ATTACHMENT 3 – ACOUSTIC ASSESSMENT (NIA)

RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT R210203R1

Revision 2

Acoustic Assessment

Planning Proposal for LEP Minimum Lot Size Amendment

Airport Street & North Street, Temora

PREPARED FOR:
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8 October 2021

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DOCUMENT CONTROL

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210203R1	Revision 0	11 August 2021	Brian Mendieta	Desmond Raymond	Rodney Stevens
210203R1	Revision 1	10 September 2021	Brian Mendieta	Desmond Raymond	Rodney Stevens
210203R1	Revision 2	8 October 2021	Brian Mendieta	Desmond Raymond	Rodney Stevens

TABLE OF CONTENTS

1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (here forth referred to as RSA) has been engaged by Salvestro Planning to conduct an acoustic assessment for a planning proposal lodgement to amend the Temora Local Environmental Plan (LEP) minimum lot size provisions over land bounded by Airport Street, North Street, Mimosa Street and Bartondale Road, Temora. The proposal will enable the creation of additional residential lots over the subject precinct. The proposal was initiated by the owners of Lot 649 who are seeking to subdivide their lot into 2 parts and create separate land title for each of two existing dwellings located on land.

This report addresses the noise impact from road traffic, nearby grain handling facility, Temora Showground and aircraft noise impacts on the amenity of the subject precinct. Rail noise is not of concern as the south-western boundary of the precinct is located at least 100m away and is located farther away as the rail line goes north. In addition to this, the number of trains passing along the Cootamundra-Lake Cargellico Railway line is low, which will have an insignificant influence on the overall ambient noise level.

Noise criteria based on the measured background noise is established in accordance with the Noise Policy for Industry (NPfI).

This assessment is to form part of the supporting documentation for the planning proposal submission to Temora Council. Specific acoustic terminology is used in this report. Appendix A provides common acoustic terminologies.

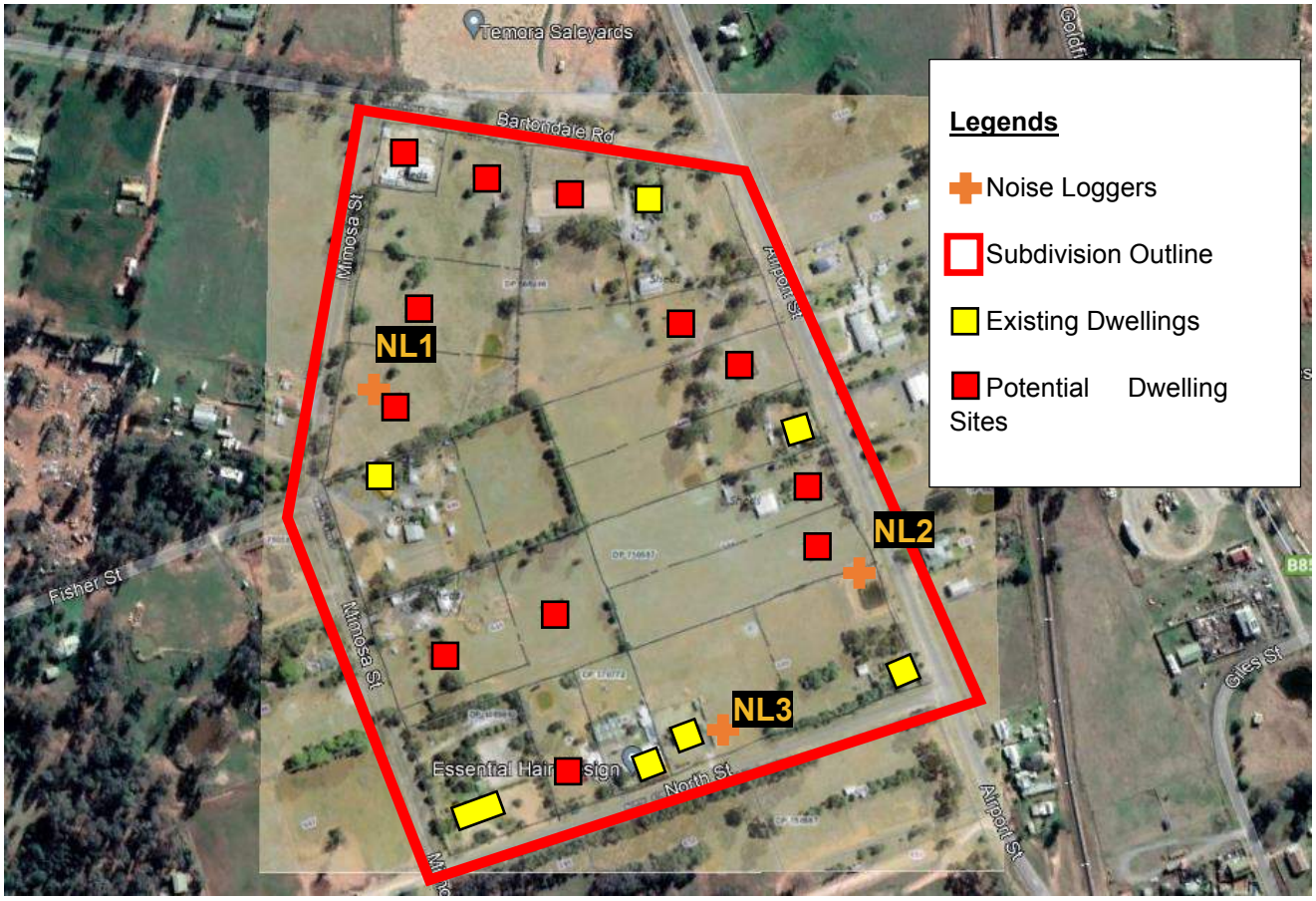
2 PROJECT DESCRIPTION

2.1 Site Location

The existing precinct is bounded by local roads, including Bartondale Road to the north, Airport Street to the east, North Street to the south and Mimosa Street to the west. There are 7 existing residential dwellings within the subject precinct and a potential additional 12 residential dwelling could be established on site (6 under the current LEP provisions and 6 under the proposed LEP amendment) as a result of the minimum lot size change.

Figure 2-1 presents an aerial map of the precinct site, along with the existing and potential additional residential dwelling sites and the location of installed noise loggers for this assessment.

Figure 2-1 Site Location



Aerial image courtesy of Google Maps © 2021

3 BASELINE NOISE SURVEY

3.1 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area, unattended noise monitoring was conducted between Tuesday 21st and Tuesday 31st July 2021 at the logging locations shown in Figure 2-1. Three noise loggers were set up on site. The noise loggers were placed within the following locations:

- The first noise logger was located on the western boundary, adjacent to Mimosa Street. The purpose of this measurement was to establish the background noise level for the residents within the north-western area of the site.

- The second noise logger was installed on the eastern boundary, adjacent to Airport Street. The purpose of this measurement was to measure road traffic noise along Airport Street. In addition to this, rail noise would also be measured from this logger; however, train noise would barely have any influence on the ambient noise. The major influence of noise would be road traffic noise along Airport Street.

- The third noise logger was installed on the southern boundary, adjacent to North Street. The purpose of this measurement was to determine the noise impact from a grain handling facility, adjacent to an existing rail line, located approximately 700m south from the subdivision. In addition to this, establish the background noise level for the receivers within the southern area.

Logger locations were selected with consideration to other noise sources which may influence readings, security issues for noise monitoring equipment and gaining permission for access from residents and landowners.

Instrumentation for the survey comprised of three RION NL-42 environmental noise loggers (serial numbers 00184110, 00885460, 00810712) fitted with microphone windshields. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. Noise data affected by significant weather conditions (i.e. heavy rain and strong winds) were removed from the noise analysis; this includes measurement taken on the 24th and 25th July 2021.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10}, L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary for definitions in Appendix A). Detailed results at the monitoring locations are presented in graphical format in Appendix B. The graphs show measured values of L_{A1}, L_{A10}, L_{A90} and L_{Aeq} for each 15-minute monitoring period

3.2 Ambient Noise Results

In order to establish the ambient noise criteria of the area, the data obtained from the noise loggers have been processed in accordance with the procedures contained in the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPfI, 2017) to establish representative noise levels that can be expected in the residential vicinity of the site. The monitored baseline noise levels are detailed in Table 3-1.

Table 3-1 Measured Baseline Noise Levels Corresponding to Defined NPfI Periods

Location	Measurement Descriptor	Measured Noise Level – dB(A) re 20 µPa		
		Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
NL1 - Mimosa Street	L_{Aeq}	52	48	43
	RBL (Background)	38	34	23
NL2 – Airport Street	L_{Aeq}	50	43	44
	RBL (Background)	38	30	22
NL3 – North Street	L_{Aeq}	55	50	48
	RBL (Background)	40	37	29

Notes: All values expressed as dB(A) and rounded to nearest 1 dB(A);

LAeq Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

LA90 Noise level present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

3.3 Noise Intrusion (State Environmental Planning Policy (Infrastructure) 2007)

To assess road noise intrusion on the subject precinct, the data obtained from the three loggers were processed to establish representative ambient noise levels.

The time periods used for this assessment are as defined in the State Environmental Planning Policy (Infrastructure) 2007 and the Development near Rail Corridors and Busy Roads Interim Guideline. Results are presented below in Table 3-2.

Table 3-2 Traffic Noise Levels Corresponding to Defined SEPP 2007 Periods

Noise Logger	Location	Period	External Noise Levels dB(A)
NL1	Approximately 15m from Mimosa Street	Day Time 7:00 am - 10:00 pm	$L_{Aeq(15hour)}$ 51
		Night Time 10:00 pm - 7:00 am	$L_{Aeq(9hour)}$ 39
NL2	Approximately 12m from Airport Street	Day Time 7:00 am - 10:00 pm	$L_{Aeq(15hour)}$ 51
		Night Time 10:00 pm - 7:00 am	$L_{Aeq(9hour)}$ 41
NL3	Approximately 15m from North Street	Day Time 7:00 am - 10:00 pm	$L_{Aeq(15hour)}$ 53
		Night Time 10:00 pm - 7:00 am	$L_{Aeq(9hour)}$ 48

4 NOISE GUIDELINES AND CRITERIA

4.1 Operational Noise Project Trigger Noise Levels

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the EPA. The EPA oversees the Noise Policy for Industry (NPfI) October 2017 which provides a framework and process for deriving project trigger noise level. The NPfI project noise levels for industrial noise sources have two (2) components:

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

4.1.1 Intrusiveness Noise Levels

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness noise level essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than 5 dB(A) above the measured Rated Background Level (RBL), over any 15 minute period.

4.1.2 Amenity Noise Levels

The amenity noise level is based on land use and associated activities (and their sensitivity to noise emission). The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. The noise levels relate only to other industrial-type noise sources and do not include road, rail or community noise. The existing noise level from industry is measured.

If it approaches the project trigger noise level value, then noise levels from new industrial-type noise sources, (including air-conditioning mechanical plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the project trigger noise level.

4.1.3 Area Classification

The NPfI characterises the "Rural" noise environment as an area with an acoustical environment that is dominated by natural sounds and generally has minimal traffic noise. In addition to this, settlement patterns would be typically sparse. The area surrounding the subject precinct falls under the "Rural" area classification.

4.1.4 Project Specific Trigger Noise Levels

Having defined the area type, the processed results of the unattended noise monitoring have been used to determine project specific project trigger noise levels for each Noise Catchment Area (NCA) on the subdivision site. NCA refers to area within the Subdivision which are likely to have similar ambient noise level.

The intrusive and amenity project trigger noise levels for nearby residential premises are presented in Table 4-1. These project trigger noise levels are nominated for the purpose of assessing potential noise emissions from the new dwellings.

In this case, the ambient noise environment is not controlled by industrial noise sources and therefore the project amenity noise levels are assigned as per Table 2.2 of the NPfI (Recommended Amenity Noise Levels) and standardised as per Section 2.2 of the NPfI. For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive project trigger noise levels are adopted. These are shown in bold text in Table 4-1.

Table 4-1 Operational Project Trigger Noise Levels

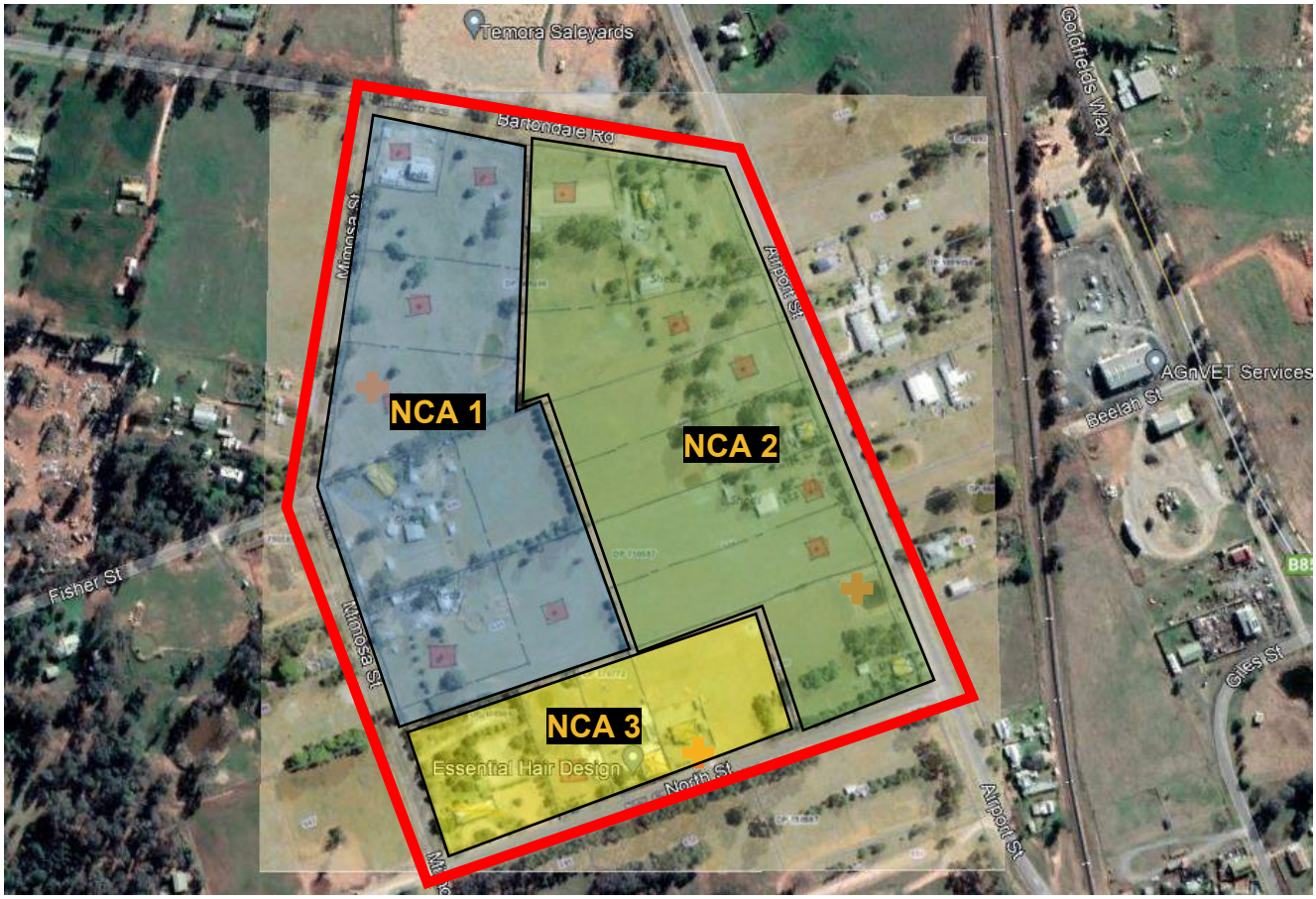
Noise Catchment Area	Time of Day	ANL [1] $L_{Aeq(15min)}$	Measured		Project Trigger Noise Levels	
			RBL [2] $L_{A90(15min)}$	Existing $L_{Aeq(Period)}$	Intrusive $L_{Aeq(15min)}$	Amenity $L_{Aeq(15min)}$
NCA 1	Day	50	38	52	**43**	53
	Evening	45	34	48	**39**	48
	Night	40	30[3]	43	**35**	43
NCA 2	Day	50	38	50	**43**	53
	Evening	45	30	43	**35**	48
	Night	40	30[3]	44	**35**	43
NCA 3	Day	50	40	55	**45**	53
	Evening	45	37	50	**42**	48
	Night	40	30[3]	48	**35**	43

Note 1: ANL = "Amenity Noise Level" for residences in Rural Areas.

Note 2: RBL = "Rating Background Level".

Note 3: According to NPfI 'where the rating background noise level is found to be less than 30dB(A) for the evening and night periods, then it is set to 30 dB(A)

Figure 4-1 Noise Catchment Area Map



Aerial image courtesy of Google Maps © 2021

4.2 Road Noise Criteria

The determination of an acceptable level of traffic noise impacting the internal residential spaces requires consideration of the activities carried out within the space and the degree to which noise will interfere with those activities.

As sleep is the activity most affected by traffic noise, bedrooms are considered to be the most sensitive internal living areas. Higher levels of noise are acceptable in living areas without interfering with activities such as reading, listening to the television etc. Noise levels in utility spaces such as kitchens, bathrooms, laundries etc. can be higher.

4.2.1 State Environmental Planning Policy (Infrastructure) 2007

The NSW Government's State Environmental Planning Policy (Infrastructure) 2007 (SEPP (Infrastructure) 2007) was introduced to facilitate the delivery of infrastructure across the State by improving regulatory certainty and efficiency. In accordance with the SEPP, Table 3.1 of the NSW Department of Planning and Infrastructure's "*Development near Rail Corridors and Busy Roads - Interim Guideline"* (the DP&I Guideline) of December 2008 provides noise criteria for residential and non-residential buildings. These criteria are summarised in Table 4-2.

Table 4-2 DP&I Interim Guideline Noise Criteria

Type of occupancy	Noise Level dB(A)	Applicable time period
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40	At any time

Note 1: Airborne noise is calculated as $L_{Aeq(15hour)}$ daytime and $L_{Aeq(9hour)}$ night-time

The following guidance is also provided in the DP&I Guideline:

> *"These criteria apply to all forms of residential buildings as well as aged care and nursing home facilities. For some residential buildings, the applicants may wish to apply more stringent design goals in response to market demand for a higher quality living environment.*
>
> *The night-time "sleeping areas" criterion is 5 dB(A) more stringent than the "living areas" criteria to promote passive acoustic design principles. For example, designing the building such that sleeping areas are less exposed to road or rail noise than living areas may result in less onerous requirements for glazing, wall construction and acoustic seals. If internal noise levels with windows or doors open exceed the criteria by more than 10 dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

The noise criteria presented in Section 4.2.1 and in Table 4-2 apply to a 'windows closed condition'. Standard window glazing of a building will typically attenuate noise ingress by 20 dB(A) with windows closed and 10 dB(A) with windows open (allowing for natural ventilation). Accordingly, the external noise threshold above which a development will require mechanical ventilation is an $L_{Aeq(9hour)}$ 55 dB(A) for bedrooms and $L_{Aeq(15hour)}$ 60 dB(A) for other areas.

Where windows must be kept closed, the adopted ventilation systems must meet the requirements of the Building Code of Australia and Australian Standard 1668 – The use of ventilation and air conditioning in buildings.

4.3 Aircraft Noise Criteria

The Australian Standard AS 2021:2015 will be used in this assessment. *Australian Standard AS 2021:2015 Acoustics – Aircraft noise intrusion - Building siting and construction* provides recommendations for acceptable internal noise levels within various areas of occupancy inside buildings during aircraft flyovers. The recommended indoor design noise levels relating to residential premises are presented in Table 4-3 below.

Table 4-3 Recommended Indoor Design Sound Levels for Residences

Area of Occupancy	Indoor Design Sound Level (L_{ASmax})
Sleeping Areas, Dedicated Lounges	50 dB(A)
Other Habitable Areas	55 dB(A)

5 AMBIENT, AIRCRAFT & ROAD TRAFFIC NOISE ASSESSMENT

5.1 Ambient Noise (Grain Handling Facility and Temora Showground)

The Council has raised concerns regarding noise from the grain handling plant located approximately 700m south from the subject precinct southern boundary. Noise measurement in NCA 3 would have captured the noise impact from the grain handling facility on the Subdivision.

RSA has also identified the Temora Showground south from the site, as a source of potential noise impact. The showground has a horse race track that is approximately 250 to 500m away from NCA 3 area of the Subdivision.

Noise measurements of a horse racing track from a previous assessment project was undertaken and the noise measurements from the racetrack will be considered in this noise assessment. Horse racing on a track has a Sound Pressure Level of 84dB(A) 9 metres away. Based on this assumption, if horses were to run the whole track within a 15-minute assessment period, the noise impact on the site would be 52dB(A). This noise impact is considered in this noise assessment and the glazing recommendation takes this impact into consideration.

Noise from the grain handling facility and Temora Showground impact on the subject precinct would be considered minor, especially for NCA 1 as it is farthest away from the these sources. This is based on the fact that existing dwellings with standardized glazing (i.e. 6mm glazing) would likely achieve internal noise limits.

5.2 Aircraft Noise

AS 2021-2015 contains a detailed procedure for assessing maximum levels of aircraft noise intrusion based on the location of a building with respect to aircrafts nearby. Based on the acceptability of the site for the proposed building use, there are further detailed procedures to determine the noise reduction required from the building construction to control maximum internal noise levels during aircraft flyovers.

Aircraft noise associated with the Temora Airport was assessed. Section 10 of the Temora Airport Masterplan states:

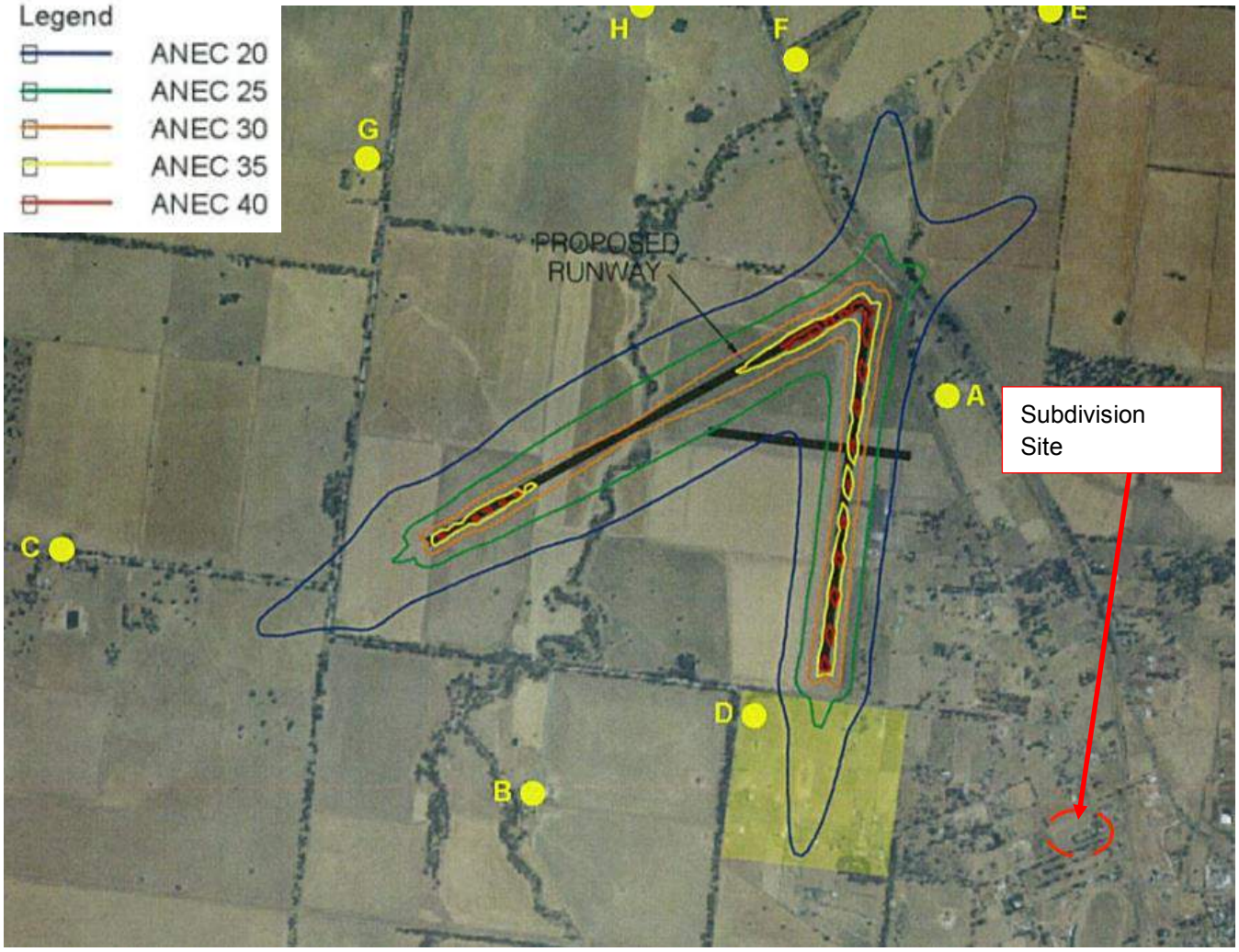
As shown by Table 1, the majority of aircraft using Temora Airport are lighter aircraft, weighing less than 1000kg. Mostly between 20 – 30% of aircraft movements will be aircraft weighing more than 1000kg each month. The exception is in the peak agricultural season in July where 43% of aircraft movements are aircraft weighing more than 1000kg.

The airport is also only used for recreational flight and does not have regular passenger services. As advised by the Temora Council as well, the aircrafts flown are recreational planes and gliders. The airport is used by visiting recreational pilots and small pilot training schools. For this reason, only lightweight aircrafts will be considered within this aircraft noise assessment.

The Temora Airport's 'Australian Noise Exposure Concept' (ANEC) in contrast with the subject precinct, is shown in Figure 5-1.

The maximum aircraft flyover noise level across the subject precinct area has been calculated in accordance with the methodology in Section 3.1 of AS 2021- 2015. The calculated noise level is 73 dB(A) on NCA 1 and 2 and 71dBA on NCA 3; this level was calculated from the departure of an Cessna 206.

Figure 5-1 Temora Airport's 'Australian Noise Exposure Concept'



5.3 Road Traffic Noise

Road traffic noise impact is based on the measured noise level take on site, as presented in Table 3-2. It should be noted that the noise logger within NCA 3 (Northern Street) also takes into account ambient noise related to the grain handling facility.

As there are no traffic count or annual growth rate studies undertaken by a traffic consultant, a 2% annual growth rate of road traffic on Airport Street has been assumed. The future Year 2031 scenario noise level increase at the precinct, based on the existing measured road traffic noise levels and an annual growth rate of 2%, has been calculated to be 0.8 dB(A). Therefore, the road traffic noise levels at the eastern boundary of the precinct in Year 2031 are predicted to be $L_{Aeq,15hour}$ 52 dB(A) and $L_{Aeq,9hour}$ 42 dB(A).

Noise from road traffic along Airport Street impacting on the precinct would be considered minor, especially for dwellings located on the west side, as they are farthest away from Airport Street. This is based on the fact that existing dwellings with standardized glazing (i.e. 6mm glazing) would likely achieve internal noise limits.

5.4 Traffic and Aircraft Noise Reduction

The recommended indoor design sound levels presented in Table 4-3 have been used to determine the required aircraft noise reduction values (ANR) and have been calculated in accordance with the procedures outlined in AS 2021:2015 and are presented in Table 5-1. In addition to this, the Traffic Noise Reduction (TNR) has also been included in the table for comparison purposes.

Table 5-1 Aircraft Noise Reduction & Traffic Noise Reduction

Noise Catchment Area	Area of Occupancy	Aircraft Noise Reduction (ANR)	Traffic Noise Reduction (TNR)
1	Sleeping Areas	23	5
	Other Habitable Areas	18	12
2	Sleeping Areas	21	7
	Other Habitable Areas	16	12
3	Sleeping Areas	23	14
	Other Habitable Areas	18	14

As shown above, the aircraft noise has a greater impact on the precinct and the acoustic recommendation for any proposed dwellings will be based on the ANR. Aircraft noise impacting on the precinct may be considered to have a low to medium noise impact. This is determined based on the acoustic performance rating required to achieve the internal noise limit for a residential dwelling. The glazing required to achieve the internal noise limit may be a minor improvement to the standard glazing thickness (6mm) and minor acoustic improvement on the walls and ceilings may be required.

The internal design noise levels and the ANR/TNR derived above assume that the windows and external entry doors are closed. As it is necessary for the windows and doors to remain closed to comply with AS 2021:2015, an alternative means of ventilation approved by Council and in accordance with the relevant regulations such as the National Construction Code (NCC) and AS 1668.2 may be required.

6 NOISE CONTROL RECOMMENDATION

6.1 Recommended noise control treatment

The noise control measures outlined in this section would be applicable to any potential new residential dwelling and not to the existing residential dwellings. It is unknown whether the existing dwellings were constructed before the release of the aircraft or road traffic noise Australian Standards or if the existing properties had an acoustic assessment undertaken. Therefore sections 6.1 to 6.5 are irrelevant to existing residential dwellings on the site, unless an extension or an additional property is constructed on the existing dwelling's land. The noise control measures outlined in this section ensure noise amenity inside the new properties are met and noise emission (i.e. mechanical noise) from the properties comply with NPfI noise limits.

The calculation procedure establishes the required noise insulation performance of each surface component such that the internal noise level is achieved whilst an equal contribution of traffic noise energy is distributed across each component. Building envelope components with a greater surface area must therefore offer increased noise insulation performance.

The recommended acoustic treatment is based on the following floor finishes:

- Bedrooms: Carpet and underlay
- Living Room Hard Flooring
- Kitchen/Wet Areas: Tiles

The acoustic requirements shown in this report may increase further where the bedroom floor finishes are tiled or timber.

6.2 Noise Control Assumptions

As noted in the previous section, a slight improvement to the standardised glazing may be required to achieve the internal noise limit of a residential dwelling. The following noise control measures are general recommendation for any potential new dwelling in this precinct.

Indicative noise insulation recommendations based on the predicted aircraft noise and typical room sizes are provided. The following glazing, wall and ceiling recommendations outlined in Sections 6.3, 6.4 and 6.5 should only serve as a guideline. The proposed architectural drawings for any potential new dwelling should be forwarded to a suitably qualified acoustics consultant to review the aircraft noise intrusion.

The glazing, wall and ceiling acoustic recommendation are based on multiple factors including room dimensions, façade/partition surface area size, reverb time, orientation of the façade in contrast with aircraft flight path. Table 6-1 provides typical room features (i.e. reverb time, room dimension and partition surface area) which will be used to determine the glazing, wall and ceiling acoustic performance requirements for the subdivision lot.

Table 6-1 Typical Room Features

Space	Assumed Reverb Time (Seconds)	Assumed Room Dimension (m)	External Window/Door	Assumed Window/Door Surface Area (m)
Bedroom	0.5	Length: 3m Width: 3m Height: 2.7m	Window	1m x 1.8m
			Door	2.4m x 2.1m
Living/ Kitchen	1	Length: 6m Width: 4m Height: 2.7m	Window	2m x 1.8m
			Door	3m x 2.4m

6.3 Glazing

The R_w rating required for each window will vary from room to room. Recommendations for windows also apply to any other item of glazing located on the external facade of the building in a habitable room unless otherwise stated.

Note that the R_w rating is required for the complete glazing and frame assembly. The minimum glazing thicknesses will not necessarily meet the required R_w rating without an appropriate frame system. It will be therefore necessary to provide a window glass and frame system having a laboratory tested acoustic performance meeting the requirements below.

The window systems must be tested in accordance with both of the following:

- Australian Window Association Industry Code of Practice Window and Door – Method of Acoustic Testing; and
- AS 1191 Acoustics – Method for laboratory measurement of airborne sound insulation of building elements.

It is necessary to submit such Laboratory certification for the proposed glazing systems (i.e. windows and framing systems) (e.g. NAL or CSIRO) for approval by an acoustic consultant prior to ordering or commitment.

The entire frame associated with the glazing must be sealed into the structural opening using acoustic mastics and backer rods. Normal weather proofing details do not necessarily provide the full acoustic insulation

potential of the window system. The manufacturers' installation instructions for the correct acoustic sealing of the frame must be followed.

It is possible that structural demands for wind loading or fire rating or the like may require more substantial glass and framing assemblies than nominated above. Where this is the case the acoustic requirements must clearly be superseded by the structural or fire rating demands.

Table 6-2 presents the minimum recommended R_w (weighted noise reduction) for glazing elements.

Table 6-2 Minimum Acoustic Rating (R_w) Required for Glazing Elements

NCA	Room	Western Side		North & South Side		Eastern Side	
		Window	Glazed Door	Window	Glazed Door	Window	Glazed Door
1	Bedroom	32	35	29	32	29	32
	Living	30	30	28	28	28	28
2	Bedroom	31	33	28	30	28	30
	Living	28	30	28	28	28	28
3	Bedroom	32	35	29	32	29	32
	Living	30	30	28	28	28	28

Glazing requirements are subject to change depending on the architectural plans of the proposed residential property.

The following table presents the Rw ratings of different glass thicknesses, please note that these are shown as a guide only. The glazing installer must certify that all systems have been installed as per manufacturer's instructions.

Table 6-3 Glass Thickness Guideline

Glass Thickness	Rw Rating (Glass Pane Only)
6mm	28
6.38mm Laminated	32
8.38 Laminated	34
10.38 Laminated	36
12.38 Laminated	37
4mm – 50mm Airgap – 6mm Double Glazed	41

6.4 Roof/Ceiling

The overall acoustic rating required is Rw 45 (minimum). This can be achieved by the following construction:

- A steel metal roof with minimum Bradford Anticon 60 MD over timber or steel purlins OR pitched tiled roof with or without 350 g/m^2 sarking

- 165mm Bradford Gold Batts R 3.0;
- Furring channel at 600mm max. centres;
- 1 x 13mm Gyprock Plus Plasterboard

If ventilators, heat extraction units or other openings into the ceiling cavity for lighting, ventilation, decoration or other purposes are to be provided, then care should be taken to ensure that each room is properly attenuated and all penetrations are properly sealed off so as not to degrade the rating of the roof/ceiling construction system. Care should also be taken to avoid any noise paths into the ceiling cavity via the eaves.

6.5 Masonry Walls

6.6 Brick Veneer/Masonry

If masonry external walls are to be used then the wall will need to achieve a rating of R_w 42. This Rw rating is generally achieved with a standard brick veneer construction with insulation. No further acoustic requirements are needed.

6.7 Light Weight Wall

All proposed lightweight cladding external walls must have a minimum Rw 42 rating. This can be met by the following minimum construction:

- External cladding materials on batten with sarking
- 1 x 6mm CSR CeminSeal Wallboard (against studs)
- 1 x 16mm Gyprock Fyrcheck MR Plasterboard (minimum density 12.5 kg/m2 per sheet)
- Timber studs at 600mm maximum centres
- 75 Gold Batts R1.5
- 1 x 16mm Gyprock Fyrcheck Plasterboard (minimum density 12.5 kg/m2 per sheet)
- 169mm Minimum Wall Thickness

6.8 Detailing

Note that well-detailed construction and careful installation is needed to achieve the required R_w acoustic ratings. All gaps are to be minimised and fully sealed with an acoustic rated sealant, such as FireBan One by Bostik or Sikaflex Pro 2HP by Sika.

7 CONCLUSION

RSA has conducted an acoustic assessment of a planning proposal to amend the LEP minimum lot size provisions over land bounded by Airport Street, North Street, Mimosa Street and Bartondale Road, Temora. The proposal will result in the potential creation of additional residential lots and dwellings within the precinct.

The NIA is intended to support a minimum lot size amendment to the precinct which may involve the addition of 6 dwellings over the total number that can be established under current LEP provisions.

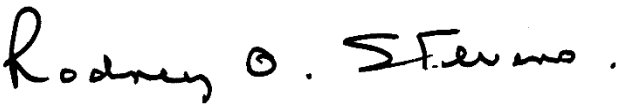
A noise survey has been conducted and the processed data has been used to establish the noise criteria for the subject precinct; in addition to this, to measure the noise impact from nearby road traffic noise and nearby grain facility farther south from the site. The acoustic assessment also takes into account noise from aircraft departing and arriving into Temora Airport and potential noise from Temora Showground.

Based on the noise impact assessment, the following items have been noted:

- Noise potential impact from the Grain Handling Operation and Temora Showground is negligible and would have no serious impact on the living amenity of existing or potentially new dwellings to be established within the subject precinct;
- Noise impact from road traffic has a negligible impact on the precinct;
- It was determined that the greatest noise impact on the precinct would be aircraft departing from Temora Airport. It should be noted; however, that aircraft noise impacting on the site would be considered to be a low-to-medium impact. This is determined based on the acoustic performance rating required to achieve the internal noise limit for a typical residential dwelling. The glazing required to achieve the internal noise limit would only involve a minor improvement to the standard glazing thickness (6mm) and minor acoustic improvement on the walls and ceilings.

Based on these findings, any additional dwellings to the precinct would not generally result in additional noise complaints in relation to grain handling facility, Temora Showground, road traffic noise or airport operation. This NIA supports the planning proposal for an amendment to the current LEP minimum lot size amendment.

Approved:-



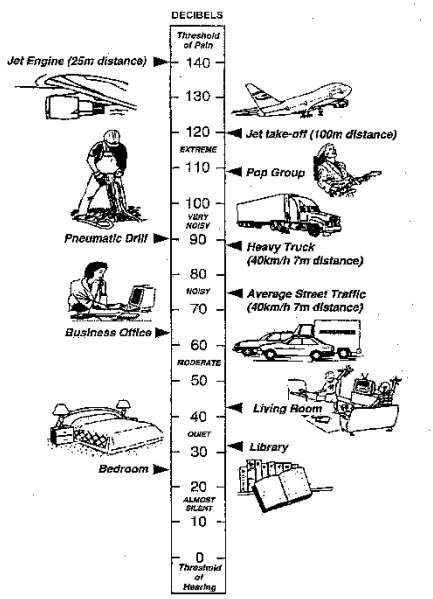
Rodney Stevens

Manager/Principal

Appendix A – Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) character of the environment (e.g. very quiet suburban, suburban, urban, near industry) miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: Noise mitigation benefits (amount of noise reduction provided, number of people protected). Cost of mitigation (cost of mitigation versus benefit provided). Community views (aesthetic impacts and community wishes). Noise levels for affected land uses (existing and future levels, and changes in noise levels).

Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.
Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10th percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

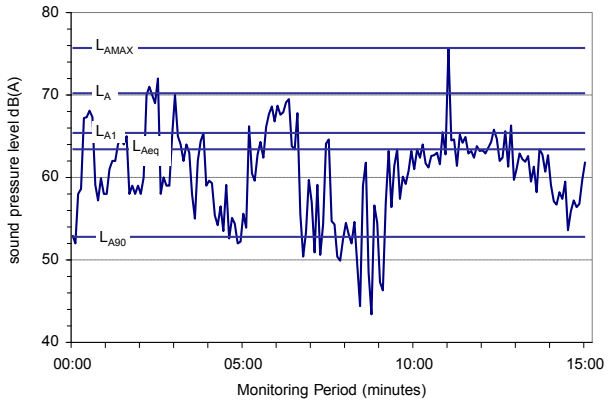
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistic noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:



Key descriptors:

L_{Amax} Maximum recorded noise level.

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.

L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

Threshold

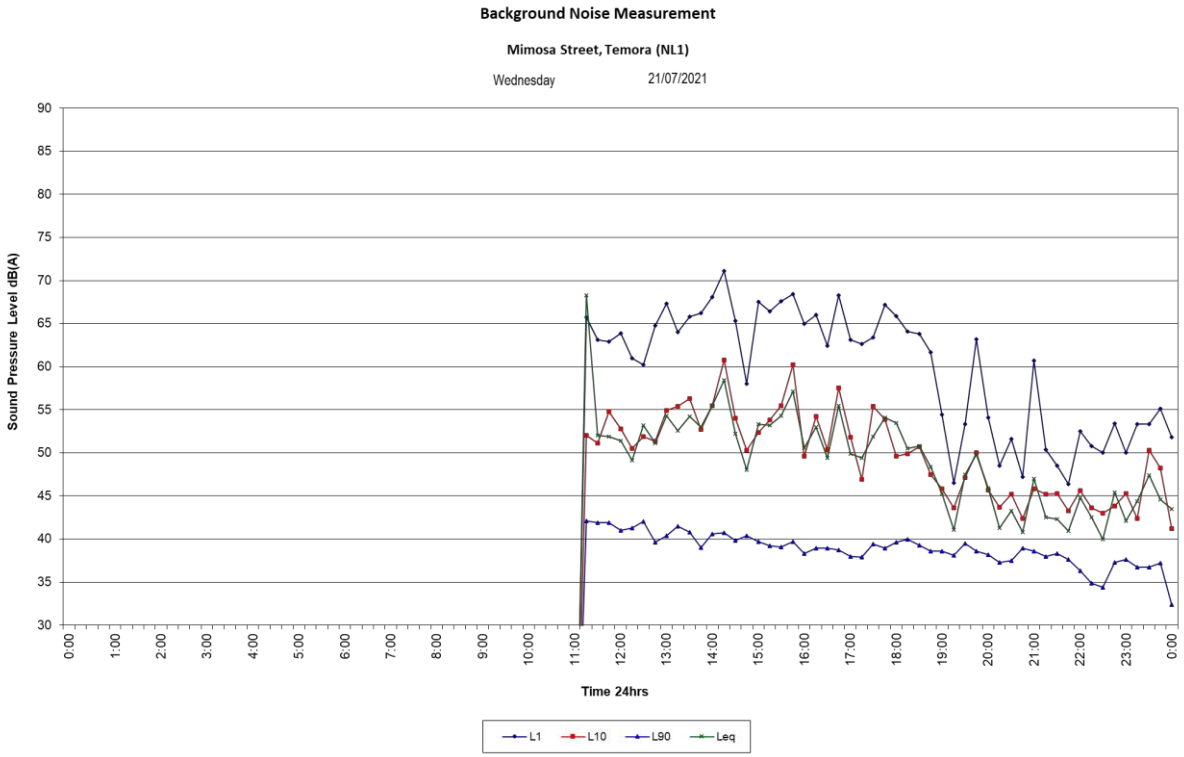
The lowest sound pressure level that produces a detectable response (in an instrument/person).

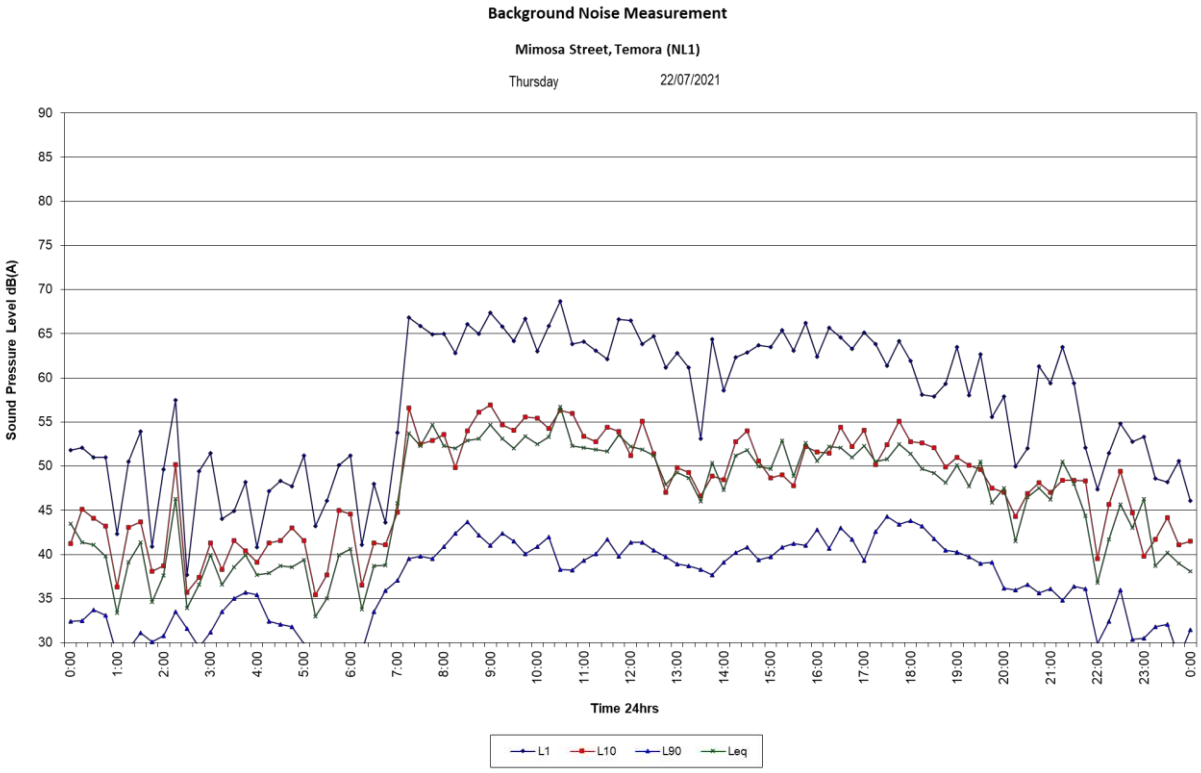
Tonality

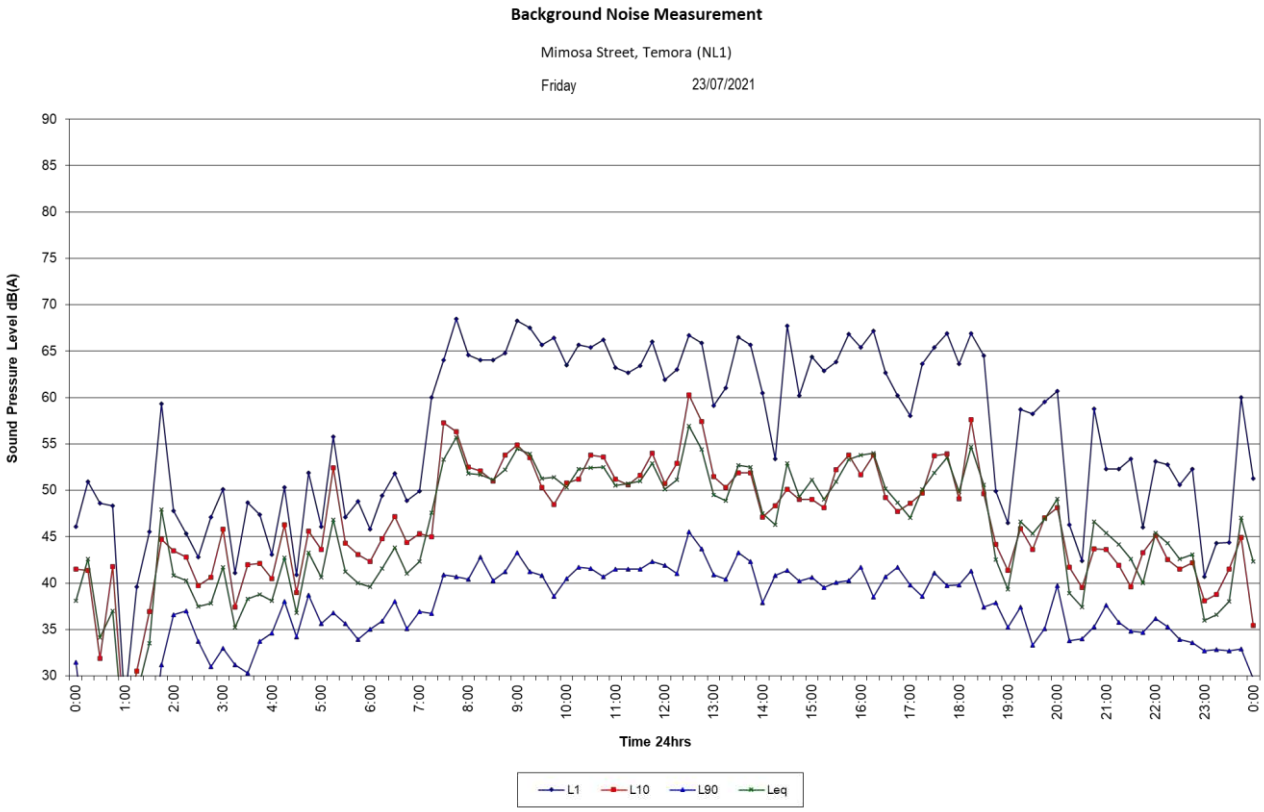
Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

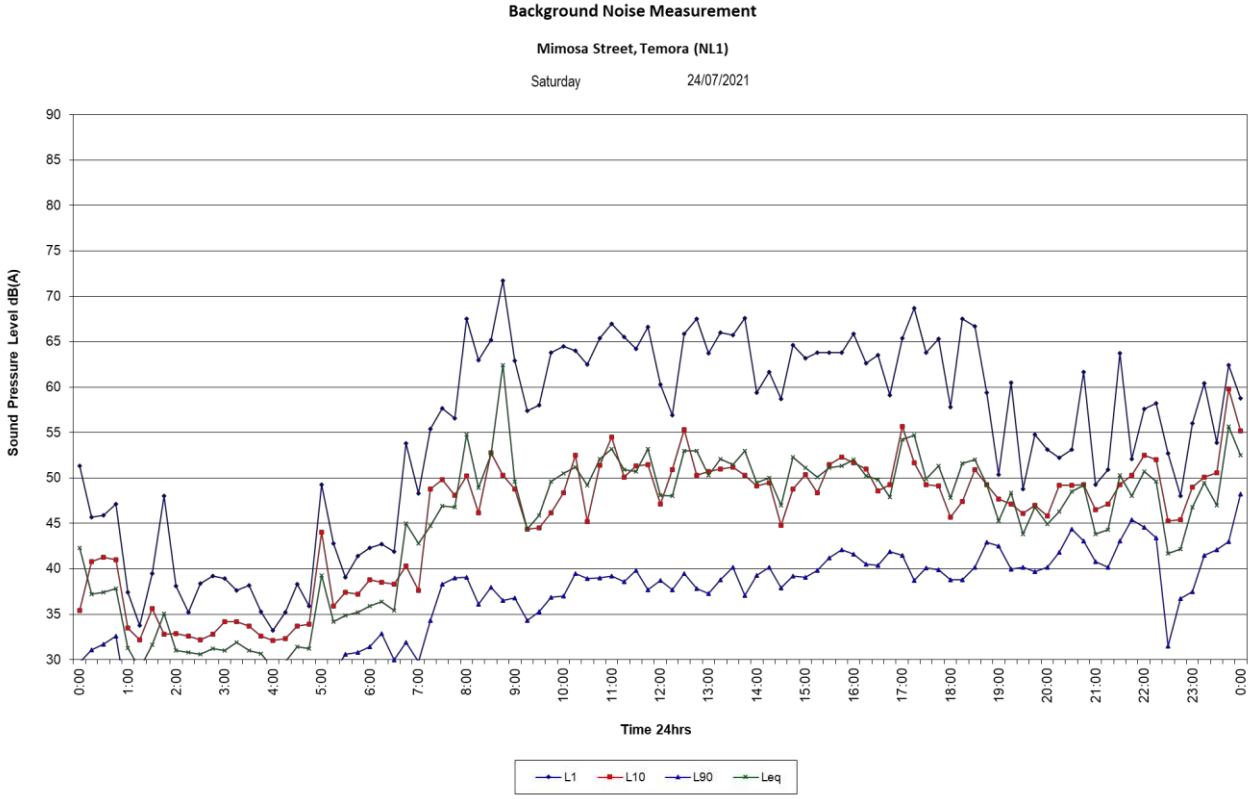
Appendix B – Logger Graphs

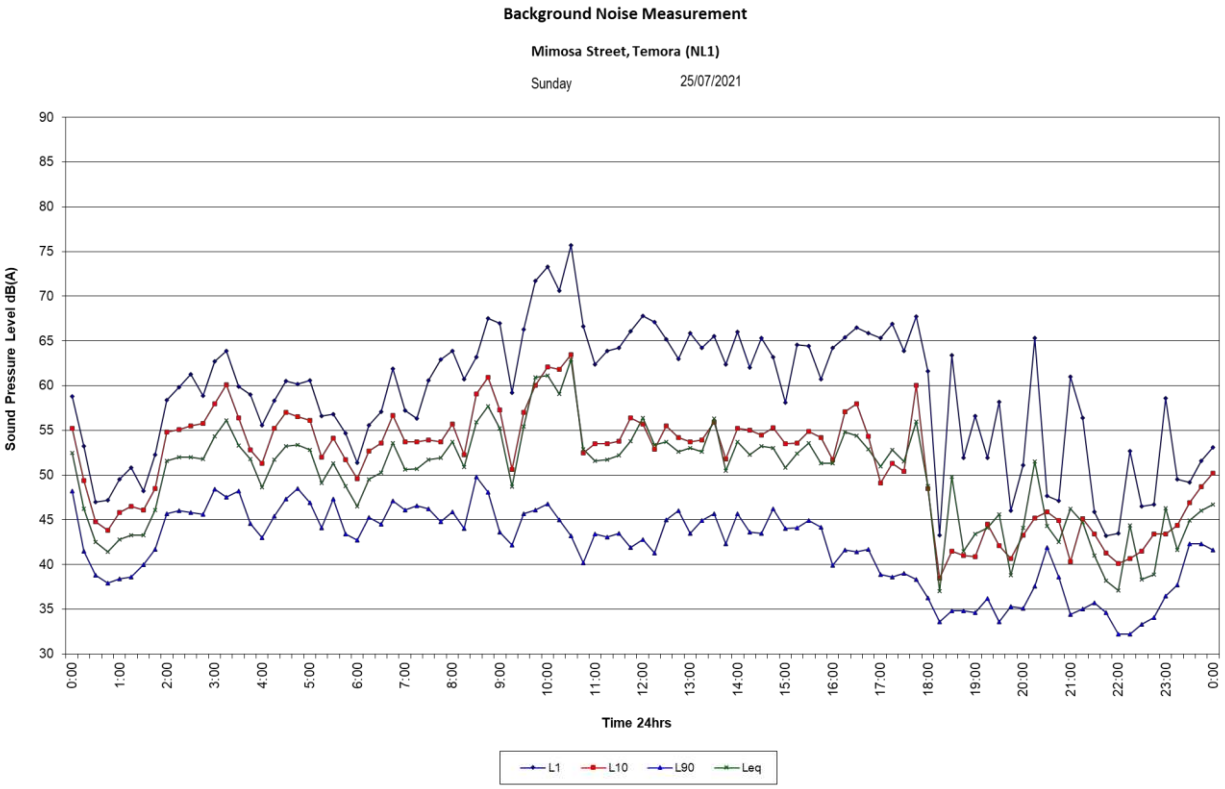
Mimosa Street, Temora (NL1)

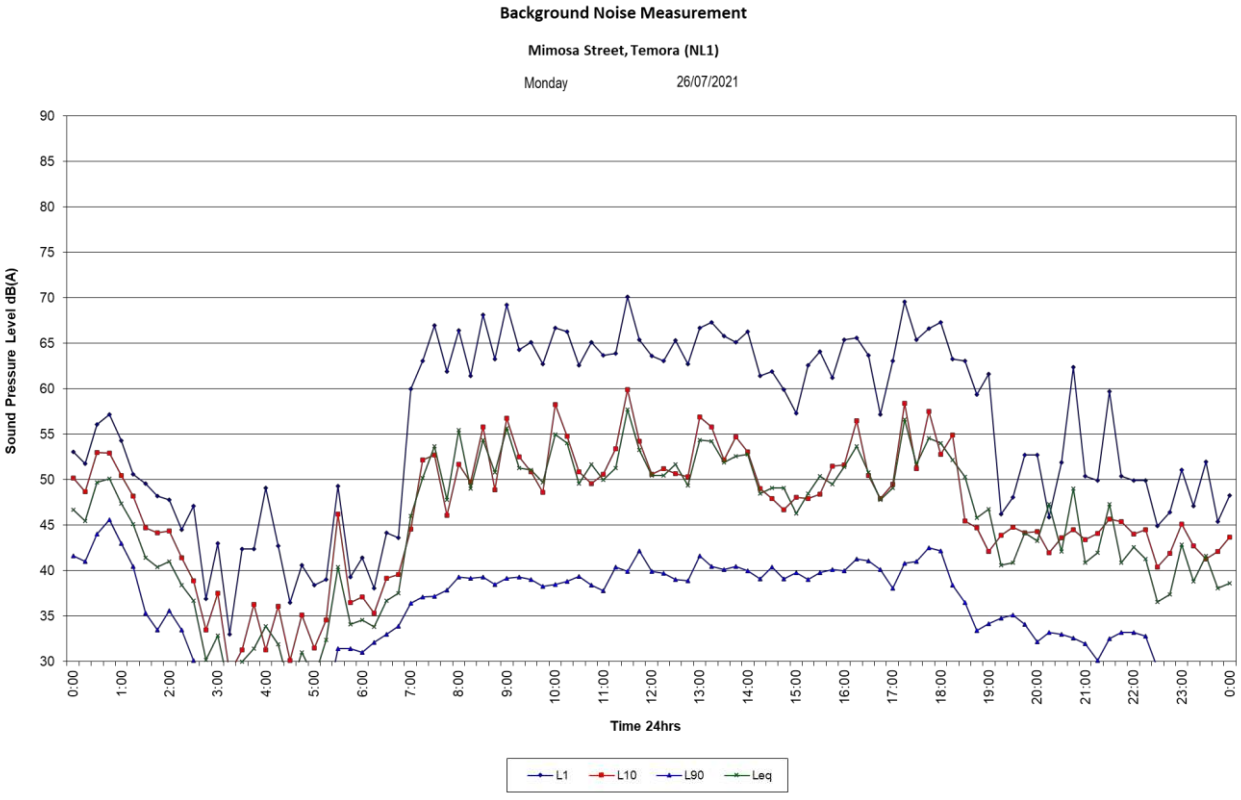


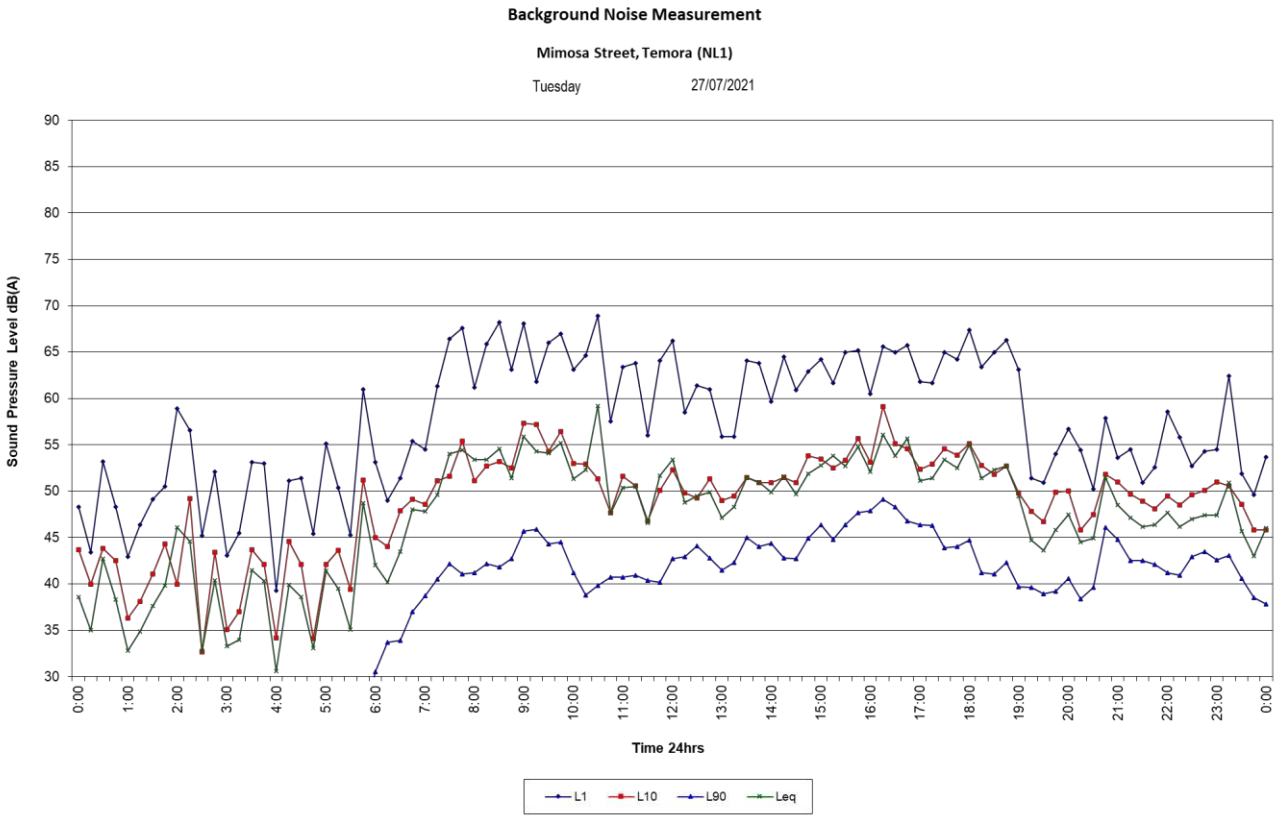



Background Noise Measurement
Mimosa Street, Temora (NL1)
Friday 23/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
Mimosa Street, Temora (NL1)
Saturday 24/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
Mimosa Street, Temora (NL1)
Sunday 25/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
Mimosa Street, Temora (NL1)
Monday 26/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
Mimosa Street, Temora (NL1)
Tuesday 27/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
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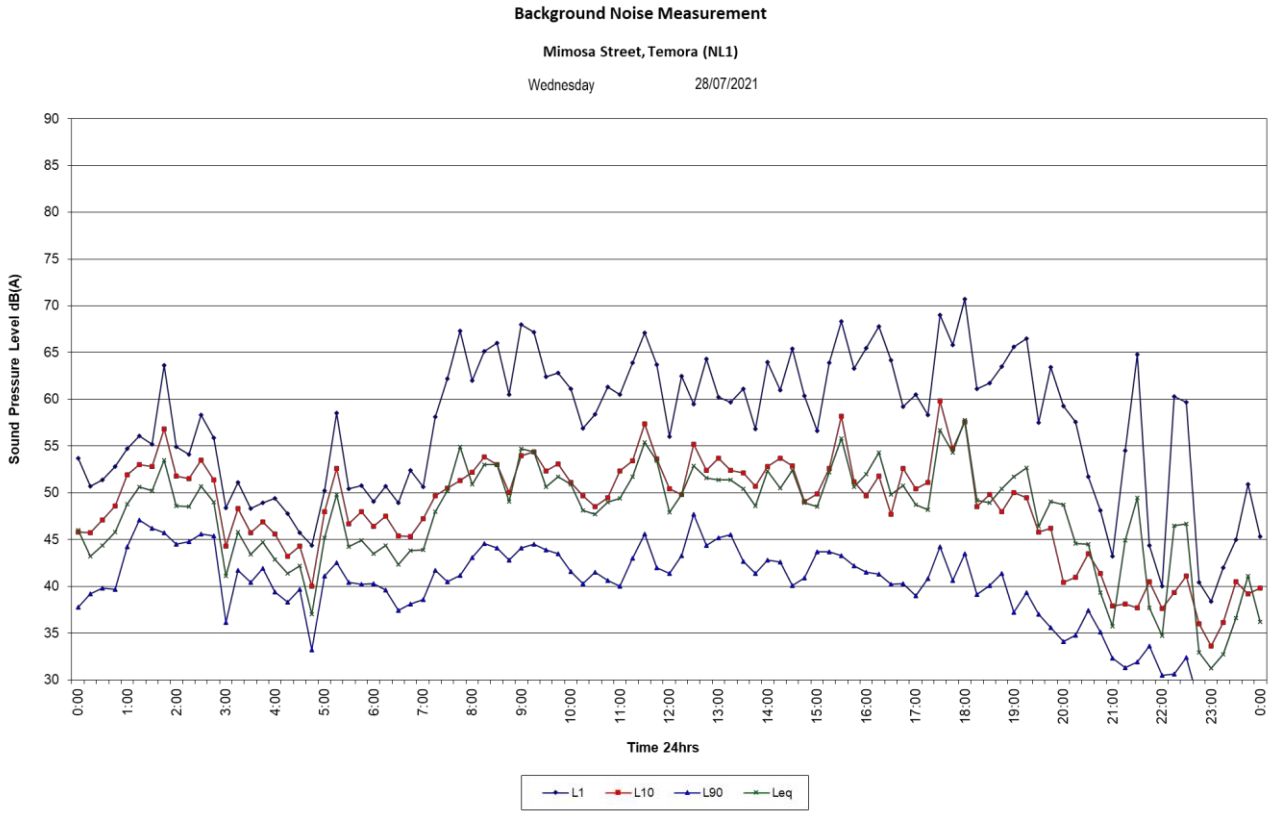
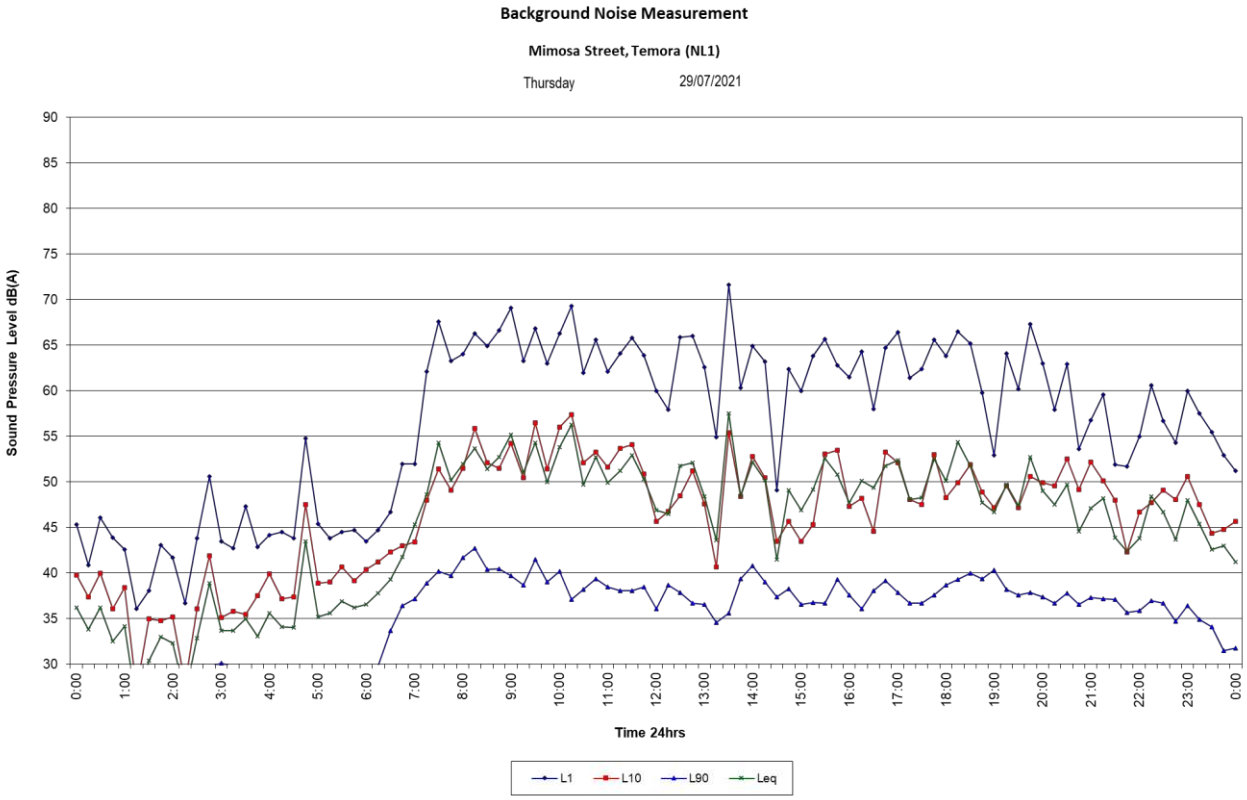
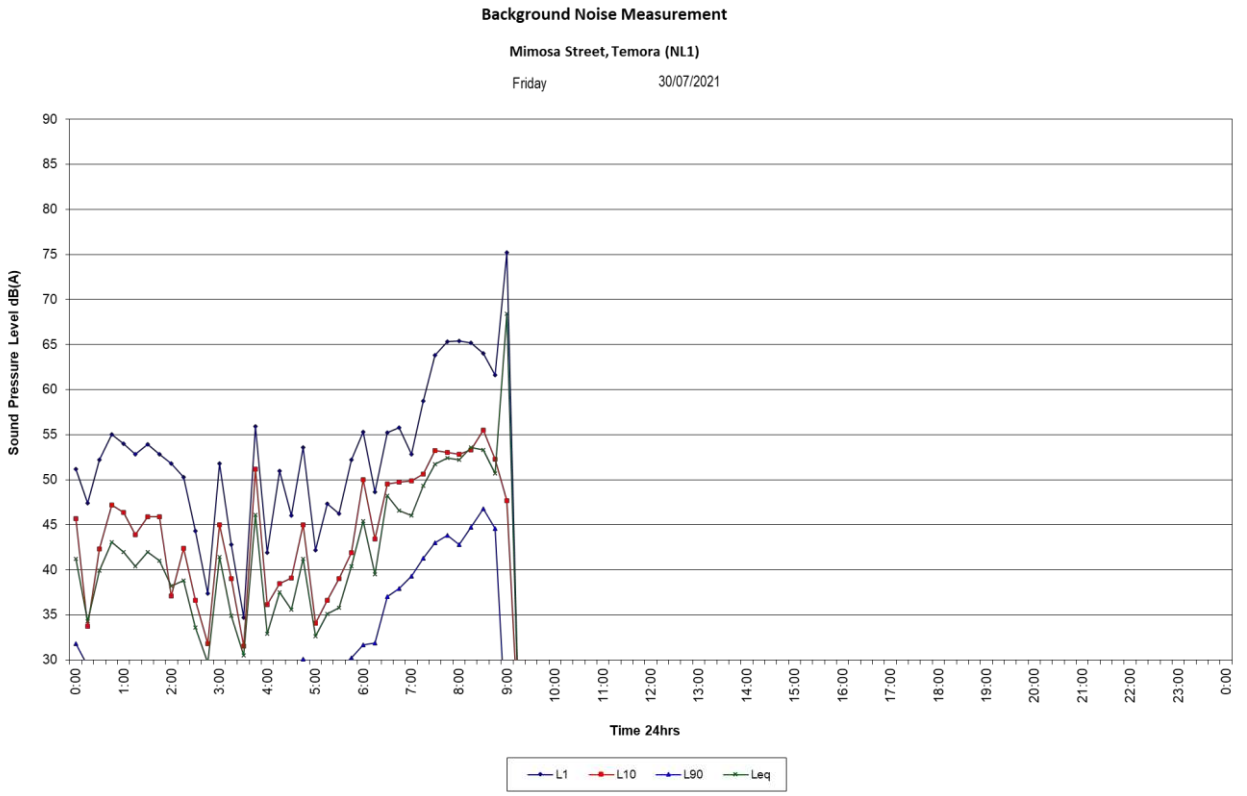
Leq


Background Noise Measurement
Mimosa Street, Temora (NL1)
Wednesday 28/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
Mimosa Street, Temora (NL1)
Thursday 29/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
Mimosa Street, Temora (NL1)
Friday 30/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
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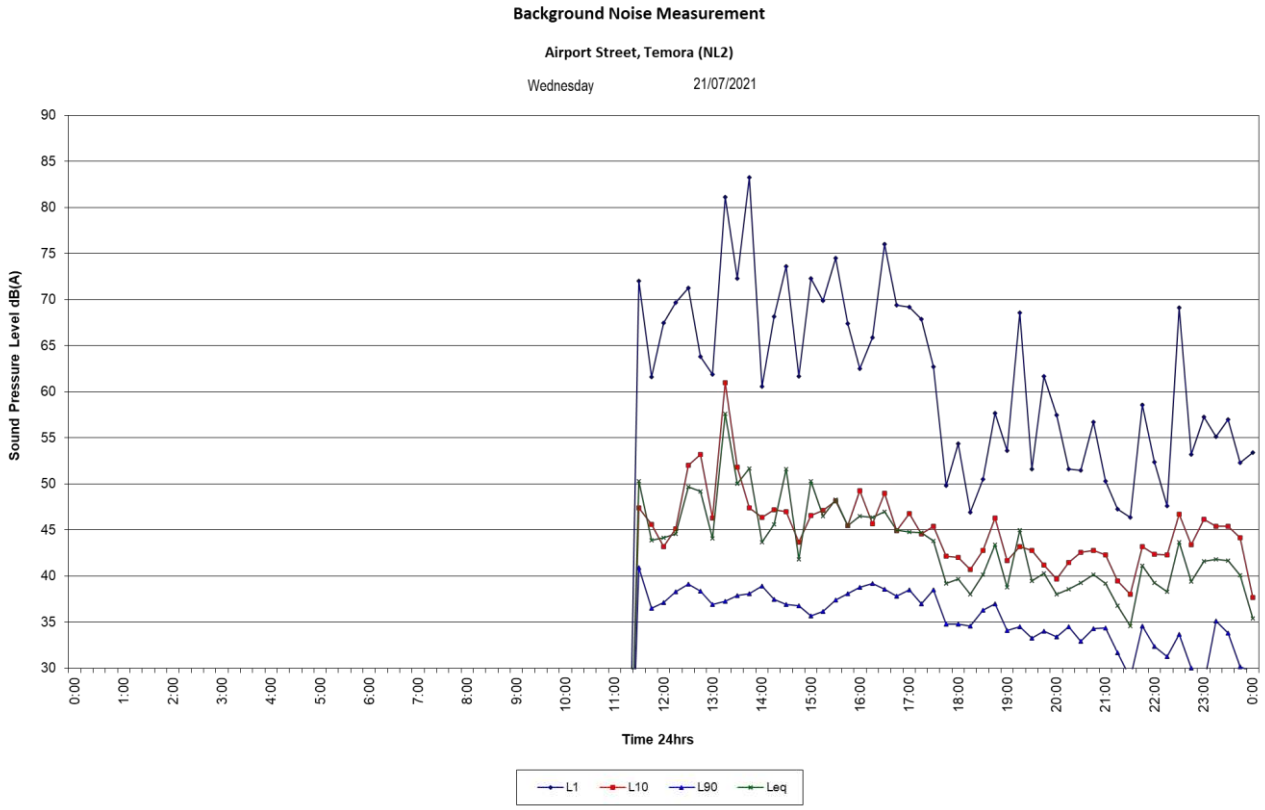
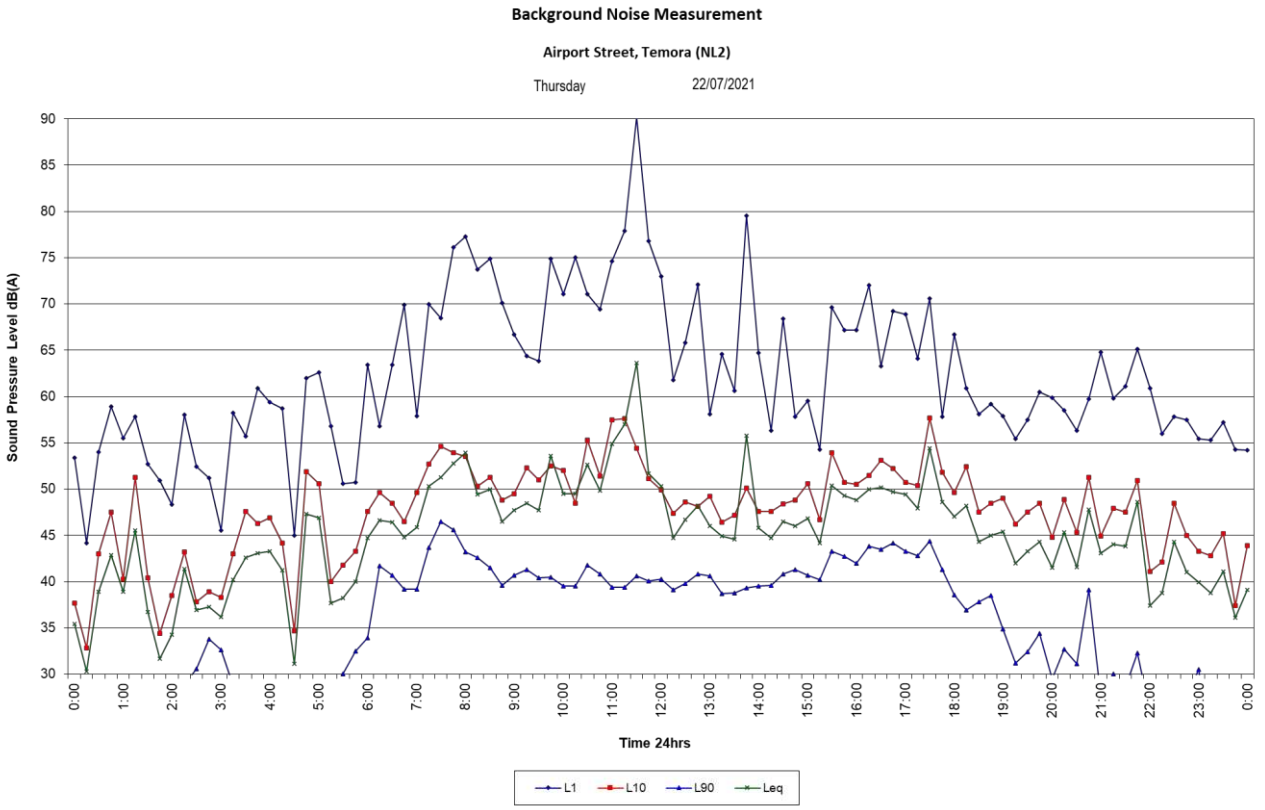
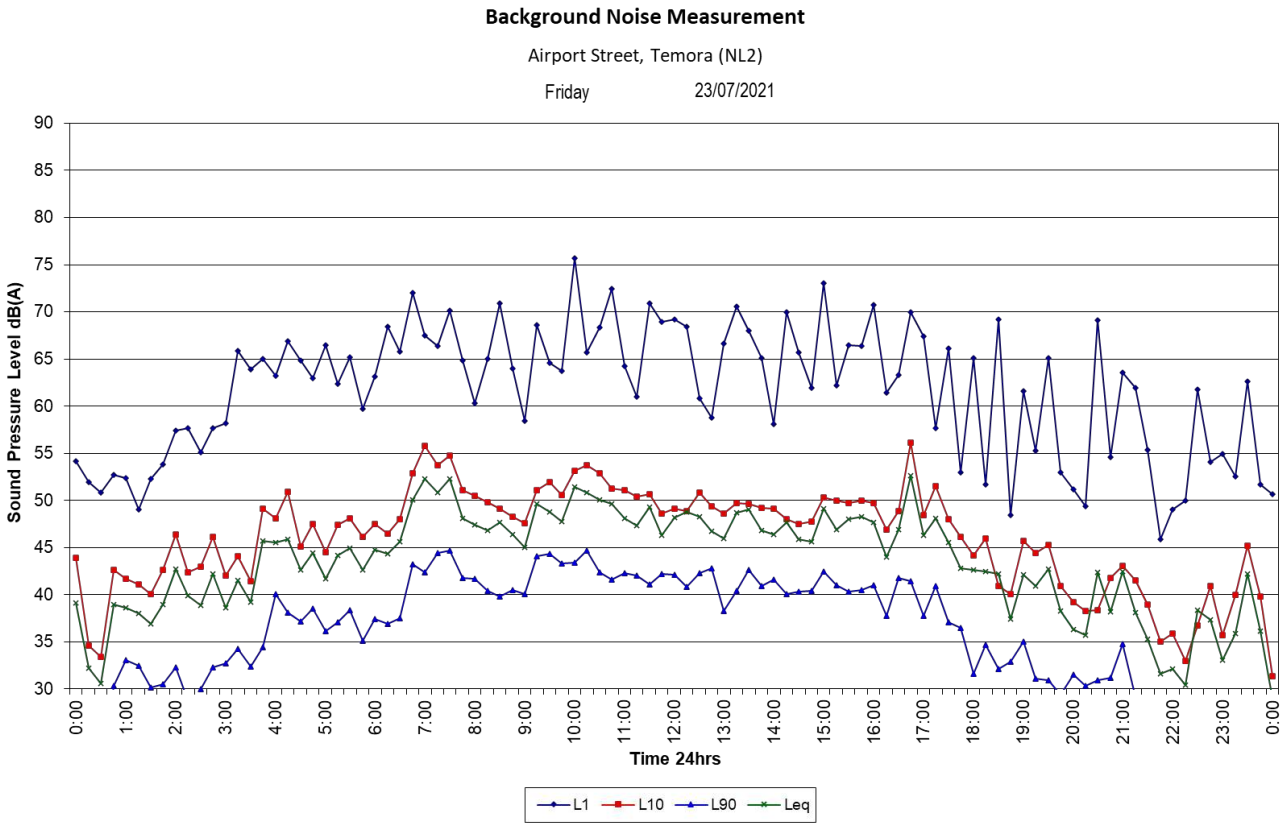
Airport Street, Temora (NL2)






Background Noise Measurement
Airport Street, Temora (NL2)
Friday 23/07/2021
Sound Pressure Level dB(A)
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Time 24hrs
L1
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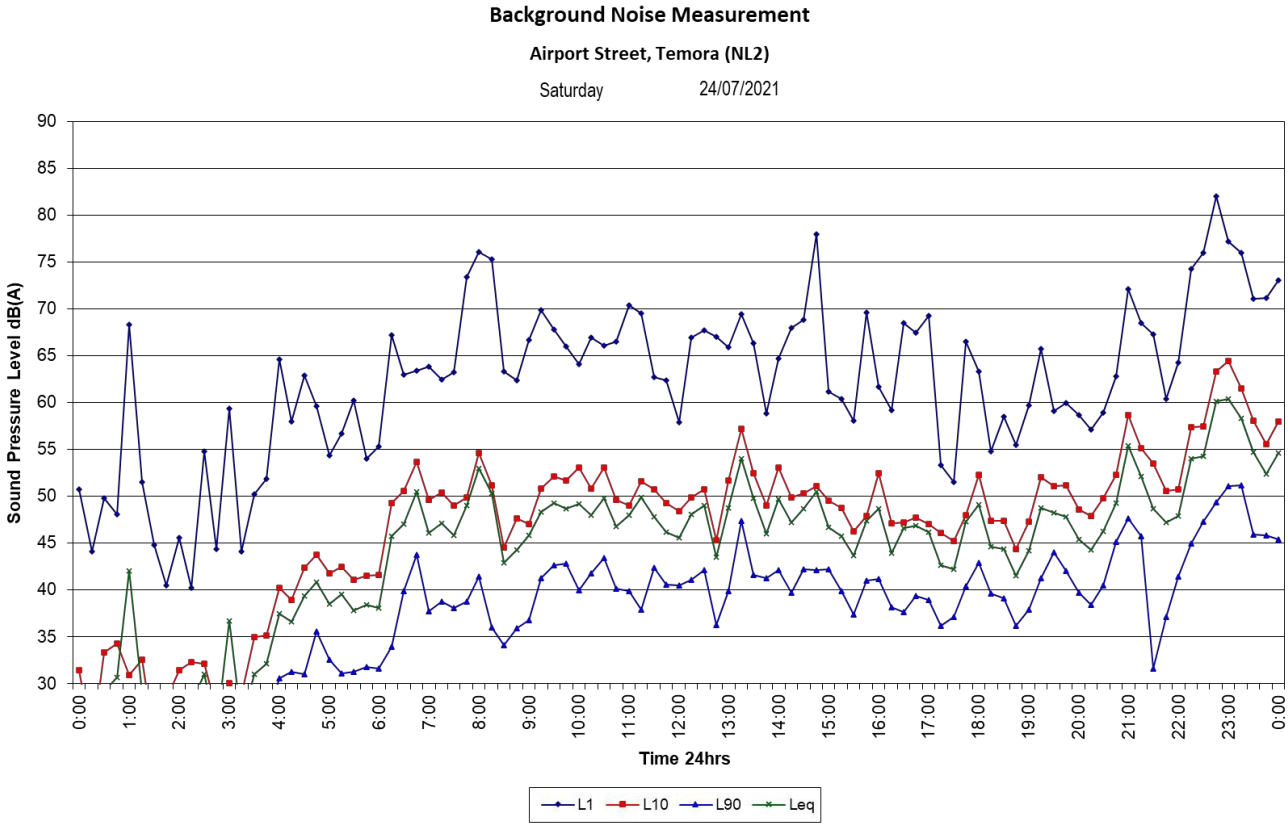
Background Noise Measurement
Airport Street, Temora (NL2)
Saturday 24/07/2021
Sound Pressure Level dB(A)
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Time 24hrs
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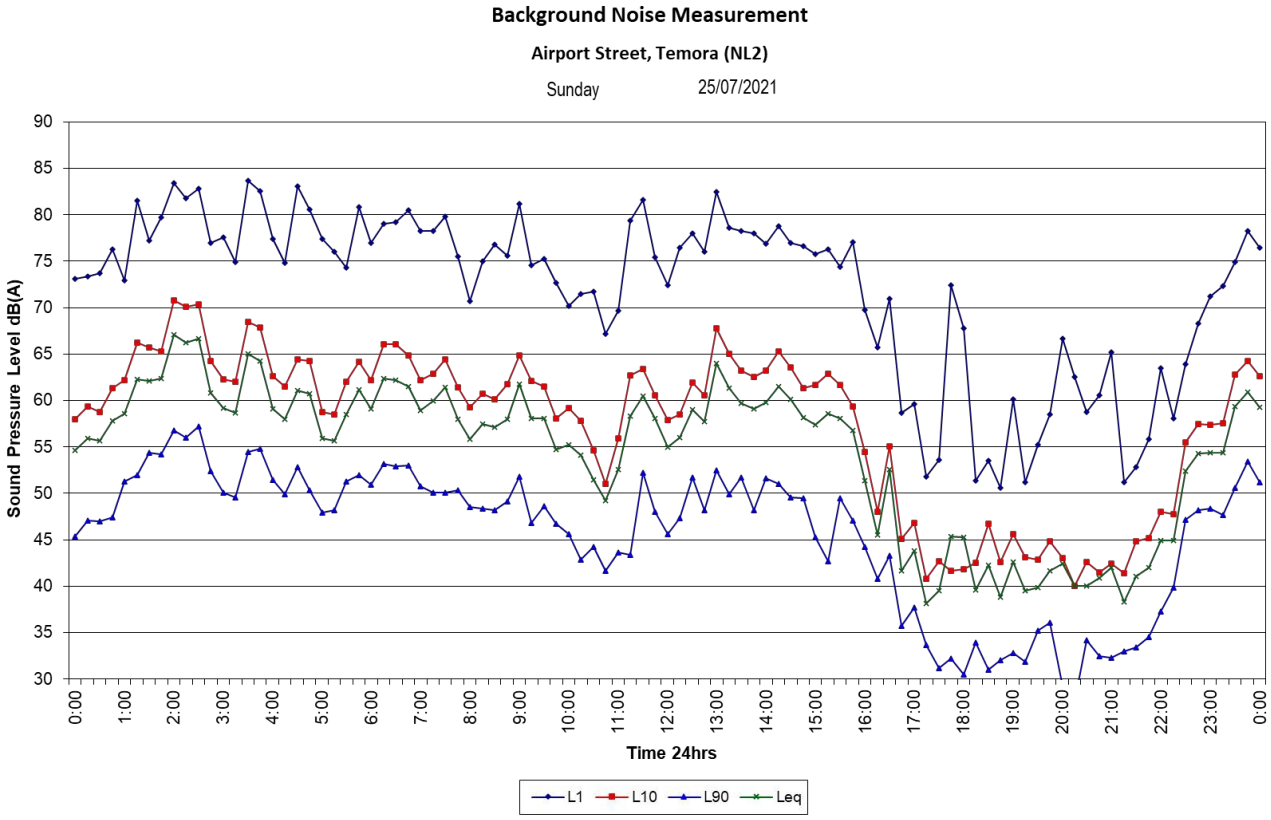
Background Noise Measurement
Airport Street, Temora (NL2)
Sunday 25/07/2021
Sound Pressure Level dB(A)
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Time 24hrs
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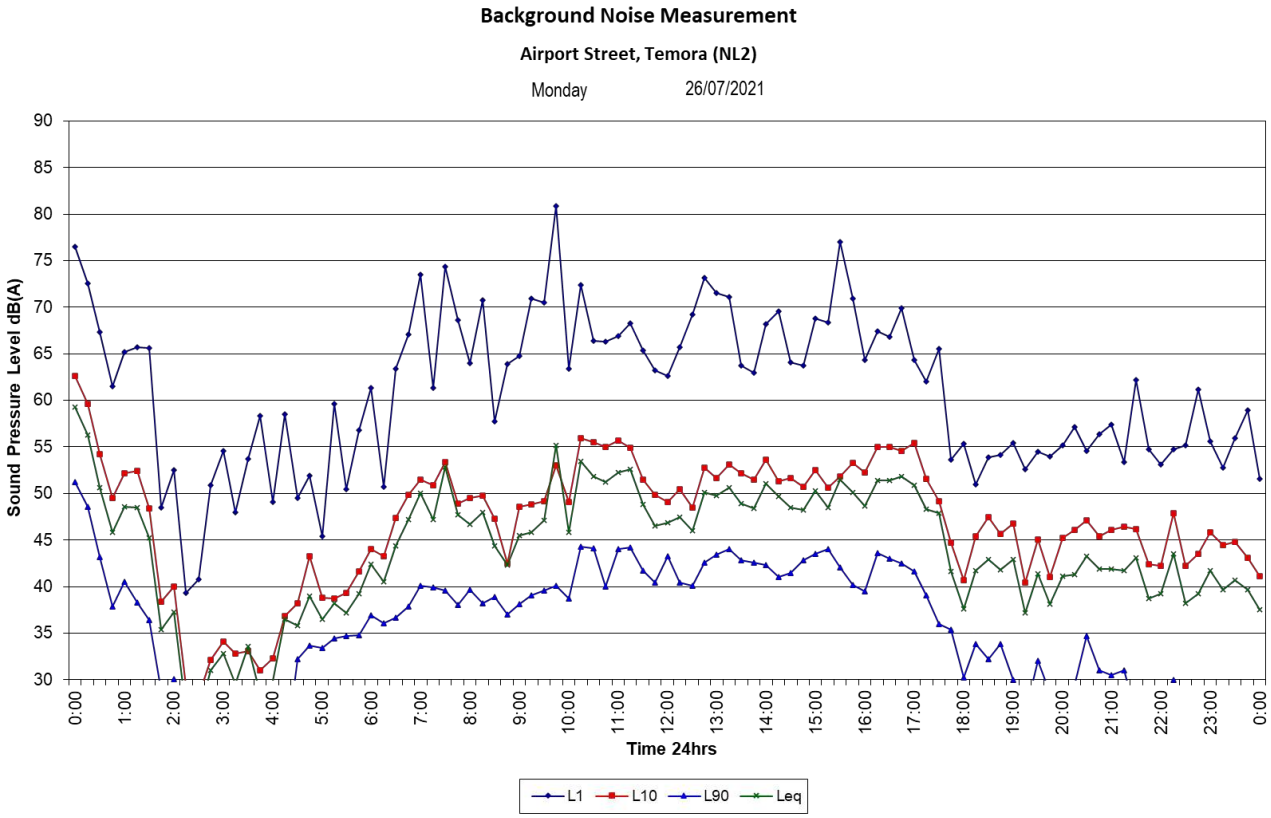
Background Noise Measurement
Airport Street, Temora (NL2)
Monday 26/07/2021
Sound Pressure Level dB(A)
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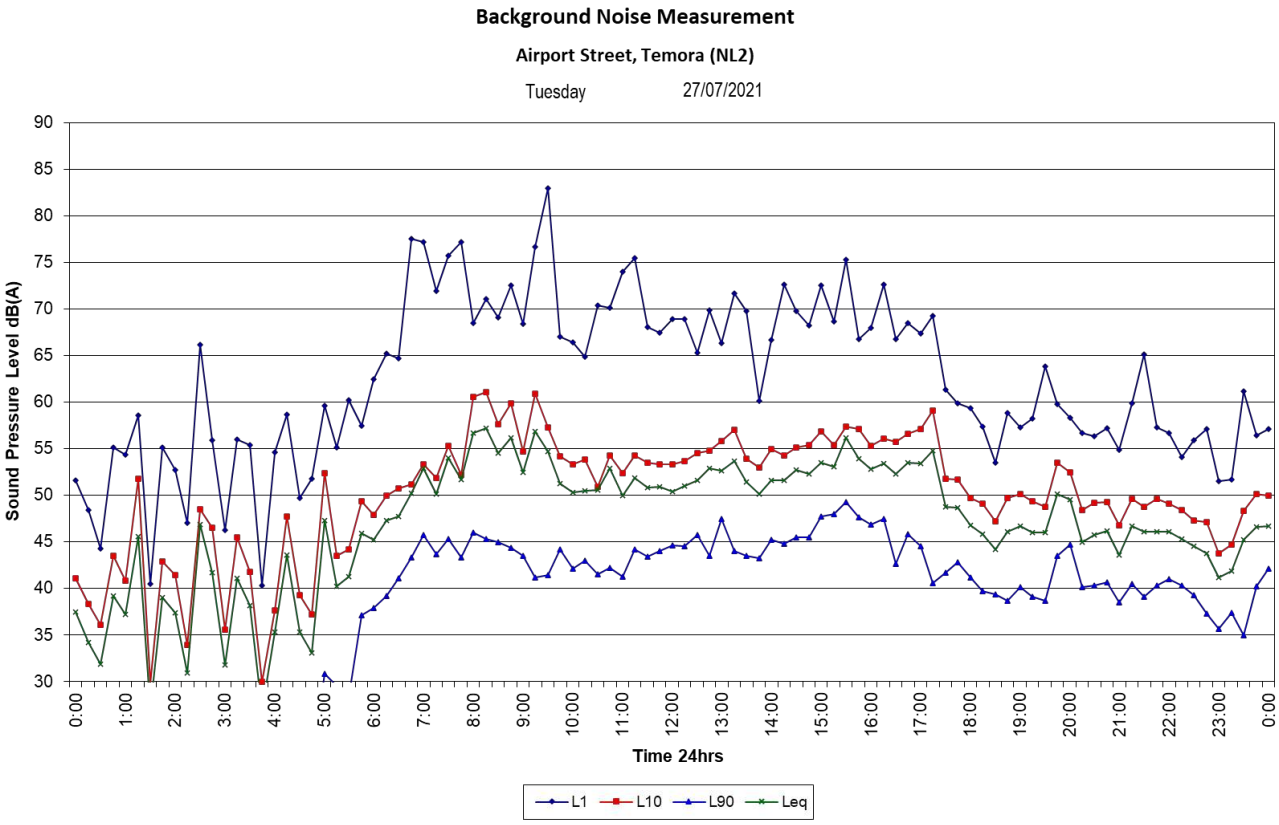
Time 24hrs
L1 L10 L90 Leq


Background Noise Measurement
Airport Street, Temora (NL2)
Tuesday 27/07/2021
Sound Pressure Level dB(A)
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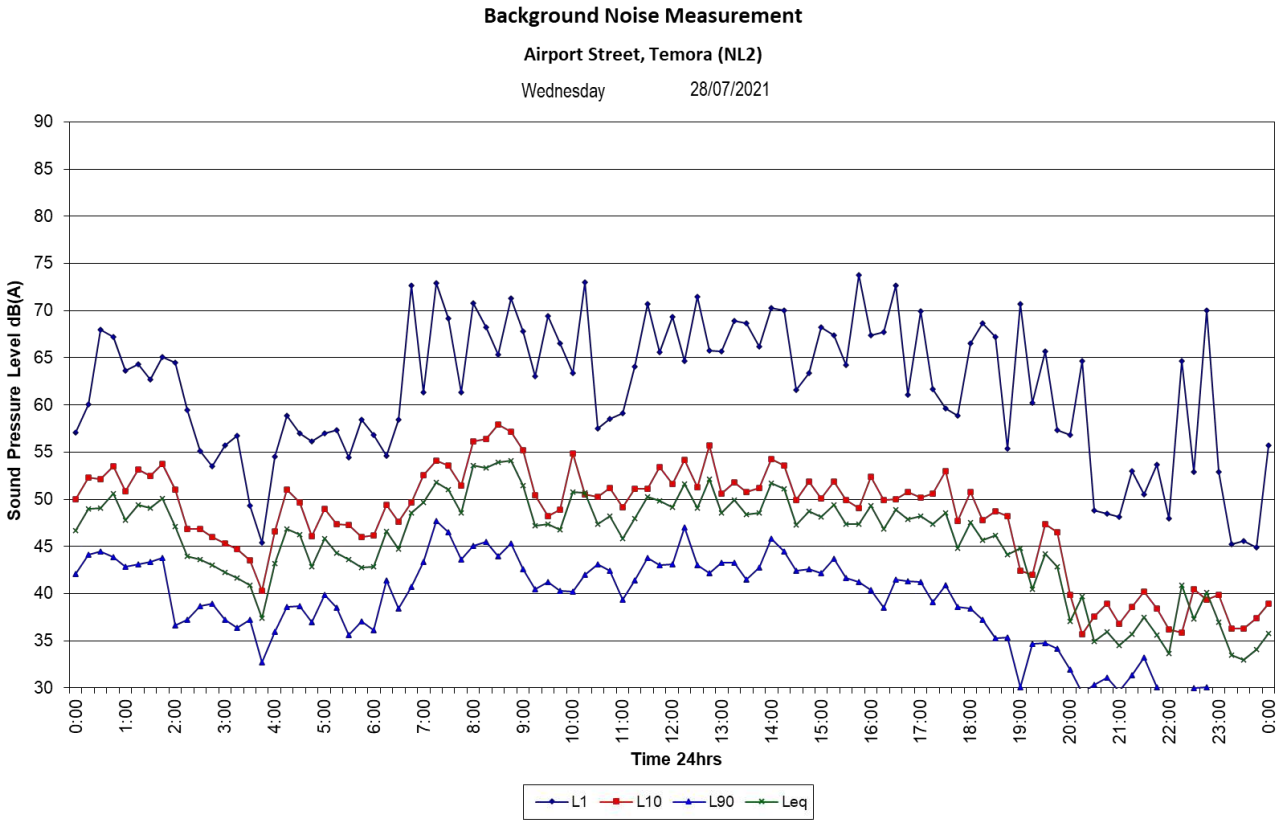
Background Noise Measurement
Airport Street, Temora (NL2)
Wednesday 28/07/2021
Sound Pressure Level dB(A)
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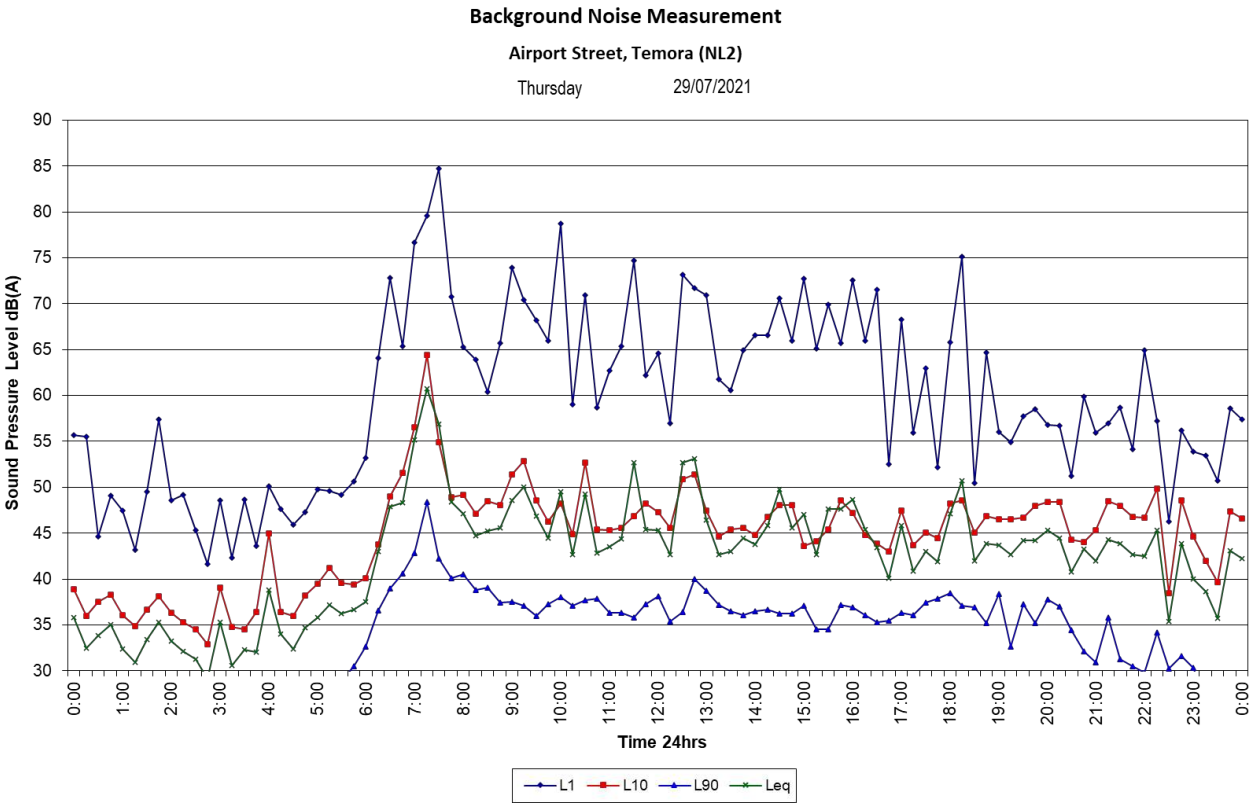
Background Noise Measurement
Airport Street, Temora (NL2)
Thursday 29/07/2021
Sound Pressure Level dB(A)
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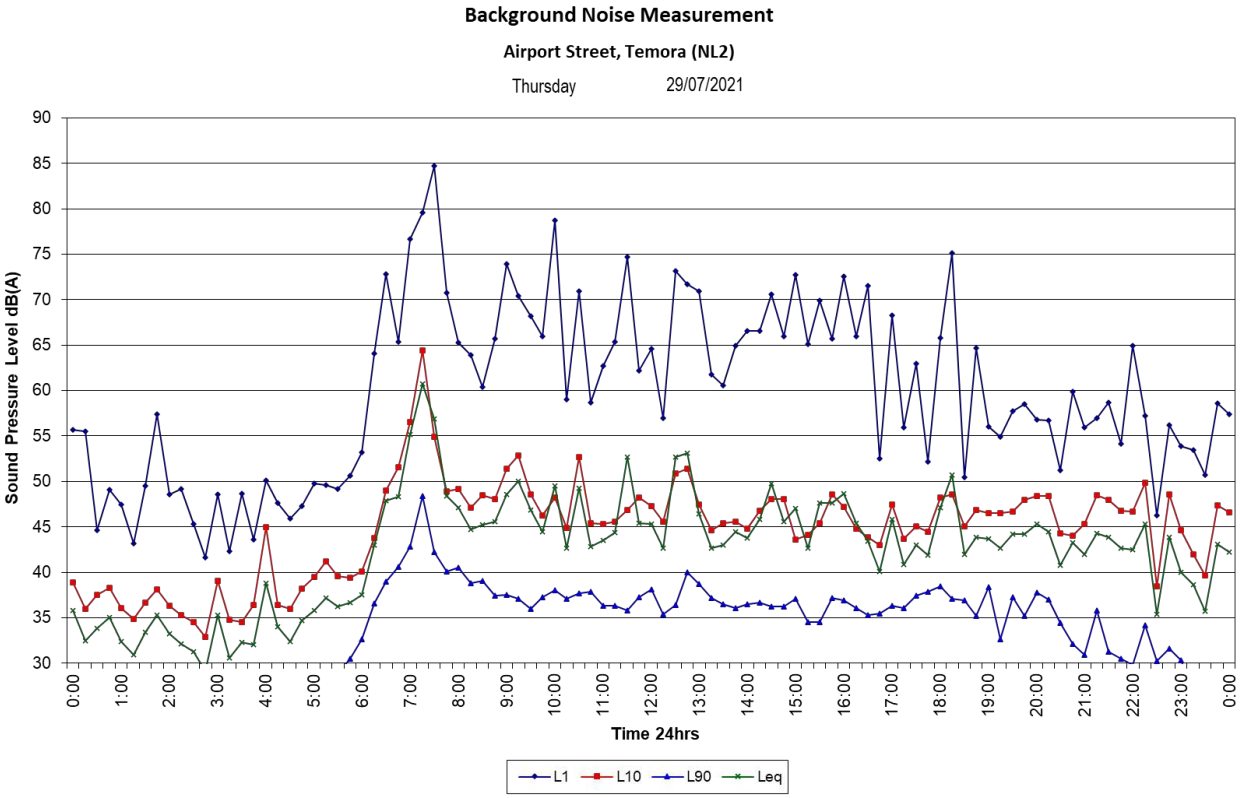
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Airport Street, Temora (NL2)
Thursday 29/07/2021
Sound Pressure Level dB(A)
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Time 24hrs
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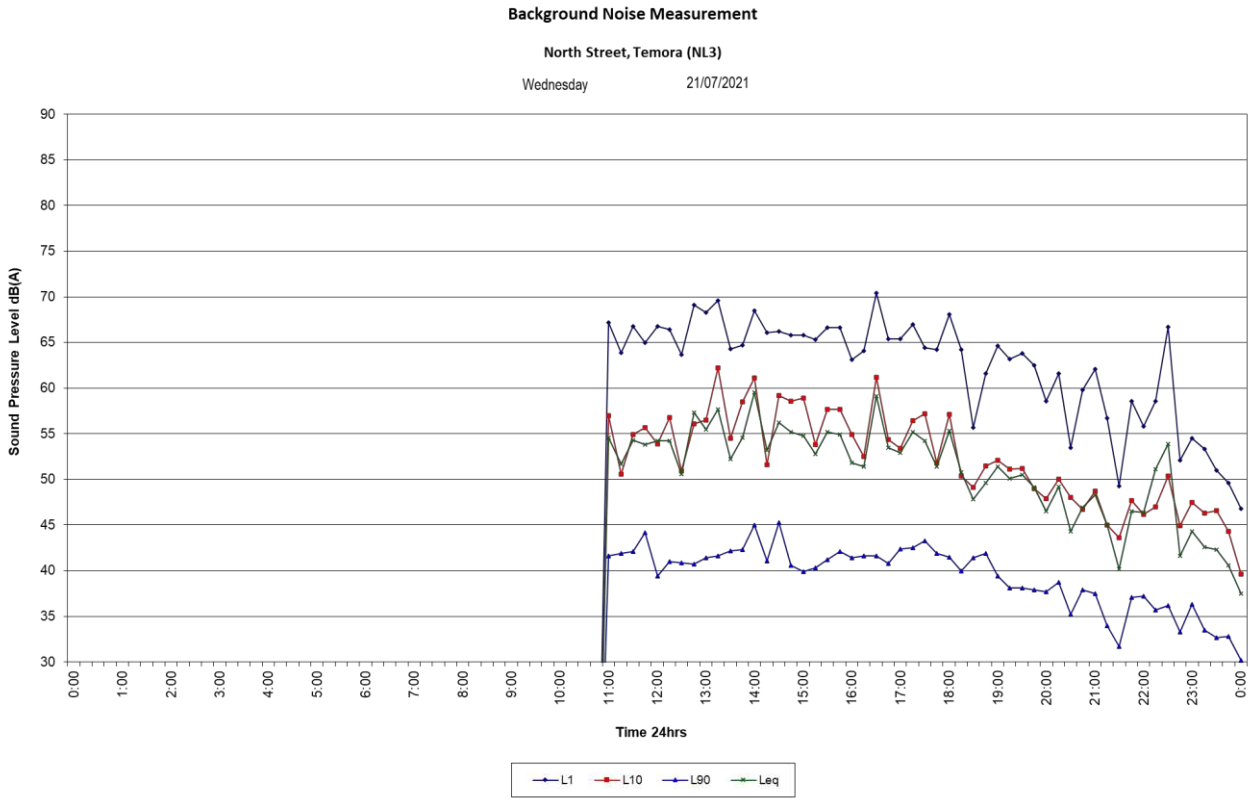
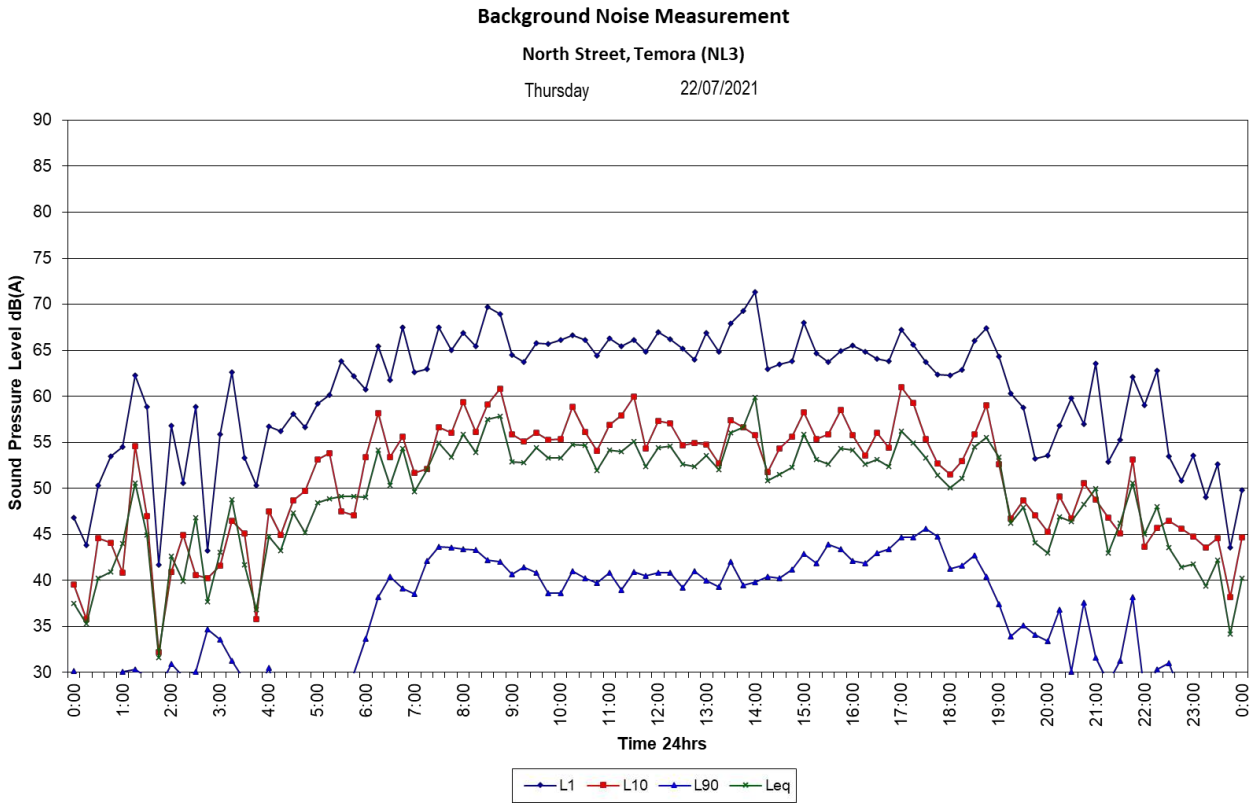
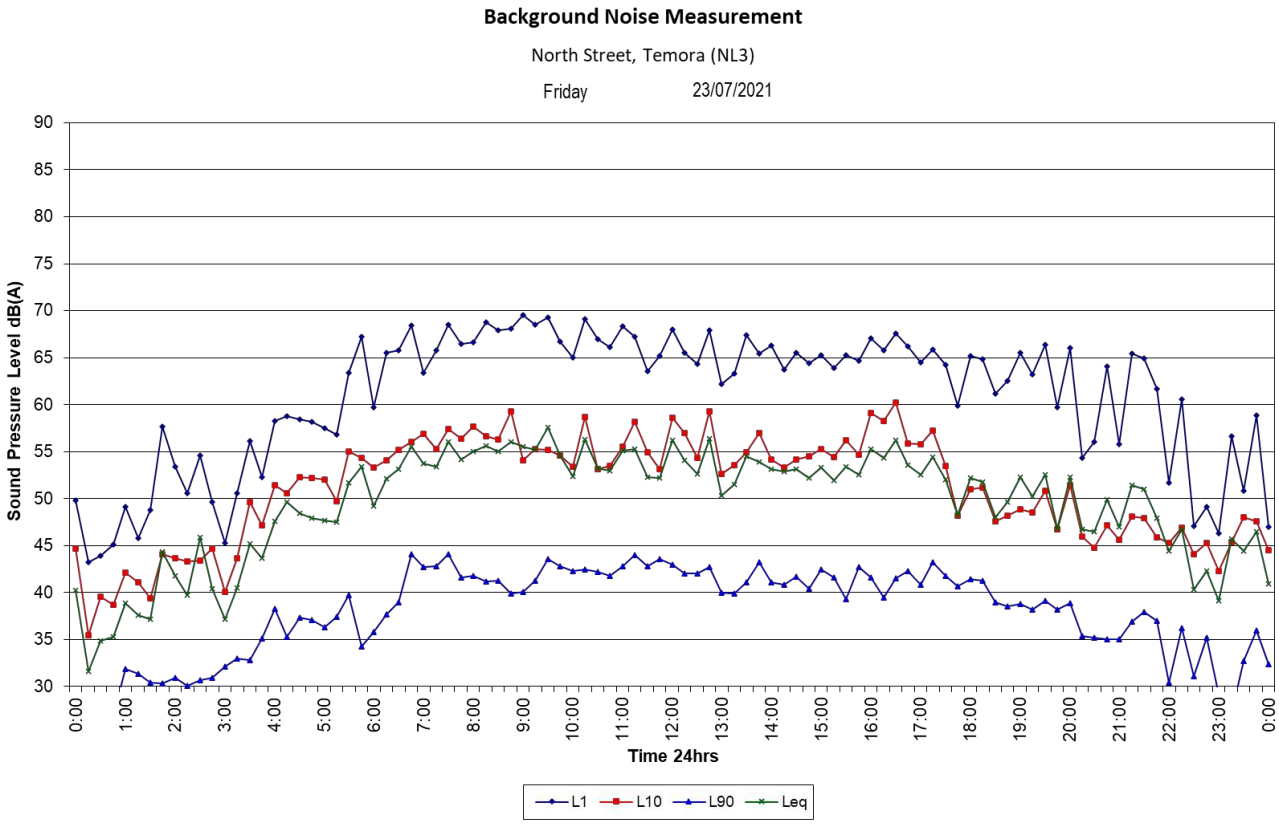
North Street, Temora (NL3)






Background Noise Measurement
North Street, Temora (NL3)
Friday 23/07/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
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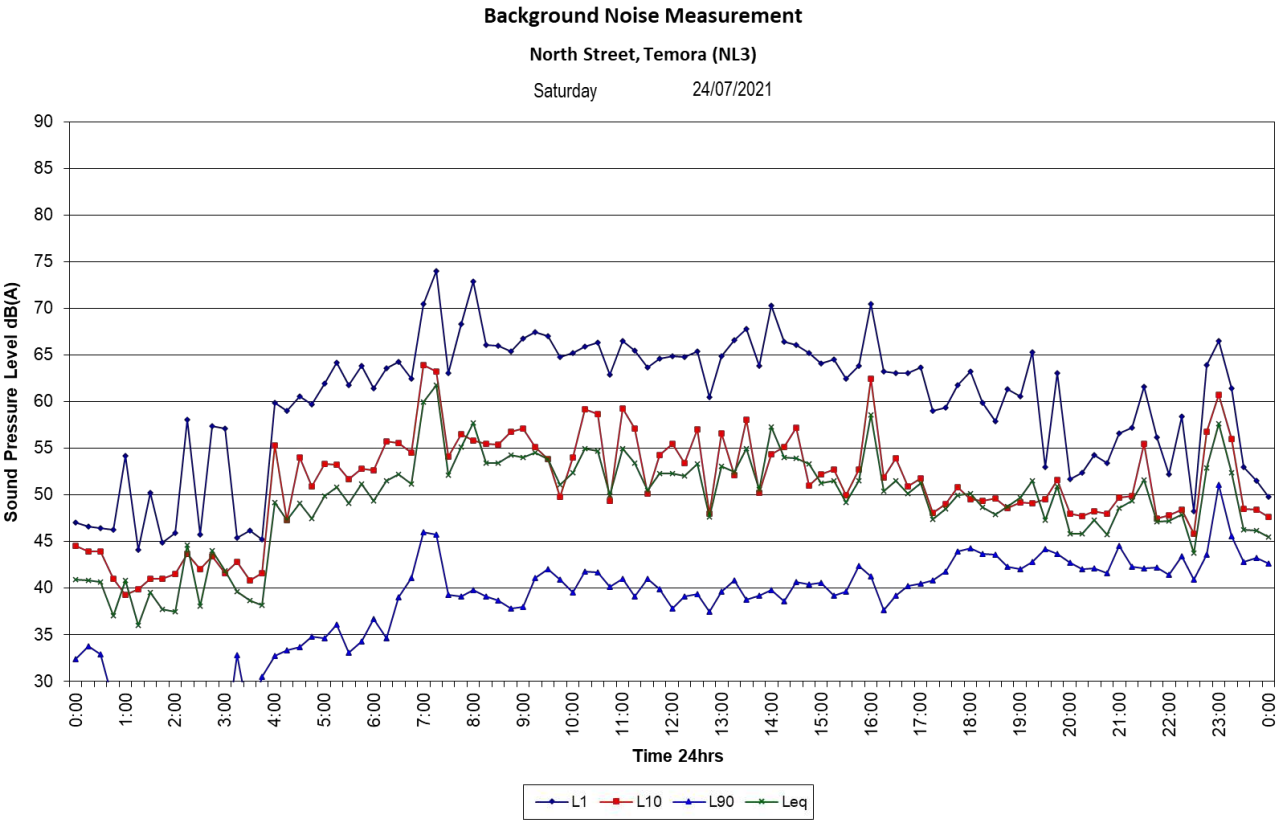
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Saturday 24/07/2021
Sound Pressure Level dB(A)
Time 24hrs
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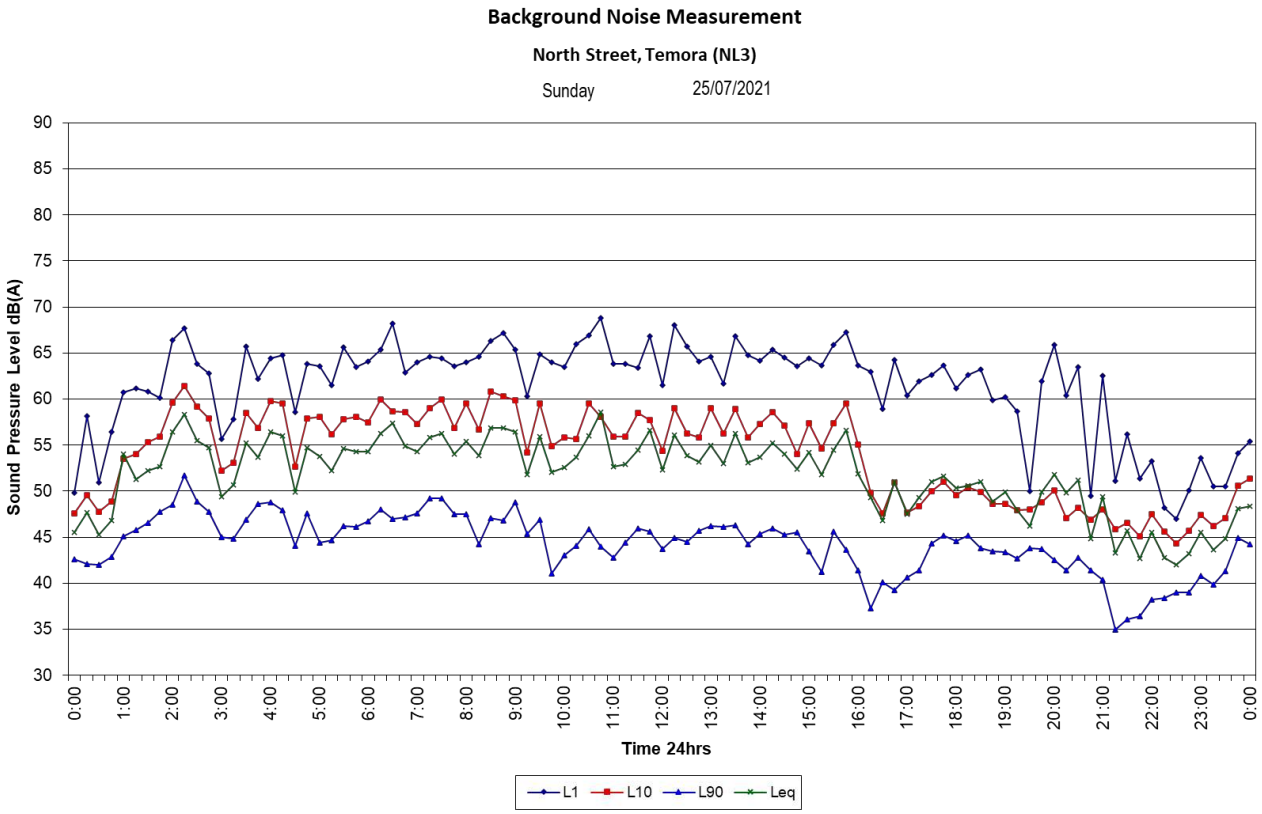
Background Noise Measurement
North Street, Temora (NL3)
Sunday 25/07/2021
Sound Pressure Level dB(A)
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Time 24hrs
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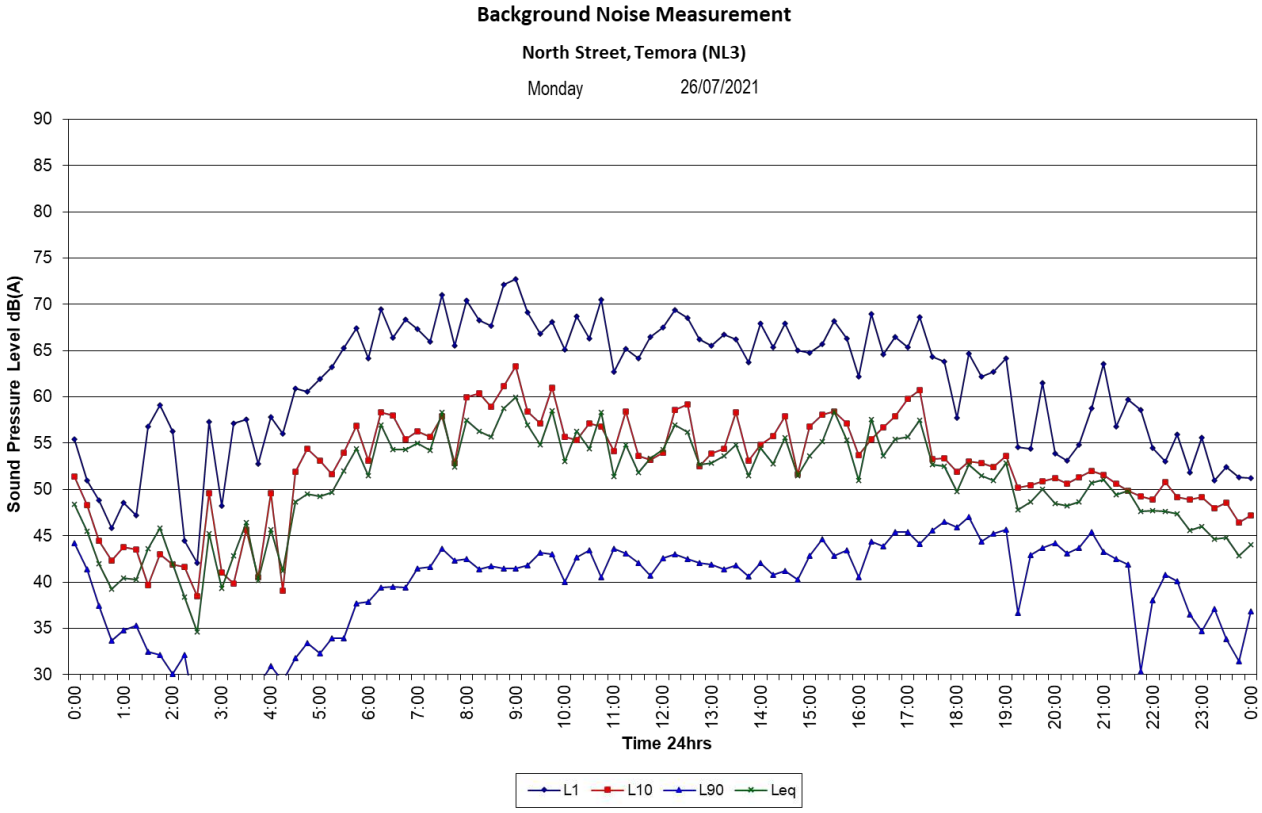
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Monday 26/07/2021
Sound Pressure Level dB(A)
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Time 24hrs
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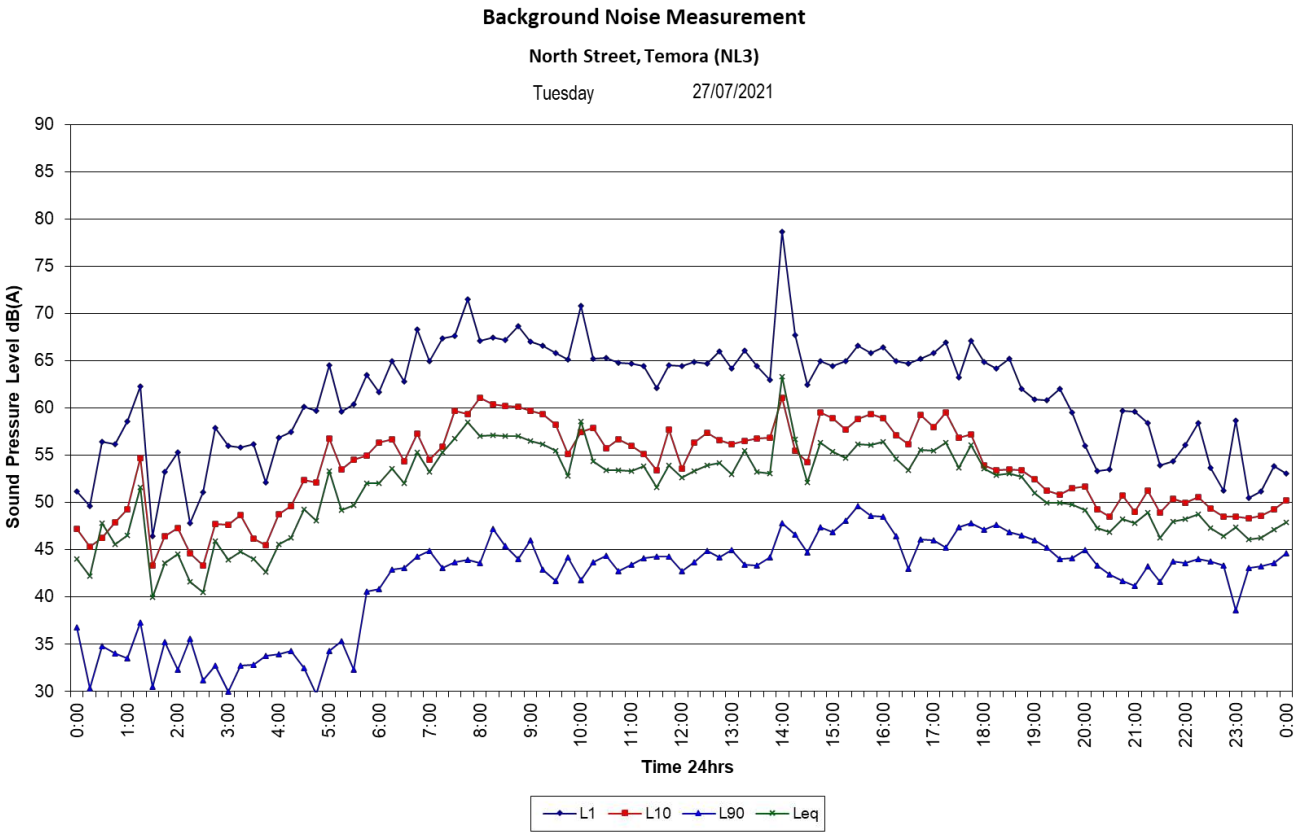
Background Noise Measurement
North Street, Temora (NL3)
Tuesday 27/07/2021
Sound Pressure Level dB(A)
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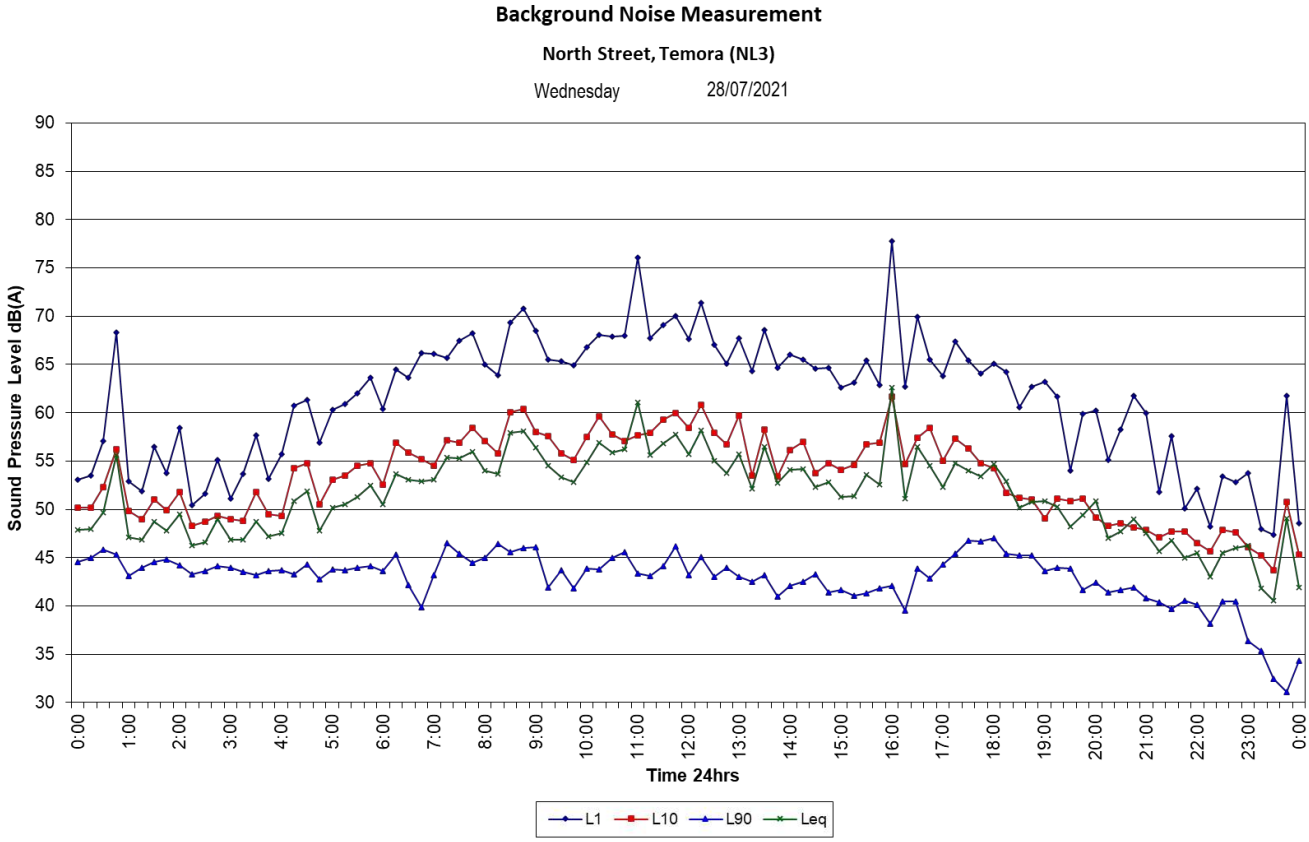
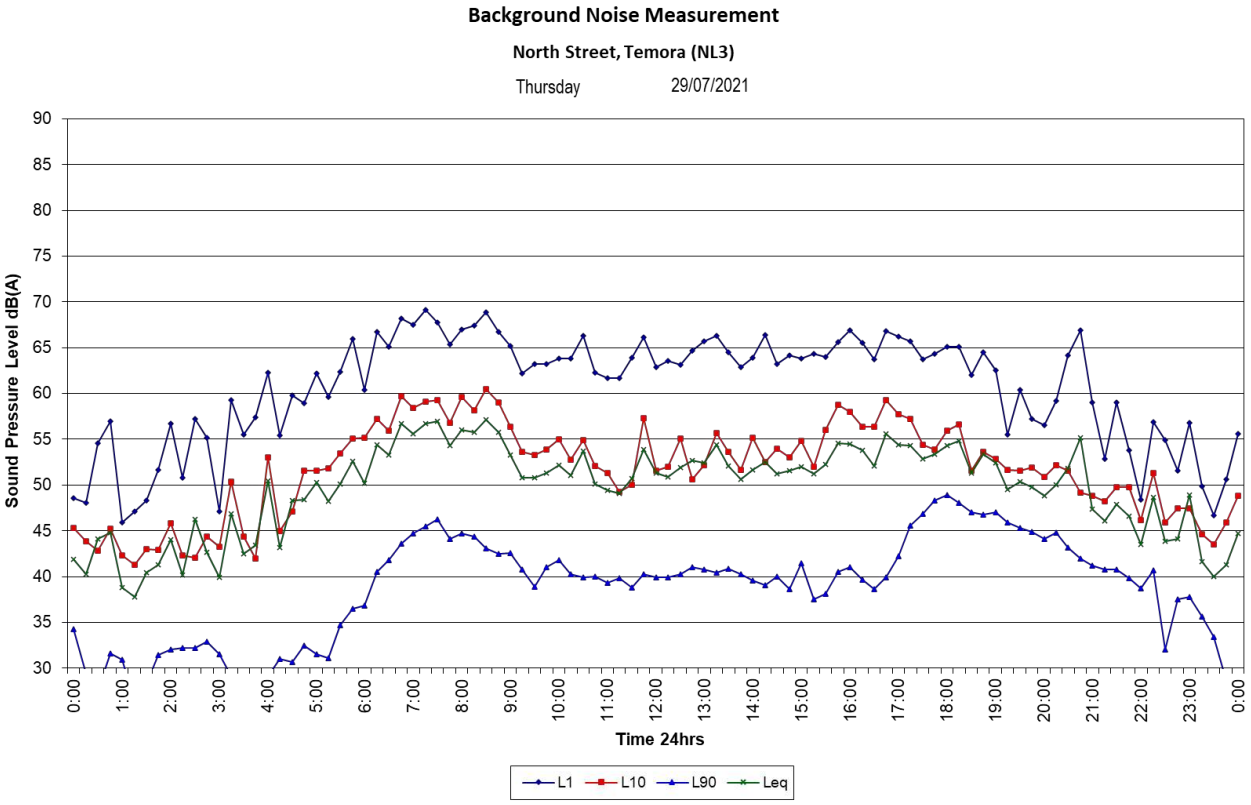
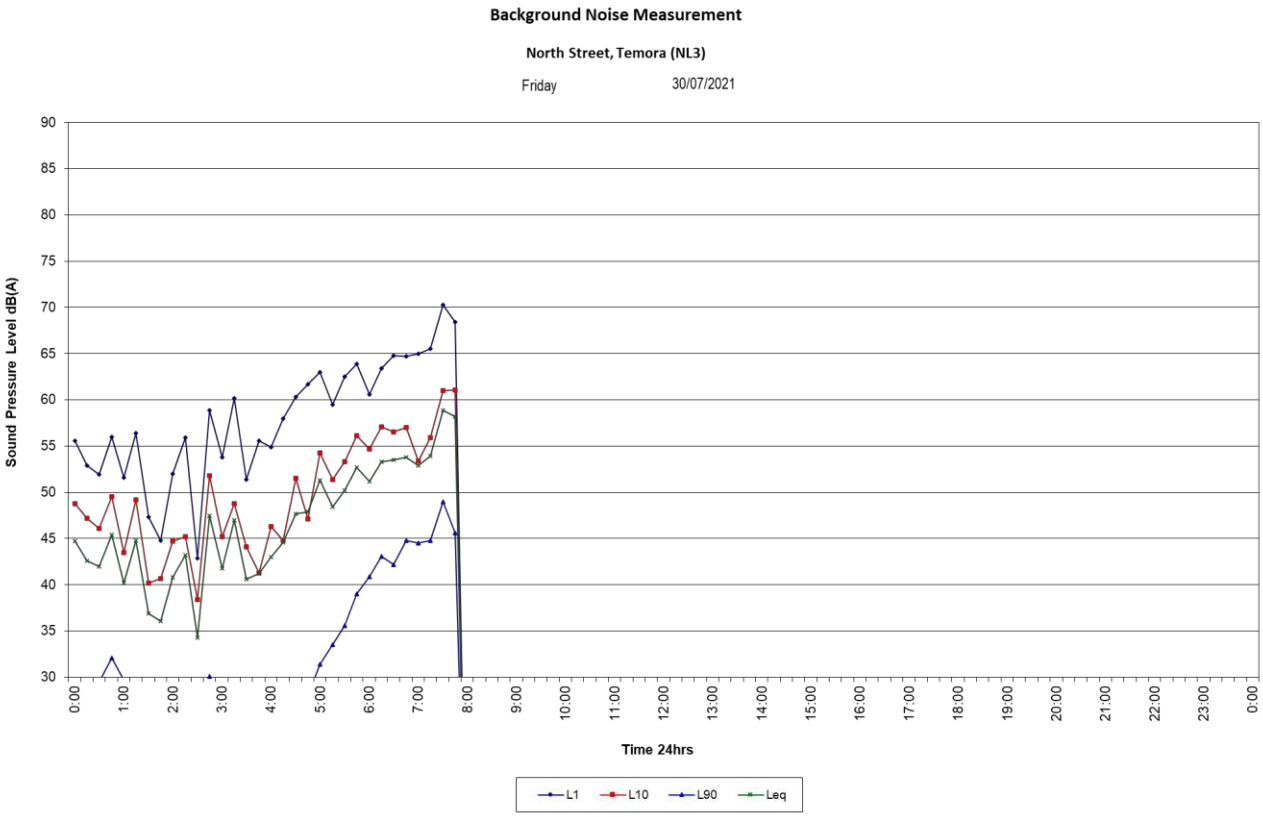
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
North Street, Temora (NL3)
Wednesday 28/07/2021
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
North Street, Temora (NL3)
Thursday 29/07/2021
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


Background Noise Measurement
North Street, Temora (NL3)
Friday 30/07/2021
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq

Appendix C – Calibration Certificate

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C20113

Client Details	Acoustic Research Labs Pty Ltd 36/14 Loyalty Rd North Rocks NSW 2151
Equipment Tested/ Model Number :	Rion NL-EX
Instrument Serial Number :	00184110
Microphone Serial Number :	173006
Pre-amplifier Serial Number :	74636

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	23.6°C	**Ambient Temperature :**	23.5°C
Relative Humidity :	51.3%	**Relative Humidity :**	52.2%
Barometric Pressure :	99.9kPa	**Barometric Pressure :**	99.9kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 5 Mar 2020
Secondary Check: Alannah Squires
Report Issue Date : 5 Mar 2020
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.2°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

PAGE 1 OF 1

Acoustic Research Labs Pty Ltd
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Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C21246

Client Details	Acoustic Research Labs Pty Ltd 36/14 Loyalty Rd North Rocks NSW 2151
Equipment Tested/ Model Number :	Rion NL-42EX
Instrument Serial Number :	00885460
Microphone Serial Number :	176935
Pre-amplifier Serial Number :	86282

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	20°C	**Ambient Temperature :**	21.7°C
Relative Humidity :	57.5%	**Relative Humidity :**	51.1%
Barometric Pressure :	101.55kPa	**Barometric Pressure :**	101.56kPa

Calibration Technician : Charlie Neil
Secondary Check: Harrison Kim
Calibration Date : 25 May 2021
Report Issue Date : 25 May 2021

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 2 requirements of IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.12dB*	*Temperature*	*±0.2°C*
1kHz	*±0.11dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.13dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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Accredited for compliance with ISO/IEC 17025 - calibration.

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PAGE 1 OF 1

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www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013

Calibration Certificate

Calibration Number C20395

Client Details	Acoustic Research Labs Pty Ltd 36/14 Loyalty Road North Rocks NSW 2151
Equipment Tested/ Model Number :	Rion Nl-42EX
Instrument Serial Number :	00810712
Microphone Serial Number :	172452
Pre-amplifier Serial Number :	10713

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	24.3°C	**Ambient Temperature :**	24.6°C
Relative Humidity :	40.2%	**Relative Humidity :**	40.5%
Barometric Pressure :	100.7kPa	**Barometric Pressure :**	100.7kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Max Moore
Calibration Date :	20 Jul 2020	**Report Issue Date :**	21 Jul 2020

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.2°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±2.4%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests	*±0.10dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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PAGE 1 OF 1