ACOUSTIC ASSESSMENT

3 Emerald Hills Boulevard, Leppington, NSW 2179
Vehicle Repair Station

Prepared for:

The Planning Hub
Suite 3.09, Level 3, 100 Collins Street
Alexandria, NSW 2015

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with The Planning Hub (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.31216-R01-v0.1	10 May 2023	Dario Barbosa	Mark Irish	

DOCUMENT REFERENCES

TABLES

FIGURES

APPENDICES

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by The Planning Hub to undertake a noise impact assessment for the anticipated use of a vehicle repair shop located at 3 Emerald Hills Boulevard, Leppington, NSW 2179.

This report summarises the potential operational noise impacts to nearby residents located to the south of the proposal. This assessment is required to permit the use of a vehicle repair station in the Camden Local Environmental Plan (EPA) 2010. It is understood that a vehicle repair station is currently prohibited in the B2 Local Centre zone.

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

1.1 Proposal Description

The proposed development includes different internal areas such as: offices, reception, storage, and a workshop with a total land area of 2,613m^2. The site is accessed via Emerald Hills Boulevard and is located within the Emerald Hills Local Centre precinct. Raby Road and Emerald Hills Boulevard intersection is located approximately 50m from the site.

Operating hours for the development would typically be 8:00 am to 5:30 pm, Monday to Friday and 8:00 am to 2:00 pm on Saturdays.

The identified sources of noise from the proposed development include:

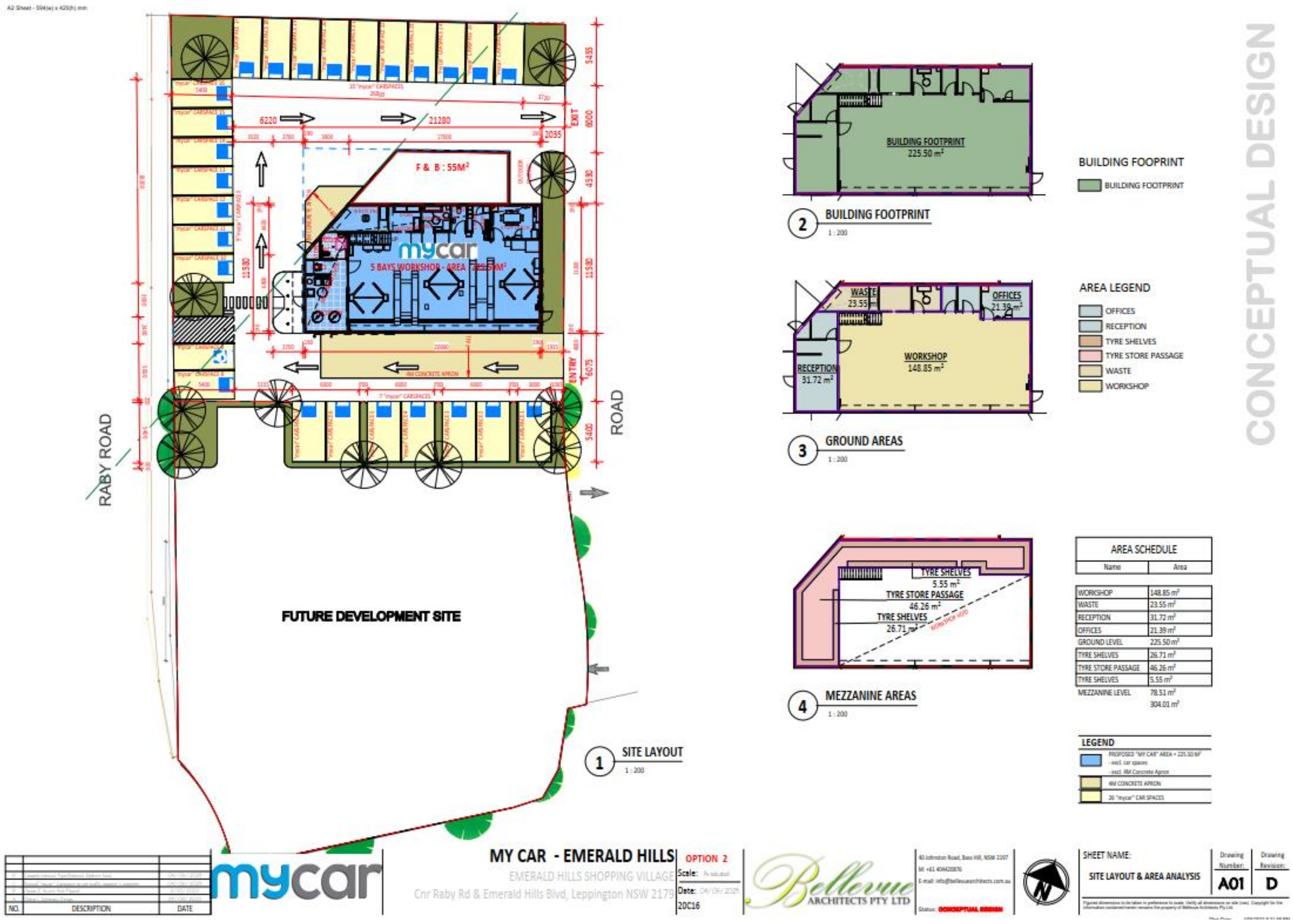
- Mechanical plant.
- Workshop area: pneumatic tools, compressors, and light vehicle car engines.
- Light vehicle movements on internal access roads.

A 26-space car park is situated around the site and the light vehicle entry/exit is situated on the eastern side of the site. Bay workshop areas face the nearest receivers to the south.

The location of the development and surrounding receivers are shown in **Figure 1** and the proposed ground floor layout is shown in **Figure 2**.

Figure 1 Site Location, Surrounding Receivers and Noise Monitoring Locations

Figure 2 Proposed Development



1.2 Nearest Receivers

The nearest sensitive receivers are residential properties to the south. The nearest commercial receiver is located to the immediate north. The nearest receivers are shown in **Figure 1** and detailed in **Table 1**.

Table 1 Surrounding Sensitive Receivers

ID	Address	Type	Distance (m)	Direction
R01	17 Coral Circuit	Residential	50	South
R02	21 Coral Circuit	Residential	40	South
R03	23 Coral Circuit	Residential	40	South
R04	19 Coral Circuit	Commercial	50	South
R05	5 Emerald Hills Boulevard	Commercial	20	North

2 Existing Noise Environment

Unattended noise monitoring was completed at the site from 29 March to 7 April 2023. The measured noise levels have been used to determine the existing noise environment and to set the criteria used to assess the potential impacts on nearby residents.

The monitoring equipment was positioned to measure existing noise levels that are representative of receivers potentially most affected by the use of the Vehicle Repair Station, within constraints such as accessibility, security and landowner permission.

The noise monitoring equipment continuously measured existing noise levels in 15-minute periods during the daytime, evening and night-time. All equipment carried current National Association of Testing Authorities (NATA) or manufacturer calibration certificates and equipment calibration was confirmed before and after each measurement.

The measured data has been processed to exclude noise from extraneous events and periods affected by adverse weather conditions, such as strong wind or rain (measured at BOM Camden airport AWS Station), to establish representative existing noise levels in the study area.

The noise monitoring locations are shown in **Figure 1** and the results are summarised in **Table 2**. Details of the unattended monitoring together with graphs of the measured daily noise levels are provided in **Appendix B**.

Table 2 Summary of Unattended Noise Monitoring Results

ID	Address	Measured Noise Levels (dBA)					
		Background Noise (RBL)			Average Noise (L_{Aeq})		
		Day	Evening	Night	Day	Evening	Night
L01	3 Emerald Hills Blvd, Leppington	49	52	41	60	58	54

Note 1: The assessment periods are the daytime which is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sundays and public holidays, the evening which is 6 pm to 10 pm, and the night-time which is 10 pm to 7 am on Monday to Saturday and 10 pm to 8 am on Sunday and public holidays. See the NSW EPA *Noise Policy for Industry*.

Three short-term attended noise measurements were also completed; two attended noise measurements were taken adjacent to the proposal at 3 Emerald Hills Boulevard and one at the nearest residential receiver to the south. The attended measurements allow the contributions of the various noise sources at each location to be determined. Detailed observations from the attended measurements are provided in **Appendix C**. The attended measurements results were found to be consistent across the three locations.

3 Assessment Criteria

3.1 Noise Policy for Industry

The NSW *Noise Policy for Industry* (NPfI) was released in 2017 and sets out the requirements for the assessment and management of operational noise from industry in NSW.

3.1.1 Industrial Noise Trigger Levels

The NPfI defines how to determine 'trigger levels' for noise emissions from industrial developments. Where a development is likely to exceed the trigger levels at existing noise sensitive receivers, feasible and reasonable noise management measures are required to be considered to reduce the impacts.

There are two types of trigger levels – one to account for 'intrusive' noise impacts and one to protect the 'amenity' of particular land uses:

- The **intrusiveness** of an industrial noise source is generally considered acceptable if the L_{Aeq} noise level of the source, measured over a period of 15-minutes, does not exceed the representative background noise level by more than 5 dB. Intrusive noise levels are only applied to residential receivers. For other receiver types, only the amenity levels apply.
- To limit continual increases in noise levels from the use of the intrusiveness level alone, the ambient noise level within an area from all industrial sources should remain below the recommended **amenity** levels specified in the NPfI for that particular land use.

Intrusive and amenity noise levels are not used directly as regulatory limits. They are used to assess the potential impact of noise, assess feasible and reasonable mitigation options, and subsequently determine achievable noise requirements.

The NPfI provides guidance on assigning residential receiver amenity noise categories based on the site-specific features shown in **Table 3**.

Table 3 Residential Receiver Amenity

Receiver Category	Typical Planning Land Use Zoning	Typical Existing Background Noise Levels (RBL)	Description
Rural	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime <40 dBA Evening <35 dBA Night <30 dBA	**Rural** – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.

Receiver Category	Typical Planning Land Use Zoning	Typical Existing Background Noise Levels (RBL)	Description
Suburban residential	RU5 – village RU6 – transition R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Daytime <45 dBA Evening <40 dBA Night <35dBA	**Suburban** – an area 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.
Urban residential	R1 – general residential R4 – high density residential B1 – neighbourhood centre (boarding houses and shop-top housing) B2 – local centre (boarding houses) B4 – mixed use	Daytime >45 dBA Evening >40 dBA Night >35 dBA	**Urban** – an area with an acoustical environment that: • Is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources • Has through-traffic with characteristically heavy and continuous traffic flows during peak periods • Is near commercial districts or industrial districts • Has any combination of the above.

Amenity noise categories have been determined for the surrounding receivers with reference to the NPFI. The assessment is shown in **Table 4**.

Table 4 Residential Receiver Amenity Category Assessment

Land Use Zoning	Existing Background Noise Levels RBL (dBA)			Resulting Amenity Classification	Discussion
	Day	Eve	Night		
R3 – medium density residential	49	52	41	Urban	The area is zoned as R3 – medium density residential, however, residences have been classified as urban due to high existing background noise levels that are dominated by mechanical plant from the shopping centre.

3.1.2 Project Noise Trigger Levels

The trigger levels for industrial noise from the proposed development are summarised in **Table 5**. The Project Noise Trigger Levels (PNTL) are the most stringent of the intrusiveness and amenity trigger level for each period and are highlighted below.

Table 5 Project Noise Trigger Levels

Receiver Location/ Type	Period	Amenity Noise Level LAeq (dBA)	Measured Noise Level (dBA)		Project Noise Trigger Levels LAeq(15minute) (dBA)	
			RBL[1]	LAeq	Intrusiveness	Amenity[2]
Residential	Day	60	49	60	**54**	58
	Evening	50	49 (52 actual)[3]	58	54	**48**
	Night	45	41	54	46	**43**
Commercial	When in use	65	-		-	63

Note 1: RBL = Rating Background Level.

Note 2: The project amenity noise levels have been converted to a 15-minute level by adding 3 dB, as outlined in the NPfI.

Note 3: RBL reduced to match the daytime RBL, as outlined in the NPfI.

3.2 Off-site Traffic on Surrounding Roads

The potential impacts from project related traffic on the surrounding public roads are assessed using the NSW *Road Noise Policy* (RNP).

An initial screening test is first applied to evaluate if existing road traffic noise levels are expected to increase by more than 2.0 dB. Where this is considered likely, further assessment is required using the RNP criteria shown in **Table 6**.

Table 6 RNP/NCG Criteria for Assessing Traffic on Surrounding Public Roads

Road Category	Type of Project/Land Use	Assessment Criteria (dBA)	
		Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Freeway/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) 60 (external)	LAeq(9hour) 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq(1hour) 55 (external)	LAeq(1hour) 50 (external)

4 Methodology

The potential operational noise levels from the proposal have been predicted to the surrounding receivers using ISO 9613-2 industrial noise algorithms as implemented in iNoise V2022.1 modelling package. The model includes ground topography, ground type (0.5 for residential areas), buildings and representative worst-case noise sources from the proposal.

The potential impacts have been determined by comparing the predicted worst-case noise levels to the NPfI Project Noise Trigger Levels in a 15-minute assessment period.

4.1 Operational Noise Sources

A summary of the expected noise sources and worst-case assessment scenarios associated with the operation of the development is provided below.

4.1.1 On-Site Traffic

On-site vehicles have been modelled using the data shown in **Table 7**. The traffic volumes are representative of the worst-case 15-minute periods for the daytime. Traffic and parking impact assessment report *REF:23-034* prepared by *Stanbury Traffic Planning* (issued May 2023) indicates that the proposed development will generate up to 15 peak hour vehicle movements. The volumes are representative of the worst-case 15-minute assessment period.

Table 7 Vehicle Traffic Data – Worst-case 15-Minute Period

Vehicle Type	Location	Sound Power Level (dBA)	Vehicle Speed (km/h)	Number of Vehicles in Worst-case 15-minute Period Daytime (7am to 6pm)
Light vehicles	Car park	96[1]	20	4 (15 vehicles in one hour)

Note 1: Taken from *Road Traffic Noise Prediction Model "ASJ RTN-Model 2013" Proposed by the Acoustical Society of Japan – Part 2: Study on Sound Emission of Road Vehicles*, OKADA et al, Internoise 2014, and accounts for vehicles accelerating.

4.1.2 Internal Activities

The internal noise generating activities in the bay workshop would include the use of pneumatic tools, and a maximum of three car engines turn on at any one time. The assumed Sound Power Level used in the model for the operations of the internal bay workshop area is shown in **Table 8**Error! Reference source not found.Error! Reference source not found.. Bay workshop doors are assumed to be open during the day.

Table 8 SWL for the Internal Bay Workshop Area

Noise Source	Sound Power Level (dBA)	Worst-case 15-minute Period Sound Power Level (dBA)
Car Engine steady state	85[1]	89[2]
Car Engine accelerating	96[1]	91[3]
Compressor	98	98
Pneumatic tool	113	101[4]

Note 1: Taken from *Road Traffic Noise Prediction Model "ASJ RTN-Model 2013" Proposed by the Acoustical Society of Japan – Part 2: Study on Sound Emission of Road Vehicles*, OKADA et al, Internoise 2014, and accounts for vehicles accelerating.

Note 2: Three car engines on in steady state.

Note 3: One Car engine accelerating during 5 minutes in a 15-minute period.

Note 4: Pneumatic tool being operated during 1 minute in a 15-minute period.

4.1.3 Mechanical Plant

The impacts from mechanical plant should be reviewed at design stage when detailed information is available. In the event of predicted impacts, it is generally straightforward to control mechanical plant noise emissions using standard mitigation measures (ie quieter equipment specification, localised shielding, etc).

4.1.4 Off-site Road Traffic

Traffic associated with the development is expected to enter and exit from the east via Emerald Hills Blvd. The potential noise impacts from development related traffic on public roads are unlikely to result in a noticeable increase in noise given the small number of vehicles accessing the site.

5 Noise Assessment

A summary of the operational noise assessment at the receivers surrounding the Vehicle Repair Station is shown in the following sections. The predicted levels are compared to the Day Project Noise Trigger Levels to determine the potential impact from the proposal.

5.1 Predicted Unmitigated Noise Levels

Predicted noise levels from the full operation of the proposal at the receivers surrounding the Vehicle Repair Station is shown in **Table 9**.

Assumptions:

- Doors from the bay workshop area are opened.
- One Compressor is in constant operation.
- A pneumatic tool is operating during 1 min.
- One car engine inside the Bay Workshop Area is constantly accelerating during 5 min.
- Three car engines inside the Bay Workshop Area are operating in a steady state.
- 15 vehicles are accessing the site in one hour.

Table 9 Operational Noise Assessment – Unmitigated

Receiver Location	Period	Noise Level $L_{Aeq(15minute)}$ (dBA)			Compliance
		Project Noise Trigger Level	Predicted	Exceedance	
R01	Day	54	53	-	Yes
R02	Day	54	52	-	Yes
R03	Day	54	52	-	Yes
R04	When in use	63	52	-	Yes
R05	When in use	63	61	-	Yes

Exceedances are shown in bold.

Operational noise emissions from the proposal have been predicted to the surrounding receivers and the levels are expected to comply with the project trigger levels.

5.2 Recommendations

Although compliance is indicated based on the assumptions included in this assessment, potential mitigation measures to minimise noise impacts to nearest sensitive receivers could include the following:

- Close Bay Workshop doors where possible.
- Turn off noisy equipment when not in use.

A summary of the predicted impacts with the Bay Workshop doors closed is shown in **Table 10**. It is assumed that doors would comprise 0.6mm metal doors (R_W 20 dB).

Table 10 Operational Noise Assessment – Following recommendations

Receiver Location	Period	Noise Level $L_{Aeq(15minute)}$ (dBA)			Compliance
		Project Noise Trigger Level	Predicted	Exceedance	
R01	Day	54	44	-	Yes
R02	Day	54	43	-	Yes
R03	Day	54	43	-	Yes
R04	When in use	63	43	-	Yes
R05	When in use	63	50	-	Yes

Exceedances are shown in bold.

6 Conclusion

SLR has been engaged to assess the operational noise emissions from the proposed Vehicle Repair Station at 3 Emerald Hills Blvd, Leppington, NSW 2179.

The assessment indicates compliance with the noise trigger levels at the nearest sensitive receivers. Recommendations in **Section 5.2** indicates that a 9 dB reduction can be achieved with the Bay Workshop doors closed to further minimise noise impacts where feasible.

Based on the predicted noise levels the proposal is considered appropriate from an acoustic standpoint.

Appendix A:

Acoustic Terminology

1. Sound Level or Noise Level

The terms ‘sound’ and ‘noise’ are almost interchangeable, except that ‘noise’ often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2 x 10^{-5} Pa.

2. ‘A’ Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an ‘A-weighting’ filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People’s hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as ‘linear’, and the units are expressed as dB(lin) or dB.

3. Sound Power Level

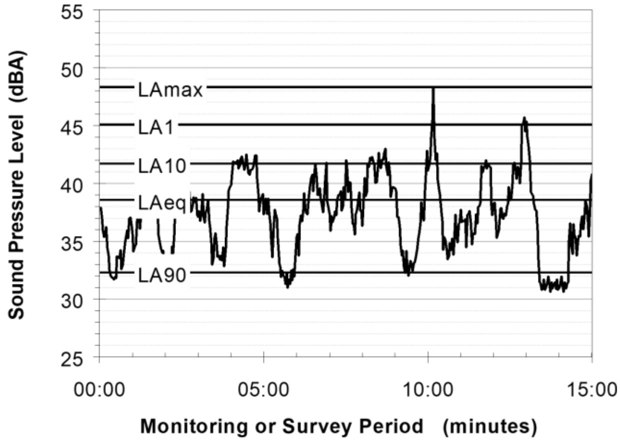
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

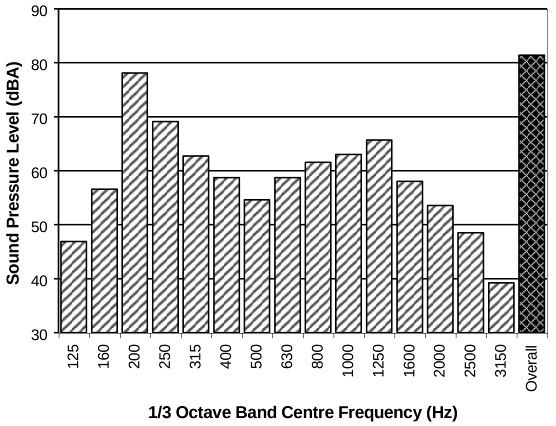
The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)

Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

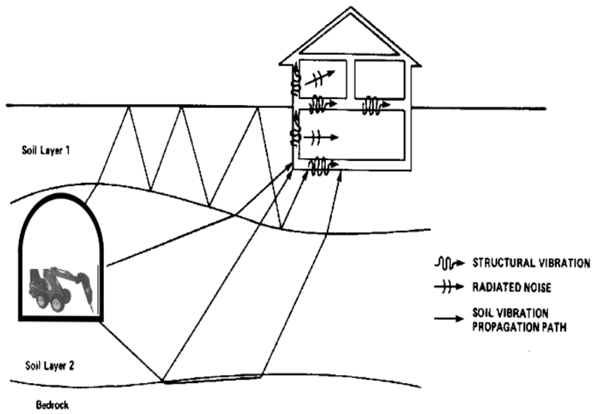
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

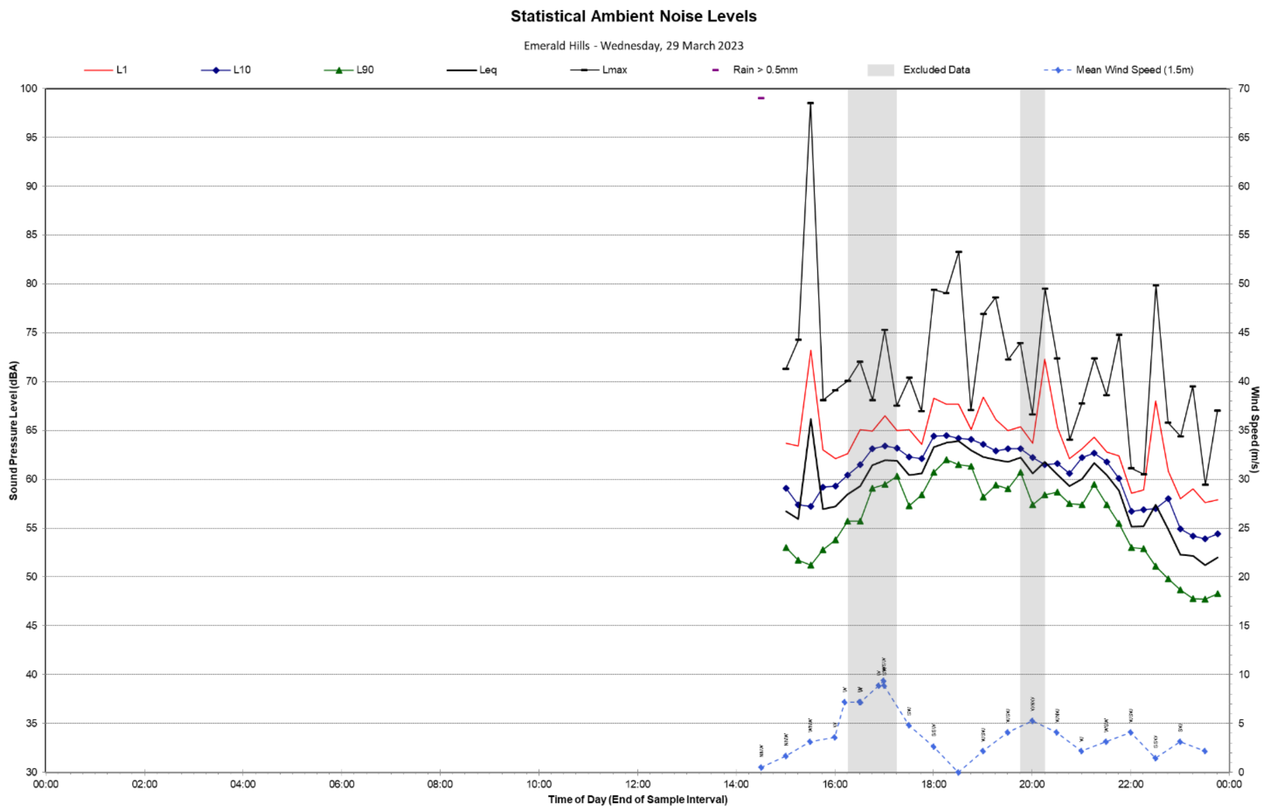
The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



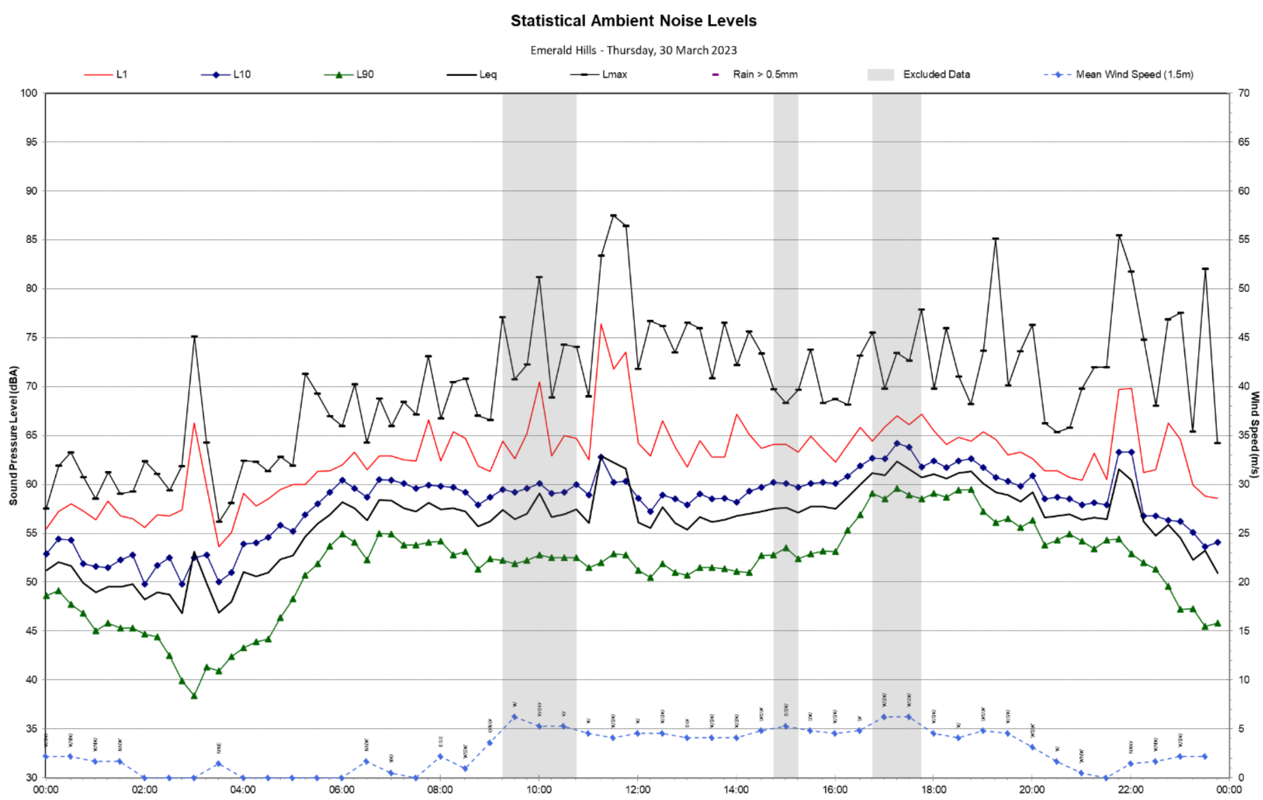
The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

Appendix B:

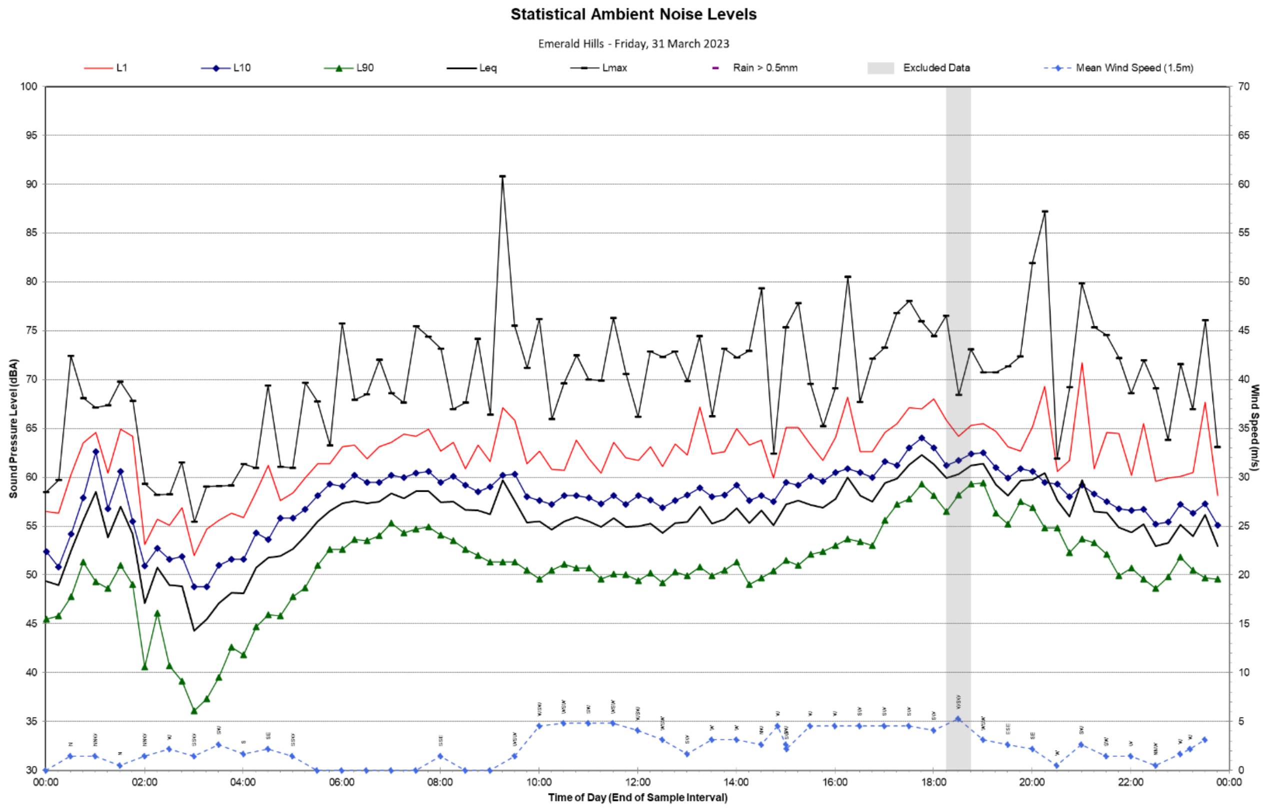
Noise logged Data with graphs.

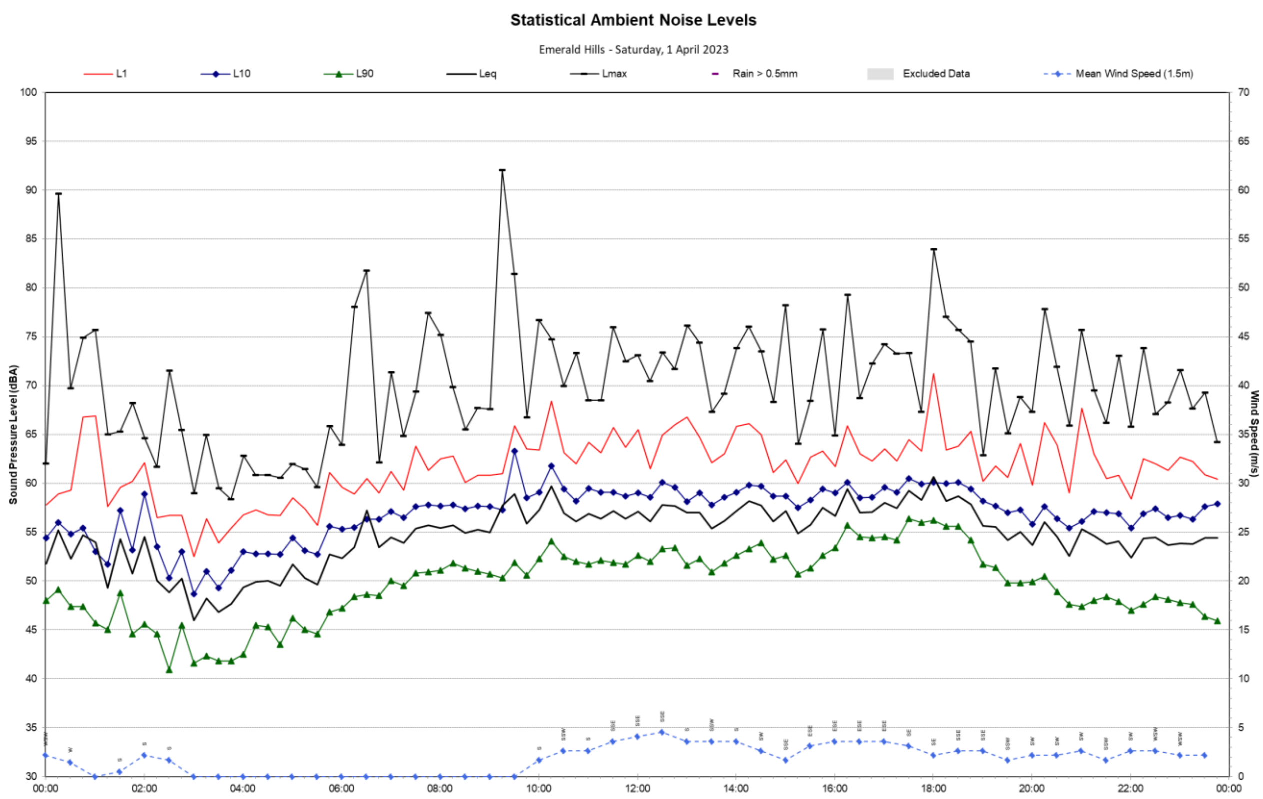


Statistical Ambient Noise Levels
Emerald Hills - Wednesday, 29 March 2023
L1
L10
L90
Leq
Lmax
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



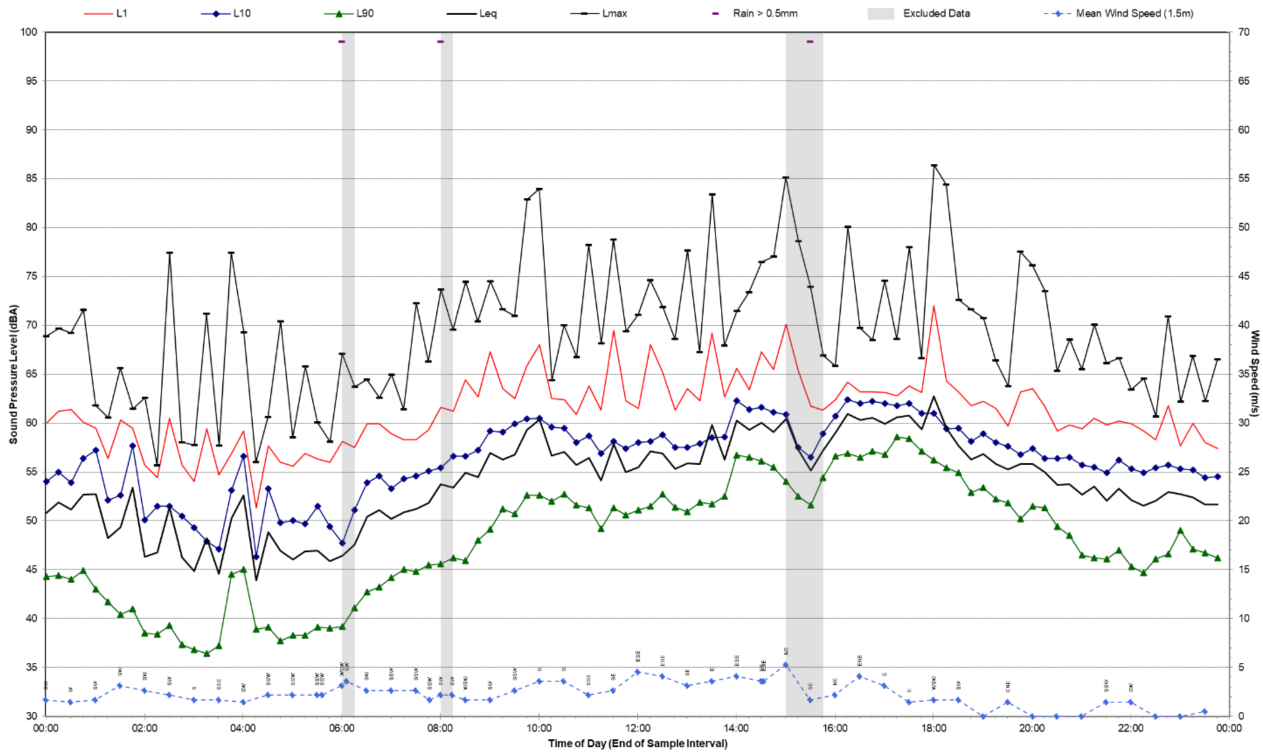
Statistical Ambient Noise Levels
Emerald Hills - Thursday, 30 March 2023
L1
L10
L90
Leq
Lmax
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Emerald Hills - Friday, 31 March 2023
L1
L10
L90
Leq
Lmax
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Emerald Hills - Saturday, 1 April 2023
L1
L10
L90
Leq
Lmax
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

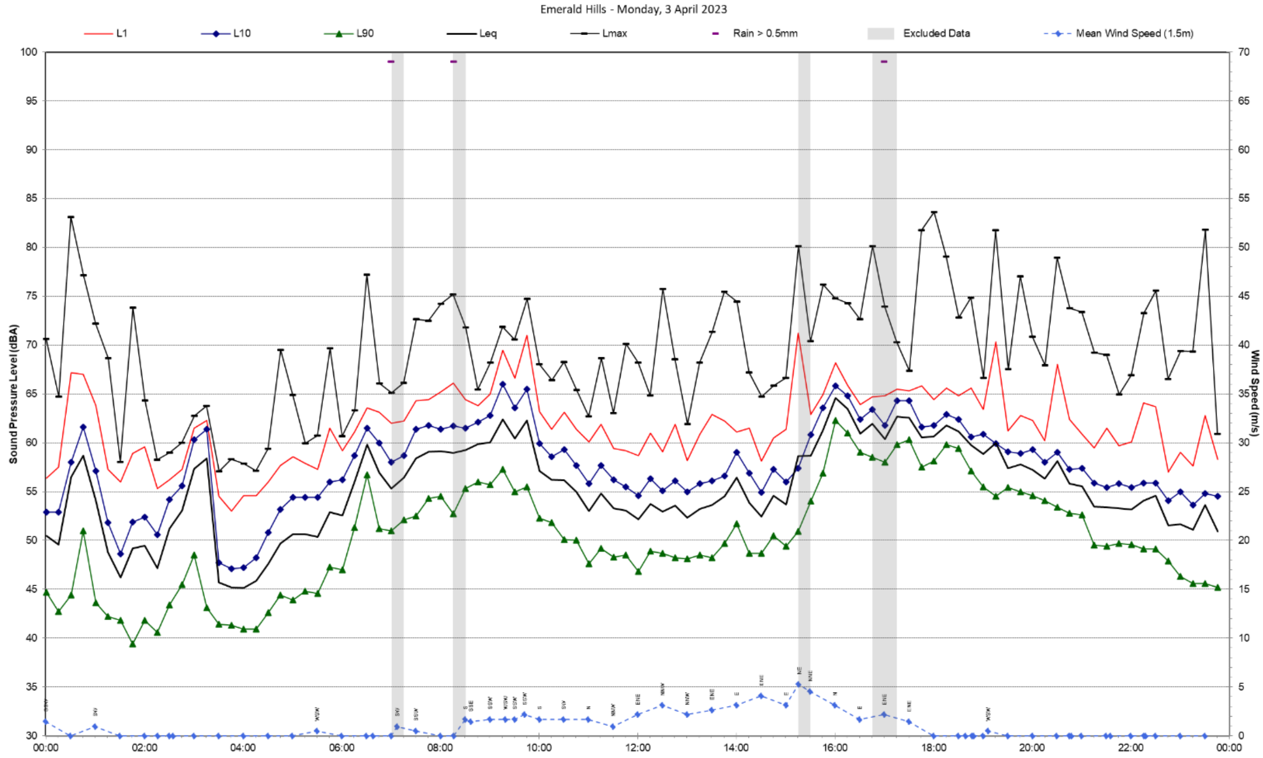
Statistical Ambient Noise Levels

Emerald Hills - Sunday, 2 April 2023



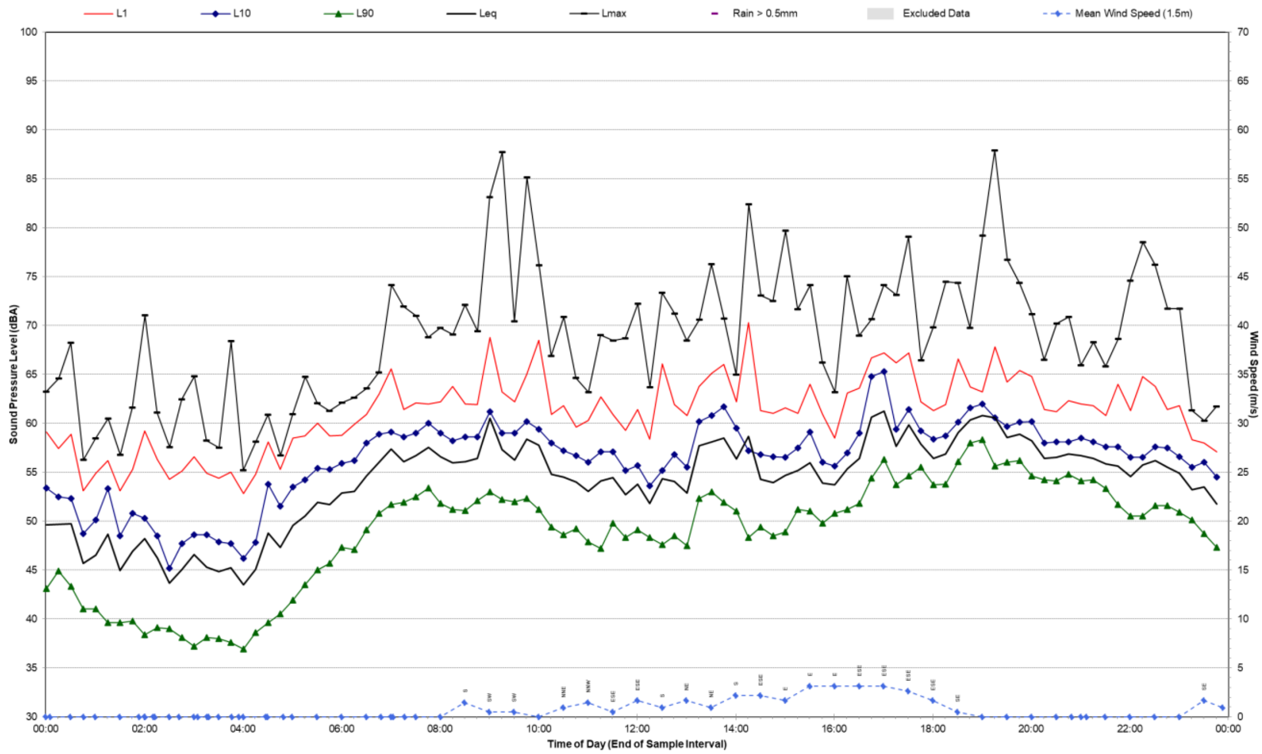
Statistical Ambient Noise Levels

Emerald Hills - Monday, 3 April 2023



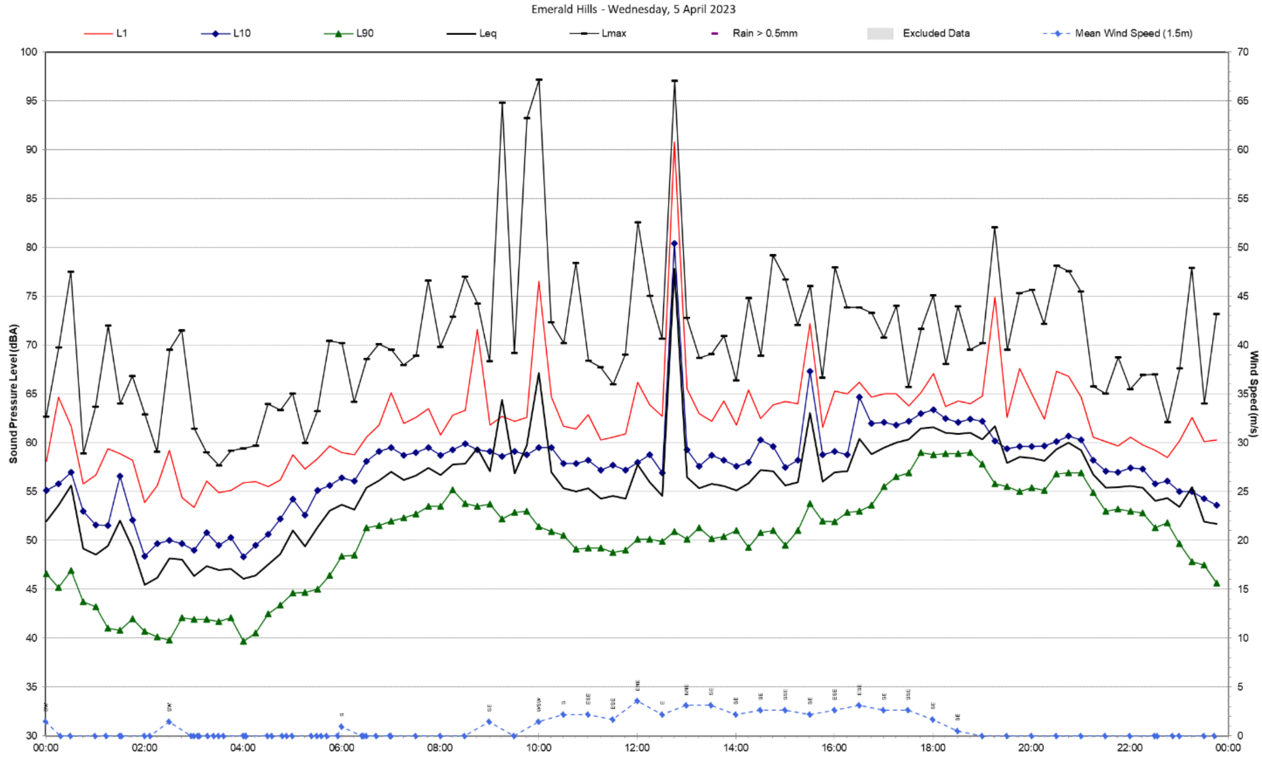
Statistical Ambient Noise Levels

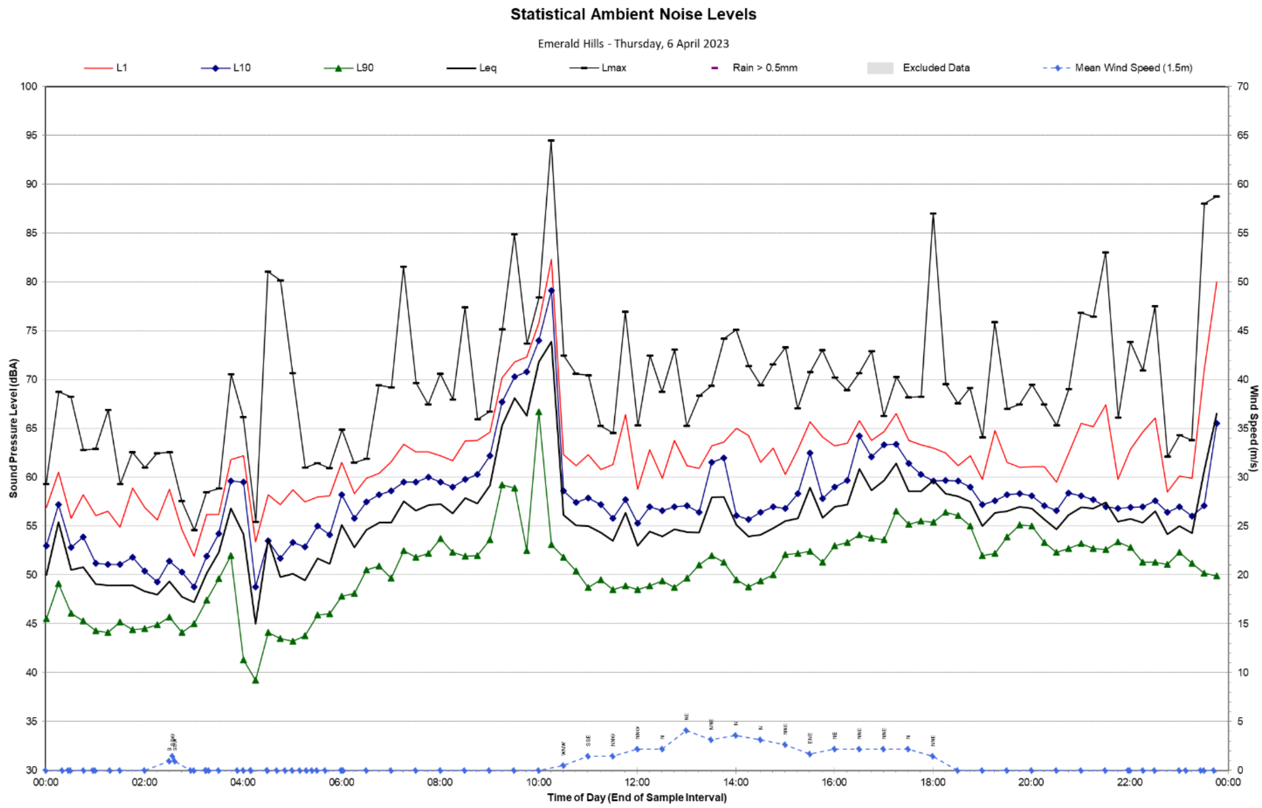
Emerald Hills - Tuesday, 4 April 2023



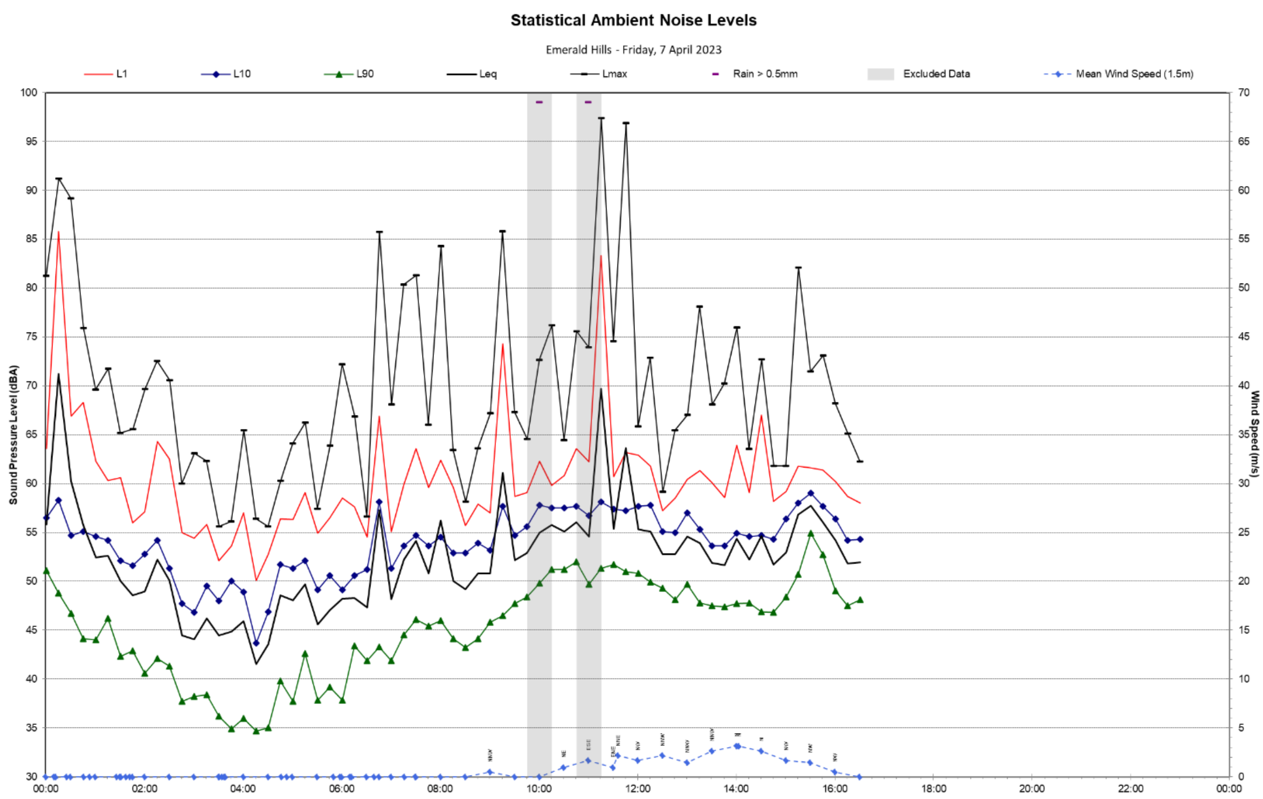
Statistical Ambient Noise Levels

Emerald Hills - Wednesday, 5 April 2023





Statistical Ambient Noise Levels
Emerald Hills - Thursday, 6 April 2023
L1
L10
L90
Leq
Lmax
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)



Statistical Ambient Noise Levels
Emerald Hills - Friday, 7 April 2023
L1
L10
L90
Leq
Lmax
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

Appendix C:

Operator attended ambient noise survey and photographs.

Date: 29/03/2023 and 07/04/2023								
Measurements undertaken in accordance with NSW Noise Policy for Industry and Australian Standard AS 1055.1-1997								
Location	**Date**	**Start Time**	**Period/ Duration**	**Measured Levels**			**Weather**	**Observations**
				L_{Amax}	**L_{Aeq}**	**L_{A90}**		
North from site	29/03/2023	14:55	Day/ 15 min	77	56	51	Wind: 0.5 m/s Gust= 2 m/s Dir= NW Hum: 84% Temp: 23 °C	Noise Sources: Insects: 54 - 56 dBA Car pass by: 55 - 77 dBA Truck pass by: 58 – 70 dBA Horn: 57 dBA Speed bump: 58 dBA Mech noise from Woolworths was constant
On site.	29/03/2023	15:12	Day/ 15 min	77	57	51	Wind: 2 m/s Gust= 3 m/s Dir= NW Hum: 72 % Temp: 25 °C	Noise Sources: Insects: 51 - 56 dBA Car pass by: 55 - 77 dBA Truck pass by: 61 – 70 dBA Horn: 57 dBA Speed bump: 58 dBA Mech noise from Woolworths was constant
Residential receiver at 23 Coral Cirt.	07/04/2023	16:52	Day/ 15 min	75	55	49	Wind: 0.5 m/s Gust= 2 m/s Dir= NW Hum: 66 % Temp: 23 °C	Noise Sources: Airplane: 60 dBA Car pass by: 56 - 67 dBA Birds: 49 - 57 dBA Local Noises: 52 - 75 dBA Distant Air Brakes: 69 dBA Mech noise from Woolworths was constant

NORTH FROM SITE

ON SITE

RESIDENTIAL RECEIVER AT 23 CORAL CIRT

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