	**Yes**
	Criteria															60
4	Car door closure	75	2	77	200	100	50	2	43			-15		-33	38	Yes
	Car passby	69		69	200	100	50	15	43			-15		-33	30	Yes
	Car start	74	2	76	200	100	50	2	43			-15		-33	37	Yes
	Gym activities	80		80	11	4	9	3600	70			-24		-36.902	28	Yes
	Recreation area - Include pool	78		78	11	4		3600	43			-1		-32.669	53	Yes
	Total														53	**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 13.

Table 13: 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 75.9 dBA 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,

Figure 6 and Figure 6 for allocated unit numbering.

Figure 4: Unit Number Allocation – Ground Level

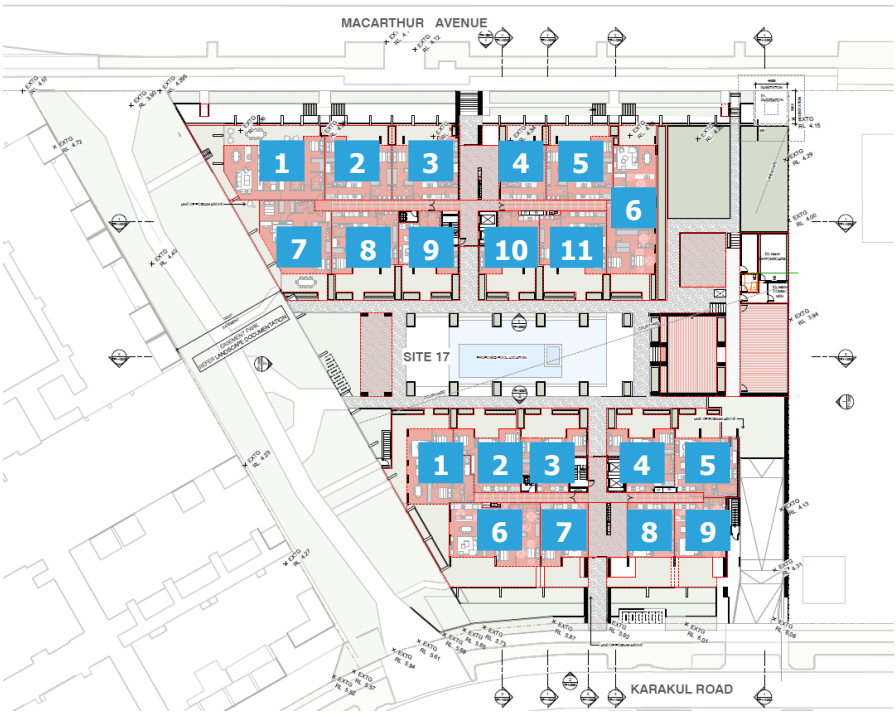


Figure 5: Unit Number Allocation – Level 1

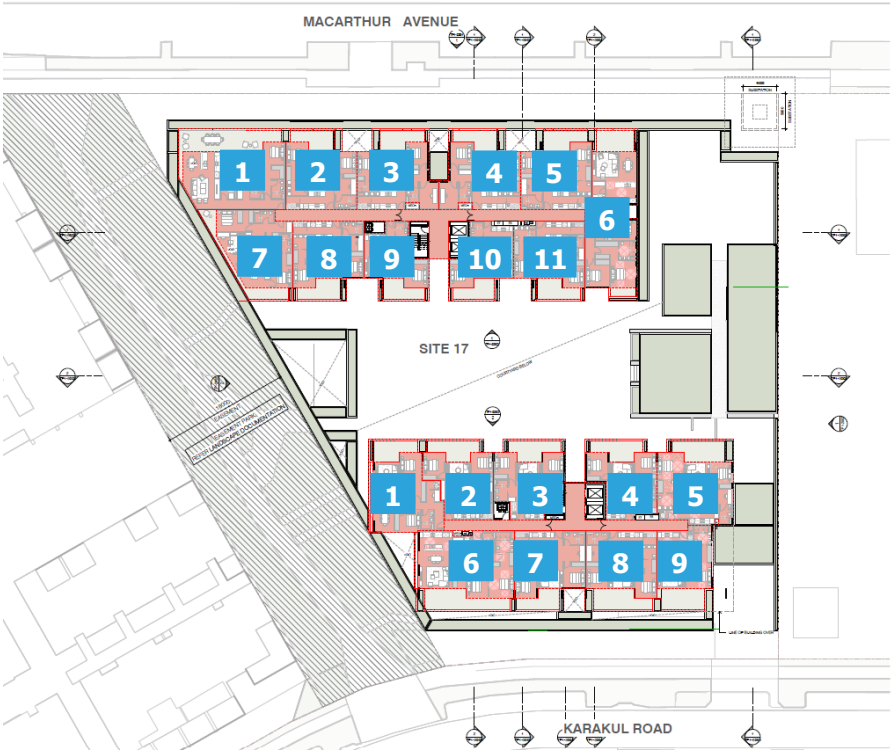


Figure 6: Unit Number Allocation – Levels 2 to 6.

9.1.2 Unit Glazing

The minimum glazing treatments are presented in Table 14, 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 14: Glazing Treatments for Aircraft Noise Impacts

Location			Rw Rating	Glazing	Acoustic Seals
Level	Unit	Room			
G	North Tower - Unit 1	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	North Tower - Unit 2	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	North Tower - 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	North Tower - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G	North Tower - 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	North Tower - Unit 6	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	North Tower - Unit 7	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	North Tower - Unit 8	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	North Tower - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G	North Tower - Unit 10	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G	North Tower - Unit 11	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G		Bed 2	34	10.38mm laminated	yes

Location			Rw Rating	Glazing	Acoustic Seals
Level	Unit	Room			
G	South Tower - Unit 1	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	South Tower - Unit 2	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	South Tower - 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	South Tower - 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	South Tower - 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	South Tower - Unit 6	Living Kitchen Dining	32	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	South Tower - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G	South Tower - Unit 8	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
G	South Tower - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
G		Bed 1	34	10.38mm laminated	yes
1	North Tower - 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		Bed 3	34	10.38mm laminated	yes
1	North Tower - 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	North Tower - 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	North Tower - 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	North Tower - 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	North Tower - 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

Location			Rw Rating	Glazing	Acoustic Seals
Level	Unit	Room			
1	North Tower - 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	North Tower - Unit 8	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	North Tower - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
1	North Tower - Unit 10	Living Kitchen Dining	24	4mm float	yes
1		Bed 1	34	10.38mm laminated	yes
1	North Tower - Unit 11	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	South Tower - 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	South Tower - 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	South Tower - 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	South Tower - 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	South Tower - 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	South Tower - 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	South Tower - 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	South Tower - Unit 8	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	South Tower - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
1		Bed 1	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3		Bed 3	34	10.38mm laminated	yes

Location			Rw Rating	Glazing	Acoustic Seals
Level	Unit	Room			
2 and 3	North Tower - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3		Bed 3	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 8	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3	North Tower - Unit 10	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3		Bed 3	34	10.38mm laminated	yes

Location			Rw Rating	Glazing	Acoustic Seals
Level	Unit	Room			
2 and 3	South Tower - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 8	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
2 and 3	South Tower - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
2 and 3		Bed 1	34	10.38mm laminated	yes
2 and 3		Bed 2	34	10.38mm laminated	yes
4	North Tower - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
4		Bed 3	34	10.38mm laminated	yes
4	North Tower - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
4	North Tower - Unit 3	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
4	North Tower - Unit 4	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
4	North Tower - Unit 5	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
4	North Tower - Unit 6	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
4		Bed 3	34	10.38mm laminated	yes
4	North Tower - Unit 7	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
4	North Tower - Unit 8	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4	North Tower - Unit 9	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4	North Tower - Unit 10	Living Kitchen Dining	31	6.38mm laminated	yes
4		Bed 1	34	10.38mm laminated	yes
4		Bed 2	34	10.38mm laminated	yes
5 and 6	South Tower - Unit 1	Living Kitchen Dining	31	6.38mm laminated	yes
5 and 6		Bed 1	34	10.38mm laminated	yes
5 and 6		Bed 2	34	10.38mm laminated	yes
5 and 6	South Tower - Unit 2	Living Kitchen Dining	31	6.38mm laminated	yes
5 and 6		Bed 1	34	10.38mm laminated	yes
5 and 6		Bed 2	34	10.38mm laminated	yes

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

Any locations not identified in the Table 14 shall require 4mm float for windows (minimum Rw 22) and 5mm toughened for sliding doors (minimum Rw 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/m^3) 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_W50.

9.2 Gym Façade Construction

9.2.1 Gym Glazing

The minimum glazing treatments presented in Table 15 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 provider 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 Rw 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 15: Gym Glazing Treatments

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

9.2.2 Gym Wall Construction

The wall construction recommendations are included in Table 16 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 16: Gym Wall Construction

Wall Rw	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 Roof/Ceiling Construction

The roof/ceiling 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 Rw ratings may also be provided.

Table 17: Gym Roof Construction

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

9.2.4 Gym Entry Doors

Table 18: Gym Entry Door Construction

Door Rw	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 and units presented in Table 14 have the provision for an alternative ventilation system similar to air-conditioning or mechanical ventilation to allow doors and windows to be closed.

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 doors and windows are to be closed during operation.
- Deliveries and waste collection shall be limited to the daytime period, between 7am and 6pm.
- 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 330 Macarthur Avenue, Hamilton. The development is predicted to satisfy all the relevant noise assessment requirements on the condition that the recommendations in Section 10 are implemented.

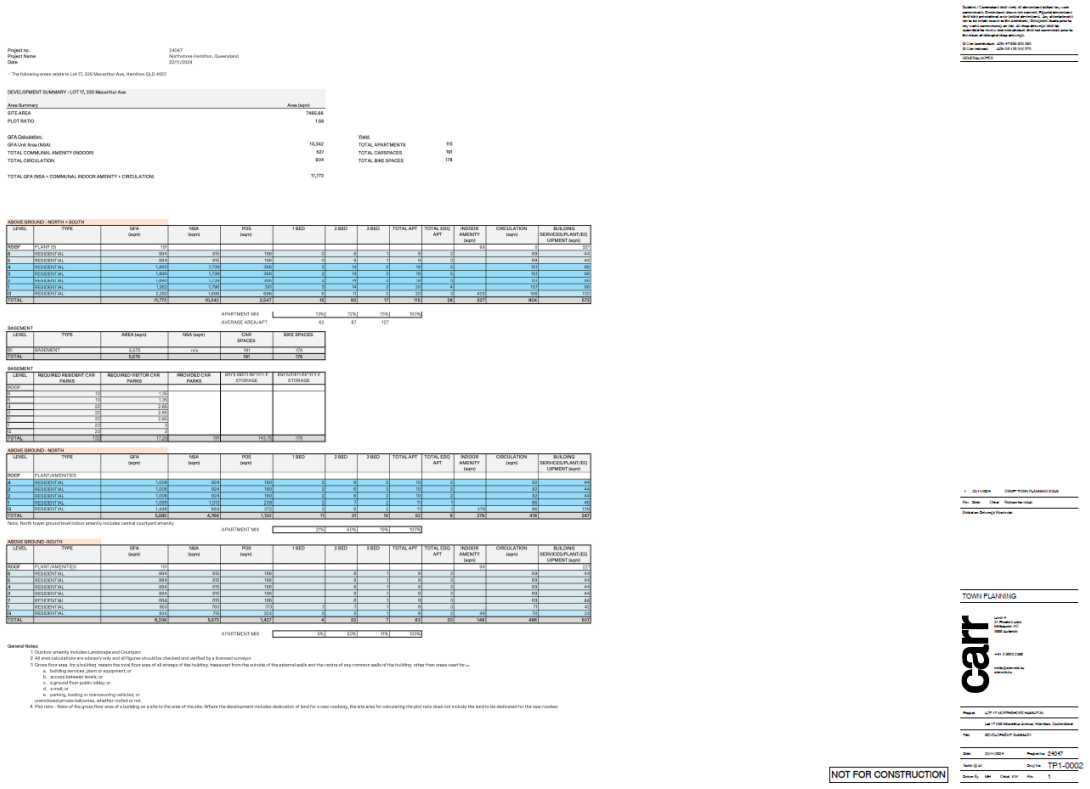
If you should have any queries, please do not hesitate to contact us.

Report Prepared By

David Dadd (B.Sc. (Env.) MAAS)
Senior Acoustic Consultant
acousticworks)))

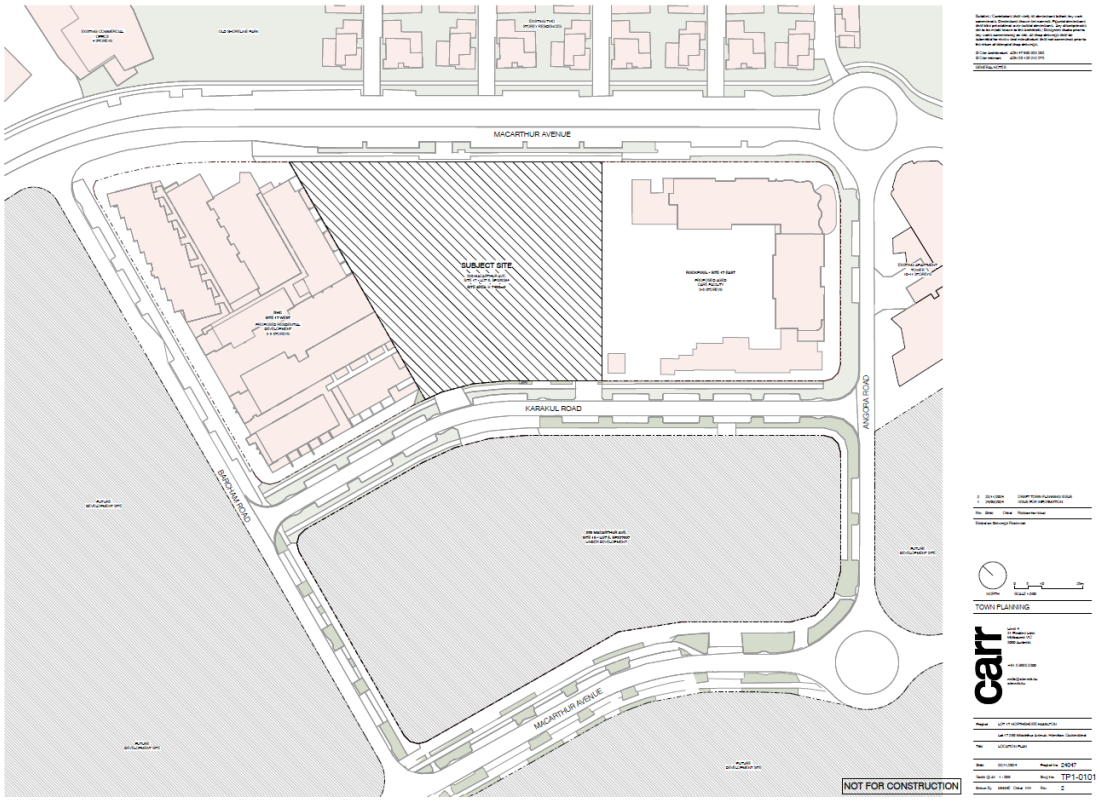
11. Appendices

11.1 Development Plans



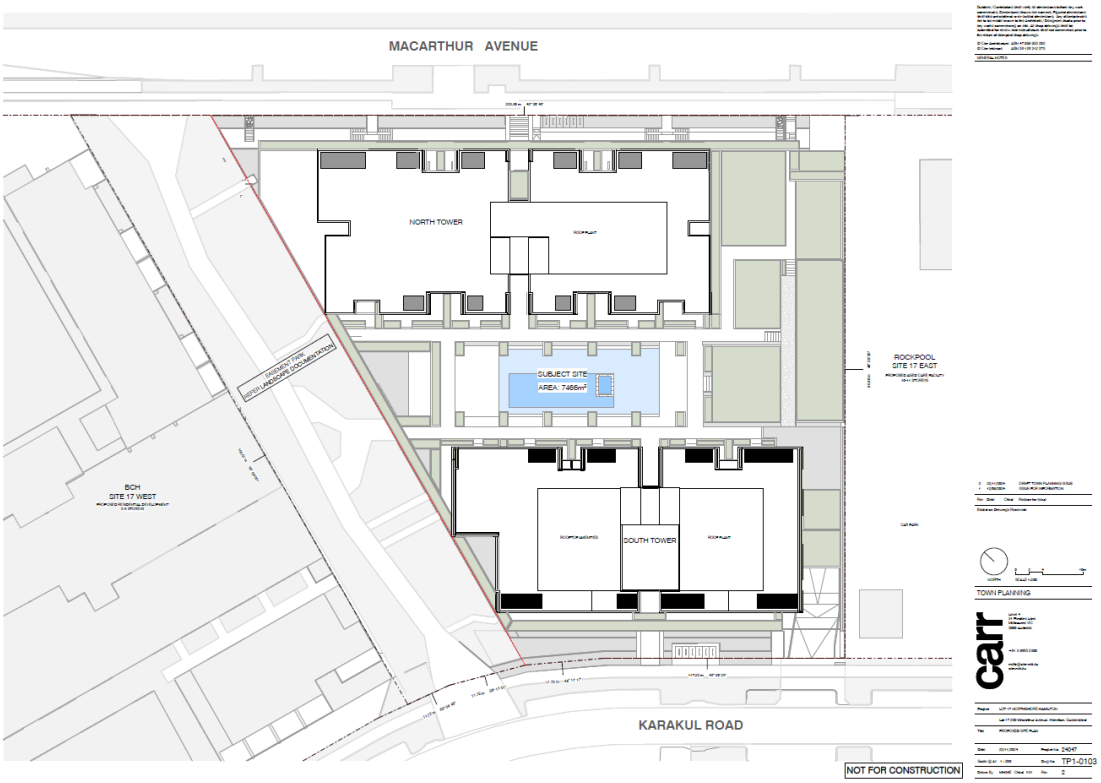
NOT FOR CONSTRUCTION

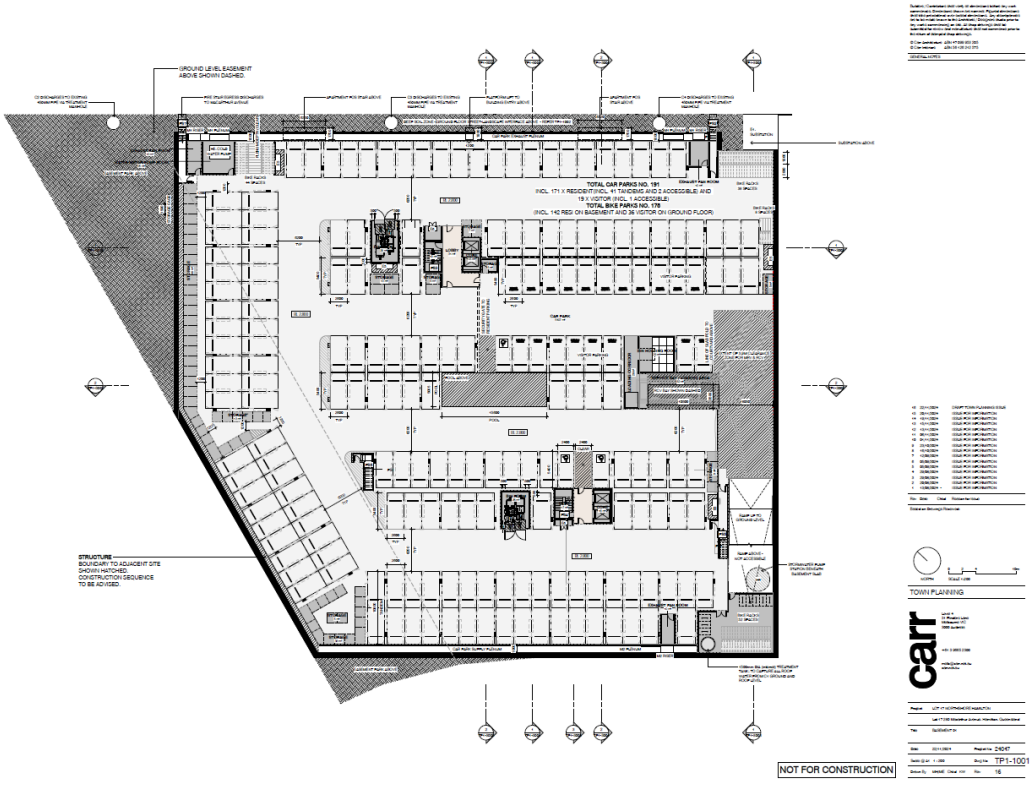
TP1-0002

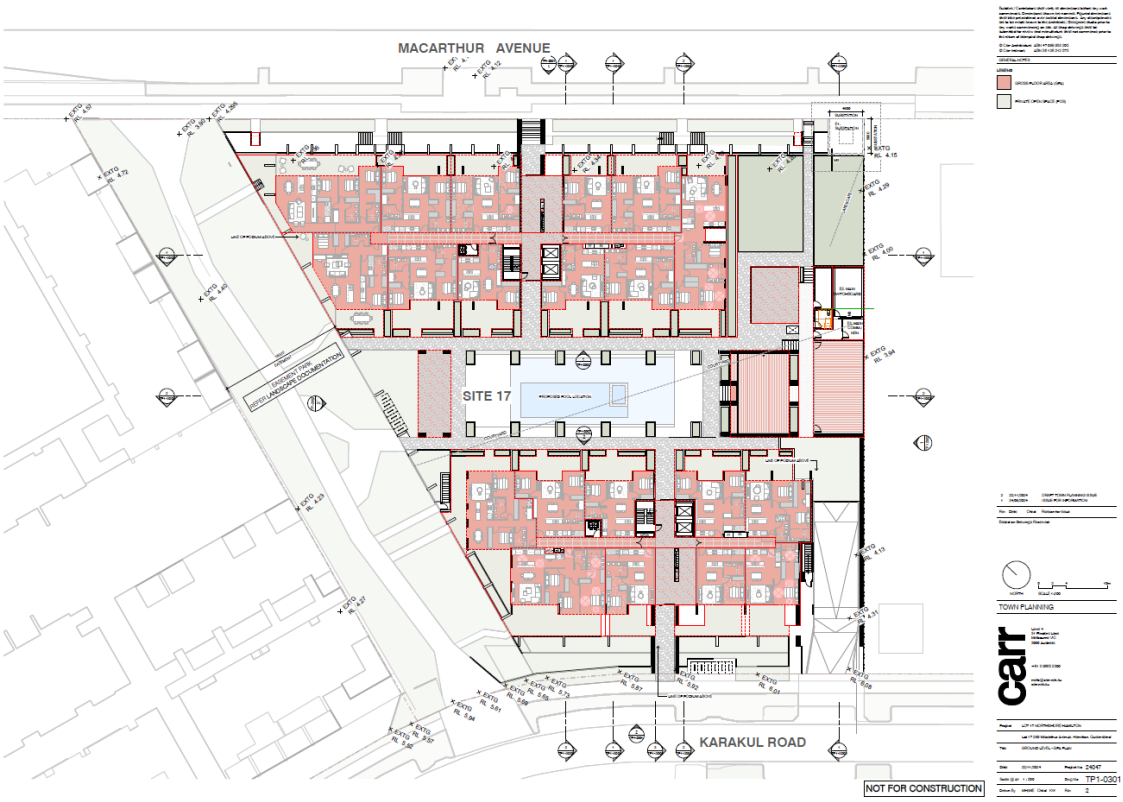


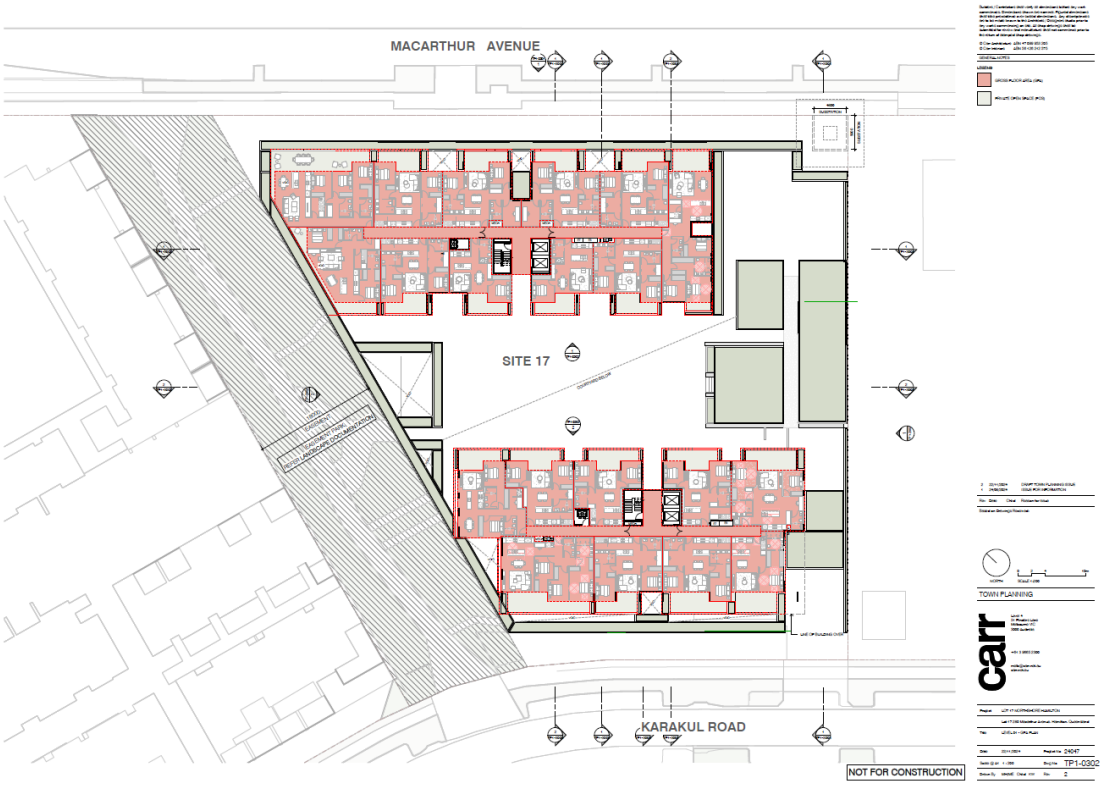
NOT FOR CONSTRUCTION

TP1-0101

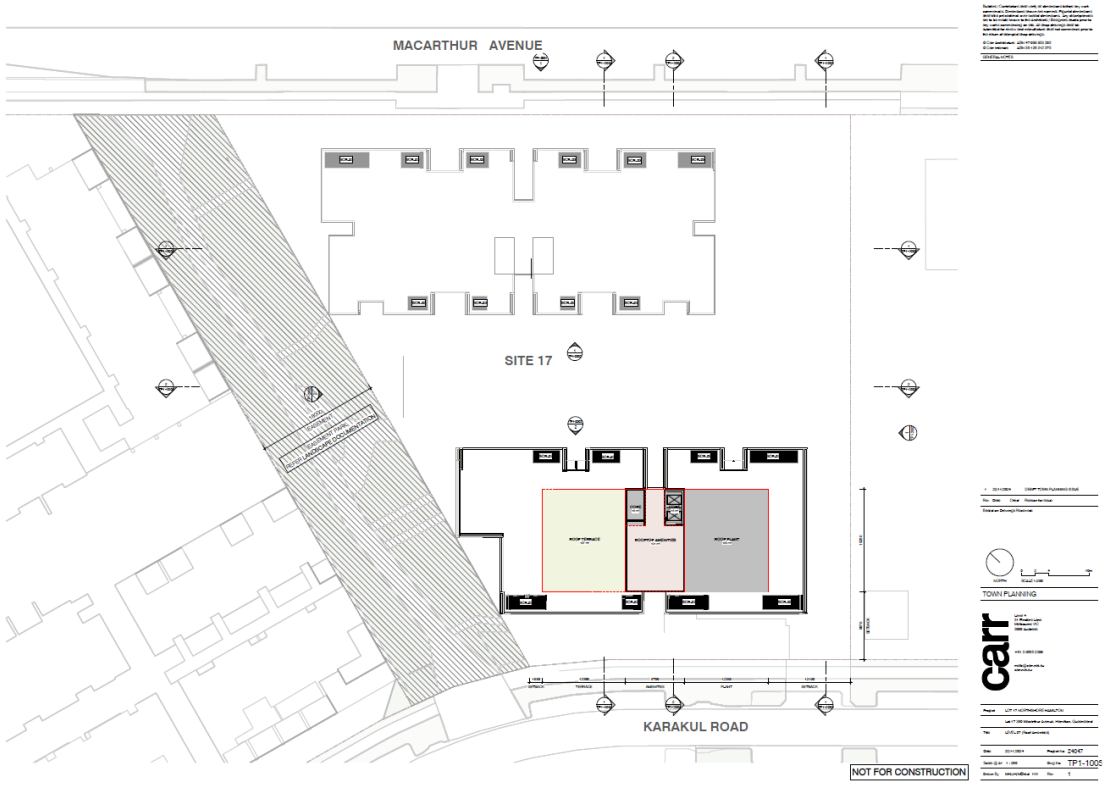

MACARTHUR AVENUE
NORTH TOWER
SUBJECT SITE
AREA: 7466m²
ROCKPOOL
SITE 17 EAST
SOUTH TOWER
BCH
SITE 17 WEST
KARAKUL ROAD
NOT FOR CONSTRUCTION
TOWN PLANNING
carr
TP1-0103

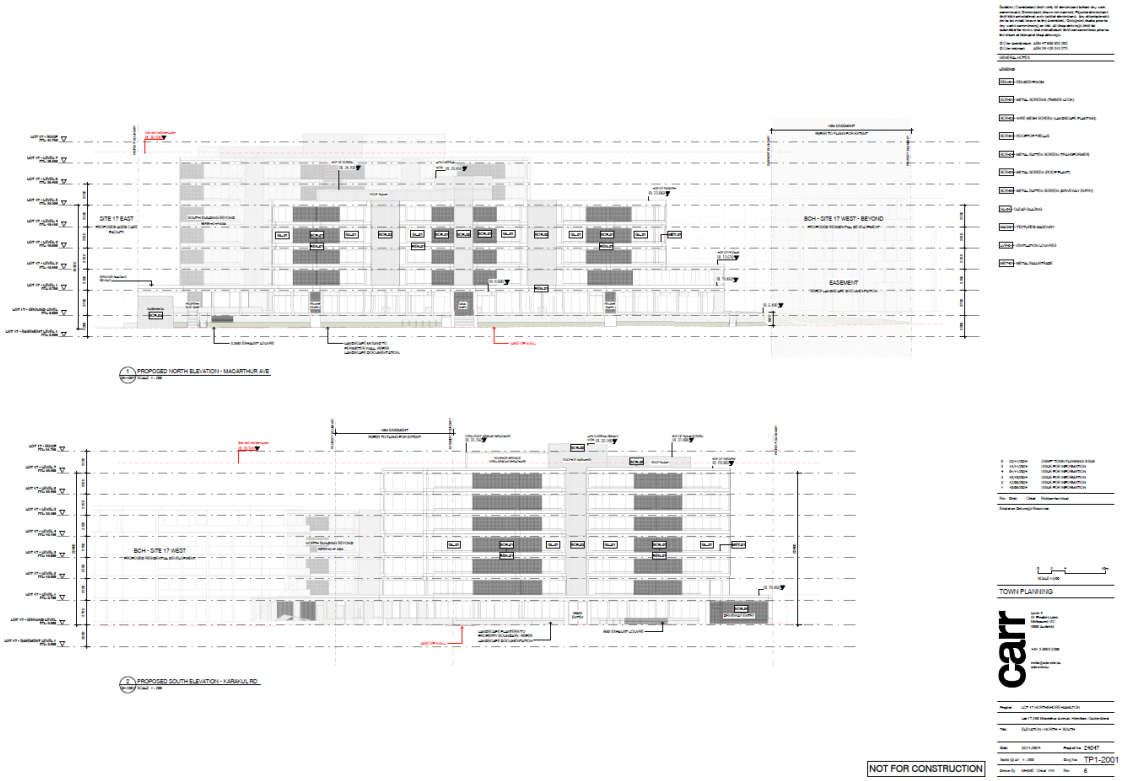

(GROUND LEVEL EASEMENT ABOVE SHOWN DASHED)
TOTAL CAR PARKS NO. 191
INCL. 171 X RESIDENTIAL, 41 TANDEMS AND 2 ACCESSIBLE AND
19 X VISITOR INCL. 1 ACCESSIBLE
TOTAL BIKE PARKS NO. 176
(INCL. 142 REG ON BASEMENT AND 34 VISITOR ON GROUND FLOOR)
STRUCTURE
BOUNDARY TO ADJACENT SITE
SHOWN HATCHED
CONSTRUCTION SEQUENCE
TO BE ADVISED
NOT FOR CONSTRUCTION
TOWN PLANNING
carr
TP1-1001


MACARTHUR AVENUE
SITE 17
KARAKUL ROAD
NOT FOR CONSTRUCTION
TOWN PLANNING
carr
TP1-0301

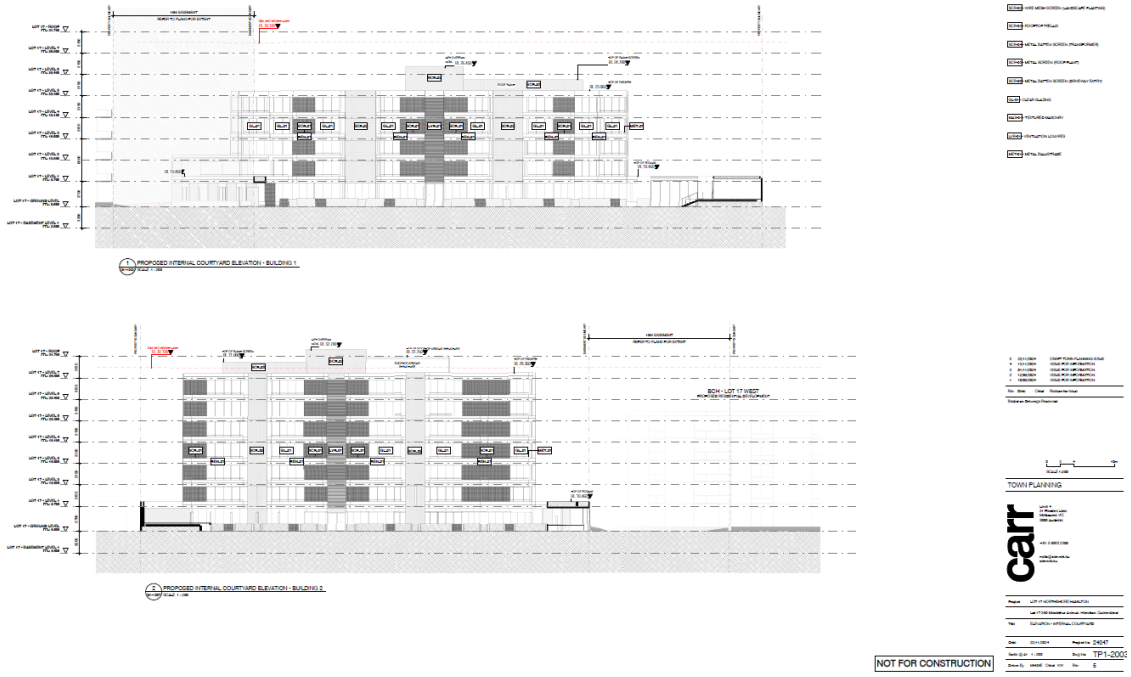

MACARTHUR AVENUE
SITE 17
KARAKUL ROAD
NOT FOR CONSTRUCTION
TOWN PLANNING
carr
TP1-0302


MACARTHUR AVENUE
SITE 17
KARAKUL ROAD
NOT FOR CONSTRUCTION
TOWN PLANNING
carr

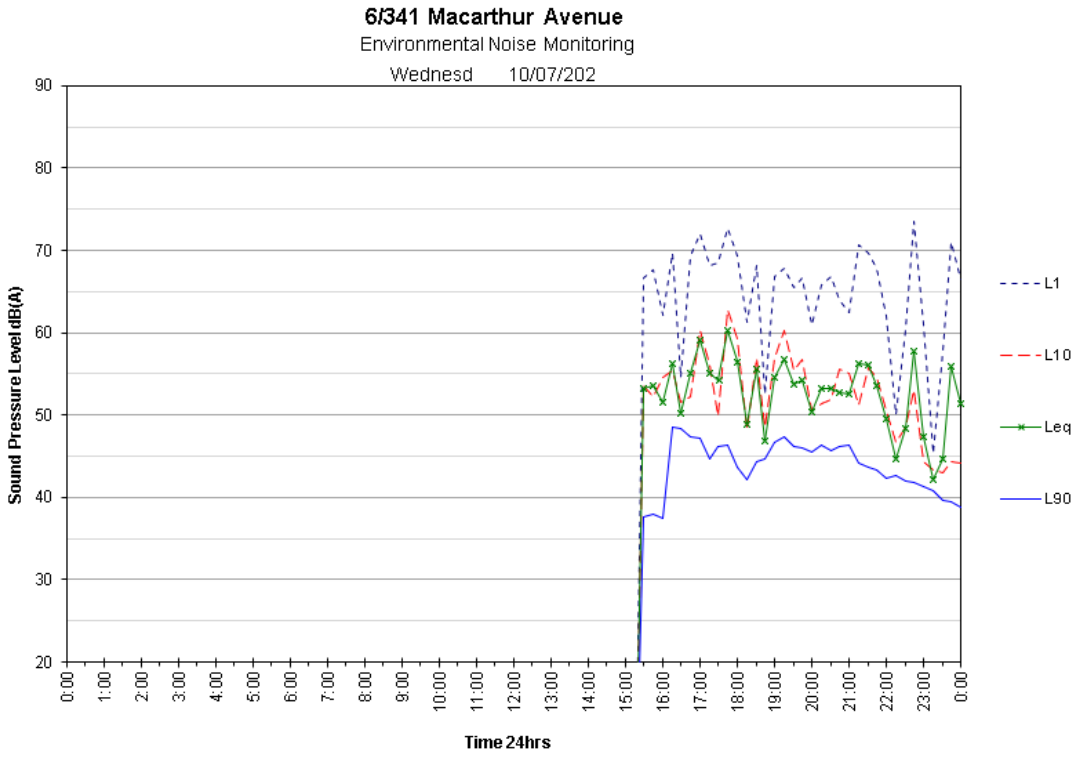

MACARTHUR AVENUE
SITE 17
KARAKUL ROAD
NOT FOR CONSTRUCTION
TOWN PLANNING
carr

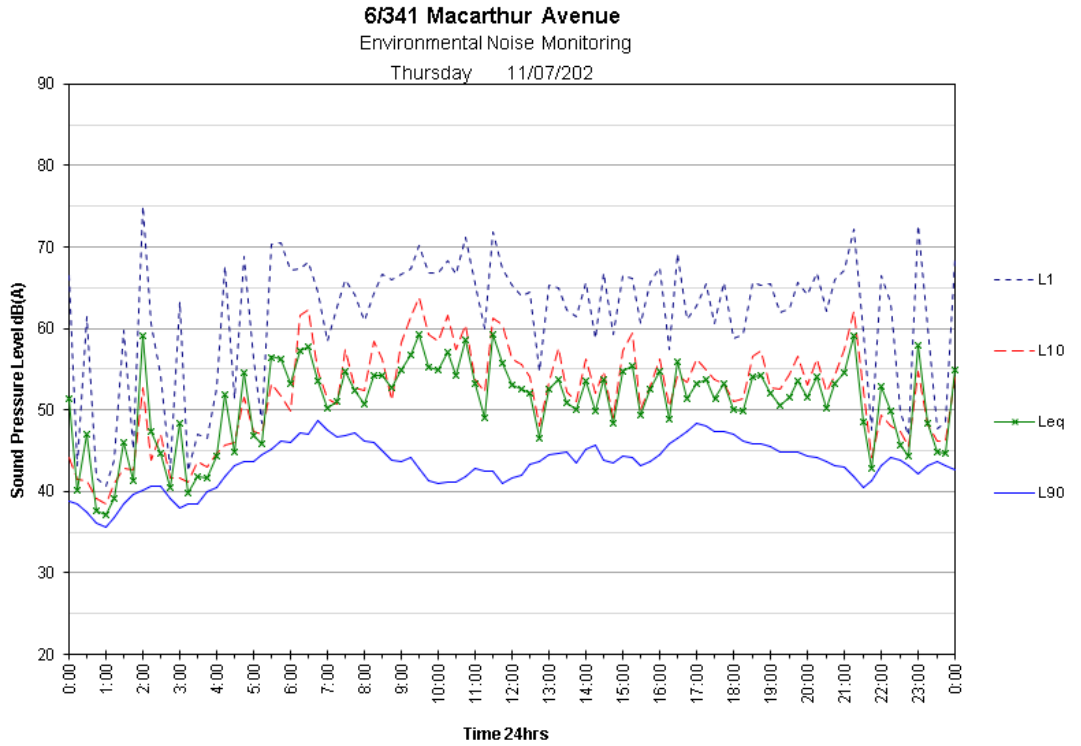

SITE 17 EAST
BCH - SITE 17 WEST - BEYOND
BASEMENT
PROPOSED NORTH ELEVATION - MACARTHUR AVE
BCH - SITE 17 WEST
PROPOSED SOUTH ELEVATION - KARAKUL RD
TOWN PLANNING
carr
NOT FOR CONSTRUCTION
TP1-2001

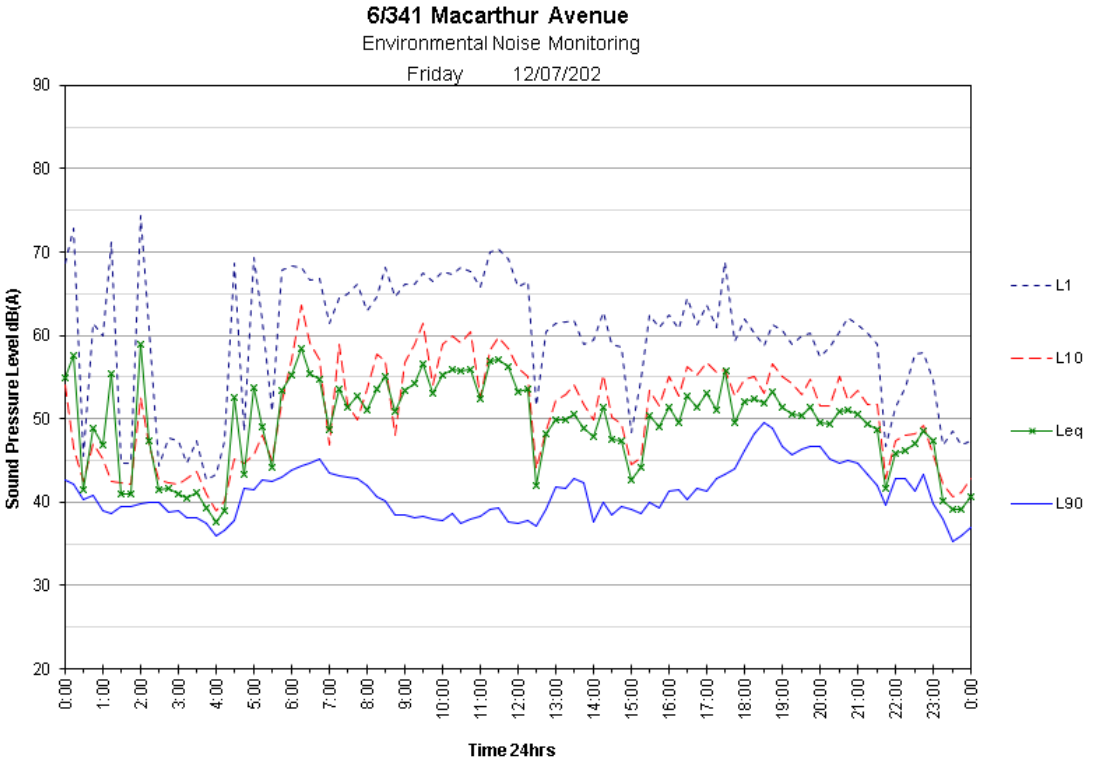

KARAKUL RD
MACARTHUR AVENUE
PROPOSED EAST ELEVATION
PROPOSED WEST ELEVATION
TOWN PLANNING
carr
NOT FOR CONSTRUCTION
TP1-2002

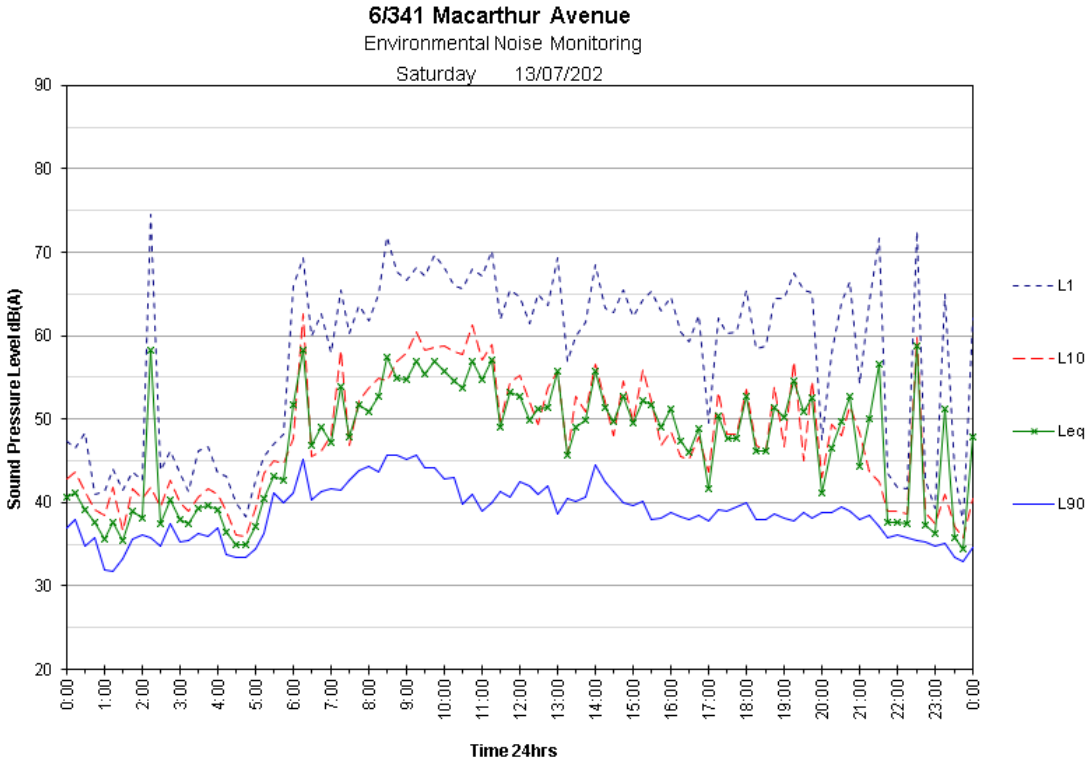

1 PROPOSED INTERNAL COURTYARD ELEVATION - BUILDING 1
2 PROPOSED INTERNAL COURTYARD ELEVATION - BUILDING 2
BCH - LOT 17 WEST
TOWN PLANNING
carr
NOT FOR CONSTRUCTION

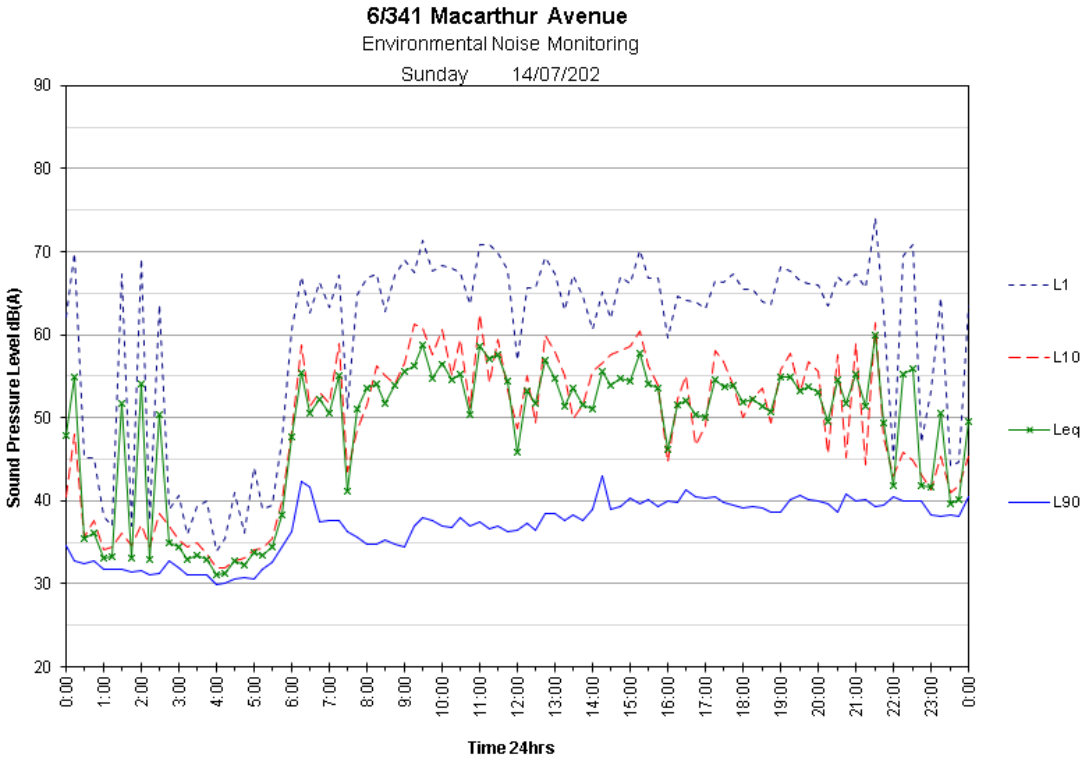
11.2 Noise Monitoring Charts

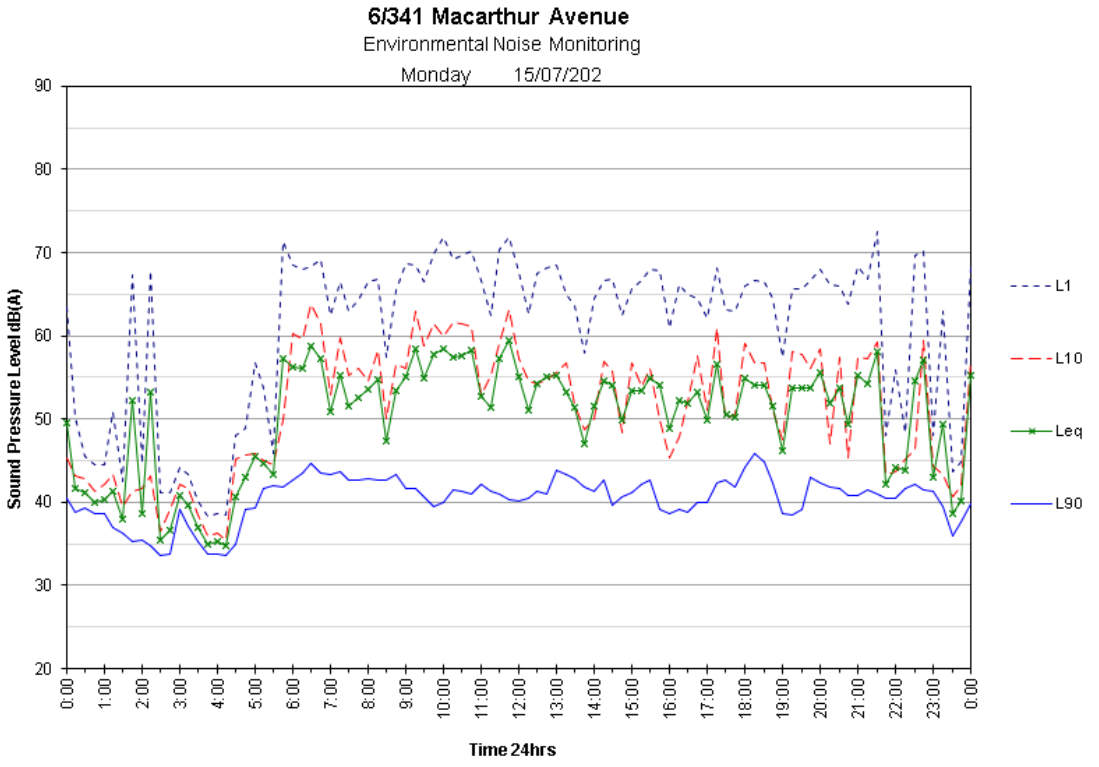


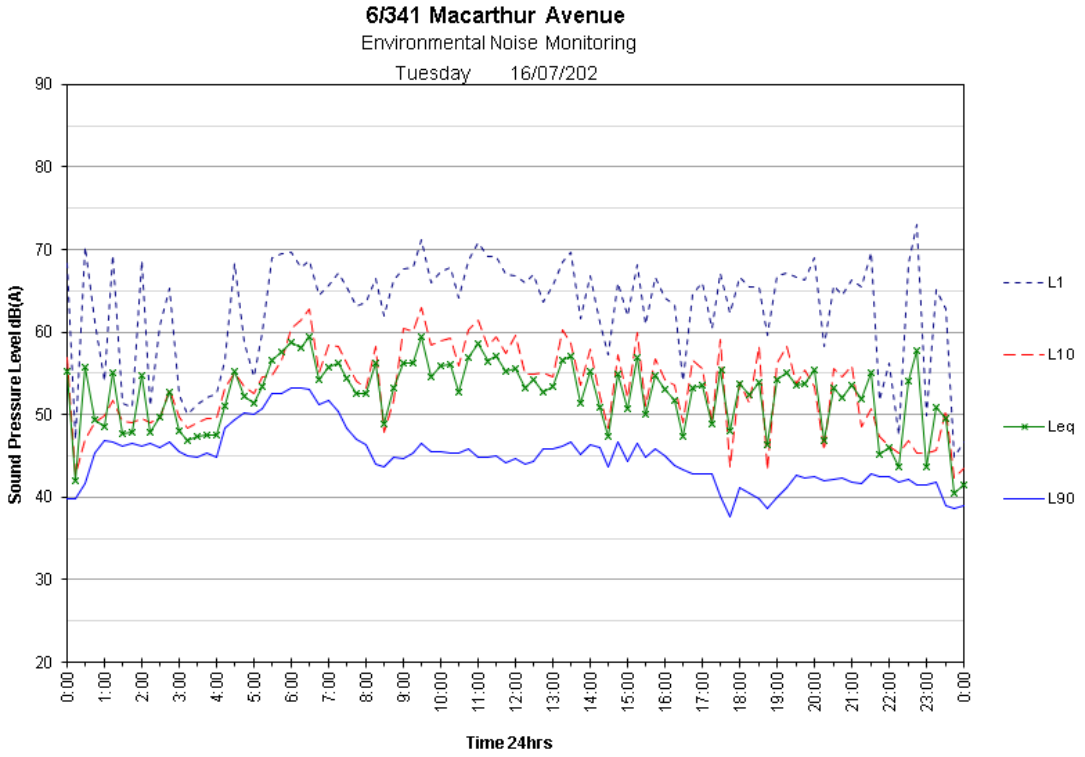


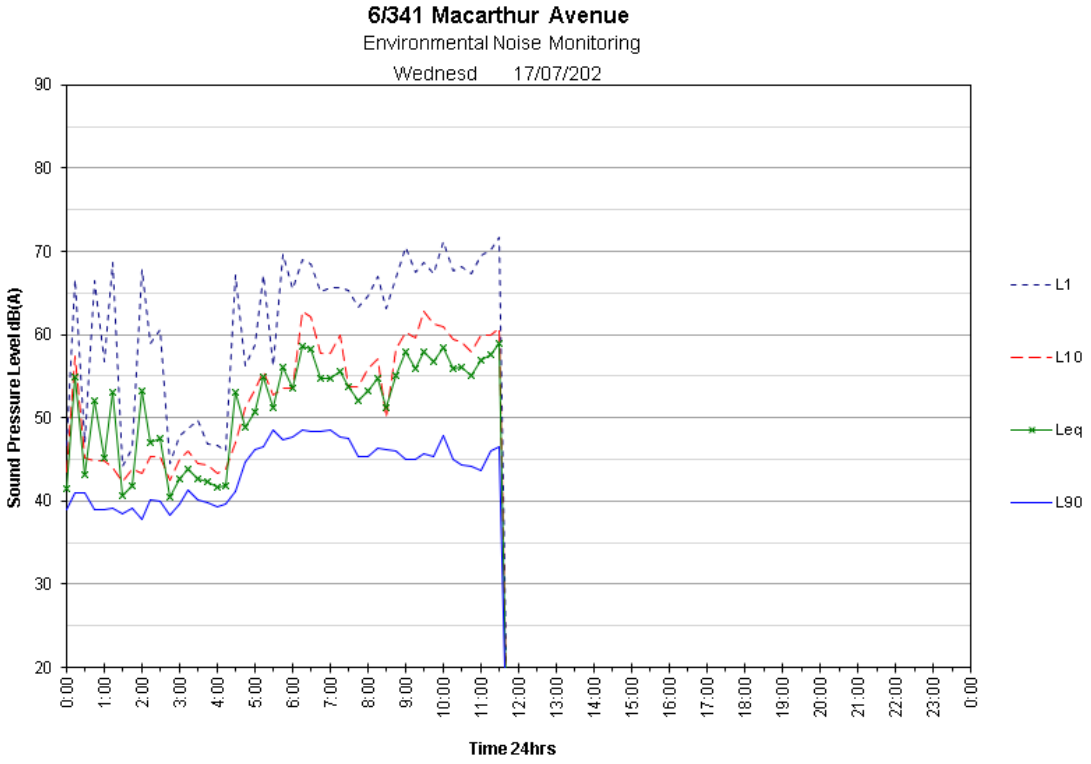

6/341 Macarthur Avenue
Environmental Noise Monitoring
Friday 12/07/202
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90


6/341 Macarthur Avenue
Environmental Noise Monitoring
Saturday 13/07/202
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90


6/341 Macarthur Avenue
Environmental Noise Monitoring
Sunday 14/07/202
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90


6/341 Macarthur Avenue
Environmental Noise Monitoring
Monday 15/07/202
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90


6/341 Macarthur Avenue
Environmental Noise Monitoring
Tuesday 16/07/202
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90


6/341 Macarthur Avenue
Environmental Noise Monitoring
Wednesd 17/07/202
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90