1411 The Northern Road

Proposed Service Station - Planning Proposal Noise Impact Assessment0

EG Property Group Pty Ltd

Level 21, Governor Phillip Tower,
1 Farrer Place
Sydney, NSW 2000

Prepared by:

SLR Consulting Australia

SLR Project No.: 630.30368.00001

23 July 2024

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
v2.0	23 July 2024	Patrick Marshall	Martin Davenport	Martin Davenport
v1.0	28 June 2022	Kieran Murphy	Martin Davenport	Martin Davenport

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with EG Property Group Pty Ltd (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.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Table of Contents

Tables in Text

Figures in Text

Appendices

1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by EG Property Group Pty Ltd to undertake a noise impact assessment of the proposed Service Station development at 1411 The Northern Road, Bringelly. This assessment has been prepared to accompany the Planning Proposal.

This report summarises the results of ambient noise measurements undertaken at the site and assesses the potential operational noise impacts associated with the proposal.

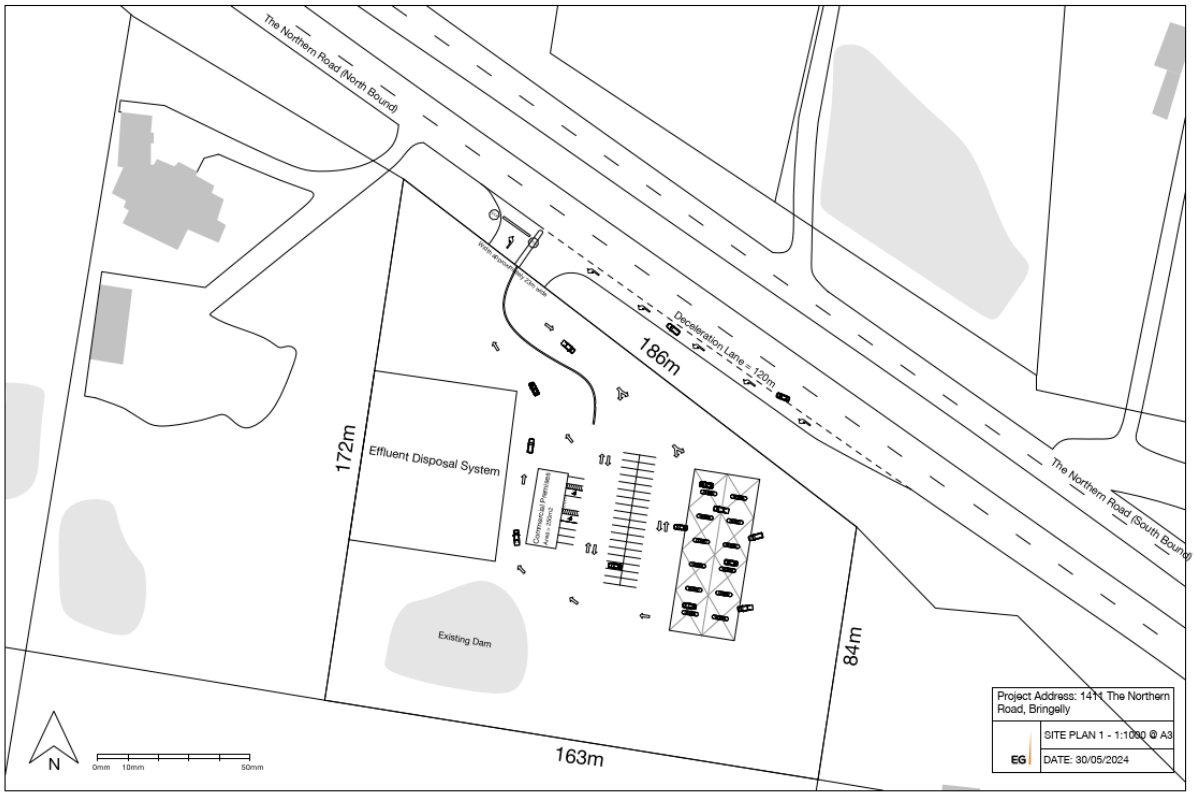
The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

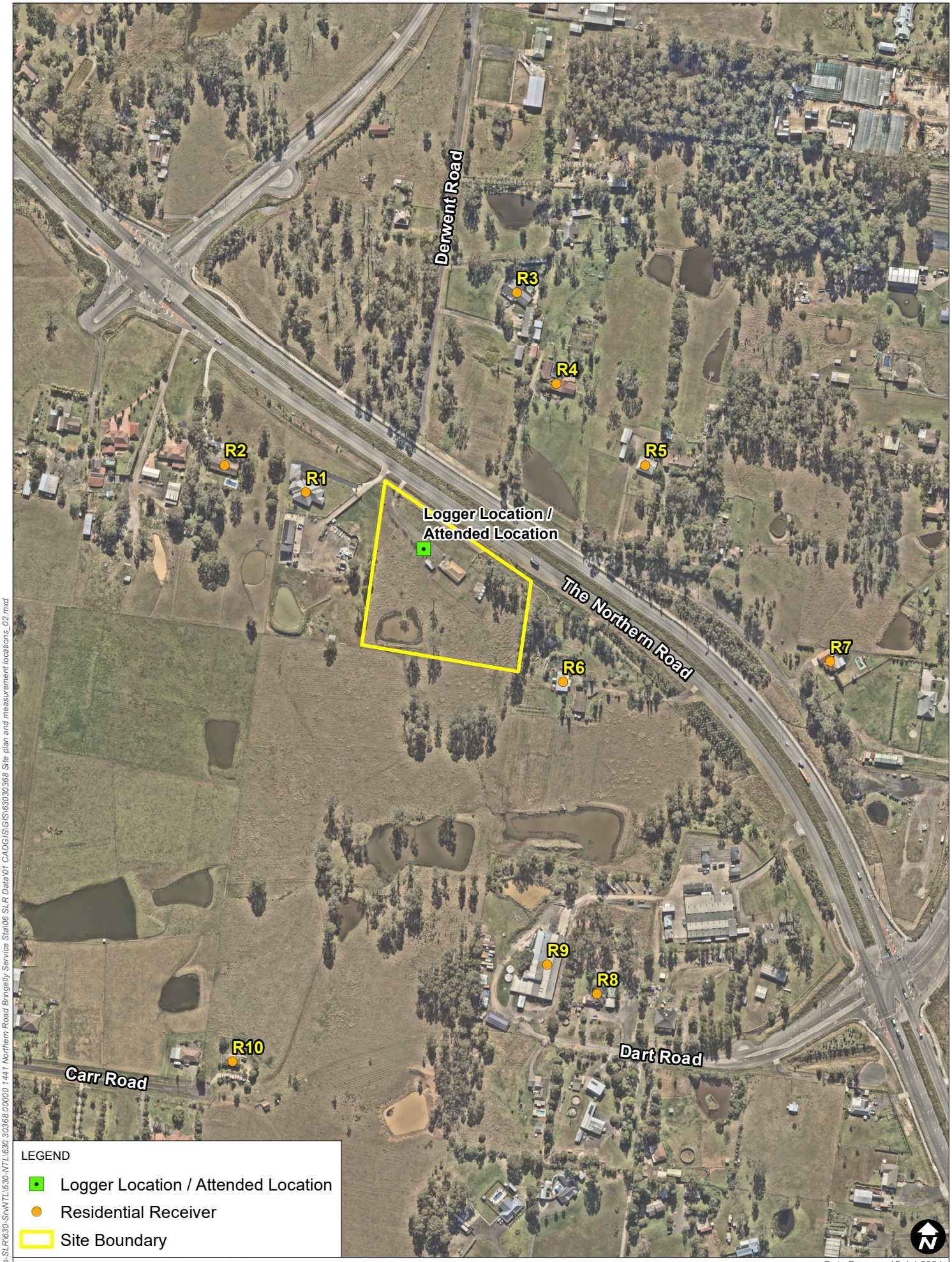
1.1 Proposal Description

The proposed development is located at 1411 The Northern Road, Bringelly. The site is adjacent to The Northern Road.

The proposed development layout is shown in **Figure 1** with the site locality shown in **Figure 2**.

Figure 1 Proposal Development





Scale: 1:5,000 at A4
Coordinate System: GDA 1994 MGA Zone 56

Date Drawn: 15-Jul-2024
Project Number: 630.30368

SLR

SITE LOCALITY

FIGURE 1

\\au.slr.local\Corporate\Projects-SLR\630-SrvNTL\630.30368.00000 1441 Northern Road Bringelly Service Stat\06 SLR Data\01 CADGIS\GIS\630303368 Site plan and measurement locations_02.mxd

Operating hours for the development would typically be 24/hrs 7 days a week. Deliveries to and from the development could occur at any time during the opening hours, on any day of the week.

The identified sources of noise from the proposed development include:

- Mechanical plant
- Truck and light vehicle movements on internal access roads and parking areas.

1.2 Nearest Receivers

The nearest sensitive receivers are residential properties located 40 m to the West and 50 m to the East. The nearest receivers are shown in **Figure 2** and **Table 1**.

Table 1 Surrounding Sensitive Receivers

RID	Address	Type	Distance (m)	Direction
R01	1431 The Northern Road, Bringelly	Residential	40	West
R02	1445 The Northern Road, Bringelly	Residential	150	West
R03	1430 The Northern Road, Bringelly	Residential	240	North
R04	1412 The Northern Road, Bringelly	Residential	160	North
R05	1402 The Northern Road, Bringelly	Residential	170	North-East
R06	1375 The Northern Road, Bringelly	Residential	50	East
R07	1370 The Northern Road, Bringelly	Residential	300	East
R08	35 Dart Road, Bringelly	Residential	350	South
R09	45 Dart Road, Bringelly	Commercial	270	South
R10	65 Carr Road, Bringelly	Residential	440	South

2.0 Existing Noise Environment

The existing noise environment at the site is generally dominated by road traffic from the surrounding road network with the nearest major road being The Northern Road, which is located 15 m to the north.

2.1 Existing Noise Survey and Monitoring

Unattended noise monitoring was completed in the study area during May 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 (measured at Badgerys Creek), such as strong wind

or rain in accordance with NPfI procedures, to establish representative existing noise levels in the study area.

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

Table 2 Summary of Unattended Noise Logging Results

LID	Address	Measured Nise Levels (dBA)					
		Background Noise (RBL)			Average Noise (LAeq)		
		Day	Evening	Night	Day	Evening	Night
L01	1411 The Northern Road, Bringelly	44	41	38	56	52	51
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 the monitoring location. The attended noise measurement was performed using a Bruel & Kjaer 2270 sound level meter (Serial Number 3004635).

The attended measurement allow for the contributions of the various noise sources at each location to be determined. Detailed observations from the attended measurements are provided in **Table 3**.

Table 3 Operator Attended Noise Monitoring Results

AID	Location	Date/ Start Time/ Weather	Primary Noise Descriptor (dBA re 20 uPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
			LAmax	LA1	LA10	LA90	LAeq	
A01	1411 The Northern Road, Bringelly	19/5/2022 13:02 18°C 2 m/s S	71	66	59	44	55	Aircraft 55-71 Traffic 44-67 Birds 54-61

The existing noise environment is dominated by road traffic from the surrounding road network with the nearest major road being The Northern Road.

3.0 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.

Although the nearest receivers adjacent the proposal are zoned RU4, the acoustic environment in the area surrounding the proposal is considered to be 'urban' as per the NPfI definitions.

Notwithstanding the existing 'urban' acoustic environment, from consultation with council, the area surrounding the proposal has been requested to be considered as 'rural'.

3.1.2 Project Noise Trigger Levels

The trigger levels for industrial noise from the proposal are summarised in **Table 4**. 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 4 Project Noise Trigger Levels

RID	Receiver Types	Period	Amenity Noise Level L_{Aeq} (dBA)	Measured Noise Level (dBA)		PNTLs $L_{Aeq(15minute)}$ (dBA)	
				RBL[1]	$L_{Aeq(period)}$	Intrusiveness	Amenity[2,3]
R1-R8, R10	Residential	Day	50	44	56	49	**48**
		Evening	45	41	52	46	**43**
		Night	40	38	51	43	**39[4]**
R9	Commercial	When in use	65	-	-	-	63

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 likely to be built in the area in the future.

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 measured L_{Aeq} noise level was dominated by existing road traffic noise and exceeds the recommended amenity noise level by 10 dB or more, therefore, the 'high traffic project amenity noise level' is the existing $L_{Aeq(traffic)}$ noise level minus 15 dB, as outlined in the NPfI.

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 residential receiver is provided in **Table 5**.

Table 5 Sleep Disturbance Criteria

Receiver Type	Sleep Disturbance Criteria (dBA)	
	L_{AFmax}	$L_{Aeq(15minutes)}$
All Residential	53	43

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 6** 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 6 are external noise levels and refer only to road traffic noise; they do not include ambient noise from other sources.

Table 6 RNP Criteria for Assessing Traffic on Public Roads

Road Category	Type of Project/Land Use	Assessment Criteria	
		Daytime (7am – 10pm)	Nighttime (10pm – 7am)
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'.*

4.0 Methodology

The potential operational noise levels from the proposal have been predicted to the surrounding receivers using CONCAWE industrial noise algorithm in SoundPLAN V8.2. 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 development is provided below.

Details of typical operational noise sources are shown in **Table 7**.

Table 7 Typical Operational Noise Sources

Plant and Equipment	Sound Power Level (dBA)	Number of Plant Equipment Operational in a 15-minute Period		
		Day	Evening	Night
On-Site Traffic				
Truck	102	4	2	2
Cars	85	35	8	8
Mechanical Plant				
Rooftop Fans	85	2	2	2
Condenser Units	90	2	2	2

Note 1: It has been assumed that the Project would be 100% utilised during the daytime period, 40% utilised during the evening and 5% utilised during the night-time period.

4.1.1 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 8 Sleep Disturbance Noise Events

Source	L_{Amax} (dBA)
Truck Manoeuvring	108
Truck (air release)	115
Car	94

4.2 Weather Conditions

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 9**.

Table 9 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 10**.

Table 10 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

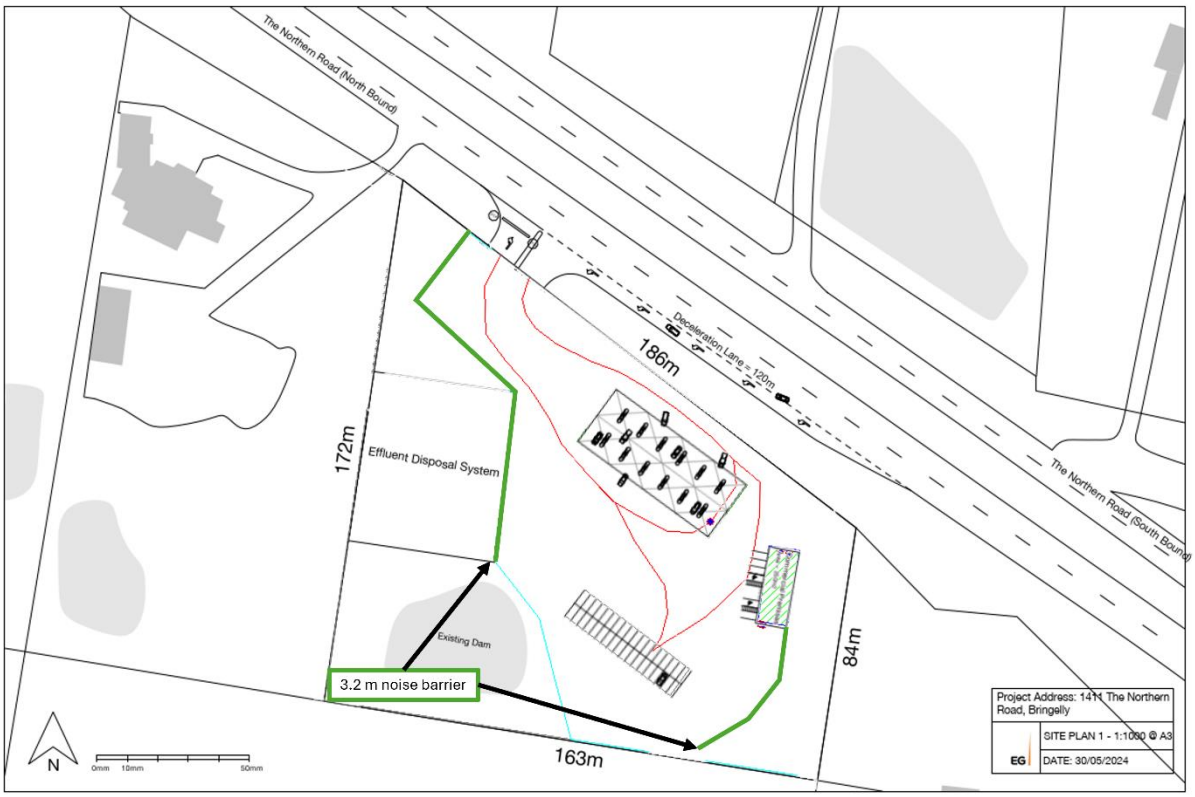
5.0 Noise Assessment

5.1 Preliminary Noise Modelling and Mitigation

Preliminary noise modelling indicated that exceedance of the PNTLs would be likely without noise mitigation measures in place. Given the proximity of the nearest residential receivers and the topography, the following noise mitigation measures are proposed:

- Re-arrangement of the proposed layout as shown in **Figure 3.**
- A 3.2 m high noise barrier be installed to the east and west of the property driveway and hardstand areas, as shown in **Figure 3**.

Figure 3 Proposed Noise Mitigation Layout



5.2 Predicted Noise Levels

A summary of the noise assessment at the receivers surrounding the proposal is shown in **Table 11**. The predicted levels are compared to the PNTLs to determine the potential impact from the proposal.

Table 11 Predicted Noise Levels

RID	Receiver Type	Period	Criteria	Predicted Noise Levels L_{Aeq} (dBA)	
				Standard	Noise Enhancing
R01	Residential	Day	48	45	47
		Evening	43	39	41
		Night	39	39	40
R02	Residential	Day	48	30	32
		Evening	43	24	26
		Night	39	23	26
R03	Residential	Day	48	37	39
		Evening	43	31	33
		Night	39	30	33
R04	Residential	Day	48	41	44
		Evening	43	35	38
		Night	39	35	37
R05	Residential	Day	48	40	42
		Evening	43	34	37
		Night	39	34	36
R06	Residential	Day	48	45	46
		Evening	43	39	41
		Night	39	38	39
R07	Residential	Day	48	32	35
		Evening	43	27	30
		Night	39	27	30
R08	Residential	Day	48	33	36
		Evening	43	28	31
		Night	39	27	30
R09	Commercial	Day	63	35	38
		Evening	63	30	33
		Night	63	29	32
R10	Residential	Day	48	29	33
		Evening	43	25	28
		Night	39	23	26

Note: Red text indicates that the predicted noise levels exceed the noise criteria.

Noise from the proposal is predicted to comply with the PNTLs at all receivers under standard and noise-enhancing weather conditions except for at R1 during the night under noise enhancing weather conditions where a there is residual exceedance of 1 dB predicted at R1.

Within the NPfI, Table 4.1 (reproduced below in **Table 12**) provides guidance to the significance of the residual noise levels above the PNTLs where all feasible and reasonable noise mitigation measures have been applied.

Table 12 Significance of Residual Noise Impacts (*NPfI Table 4.1)*

If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Then the significance of residual noise level is:
≤ 2 dB(A)	Not applicable	Negligible
≥ 3 but ≤ 5 dB(A)	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1dB	Marginal
≥ 3 but ≤ 5 dB(A)	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB	Moderate
> 5 dB(A)	≤ recommended amenity noise level	Moderate
> 5 dB(A)	> recommended amenity noise level	Significant

The predicted residual exceedance of 1 dB at R1 is considered to have negligible significance as guided by the NPfI and no consideration of receiver-based treatments or controls is warranted.

It should be noted that no exceedance of the NPfI PTNLs would occur if the surrounding area was classified as an urban environment in accordance with the NPfI.

5.3 Sleep Disturbance

A review of **Table 11** indicates that the $L_{Aeq(15minute)}$ sleep disturbance criterion of 43 dBA is predicted to be compliant at all nearest noise sensitive receivers. The predicted night-time L_{Amax} noise levels at the nearest residential receivers are shown in **Table 13**. The predicted levels are compared to the L_{Amax} sleep disturbance criteria to determine the potential impact from the proposal.

Table 13 Sleep Disturbance Assessment

RID	Receiver Type	Period	Criteria	Sleep Disturbance LAmax (dBA)	
				Standard	Noise Enhancing
R01	Residential	Night	53	59	61
R02	Residential	Night	53	26	47
R03	Residential	Night	53	33	54
R04	Residential	Night	53	37	58
R05	Residential	Night	53	36	58
R06	Residential	Night	53	39	58
R07	Residential	Night	53	30	52
R08	Residential	Night	53	30	51
R10	Residential	Night	53	26	47
Note: Red text indicates that the predicted noise levels exceed the noise criteria.					

The night-time L_{Amax} noise levels are predicted to be compliant with the sleep disturbance screening criteria at all nearby residential receivers except for R1 under standard weather conditions. An exceedance of 6 dB is predicted at R1 under standard weather conditions. Under noise-enhancing weather conditions, the night-time L_{Amax} noise levels are predicted to be compliant with the sleep disturbance screening level at R2, R7, R8, and R10. Under noise enhancing weather conditions, an exceedance of up to 8 dB is predicted at R1. Air release from trucks stopping at the bowsers is the main contributor to the exceedances of the sleep disturbance screening criteria.

Where a development is predicted to exceed the Noise Policy for Industry (2017) (NPfI) sleep disturbance screening criteria "*a detailed maximum noise level event assessment should be undertaken*". The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the Rating Background Noise Level (RBL), and the number of times this happens during the night-time period.

The NPfI refers to the NSW *Road Noise Policy* (RNP) for additional information regarding sleep disturbance. Studies from enHealth Council are referenced which include that for short term transient noise events, for good sleep over eight hours the internal L_{Amax} sound pressure level should ideally not exceed around 45 dBA more than 10 or 15 times per night.

The RNP goes on to conclude that from research on sleep disturbance to date:

- 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, based on the studies from enHealth Council, for a good sleep over eight hours the external noise levels should not exceed around 55 dBA more than 10 or 15 times per night when assuming a conservative 10 dB loss for open windows. The first conclusion from the RNP suggests that maximum external noise level of 65 dBA when assuming a conservative 10 dB loss for open windows are unlikely to cause awakening reactions, with the second suggesting that one or two events per night with external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

Using the onsite traffic numbers detailed in **Table 7** of two (2) trucks onsite during a 'worst-case' 15 minute period, this would equate to up to approximately 72 trucks throughout a night-time period. It should be noted that not all truck movement events would result in this maximum noise level being generated form air release.

Based on the foregoing a detailed maximum noise level assessment of maximum noise level events is provided in **Table 14**.

Table 14 Detailed Maximum Noise Level Assessment

NCA	Maximum Noise Level L_{Amax} (dBA)					Comments
	External Sleep Disturbance Goals		Project Related Maximum Noise Events		Existing Maximum Noise Level[3]	
	Good Sleep[1]	Awakening Response[2]	Predicted	Frequency		
R1-R8, R10	55 (should not occur more than 10 to 15 times per night)	65	47-61	Up to 72 noise level events over a night-time period	48-79	**Good Sleep**: Truck movement on-site is the only source predicted to exceed 55 dBA noise goal for 'good sleep' at residential locations. Truck movement would occur at a maximum of 72 times over the course of a night-time period. **Awakening Response**: Maximum noise levels are not predicted to exceed the 'awakening response' level. **Existing maximum noise levels**: Measured maximum noise levels during the night-time period were typically around 48-79 dBA. The majority of the predicted maximum noise levels from the development are similar to or lower than the existing maximum noise levels and are likely to occur less frequently than existing maximum noise events from nearby road networks

Note 1: Based on RNP guidance that for a good sleep over eight hours the indoor lama sound pressure level should not exceed around 45 dBA more than 10 or 15 times per night. This equates to an external noise level of around 55 dBA when assuming a 10 dB loss for open windows for ventilation.

Note 2: Based on RNP guidance that maximum internal noise levels below 50 dBA to 55 dBA are unlikely to awaken people from sleep. This equates to an external noise level of around 65 dBA when assuming a 10 dB loss for open windows for ventilation.

Note 3: Existing maximum noise levels have been taken from the unattended noise monitoring (**Section 2.1**)

A review of **Table 14** indicates that although on-site truck air release has the potential to exceed 55 dBA L_{Amax} up to approximately 72 times during a night-time period, maximum noise levels are unlikely to cause awakening reactions. Maximum noise levels in the area already routinely exceed those predicted from the proposal, and as such given the relatively infrequent occurrence of maximum noise level events compared to existing maximum noise level events, noise levels from the proposal are unlikely to have an adverse impact on the acoustic amenity of the surrounding residential areas. Furthermore, maximum noise levels are predicted to be significantly below the noise levels where RNP guidance suggests one or two events per night would be unlikely to affect health and wellbeing significantly.

5.4 Traffic Increases on Surrounding Roads

All traffic would access the development directly from The Northern Road to the north of the site. Only northbound traffic would access the site. Existing traffic count and traffic generation for the site has been completed by Traffix Pty Ltd Traffic Impact Assessment Reference "21.471r01v01 Traffix 1411 The Northern Road, Bringelly TIA" dated 7 June 2022 (Traffic Report).

The Traffic Report data has been used to calculate the expected increase in noise levels on the Northern Road due to traffic associated with the development. The results are summarised in **Table 15**.

Table 15 Existing and Predicting Traffic Flow Volumes (7 Day AADT)

Location	Existing Vehicles Northbound	Predicted Increase	Noise Level Increase
The Northern Road	7628	745	0.1 dB

Based on the results of the assessment in Table 15, there is predicted to be less than a 1 dB increase in road traffic noise levels on the Northern Road. 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.

6.0 Conclusion

SLR has been engaged to assess the potential operational noise emissions from the proposed service station development at 1411 The Northern Road, Bringelly. The proposal includes the operation of a service station which would be operational 24/7.

With reasonable and feasible mitigation measures implemented on the site, operational noise levels are predicted to comply with the relevant criteria under standard and noise-enhancing weather conditions at all receivers except for R1. Following the implementation of all reasonable an feasible mitigation measures there is a predicted 1 dB residual exceedance of the night-time PNTL at R1 under noise enhancing weather conditions. In accordance with the NPfI the significance of this residual exceedance is considered negligible and would not warrant receiver-based treatment or controls.

Night-time sleep disturbance criteria is predicted to be met at all nearby residential receivers except for R1 under standard weather conditions, and all nearby residential receivers except for R1, R3, R4, R5, and R6. These noise levels are unlikely to cause awakening reactions.

There is predicted to be less than a 1 dB 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.

Appendix A Acoustic Terminology

1411 The Northern Road

Proposed Service Station - Planning Proposal Noise Impact Assessment0

EG Property Group Pty Ltd

SLR Project No.: 630.30368.00001

23 July 2024

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 2×10^{-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

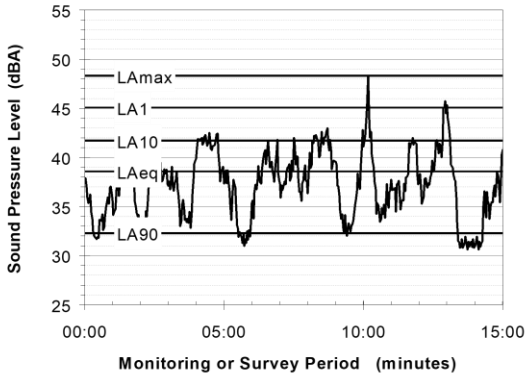
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

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:

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.

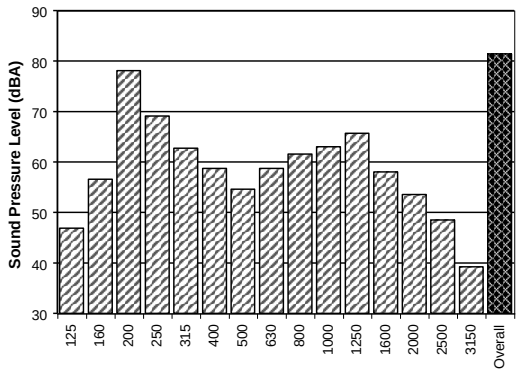
The units for frequency are Hertz (Hz), which represent the number of cycles per second.

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:

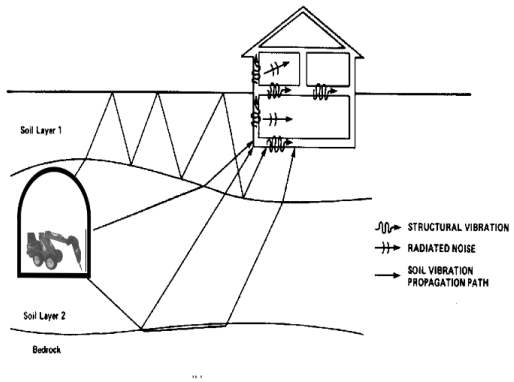
- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more 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. 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 Stastistical Ambient Noise Levels

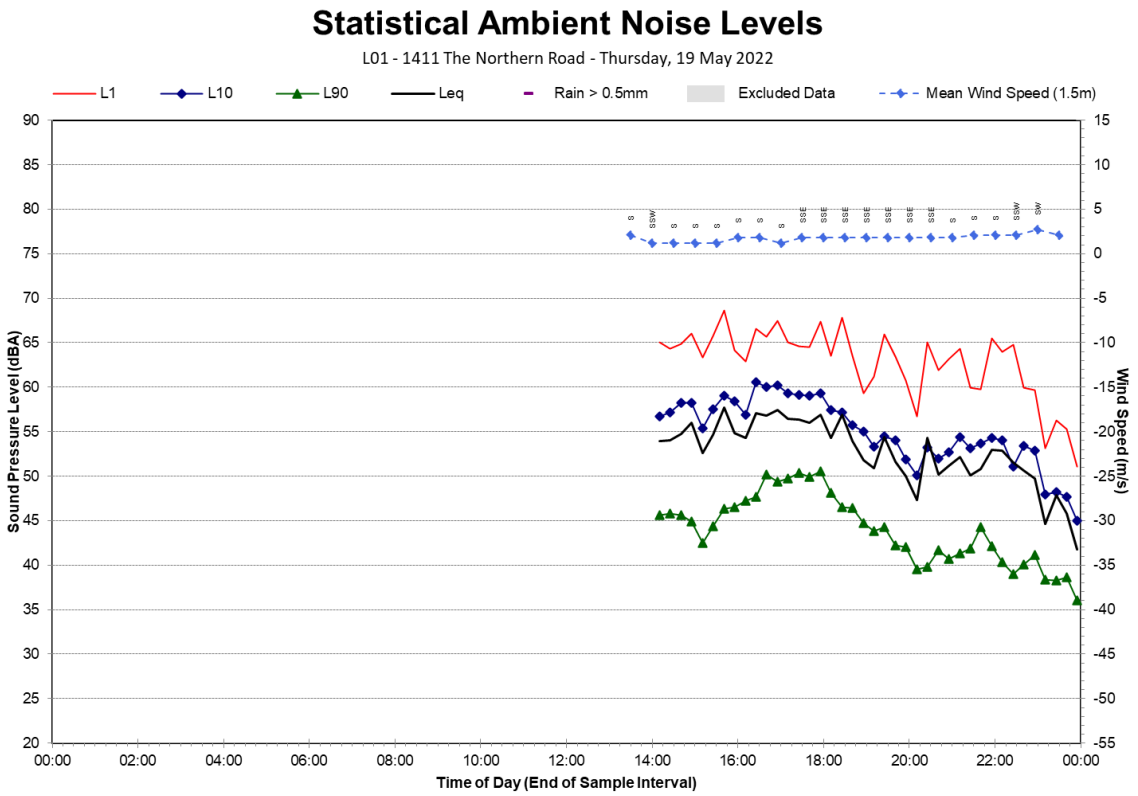
1411 The Northern Road

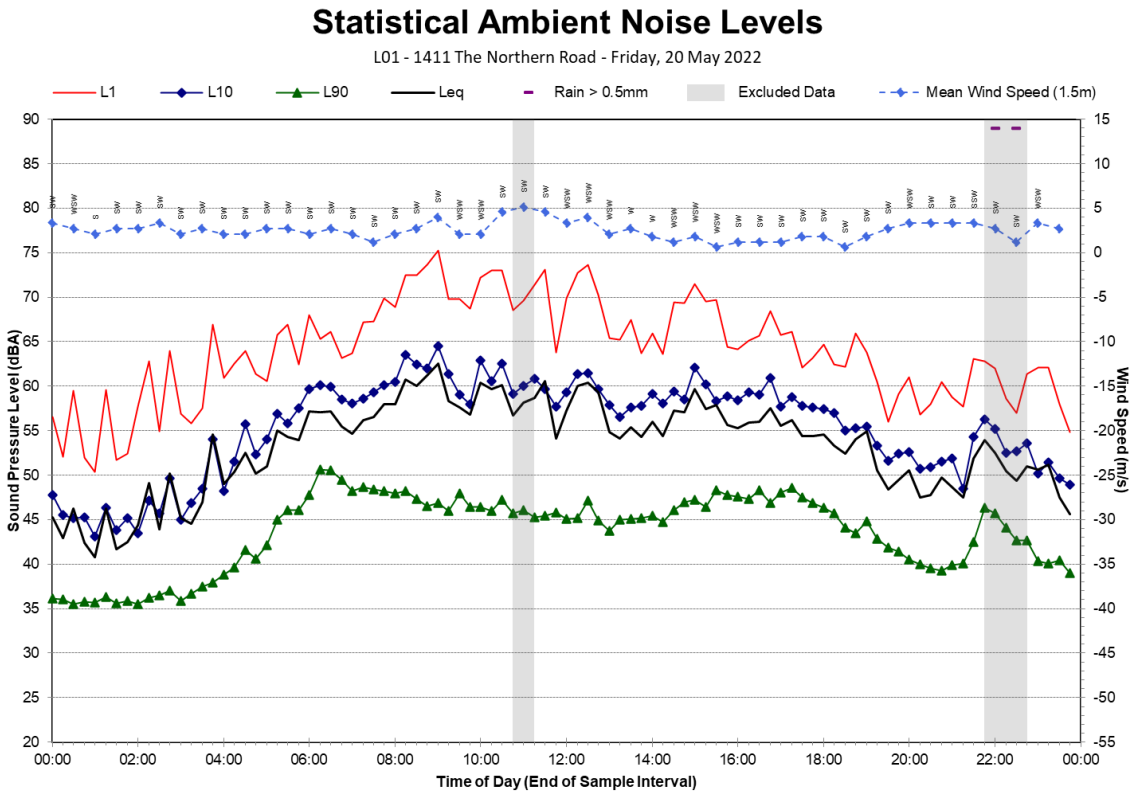
Proposed Service Station - Planning Proposal Noise Impact Assessment0

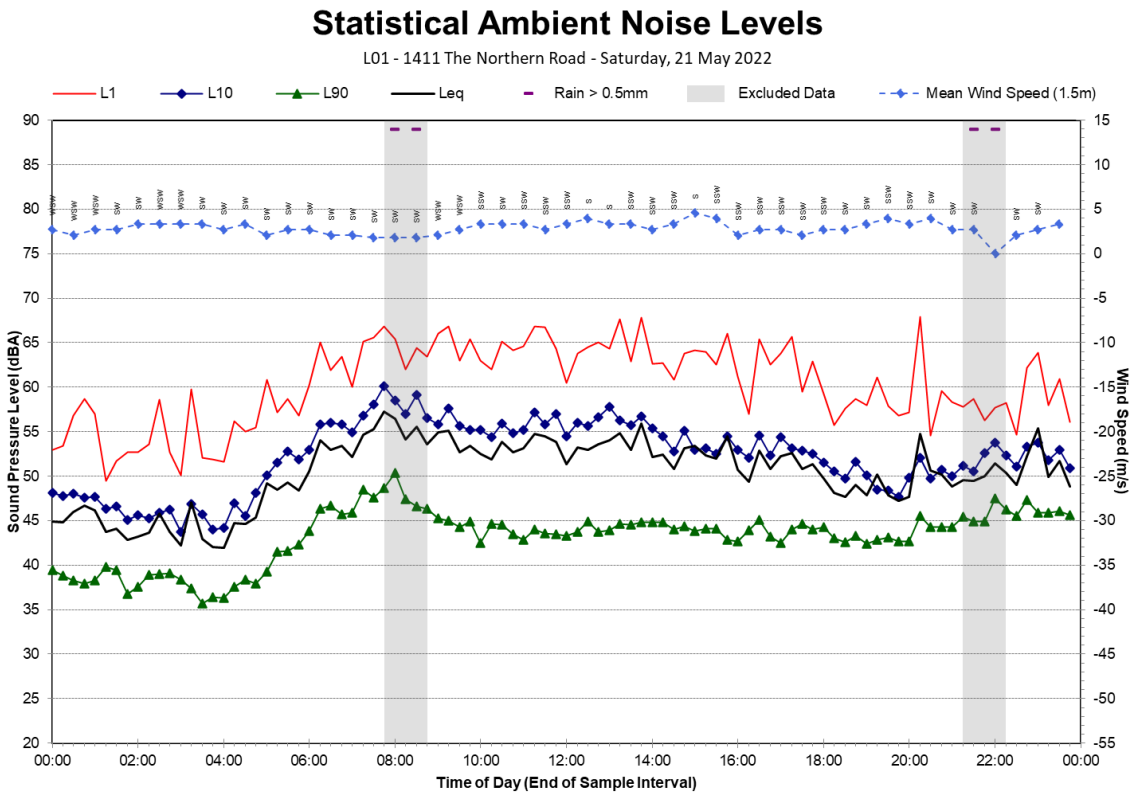
EG Property Group Pty Ltd

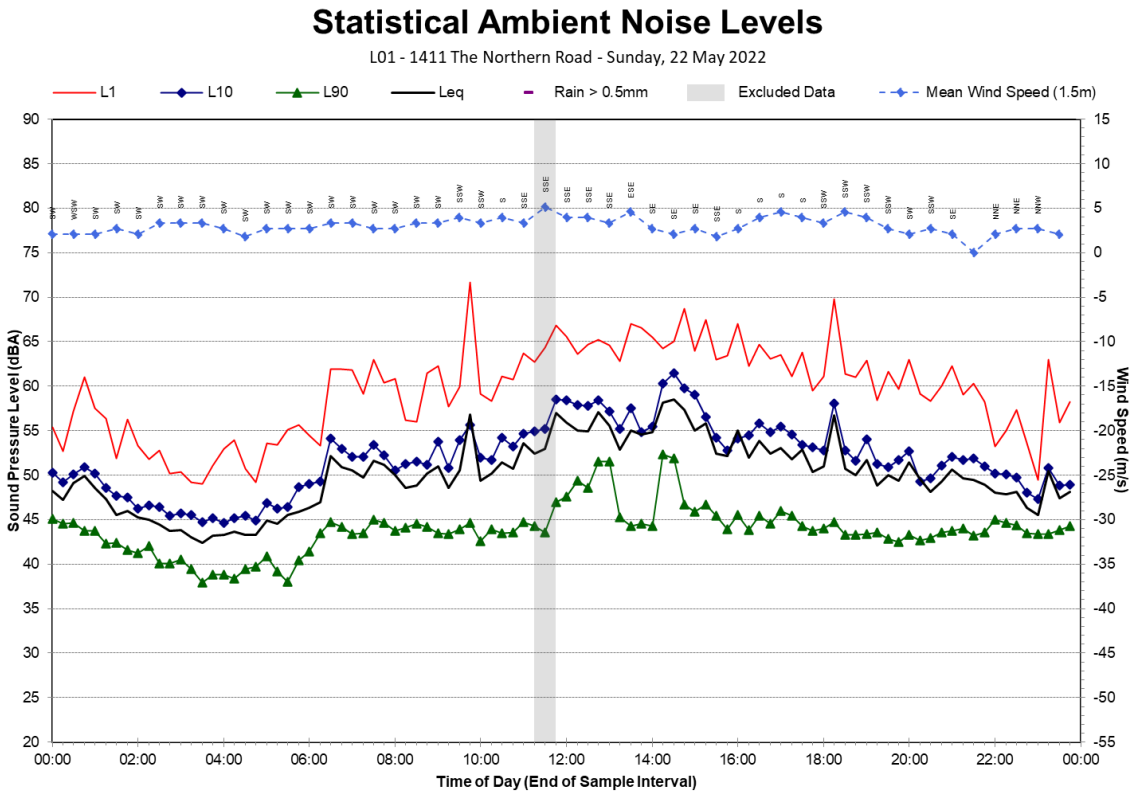
SLR Project No.: 630.30368.00001

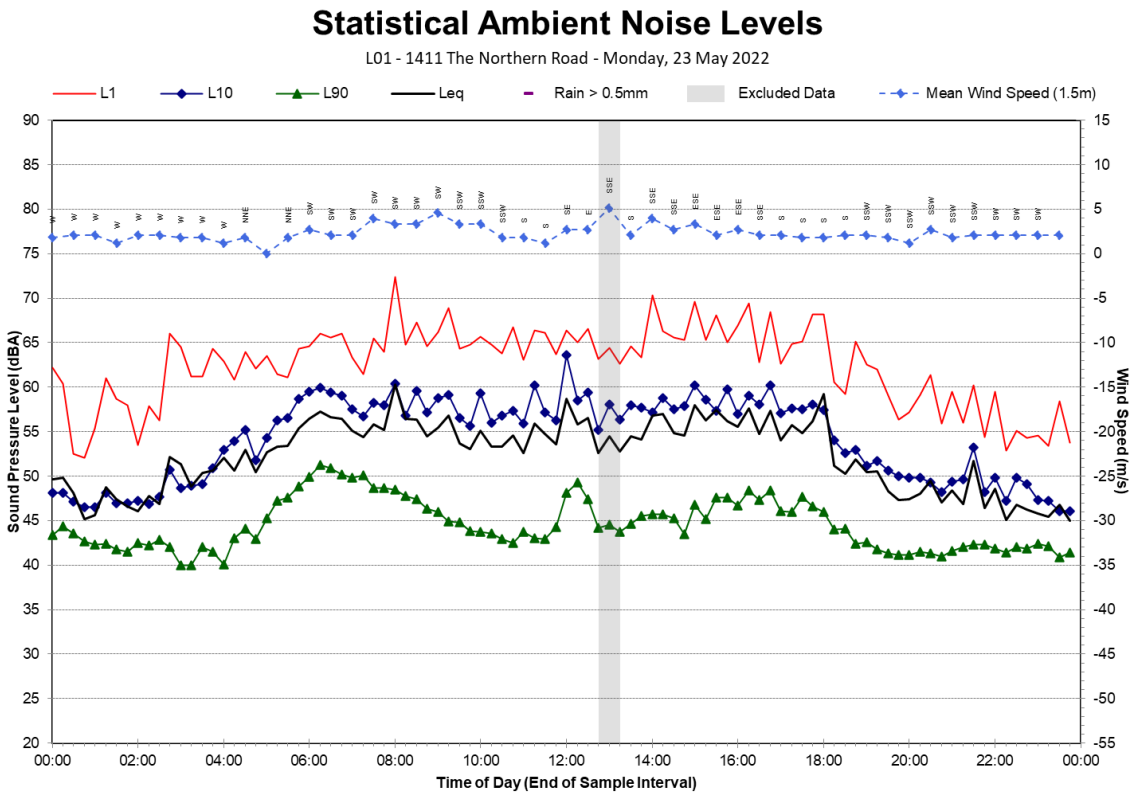
23 July 2024

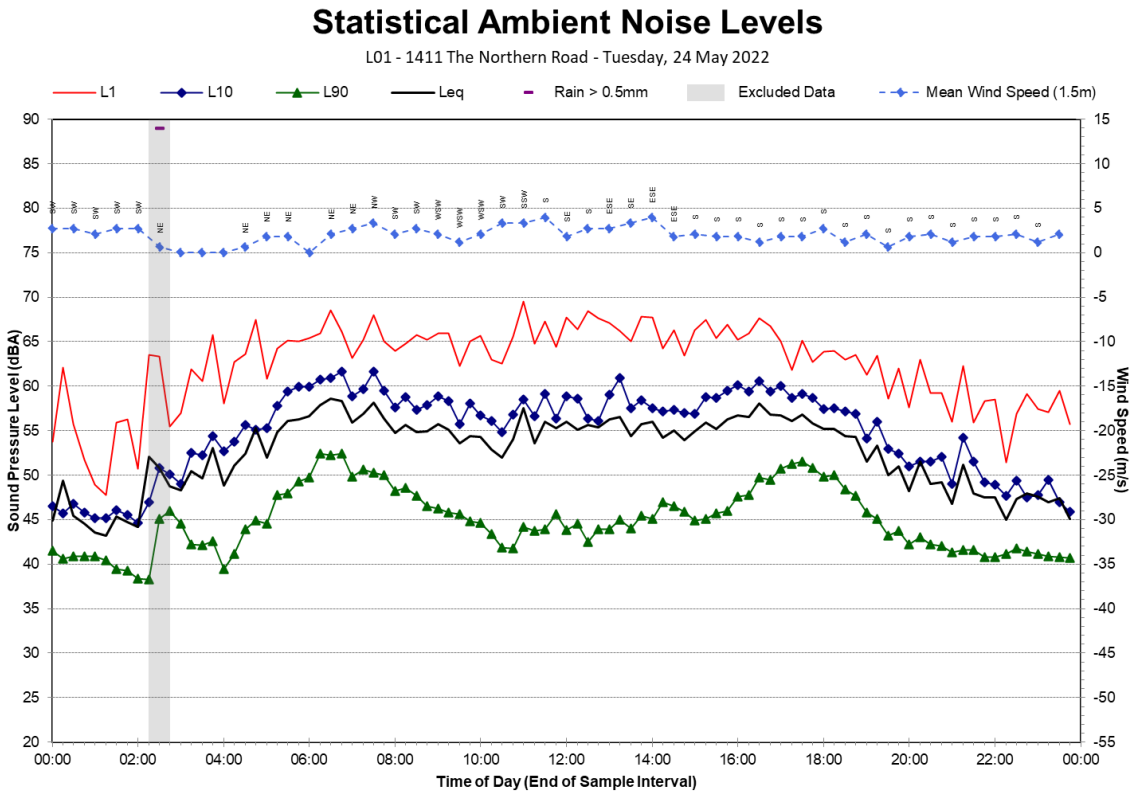

Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Thursday, 19 May 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

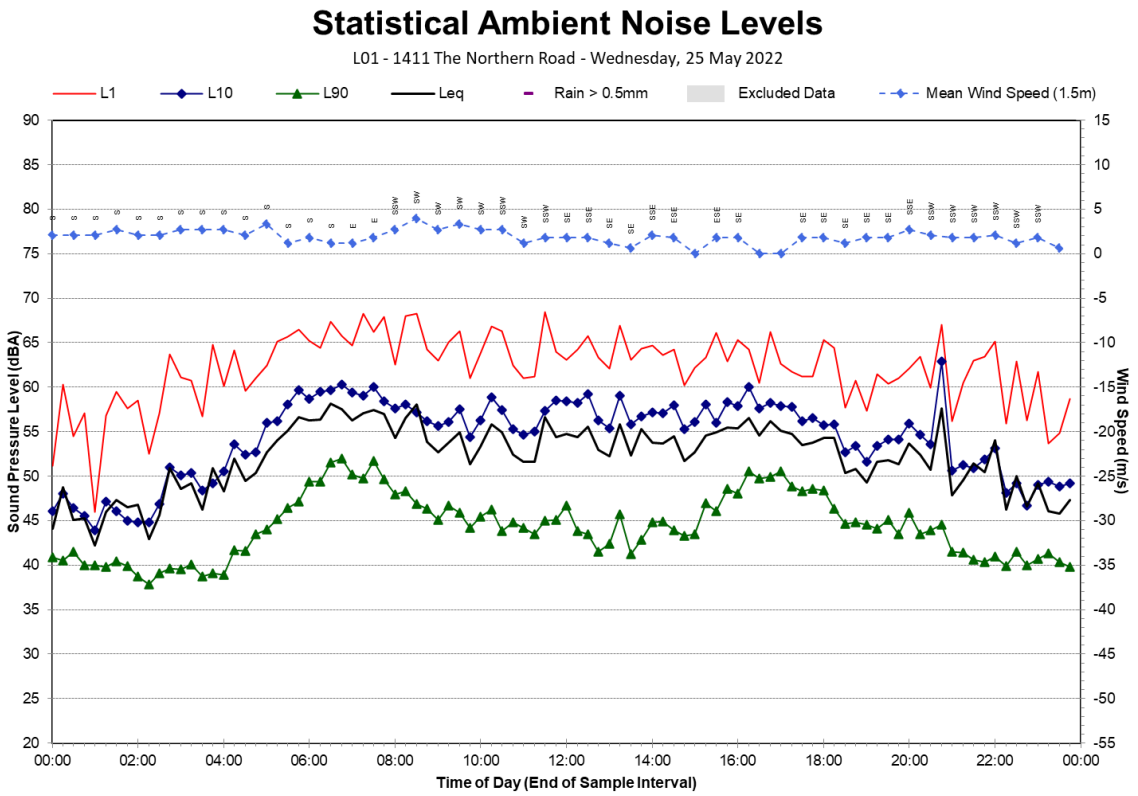

Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Friday, 20 May 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

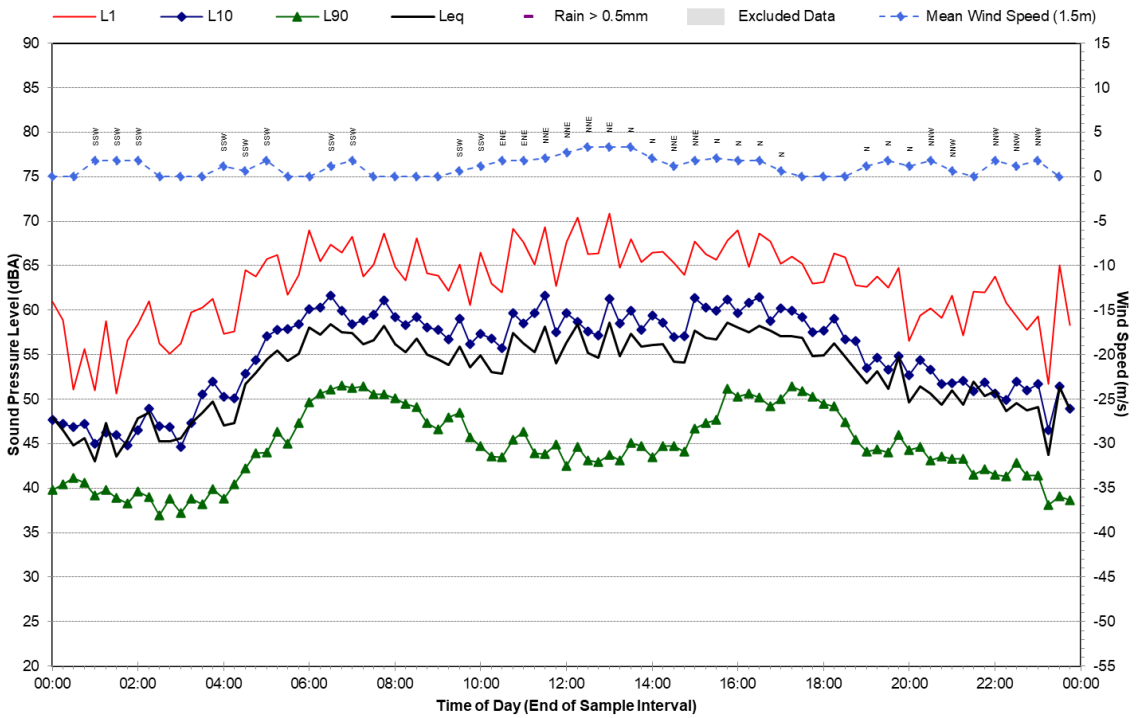

Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Saturday, 21 May 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

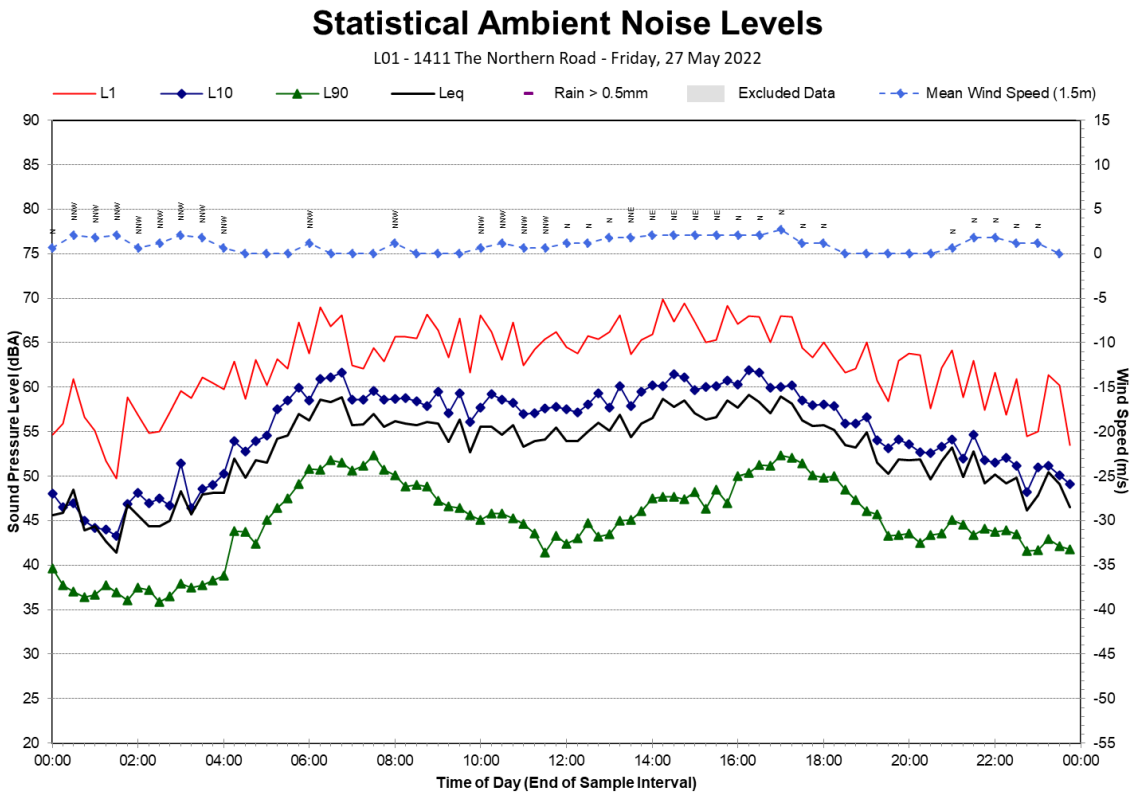

Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Sunday, 22 May 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

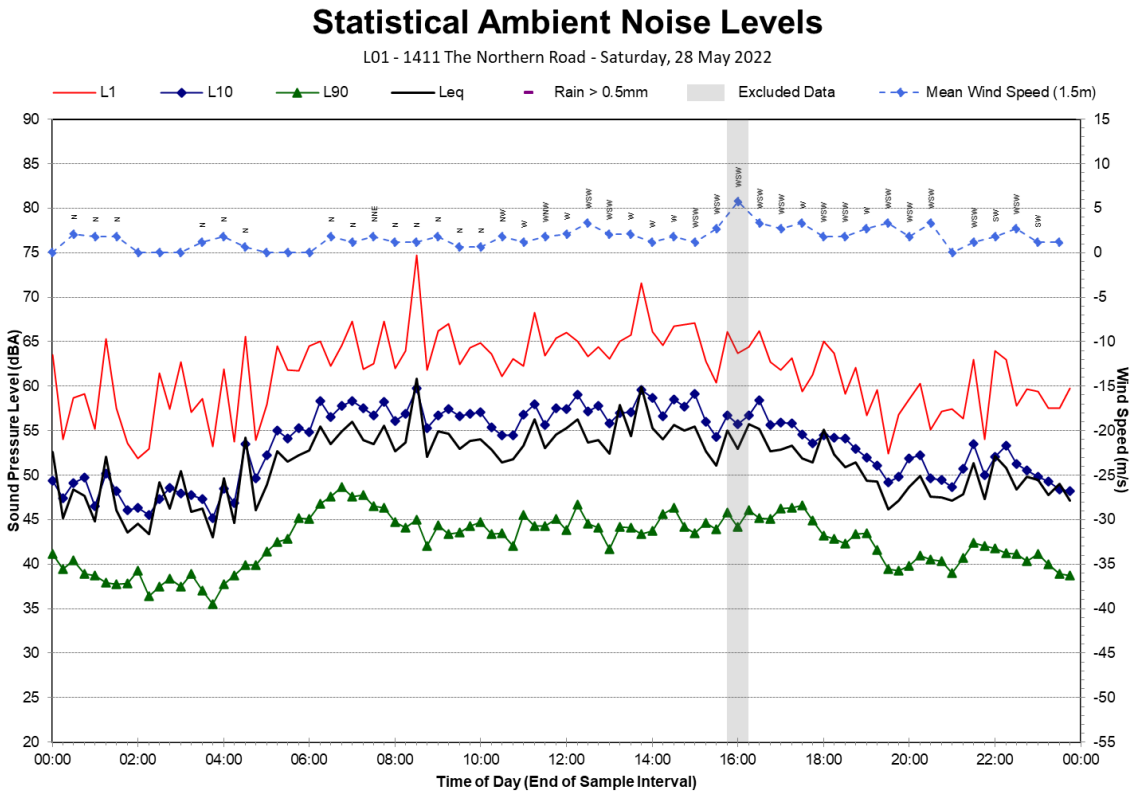

Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Monday, 23 May 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Tuesday, 24 May 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 - 1411 The Northern Road - Wednesday, 25 May 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)

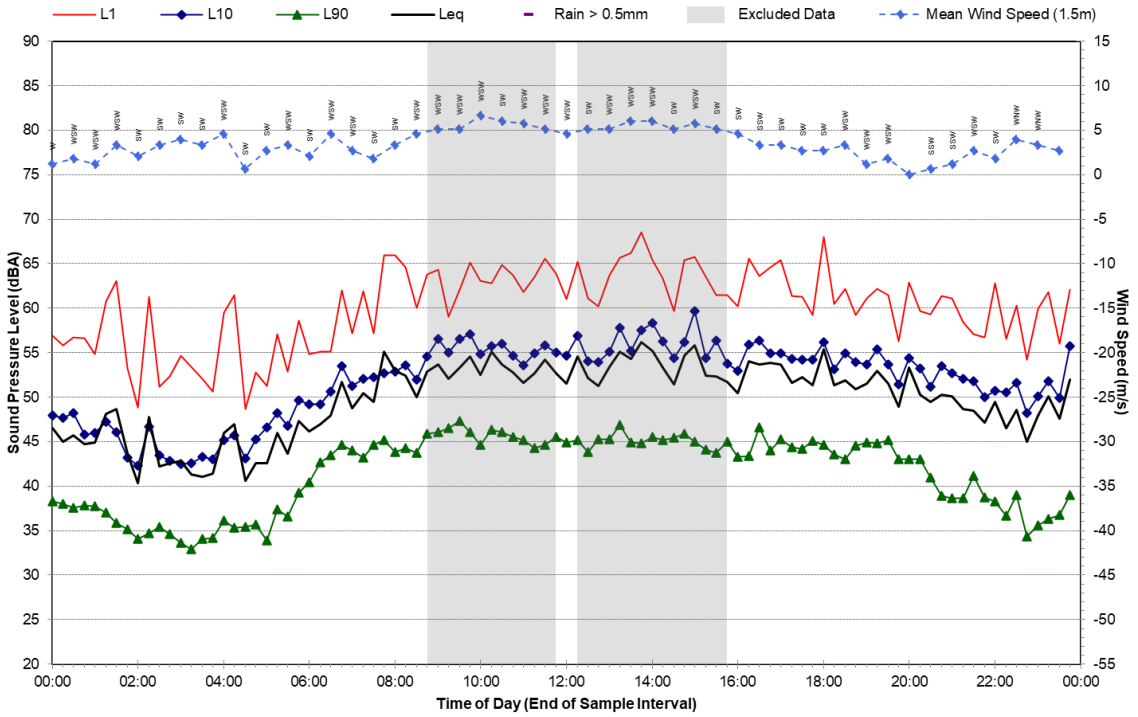

Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Thursday, 26 May 2022
L1
L10
L90
Leq
Rain > 0.5mm
Excluded Data
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
L01 - 1411 The Northern Road - Friday, 27 May 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 - 1411 The Northern Road - Saturday, 28 May 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)

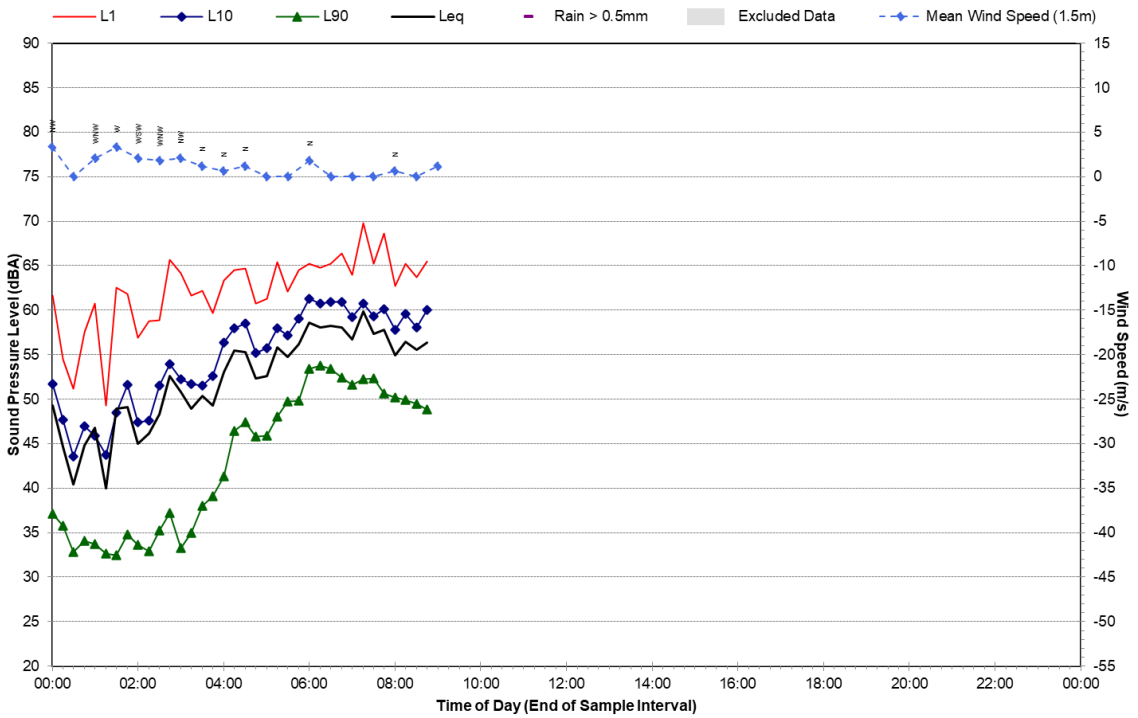
Statistical Ambient Noise Levels

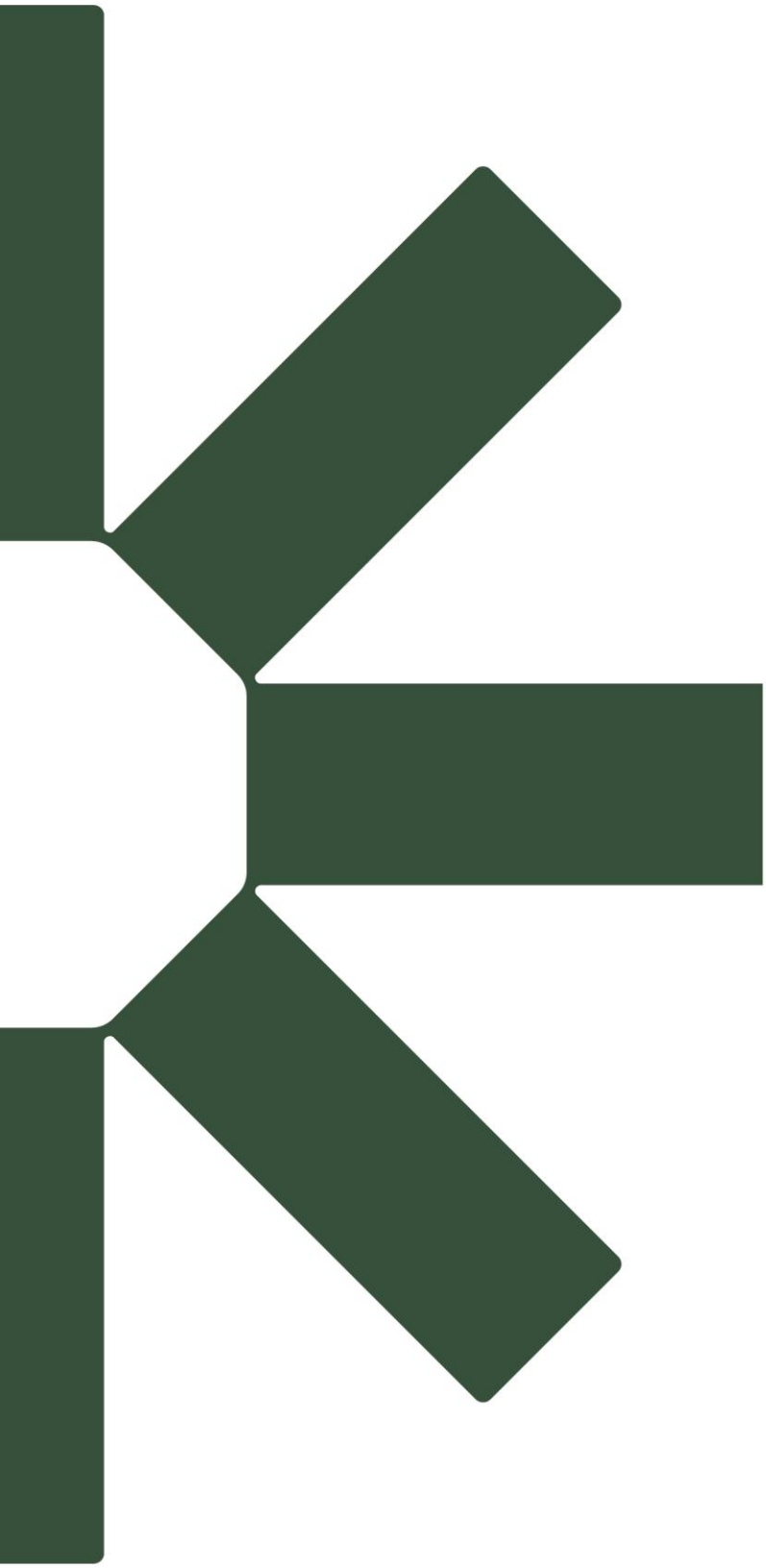
L01 - 1411 The Northern Road - Sunday, 29 May 2022



Statistical Ambient Noise Levels

L01 - 1411 The Northern Road - Monday, 30 May 2022





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