

LOGAN CITY COUNCIL

APPROVED DOCUMENT

This is an approved document for Development Application

MCUI/34/2024

**Environmental Noise Level Impact Assessment for Proposed Health
Care Service, 896 Kingston Road, Waterford West**

conducted for

YCL Enterprise Pty Ltd

Report No: R24080/D3910/Rev.0/10.09.2024

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Calculations	David Moore	31.08.2024
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INTRODUCTION

It is proposed to remove all of the existing structures and develop the subject site at 896 Kingston Road, Waterford West (Lot 281 on RP849284) with a health care service comprising ground level carparking, level 1 reception, office and dental and medical rooms and staff facilities.

The primary potential noise impact upon this proposed health care service is traffic noise from Kingston Road, whilst noise sources associated with this proposed health care service, namely carpark activity, delivery vehicles and air-conditioning units, have the potential to noise impact the adjoining residences to the north and west.

The subject site is adjoined by Kingston Road to the south, Remaro Street to the east and residential properties to the north and west. The zoning of the subject site and all adjoining lots is low density residential. In accordance with the Low Density Residential Code of the Logan Planning Scheme 2015, v.9, one of the acceptable uses is a 'small-scale health care service' and, in accordance with PO5 and AO5 of the Low Density Residential Code:

PO5

Development protects the intended amenity for the zone and precinct of an adjoining premises by having regard to:

- a. noise emissions;
- b.

AO5

Development complies with the following emissions standard of Planning scheme policy 3 – Environmental management:

- a. Table 3.2.1.1 – Noise emission standards for the protection of residential amenity where adjoining a premises in a zone specified in 3.2.1(1)(a) of Planning scheme policy 3 – Environmental management;
- b.

3.2.1(1)(a) includes low density residential and, therefore, the noise limits in Table 3.2.1.1 are applicable to this proposed health care service.

To determine the background sound levels an unattended noise logger was located at monitoring location A, which was on the subject site on the verandah of the existing dwelling facing Kingston Road with the microphone elevated 1.5 metres, at least 3 metres from a reflective surface and for a 7-day period. The dominant noise source at monitoring location A was traffic on Kingston Road, particularly during the daytime and evening, with lower traffic volumes during the night-time.

To assess the ambient noise levels relative to the adjoining residence to the north (and more distant from the traffic noise from Kingston Road) a further noise logger was located at monitoring location B, on the northern boundary of the subject site and approximately midway between the western and eastern boundaries, with the microphone elevated 1.5 metres, for a 7-day period.

This report details the results of the ambient noise level studies, traffic noise levels, traffic noise impact and traffic noise control measures, as well as all potential noise sources and source noise levels for the proposed health care service, noise limits, state of compliance with these noise limits and any required noise control measures, relative to the closest residences to the west and north, with noise limits based on the results of the noise assessment at monitoring location A and B respectively.

Refer Figure 1 for aerial photo and monitoring locations A and B, Figure 2 for proposed site plan, Figure 3 for the proposed ground floor plan and Figure 4 for the proposed first floor plan for the health care service.



Figure 1
Aerial Photo, Monitoring Locations A and B and Closest Residences

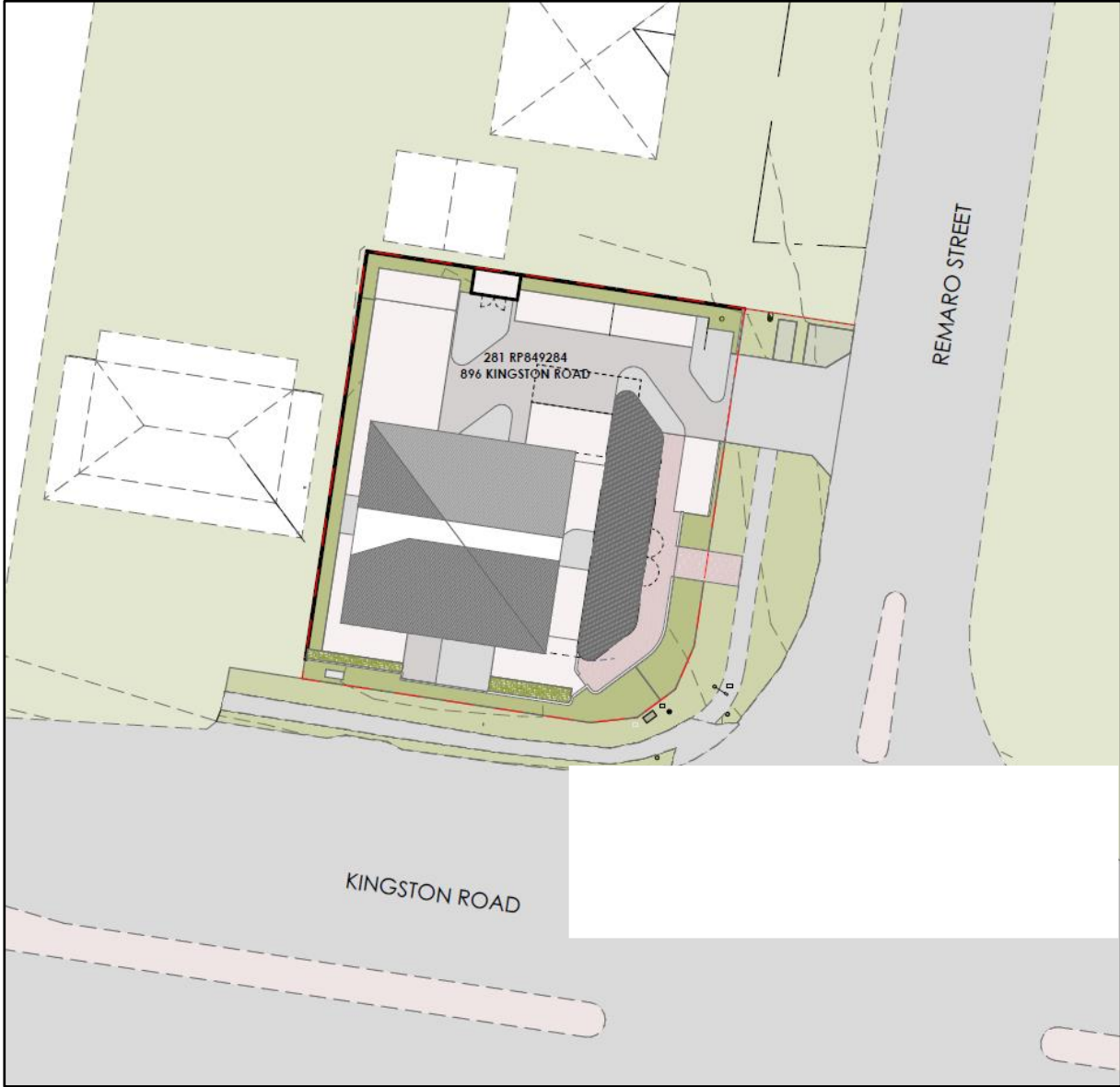


Figure 2
Site Plan

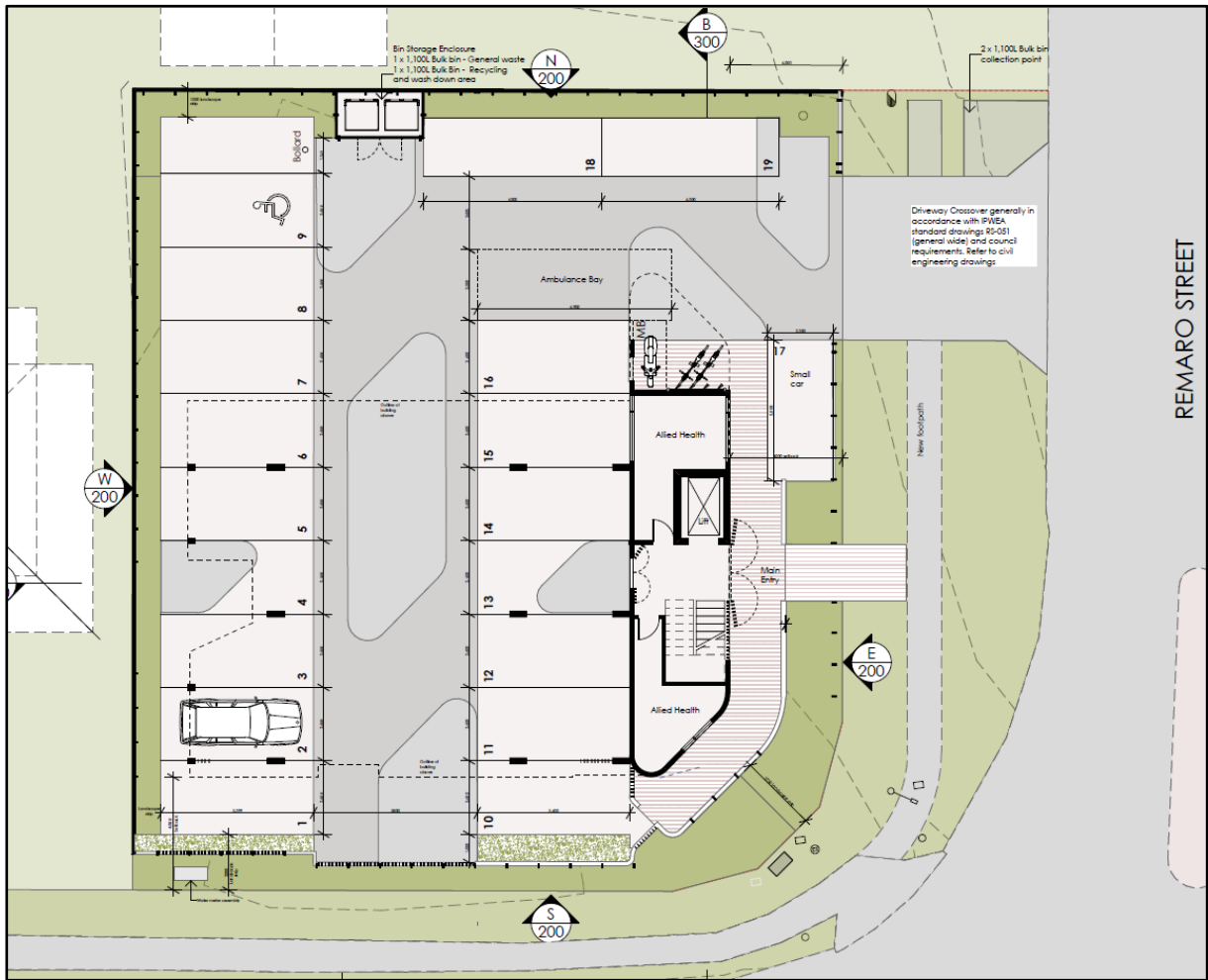


Figure 3
Ground Floor Plan

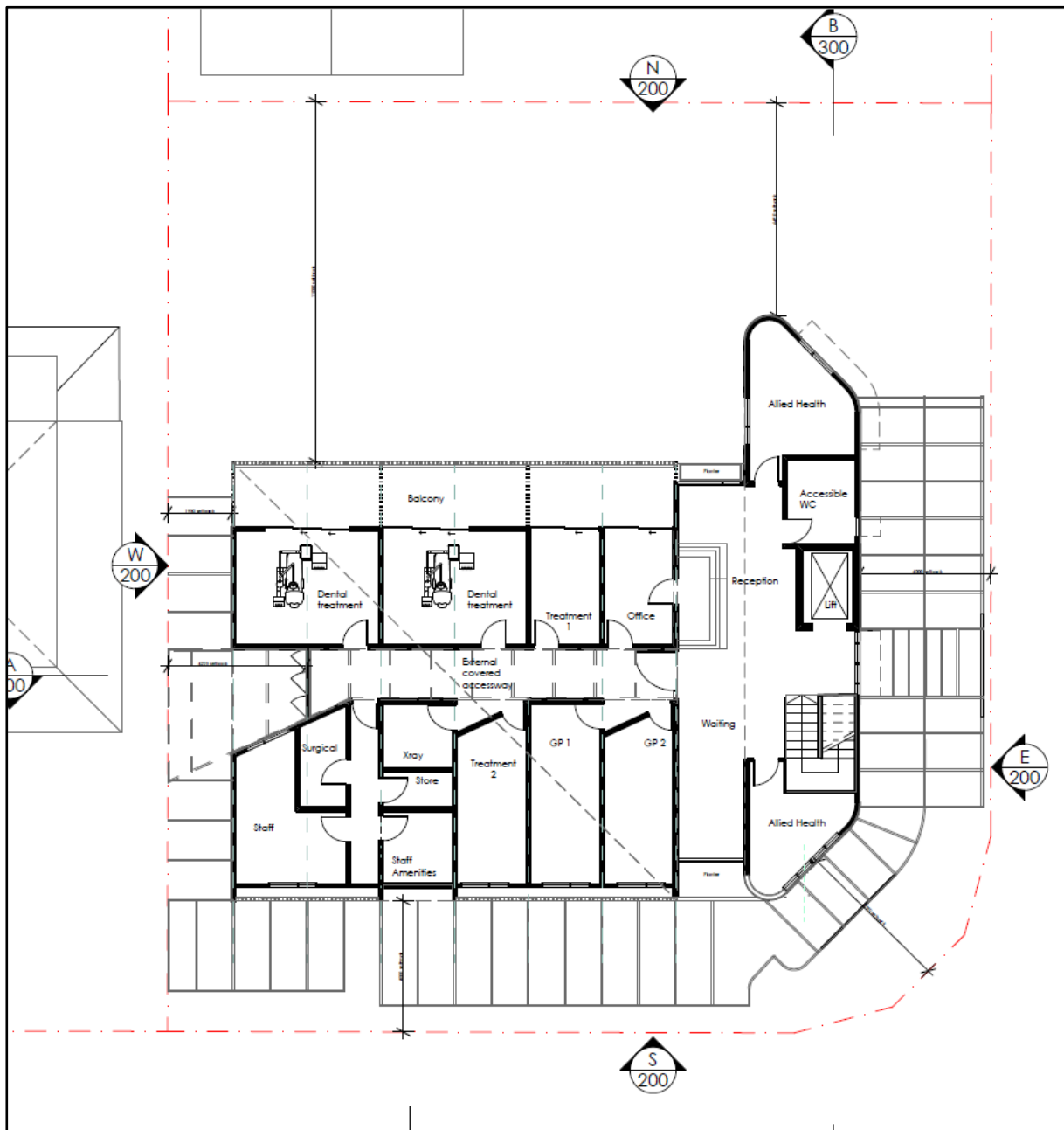


Figure 4
Level 1 Floor Plan

CRITERIA

Measurements and Calculations

All noise level measurements were conducted generally in accordance with the following:

- general requirements of the Queensland environmental protection legislation;
- Environmental Protection (Noise) Policy 2019 (EPP Noise);
- *Noise Measurement Manual*, Queensland Department of Environment and Heritage Protection, Version 4.01, 10 March 2020;

- Australian Standard AS 1055 - 2018, *Acoustics, Description and measurement of environmental noise*.

Noise Limits

The proposed health care service will generally operate from 0800 to 1700 hours Monday to Saturday.

In accordance with the Logan Planning Scheme 2015: v 9.0, SC6.2.3 Planning scheme policy 3 – Environmental management, 3.2 Emission and Immission standards, Table 3.2.1.1 noise levels at the boundary of the adjoining low density residential are:

Noise Type	Time Period	Monday to Saturday	Sunday and Public Holidays
Non-steady sound	Day, 0700 to 1800 hours	$L_{Aeq,adj,T} \leq L_{A90} + 5 \text{ dB(A)}$	$L_{Aeq,adj,T} \leq L_{A90} + 5 \text{ dB(A)}$
	Evening, 1800 to 2200 hours	$L_{Aeq,adj,T} \leq L_{A90} + 5 \text{ dB(A)}$	$L_{Aeq,adj,T} \leq L_{A90} + 5 \text{ dB(A)}$
	Night, 2200 to 0700 hours	$L_{Aeq,adj,T} \leq L_{A90} + 0 \text{ dB(A)}$ and $L_{Amax} \leq 60 \text{ dB(A)}$	$L_{Aeq,adj,T} \leq L_{A90} + 0 \text{ dB(A)}$ and $L_{Amax} \leq 60 \text{ dB(A)}$
Continuous sound	Anytime	$L_{A90,T} + 0 \text{ dB(A)}$	$L_{A90,T} + 0 \text{ dB(A)}$

CURRENT AMBIENT NOISE LEVELS

For monitoring location A Table 1 details the results of the ambient/traffic noise level measurements obtained from the un-attended noise logger, and for monitoring location B Table 2 details the results of the ambient noise assessment. For the monitoring location A ambient noise level measurement equipment, equipment settings, calibration, monitoring location and atmospheric conditions, refer Appendix A. Appendix B contains, for the key parameters, all of the results of the ambient noise level measurements. For the monitoring location B ambient noise level measurement equipment, equipment settings, calibration, monitoring location and atmospheric conditions, refer Appendix C. Appendix D contains, for the key parameters, all of the results of the ambient noise level measurements. Refer Appendix E for atmospheric data for Logan City, which generally complied with the requirements of the Australian Standard for conducting environmental noise levels.

For the 7-day noise assessments there was no rainfall and wind speeds were all less than 5 m/s (approximately 19 km/hr). Therefore the atmospheric conditions were compliant with the requirements for environmental noise measurements.

With respect to noise the following should be noted:

- daytime: 0700 to 1800 hours;
- evening: 1800 to 2200 hours;
- night-time: 2200 to 0700 hours;
- 'A' weighted: adjustment made by the sound level meter to the measured noise to correspond to the response of the human ear. This adjustment is standardised by international noise standards;
- $L_{Aeq,T}$: the equivalent continuous (or approximately the 'average') 'A' weighted sound pressure level for the measurement period 'T';
- $L_{A1,T}$: the 'A' weighted sound pressure level exceeded for 1% of the measurement period 'T';
- $L_{A10,T}$: the 'A' weighted sound pressure level exceeded for 10% of the measurement period 'T', which is an approximation of the 'average of the maximum noise levels';
- $L_{A90,T}$: the 'A' weighted sound pressure level exceeded for 90% of the measurement period 'T', which is an approximation of the 'average of the minimum noise levels', which is also known as the 'background' noise level;

- RBL: the Rating Background Level is the 10th percentile of the L_{A90,T} background sound levels for the periods daytime, evening and night-time, and is a single figure for each of these time periods.

Table 1 Results of Ambient (Traffic) Noise Assessment, Monitoring Location A															
Day	Date	Time	L _{Aeq,T}			L _{A1,T}			L _{A10,T}			L _{A90,T}			RBL
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Average
Thursday	22.08.24	Evening	60.5	68.1	63.3	69.3	79.1	73.2	63.8	68.6	65.8	46.9	55.3	50.7	47.7
		Night	52.8	68.2	61.8	63.9	78.6	71.1	57.0	70.9	65.4	34.5	57.5	50.0	34.7
Friday	23.08.24	Day	65.1	70.6	67.6	72.8	80.6	77.0	68.6	71.7	70.4	54.3	59.0	57.4	56.0
		Evening	62.5	72.6	66.2	71.3	84.0	76.6	66.5	70.0	68.3	51.4	56.3	54.0	51.8
		Night	55.6	72.1	63.2	65.9	81.4	72.6	60.2	68.2	64.3	38.0	53.3	47.3	38.5
Saturday	24.08.24	Day	61.4	70.6	66.2	70.2	82.9	76.9	65.8	70.5	68.4	51.2	56.3	54.8	53.2
		Evening	63.4	73.2	68.3	72.1	84.3	79.0	66.2	68.5	67.4	51.6	53.8	53.0	51.8
		Night	55.0	67.6	61.1	65.6	75.9	70.8	58.1	66.3	63.3	34.6	51.3	46.0	37.1
Sunday	25.08.24	Day	62.5	71.2	66.4	71.6	82.1	76.8	65.5	70.0	68.0	49.5	55.1	53.6	52.1
		Evening	59.2	71.0	65.1	67.9	82.3	75.3	63.4	67.4	65.4	46.1	53.4	50.0	46.3
		Night	53.2	70.9	62.9	64.4	83.8	73.6	56.0	70.8	65.8	34.1	58.0	50.8	35.3
Monday	26.08.24	Day	63.5	68.5	65.8	70.3	81.1	75.4	67.2	71.2	68.9	53.0	59.1	55.1	53.7
		Evening	61.9	71.6	65.7	70.6	80.1	76.9	64.8	68.1	66.5	46.3	54.3	51.8	47.3
		Night	55.5	69.2	63.3	66.1	78.6	72.8	58.1	71.8	66.4	36.8	58.7	51.0	38.4
Tuesday	27.08.24	Day	64.2	69.3	66.9	71.7	81.6	76.7	68.1	72.3	69.8	54.4	58.2	56.0	54.8
		Evening	60.4	68.8	65.1	69.1	82.1	76.3	64.7	69.4	67.0	47.7	56.5	52.4	48.0
		Night	54.8	71.4	64.5	66.8	86.9	76.6	56.2	71.9	66.6	34.3	57.6	50.8	34.6
Wednesday	28.08.24	Day	63.0	71.1	66.5	71.2	84.3	76.8	66.8	71.8	68.9	52.8	57.7	54.9	53.4
		Evening	60.5	71.1	65.3	69.9	82.0	75.7	64.2	68.4	66.8	48.5	54.1	51.7	48.7
		Night	54.9	70.9	64.1	66.9	79.9	73.6	59.2	71.7	66.9	36.6	58.2	51.7	39.2
Thursday	29.08.24	Day	62.3	71.4	66.4	71.1	82.5	75.9	66.0	72.0	68.7	52.1	58.6	55.0	52.5

Average Noise Level, Monday to Saturday, dB(A)

L _{Aeq,T}	Daytime	66.6	L _{A90,T}	Daytime	55.7
	Evening	65.1		Evening	52.1
	Night-time	63.4		Night-time	50.2
L _{A1,T}	Daytime	76.4	RBL	Daytime	54.1
	Evening	75.7		Evening	48.7
	Night-time	73.3		Night-time	37.1
L _{A10,T}	Daytime	69.3			
	Evening	66.9			
	Night-time	65.9			

Average Noise Level, Sunday, dB(A)

L _{Aeq,T}	Daytime	66.4	L _{A90,T}	Daytime	53.6
	Evening	65.1		Evening	50.0
	Night-time	62.9		Night-time	50.8
L _{A1,T}	Daytime	76.8	RBL	Daytime	52.1
	Evening	75.3		Evening	46.3
	Night-time	73.6		Night-time	35.3
L _{A10,T}	Daytime	68.0			
	Evening	65.4			
	Night-time	65.8			

Table 2 Results of Ambient (Residential) Noise Assessment, Monitoring Location B																
Day	Date	Time	L _{Aeq,T}			L _{A1,T}			L _{A10,T}			L _{A90,T}			RBL	
			Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Average	
Thursday	22.08.24	Evening	49.5	56.4	53.4	58.7	68.6	64.0	52.0	58.3	54.8	44.2	47.8	45.8	44.3	
		Night	42.1	62.6	52.5	52.1	74.1	63.2	46.1	66.5	55.2	29.9	48.4	41.4	31.0	
Friday	23.08.24	Day	53.7	60.2	57.6	61.2	72.0	67.6	56.6	64.9	59.8	43.2	52.7	49.5	45.7	
		Evening	52.3	62.3	55.4	61.1	70.9	65.1	54.2	59.0	56.5	42.3	47.6	45.3	42.7	
		Night	42.2	62.6	52.6	52.8	73.4	64.3	46.4	65.5	54.2	31.3	50.3	41.1	32.1	
Saturday	24.08.24	Day	53.0	59.1	56.5	62.2	71.7	67.8	55.0	61.4	58.3	43.3	49.8	46.5	44.0	
		Evening	51.1	62.5	56.3	60.4	71.5	66.7	53.6	57.5	55.7	43.2	46.2	44.7	43.6	
		Night	41.5	60.8	51.6	51.8	71.8	62.5	45.4	65.0	54.0	28.8	49.3	42.5	30.9	
Sunday	25.08.24	Day	52.9	64.6	56.9	62.0	77.7	68.7	54.3	66.9	58.5	42.2	47.9	45.2	43.2	
		Evening	48.1	58.2	53.3	57.1	72.6	65.2	51.0	56.0	53.9	40.1	45.4	42.9	40.1	
		Night	40.5	59.6	51.5	51.3	70.6	62.4	43.8	60.5	53.8	32.1	48.5	41.7	32.8	
Monday	26.08.24	Day	51.1	61.5	55.1	58.2	71.8	65.4	54.2	66.5	57.7	42.7	48.5	45.6	43.4	
		Evening	50.3	60.3	54.6	59.3	67.5	65.2	53.2	57.1	54.9	40.5	48.0	45.0	41.4	
		Night	43.6	60.3	52.6	53.4	72.3	62.9	46.9	62.8	54.7	34.5	49.4	42.7	36.2	
Tuesday	27.08.24	Day	52.5	61.5	56.1	60.1	72.9	66.2	55.7	66.1	58.8	42.9	49.8	46.6	44.0	
		Evening	47.8	56.2	53.3	56.4	70.0	64.9	51.3	57.6	54.6	39.3	46.6	43.8	39.6	
		Night	40.0	61.9	53.1	52.2	74.6	64.8	41.8	63.1	54.0	25.0	50.2	41.2	26.7	
Wednesday	28.08.24	Day	51.2	65.3	56.3	59.5	72.0	65.6	54.4	65.2	57.7	43.3	48.8	46.1	44.0	
		Evening	48.8	56.8	53.2	56.5	70.9	64.2	51.5	57.8	54.5	42.0	47.2	44.8	42.1	
		Night	42.0	59.1	51.8	52.3	70.2	61.9	46.0	60.7	54.0	32.6	50.4	43.8	34.2	
Thursday	29.08.24	Day	51.8	61.4	55.9	59.0	72.6	66.1	54.2	61.9	57.7	43.4	48.8	46.2	43.9	

Average Noise Level, Monday to Saturday, dB(A)

L _{Aeq,T}	Daytime	56.3	L _{A90,T}	Daytime	46.8
	Evening	54.4		Evening	44.9
	Night-time	52.4		Night-time	42.1
L _{A1,T}	Daytime	66.5	RBL	Daytime	44.2
	Evening	65.0		Evening	42.3
	Night-time	63.3		Night-time	31.9
L _{A10,T}	Daytime	58.3			
	Evening	55.2			
	Night-time	54.4			

Average Noise Level, Sunday, dB(A)

L _{Aeq,T}	Daytime	56.9	L _{A90,T}	Daytime	45.2
	Evening	53.3		Evening	42.9
	Night-time	51.5		Night-time	41.7
L _{A1,T}	Daytime	68.7	RBL	Daytime	43.2
	Evening	65.2		Evening	40.1
	Night-time	62.4		Night-time	32.8
L _{A10,T}	Daytime	58.5			
	Evening	53.9			
	Night-time	53.8			

It should be noted that all of the ambient noise levels were obtained as detailed 1/3rd octave frequency spectrum. An examination of these frequency spectrum revealed no insect noise present for the daytime, evening or night-time periods. All time periods were influenced by the noise of traffic on Kingston Road.

Based on the above background sound levels and the hours of operation for the health care service (generally 0800 to 1700 hours Monday to Saturday) the noise limits applied in this report are:

Adjoining Residential to West

Non-steady noise

- 0700 to 1800 hours (daytime): 54.1 + 5 = 59 dB(A) L_{Aeq,adj,T};
- 1800 to 2200 (evening): 48.7 + 5 = 54 dB(A) L_{Aeq,adj,T}.

Continuous noise

- 0700 to 1800 hours (daytime): 54.1 + 0 = 54 dB(A) L_{Aeq,adj,T};
- 1800 to 2200 (evening): 48.7 + 0 = 49 dB(A) L_{Aeq,adj,T}.

The above noise limits apply at the residential boundary.

Adjoining Residential to North

Non-steady noise

- 0700 to 1800 hours (daytime): 44.2 + 5 = 49 dB(A) L_{Aeq,adj,T};
- 1800 to 2200 (evening): 42.3 + 5 = 47 dB(A) L_{Aeq,adj,T}.

Continuous noise

- 0700 to 1800 hours (daytime): $44.2 + 0 = 44$ dB(A) $L_{Aeq,adj,T}$;
- 1800 to 2200 (evening): $42.3 + 0 = 42$ dB(A) $L_{Aeq,adj,T}$.

The above noise limits apply at any residential boundary.

TRAFFIC NOISE IMPACT UPON MEDICAL CENTRE

The only potential for traffic noise impact is to the inside of the health care service building. In accordance with Australian Standard AS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors*, Table 1 details the design sound levels for different areas of occupancy inside buildings. The following should be noted for health buildings:

- consulting rooms, 40 to 45 dB(A) $L_{Aeq,T}$;
- dental clinics, 40 to 45 dB(A) $L_{Aeq,T}$;
- patient lounge 40 to 45 dB(A) $L_{Aeq,T}$;
- reception, waiting rooms 40 to 50 dB(A) $L_{Aeq,T}$;
- office areas, 35 to 45 dB(A) $L_{Aeq,T}$.

Based on the above, provided the internal noise level did not exceed more than 45 dB(A) $L_{Aeq,T}$ then all areas would comply with AS 2107:2016.

Further to the above the Department of Transport and Main Roads *Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure* the primary noise criteria is relative to the facade of the building (≤ 58 dB(A) L_{10} (1hr) facade corrected (maximum hour during normal opening hours)) and the secondary criteria is relative to the interior of the building (≤ 35 dB(A) L_{eq} (1hr) facade corrected (maximum hour during normal opening hours)).

At monitoring location A, approximately 29 metres from the centre of Kingston Road, the maximum $L_{Aeq,1H}$ noise levels between 0800 and 1700 hours were:

- Friday 23rd: 68.5 dB(A) $L_{Aeq,1H}$ and 70.9 dB(A) $L_{A10,1H}$;
- Saturday 24th: 67.3 dB(A) $L_{Aeq,1H}$ and 69.3 dB(A) $L_{A10,1H}$;
- Monday 26th: 66.2 dB(A) $L_{Aeq,1H}$ and 69.8 dB(A) $L_{A10,1H}$;
- Tuesday 27th: 67.1 dB(A) $L_{Aeq,1H}$ and 70.8 dB(A) $L_{A10,1H}$;
- Wednesday 28th: 66.9 dB(A) $L_{Aeq,1H}$ and 70.3 dB(A) $L_{A10,1H}$;
- Thursday 29th: 67.3 dB(A) $L_{Aeq,1H}$ and 70.5 dB(A) $L_{A10,1H}$.

From the above the average 1-hour traffic noise level at monitoring location A was 67.2 dB(A) $L_{Aeq,1H}$ and 70.3 dB(A) $L_{A10,1H}$.

Monitoring location A was approximately 29 metres from the centre of Kingston Road, compared to the closest facade of the proposed health care service building being approximately 19 metres from the centre of Kingston Road. This reduction in separation distance (and reduction in ground absorption) would increase the traffic noise level by 2.8 dB(A) to $67.2 + 2.8 = 70$ dB(A) $L_{Aeq,1H}$ and $70.3 + 2.8 = 73.1$ dB(A) $L_{A10,1H}$.

For the primary noise criteria the traffic noise must not exceed 58 dB(A) $L_{A10,1H}$ maximum for the hours of operation of the health care service, necessitating an acoustic barrier which would need to provide a noise reduction of $73.1 - 58 = 15.1$ dB(A). With the medical and dental consulting rooms on the first floor level, by path difference calculation an acoustic barrier would need to be 6.5 metres high to achieve the required traffic noise level reduction. Due to the excessive height of the acoustic barrier required to adequately control traffic noise impact at the facade of the health care service building, a more appropriate method of traffic noise control would be to upgrade the materials of construction to achieve the internal noise criteria. This secondary criteria for health care services buildings is ≤ 35 dB(A) $L_{Aeq,1H}$ (maximum hour during normal operating hours).

To comply with the internal noise limit of 35 dB(A) the materials of construction need to provide a traffic noise reduction of $70.0 - 35 = 35.0$ dB(A) $L_{Aeq,T}$.

In accordance with the Queensland Development Code Mandatory Part 4.4 *Building in a Transport Noise Corridor* a noise reduction of 35 dB(A) is Noise Category 3, with the following minimum Rw requirements:

- Category 3:
 - Glazing: Rw 35 for glazing with up to and equal to 1.8m²;
Rw 38 for glazing greater than 1.8m²;
 - External walls: Rw 47;
 - Roof: Rw 41;
 - Entry Doors: Rw 33.

With respect to the above the following examples of achieving the nominated minimum Rw values should be noted (extracted from MP4.4):

- **Noise Category 3:**
 - Glazing Rw 38:
 - minimum 14.38mm thick laminated glass, with full perimeter *acoustically rated seals*;
 - OR
 - Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter *acoustically rated seals*
 - Glazing Rw 35:
 - minimum 10.38mm thick laminated glass, with full perimeter *acoustically rated seals*
 - External walls Rw 47:
 - two leaves of clay brick masonry at least 110mm thick with:
 - (6) cavity not less than 50mm between leaves; and
 - (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation a density of 11kg/m³ or 50mm thick polyester insulation with a density of 20kg/m³ in the cavity.
 - with
 - OR
 - two leaves of clay brick masonry at last 110mm thick with:
 - (7) cavity not less than 50mm between leaves; and
 - (ii) at least 13mm thick cement render on each face
 - OR
 - Single leaf of clay brick masonry at least 110mm thick with:
 - (8) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and
 - (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and
 - (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs.
 - OR
 - Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.
 - Roof Rw 41:
 - concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm

- thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity.
OR
- Concrete suspended slab at least 100mm thick.
- Floors Rw 45:
 - concrete slab at least 100mm thick
OR
Tongued and grooved boards at least 19mm thick with:
 - (v) timber joists not less than 175mm x 50mm; and
 - (ii) mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m³ positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and
 - (iii) mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m³ laid over entire floor, including tops of joists before flooring is laid; and
 - (iv) secured to battens at least 75mm x 50mm; and
 - (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
- Entry doors Rw 33:
 - fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter *acoustically rated seals* and constructed of –
 - (9) solid core, wood, particleboard or blockboard not less than 45mm thick; and/or
 - (ii) acoustically laminated glass not less than 10.38mm thick.

To comply with the internal noise criteria all external openings would need to be closed and, therefore, those rooms which require upgraded materials of construction for traffic noise control (Noise Category 3) must be mechanically ventilated and/or air-conditioned. This air-conditioning/mechanical ventilation system must be designed and installed such that it maintains the internal noise and, furthermore, complies with the ventilation requirements of the Building Code of Australia.

NOISE IMPACT FROM HEALTH CARE SERVICE TO RESIDENTIAL

Source Noise Levels

The potential noise sources associated with the proposed medical centre, adjusted for tonality and/or impulsiveness, are as follows:

- passenger vehicle driving, parking, door closing and engine starting:
 - 43 dB(A) $L_{Aeq,T} + 5$ (adjustment for tonality and impulsiveness) = 48 dB(A) $L_{Aeq,adj,T}$ @ 8 metres;
- people (2) talking in the carpark:
 - 43 dB(A) $L_{Aeq,T} + 2$ (tonality) = 45 dB(A) $L_{Aeq,adj,T}$ @ 8 metres;
- delivery van driving, parking, door closing, unloading/loading and engine starting:
 - 45 dB(A) $L_{Aeq,T} + 5$ (adjustment for tonality and impulsiveness) = 50 dB(A) $L_{Aeq,adj,T}$ @ 8 metres;
- air-conditioner:
 - 68 dB(A) $L_{WAeq} + 2$ (tonality) – 17.5 (sound power level to sound pressure level @ 3m) = 53 dB(A) $L_{Aeq,adj,T}$ @ 3 metres.

With respect to the carpark activity for passenger vehicles this was assessed relative to the centre of the parking area. For the noise from the air-conditioning units, at the time of preparing this report the actual number, noise level and location of the air-conditioning units was not known. However, for the purpose of potential noise impact, it has been assumed that multiple head split system air-conditioners

will be used, with four units equi-spaced along the solid wall on the eastern side of the carpark and just under the concrete floor slab over.

Western Residential Boundary

At the closest point on the western boundary the noise level impact will be:

Time Varying Noise

- passenger vehicles: 48 dB(A) @ 8m – 1.0 (distance, 9m) + 6 (reflected noise) = 53 dB(A) $L_{Aeq,adj,T}$;
- people talking: 45 dB(A) @ 8m – 1.0 (distance, 9m) + 6 (reflected noise) = 50 dB(A) $L_{Aeq,adj,T}$
- delivery vehicle: 50 dB(A) @ 8m – 4.9 (distance, 14m) + 6 (reflected noise) = 51 dB(A) $L_{Aeq,adj,T}$;
- combined = 53 + 50 + 51 = 56.3 = 56 dB(A) $L_{Aeq,adj,T}$.

The combination of the above time-varying noise sources comply with the daytime noise limit of 59 dB(A) $L_{Aeq,adj,T}$ at the western residential boundary.

Continuous Noise

- air-conditioners:
 - 53 @ 3m – 15.1 (distance, 17m) + 6 (reflected noise) = 43.9 dB(A) $L_{Aeq,adj,T}$;
 - 53 @ 3m – 15.1 (distance, 17m) + 6 (reflected noise) = 43.9 dB(A) $L_{Aeq,adj,T}$;
 - 53 @ 3m – 15.1 (distance, 17m) + 6 (reflected noise) = 43.9 dB(A) $L_{Aeq,adj,T}$;
 - 53 @ 3m – 15.1 (distance, 17m) + 6 (reflected noise) = 43.9 dB(A) $L_{Aeq,adj,T}$;
 - combined = 43.9 + 43.9 + 43.9 + 43.9 + 43.9 = 49.9 = 50 dB(A) $L_{Aeq,adj,T}$.

At the closest point on the western residential boundary the combination of the continuous source noise levels complies with the daytime noise limit of 54 dB(A) $L_{Aeq,adj,T}$.

Northern Residential Boundary

At the closest point on the northern residential boundary the noise level impact will be:

Time Varying Noise

- passenger vehicles: 48 dB(A) @ 8m – 4.2 (distance, 9m) + 6 (reflected noise) = 50 dB(A) $L_{Aeq,adj,T}$;
- people talking: 45 dB(A) @ 8m – 4.2 (distance, 9m) + 6 (reflected noise) = 47 dB(A) $L_{Aeq,adj,T}$
- delivery vehicle: 50 dB(A) @ 8m + 1.2 (distance, 7m) + 6 (reflected noise) = 57 dB(A) $L_{Aeq,adj,T}$;
- combined = 50 + 47 + 57 = 58.1 = 58 dB(A) $L_{Aeq,adj,T}$.

The combination of the above time-varying noise sources exceed the daytime noise limit of 49 dB(A) $L_{Aeq,adj,T}$ at the northern residential boundary by 9 dB(A). To control this noise limit exceedance an acoustic barrier is required – refer Noise Control section of this report for detail.

Continuous Noise

- air-conditioners:
 - 53 @ 3m – 13.4 (distance, 14m) + 6 (reflected noise) = 45.6 dB(A) $L_{Aeq,adj,T}$;
 - 53 @ 3m – 14.0 (distance, 15m) + 6 (reflected noise) = 45.0 dB(A) $L_{Aeq,adj,T}$;
 - 53 @ 3m – 16.5 (distance, 20m) + 6 (reflected noise) = 42.5 dB(A) $L_{Aeq,adj,T}$;
 - 53 @ 3m – 17.3 (distance, 22m) + 6 (reflected noise) = 41.7 dB(A) $L_{Aeq,adj,T}$;
 - combined = 45.6 + 45.0 + 42.5 + 41.7 = 50.0 = 50 dB(A) $L_{Aeq,adj,T}$.

At the closest point on the northern residential boundary the combination of the continuous source noise levels exceeds the daytime noise limit of 44 dB(A) $L_{Aeq,adj,T}$ by 6 dB(A). To control this noise limit exceedance an acoustic barrier is required – refer Noise Control section of this report for detail.

NOISE CONTROL

Applying the noise limits for non-steady noise and continuous noise at the closest residential boundaries to the proposed health care service, the daytime noise limit is complied with at the western residential boundary for both time varying and continuous noise sources, but exceeded at the northern residential boundary. For the northern residential boundary a noise reduction of 9 dB(A) is required for the time varying noise sources and a noise reduction of 6 dB(A) is required for the continuous noise sources.

By path difference calculation an acoustic barrier 2.2 metres high on the northern boundary would reduce the time varying noise sources by 9 dB(A) and the continuous noise sources by 6 dB(A). This acoustic barrier must be continuous and gap free, be constructed from materials with a minimum surface area density of 12.5 kg/m² and be located as per Figure 5. This minimum surface area density can be achieved by the following examples of materials of construction:

- earth mound;
- concrete;
- brick or blockwork;
- sheet metal a minimum 2.0mm thick;
- fibrous cement sheeting a minimum 7.5mm thick;
- overlapping timber paling fence, for example, 23 mm thick palings 100 mm wide overlapped a minimum 20 mm each side;
- any combination of the above.

To determine traffic noise levels and background sound levels relative to the residential premises on Kingston Road an unattended noise logger was located at monitoring location A, which was on the verandah of the existing residence on the subject site for a 7-day period. The dominant noise source at monitoring location A was traffic on Kingston Road, particularly during the daytime and evening, with lower traffic volumes during the night-time. To determine background sound levels relative to the adjoining residence to the north an unattended noise logger was located at monitoring location B, which was on the subject site on the northern boundary and approximately midway between the eastern and western boundaries, also for an 7-day period.

Traffic noise impact to the internal areas of the proposed health care service building was considered and provided that the materials of construction can reduce traffic noise levels by at least 35 dB(A) $L_{Aeq,T}$ then the internal areas of the health care service building will comply with the requirements for a health building in accordance with the Department of Transport and Main Roads *Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure*.

Noise from the subject site could include carpark activity, people talking in the carpark, delivery vehicles and air-conditioning units. The noise limits for non-steady noise and continuous noise were determined, based on the measured background sound levels, and calculated to the closest residential boundaries, which are to the west and north. For the western residential boundary the combined noise level for non-steady noise sources and the combined noise level for continuous noise sources complied with their respective noise limits, with no additional noise control measures in place. For the northern residential boundary the combined noise level for non-steady noise sources exceeded the noise limit by 9 dB(A) and the combined noise level for continuous noise sources (air-conditioning units) exceeded the noise limit by 6 dB(A). To control these noise limit exceedances to the daytime noise limit path difference calculations were undertaken and it was determined that an acoustic barrier 2.2 metres high is required. This acoustic barrier must be continuous and gap free, be constructed from materials with a minimum surface area density of 12.5 kg/m² and be located as per Figure 5.

Once the location of all of the air-conditioning units, together with manufacturer and sound power level, has been determined, then the acoustic consultant should re-assess the potential noise impact. If any of the noise limits are exceeded, then suitable noise control measures should be defined.

RECOMMENDATION

It is recommended that the proposed health care service at 896 Kingston Road, Waterford West be approved for operation from 0800 to 1700 hours Monday to Saturday, provided that the noise control measures detailed in this report are incorporated into this development.

APPENDIX A: LOCATION A NOISE LEVEL MEASUREMENT EQUIPMENT

Measurement Equipment

The following equipment was used to conduct the 7-day ambient noise assessment from monitoring location A:

- Bruel and Kjaer Type 2260 Hand Held Analyzer, Serial No. 2409371, with Type BZ7219 version 1.2 and Prepolarised free-field ½" microphone, Type 4189, Serial No. 2395445;
- Bruel and Kjaer Type 4231 Sound Level Calibrator, Serial No. 3024824.

All of the above equipment is Type 1 in accordance with the requirements of Australian Standard AS 1259-1990, *Acoustics – Sound Level Meters*.

Measurement Equipment Settings

The above equipment was used with the following settings:

- Detector: RMS
- Time Weighting: FAST
- Frequency Weighting: linear in 1/3rd octave bands from 12.5 to 20000 Hz
- Sound Incidence: FRONTAL;
- Sensitivity: -30.0 dB.

Calibration

The sound level meter was calibrated to the required value of 93.8 dB at 1000 Hz immediately before and after the noise level measurements were conducted. At no time was an adjustment of more than ±0.5 dB required. This complies with the requirements of the Australian Standard. The sound level meter and acoustic calibrator were NATA certified calibrated in February 2023 and March 2024 respectively.

Monitoring Location

Monitoring Location A was located on the edge of the verandah of the existing residence set back from the closest edge of Kingston Road approximately 18 metres and approximately 29 metres from the centre of Kingston Road, with the microphone elevated 1.5 metres. Refer Figure 1 for further detail.

Atmospheric Conditions

Throughout the 7-day period, atmospheric conditions generally complied with the requirements of the Australian Standard – refer Appendix E for detail.

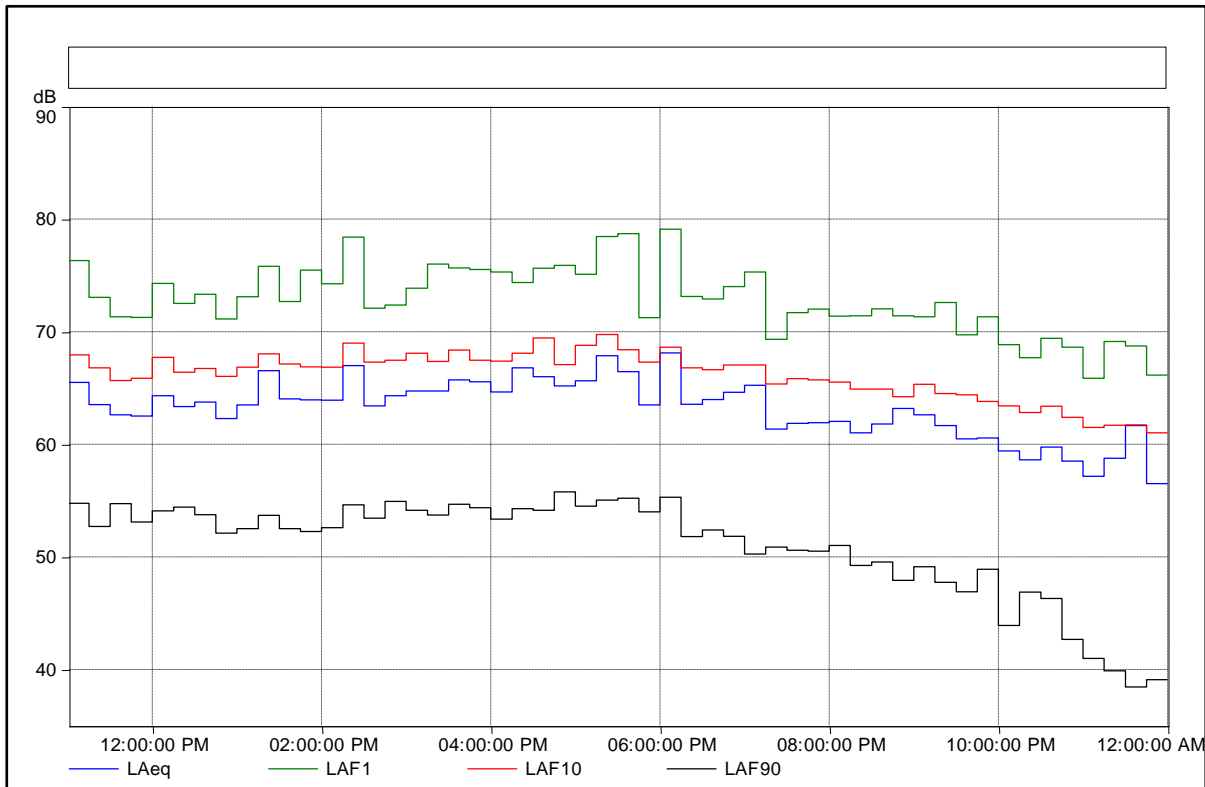
APPENDIX B: DETAILED RESULTS OF LOCATION A AMBIENT NOISE LEVELS

Instrument: 2260
Application: BZ7219 version 1.1
Start Time: 22/08/2024 11:00:48 AM
End Time: 29/08/2024 12:09:53 PM
Elapsed Time: 169:09:05
Bandwidth: 1/3 Octave
Peaks Over: 140.0 dB
Range: 34.0-114.0 dB

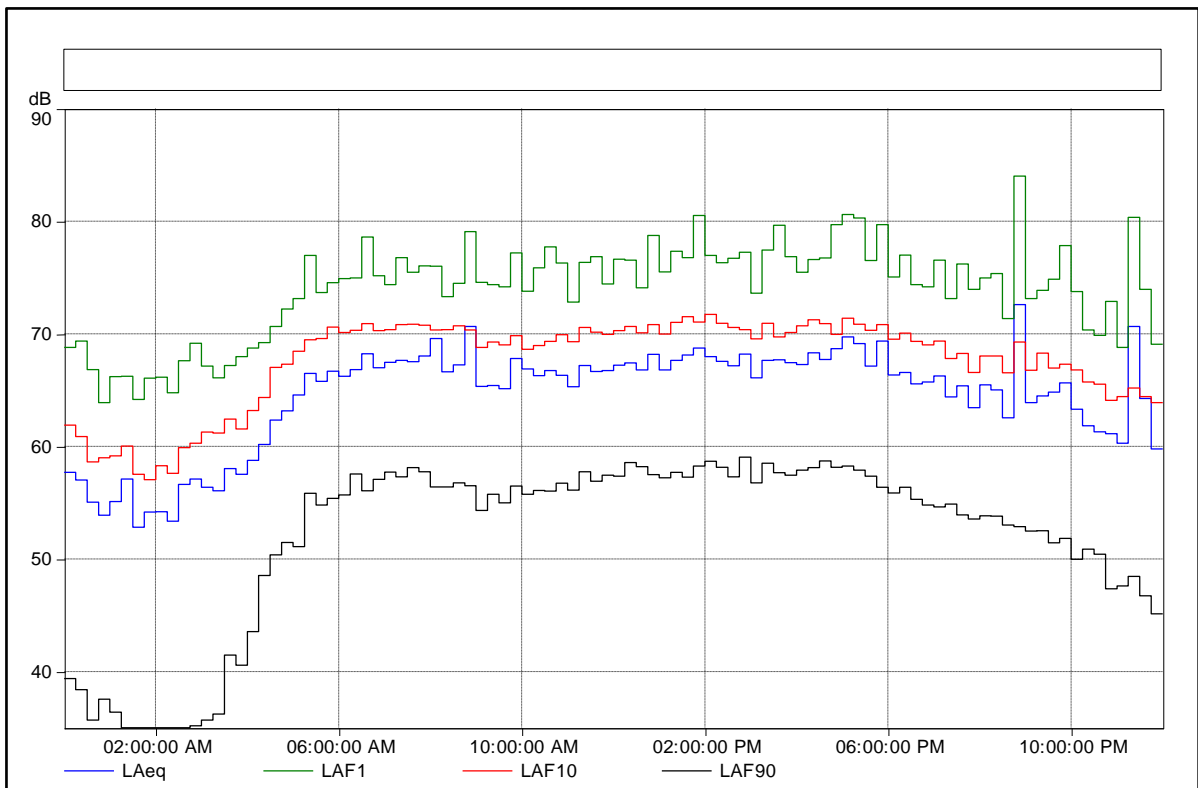
	Time	Frequency
Broad-band measurements:	S F I	A C
Broad-band statistics:	F	A
Octave measurements:	F	L
	Logging	
Log Rate:	0:15:00	
Broadband Parameters:	All	
Spectrum Parameters:	All	

Instrument Serial Number: 2409371
Microphone Serial Number:
Input: Microphone
Windscreen Correction: None
S. I. Correction: Frontal

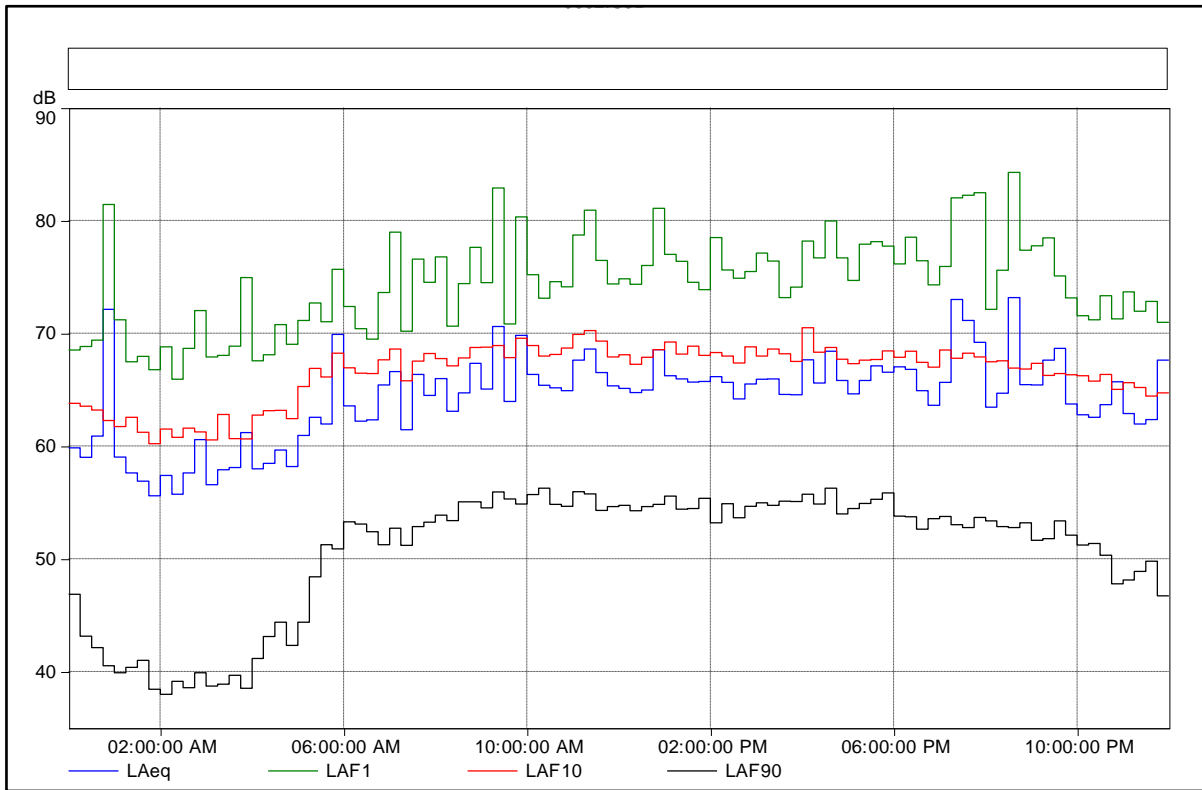
Calibration Time: 22/08/2024 11:27:21 AM
Calibration Level: 93.9 dB
Sensitivity: -30.0 dB



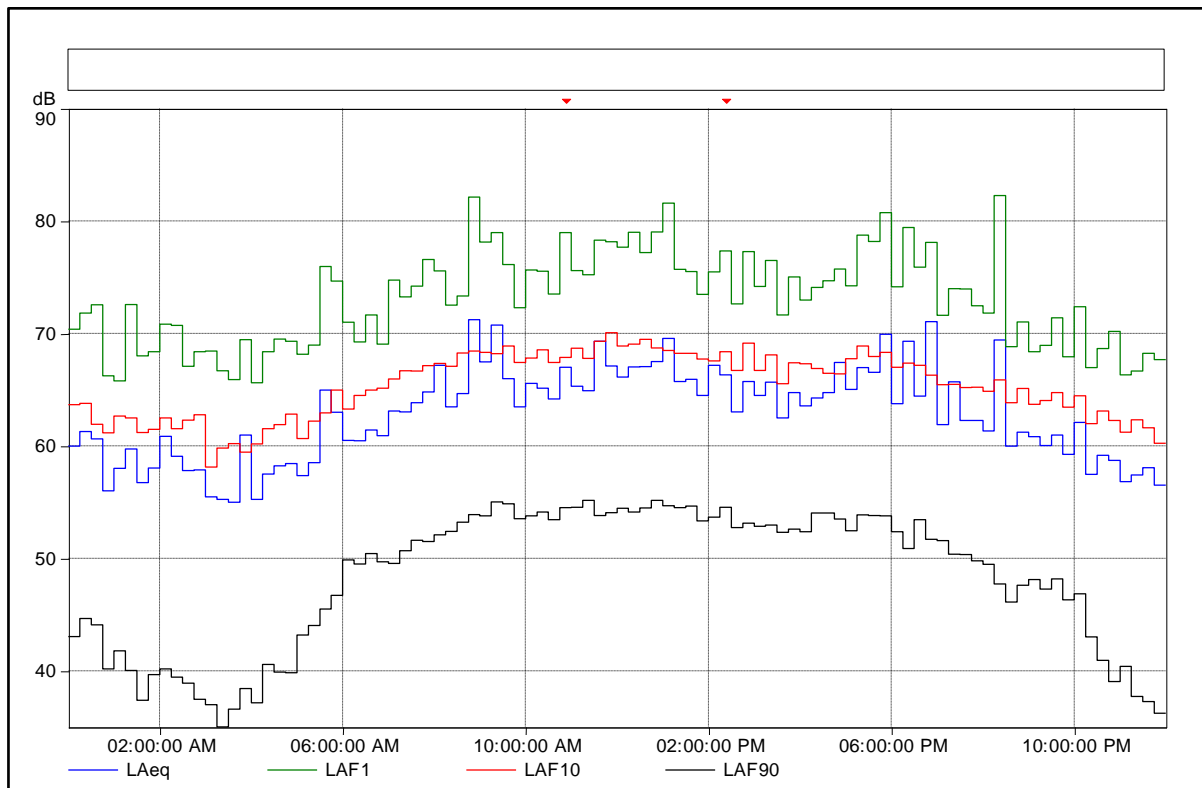
Day 1, Thursday 22 August 2024 from 1101 hours



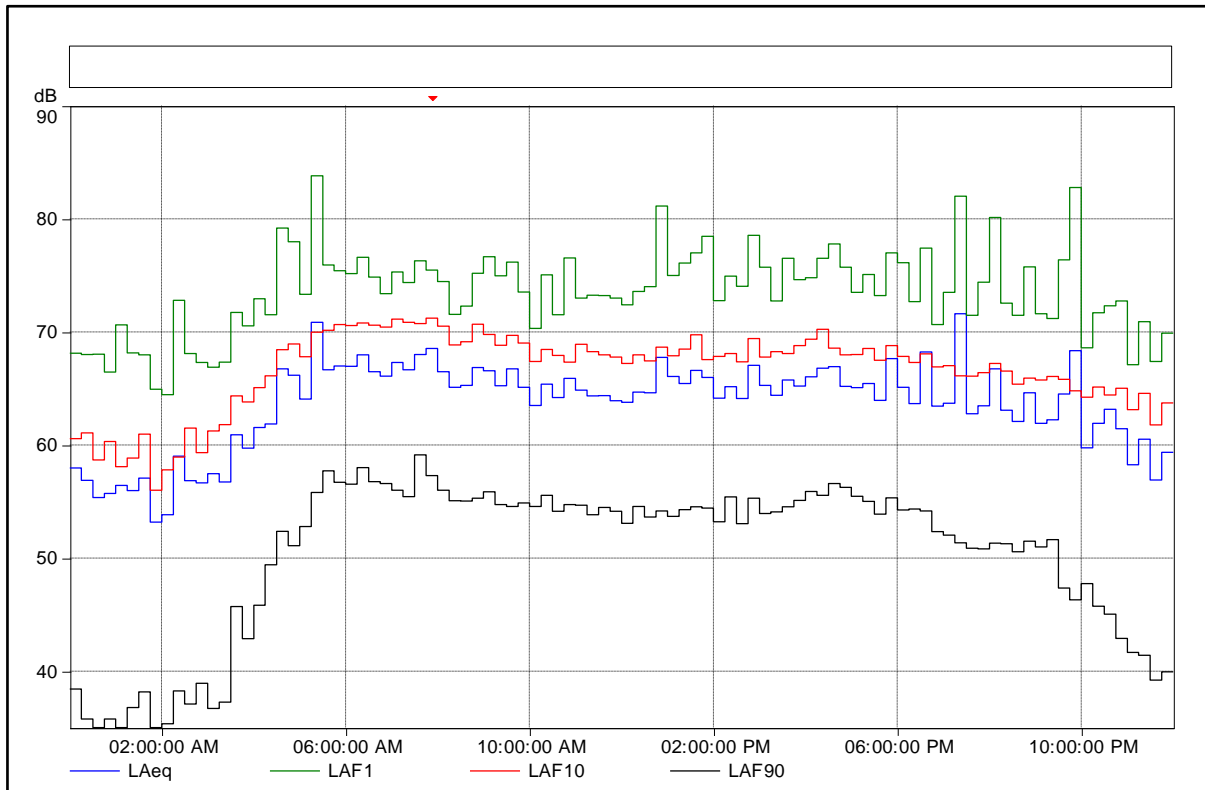
Day 2, Friday 23 August 2024



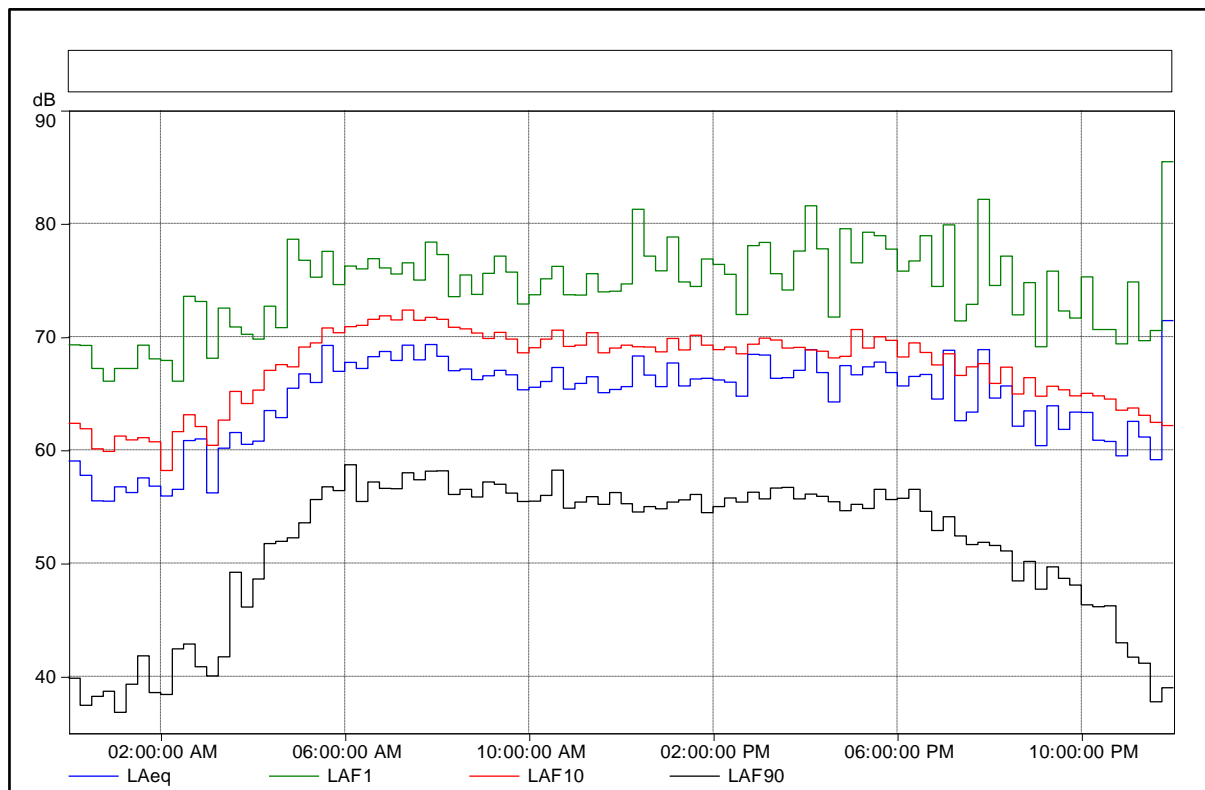
Day 3, Saturday 24 August 2024



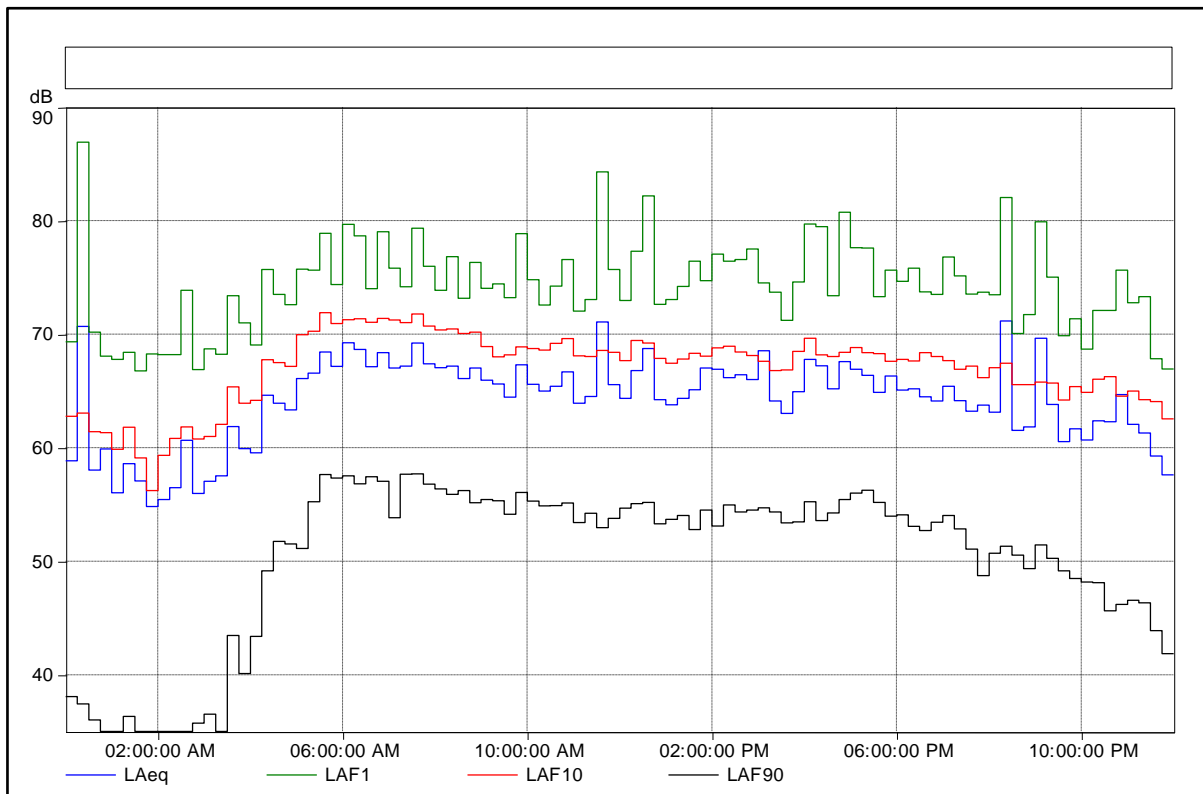
Day 4, Sunday 25 August 2024



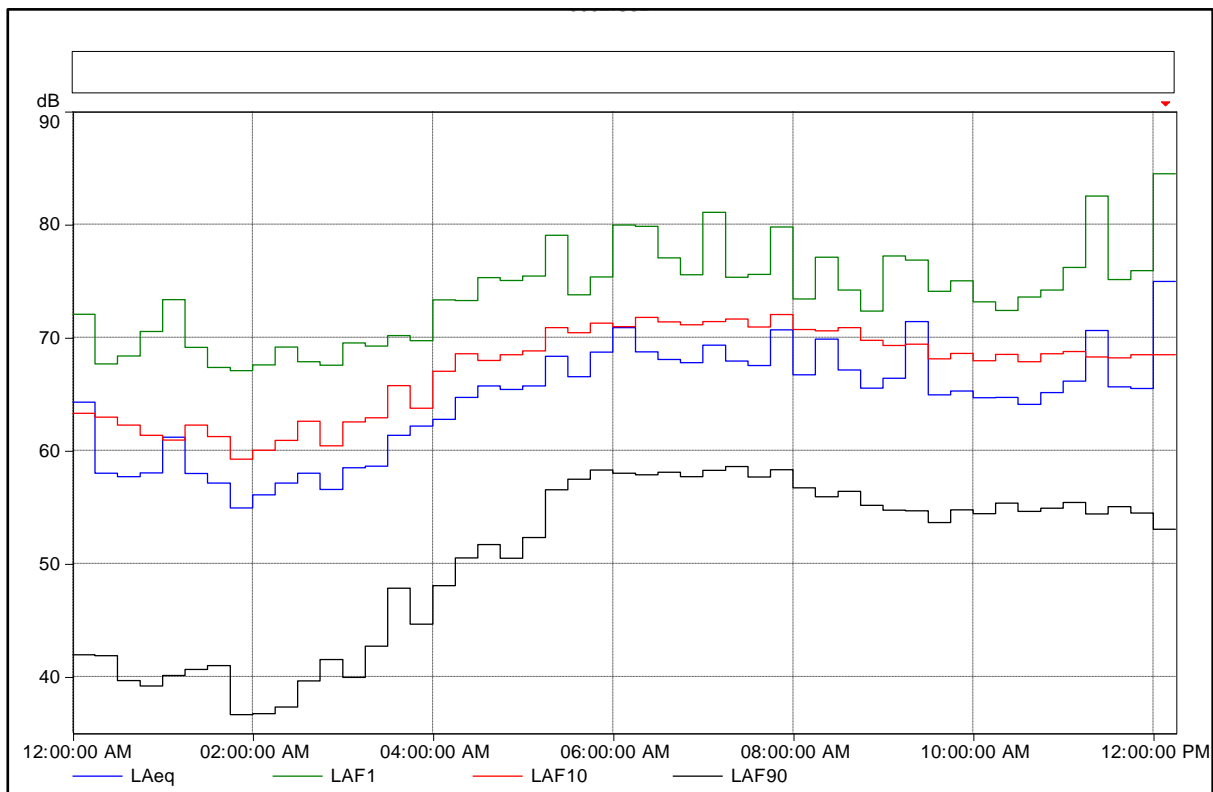
Day 5, Monday 26 August 2024



Day 6, Tuesday 27 August 2024



Day 7, Wednesday 28 August 2024



Day 8, Thursday 29 August 2024 until 1215 hours

APPENDIX C: LOCATION B AMBIENT NOISE LEVEL MEASUREMENT EQUIPMENT

Measurement Equipment

The following equipment was used to conduct the 7-day ambient noise assessment from monitoring location B:

- Bruel and Kjaer Type 2250 Hand Held Analyzer, Serial No. 3004552, with Type BZ 7133 Software Version 4.7.6 and Prepolarised free-field ½" microphone, Type 4189, Serial No. 2880058;
- Bruel and Kjaer Type 4231 Sound Level Calibrator, Serial No. 3024824.

All of the above equipment is Type 1 in accordance with the requirements of Australian Standard AS 1259-1990, *Acoustics – Sound Level Meters*.

Measurement Equipment Settings

The above equipment was used with the following settings:

- Detector: RMS
- Time Weighting: FAST
- Frequency Weighting: linear in 1/3rd octave bands from 12.5 to 16000 Hz
- Sound Incidence: FRONTAL;
- Sensitivity: 32.918 mV/Pa.

Calibration

The sound level meter was calibrated to the required value of 93.8 dB at 1000 Hz immediately before and after the noise level measurements were conducted. At no time was an adjustment of more than ±0.5 dB required. This complies with the requirements of the Australian Standard. The sound level meter and acoustic calibrator were NATA certified calibrated in November 2023 and March 2024 respectively.

Monitoring Location

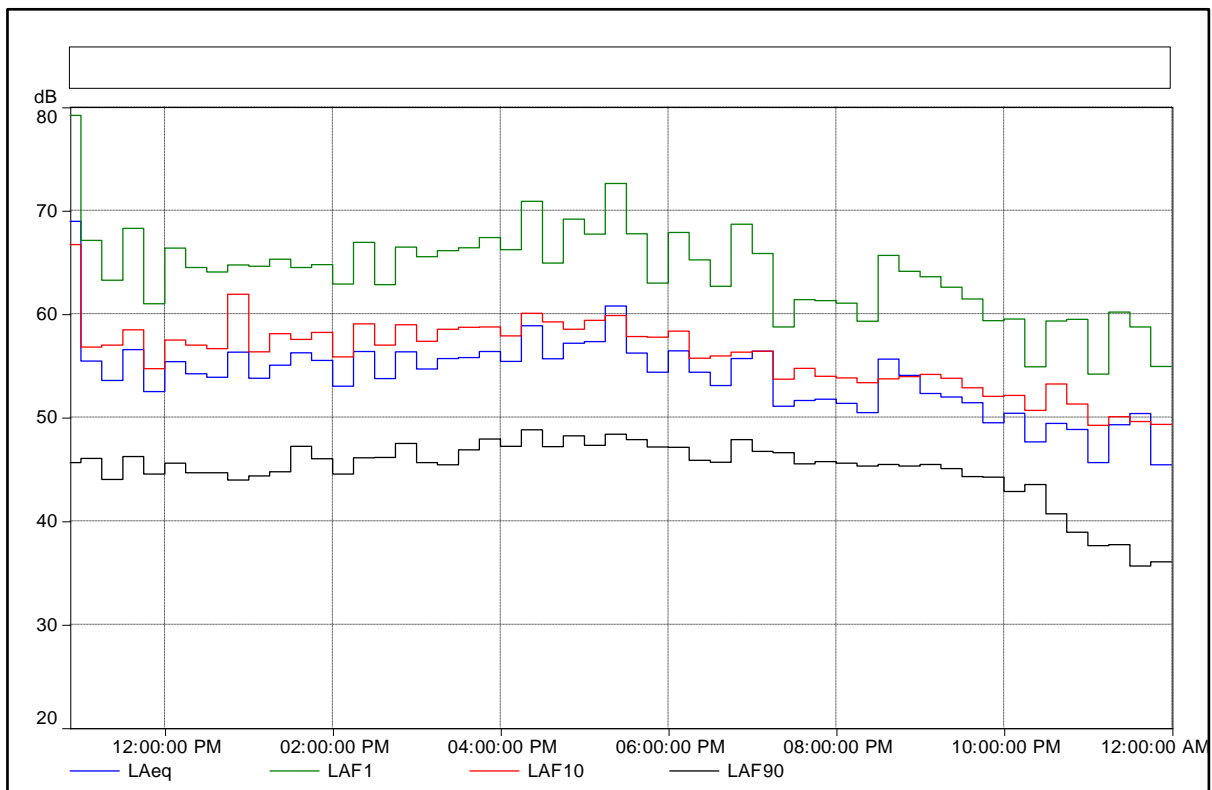
Monitoring Location B was located on the subject site on the northern boundary approximately midway between the western and eastern boundaries with the microphone elevated 1.5 metres above ground level. Refer Figure 1 for further detail.

Atmospheric Conditions

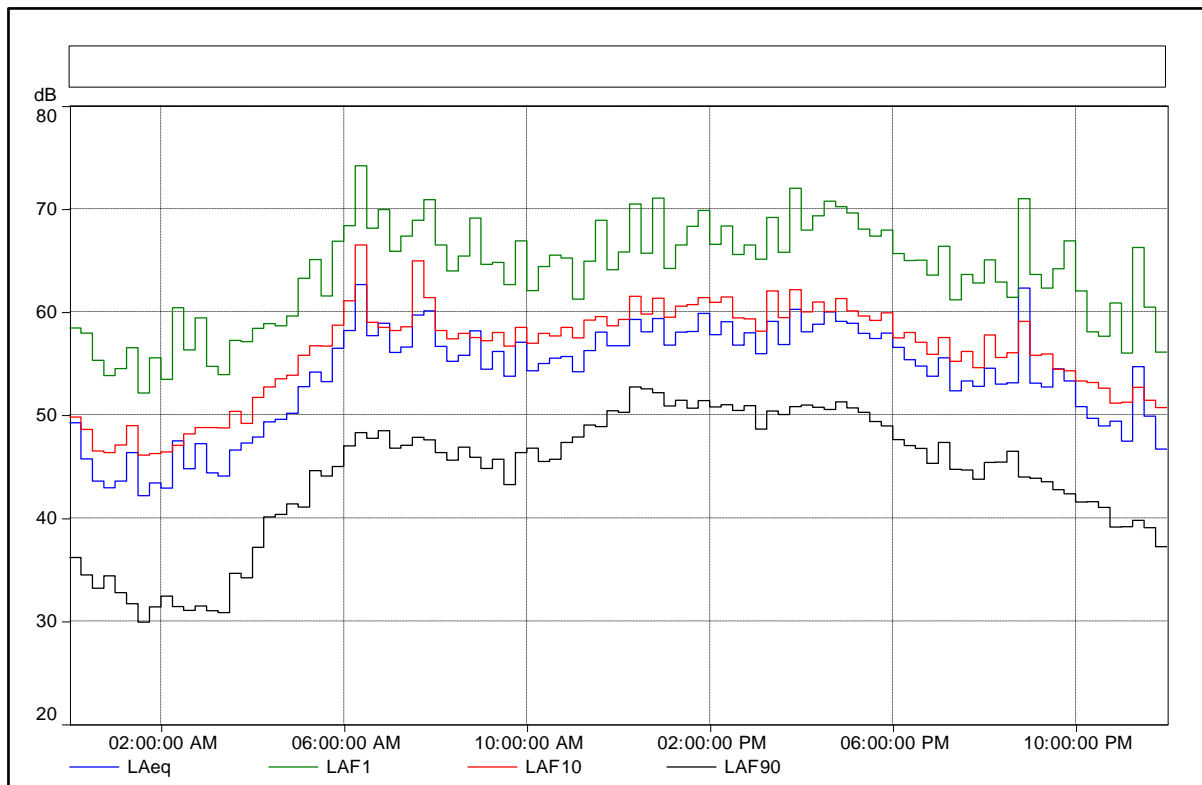
Throughout the 7-day period, atmospheric conditions generally complied with the requirements of the Australian Standard – refer Appendix E for detail.

APPENDIX D: DETAILED RESULTS OF LOCATION B AMBIENT NOISE LEVELS

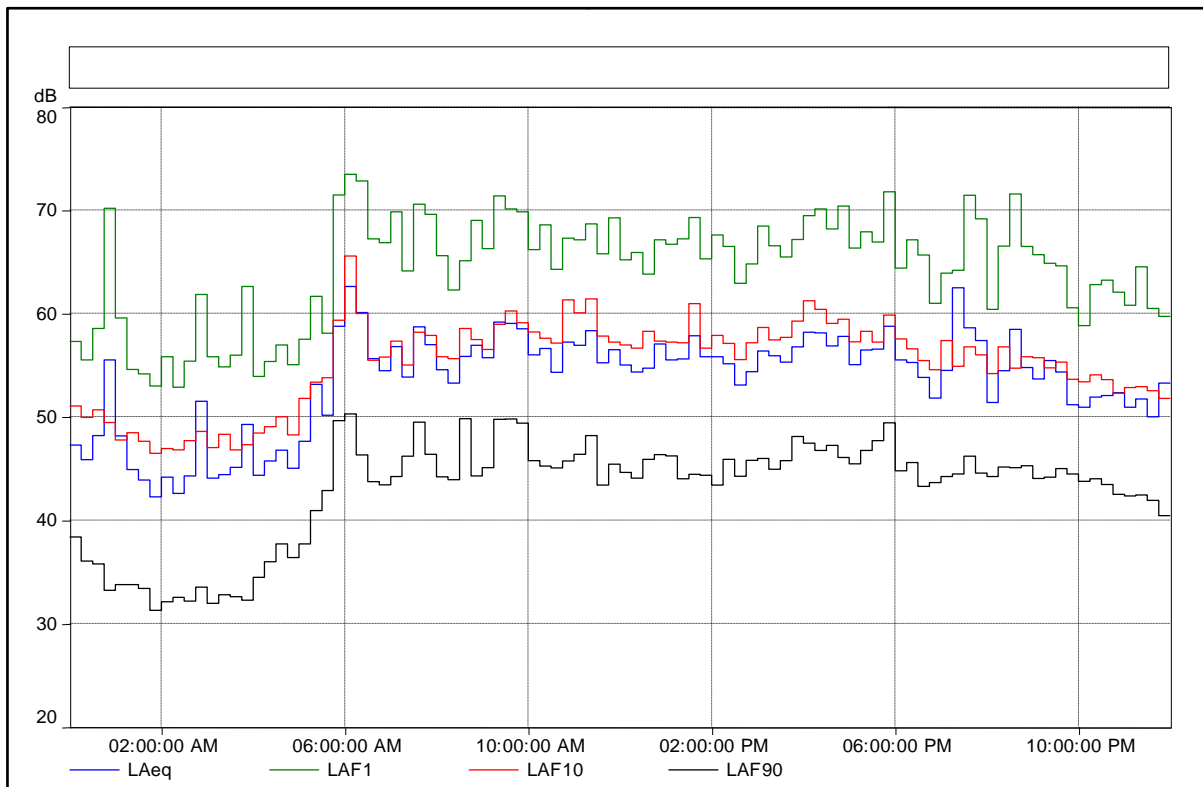
Instrument:	2250-L	
Application:	BZ7133 Version 4.7.6	
Start Time:	08/22/2024 10:52:01	
End Time:	08/29/2024 12:17:40	
Elapsed Time:	7.01:25:39	
Bandwidth:	1/3-octave	
Max Input Level:	144.58	
	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z
Instrument Serial Number:	3004552	
Microphone Serial Number:	2880058	
Input:		
Windscreen Correction:	None	
Sound Field Correction:	Free-field	
Calibration Time:	08/22/2024 10:42:47	
Calibration Type:	External reference	
Sensitivity:	32.9183712601662 mV/Pa	



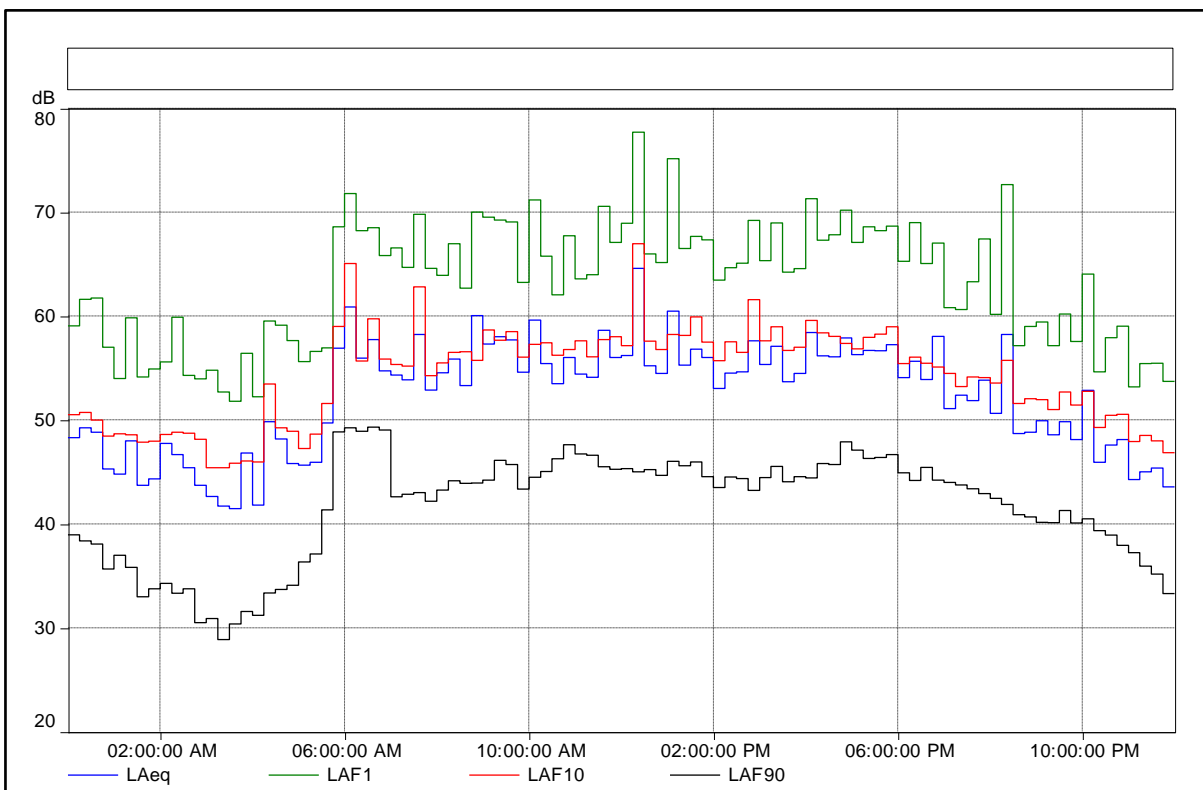
Day 1, Thursday 22 August 2024 from 1052 hours



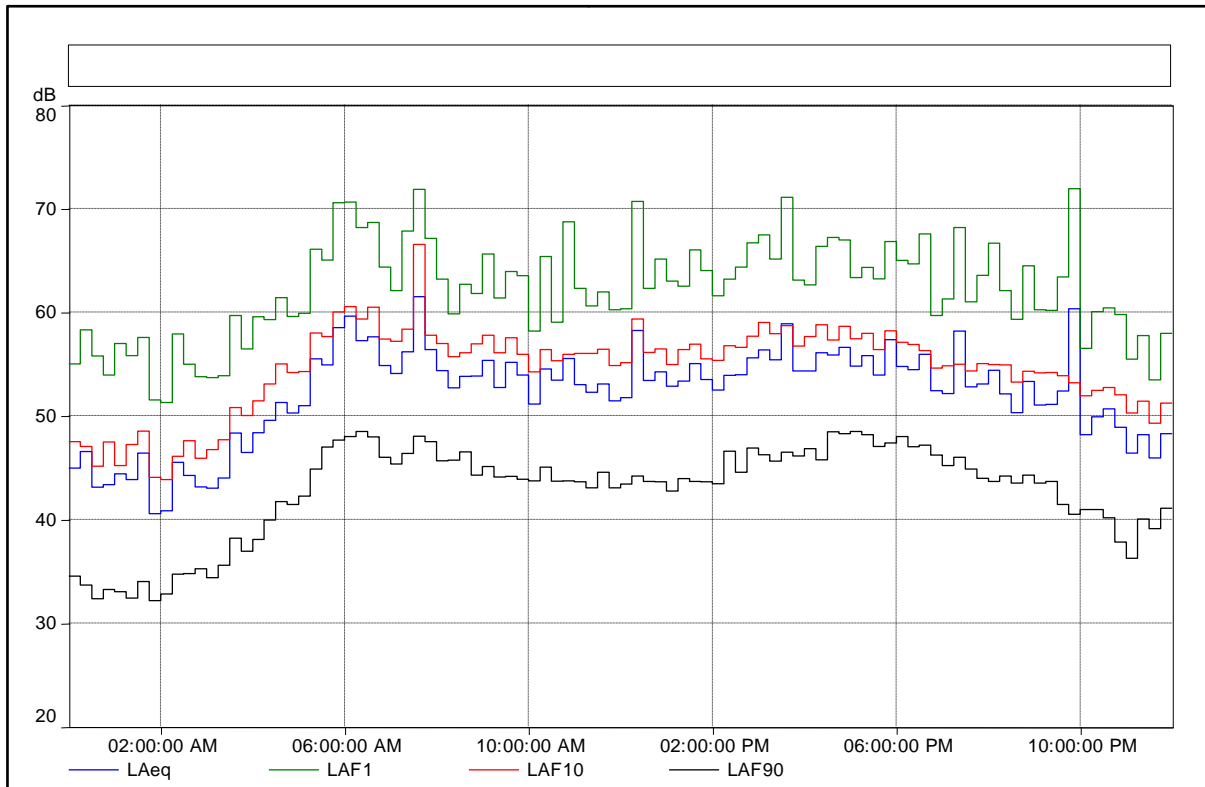
Day 2, Friday 23 August 2024



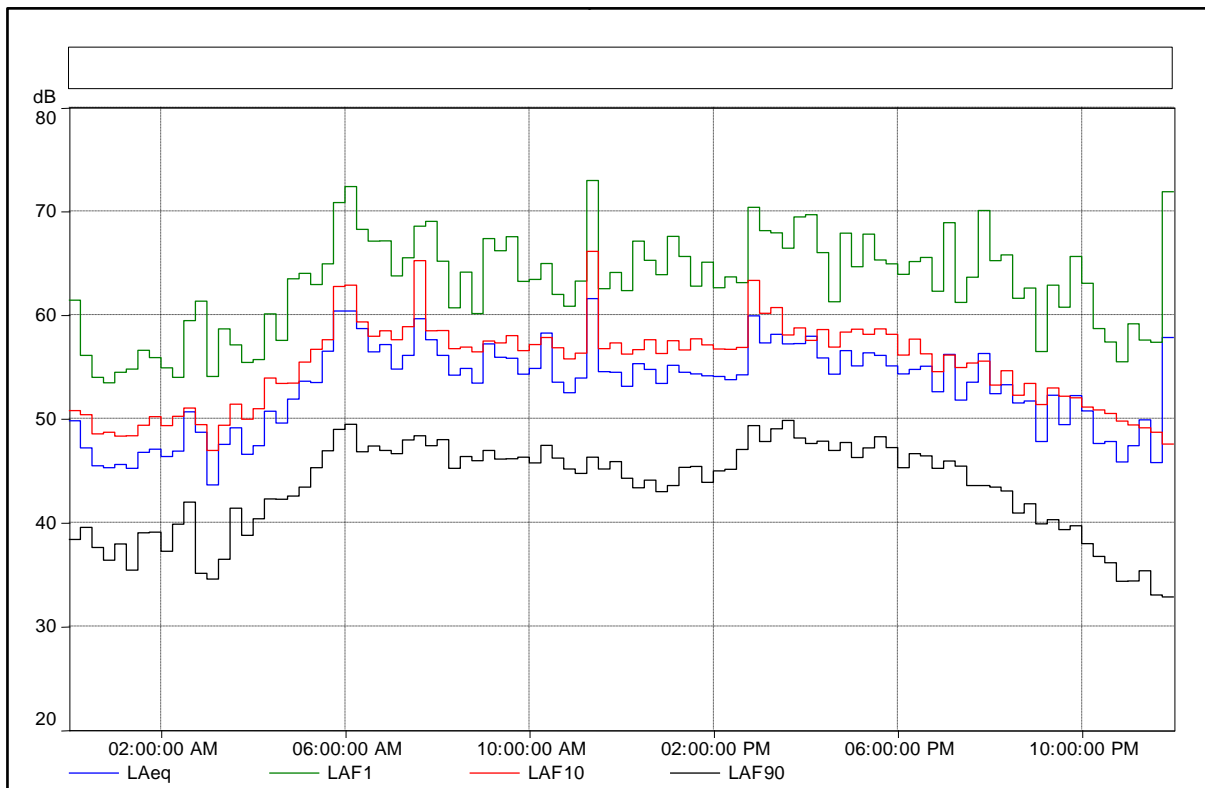
Day 3, Saturday 24 August 2024



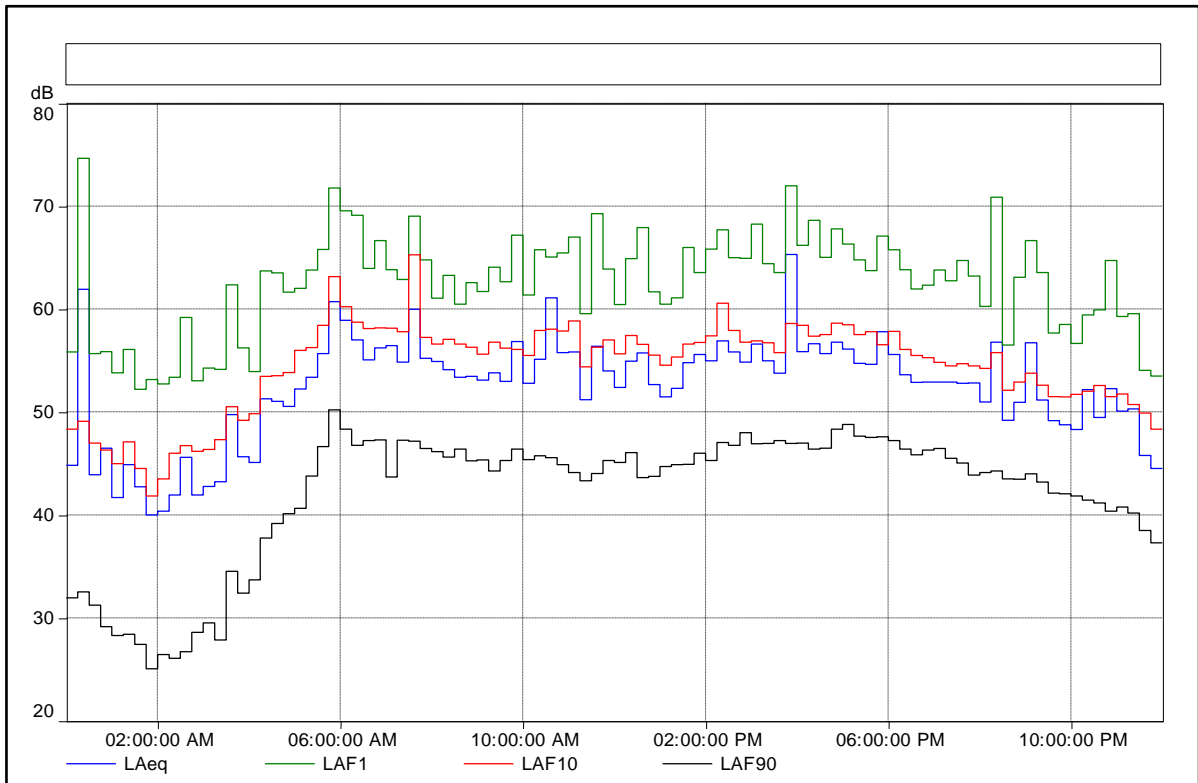
Day 4, Sunday 25 August 2024



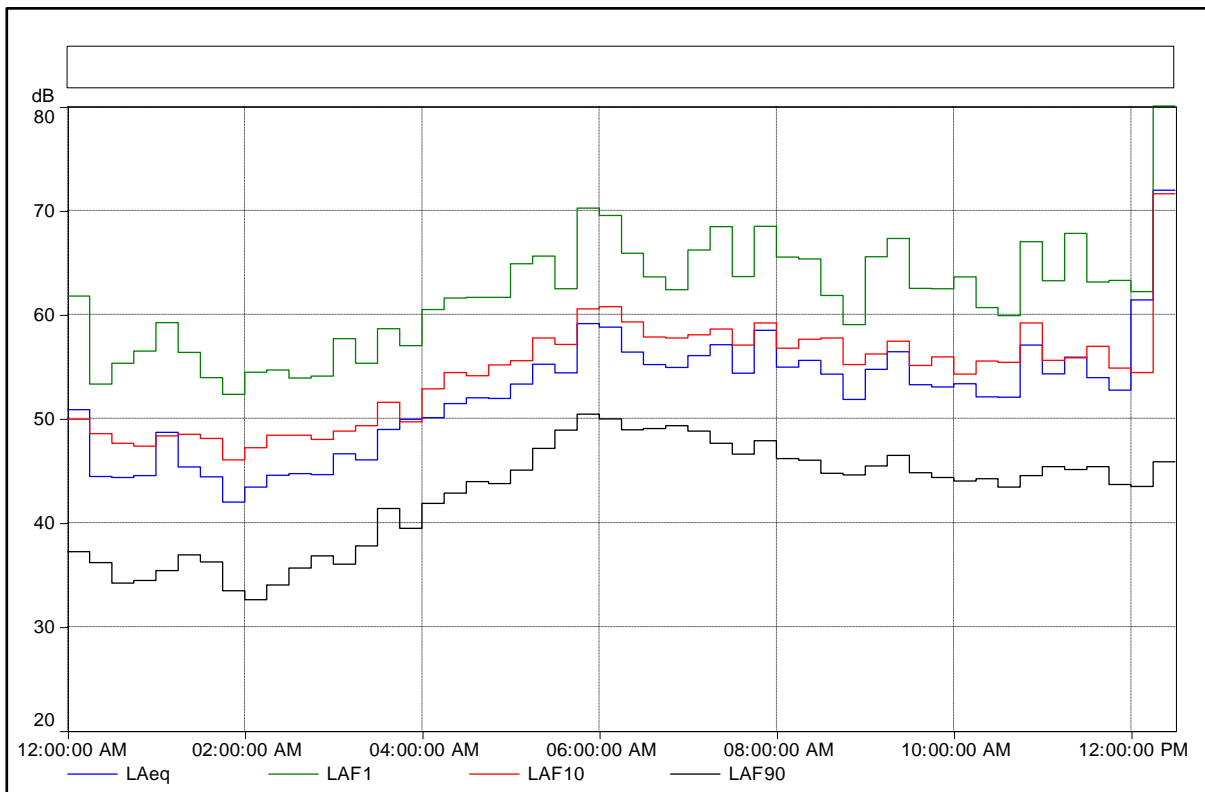
Day 5, Monday 26 August 2024



Day 6, Tuesday 27 August 2024



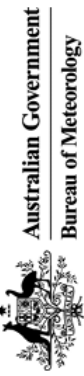
Day 7, Wednesday 28 August 2024



Day 8, Thursday 29 August 2024 until 1230 hours

APPENDIX E: ATMOSPHERIC CONDITIONS FOR LOGAN CITY FOR AUGUST 2024

Date		Temps		Rain	Evap	Sun	Max wind gust			9am					3pm						
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C				km/h	km/h	local	°C	%	eighths	km/h	km/h	hPa	°C	%	eighths	km/h	hPa	
1	Th	5.5	21.5	0			10.0	74	1	W	4	21.2	33	2	W	4	21.2	33	2	W	4
2	Fr	6.9	21.2	0			10.8	77	1	SE	2	20.4	53	1	E	4	20.4	53	1	E	4
3	Sa	7.1	22.2	0			12.9	69	1	E	4										
4	Su	7.6	22.0	0			12.8	84	1	E	4										
5	Mo	11.0	22.5	0			15.3	71	8	E	4	20.8	65	7	W	4	20.8	65	7	W	4
6	Tu	11.0	23.5	1.0			14.5	94	6	W	2	22.9	62	6	W	4	22.9	62	6	W	4
7	We	11.8	22.5	0			16.4	79	3	E	4	20.0	72	3	E	7	20.0	72	3	E	7
8	Th	9.5	20.0	0.5			14.5	94	6	SE	7	18.5	81	5	E	4	18.5	81	5	E	4
9	Fr	10.5	22.5	1.5			14.0	89	4	W	4	21.5	65	3	SE	7	21.5	65	3	SE	7
10	Sa	10.0	23.0	0			15.0	83	1	W	6										
11	Su	12.0	22.5	0			17.5	75	1	E	2										
12	Mo	13.5	21.2	3.0			17.0	85	5	W	4										
13	Tu	16.2	21.0	24.6			18.3	99	8	W	11	20.5	81	7	E	9	20.5	81	7	E	9
14	We	16.0	20.5	24.0			18.0	100	7	NE	7	19.5	90	6	E	4	19.5	90	6	E	4
15	Th	17.1	24.5	23.6			19.6	99	8	NE	4	22.6	91	6	SW	4	22.6	91	6	SW	4
16	Fr	17.4	25.5	0.7			19.0	99	7	SW	4	24.0	70	5	SW	4	24.0	70	5	SW	4
17	Sa	12.2	28.6	0			16.9	86	0	SW	4										
18	Su	7.5	24.8	0			16.0	63	0	SW	4										
19	Mo	10.4	23.4	0			17.2	74	2	E	2	21.8	71	5	W	9	21.8	71	5	W	9
20	Tu	13.0	22.0	1.4			15.4	97	6	SW	7	21.7	78	5	SW	11	21.7	78	5	SW	11
21	We	11.9	24.9	0.1			15.3	76	2	E	4	23.5	72	5	W	9	23.5	72	5	W	9
22	Th	13.8	26.8	0			18.3	79	1	E	2	25.3	69	3	W	6	25.3	69	3	W	6
23	Fr	14.5	24.5	0			21.4	86	6	E	2	23.0	66	5	W	6	23.0	66	5	W	6
24	Sa	12.0	25.1	0			17.5	80	2	E	2										
25	Su	12.8	29.2	0			20.0	84	1	SE	2										
26	Mo	14.4	29.6	0			20.0	91	1	W	2	28.2	49	3	SW	4	28.2	49	3	SW	4
27	Tu	16.3	28.0	0			23.1	80	3	W	4	27.2	64	4	W	4	27.2	64	4	W	4
28	We	17.0	30.5	0			20.0	91	1	W	6	28.0	51	1	NE	6	28.0	51	1	NE	6
29	Th	14.5	32.0	0			22.5	74	1	W	2	28.5	48	1	NE	6	28.5	48	1	NE	6
30	Fr	12.5	31.0	0			19.0	63	1	W	2	30.5	42	1	NE	2	30.5	42	1	NE	2
31	Sa	15.5	33.0	0			22.0	74	1	W	2										
Statistics for August 2024																					
Mean		12.2	24.8				17.1	82	3		3	23.3	65	4			23.3	65	4		5
Lowest		5.5	20.0				10.0	63	0	#	2	18.5	33	1	NE	2	18.5	33	1	NE	2
Highest		17.4	33.0	24.6			23.1	100	8	W	11	30.5	91	7	SW	11	30.5	91	7	SW	11
Total				80.4																	



**Logan City, Queensland
 August 2024 Daily Weather Observations**