AURIZON PORT SERVICES NSW EXPANSION

Noise Impact Assessment

Prepared for:

Aurizon Operations Limited
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Mayfield, NSW 2304

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BASIS OF REPORT

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.30321-R01-v2.0	27 March 2023	Kieran Murphy/Martin Davenport	Jonathan Caine	Martin Davenport
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1 Introduction

1.1 Project Description

The Site is located within the Port of Newcastle lease area within the suburb of Carrington. The immediate surrounds are characterised by industrial and logistics operations (refer to **Figure 1**). The Site is legally described as Lot 16, DP 1190232 (northern part) and Lot 220, DP1195310 (southern part) and leased by Aurizon Port Services NSW (APSN) from the Port of Newcastle.

The Site is accessed by vehicle from Bourke Street from the north, from train on the Port of Newcastle rail corridor from the east and by ship on the neighbouring berths, further east (on the Hunter River). The nearest sensitive receivers, residential areas, are located within Carrington (approximately 350m west of the Site) and Stockton (approximately 720m east (across the Hunter River)).

Figure 1 Site Locality

1.2 DPI&E Requirements

The NSW Department of Planning and Infrastructure and Environment (DPI&E) has issued assessment requirements for the Proposal. The requirements relevant to noise are provided in **Table 1** together with the relevant section of the NIA indicating where the requirements have been addressed.

Table 1 DPI&E Requirements - Noise

Environmental Assessment Requirement	Relevant NIA Section
As per RE: Aurizon Port Services Capacity Increase and Mineral Sands Project Development Application (DPI&E, 17 November 2020) the assessment is to consider the following: a quantitative noise impact assessment undertaken by a suitably qualified acoustic consultant in accordance with the relevant Environment Protection Authority guidelines and Australian Standards which includes:	
Identification of impacts associated with site emission and traffic generation at noise affected sensitive receivers, including sleep disturbance impacts	**Section 4** and **Section 5**
Details of noise monitoring survey, background noise levels and noise emission levels of proposed activities	**Section 2**
Consideration of annoying characteristics of noise and prevailing meteorological conditions in the study area	**Section 4.3**
The cumulative impacts of the development and all current operations of the site	**Section 5**
Details and analysis of the effectiveness of proposed management and mitigation measures to adequately manage identified impacts, including a clear identification of residual noise following application of these measures and details of any proposed compliance monitoring programs.	**Section 4, Section 5** and **Section 6**

1.3 Nearest Receivers

The nearest sensitive receivers are residential properties located 350-600m to the west in Carrington, 720m to the east in Stockton and 900m to the south in Honeysuckle (part of the Newcastle CBD). The nearest receivers are shown in **Figure 2** and detailed in **Table 2**.

Table 2 Surrounding Sensitive Receivers

NCA	ID	Address	Type	Distance (m)	Direction
NCA1	R01	103 Bourke Street Carrington	Residential	380m	North-West
	R02	47 Victoria Street Carrington	Residential	350m	West
	R03	107 Lott Street, Carrington	Residential	450m	West
	R04	149 Wilson Street, Carrington	Residential	600m	South-West
NCA2	R05	338 Wharf Road, Newcastle	Residential	720m	South
NCA3	R06	70 Hunter Street, Stockton	Residential	900m	East

Figure 2 Site Location, Surrounding Receivers and Noise Monitoring Locations

2 Existing Noise Environment

2.1 Existing Noise Survey and Monitoring Locations

Unattended noise monitoring was completed in the study area during February 2022. The measured noise levels have been used to determine the existing noise environment and to set the criteria used to assess the potential impacts from the Proposal.

The monitoring equipment was positioned to measure existing noise levels that are representative of receivers potentially most affected by the Proposal, 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. Weather data for the survey period was obtained from the nearest Bureau of Meteorology automatic weather station located at Newcastle (Nobbys station number 061055). Data recorded during wind speeds greater than 5 m/s and/or periods of rainfall were excluded in accordance with NPfI data exclusion methodology.

The noise monitoring locations are shown in **Table 3** and the results are summarised in **Table 3**. Details of each monitoring location together with graphs of the measured daily noise levels are provided in **Appendix B**.

Table 3 Summary of Unattended Noise Logging Results

ID	Address	Measured Noise Levels (dBA)					
		Background Noise (RBL)			Average Noise (L_{Aeq})		
		Day	Evening	Night	Day	Evening	Night
L01 (NCA1)	93 Bourke Street, Carrington	44	48	40	58	56	52
L02 (NCA2)	Rydges, Wharf Road, Newcastle	47	47	46	56	55	50
L03 (NBA3)	33 Fullerton Street, Stockton	40	42	42	71	67	68

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*.

2.2 Attended Noise Measurements

Short-term attended noise monitoring was also completed at each monitoring location. The attended noise measurement was performed using a Bruel & Kjaer 2270 sound level meter (Serial Number 2679354).

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 **Table 4**.

Table 4 Operator Attended Noise Monitoring Results

Attended ID	Location	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Key Descriptor L_{Aeq} (dBA)
			L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
A01 (NCA1)	93 Bourke Street, Carrington	15/2/2022 15:50 25°C 6.5 m/s NE	84	68	61	54	61	Traffic 54-84 Aurizon port 50-52
A02 (NCA2)	Rydges, Merewether Street, Newcastle	15/2/2022 15:04 25°C 6.5 m/s NE	71	60	56	51	54	Wind 51 - 56 industrial noise 55 - 62 Pedestrians 62-71
A03 (NBA3)	33 Fullerton Street, Stockton	15/2/2022 14:09 25°C 6.5 m/s NE	69	63	56	46	53	Wind 46 - 57 Birds 55 - 69 Traffic 54 - 63

The existing noise environment at NCA1 is generally influenced by road traffic from the surrounding road network with the nearest major road being Bourke Street and other existing industrial premises within the Port of Newcastle

The existing noise environment at NCA2 is dominated by industrial noise from nearby commercial premises as well as the Port of Newcastle along with urban activities.

The existing noise environment within NCA3 is dominated by local traffic and, in SLR's experience, industrial noise from the Port of Newcastle.

3 Relevant 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.

For this assessment, the area surrounding the Proposal is considered to be 'urban' as per the NPfI definitions.

3.1.2 Project Noise Trigger Levels

The trigger levels for industrial noise from the Proposal 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 ID	Receiver Type	Period	Project Amenity Noise Level L_{Aeq} (dBA)	Measured Noise Level (dBA)		Project Noise Trigger Levels $L_{Aeq(15minute)}$ (dBA)	
				RBL[1]	$L_{Aeq(period)}$	Intrusiveness	Amenity[2,3]
NCA1	Residential	Daytime	55	44	58	**49**	58
		Evening	45	44 (48 actual)	56	**49**	49[6]
		Night-time	40	40	52	**45**	45[6]
NCA2	Residential	Daytime	55	47	56	**52**	58
		Evening	45	47	55	52	**48**[6]
		Night-time	40	46	50	51	**43**[6]
NCA3	Residential	Daytime	55	40	71	**45**	58
		Evening	45	40 (42 actual)	67	**45**	48
		Night-time	40	40 (42 actual)	68	45	**43**

Note 1: RBL = Rating Background Level.

Note 2: The recommended amenity noise levels have been reduced by 5 dB, where appropriate, to give the project amenity noise levels due to other sources of industrial noise being present in the area.

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

Note 4: The NPfI minimum value has been used due to the measured RBL being below the NPfI minimum value.

Note 5: The evening and night-time RBL has been reduced to match the daytime RBL due to the measured evening and night-time RBL being higher than the daytime, as outlined in the NPfI.

Note 6: Project amenity level was set at 10 dB below the existing industrial noise level.

3.2 Sleep Disturbance

In addition to the PNTLs, NPfI provides guidance in relation to the assessment of sleep disturbance. Specifically, the NPfI states:

Where the subject development/premises night-time noise levels at a residential location exceed:

- *$L_{Aeq(15minute)}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *L_{AFmax} 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level assessment should be undertaken.

Where those trigger levels are not met, it is appropriate to consider any effect of the noise with regard to:

- The extent to which the maximum noise level exceeds the rating background noise level.
- How often high noise events will occur.
- The distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development.
- Whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods).
- Current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

It may also be appropriate to consider other published research including the NSW *Road Noise Policy* which contains additional guidance relating to potential sleep disturbance impacts.

A review of research on sleep disturbance in the RNP indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on studies into sleep disturbance, the RNP concludes that:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions; and that
- One or two noise events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly.

Internal noise levels in a dwelling, with the windows open, are commonly 10 dB lower than external noise levels. Therefore, the first conclusion above suggests that short-term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

Sleep Disturbance criteria at each NCA is provided in **Table 6.**

Table 6 Sleep Disturbance Criteria

Receiver ID	Sleep Disturbance Criteria	
	L_{AFmax} dBA	LAeq(15minute) dBA
NCA1	55	45
NCA2	61	45
NCA3	55	45

3.3 Traffic on Surrounding Roads

The potential impacts from Proposal related traffic on the surrounding public roads are assessed using the NSW EPA *Road Noise Policy* (RNP). **Table 7** presents the RNP criteria for residential land uses affected by additional traffic on public roads as a result of a development. Noise levels provided in **Table 7** are external noise levels and refer only to road traffic noise; they do not include ambient noise from other sources.

Table 7 RNP Criteria for Assessing Traffic on 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	$L_{Aeq(15hour)}$ 60 (external)	$L_{Aeq(9hour)}$ 55 (external)

Section 3.4 of the RNP also states:

Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.

In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

4 Methodology

The potential operational noise levels from the Proposal have been predicted to the surrounding receivers using CONCAWE industrial noise algorithm in SoundPLAN V8.1. The model includes ground topography, buildings and representative noise sources from the Proposal.

The potential impacts have been determined by comparing the predicted noise levels to the PNTLs in a 15-minute assessment period.

4.1 Operational Noise Sources

A summary of operational noise sources associated with the existing operations and proposed operations for the Proposal is provided below.

4.1.1 Ship Loading and Rail Unloading

Details of the ship loading and rail unloading noise sources are shown in **Table 8**.

Table 8 Typical Loading Dock Noise Sources

Noise Source	Sound Power Level (dBA)	Typical Duration of Use in Worst-case 15-minute Period	Source Height (m)
Conveyor[1]	66[2]	15 minutes	1 m to 10 m
Tipler Building[1]	94	15 minutes	8 m
Forklift[1]	105	15 minutes	1 m
Shiploader	96	15 minutes	10 m

Note 1: SWL were measured at the existing APSN Site.
Note 2: SWL per m^2

4.1.2 Cement Deliveries

Details of the cement deliveries and handling noise sources are shown in **Table 9**.

Table 9 Typical Cement Deliveries Noise Sources

Noise Source	Sound Power Level (dBA)	Typical Duration of Use in Worst-case 15-minute Period	Source Height (m)
Truck	102	15 minutes	1.5 m
Forklift	105[1]	15 minutes	1 m
Reach Stacker	107	15 minutes	2 m

Note 1: SWL were measured at the existing APSN Site.

4.1.3 Internal Activities

The internal noise generating activities in the warehouse would include the loading of conveyors from storage bins using two (2) Volvo L250G front end loaders, the unloading of material into bins via an overhead conveyor and associated conveyor drives. The calculated reverberant noise level used in the model for internal areas of the warehouse is shown in **Table 10**. It should be noted that with the exception of increased storage capacity and extension of the internal conveyor system, internal operations within the shed is proposed to remain the same due to the Proposal.

Table 10 Reverberant Noise Level for Internal Areas

Noise Source	Reverberant Sound Pressure Level (dBA)
Internal Warehouse	76[1]

Note 1: Calculated based off existing plant and equipment measured at the APSN Site.

4.1.4 Noise Sources with Potential for Sleep Disturbance

As the development is proposed to operate 24-hours a day, noise emissions during the night-time require assessment for potential sleep disturbance at the nearest residential receivers. The details of typical activities with the potential to cause sleep disturbance are shown in **Table 11**.

Table 11 Sleep Disturbance Noise Events – L_{Amax} Sound Power Levels

Noise Source	Sound Power Level L_{Amax} (dBA)	Source Height
Tipler Building	111	8m
Forklift	112	1m
Shiploader	96	10m
Reach Stacker	116	2m
Truck	108	1.5m

4.2 Operational Scenarios

SLR have identified two operational scenarios that have been modelled as part of the Proposal, representative of existing approved activities and future expanded operational activities. The noise modelling scenarios are provided in **Table 12**.

Table 12 Modelled Operational Scenarios

Scenario	Noise Source	Sound Power Level L_{Aeq} (L_{Amax})	Scenario SWL L_{Aeq}
Existing	Truck	102 (108)	107
	Forklift	105 (112	
	Conveyor	66[2, 3]	
	Tipler Building	94 (111)[2]	
	Warehouse	76[1,2]	
	Shiploader	94 (96) [2]	

Scenario	Noise Source	Sound Power Level L_{Aeq} (L_{Amax})	Scenario SWL L_{Aeq}
Proposed Expansion	Truck	102 (108)	110
	Forklift	105 (112	
	Conveyor	66[2, 3]	
	Tipler Building	94 (111)[2]	
	Warehouse	76[1,2]	
	Shiploader	94 (96) [2]	
	Reach Stacker	107 (116)	

Note 1: Internal warehouse reverberant noise level.

Note 2: SWL were measured at the existing APSN Site.

Note 3: SWL per m or m^2.

Note 4: Scenario includes existing storage shed. Aurizon have detailed that the noise sources identified in the existing scenario will be identical for both mineral sands and ore.

4.3 Meteorological Modelling Parameters

The meteorological environment has been assessed in accordance with the requirements of the NPfI Fact Sheet D, which sets out procedures for establishing noise enhancing weather conditions. There are two options available to consider meteorological effects, as follows.

> *Adopt the **noise-enhancing meteorological conditions** for all assessment periods for noise impact assessment purposes without an assessment of how often these conditions occur - a conservative approach that considers source-to-receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night.*
>
> ***Or***
>
> *Determine the **significance** of noise-enhancing conditions. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night-time period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.*

NPfI Fact Sheet D also contains several important notes, and in particular states:

> *Noise limits derived for consents and licences will apply under the meteorological conditions used in the environmental assessment process, that is, standard or noise-enhancing meteorological conditions. For 'very noise-enhancing meteorological conditions' (see glossary) a limit is set based on the limit derived under standard or noise-enhancing conditions (whichever is adopted in the assessment) plus 5 dB. In this way a development is subject to noise limits under all meteorological conditions.*
>
> *It should be noted that noise limit conditions will include the wind speed (scalar quantity without direction) under which noise limits will apply.*

To provide a conservative approach and based on NPfI Table D1, the standard and noise enhancing meteorological conditions are presented in **Table 13**.

Table 13 NPfI Table D1 Standard and Noise Enhancing Meteorological Conditions

Meteorological Conditions	Meteorological Parameters
Standard	Day/evening/night: stability categories A-D with wind speed up to 0.5m/s at 10m AGL
Noise-enhancing	Day/evening: stability categories A-D with light winds (up to 3m/s at 10m AGL) Night-time: stability categories A-D with light winds (up to 3m/s at 10m AGL) and/or stability category F with winds up to 2m/s at 10m AGL

Notes: m/s = metres per second, m = metres, AGL = above ground level

where a range of conditions is nominated, the meteorological condition delivering the highest predicted noise level should be adopted for assessment purposes. However, feasible and reasonable noise limits in consents and licences derived from this process would apply under the full range of meteorological conditions nominated under standard or noise-enhancing conditions as relevant. All wind speeds are referenced to 10m AGL. Stability categories are based on the Pasquill-Gifford stability classification scheme.

The NPfI standard and noise enhancing meteorological conditions can be further defined for noise modelling purposes as presented in **Table 14**.

Table 14 Meteorological Parameters Considered for Noise Predictions

Period	Meteorological Conditions	Wind Speed (m/s) (Source to receiver)	Stability Category
Day	Standard	0.5	D Class
	Noise enhancing	3	
Evening	Standard	0.5	D Class
	Noise enhancing	3	
Night	Standard	0.5	D Class
	Noise enhancing	3	
		2	F Class

5 Noise Assessment

5.1 Operational Noise

A summary of the noise assessment at the receivers surrounding the Proposal is shown in **Table 15** and **Table 16**. The predicted levels are compared to the PNTLs to determine the potential impact from the Proposal.

Table 15 Industrial Noise Assessment –Standard Weather Conditions

Location	Period	Noise Level $L_{Aeq\ (15\ minute)}$ dBA			Exceedance Existing	Exceedance Existing and Expansion
		PTNL (dBA)	Predicted Noise Level – APSN Existing	Predicted Noise Level – APSN including Expansion		
R1	Day	49	36	41	-	-
	Evening	48	36	41	-	-
	Night	45	36	41	-	-
R2	Day	49	44	44	-	-
	Evening	48	44	44	-	-
	Night	45	44	44	-	-
R3	Day	49	37	40	-	-
	Evening	48	37	40	-	-
	Night	45	37	40	-	-
R4	Day	49	33	35	-	-
	Evening	48	33	35	-	-
	Night	45	33	35	-	-
R5	Day	52	28	37	-	-
	Evening	48	28	37	-	-
	Night	43	28	37	-	-
R6	Day	45	37	42	-	-
	Evening	45	37	42	-	-
	Night	43	37	42	-	-

Table 16 Industrial Noise Assessment – Noise Enhancing Weather Conditions

Location	Period	Noise Level $L_{Aeq\ (15\ minute)}$ dBA			Exceedance Existing	Exceedance Existing and Expansion
		PTNL (dBA)	Predicted Noise Level – APSN Existing	Predicted Noise Level – APSN Expansion and Existing		
R1	Day	49	38	43	-	-
	Evening	48	38	43	-	-
	Night	45	38	43	-	-
R2	Day	49	46	47	-	-
	Evening	48	46	47	-	-
	Night	45	**46**	**47**	**1**	**2**
R3	Day	49	40	42	-	-
	Evening	48	40	42	-	-
	Night	45	40	42	-	-
R4	Day	49	36	37	-	-
	Evening	48	36	37	-	-
	Night	45	36	37	-	-
R5	Day	52	30	40	-	-
	Evening	48	30	40	-	-
	Night	43	30	40	-	-
R6	Day	45	40	45	-	-
	Evening	45	40	45	-	-
	Night	43	40	**45**	-	**2**

Noise from the Proposal is predicted to comply with the PNTLs at all receivers under standard meteorological conditions. Under noise-enhancing weather conditions, the night time period at receivers R2 and R6 (103 Bourke Street, Carrington and 70 Hunter Street, Stockton) are predicted to exceed the relevant PNTLs by up to 2 dB from expanded operational activities.

It should be noted that the exceedance at R2 is primarily driven from existing approved operations, in particular the unloading and loading of trains using the forklift at the unloading pad.

The exceedance at R6 is primarily driven by additional plant and equipment operating to the south of the Aurizon Port Services NSW (APSN) shed. In particular the movement and storage of shipping containers with a reach stacker.

It should be noted that modelled operations conservatively assumed a worst case operational scenario with all Site equipment would be operational in any one 15 minute period. As such actual noise emissions are likely to be less than those presented in **Table 15** and **Table 16** for much of the time. Notwithstanding, in accordance with the NPfI where the PNTLs are exceeded, feasible and reasonable noise mitigation measures should be evaluated, with the aim of reducing noise to the PNTLs.

5.2 Sleep Disturbance

The predicted night-time L_{Amax} noise levels at the nearest residential receivers are shown in **Table 17** and **Table 16**. The predicted levels are compared to the PNTLs to determine the potential impact from the Proposal.

Table 17 Sleep Disturbance Assessment – Standard Weather Conditions

Location	Period	Noise Level $L_{Aeq\ (15\ minute)}$ dBA			Exceedance Existing	Exceedance Existing and Expansion
		PTNL (dBA)	Predicted Noise Level – APSN Existing	Predicted Noise Level – APSN Expansion and Existing		
R1	Night	55	38	45	-	-
R2	Night	55	47	47	-	-
R3	Night	55	39	46	-	-
R4	Night	55	35	38	-	-
R5	Night	61	29	42	-	-
R6	Night	55	40	45	-	-

Table 18 Sleep Disturbance Assessment – Noise Enhancing Weather Condition

Location	Period	Noise Level $L_{Aeq\ (15\ minute)}$ dBA			Exceedance Existing	Exceedance Existing and Expansion
		PTNL (dBA)	Predicted Noise Level – APSN Existing	Predicted Noise Level – APSN Expansion and Existing		
R1	Night	55	45	48	-	-
R2	Night	55	47	50	-	-
R3	Night	55	46	49	-	-
R4	Night	55	38	41	-	-
R5	Night	61	42	45	-	-
R6	Night	55	45	48	-	-

Under standard and noise-enhancing weather conditions the sleep disturbance is expected to be compliant at all nearest noise sensitive receivers.

5.3 Traffic Increases on Surrounding Roads

Heavy vehicles would access the Proposal directly from Darling Street to the north of the Site with light vehicles entering via Bourke Street. Existing traffic count and traffic generation for the Site has been completed by SLR Consulting (Traffic Report), SLR Report Reference "610.30882.00000-R01 Port of Newcastle TIA v0.1-20220607" dated 7 June 2022 (Traffic Report).

The data derived from SLR's Traffic Report has been used to calculate the expected noise increase due to traffic associated with the development onto Darling Street. The results are summarised in **Table 19**.

Table 19 Existing and predicted traffic flow volumes (15 hour and 9 hour)

Location	Existing Vehicles		Predicted Increase		Noise Level Increase (dB)	
	AM (15 hour)	PM (9 hour)	AM (15 hour)	PM (9 hour)	AM (15 hour)	PM (9 hour)
Darling Street	1129	155	15	9	<0.1	0.1

Based on the results of the assessment in **Table 19**, there is predicted to be less than a 1 dB increase in traffic noise levels. The corresponding increase in road traffic noise would therefore be expected to remain below 2 dB which, according to the RNP, is unlikely to be discernible and would not require consideration of mitigation.

6 Operational Noise Mitigation

Fact Sheet F of the NPfI (**Appendix B**) defines what is a feasible mitigation measure and a reasonable mitigation measure.

- A feasible mitigation measure is a noise mitigation measure that can be engineered and is practical to build and/or implement, given Site constraints such as safety, maintenance, and reliability requirements.
- A reasonable mitigation measure requires judging whether the noise benefits from the mitigation outweigh other impacts form the proposed mitigation including social, economic, and other environmental effects.

From a Site wide audit of acoustically significant plant and equipment along with Site operational requirements a summary of noise mitigation options is provided in **Table 20**.

Table 20 Summary of Noise Mitigation and Management Options

Mitigation Measure	Estimated Individual Source Noise Reduction	Description and Comments on Feasibility and Reasonableness
Source Control Measures		
Noise mitigation measures to Forklift consisting of engine cowling upgrades, cooling fan upgrades and or exhaust muffler upgrades	Nominally 5-10 dB	Potentially feasible subject to upgrading fans and exhaust muffler can be expensive and may reduce the efficiency and reliability of the forklift.
Noise mitigation measures to Reach Stacker consisting of engine cowling upgrades, cooling fan upgrades and or exhaust muffler upgrades	Nominally 5-10 dB	Potentially feasible, upgrading fans and exhaust muffler can be expensive and may reduce the efficiency and reliability of the reach stacker.

Mitigation Measure	Estimated Individual Source Noise Reduction	Description and Comments on Feasibility and Reasonableness
Path Control Measures		
Eastern Boundary Noise Barrier	Marginal	Not considered feasible to construct due to a high impact on operations (segregation of rail line from loading operations, reduction in storage space, reduction in available space for truck movements accessing the site, reach stackers/forklifts to move). Not considered reasonable due to the significant height required to provide significant attenuation under noise enhancing conditions along with accessibility constraints.
Western Boundary Noise Barrier	Negligible	Not considered feasible to construct due to a high impact on operations (segregation of rail line from loading operations, reduction in storage space, reduction in available space for truck movements accessing the site, reach stackers/forklifts to move). Not considered reasonable due to the significant height required to provide significant attenuation under noise enhancing conditions along with accessibility constraints.

The NPfI acknowledges that generally the range of noise mitigation for existing developments is more limited than that for a new development at the planning stage. As such it is acknowledged that some residual impacts, despite the implementation of feasible and reasonable mitigation options would remain.

Best practice noise mitigation and management strategies at the Site should be implemented such as:

- An awareness and understanding of noise issues and the use of quiet work practices will be included in Site inductions for all staff, contractors and visitors to the Site. Specific mention of the following items will be included:
  - Site specific noise management measures to be followed.
  - Locations of nearby noise sensitive receivers.
- The simultaneous use of multiple items of significant noise generating equipment will be avoided wherever possible, scheduling operations so they are used separately rather than concurrently.
- The noisiest activities will be scheduled to the least noise sensitive times of the day (i.e. not during the night-time period) where practicable.
- Ensure that openings to buildings are closed while noisy works are being undertaken inside.
- All machinery and plant used on- Site will be maintained and operated in a proper and efficient manner to minimise noise generation.
- Switch off plant and equipment when not in use and avoid excessive idling.
- Maintain the effectiveness of any noise suppression equipment on plant at all times and ensure defective plant is not operational until fully repaired.
- Procurement processes for new plant and equipment would be subject to the requirement that the equipment being replaced not lead to any increase in noise levels. Specify maximum allowable noise/sound levels when purchasing equipment. This would enable low noise mobile and fixed plant equipment to be used as part of future operations and continual noise improvement over time.

- An awareness of industry developments will be maintained in relation to noise mitigation engineering for individual plant items in order to assess inherent cost and practicality with a view of continuously improving noise performance.

With the inclusion of reasonable and feasible mitigation measures as appropriate the NPfI acknowledges that the significance of a residual exceedance of up to 2dB is considered to be negligible and would not be discernible by the average listener. Therefore additional noise mitigation measures such as receiver-based treatments or controls would not be warranted.

7 Rail Traffic Noise Assessment

7.1 Noise Assessment Criteria

The ARTC operates the Hunter Valley Rail Network in NSW and the extent of the network is shown in the Hunter Valley Network Corridor Diagram dated 20 October 2022 attached as **Appendix C**. Noise emissions from the ARTC's railways are regulated via their Environmental Protection Licence (EPL) No 3142 dated 3 March 2023.

In addition, the NSW EPA *Rail Infrastructure Noise Guideline* (EPA, May 2013) specifies noise and vibration trigger levels for (new and existing) heavy and light rail infrastructure projects. However, land use developments other than rail infrastructure projects (i.e. mining and extractive industries) that are likely to generate additional rail traffic on an existing rail network (i.e. the Project) with potential noise impacts are assessed against the requirements detailed in the RING Appendix 2.

The rail noise assessment criteria from EPA's RING (Appendix 2) are reproduced **Table 21**.

Table 21 RING (Appendix 2) Rail Noise Assessment Trigger Levels

Railway	Descriptor	Rail Noise Assessment Trigger Levels
ARTC Rail Network	Daytime/evening $L_{Aeq(15hour)}$	65 dBA
	Night-time $L_{Aeq(9hour)}$	60 dBA
	Maximum Pass-by [L_{Amax} (95th percentile)]	85 dBA
	Project related rail noise increase	> 0.5 dBA

Note: 95th percentile equates to the 5% exceedance value.

It is noted that rail traffic generated by facilities transporting to the Project would have been assessed and approved as part of those projects.

Trains traveling on the ARTC network to the Project would travel to Port Waratah and Bullock Island through the nearest potentially affected residential areas in the suburbs of Carrington, Tighes Hill and Mayfield. The Project does not involve any change to existing rail infrastructure (lines, sidings etc).

7.2 Rail Movements

Existing and proposed rail movements for the Project are shown in **Table 22**. It should be noted that the Project would not lead to more than one train being able to be unloaded at the site at any one time.

Table 22 Existing and Proposed Railway Traffic – Project Only

Description	Existing	Proposed	Total
Train Passbys[1] (i.e train movements through Carrington, Tighes Hill and Mayfield)	16 per week	8 per week	24 per week.

Note 1: One train arrival plus one train departure would be one load delivered to the Project and result in two passbys at receivers on the rail network.

7.3 Rail Noise Impact

The increase in the number of train movements (i.e. average increase of approximately 8 train movements per week) will give rise to an increase in the daytime/evening $L_{Aeq(15hour)}$ and night-time $L_{Aeq(9hour)}$ train pass-by noise levels on the ARTC network in the vicinity of the Project. The increase in the train pass-by noise levels (in isolation from other coal and freight traffic) can be estimated from the 50% increase in proposed train movements.

The estimated 50% increase would produce a minor 1.7 dB project related increase to the existing daytime/evening $L_{Aeq(15hour)}$ noise levels from proposed trains servicing the Project (in isolation) compared to trains servicing the existing Site (in isolation).

The Project related increase to the existing daytime/evening $L_{Aeq(15hour)}$ and night-time $L_{Aeq(9hour)}$ train pass-by noise levels from trains servicing the Project would be appreciably less than 1.7 dB if considered against the baseline of all existing and approved coal and freight train movements into Port Waratah and Bullock Island (and their associated pass-by noise levels) through Carrington, Tighes Hill and Mayfield and would be less than 0.5 dB.

As there would be no change to the types of trains associated with the Project there would be no change to the maximum train pass-by noise level [L_{Amax} (95^{th} percentile)] as a result of the Project.

8 Shipping Traffic Noise Assessment

Existing and proposed ship loads exported from the Project are shown in **Table 22**. It should be noted that the Project would not lead to more than one ship being able to be loaded at the site at any one time.

Table 23 Existing and Proposed Railway Traffic – Project Only

Description	Existing	Proposed	Total
Ship loads (i.e ship loads exported through Newcastle Harbour)	4-5 per month	2-3 per month	7 per month.

Note 1: One ship arrival plus one ship departure would be one load delivered to the Project and result in two passbys through the Port of Newcastle.

There is currently no applicable noise limits or assessment guideline for the assessment of noise from additional shipping movements on Newcastle Harbour. While ships need to be registered and ships captains licensed, it is understood that no approvals are required for ship passage through Newcastle Harbour that comply with navigational safety rules.

Notwithstanding, given that over 2,200 trade vessels use the Port of Newcastle each year (in the order of approximately 183 vessels per month) the increase in overall shipping noise levels on a monthly basis due to the Project would result in an increase of less than 0.1 dB. Noise from individual shipping movements would remain unchanged as a result of the Project.

Given that the Project would not result in a change in the way ships are loaded at the Site and the relatively small increase in vessel movements through Newcastle Harbour as a result of the Project when compared to existing vessels movements, any potential noise impacts would be considered negligible.

9 Conclusion

SLR has been engaged to assess the potential operational noise emissions from the proposed Aurizon Port Services NSW (APSN) development expansion at the Port of Newcastle. The Proposal includes the operation of light industrial warehouses used for distribution and storage of goods, which would be operational 24/7.

Operational noise levels are predicted to comply with the relevant criteria at all receivers with the exception of marginal exceedances under noise-enhancing weather conditions at the receiver R2 to the west and receiver R6 south by up to 2 dB. These exceedances are due to forklift and reach stacker operations at the north and south of the Site, respectively.

Project specific mitigation measures and operational management have been considered in **Section 6**. Provided reasonable and feasible mitigation measures and operational management procedures are implemented the residual noise is considered to be negligible and would not be discernible by the average listener.

Under standard and noise-enhancing weather conditions the sleep disturbance is expected to be compliant at all nearest noise sensitive receivers.

There is predicted to be less than a 1dB increase in traffic noise levels due to increased traffic accessing the Site, which, according to the RNP, is unlikely to be discernible and would not require consideration of mitigation.

Additional rail and shipping movements to and from the Site would lead to negligible increase in noise levels and it is concluded that the potential noise impacts would be negligible and generally remain unaltered by the Project.

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

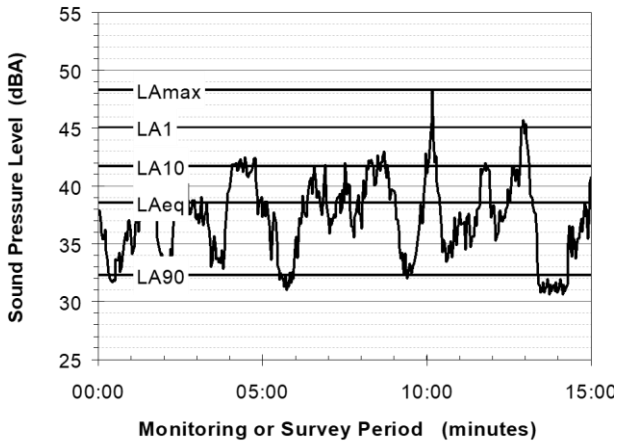
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

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 L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} 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:

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

L_{A10} The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} 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.

L_{Aeq} 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

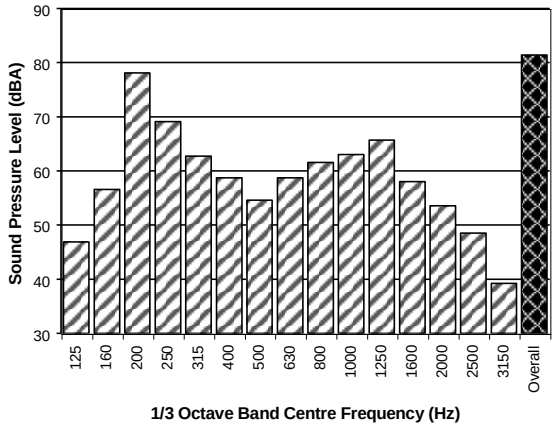
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

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

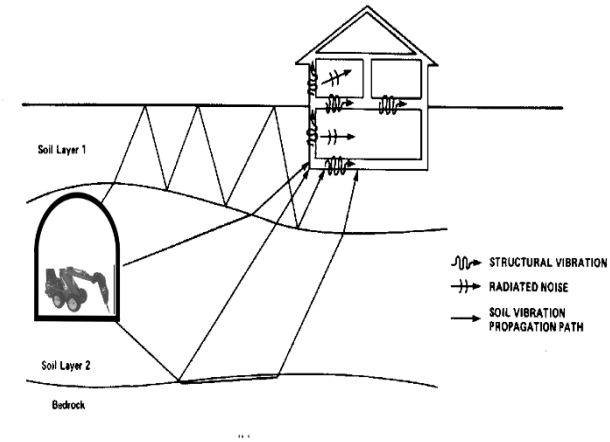
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience 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.



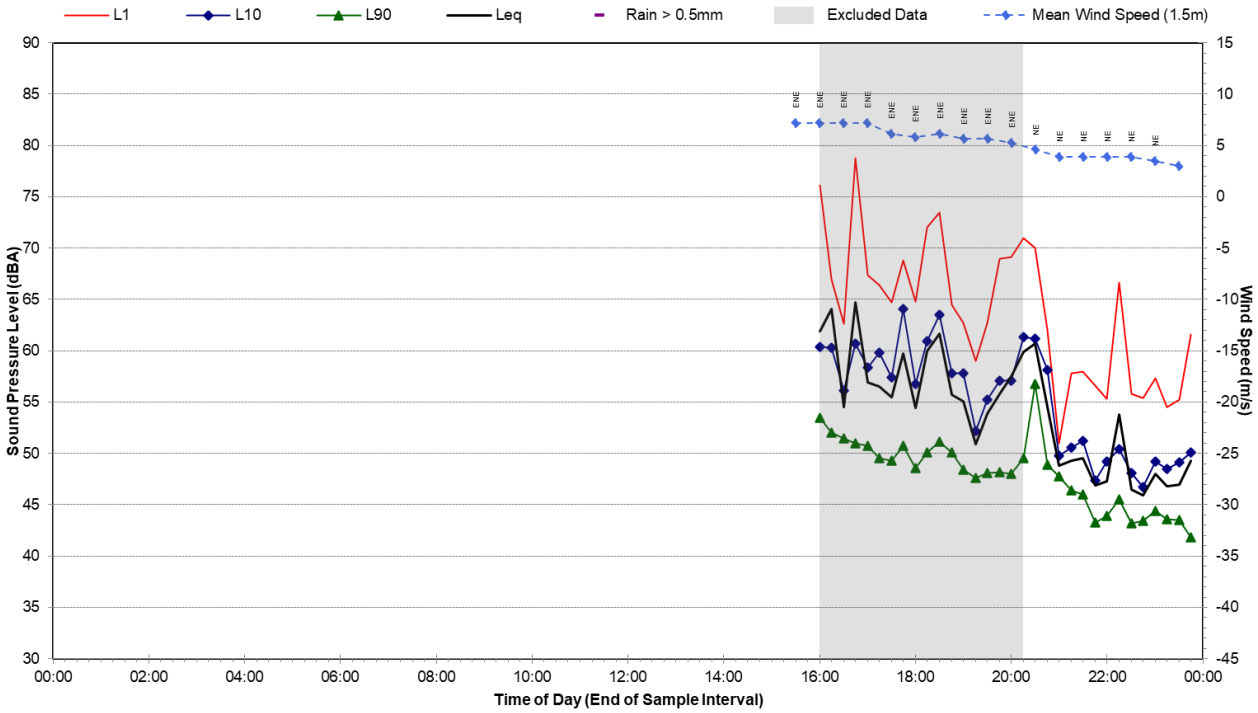
The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect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

APPENDIX B

Statistical Ambient Noise Levels

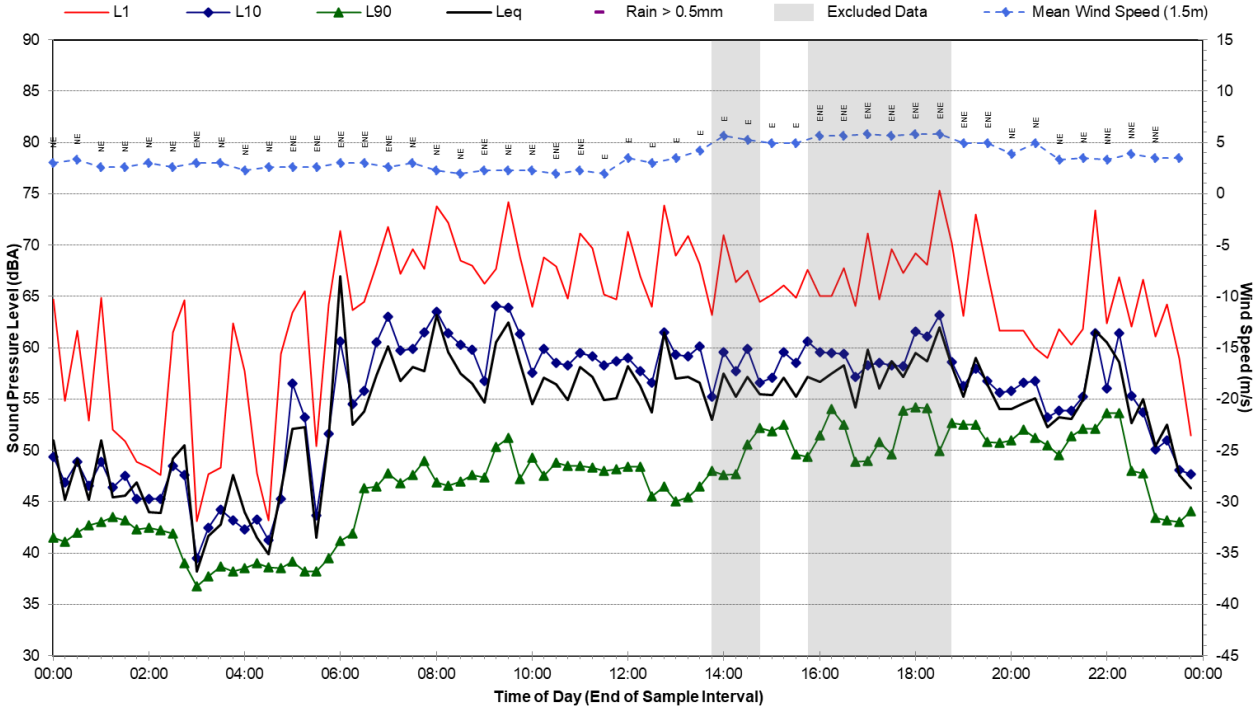
Statistical Ambient Noise Levels

L01 - 93 Bourke Street, Carrington - Tuesday, 15 February 2022



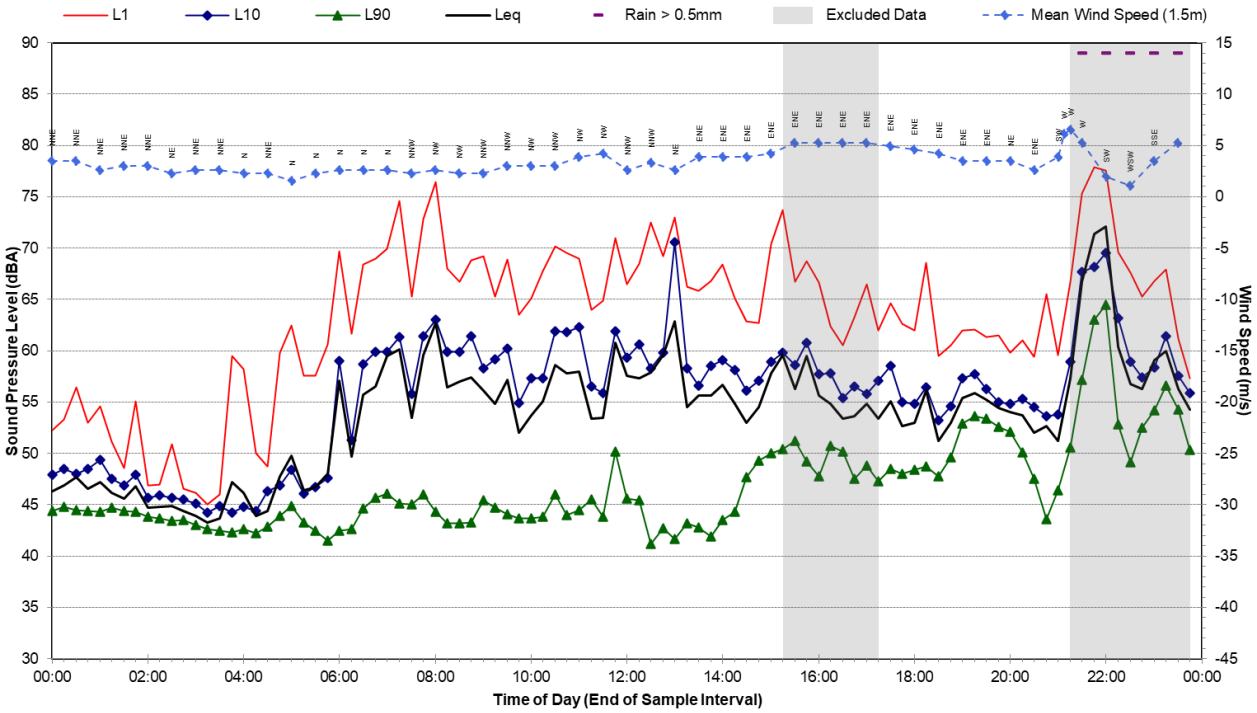
Statistical Ambient Noise Levels

L01 - 93 Bourke Street, Carrington - Wednesday, 16 February 2022



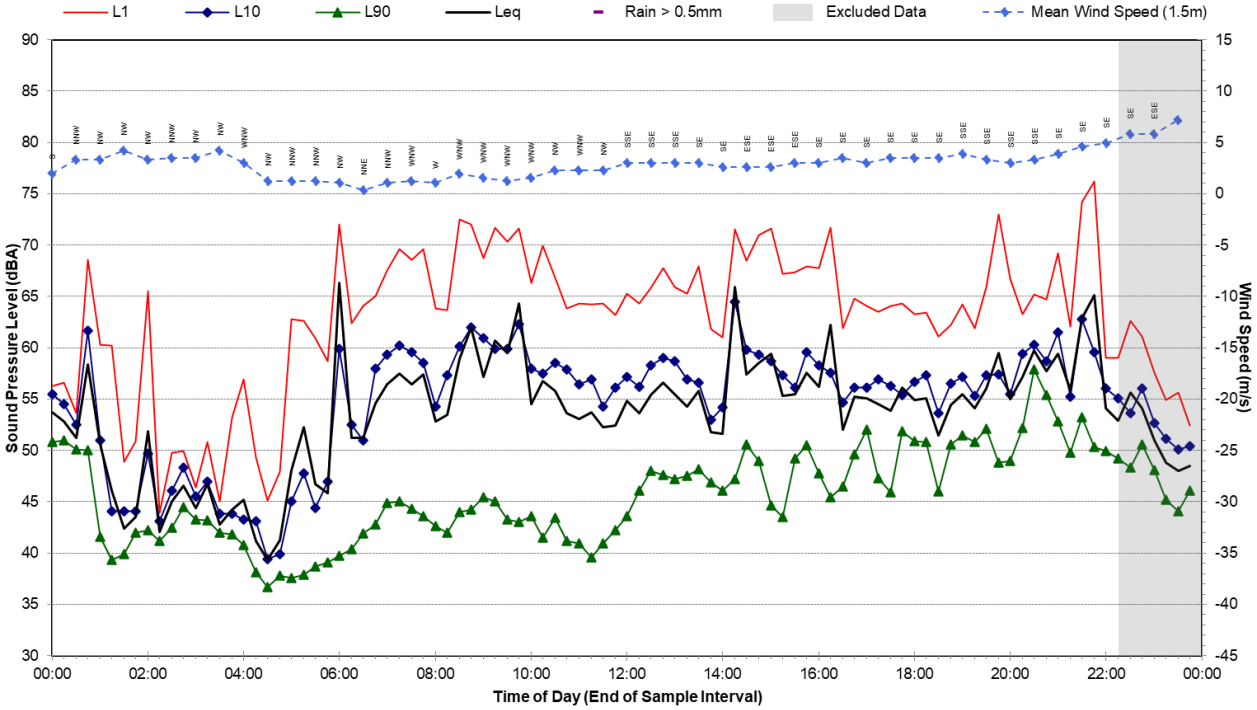
Statistical Ambient Noise Levels

L01 - 93 Bourke Street, Carrington - Thursday, 17 February 2022



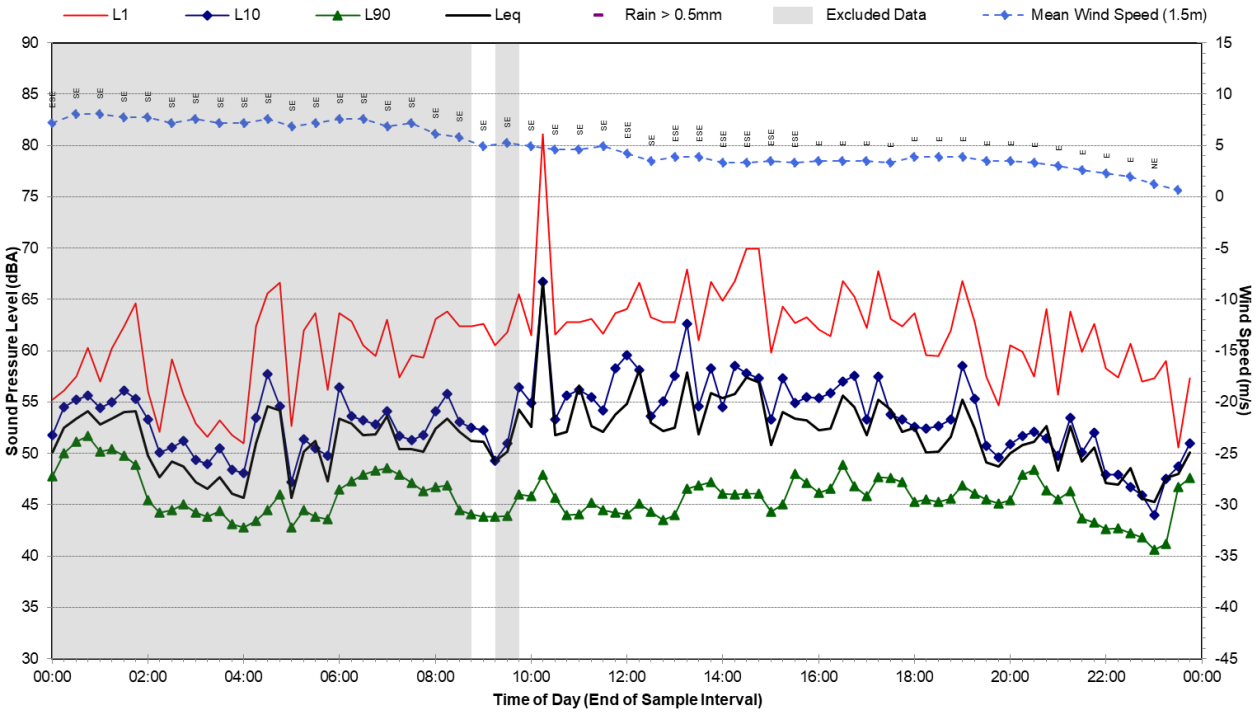
Statistical Ambient Noise Levels

L01 - 93 Bourke Street, Carrington - Friday, 18 February 2022



Statistical Ambient Noise Levels

L01 - 93 Bourke Street, Carrington - Saturday, 19 February 2022



Statistical Ambient Noise Levels

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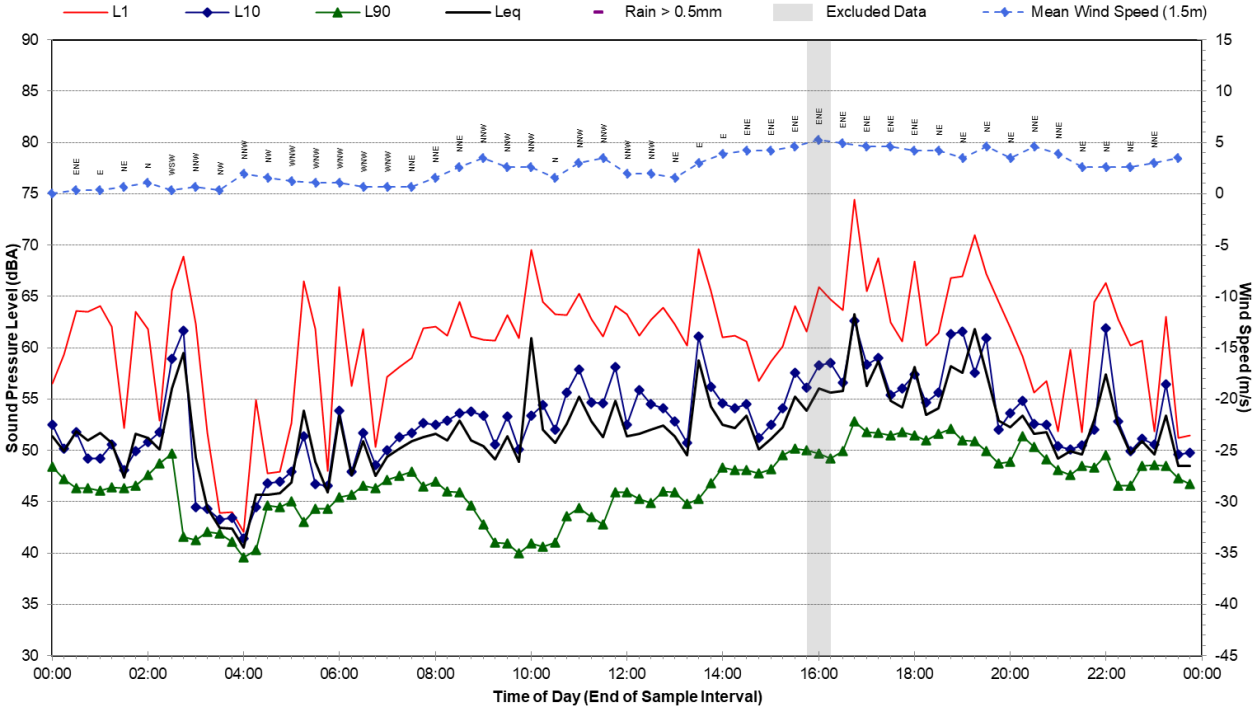
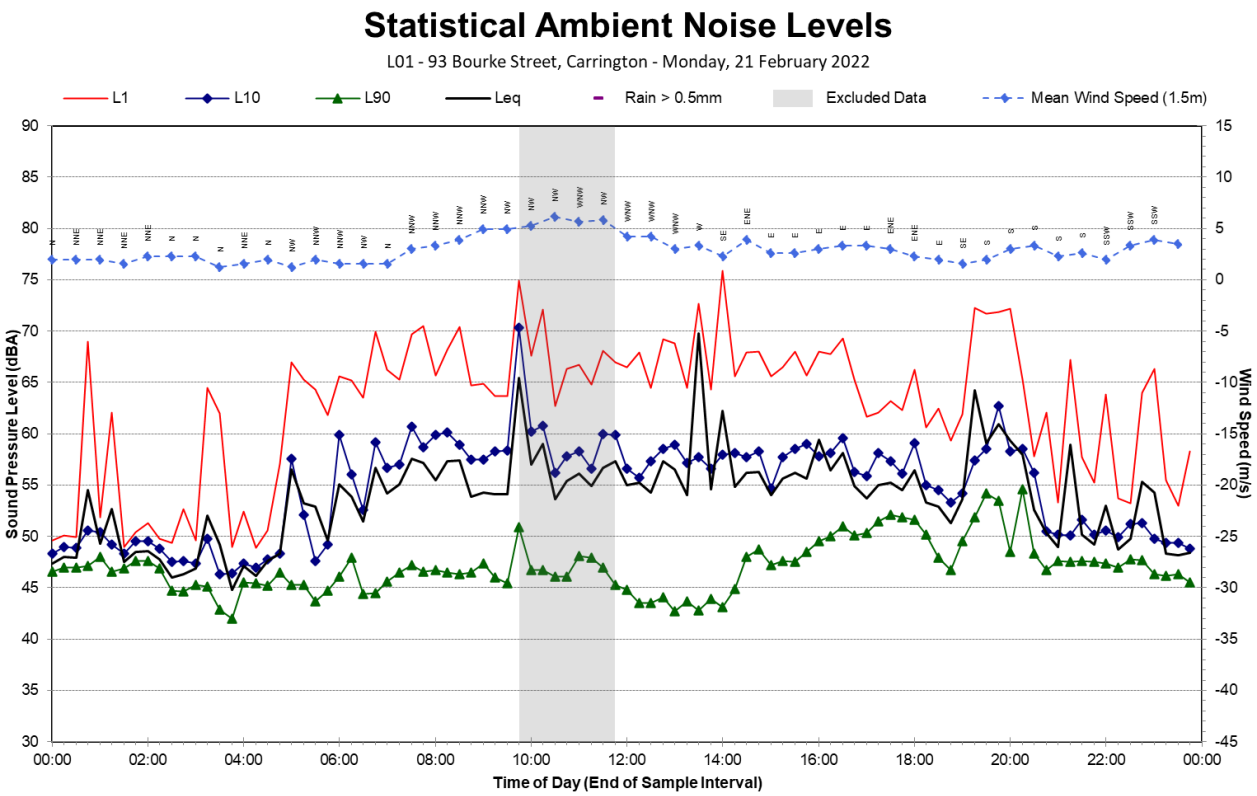
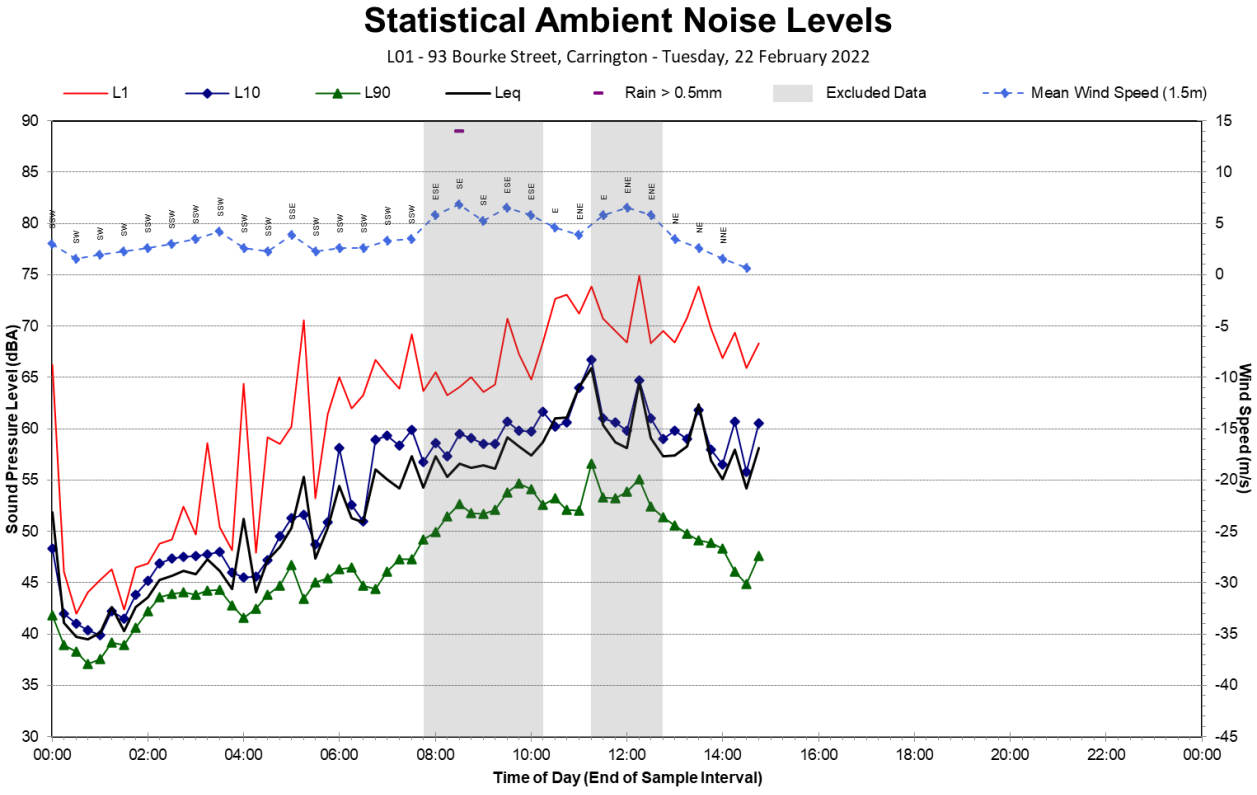



Statistical Ambient Noise Levels
L01 - 93 Bourke Street, Carrington - Monday, 21 February 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L01 - 93 Bourke Street, Carrington - Tuesday, 22 February 2022
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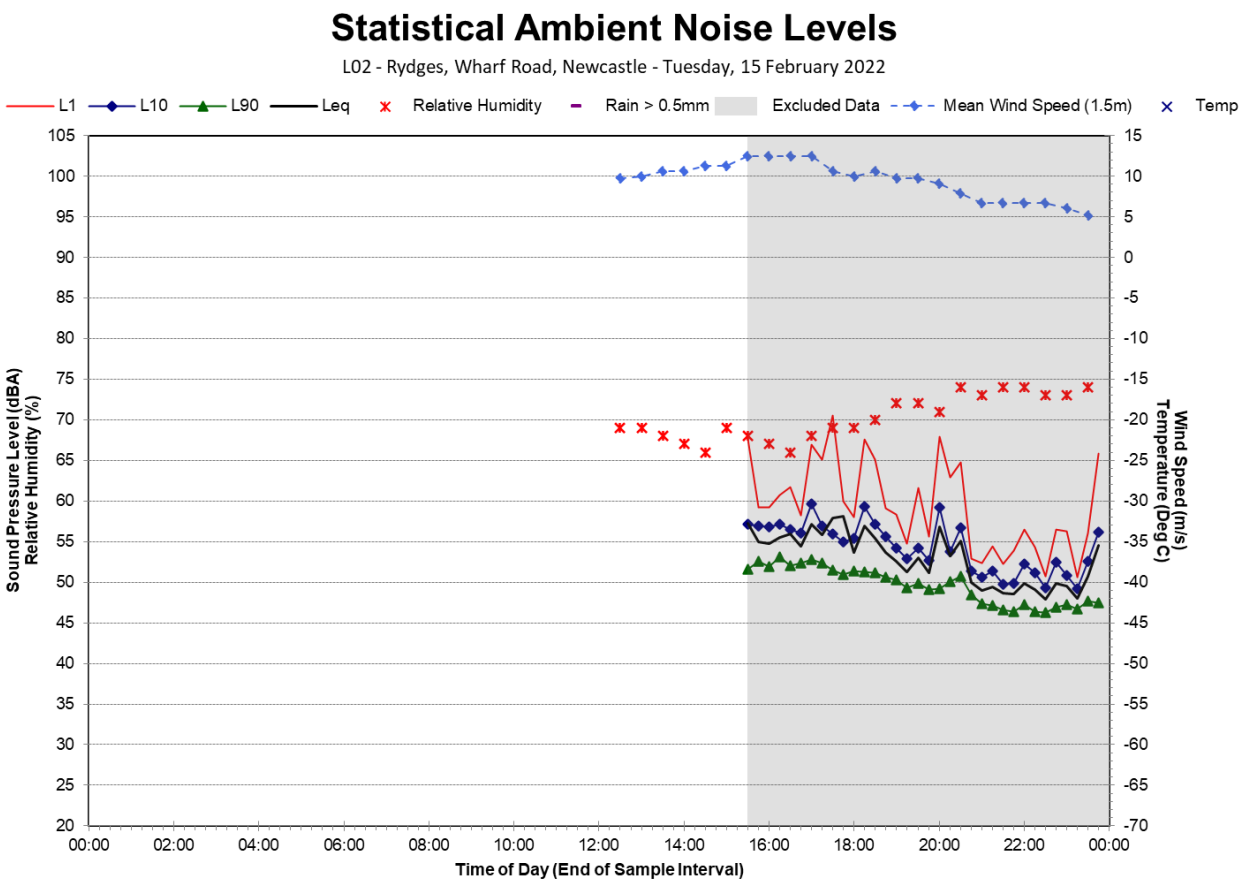
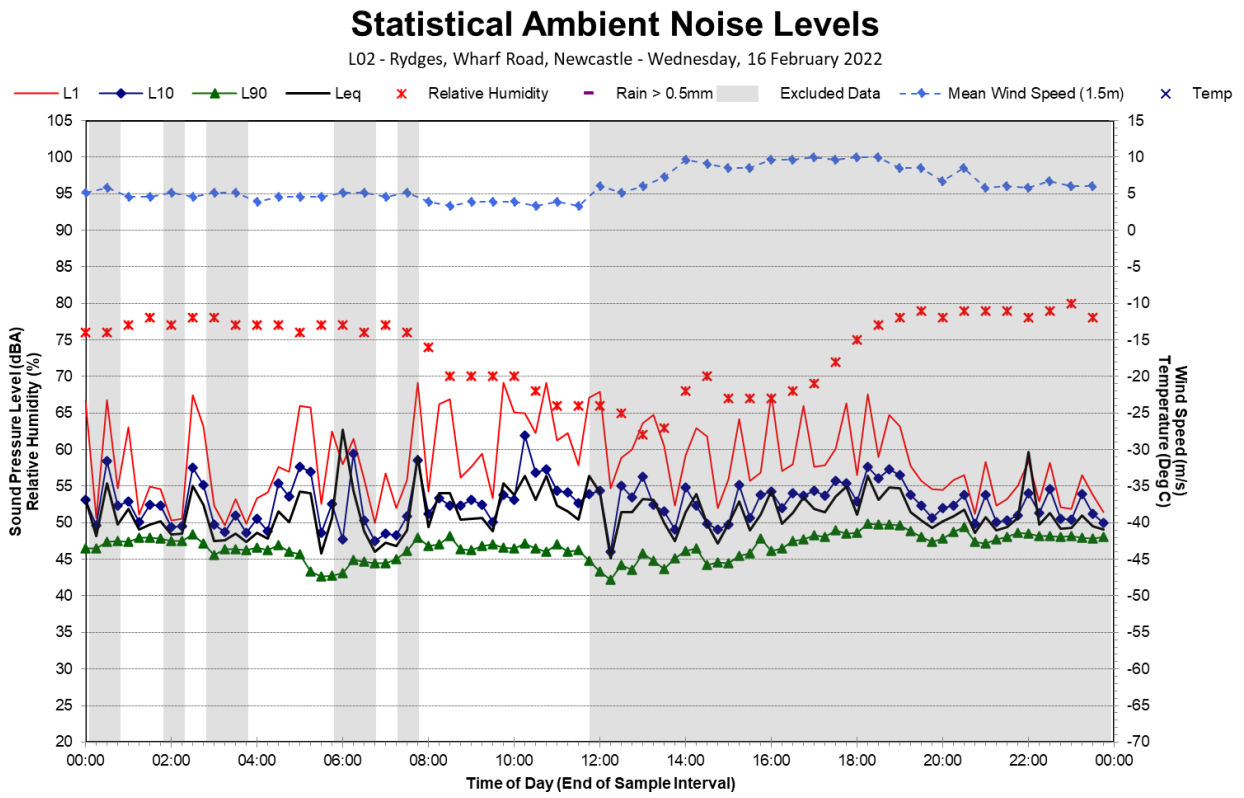
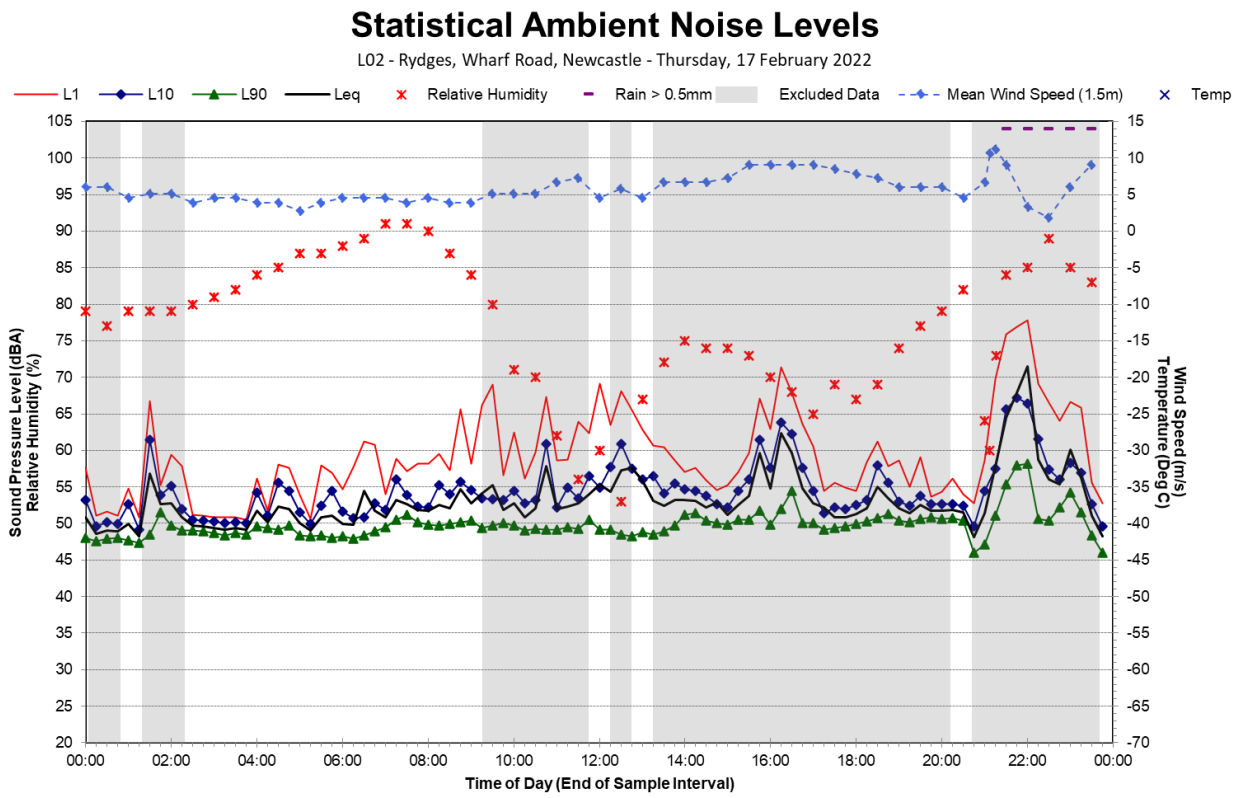
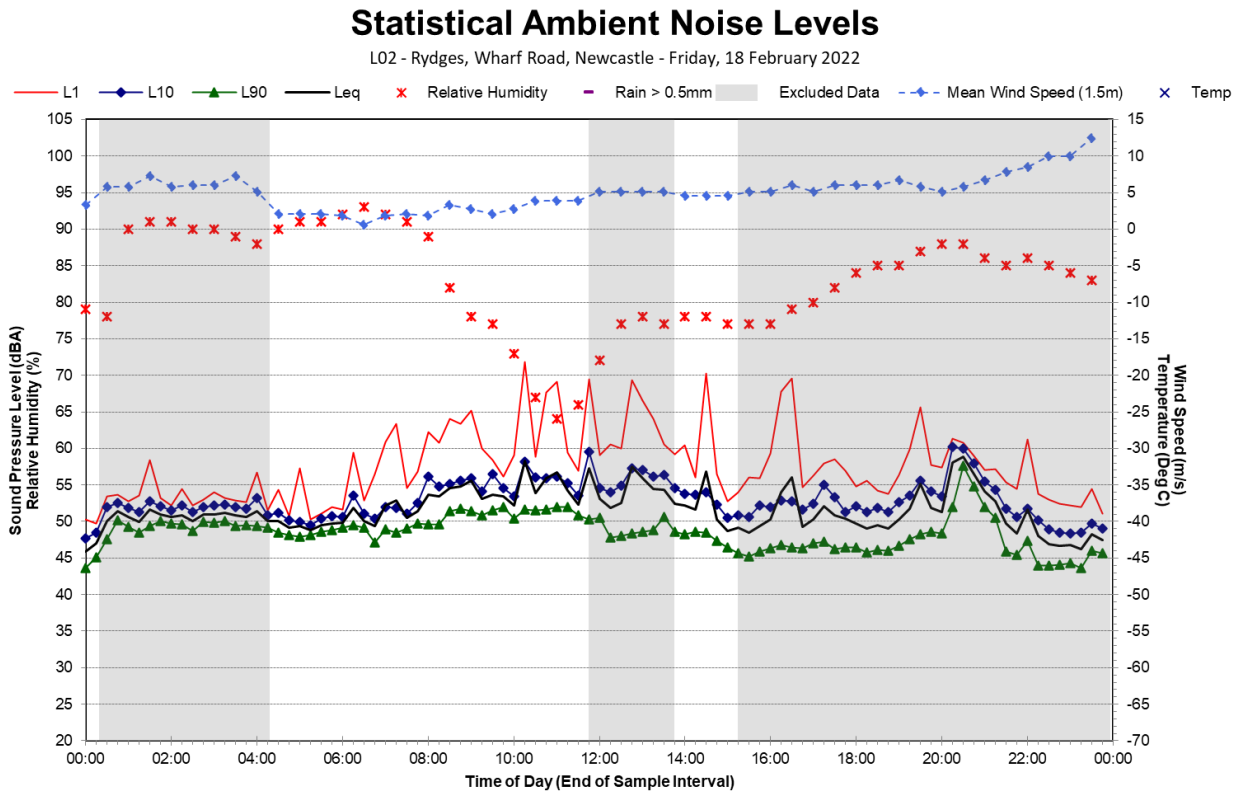
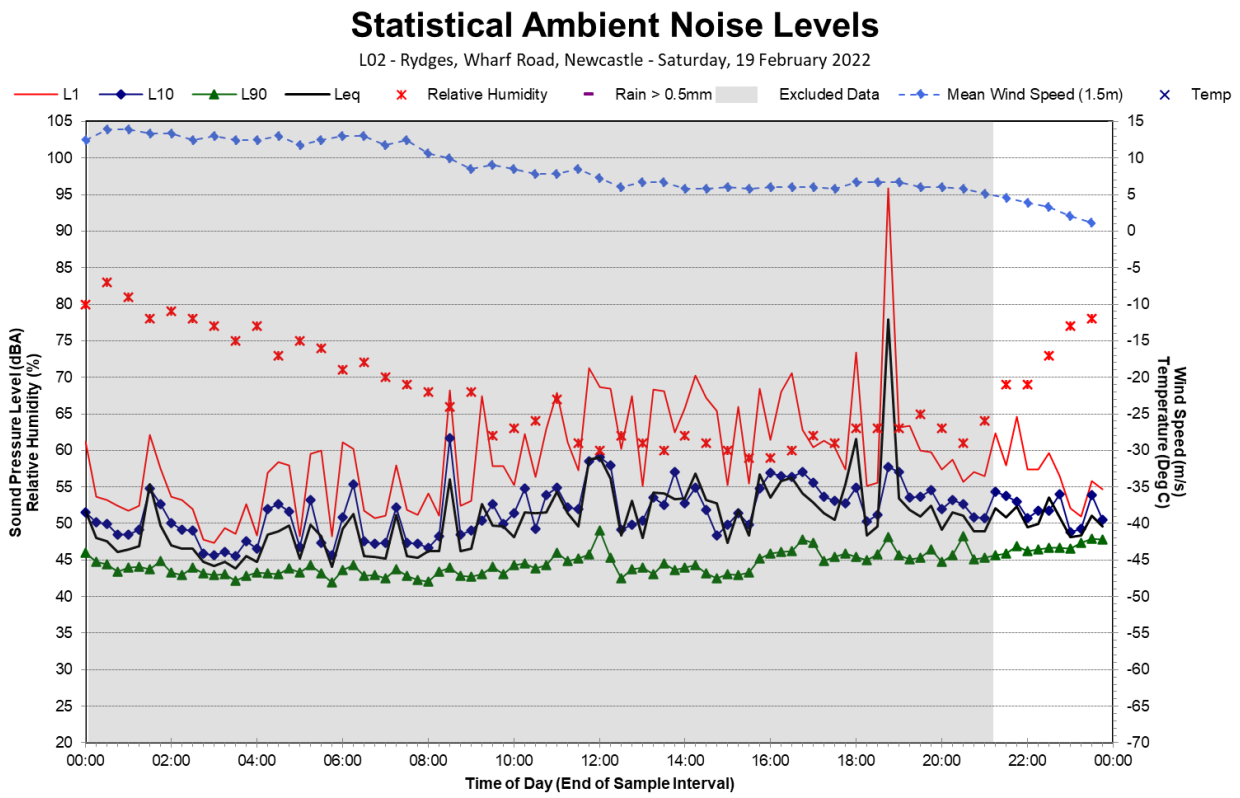
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

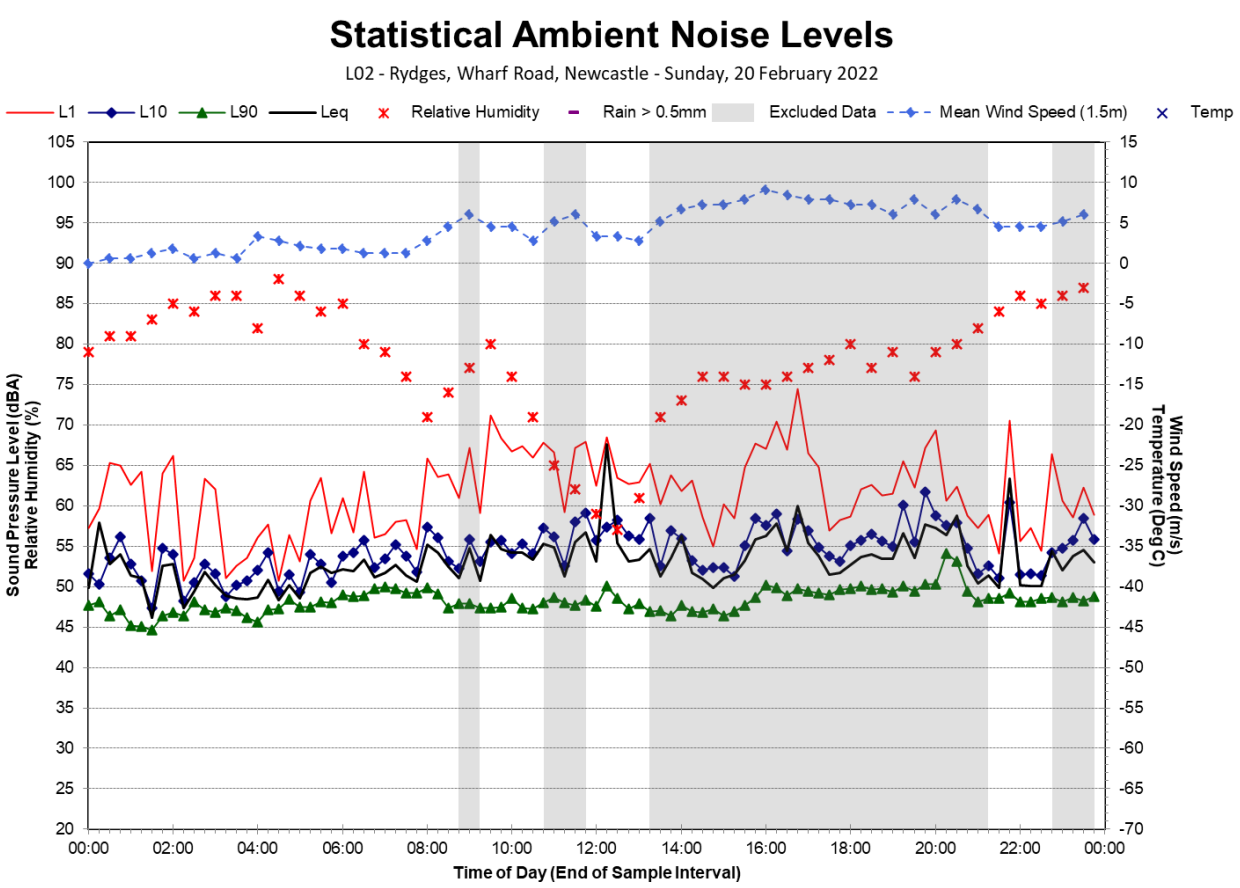

Statistical Ambient Noise Levels
L02 - Rydges, Wharf Road, Newcastle - Tuesday, 15 February 2022
L1
L10
L90
Leq
Relative Humidity
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - Rydges, Wharf Road, Newcastle - Wednesday, 16 February 2022
L1
L10
L90
Leq
Relative Humidity
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - Rydges, Wharf Road, Newcastle - Thursday, 17 February 2022
L1
L10
L90
Leq
Relative Humidity
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

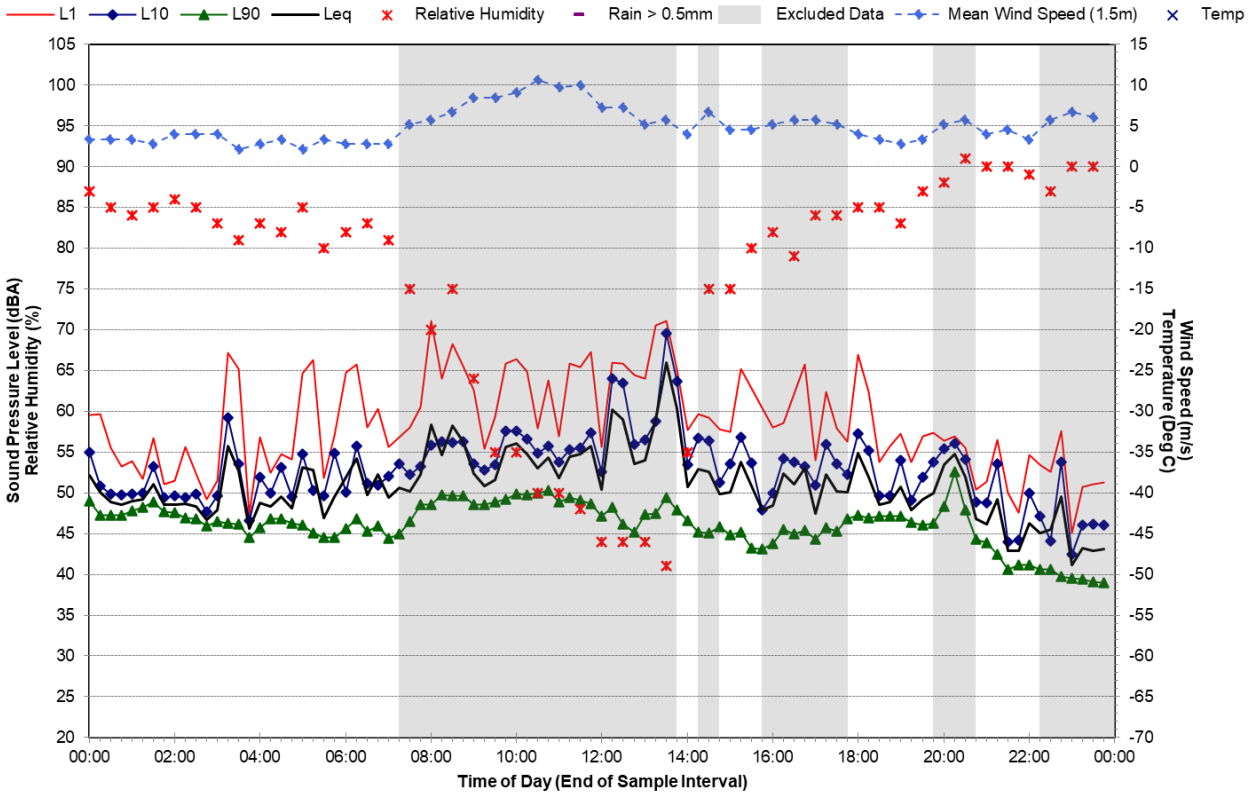

Statistical Ambient Noise Levels
L02 - Rydges, Wharf Road, Newcastle - Friday, 18 February 2022
L1
L10
L90
Leq
Relative Humidity
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - Rydges, Wharf Road, Newcastle - Saturday, 19 February 2022
L1
L10
L90
Leq
Relative Humidity
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L02 - Rydges, Wharf Road, Newcastle - Sunday, 20 February 2022
L1
L10
L90
Leq
Relative Humidity
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

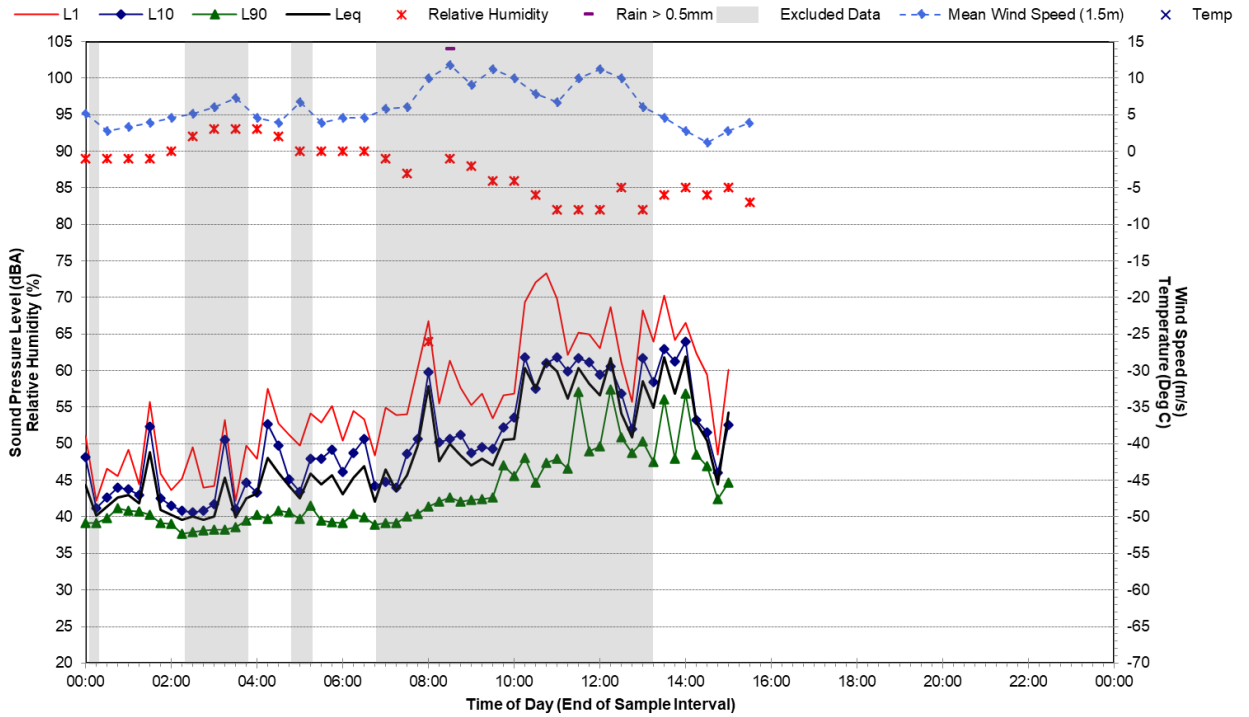
Statistical Ambient Noise Levels

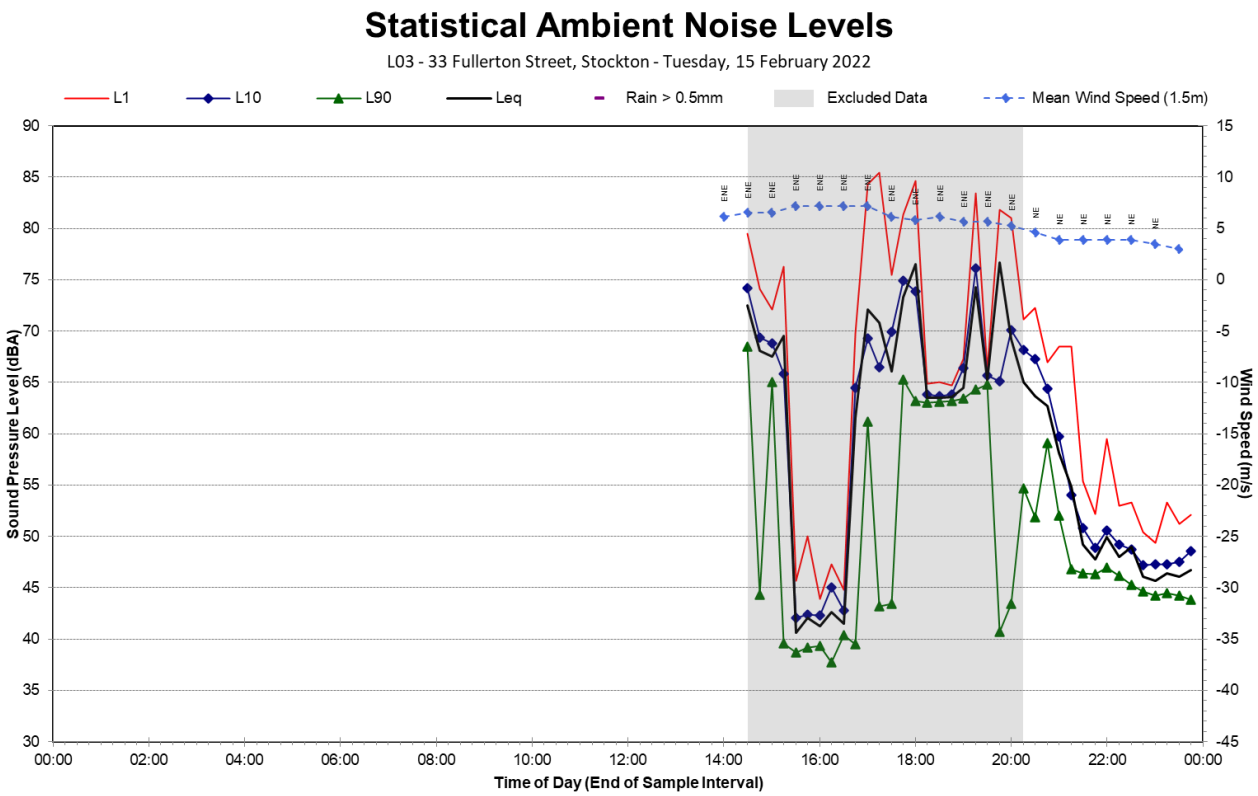
L02 - Rydges, Wharf Road, Newcastle - Monday, 21 February 2022

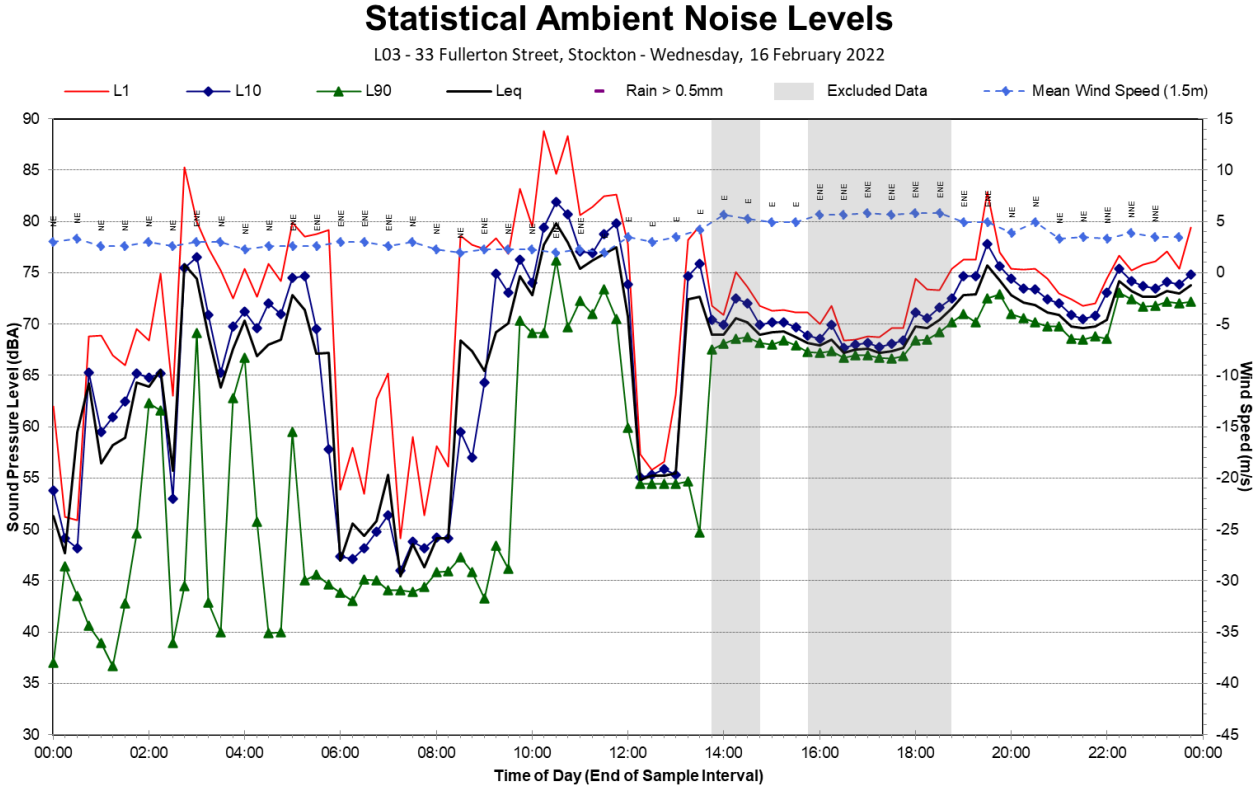


Statistical Ambient Noise Levels

L02 - Rydges, Wharf Road, Newcastle - Tuesday, 22 February 2022

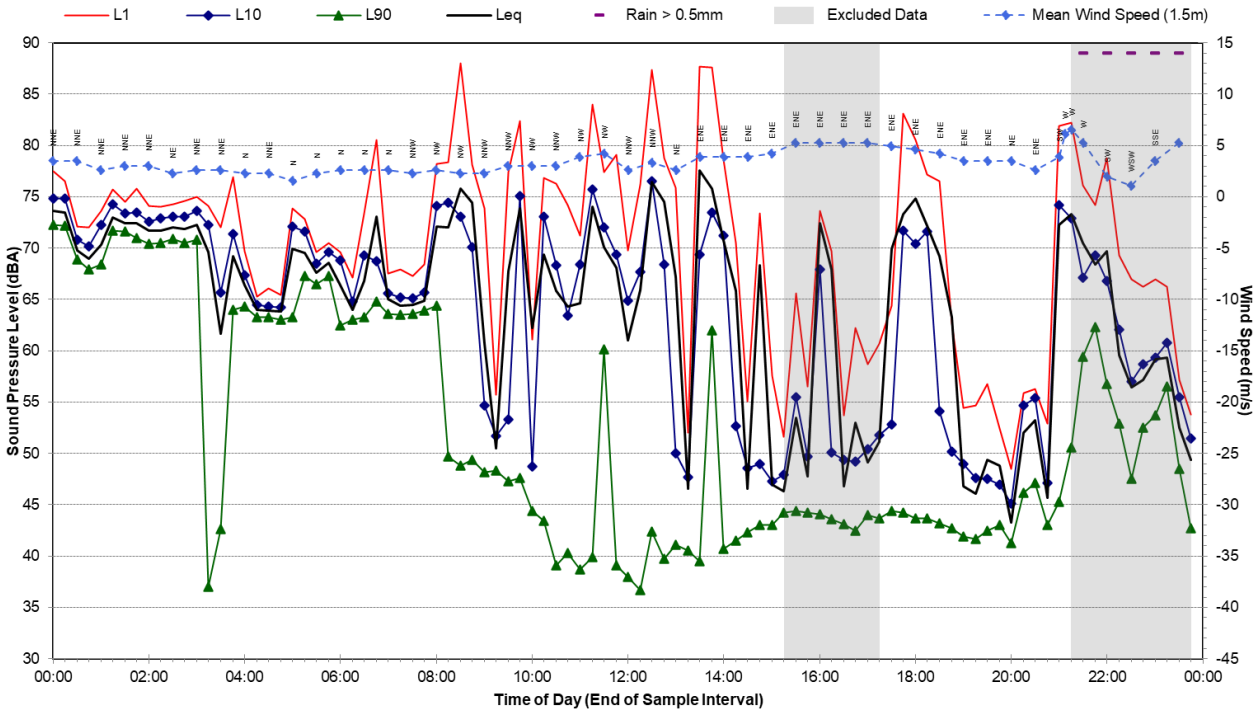



Statistical Ambient Noise Levels
L03 - 33 Fullerton Street, Stockton - Tuesday, 15 February 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L03 - 33 Fullerton Street, Stockton - Wednesday, 16 February 2022
L1
L10
L90
Leq
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)

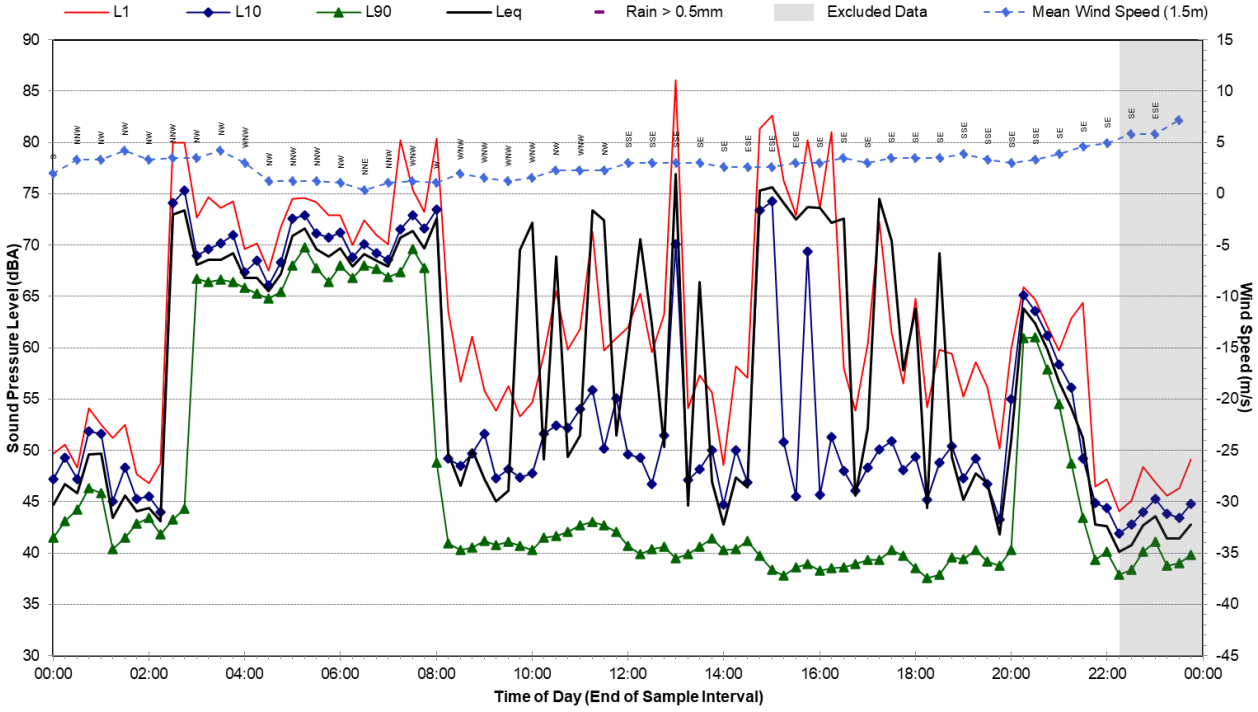
Statistical Ambient Noise Levels

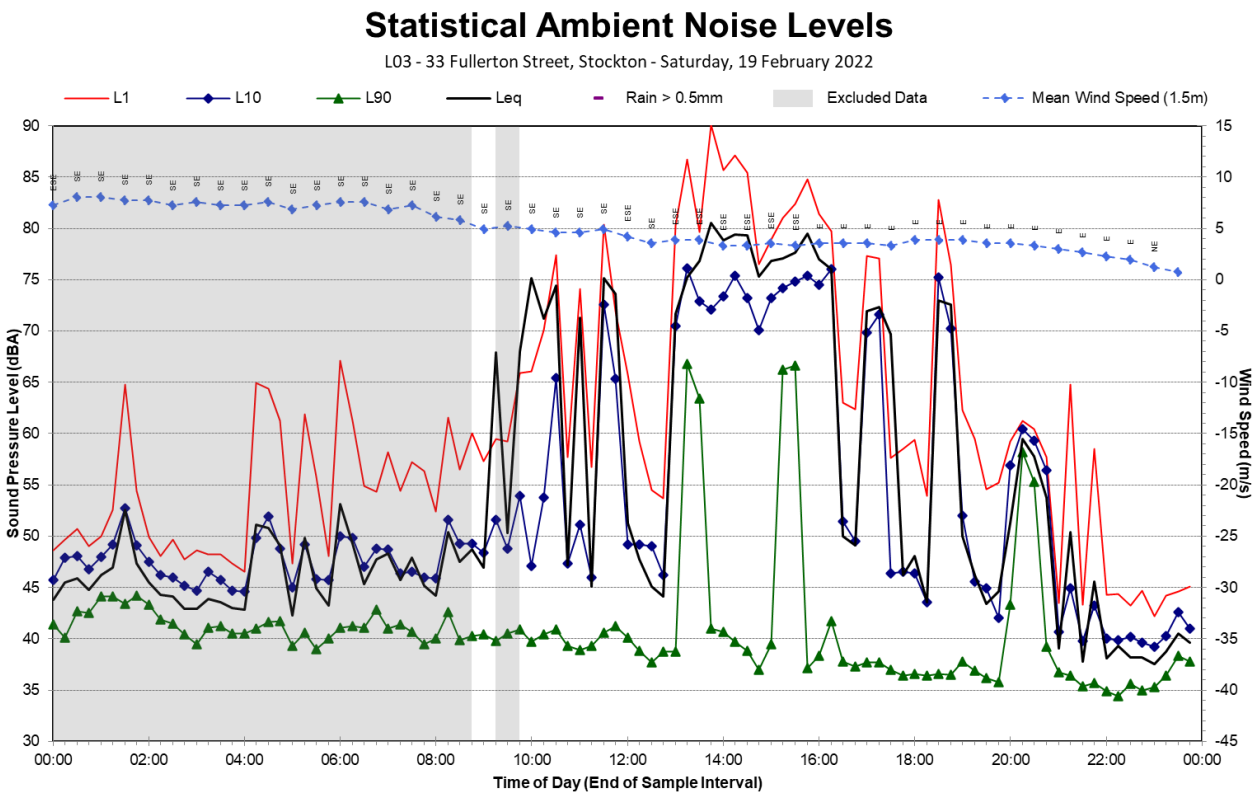
L03 - 33 Fullerton Street, Stockton - Thursday, 17 February 2022

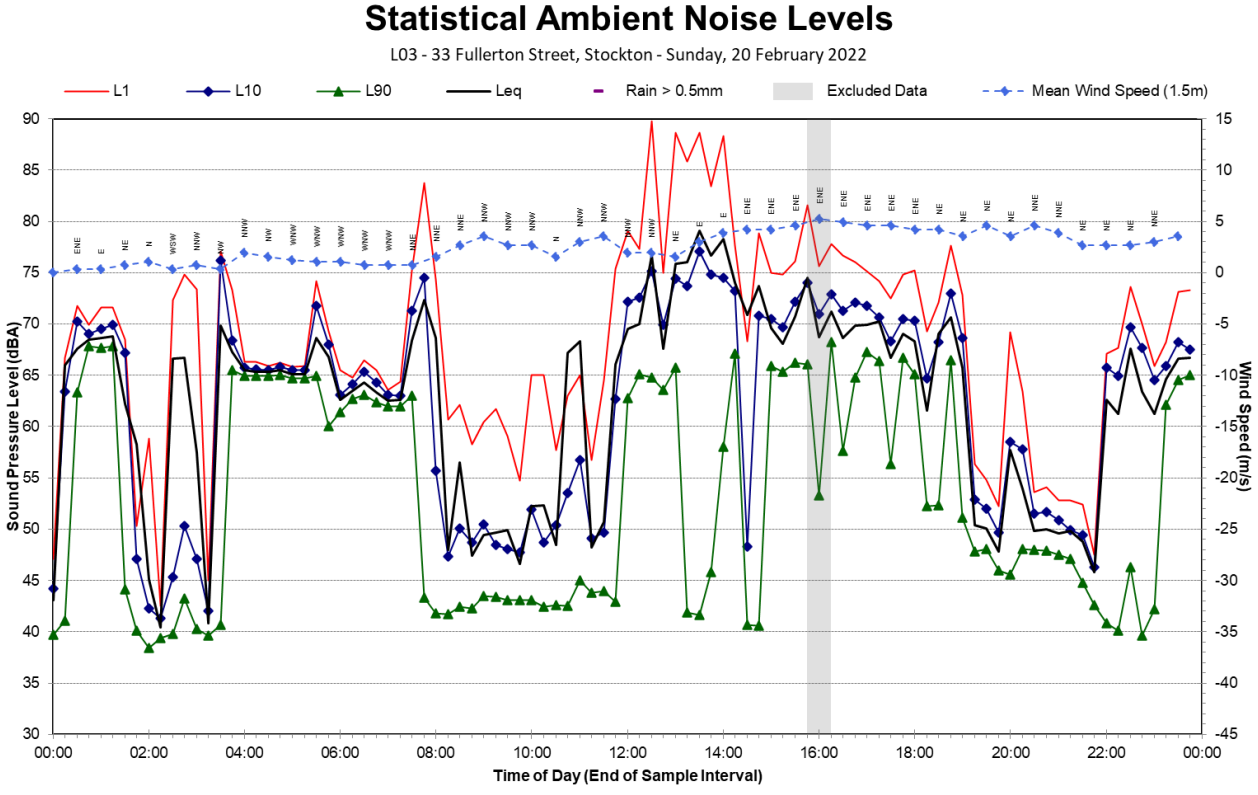


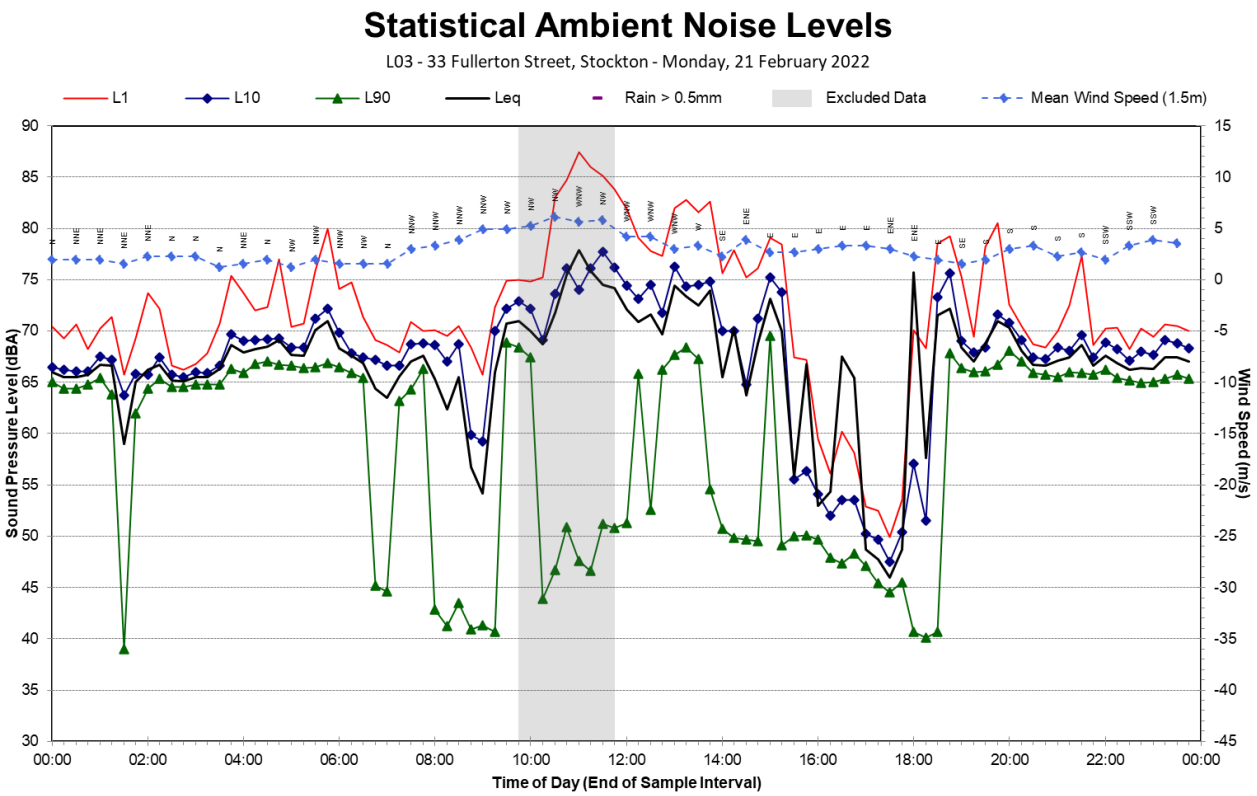
Statistical Ambient Noise Levels

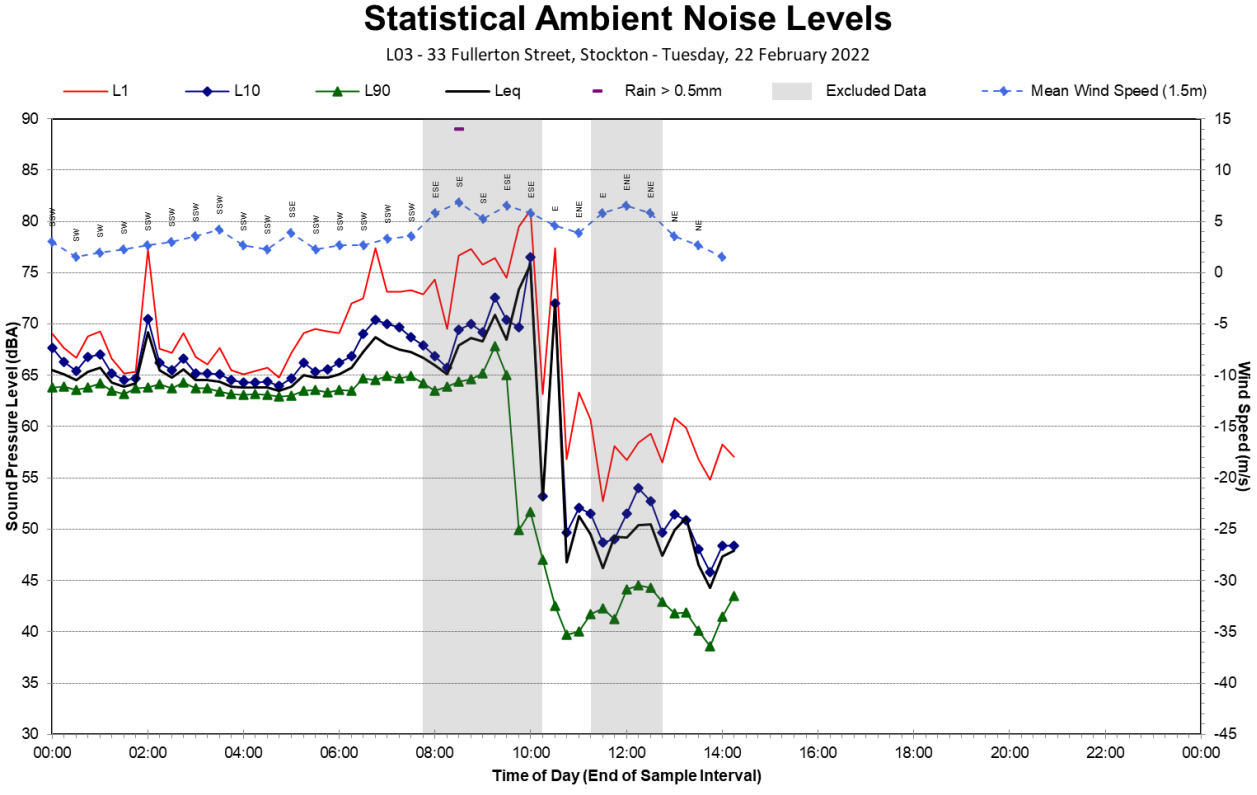
L03 - 33 Fullerton Street, Stockton - Friday, 18 February 2022




Statistical Ambient Noise Levels
L03 - 33 Fullerton Street, Stockton - Saturday, 19 February 2022
L1
L10
L90
Leq
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)

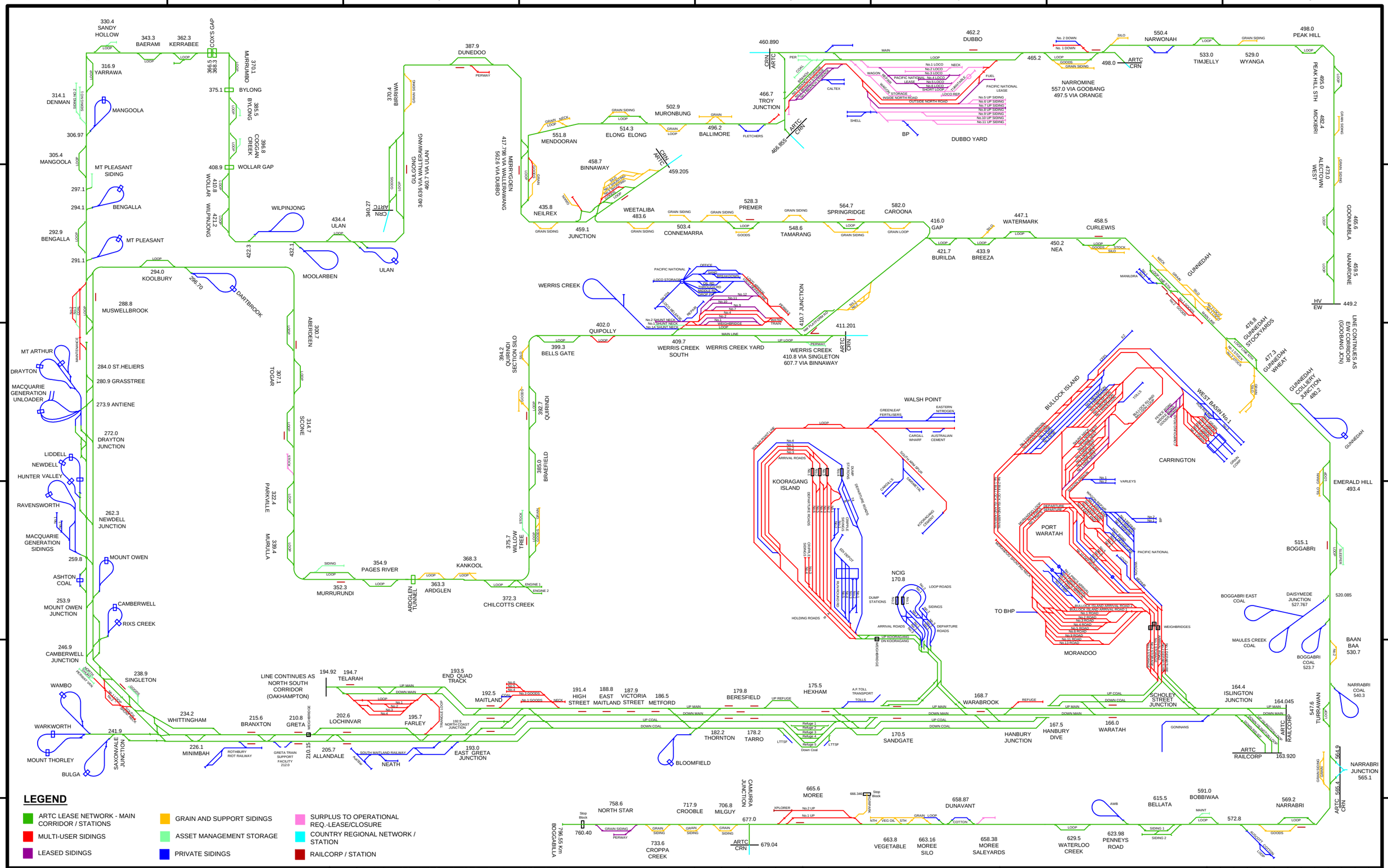

Statistical Ambient Noise Levels
L03 - 33 Fullerton Street, Stockton - Sunday, 20 February 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L03 - 33 Fullerton Street, Stockton - Monday, 21 February 2022
L1
L10
L90
Leq
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
L03 - 33 Fullerton Street, Stockton - Tuesday, 22 February 2022
L1
L10
L90
Leq
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

Hunter Valley Network Corridor Diagram



LEGEND

- ARTC LEASE NETWORK - MAIN CORRIDOR / STATIONS
- MULTI-USER SIDINGS
- LEASED SIDINGS
- GRAIN AND SUPPORT SIDINGS
- ASSET MANAGEMENT STORAGE
- PRIVATE SIDINGS
- SURPLUS TO OPERATIONAL REQ.-LEASE/CLOSURE
- COUNTRY REGIONAL NETWORK / STATION
- RAILCORP / STATION

Used on / Next higher assembly: ASSEMBLY

Filename: ARTCS3090007001.DWG

Alternate DMS number:

Rev	Date	Revision Description	Designed	Checked	Ind. Rev.	Approv.
20	Oct 22	Narrabri to North Star Inland Rail project stages 1 & 2 updated				
19	Jun 22	Mt Pleasant siding updated				
18	Nov 21	Inland Rail Parkes to Narromine changes & Gurley removal. Mt Pleasant loop added & siding updated.				
17	Jul 19	Murrurundi & Ardglen yard rationalisations & Kooragang holding roads updated, Mt Pleasant coal loop added				
16	Jun 16	Drayton Junction relief road correction				
15	Jun 15	Hexham relief roads added, Beresfield private siding removed, Gunnedah yard & NCIG flyover updated & various corrections including Dubbo, Denman, Branxton, Gulgong & Moree				
14	Dec 14	Drayton Junction down refuge loop & Maules Creek line added, NCIG & Hexham crossovers updated				

Designing Company:

Designed DATE

Checked DATE

Ind.Rev. Company | Ind.Rev. Name

Review Signature DATE

ARTC APPROVAL
Approved By

Signed:

Approval Date

ARTC

ARTCS3090007

TITLE
HUNTER VALLEY CORRIDOR NETWORK DIAGRAM

Sheet No. 1 of 1

Scale: NTS

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