Alma Mexican Eatery – 20 Albert Street, Freshwater – DA Acoustic Assessment

Alma Mexican Eatery
20 Albert Street,
Freshwater NSW 2096

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1 INTRODUCTION

Pulse White Noise Acoustics Pty Ltd (PWNA) has been engaged by Alma Mexican Eatery to undertake an acoustic assessment, as part of the Development Application (DA) submission, for the proposed restaurant (Alma Freshwater) to be located at 20 Albert Street, Freshwater.

The proposed hours of operation are understood to be the following:

- Monday – Saturday: 11am – Midnight
- Sunday: 11am – 10pm

This assessment will address the following:

- External noise emissions on nearby receivers from mechanical services, including the new kitchen exhaust system.
- External noise emissions from patron noise and activities related to the use of the restaurant such as background music.

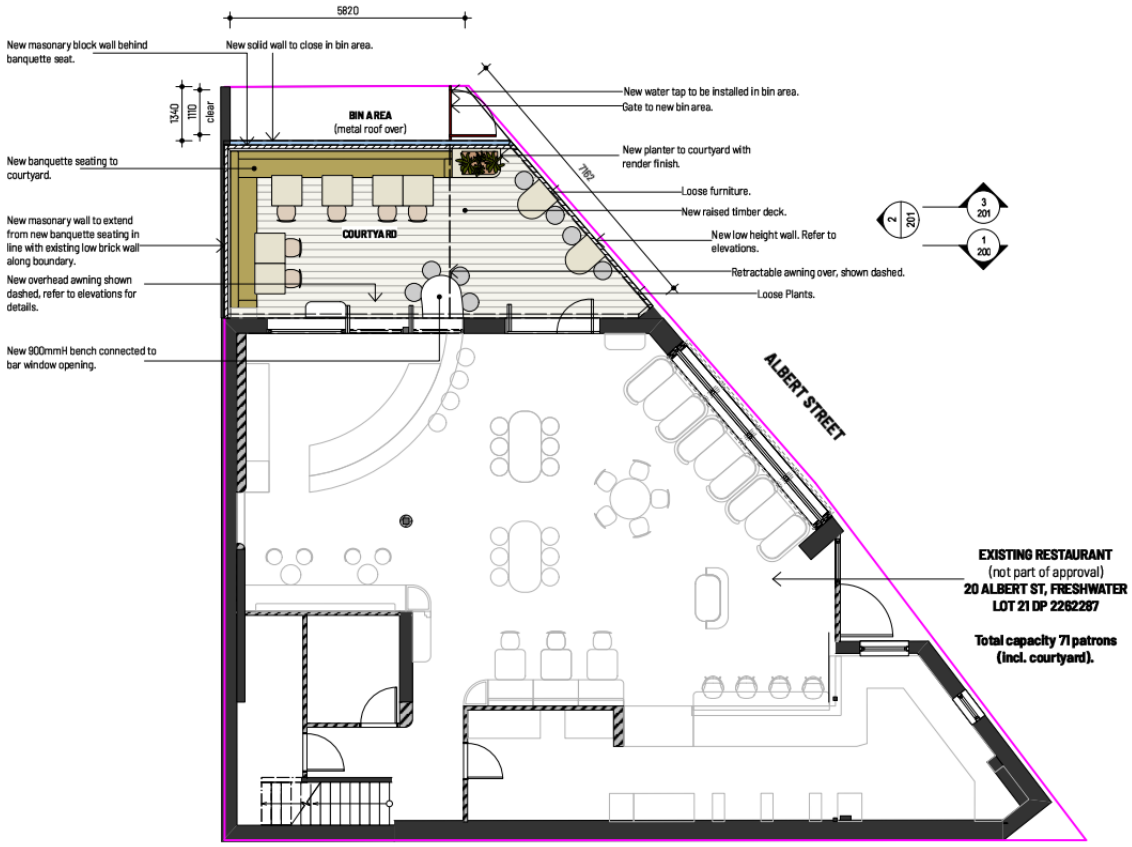
The report will discuss the relevant acoustic criteria which have been adopted as well as the outcome of the assessment.

A glossary of acoustic terminology, used in the acoustic assessment, is provided in Appendix A of this report.

1.1 Site Layout and Development Overview

The general floor plan of the proposed restaurant at 20 Albert Street, Freshwater is shown in Figure 1.

Figure 1 Floor Plan of Proposed Restaurant at 20 Albert Street, Freshwater



Commercial and residential receivers surround the project site. The site location, in relation to surrounding buildings and nearest receivers, is shown in Figure 2 below. The location of the unattended noise monitor used for our assessment is also specified.

The areas identified in Figure 2 are the nearest potentially affected receivers; these form the basis of our acoustic assessment. Residences are located along Albert Street and Lawrence Street in the form of shop top housing. The receiver types and locations are listed in Table 1.

Table 1 Receiver Types and Locations

Receiver Number	Receiver Type	Address
Receiver 1 (R1)	Residential	22–26 Albert Street, Freshwater NSW 2096
Receiver 2 (R2)	Commercial + Residential	7B Lawrence Street, Freshwater NSW 2096
Receiver 3 (R3)	Commercial + Residential	8 Lawrence Street, Freshwater NSW 2096
Receiver 4 (R4)	Commercial	23A Moore Lane, Freshwater NSW 2096
Receiver 5 (R5)	Commercial	1–3 Moore Road, Freshwater NSW 2096
Receiver 6 (R6)	Commercial + Residential	22A Albert Street, Freshwater NSW 2096

The proposed restaurant will comprise the following spaces:

- An outdoor seating area facing Albert Street. A retractable external awning is proposed to be installed in the outdoor region. The proposed awning is to include SergeFerrari Soltis Proof 502 fabric.
- An indoor restaurant area which includes a dining space and a commercial kitchen

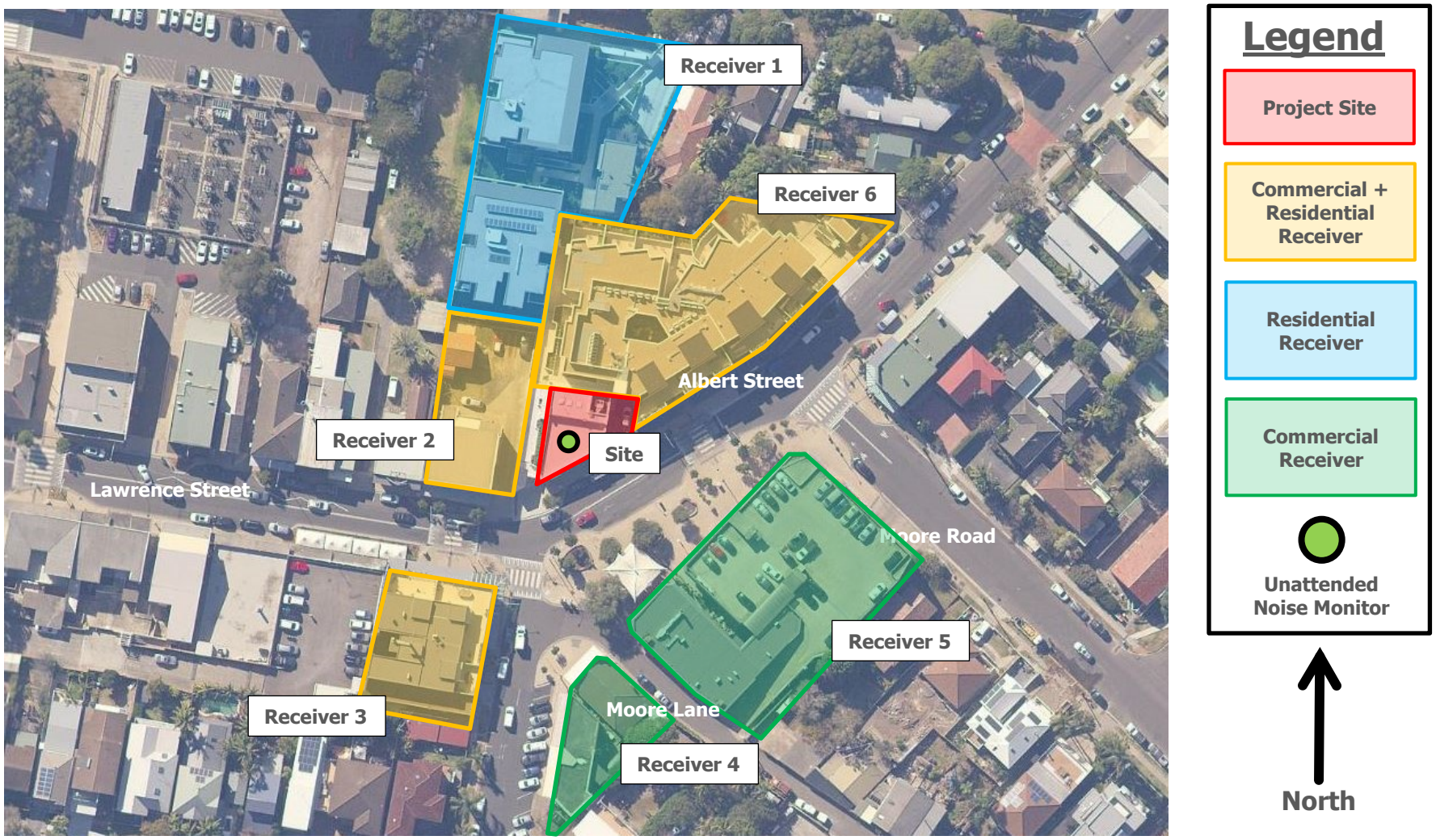
The following hours are proposed for the new restaurant development:

- Monday – Saturday: 11am – Midnight
- Sunday: 11am – 10pm

In regard to patron capacity, the following has been advised to consider in our assessment:

- Outdoor seating area facing Albert Street: Maximum of 20 patrons
- Indoor dining area: Maximum of 51 people
- Staff: Maximum of 10 people

Figure 2 Site Map and Surrounding Receivers – Sourced from SixMaps NSW



2 EXISTING ACOUSTIC ENVIRONMENT

2.1 Unattended Noise Monitoring

Noise levels were monitored for the nearest residential properties in order to determine the existing noise levels without the operation of the restaurant. This unattended noise monitoring was conducted between Monday 1 February 2021 and Monday 8 February 2021 in the empty outdoor area of the proposed restaurant, facing Albert Street and the nearest affected receivers. The logger location is shown in Figure 2.

The instrumentation for the survey comprised one Rion NL-42 noise logger (serial number 00396932). Calibration of the logger was checked prior to and following measurements using a Bruel & Kjaer Type 4230 sound calibrator (serial number 1645362). The calibrator emitted a calibration tone of 94 dB at 1 kHz. The drift in calibration did not exceed ±0.5 dB. All equipment carries appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured daily noise data are attached in Appendix B. The charts present each 24 hour period and show the LA1, LA10, LAeq and LA90 noise levels for the corresponding 15 minute periods. This data has been filtered to remove periods affected by adverse weather conditions, based on weather information obtained from Observatory Hill weather station (ID 066214).

2.1.1 Noise Descriptors and Terminology

Environmental noise constantly varies in level with time. Therefore, it is necessary to measure environmental noise in terms of quantifiable time periods and statistical descriptors. Typically, environmental noise is measured over 15 minute periods and relevant statistical descriptors of the fluctuating noise are determined to quantify the measured level.

Noise (or sound) consists of minute fluctuations in atmospheric pressure capable of detection by human hearing. Noise levels are expressed in terms of decibels, abbreviated as dB or dBA, the "A" indicating that the noise levels have been frequency weighted to approximate the characteristics of normal human hearing. Because noise is measured using a logarithmic scale, 'normal' arithmetic does not apply, e.g., adding two sound sources of equal values result in an increase of 3dB (i.e., 60 dBA plus 60 dBA results in 63 dBA). A change of 1 dB or 2 dB in the sound level is difficult for most people to detect, whilst a 3 dB – 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change roughly corresponds to a doubling or halving in loudness.

The most relevant environmental noise descriptors are the LAeq, LA1, LA10 and LA90 noise levels. The LAeq noise level represents the "equivalent energy average noise level". This parameter is derived by integrating the noise level measured over the measurement period. It represents the level that the fluctuating noise with the same acoustic energy would be if it were constant over the measured time period.

The LA1, LA10 and LA90 levels are the levels exceeded for 1%, 10% and 90% of the sample period. These levels can be considered as the maximum noise level, the average repeatable maximum and average repeatable minimum noise levels, respectively.

Specific acoustic terminology is used in this assessment report. An explanation of common acoustic terms is included as Appendix A.

2.1.2 Noise Monitoring Results

The noise levels measured at the logger location have been used to assess the noise impact of the development at the nearest noise affected receivers identified in Section 1.1. The time periods used are in accordance with those recommended in the NSW Environment Protection Authority's (EPA) Noise Policy for Industry (NSW NPI). The measurement results are presented in Table 2 below.

Table 2 Measured Ambient Noise Levels corresponding to the NPI's Assessment Time Periods

Measurement Location	Daytime[1] 7:00 am to 6:00 pm		Evening[1] 6:00 pm to 10:00 pm		Night-time[1] 10:00 pm to 7:00 am	
	LA90[2] (dBA)	LAeq[3] (dBA)	LA90[2] (dBA)	LAeq[3] (dBA)	LA90[2] (dBA)	LAeq[3] (dBA)
Logger Location (20 Albert Street, Freshwater)	48	53	45	55	36	48

Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2: The L_{A90} or RBL noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.

Note 3: The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

2.2 Attended Noise Measurements

In order to obtain noise spectrum characteristics for the existing ambient noise levels, attended noise measurements were undertaken at the logger location, at different time periods which extend through the operational times proposed for the development.

The attended noise measurements were conducted using a Bruel & Kjaer Type 2250 sound level meter (serial number 2709757). Calibration of the sound level meter was checked prior to and following measurements using a Bruel & Kjaer Type 4230 sound calibrator (serial number 1645362). The calibrator emitted a calibration tone of 94 dB at 1 kHz. The drift in calibration did not exceed ±0.5 dB. All equipment carries appropriate and current NATA (or manufacturer) calibration certificates.

The measured L90 noise levels during the operational time periods are presented in octave band spectrums in Table 3 below.

Table 3 Measured L_{90} octave band spectra

Date	Time	Octave Band Centre Frequency, Hz									Overall dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
8 Feb 2021	3:30 pm – 3:45 pm	58	54	49	48	43	42	37	31	22	47
3 Feb 2021	10:25 pm – 10:40 pm	51	49	46	43	40	37	34	28	21	43

3 PROJECT ACOUSTIC CRITERIA

The assessment criteria for the development are defined in accordance with Noise Policy for Industry (NSW NPI) and those directed by Liquor & Gaming NSW (L&G NSW).

The criteria derived in accordance with the NSW NPI will be used to assess external noise emissions by mechanical services (e.g., kitchen exhaust fans). Noise emissions from patrons and activities related to the venue will be assessed against those recommended by L&G NSW.

3.1 NSW Noise Policy for Industry

In NSW, the control of noise emissions is the responsibility of Local Governments and the NSW Environment Protection Authority (NSW EPA).

The NSW EPA has recently released a document titled Noise Policy for Industry (NSW NPI) which provides a framework and process for determining external noise criteria and the assessment of noise emission from industrial developments. The NSW NPI criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

3.1.1 Intrusive Noise Impacts (Residential Receivers)

> *'The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the LAeq descriptor), measured over a 15minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.'*

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NPI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

3.1.2 Protecting Noise Amenity (All Receivers)

> *'To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.*
>
> *Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)*
>
> *Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.*
>
> *The LAeq is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the LAeq,15min will be taken to be equal to the LAeq, period + 3 decibels (dB), unless robust evidence is provided for an alternative approach for the particular project being considered.*

Project amenity noise level (ANL) is urban ANL (Table 2.1) minus 5 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level (dB = decibel; dB[A] = decibel [A-weighted]; RBL = rating background noise level).'

Noise levels used in the assessment of noise emission from the site have been based on the noise level survey conducted at the site and detailed in this section of the report.

Consequently, the resulting noise level criteria are summarised in the table below, with project noise trigger levels shown in bold text. The criteria are nominated for the purpose of determining the operational noise limits for the operation of the site, including mechanical plant associated with the development, which can potentially affect noise sensitive receivers. For each assessment period, the lower (i.e., the more stringent) of the amenity or intrusive criteria are adopted. The calculated *Project Amenity Noise Level* is equal to either the *Recommended Amenity Noise Level* minus 5 dB(A) plus 3 dB(A) (for a 15-minute period) or the measured existing L_{Aeq} noise level minus 10 dB if this is greater as determined by the NPI.

3.1.2.1 Area Classification

The NSW NPI characterises a "suburban" noise environment as an acoustical environment that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.

The residential receivers closest to the proposed development fall under the "suburban" area classification in accordance with the zoning map shown in Figure 3. The project site is located within a B2 zone (Local Centre). Commercial receivers surrounding the project site at 20 Albert Street are also located within a B2 zone. The residential areas are located within R2 zones (Low Density Residential) which are classified as "suburban" in Table 2.3 of the NSW NPI. For residential receivers in a suburban area, and non-residential premises adjacent to the site; the recommended amenity criteria are shown in Table 4 below.

Figure 3 NSW Planning ePlanning Spatial Viewer Zoning Map

Table 4 NSW NPI – Recommended LAeq noise levels from industrial noise sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day[1]	Recommended Amenity Noise Level ($L_{Aeq, period}$)[2]
Residential	Suburban	Day	55
		Evening	45
		Night	40
Commercial premises	All	When in use	65

Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2: The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

When the existing noise level from industrial noise sources is close to the recommended "Amenity Noise Level" (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPI.

3.1.3 Project Trigger Noise Levels

The intrusive and amenity criteria for industrial noise emissions derived from the measured data are presented in Table 5. These criteria are nominated for the purpose of determining the operational noise limits for mechanical plant associated with the development which can potentially affect noise sensitive receivers.

For each assessment period, the lower (i.e., the more stringent) of the amenity or intrusive criteria are adopted. These are shown in bold text in Table 5.

Table 5 External noise level criteria in accordance with the NSW NPI

Location	Time of Day	Project Amenity Noise Level, $L_{Aeq, period}$ [1] (dBA)	Measured $L_{A90, 15\ min}$ (RBL) [2] (dBA)	Measured $L_{Aeq, period}$ Noise Level (dBA)	Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA)	Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [4]
Residential (Suburban)	Day	50	48	53	**53**	**53**
	Evening	40	45	55	50	**48**[4]
	Night	35	36	48	**41**	**41**[4]
Commercial premises	When in use	60			–	**63**

Note 1: Project Amenity Noise Levels corresponding to "Suburban" areas, equivalent to the Recommended Amenity Noise Levels (Table 4) minus 5 dBA

Note 2: L_{A90} Background Noise or Rating Background Level

Note 3: Project Noise Trigger Levels are shown in bold

Note 4: Project amenity noise levels based on the measured L_{Aeq} existing noise levels minus 10 dB

3.2 Liquor & Gaming NSW

Section 79 of the Liquor Act 2007 provides mechanisms for complaints to be made when the amenity of local areas is disturbed by the use of licensed premises and registered clubs (including disturbances caused by patrons). These complaints are addressed by the Director of Liquor and Gaming, and in the process may impose temporary or permanent noise conditions on the licensed venue. Typical noise conditions that are imposed upon licensed premises are as follows:

> *The LA10* noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) by more than 5 dB between 07:00 am and 12:00 midnight at the boundary of any affected residence.*
>
> *The LA10* noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) between 12:00 midnight and 07:00 am at the boundary of any affected residence.*
>
> *Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 07:00 am.*
>
> ** For the purposes of this condition, the LA10 can be taken as the average maximum deflection of the noise emission from the licensed premises.*
>
> *This is a minimum standard. In some instances the Director may specify a time earlier than midnight in respect of the above condition.*

Interior noise levels which still exceed safe hearing levels are in no way supported or condoned by the Director.

These criteria are applicable to noise emissions from any indoor and outdoor areas in a restaurant (excluding noise from mechanical services). Octave band spectral criteria for each assessment period has been summarised in Table 6 below. These are based on the measured noise spectra shown in Table 3 which has been adjusted to match the overall RBLs listed in Table 2.

Table 6 Liquor & Gaming NSW – L_{10} Criteria

Time Period	Parameter	Octave Band Centre Frequency, Hz									Overall dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
Daytime period 7:00 am – 6:00 pm	Measured L_{A90} [1]	59	55	50	49	44	43	38	32	23	48
	L_{A10} criteria	**64**	**60**	**55**	**54**	**49**	**48**	**43**	**37**	**28**	**53**
Evening period 6:00 pm – 10:00 pm	Measured L_{A90} [1]	53	51	48	45	42	39	36	30	23	45
	L_{A10} criteria	**58**	**56**	**53**	**50**	**47**	**44**	**41**	**35**	**28**	**50**
Night-time period 10:00 pm – 7:00 am	Measured L_{A90} [1]	44	42	39	36	33	30	27	21	14	36
	L_{A10} criteria	**49**	**47**	**44**	**41**	**38**	**35**	**32**	**26**	**19**	**41**

Note 1: Measured L_{A90} spectrum has been adjusted to match overall RBL for each corresponding period

3.3 Internal Noise Level Criteria for Commercial Premises

Recommended ambient noise levels for internal spaces are given in a number of publications including Table 1 of Australian / New Zealand Standard AS/NZS 2107:2016 "Acoustics - Recommended design sound levels and reverberation times for building interiors". Unlike the previous version of this Standard, this latest edition recommends a range with lower and upper levels (rather than "satisfactory" and "maximum" internal noise levels) for building interiors based on room designation and location of the development relative to external noise sources. This change has occurred due to the fact that sound levels below 'satisfactory' could be interpreted as desirable, but the opposite may in fact be the case. Levels below those which were listed as 'satisfactory' can lead to inadequate acoustic masking resulting in a loss of acoustic isolation and speech privacy.

Internal noise levels due to the combined contributions of external noise intrusion and mechanical ventilation plant should not exceed the maximum levels recommended in this standard. The levels for areas relevant to this development are given in Table 7 below. The mid to maximum points of the internal noise level ranges are generally adopted as the internal design noise criteria for the combined effect of mechanical services and external noise intrusion. In this report we will confine our recommendations to dBA levels, however, where the background noise appears to be unbalanced, standard AS/NZS 2107:2016 provides direction in terms of suitable diagnostic tools that can be used to assess the spectrum distribution of the background noise.

Table 7 Recommended design sound levels as per standard AS/NZS 2107:2016

Type of Occupancy	Design sound level range ($L_{Aeq,t}$)	Project Design Noise Level [1]	
		Approx. RC Mark II	dBA
Open plan office	40 to 45	40	**45**
General office areas	40 to 45	40	**45**
Cafeterias	40 to 50	40	**50**
Food courts	45 to 55	45	**55**
Coffee shops	40 to 50	40	**50**
Restaurants	40 to 50	40	**50**
Small retail stores (general)	<50	50	**50**

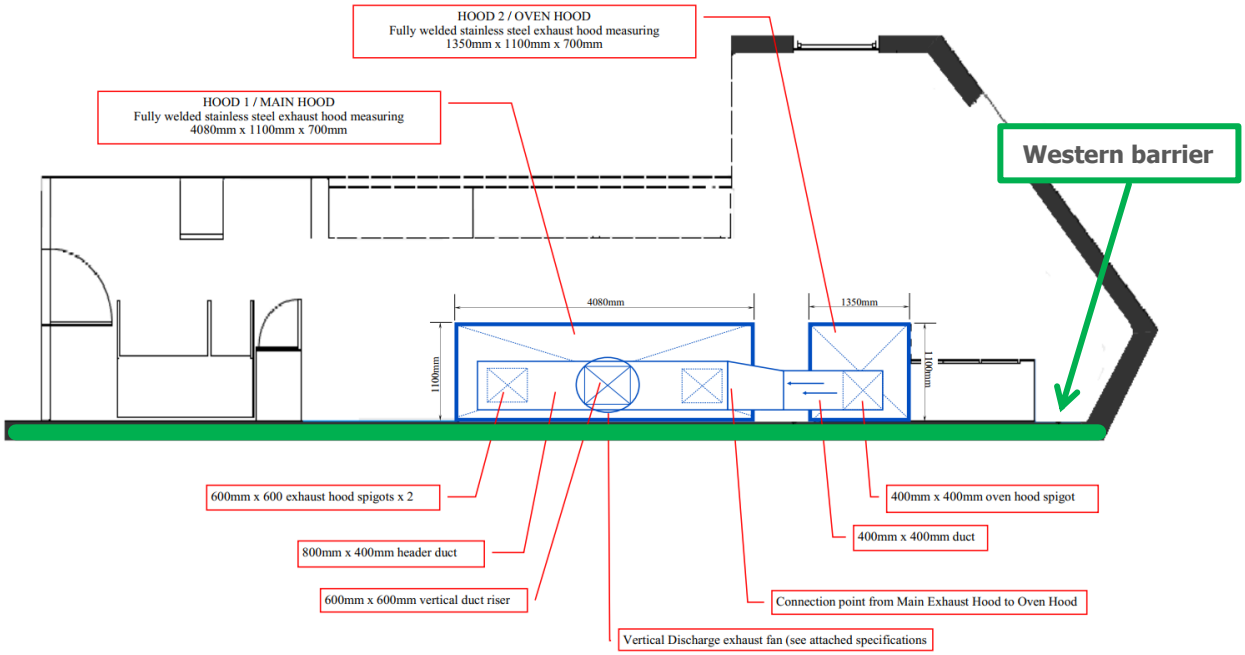
Note 1: Recommended level for mechanical services noise and intrusive noise, combined

4 ACOUSTIC ASSESSMENT

4.1 Noise Emissions from Mechanical Services

Noise emissions from mechanical services are primarily generated by the kitchen exhaust fan serving the proposed restaurant. The proposed kitchen exhaust fan unit is to be positioned on the roof of the new restaurant at 20 Albert Street, Freshwater; see Figure 4 below.

Figure 4 Plan view of the proposed vertical discharge exhaust fan



Based on specifications supplied to the client by Ace Ventilation, the vertical discharge exhaust fan (Model no. V53-116-3P) has an approximate noise level of 58 dBA at 3 metres from the unit. This corresponds to a Sound Power Level of 76 dBA at the exhaust fan. Technical data for the exhaust fan is shown in Figure 5.

Given that the proposed hours of operation of the restaurant run into the night-time period, the night-time criteria for residential receivers in Table 5 must be met.

If the exhaust fan unit is positioned as per the location specified in Figure 4 then the noise levels at the nearest residential receivers will be non-compliant. Noise levels at the nearest residential receivers are listed in Table 8, showing non-compliance.

Table 8 Predicted noise level at Receiver 2 (R2) – 7 Lawrence Street, Freshwater NSW 2096

Descriptor	Noise Level
Sound Power Level of Discharge Exhaust Fan	76 dBA L_{Aeq}
Distance correction (10m)	-28
Barrier attenuation (1m barrier)[1]	-1
Resulting Noise Level at receiver (external)	47 dBA
Relevant criteria (residential receiver; night-time)	41 dBA
Compliance?	**NO (+6 dBA)** **(Refer to recommended treatments detailed below.)**

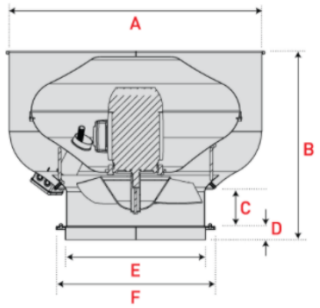
Note 1: The transmission loss from the building façade is conservatively approximated based on typical values for buildings of this type, in our experience.

Figure 5 Technical Data and Dimensions of Proposed Vertical Discharge Exhaust Fan

Technical Data

Model No.	Fan Speed Rev/Min	K.W	Amps	Volts	Approx Noise Level @ 3mtr (dBA)	Motor Shaft mm	IP Rating
V53-116-3P	900	1.10	2.8	415	58	24	55

Dimensions



A	940mm
B	750mm
C	140mm
D	45mm
E	535mm
F	600mm

Due to this predicted exceedance, the following mitigation strategy is recommended:

- The exhaust fan selection should be altered such that the approximate noise level at 3m is no greater than 50 dBA.
- The western barrier (see Figure 4) which is at an approximate height of 1m should be increased to an acoustic-rated barrier of minimum height 2m. The barrier fence should be a solid construction with no gaps or perforations. Providing it is structurally sound, the additional height may be fabricated out of the same material as the existing barrier (or equivalent).

Provided these alterations are made, the noise levels at the nearest receivers will be compliant with the criteria set out in Section 3.

The following analysis also assumes that the exhaust fan is to be positioned on the lower section of the roof of the restaurant (see Figure 6). This is important as the barrier separating the lower and upper levels of the roof, seen in Figure 6, provides acoustic shielding for the residential receivers on the northern boundary of the project site. Additional mitigation strategies would be required if the exhaust fan were to be positioned on the upper section of the roof.

Figure 6 Picture of roof of proposed restaurant at 20 Albert Street, Freshwater

In addition, during site visits by PWNA representatives we noted that a Packaged Air Conditioning Unit was located on the roof towards the rear of the pre-existing building. It is our understanding that this unit will remain in operation once the new restaurant is operational. Given that this unit is a pre-existing plant item, it does not form part of this Development Application and therefore is not assessed in this report.

4.2 Patron Noise Emissions

4.2.1 External Noise Emissions Towards Residences

Patron noise was estimated using the prediction model outlined in *Acoustical capacity as a means of noise control in eating establishments* by J. H. Rindel (Joint Baltic-Nordic Acoustics Meeting 2012) which accounts for the Lombard effect which describes the increase in speech volume with increasing ambient noise levels. The estimated reverberant noise levels, using this prediction methodology, are listed in Table 9 below and have been used in our assessment of patron noise.

Table 9 Estimated L_{10} noise levels – Patron Noise

Location	Octave Band Centre Frequency, Hz									Overall dBA
	31.5	63	125	250	500	1k	2k	4k	8k	
Inside restaurant (reverberant noise level): 51 people (with 26 people talking simultaneously with normal voice level)	46	50	64	68	69	63	58	53	47	69
Outdoor seating: 20 people (with 10 people talking simultaneously with normal voice level)	46	50	64	67	69	63	58	53	47	69

The nearest potentially sensitive residential receiver is located as specified in Figure 7, with the balcony of this residence directly adjacent to the external dining area, approximately 4m above the proposed outdoor deck.

Figure 7 Outdoor Seating Area and Nearest Residence – sourced from Google Street View

This residential receiver (R6) is employed for the purpose of our assessment. Therefore, based on the information above, noise emissions to the nearest sensitive receiver have been modelled for the daytime period, evening period and night-time period, as defined by the NSW NPI. This allowed us to establish suitable operational procedures for the proposed restaurant.

The modelled scenarios for the daytime period included:

- Scenario 1: Full patron capacity (20 people outdoors, 51 people indoors), with all doors open and windows closed, and awning retracted/open. Internal music limited to a maximum level of 72 dBA L_{Aeq}.
- Scenario 2: Full patron capacity (20 people outdoors, 51 people indoors), with all doors and windows closed, and awning retracted/open. Internal music limited to a maximum level of 80 dBA L_{Aeq}.

Table 10 below shows the results of predictive modelling for each of the scenarios identified above.

Table 10 Daytime Period, Patron Noise Emissions – Estimated L_{10} noise levels at nearest residence

Parameter (dBA)	Octave Band Centre Frequency, Hz									Overall dBA
	31.5	63	125	250	500	1k	2k	4k	8k	
Criterion for daytime period: 7:00am – 6:00pm	64	60	55	54	49	48	43	37	28	53
Predicted L_{10} Noise Levels – Scenario 1	29	33	45	51	50	46	42	39	27	52
Exceedances for Scenario 1	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**-**
Predicted L_{10} Noise Levels – Scenario 2	24	28	41	45	46	40	35	30	24	46
Exceedances for Scenario 2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**

Note 1 Exceedances of 1–2 dB are considered marginal compliance. The reason for marginal compliance is because a 1–2 dB difference is difficult to perceive subjectively

The modelled scenarios for the evening period included:

- Scenario 3: Full patron capacity (20 people outdoors, 51 people indoors), with all doors open and windows closed, and awning retracted/open. Internal music limited to a maximum level of 65 dBA L_{Aeq}.
- Scenario 4: Full patron capacity (20 people outdoors, 51 people indoors), with all doors and windows closed, and awning retracted/open. Internal music limited to a maximum level of 80 dBA L_{Aeq}.

Table 11 below shows the results of predictive modelling for each of the scenarios identified above.

Table 11 Evening Period, Patron Noise Emissions – Estimated L_{10} noise levels at nearest residence

Parameter (dBA)	Octave Band Centre Frequency, Hz									Overall dBA
	31.5	63	125	250	500	1k	2k	4k	8k	
Criterion for evening period: 6:00pm – 10:00pm	58	56	53	50	47	44	41	35	28	50
Predicted L_{10} Noise Levels – Scenario 3	26	30	43	48	48	43	38	35	26	49
Exceedances for Scenario 3	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**-**
Predicted L_{10} Noise Levels – Scenario 4	24	28	41	45	46	40	35	30	24	46
Exceedances for Scenario 4	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**

Note 1 Exceedances of 1–2 dB are considered marginal compliance. The reason for marginal compliance is because a 1–2 dB difference is difficult to perceive subjectively

The modelled scenarios for the night-time period included:

- Scenario 5: 51 patrons indoors, zero (0) patrons outdoors, with all doors and windows closed, and awning retracted/open. Internal music limited to a maximum level of 72 dBA L_{Aeq}.
- Scenario 6: Full patron capacity (20 people outdoors, 51 people indoors), with all doors and windows closed, and an acoustic rated awning fully extended/covering the entire outdoor area. Internal music limited to a maximum level of 72 dBA L_{Aeq}. The proposed awning construction and extent (as per drawing no. D.105 by FiveFootOne) is shown in Figure 8, and described in the recommendations below.

Figure 8 Plan view of proposed overhead awning covering external dining area

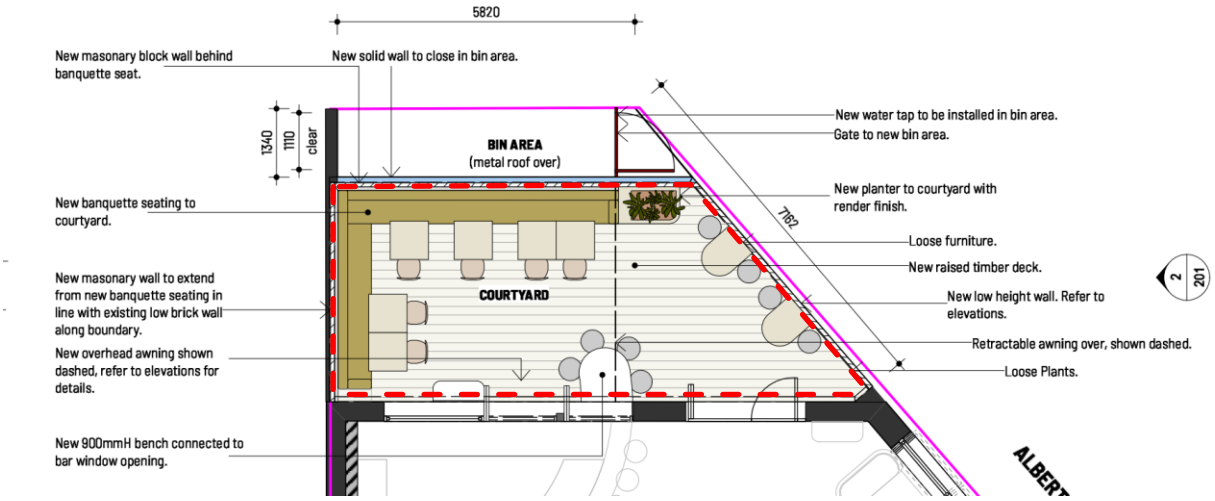


Table 12 below shows the results of predictive modelling for the scenario identified above.

Table 12 Night-time Period, Patron Noise Emissions – Estimated L_{10} noise levels at nearest residence

Parameter (dBA)	Octave Band Centre Frequency, Hz									Overall dBA
	31.5	63	125	250	500	1k	2k	4k	8k	
Criterion for night-time period: 10:00pm – 7:00am	49	47	44	41	38	35	32	26	19	41
Predicted L_{10} Noise Levels – Scenario 5	11	15	26	31	26	17	18	10	0	28
Exceedances for Scenario 5	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**
Predicted L_{10} Noise Levels – Scenario 6	20	24	36	38	37	30	21	13	4	37
Exceedances for Scenario 6	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**

Note 1 Exceedances of 1–2 dB are considered marginal compliance. The reason for marginal compliance is because a 1–2 dB difference is difficult to perceive subjectively

From the predicted patron noise levels listed in the above tables, the following is observed:

For the proposed daytime operating period (11:30 am to 6:00 pm), compliance is expected if either of the following two operational controls are enforced:

i. The restaurant operates at full patron capacity (maximum of 20 people outdoors, 51 people indoors), with all doors open and windows closed, awning retracted/open, and ambient music inside the restaurant is limited to a maximum level of 72 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area.

ii. Alternatively, the restaurant operates at full patron capacity (maximum of 20 people outdoors, 51 people indoors), with all doors closed (including the door between the external and internal eating areas) and windows closed, awning retracted/open, and ambient music inside the restaurant is limited to a maximum level of 80 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area.

For the proposed evening operating period (6:00 pm to 10:00 pm), compliance is expected if either of the following two operational controls are enforced:

i. The restaurant operates at full patron capacity (maximum of 20 people outdoors, 51 people indoors), with all doors open and windows closed, awning retracted/open, and ambient music inside the restaurant is limited to a maximum level of 65 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area.

ii. Alternatively, the restaurant operates at full patron capacity (maximum of 20 people outdoors, 51 people indoors), with all doors closed (including the door between the external and internal eating areas) and windows closed, awning retracted/open, and ambient music inside the restaurant is limited to a maximum level of 80 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area.

For the proposed night-time operating period (10:00 pm to 12:00 am), compliance is expected if either of the following two operational controls are enforced:

i. The restaurant operates at full patron capacity internally (maximum of 51 people indoors), but zero (0) capacity in the external area (i.e., no patrons outdoors), with all doors closed (including the door between the external and internal eating areas) and windows closed, awning retracted/open, and ambient music inside the restaurant is limited to a maximum level of 72 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area.

ii. Alternatively, the restaurant operates at full patron capacity (maximum of 20 people outdoors, 51 people indoors), with all doors closed (including the door between the external and internal eating areas) and windows closed, awning fully extended over the entire external dining area, and ambient music inside the restaurant is limited to a maximum level of 72 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area. If the awning is to be a retractable construction, it must remain extended (i.e., covering the entire outdoor area, with no gaps) for the entirety of the night-time operating period (i.e., from 10:00 pm to 12:00 am) if any patrons are seated in this area. The acoustic performance requirements for the overhead awning are as follows:

- The roofing system should have a minimum design sound insulation rating (Rw) of 16.
- The proposed awning is to include SergeFerrari Soltis Proof 502 fabric. No acoustic data is available for this system. This system should meet the minimum required design sound insulation rating (Rw) of 16, and the following must be achieved as a minimum:
  - **The awning should be a continuous construction with no perforations or gaps. Note that the entire roofing system must have an overall Rw of at least 16, i.e., gaps will significantly reduce the acoustic performance of the selected roofing system.**
  - **The awning is fully extended and covers the entire external dining area (as specified above).**

Note: If a PVC fabric roof system cannot be provided which meets an Rw rating of 16 it is recommended that glazed panels are installed. An equal construction would be a 6 mm float glass.

The above observations are recommended as operational procedures to be adopted by restaurant management during the daytime, evening, and night-time periods, as defined above. The following additional measures are also recommended:

- New external doors should be treated in order to achieve a minimum sound insulation performance of Rw 25 – 30. Refer to Table 13 below for recommended door constructions.

Table 13 Recommended door construction

Design Sound Insulation Rating (Rw)	Door Leaf Description	Door Frame	Examples of Acoustic Seals			
			Perimeter Seals	Bottom Threshold Seals	Meeting Stile Seals	Additional Comments
25–30	Min. 6.38 mm laminated glass	Metal hollow frames are acceptable	Batwing seals such as Lorient Type LAS 1212, LAS 1515, Raven Type RP124, RP134; or equivalent product OR Compression seals such as Raven Type RP24, RP78Si, RP84Si or equivalent product	If threshold gap is less than 5 mm and has carpet floor finishes, then no seals are required. If gap is greater than 5 mm then drop down seals are recommended as per comments below for 35 dB Rw doors	Batwing seals such as Lorient Type LAS 1212 or LAS 1515 OR Raven seal type RP 16Si, RP 134, RP 121	Seals should be selected in order for door construction to achieve a minimum sound insulation performance of 30 dB Rw
Note 1: All doors with required acoustic performance should be hinged doors. Pivot or sliding doors are not acceptable						

- It is advised that a noise limiter be installed as part of the audio / PA system in order to prevent noise output from this system exceeding the maximum recommended overall noise levels recommended above.

- Staff should be advised of the recommended operational control measures listed above, and/or signs should be installed in discrete regions of the restaurant notifying staff of these measures.

4.2.2 Break-Out Noise Emissions to Commercial Premises

Break-out noise emissions to commercial premises surrounding the proposed restaurant development due to the operation of the restaurant have also been estimated by considering patron noise levels inside the restaurant, as well as noise emissions from mechanical plant (namely, the kitchen exhaust fan).

Given that compliance is achieved at the nearest residential receivers, and the criteria for residential receivers is more stringent than that for commercial receivers (see Section 3), compliance is expected at all surrounding commercial receivers. No additional control measures or acoustic remediation strategies, specifically relating to commercial receivers, are recommended.

5 CONCLUSION

Pulse White Noise Acoustics Pty Ltd (PWNA) has been engaged by Alma Mexican Eatery to undertake an acoustic assessment, as part of the Development Application (DA) submission, for the proposed restaurant (Alma Freshwater) to be located at 20 Albert Street, Freshwater.

This assessment is required as part of the DA application requested by local council in order to assess the acoustic impact due to the proposed development.

Our recommendations are split into 3 categories, being daytime (operation from 11:30 am to 7:00 pm), evening (operation from 7:00 pm to 10:00 pm), and night-time (operation from 10:00 pm to 12:00 am). Based on our predictive modelling and acoustic assessment, several operational control measures are advised for each operational period. These are summarised in Section 4.2.1.

For the night-time operating period (10:00 pm to 12:00 am), compliance is expected if either of the following two operational controls are enforced:

i. The restaurant operates at full patron capacity internally (maximum of 51 people indoors), but zero (0) capacity in the external area (i.e., no patrons outdoors), with all doors closed (including the door between the external and internal eating areas) and windows closed, awning retracted/open, and ambient music inside the restaurant is limited to a maximum level of 72 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area.

ii. Alternatively, the restaurant operates at full patron capacity (maximum of 20 people outdoors, 51 people indoors), with all doors closed (including the door between the external and internal eating areas) and windows closed, awning fully extended over the entire external dining area, and ambient music inside the restaurant is limited to a maximum level of 72 dBA L_{Aeq}. No amplified or acoustic music should be played in the outdoor seating area. If the awning is to be a retractable construction, it must remain extended (i.e., covering the entire outdoor area, with no gaps) for the entirety of the night-time operating period (i.e., from 10:00 pm to 12:00 am) if any patrons are seated in this area. The acoustic performance requirements for the overhead awning are as follows:

    - The roofing system should have a minimum design sound insulation rating (Rw) of 16.
    - The proposed awning is to include SergeFerrari Soltis Proof 502 fabric. No acoustic data is available for this system. This system should meet the minimum required design sound insulation rating (Rw) of 16, and the following must be achieved as a minimum:
        - **The awning should be a continuous construction with no perforations or gaps. Note that the entire roofing system must have an overall Rw of at least 16, i.e., gaps will significantly reduce the acoustic performance of the selected roofing system.**
        - **The awning is fully extended and covers the entire external dining area (as specified above).**

    Note: If a PVC fabric roof system cannot be provided which meets an Rw rating of 16 it is recommended that glazed panels are installed. An equal construction would be a 6 mm float glass.

Provided that the acoustic conceptual measures discussed herein are implemented, then the proposed restaurant development is expected to be satisfactory in terms of acoustic impacts to the nearest affected locations.

We trust this information is of assistance. If you have any further questions, please do not hesitate to contact the undersigned.

Regards,

Alex Danon

Acoustic Engineer

PULSE WHITE NOISE ACOUSTICS PTY LTD

APPENDIX A: ACOUSTIC GLOSSARY

The following is a brief description of the acoustic terminology used in this report:

Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dBA	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dBA. Practically all noise is measured using the A filter. The sound pressure level in dBA gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
LMax	The maximum sound pressure level measured over a given period.
LMin	The minimum sound pressure level measured over a given period.
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dBA.
Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
dB (A)	'A' Weighted overall sound pressure level
Sound Pressure Level, LP dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, Lw dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt

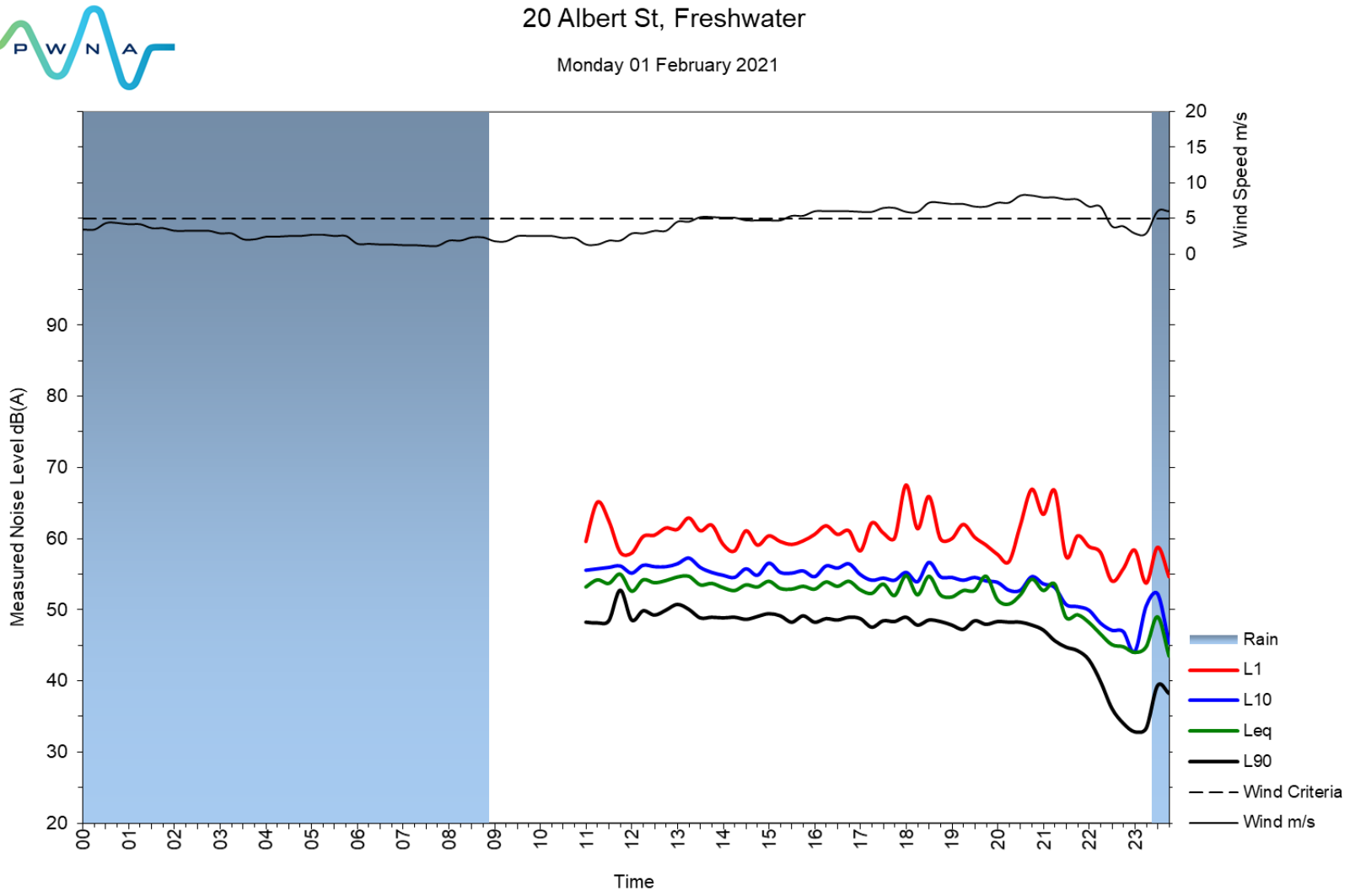
APPENDIX B: UNATTENDED NOISE MONITORING RESULTS

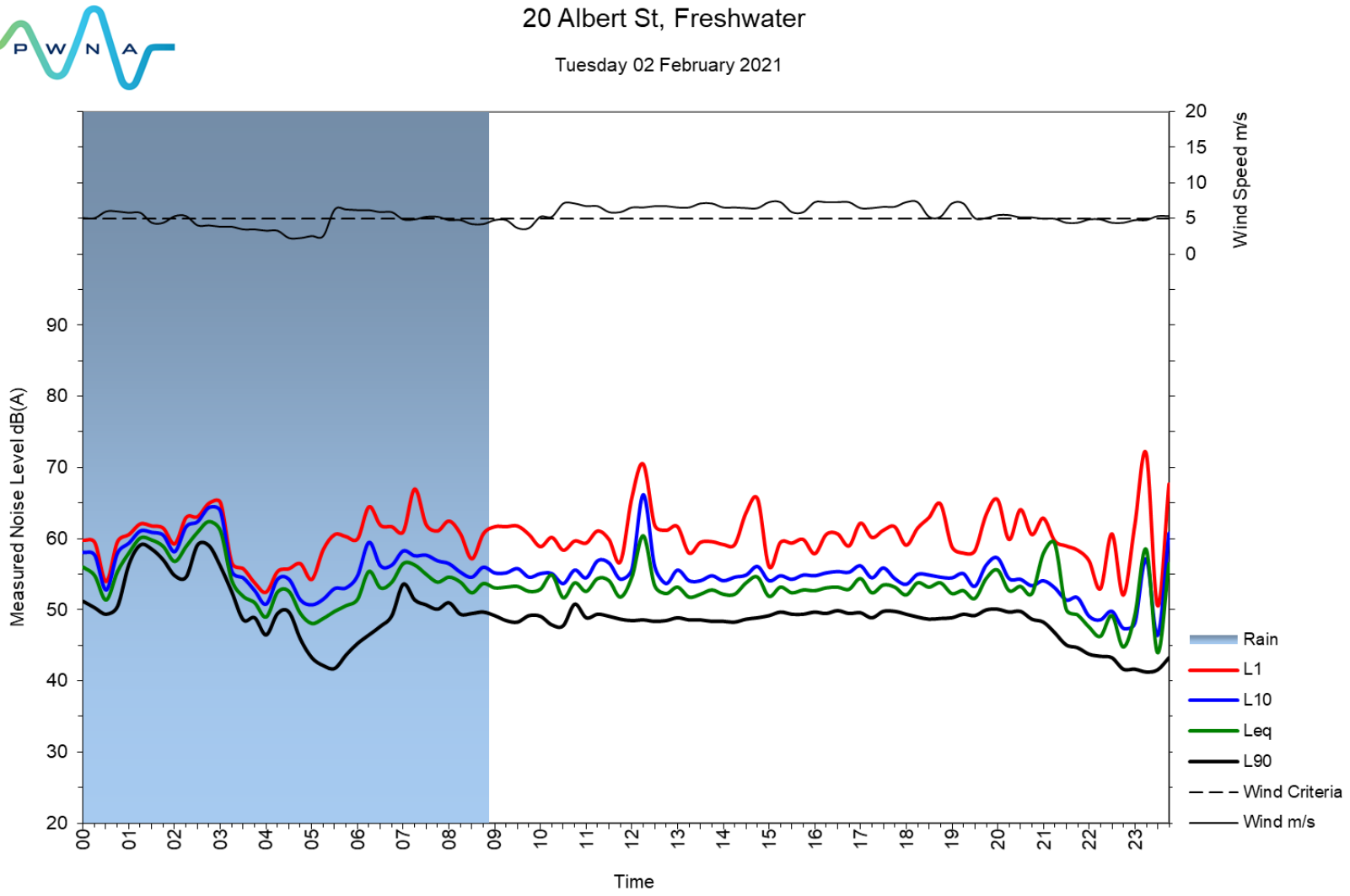
Weather Station: Observatory Hill

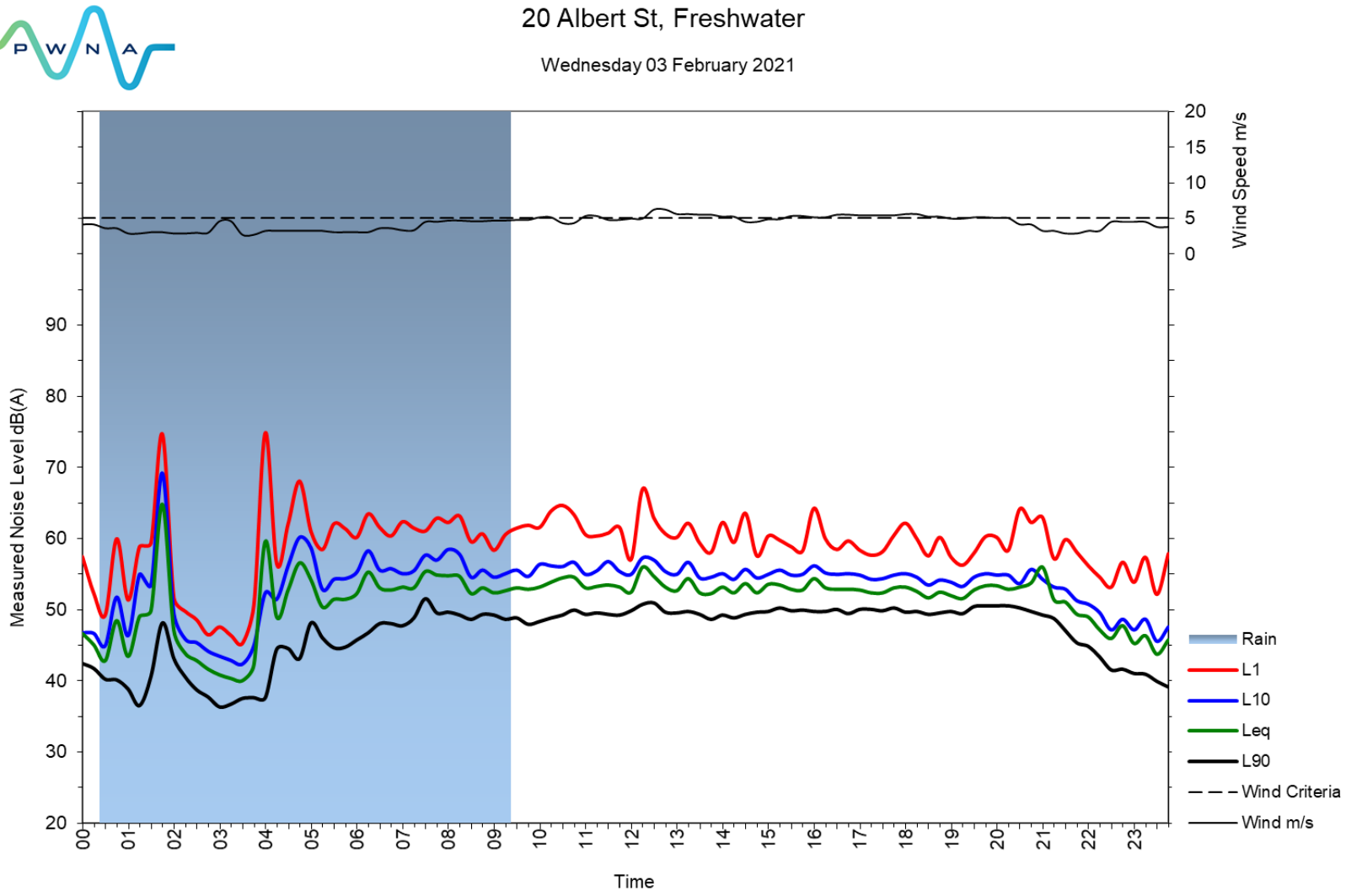
Weather Station ID: 066214

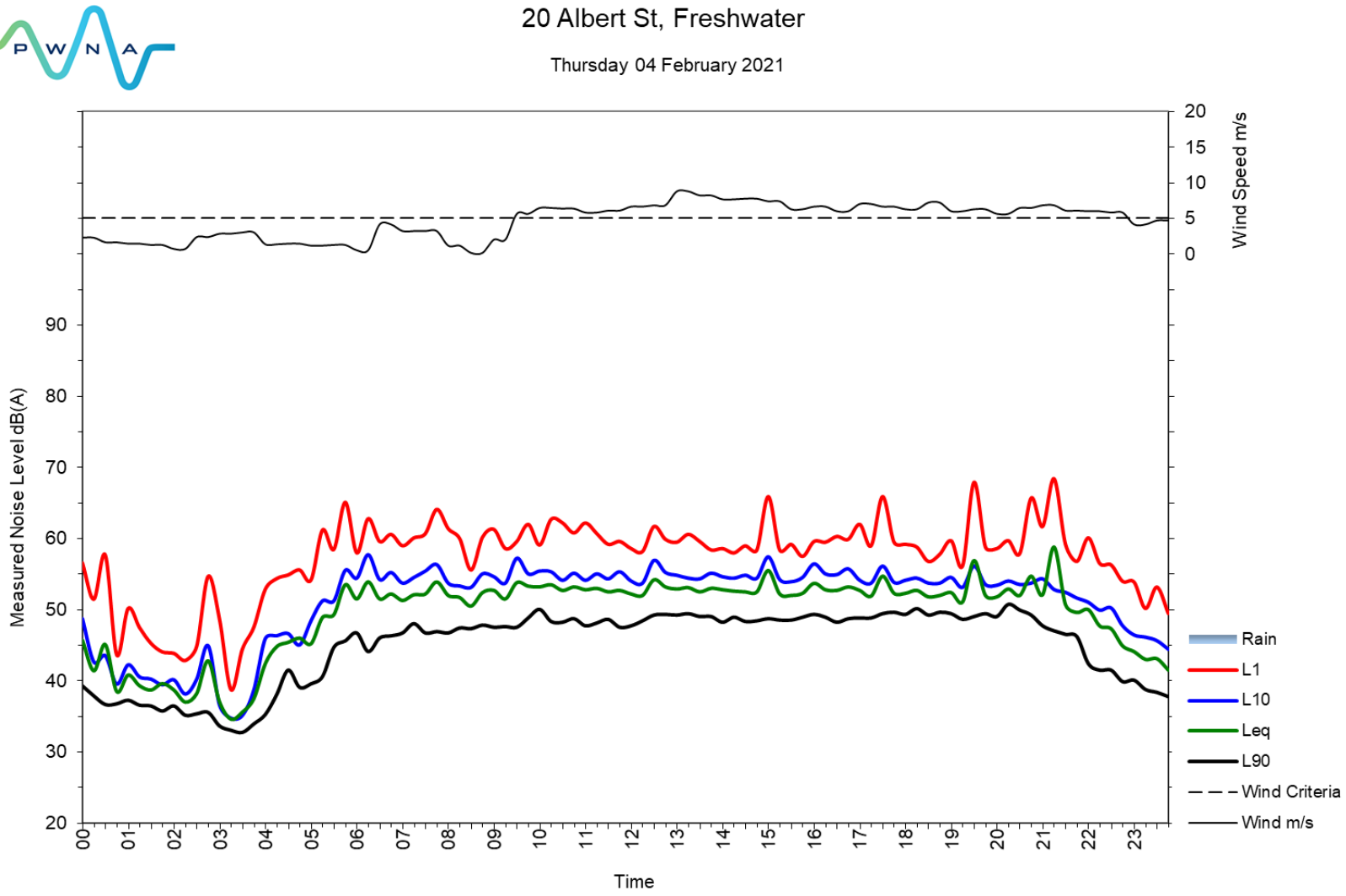
Coordinates: Lat: -33.86, Lon: 151.20, Height: 43.37 m

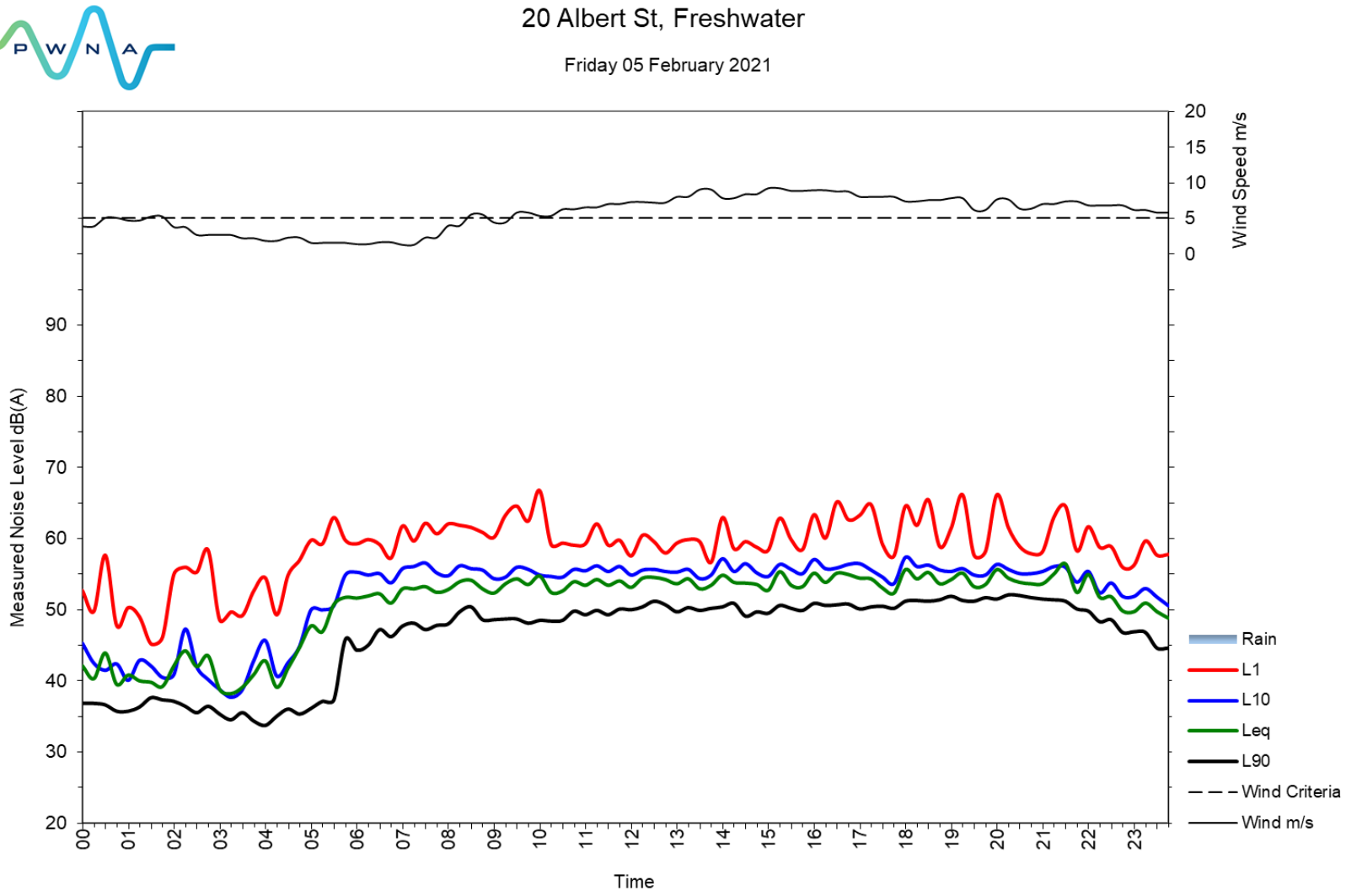
Figure 9 Photos of Unattended Noise Monitor Location – 20 Albert Street, Freshwater

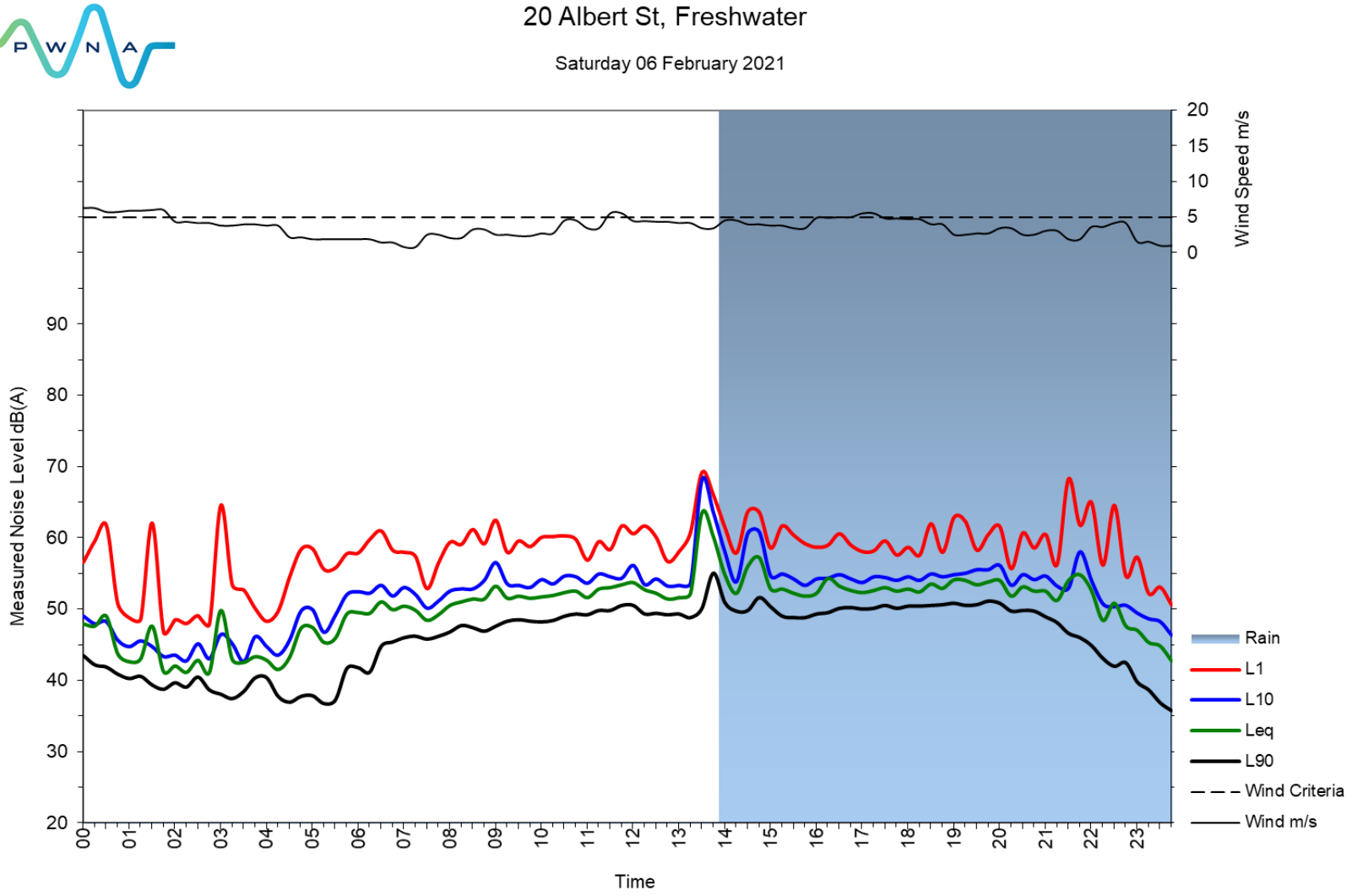

20 Albert St, Freshwater
Monday 01 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s

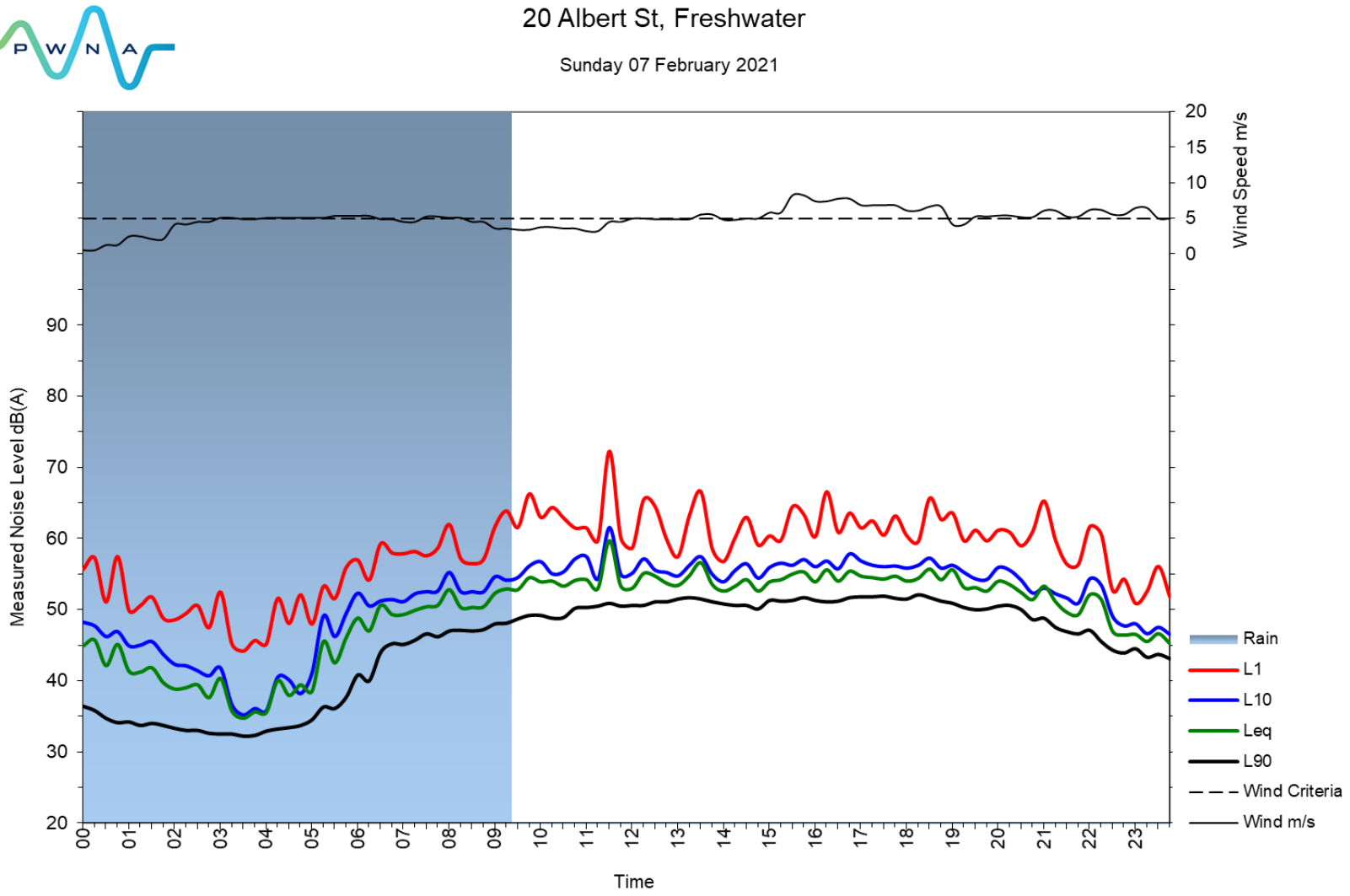

20 Albert St, Freshwater
Tuesday 02 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s

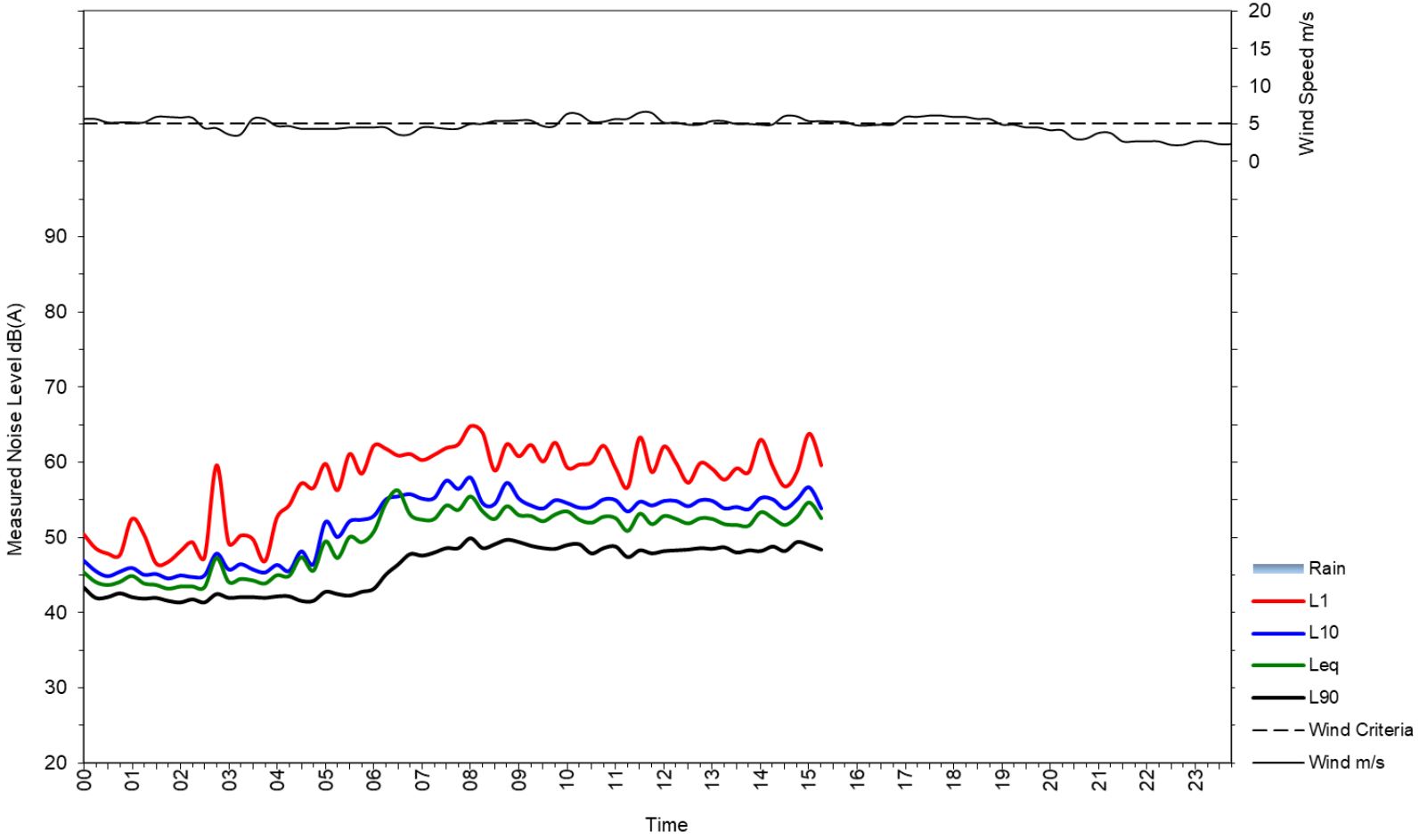

20 Albert St, Freshwater
Wednesday 03 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s


20 Albert St, Freshwater
Thursday 04 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s


20 Albert St, Freshwater
Friday 05 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s


20 Albert St, Freshwater
Saturday 06 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s


20 Albert St, Freshwater
Sunday 07 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s


20 Albert St, Freshwater
Monday 08 February 2021
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s