DA Noise Impact Assessment

Child Care Centre

28 & 30 Forrest Road, East Hills NSW 2213

Report Number 22252.1

Peter White Constructions (NSW) Pty. Limited

VMS AUSTRALIA PTY LTD

ABN: 52 168 418 013
Unit 45, 45 Green Street BANKSMEADOW NSW 2019

PO Box 6450 Silverwater NSW 1811
Telephone: 1800 867 000
Email: info@vms.com.au
Website: www.vms.com.au

PREPARED FOR: **Peter White Constructions (NSW) PTY. LIMITED**

PREPARED BY: **VMS Australia Pty Ltd**
Unit 45, 45 Green Street BANKSMEADOW NSW 2019
ABN: 52 168 418 013

Quality Management

Reference	Status	Date	Prepared	Checked	Authorised
22252.1	Revision 0	18 April 2023	Feras Ahmed	Sam Demasi	Sam Demasi

This Report by VMS Australia Pty Ltd is prepared for the Client listed above and is based on the objective, scope, conditions and limitations as agreed. The Report presents only the information that VMS Australia Pty Ltd believes, in its professional opinion, is relevant and necessary to describe the issues involved. The Report should not be used for anything other than the intended purpose. All surveys, forecasts, projections, and recommendations contained in or associated with this report are made in good faith and on the basis of information supplied to VMS Australia Pty Ltd at the date of this report, and upon which VMS Australia Pty Ltd relied.

VMS Australia Pty Ltd does not accept any liability or responsibility to any party with respect to the information and opinions contained in this report.

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1 Introduction

VMS Australia Pty Ltd (VMS) has been commissioned by Peter White Constructions (NSW) Pty Limited (PWC) to undertake a noise impact assessment for a proposed Child Care Centre (CCC) to be located at 28 & 30 Forrest Road, East Hills. This assessment has been prepared to assist Canterbury-Bankstown Council's (Council) consideration of a Development Application for the proposed CCC.

This report presents an assessment of the potential noise impact associated with the CCC and also assesses the suitability of the site for the purposes of a CCC development. Where required, recommendations are documented for design measures to mitigate potential noise impacts to achieve acoustical amenity requirements within the CCC and at surrounding receivers.

For this project, consideration has been given to the following applicable guidelines:

- SEPP (Educational Establishments and Child Care Facilities) 2017.
- Child Care Planning Guideline (NSW Department of Planning & Environment 2017).
- Guideline for Child Care Centre Acoustic Assessment Version 3.0 (AAAC 2020).
- Noise Policy for Industry (NSW Environment Protection Authority (EPA) 2017).
- NSW Road Noise Policy (NSW Environment Protection Authority (EPA) 2011).
- Guide to Traffic Generating Developments (Roads and Traffic Authority (RTA), Version 2.2, dated October 2002).

This assessment references the Revised DA Architectural Plans & Drawings prepared by Dawsonvu, Issue B, dated 11 October 2022.

A glossary of the acoustical terminology used throughout this report is contained within **Appendix A**.

2 Proposed Development

2.1 Site Locality

The proposed development site is located at 28 & 30 Forrest Road, East Hills.

Surrounding the development site is a double-storey residential receiver adjacent to the site's southern boundary, a single storey residential receiver adjacent to the east and north-east of the site's boundary, a double-storey residential receiver adjacent to the north of the site's boundary, mixed-use worship and residential receiver adjacent to the north-west of the site's boundary, as well as single and double storey residential receivers south-west of the project site across Forrest Road.

Forrest Road adjoins the south-western site boundary. It is a local road that carries two-way traffic and has a signposted 50km/hr speed limit.

The project site, surrounding receivers and noise monitoring locations are shown in **Figure 1**.

Figure 1 Project Site Locality & Noise Monitoring Locations

Source: SIX Maps (as marked up by VMS)

The receivers most potentially impacted by the operation of the CCC are as documented in **Table 1** and can be identified in **Figure 1**.

Table 1 Receivers Potentially Impacted by the Operation of the CCC

Receiver Address	Receiver Type	Receiver Location
34 Forrest Road, East Hills	Mixed-Use (Place of Worship + Residential)	Adjacent to the north of the project site's boundary
59 Lehn Road, East Hills	Double-Storey Residential	Adjacent to the north-east of the project site's boundary
59A Lehn Road, East Hills	Single-Storey Residential	Adjacent to the north-east of the project site's boundary
16 Cowland Avenue, East Hills	Single-Storey Residential	Adjacent to the north-east of the project site's boundary
22 Forrest Road, East Hills	Single-Storey Residential	Adjacent to the south-east of the project site's boundary
26 Forrest Road, East Hills	Double-Storey Residential	Adjacent to the south of the project site's boundary
11 Forrest Road, East Hills	Single-Storey Residential	South-west of the project site, across Forrest Road
13/13A Forrest Road, East Hills	Double-Storey Residential	West of the project site, across Forrest Road

2.2 Proposed Development

The CCC would operate between 7:00am and 6:00pm from Monday to Friday and will accommodate a maximum of 120 children and 17 staff. The proposed age breakdown of the children is as follows:

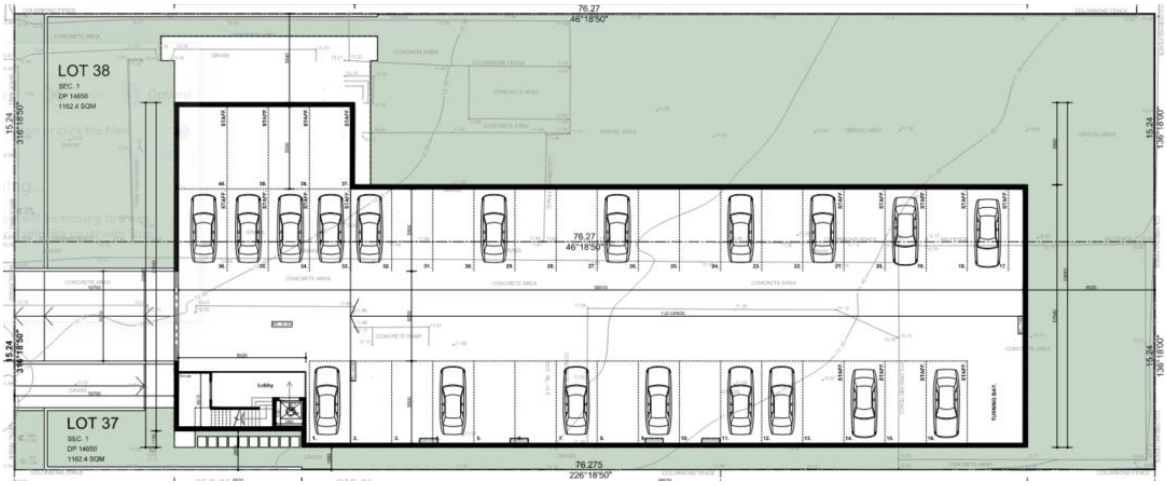
- 0 - 2 years 20 Children
- 2 - 3 years 20 Children
- 3 - 5 years 80 Children

The CCC is proposed to accommodate a basement level carpark and 6 ground level indoor rooms along with a lobby, kitchen, toilets, multi-purpose room and one outdoor play area including an elevated outdoor deck.

Basement carparking will be accessed via Forrest Road.

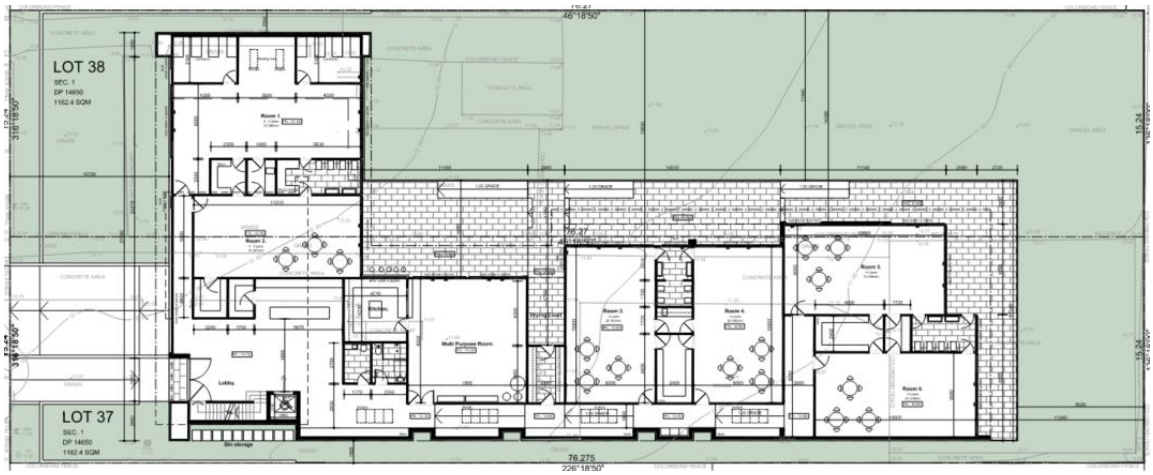
Figure 2 and **Figure 3** show the proposed basement and ground floor layouts.

Figure 2 Proposed Basement Floor Layout



Source: Dawsonvu.

Figure 3 Proposed Ground Floor Layout



Source: Dawsonvu.

3 Existing Noise Environment

3.1 Unattended Noise Monitoring

Unattended noise monitoring was conducted from Wednesday 22 March 2023 to Friday 31 March 2023 at the locations presented in **Figure 1** in order to characterise the existing acoustical environment of the area. The noise monitors were deployed within the site boundary at the front yard and backyard of 30 Forrest Road, East Hills.

Instrumentation for the survey comprised of two BSWA 309 environmental noise monitors fitted with a microphone windshield (serial numbers: BW600101 & BW58007). Calibration of the monitors was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured daily noise data are attached in **Appendix C** and **Appendix D**. The charts present each 24-hour period and include primarily noise parameters such as L_{A10}, L_{Aeq} and L_{A90} noise levels for the corresponding 15-minute periods.

The measured data has been filtered to remove periods affected during adverse weather conditions following consultation of weather reports recorded at the Bureau of Meteorology (BOM) Bankstown weather station. The filtered data is shown in **Appendix C** and **Appendix D**.

3.1.1 Existing Background Noise Levels

To assess noise emission from the proposed development, the data obtained from the noise monitoring was processed in accordance with the procedures contained in the Noise Policy for Industry (NPfI) to establish representative noise levels that can be expected in the vicinity of the site. The results of this analysis are presented in **Table 2**.

Table 2 Background Noise Levels Corresponding to Defined NPfI Period - Location 1

Date	ABL[1] Day L_{90} 7:00am - 6:00pm
Wednesday, 22 March 2023	36
Thursday, 23 March 2023	Note 2
Friday, 24 March 2023	37
Saturday, 25 March 2023	Note 3
Sunday, 26 March 2023	Note 3
Monday, 27 March 2023	Note 2
Tuesday, 28 March 2023	Note 2
Wednesday, 29 March 2023	40
Thursday, 30 March 2023	39
Friday, 31 March 2023	36
RBL[1] (Median)	**37**

Note 1: Assessment Background Level (ABL) is the single figure background level for each assessment period (day, evening and night), whereas the Rating Background Level (RBL) is the single figure background level over the entire monitoring period taken to be the median of the relevant ABLs.

Note 2: Data likely to be impacted by weather and so excluded from the calculation.

Note 3: Data collected, but not used as these days are outside the operation of the CCC.

3.1.2 Existing Traffic Noise Levels

To assess traffic noise generated from the operation of the CCC and traffic noise intrusion into the CCC, the data obtained from the noise logging was processed in accordance with the procedures contained in the Road Noise Policy (RNP) to establish representative traffic noise levels that can be expected in the vicinity of the site. The result of this analysis is presented in **Table 3**.

Table 3 Measured Traffic Noise Levels - Location 2

Location	Monitoring Period	Measured Noise Level $L_{Aeq(1hour)}$ - dBA	RBL - dBA
30 Forrest Road, East Hills Front Yard - 3m from the site boundary	Wednesday, 22 March 2023 to Friday, 31 March 2023 (Weekdays Only)	54[1] - 56[2]	38

Note 1: Corresponds to the morning drop-off time period of 4:00pm - 6:00pm.

Note 2: Corresponds to the afternoon pick-up time period of 7:00am - 9:00am.

4 Assessment Criteria

There are typically two considerations when conducting a noise impact assessment for a CCC:

- The impact that the operation of the CCC may have on nearby receivers; and
- The impact of noise from the surrounding environment on the development itself.

Assessment of operational noise from the CCC includes the following sources:

- Children, primarily from outdoor (and indoor) play areas;
- Mechanical plant (in-principle);
- Vehicular movement events associated with the carpark/drop-off/pick-up; and
- Traffic generated by the CCC on nearby road network.

Assessment of the impact of noise from the surrounding environment on the CCC includes:

- Road traffic noise impacting internal and external areas of the CCC.

4.1 Noise Emission Impacts to Place of Worship

Consistent with the recommendations of the NPfI and the AAAC Guideline, the adopted cumulative noise level emitted from the use and operation of the CCC shall not exceed the following noise criteria when assessed at the most affected point on or within any place of worship property boundary:

- $L_{Aeq(15minute)}$ 40 dBA (Internal) - When in use

4.2 Noise Emission Impacts to Residential Receivers

SEPP (*Educational and Child Care Facilities*) 2017 requires the consent authority to consider the applicable provisions of the *Child Care Planning Guideline* (CCPG) prior to determining a development application in relation to a proposed development. The CCPG documents general planning measures to promote acoustic privacy for children attending a CCC and for the surrounding neighbours. The impact of environmental noise is to be assessed against recommended acceptable limits. Criteria for assessment are not quantified in either the SEPP or CCPG.

A guideline for the assessment of noise from CCC has been prepared by the Association of Australasian Acoustical Consultants (AAAC) as a result of an NSW Australian Acoustical Society (AAS) Technical Meeting held in September 2007 on Child Care Noise. The document, AAAC *Guideline for Child Care Centre Acoustic Assessment*, Version 3.0 (October 2020), provides criteria for the assessment of noise intrusion into and noise emissions from CCC and also provides recommendations for treatment to minimise acoustical impacts upon neighbouring premises. The guideline has been placed before the Land and Environment Court (LEC) during matters involving CCC applications.

4.2.1 Outdoor Play

The AAAC considers a base criteria for noise emitted from outdoor play to not exceed $L_{Aeq,15min}$ of 45 dB for childcare centre developments in an environment where the rating background noise level is less than 40 dBA. As shown in **Table 2**, an RBL of 37 dBA has been derived and, on this basis, the noise level emitted from outdoor play shall not exceed the following noise criteria:

- $L_{Aeq(15minute)}$ 45 dBA when assessed at the most affected point on or within any residential property boundary.

4.2.2 Indoor Activities, Mechanical Plant (in-principle) and On-Site Vehicular Movements

The AAAC guideline recommends the $L_{Aeq(15minute)}$ noise level emitted from the cumulative operation of indoor activities, mechanical plant and traffic on the site should not exceed the background noise level by more than 5dB at the assessment location. The assessment location is defined as the most affected point on or within any residential receiver property boundary.

On this basis, the recommended design limit for assessment of noise generated by indoor activities, mechanical plant and on-site traffic is as follows:

- $L_{Aeq(15minute)}$ 42 dBA when assessed at the most affected point on or within any residential property boundary north, east or south of the project site.
- $L_{Aeq(15minute)}$ 43 dBA when assessed at the most affected point on or within any residential property boundary west of the project site or facing Forrest Road.

4.2.3 Traffic Generated by the Child Care Centre on the Road Network

Road traffic generated by the proposed CCC may result in increased levels of noise at residential receivers primarily on Forrest Road which is classified as a local road. Based on the recommendations of the RNP, the relevant criterion for daytime operations is presented in **Table 4** to assess impacts along local roads.

Table 4 Road Traffic Noise Assessment Criterion - Additional Generated Traffic (dBA)

Road Category	Type of Project/Land Use	Assessment Criterion (Day) - dBA
Local	Existing residences affected by additional traffic on existing local roads generated by land use developments	55 $L_{Aeq(1hour)}$

Note: The assessment criteria are applied externally and to residential receivers only.

Note: Day is defined by the RNP as the time period from 7:00am to 10:00pm.

In the absence of a traffic assessment, the analysis relies on typical traffic generation rates from RTA's Guide to Traffic Generating Developments (GTGD). Where predicted noise levels exceed the noise assessment criterion, an assessment of all feasible and reasonable mitigation options should be considered. The RNP states that an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

4.3 Noise Intrusion to the Child Care Centre

The AAAC childcare centre guideline also presents recommendations for noise impact upon children in CCC as follows:

- The $L_{Aeq,1hour}$ intrusive noise level from road traffic or industry at any location within an outdoor play area should not exceed 55dBA.
- The $L_{Aeq,1hour}$ intrusive noise level from road traffic or industry within the indoor play areas should not exceed 40dBA and 35dBA in sleeping areas.

5 Assessment of Noise Impacts

5.1 Noise Modelling

Site-related noise emissions were modelled using the iNoise 2023 noise prediction software. Factors that are addressed in the modelling are:

- Source sound level emissions and locations;
- Screening effects from buildings and barriers;
- Receiver locations;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

5.2 Noise Emission Impacts to Receivers

5.2.1 Outdoor Play

Considering the rating background noise level of 37 dBA as shown in **Table 2**, a limiting criterion of $L_{Aeq(15minute)}$ 45 dB at the most affected point on or within any residential property boundary is appropriate in accordance with the AAAC guideline.

The $L_{Aeq(15minute)}$ criteria for a place of worship receivers is 40 dBA internally, of which, if a window or door is partially opened for ventilation, it is commonly accepted that an outside to inside attenuation of 10 dB can be achieved. On this basis, the external criteria for a place of worship receiver would translate to 50 dBA.

Using the AAAC Guideline's range of sound power levels (refer **Table 5**) applied to groups of children located across the outdoor play area, modelling of noise to the identified receivers has been undertaken.

Table 5 Effective Sound Power Levels for Groups of 10 Children Playing

Number and Age of Children	Sound Power Level - $L_{eq(15minute)}$ - dBA (Active Play)	Sound Power Level - $L_{eq(15minute)}$ - dBA (Passive Play)[1]
10 Children, 0 - 2 years	78	72
10 Children, 2 - 3 years	85	79
10 Children, 3 - 6 years	87	81

Note 1: As noted in the AAAC Guideline, passive play can be up to typically 6dB lower and involves activities such as painting, drawing, etc…

The following outdoor play scenario and mitigation measures have been included in the project design and modelling:

- Outdoor Play (Refer to **Appendix B** for a markup):
    - Babies (Active or Passive) Play Area: Maximum 10 of the 0 - 2 year olds playing at any given time.
    - Active Play Area: Maximum 10 of the 2 - 3 year olds playing at any given time.
    - Active Play Area: Maximum 20 of the 3 - 5 year olds playing at any given time.
    - Passive Play Area: Maximum 10 of the 2 - 3 year olds playing at any given time.
    - Passive Play Area: Maximum 10 of the 3 - 5 year olds playing at any given time.
- Solid continuous boundary barrier with a minimum total height of 1.8m from the ground level (can be Colorbond or equivalent) constructed to the extent(s) shown in **Appendix B**.
- Solid continuous boundary barrier with a minimum total height of 2.1m from the ground level and a minimum surface density of 10kg/m^2 (can be made of lapped and capped timber, brick, masonry or equivalent acoustic barrier) constructed to the extent shown in **Appendix B**.
- Solid continuous boundary barrier with a minimum total height of 2.4m from the ground level and a minimum surface density of 10kg/m^2 (can be made of lapped and capped timber, brick, masonry or equivalent acoustic barrier) constructed to the extent shown in **Appendix B**.
- The area towards the north-east of the project site shaded in yellow in the markup in **Appendix B** to be strictly **not used** for any active or passive play (can be used as a vegetable garden or equivalent).

It recommended that the final construction of all barriers is confirmed prior to construction certificate to ensure noise attenuation can be met.

With the inclusion of the outdoor play scenario and mitigation measures as nominated, noise emissions from outdoor play can comply with the recommended assessment criterion at surrounding potentially sensitive receiver locations as shown in **Table 6**.

Table 6 Predicted $L_{Aeq(15minute)}$ Noise Emission Levels from Outdoor Play

Receiver[1]	Predicted Noise Level $L_{eq(15minute)}$ - dBA	Assessment Criterion $L_{Aeq(15minute)}$ - dBA	Assessment
34 Forrest Road, East Hills (Place of Worship)	50 External (40 Internal)[2]	40 Internal	**COMPLIES**
34 Forrest Road, East Hills (Residential)	46[3]	45	**COMPLIES**
59 Lehn Road, East Hills	43	45	**COMPLIES**
59A Lehn Road, East Hills	45	45	**COMPLIES**
16 Cowland Avenue, East Hills	45	45	**COMPLIES**
22 Forrest Road, East Hills	39	45	**COMPLIES**
26 Forrest Road, East Hills	43	45	**COMPLIES**
11 Forrest Road, East Hills	37	45	**COMPLIES**
13/13A Forrest Road, East Hills	43	45	**COMPLIES**

Note 1: Predicted noise emission compliance at the receivers assessed above ultimately means that noise emission levels will also comply at all other receivers due to further screening, directivity, and distance attenuations.

Note 2: Predicted externally but considers the external to internal 10dB attenuation with windows open discussed in **Section 5.2.1.**

Note 3: The criterion is based on a conservative RBL and a 1dB exceedance is considered negligible and not discernible.

Further Outdoor Play Recommendations

A plan of management to be prepared and adhered such that structured outdoor play is managed as recommended above.

5.2.2 Indoor Activities, Mechanical Plant and On-Site Traffic

The reverberant noise level generated during indoor activities will vary depending on the space, activity, age group and number of children. The typical range of levels are between 60 to 75dBA, however it is unlikely that these levels would be sustained for more than 5-minutes. Considering the site layout and age groups, the following reverberant noise levels have been assumed over a 15-minute period:

- 0 - 2 age group internal space - typical reverberant sound level of 55 dBA.
- 2 - 3 age group internal space - typical reverberant sound level of 65 dBA.
- 3 - 5 age group internal space - typical reverberant sound level of 70 dBA.

Impacts associated with breakout noise from within the spaces are considered negligible for this development, particularly when compared to the noise generated from outdoor play. Further assessment is therefore not considered necessary.

Specific details in regard to the mechanical plant selection are unavailable at this stage. Noise emission from mechanical plant is to comply with the criteria stated in Section **4.2.2**. This can be confirmed at detailed design stage, however there are ample opportunities to reduce noise (if required) including:

- Plant selection and location.
- Acoustic treatment such as acoustic louvres, internally lined ducts, silencers, and the like.

All on-site carparking is enclosed beneath the building at basement level. The basement level carpark is directly accessed via Forrest Road. Given that vehicular noise emissions generated during drop off and pickup occur within the existing enclosed basement level carpark, and the distance from such noise to the residences fronting Forrest Road, the noise from this activity is considered negligible and further assessment is not considered necessary.

5.2.3 Road Traffic Noise

The GTGD publishes trip generation rates for "long day care" for CCC as follows:

- 0.8 trips per child between 7:00am and 9:00am.
- 0.7 trips per child between 4:00pm and 6:00pm.

Staff arrival will be staggered but some staff are expected to arrive prior to the 7:00 am commencement. Staff departure is expected to be staggered from 4:00 pm until just after the 6:00 pm close. It is expected that the majority of the staff will enter and leave the carpark directly off Forrest Road.

On this basis, the estimated trips during the morning drop off and afternoon pickup are shown in **Table 7** with the net trip generation per peak hour including arrival and departure at a given time. It has been assumed that 50% of children would arrive/leave per hour over the two-hour peak period.

Table 7 Total Trips Generated

Peak Hour	Number of Children Arriving/Leaving in 1 hour	Trip rate/child	Trips Generated	Net Trips Generated (2 x trips generated)
AM	60	0.8	48	96
PM	60	0.7	42	84

The potential impact of noise impact from additional traffic generated as a result of the development has been considered to the worst affected residential receivers along Forrest Road (staff and children).

The *Calculation of Road Traffic Noise* (CoRTN) 1988 algorithm was used to predict the $L_{Aeq1hour}$ traffic noise level generated by the proposed development at residential properties along Forrest Road.

For the hours when drop-off (~7:00am - 9:00am) and pick-up (~4:00pm - 6:00pm) occurs, the existing traffic noise level measured at 30 Forrest Road during the day period ranged between 54 - 56dBA and exceeds the criterion documented in **Table 4**. In this case, adopting the relative exceedance approach of 2 dB is considered appropriate for assessment purposes. Assuming the lowest measured $L_{Aeq1hour}$ noise level of 54dBA; this equates to 56dBA. The predicted noise levels are presented in **Table 8**.

Table 8 Predicted Peak Generated Traffic Noise Levels

Noise Source	Receiver[1]	Predicted $L_{Aeq(1hour)}$ dBA	Assessment Criterion $L_{Aeq(1hour)}$ dBA	Assessment
Traffic Generated by the CCC on Forrest Road	Residential Receivers along the road network	55	56	**COMPLIES**

Note 1: Predicted compliance at the receivers assessed above ultimately means that traffic noise levels generated will also comply at all other receivers due to similarities in setback from the road and/or shielding.

5.3 Noise Intrusion to the Child Care Centre

Considering the measured traffic and environmental noise levels in the surrounding locality of the Project Site, external noise intrusion from transportation and other environmental noise sources will be within the relevant criteria in the CCC and at the outdoor play areas. Therefore, no acoustic upgrading/attenuation measures would be required with regards to noise intrusion.

6 Conclusion

VMS Australia Pty Ltd has undertaken a noise impact assessment for the Child Care Centre proposed to be located at 28 & 30 Forrest Road, East Hills NSW 2213. This assessment has been prepared to assist Canterbury-Bankstown Council's consideration of a Development Application for the proposed Child Care Centre.

External noise emissions from the development and can be met provided that the recommendations in **Section 5.2.1** and **Section 5.2.2** are implemented.

Traffic noise generated by the Child Care Centre along the road network and traffic noise intrusion to the Child Care Centre were predicted and shown to be compliant.

We trust this information meets with your immediate requirements. However, should you require additional information, or would like to discuss further, please do not hesitate to contact the undersigned directly on 0438 769 165.

Sincerely,

FERAS AHMED
Project Consultant - Acoustics & Vibration

Terminology Relating to Noise and Vibration

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Power	Sound Power is the rate at which sound energy is emitted, reflected, transmitted or received, per unit time. Unlike sound pressure, sound power is neither room-dependent nor distance-dependent.
Sound Pressure Level (SPL)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa ($20x10^{-6}$ Pascals) on a decibel scale.
Sound Power Level (SWL)	The Sound Power Level is the sound power relative to a standard reference pressure of 1pW ($20x10^{-12}$ Watts) on a decibel scale. The SWL of a simple point source may be used to calculate the SPL at a given distance (r) using the following formula: $SPL = SWL - 10 \times Log_{10}(4 \times \pi \times r^2)$ Note that the above formula is only valid for sound propagation in the free-field (see below).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dBA	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.
$D_{nT,w}$	The single number quantity that characterises airborne sound insulation between rooms over a range of frequencies.
Rw	Single number quantity that characterises the airborne sound insulating properties of a material or building element over a range of frequencies.
Reverberation	The persistence of sound in a space after a sound source has been stopped.
PPV	The particles of a medium are displaced from their random motion in the presence of a vibration wave. The greatest instantaneous velocity of a particle during this displacement is called the Peak Particle Velocity (PPV) and is typically measured in the units of mm/s.
Hertz, Hz	The unit of Frequency (or Pitch) of a sound or vibration. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
Acceleration	Acceleration is defined as the rate of change of Velocity of a particle over a period of time and is typically measured in the units of m/sec^2.
Vibration Dose, VDV	When assessing intermittent vibration it is necessary to use the vibration dose value (VDV), a cumulative measurement of the vibration level received over an 8-hour or 16-hour period. The VDV formulae uses the RMS Acceleration raised to the fourth power and is known as the Root-mean-quad method. This technique ensures the VDV is more sensitive to the peaks in the acceleration levels. VDVs are typically measured in the units of $m/s^{1.75}$.

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(Refer Below)

22252.1 Markups 20230418 VMS AUSTRALIA

LOT 2
DP 418438

LOT 38
SEC. 1
DP 14650

Active Play Area for 10 of 0-2 Year Olds

Active Play Area for 10 of 2-3 Year Olds

Active Play Area for 20 of 3-5 Year Olds

Vegetable Garden, etc... **ONLY**

No Passive or Active Play

Passive Play Area for 10 of 2-3 Year Olds

Passive Play Area for 10 of 3-5 Year Olds

LOT 37
SEC. 1
DP 14650
1162.4 SQM

LOT 3
DP 832117

NO. 26 & 26A
2 - STOREY
BRICK DUPLEX
(METAL ROOF)

(B) = window (2.5w * 1.0h) SILL RL. 13.3
(C) = window (2.5w * 0.9h) SILL RL. 13.3
(D) = window (0.9w) TOP RL. 14.2
(E) = window (1.9w * 0.6h) SILL RL. 12.7
(F) = window (0.8w * 1.8h) SILL RL. 12.4
(G) = window (0.9w * 1.8h) SILL RL. 12.4
(H) = window (2.5w * 1.0h) SILL RL. 16.4

Key

Minimum 2.4m Total Height Solid Continuous Barrier
Minimum 10 kg/m² Surface Density

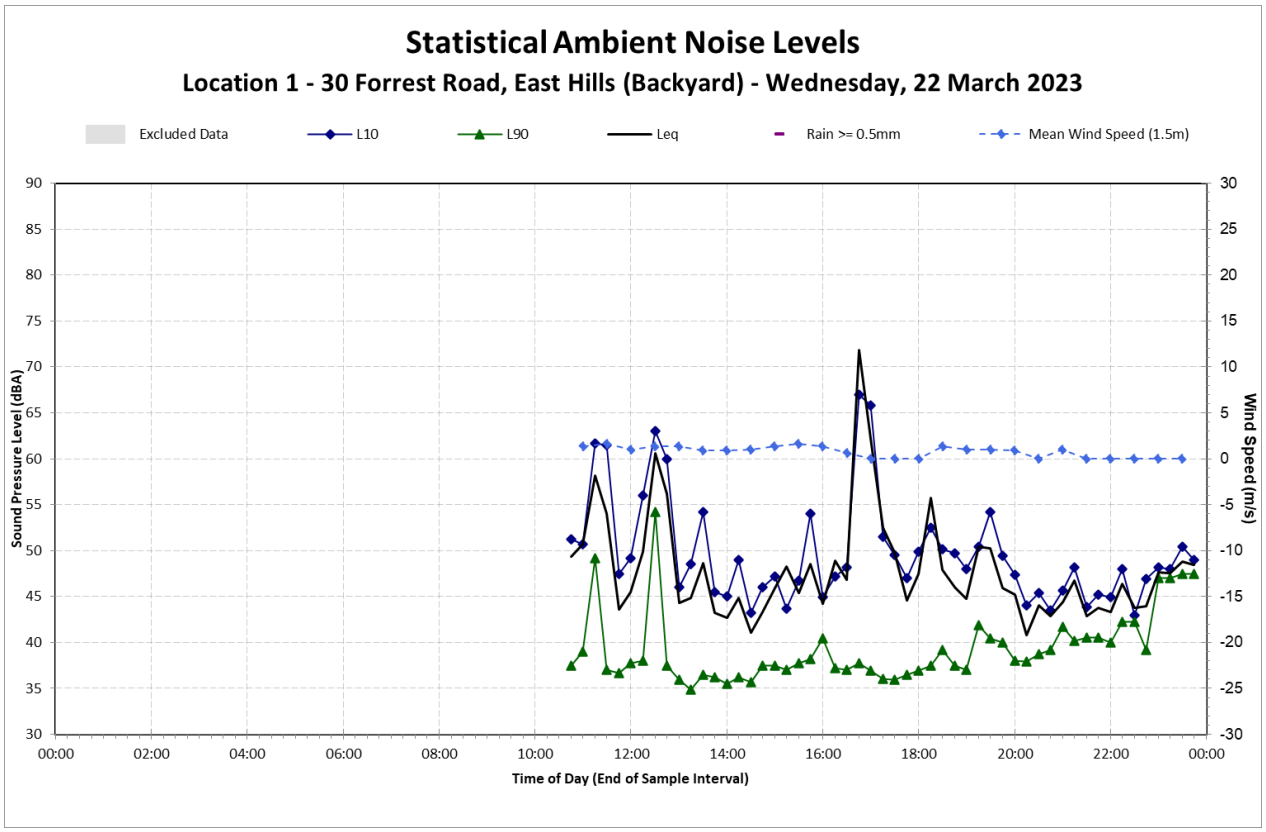
Minimum 2.1m Total Height Solid Continuous Barrier
Minimum 10 kg/m² Surface Density

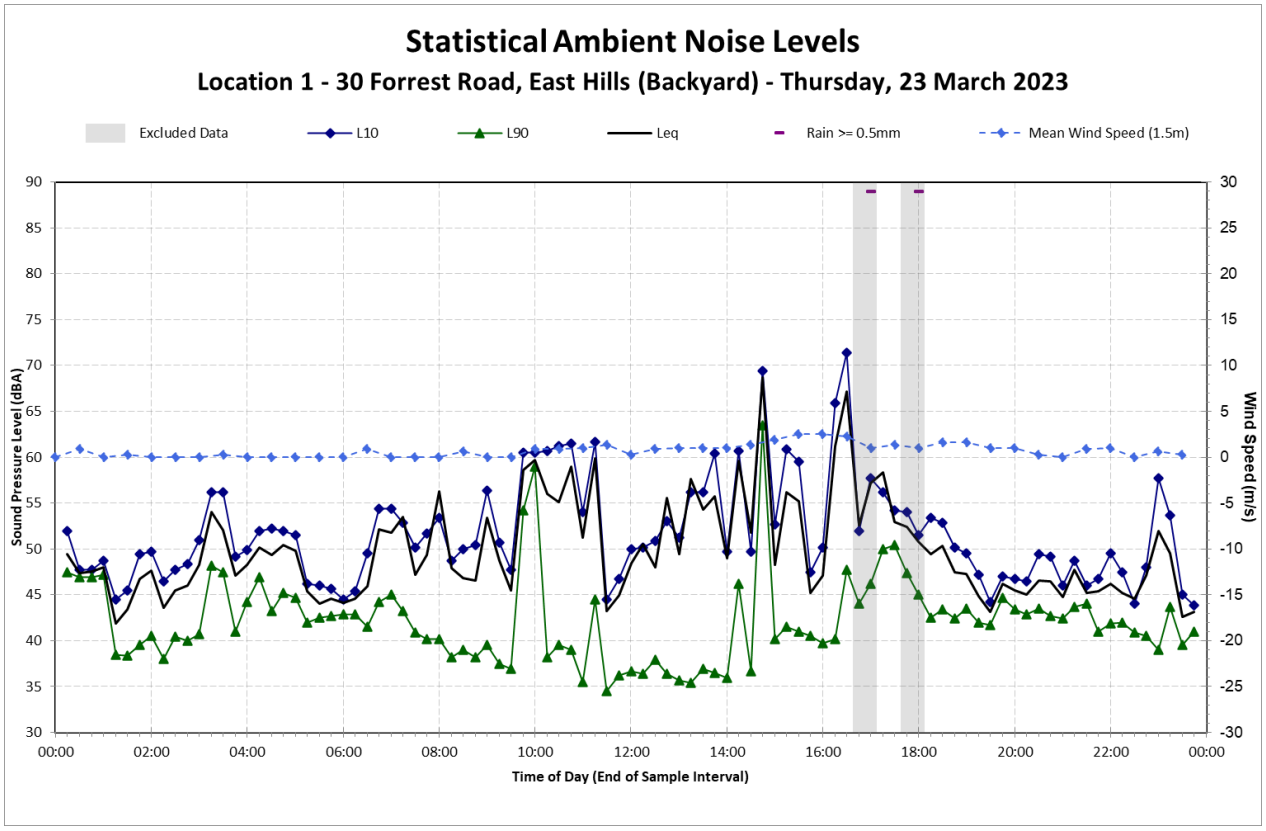
Minimum 1.8m Total Height Solid Continuous Barrier
Can be made of Colorbond

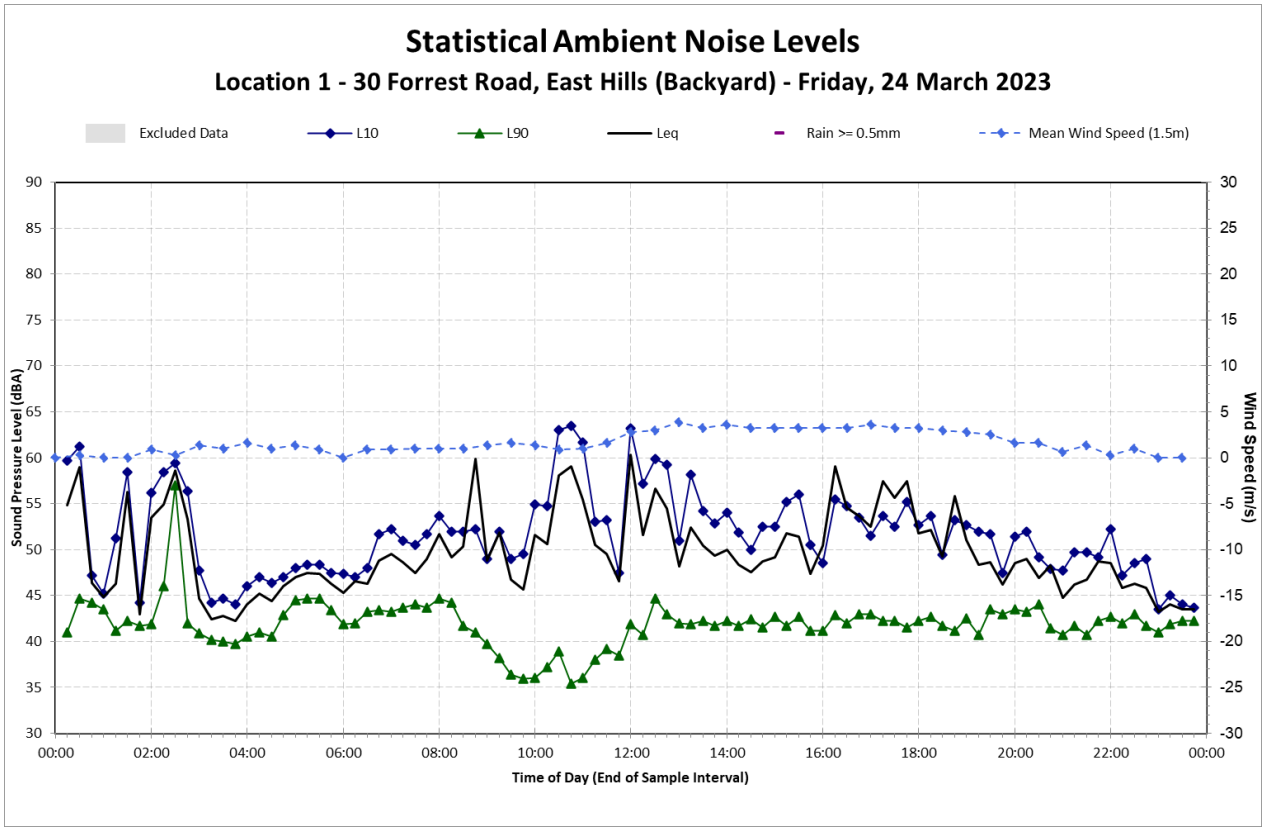
DAWSONVU
po box 1152 hunters hill nsw 2110
www.dawsonvu.com.au
info@dawsonvu.com.au
trang@dawsonvu.com.au
0438 297 973
michael@dawsonvu.com.au
0438 297 962

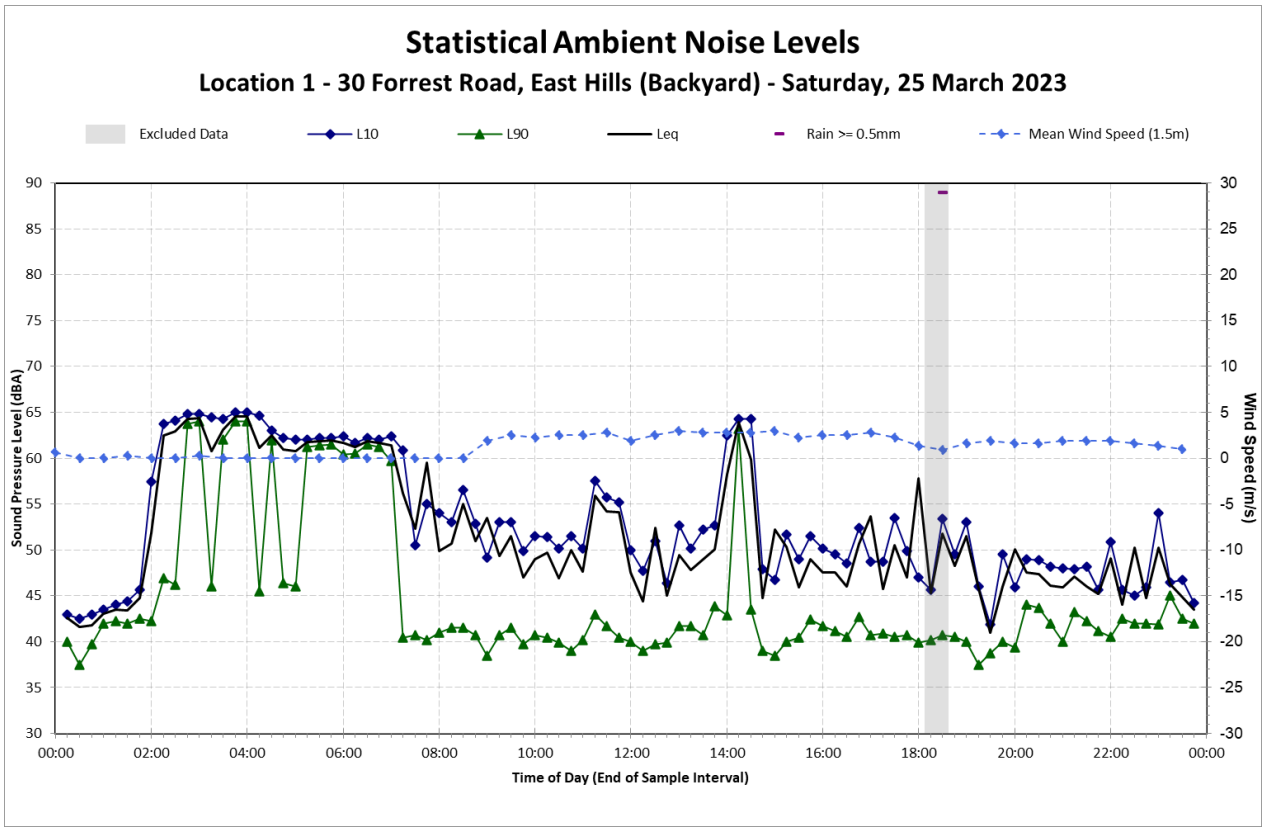
date	revision	issue
11.10.22	B	Revised DA submission
16.06.22	A	DA submission

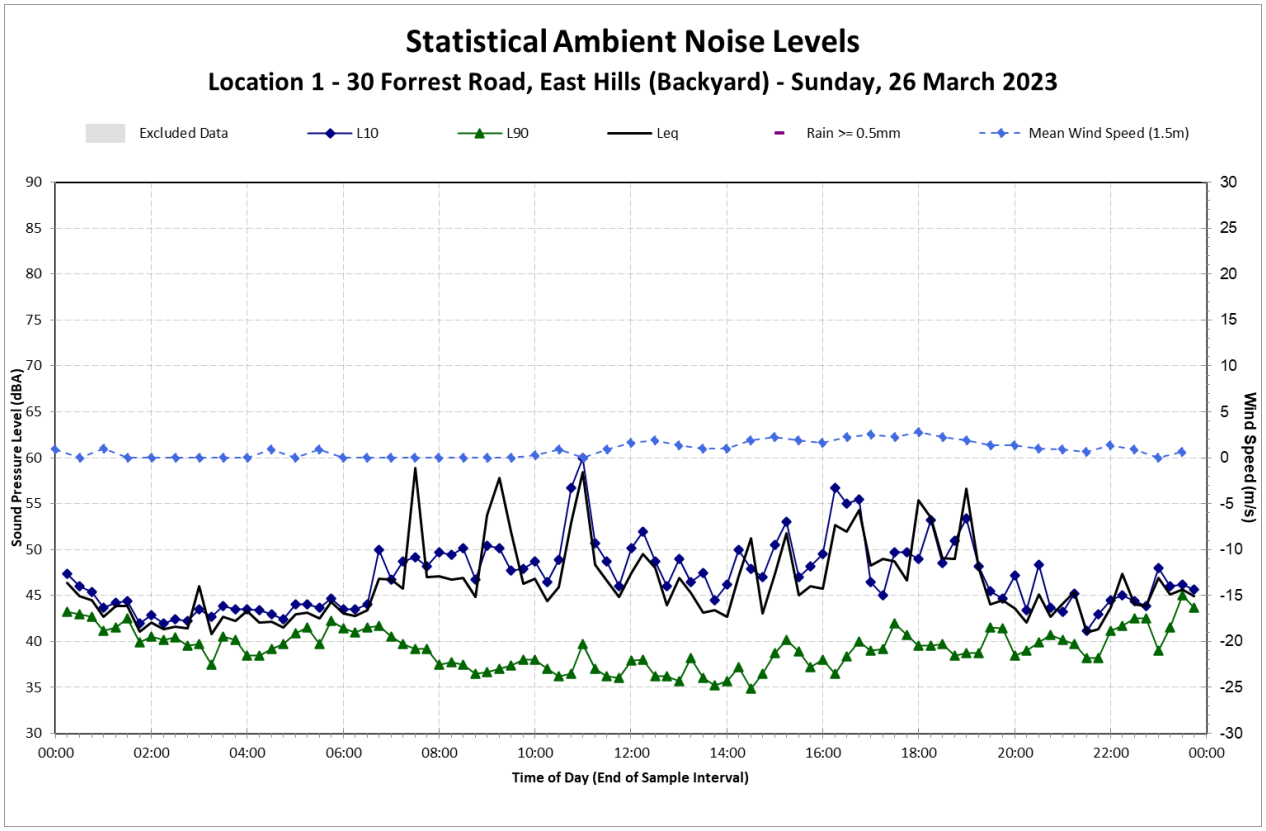
address: **28 & 30 Forrest Road, East Hills, Lot 37 & 38, DP 14650**
drawing : **Ground Floor Plan**
drawing no. : **2**
date: 11.10.22
revision: **B**
scale: 1:100 @ A1

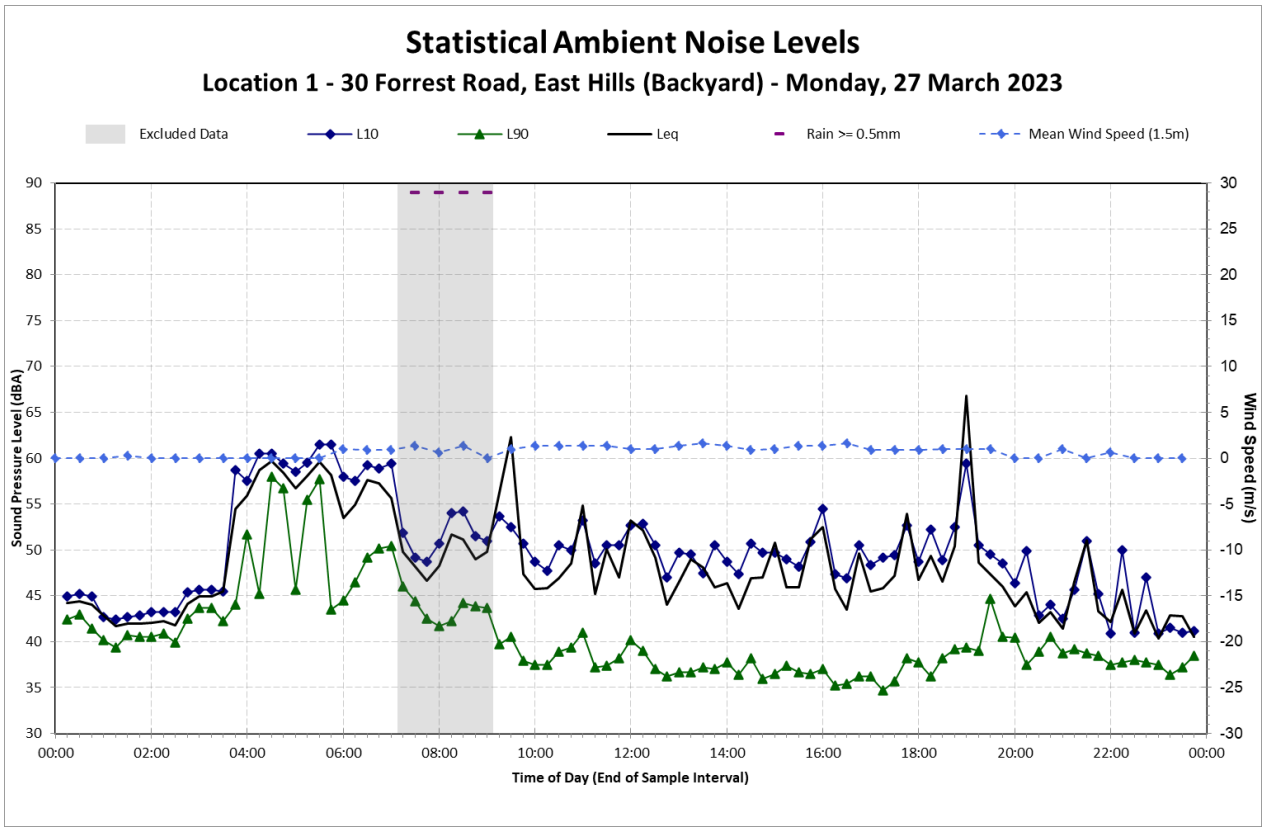

Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Wednesday, 22 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

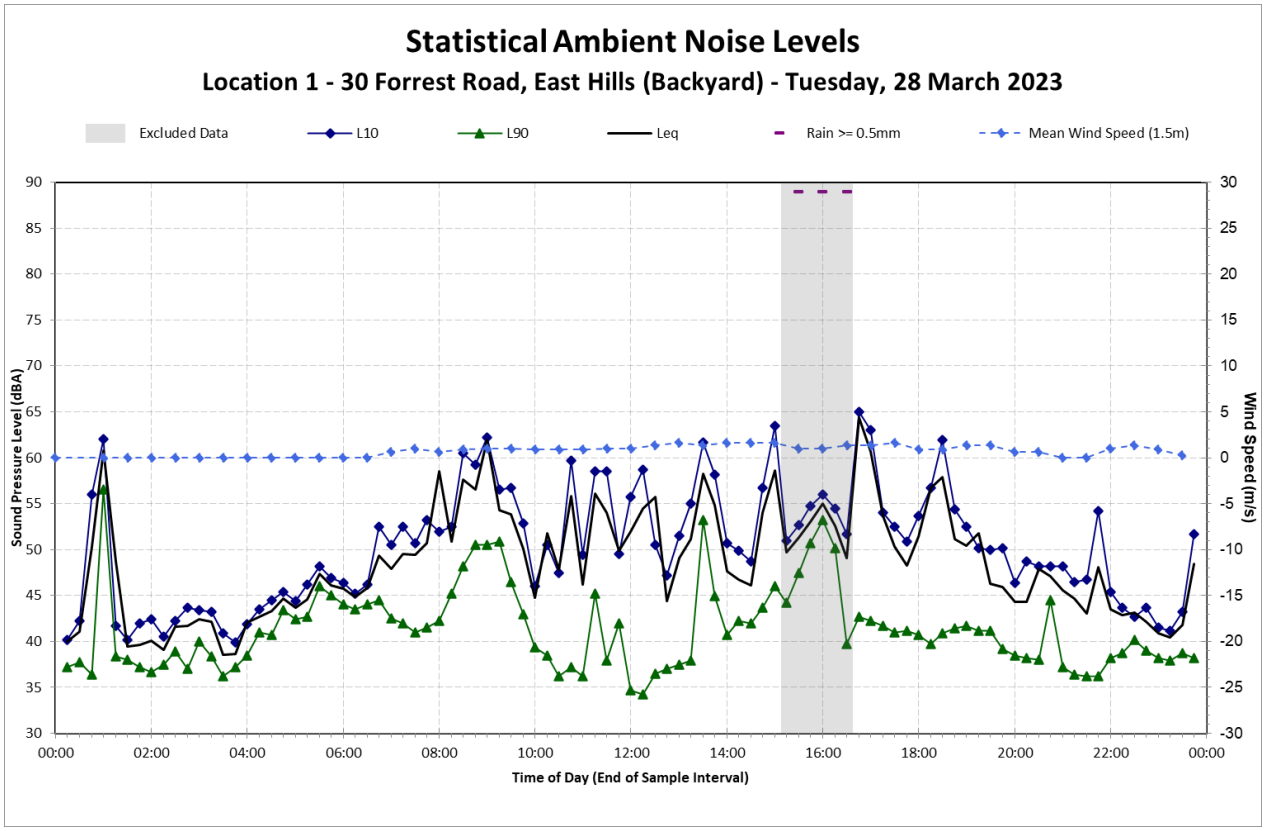

Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Thursday, 23 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

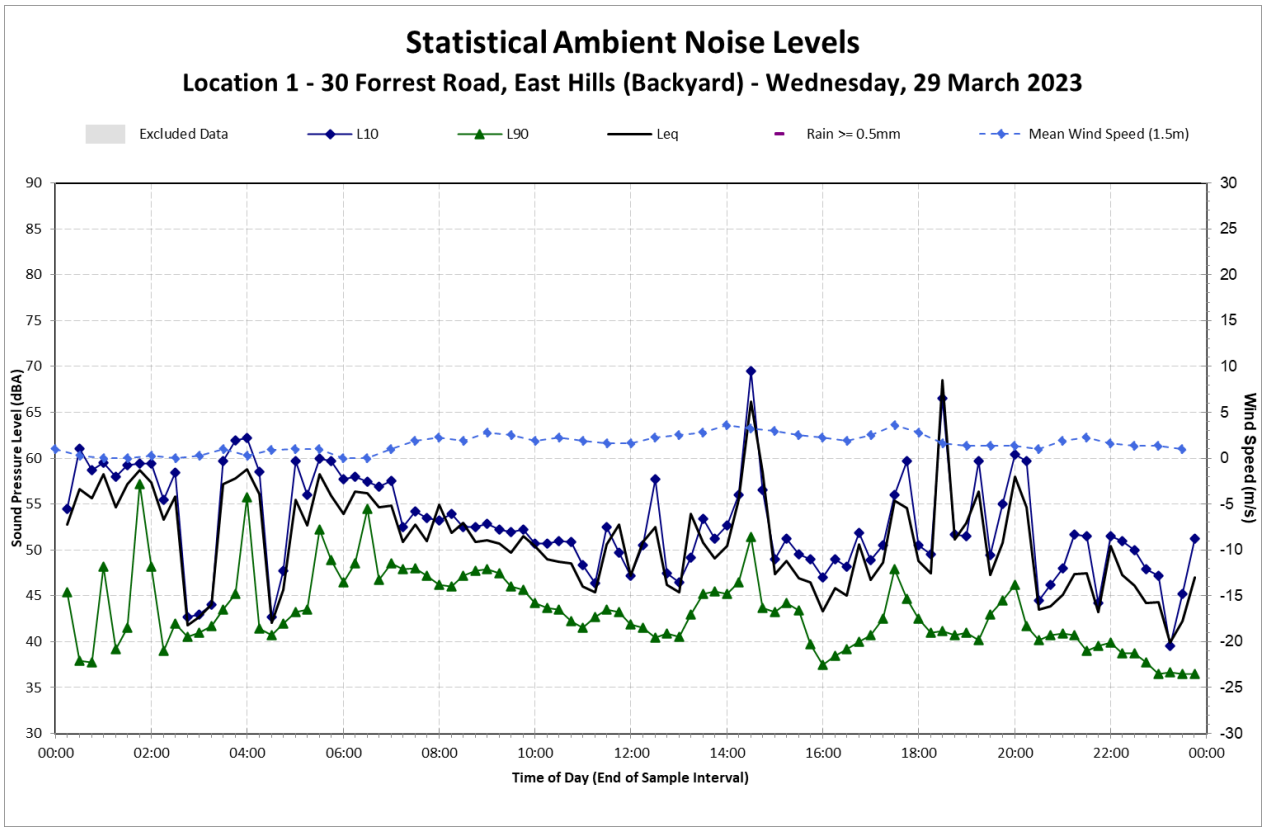

Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Friday, 24 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

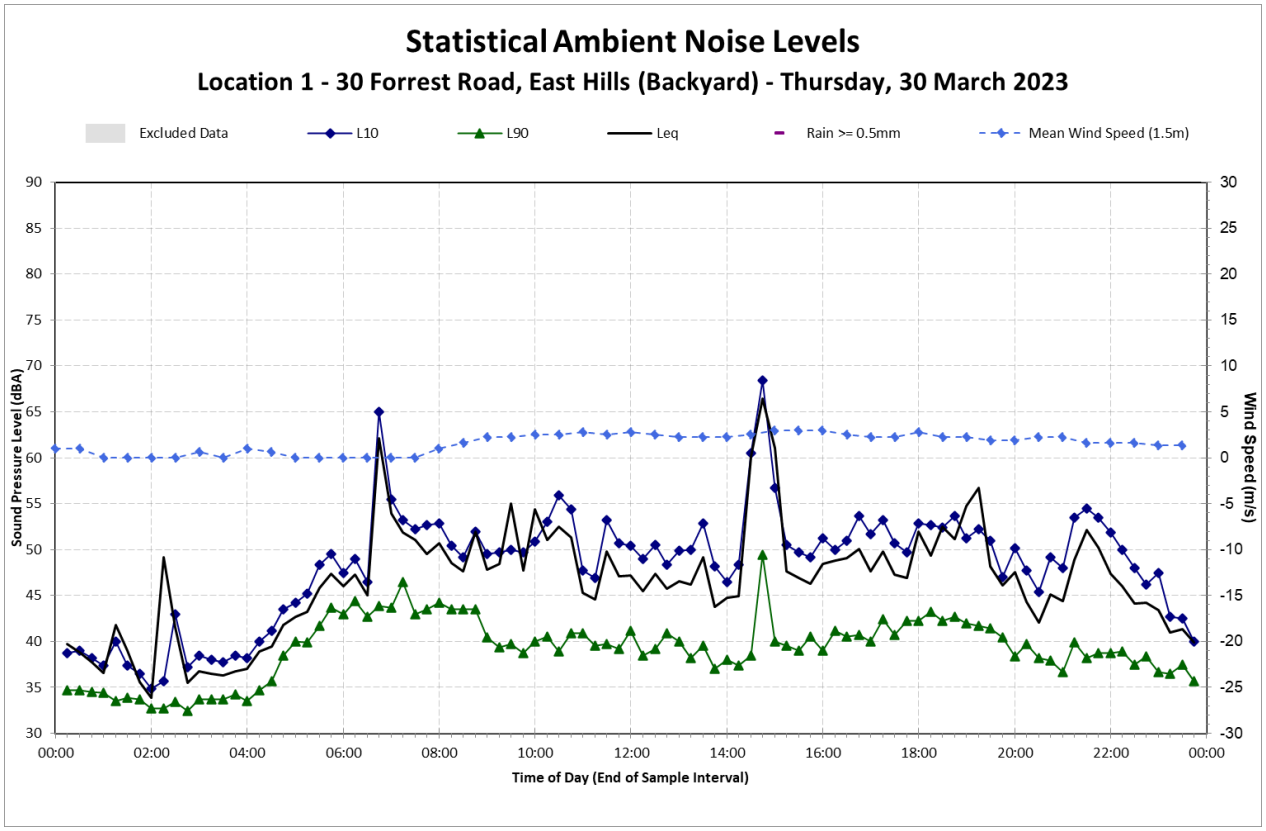

Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Saturday, 25 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Sunday, 26 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Monday, 27 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Tuesday, 28 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Wednesday, 29 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Thursday, 30 March 2023
Excluded Data
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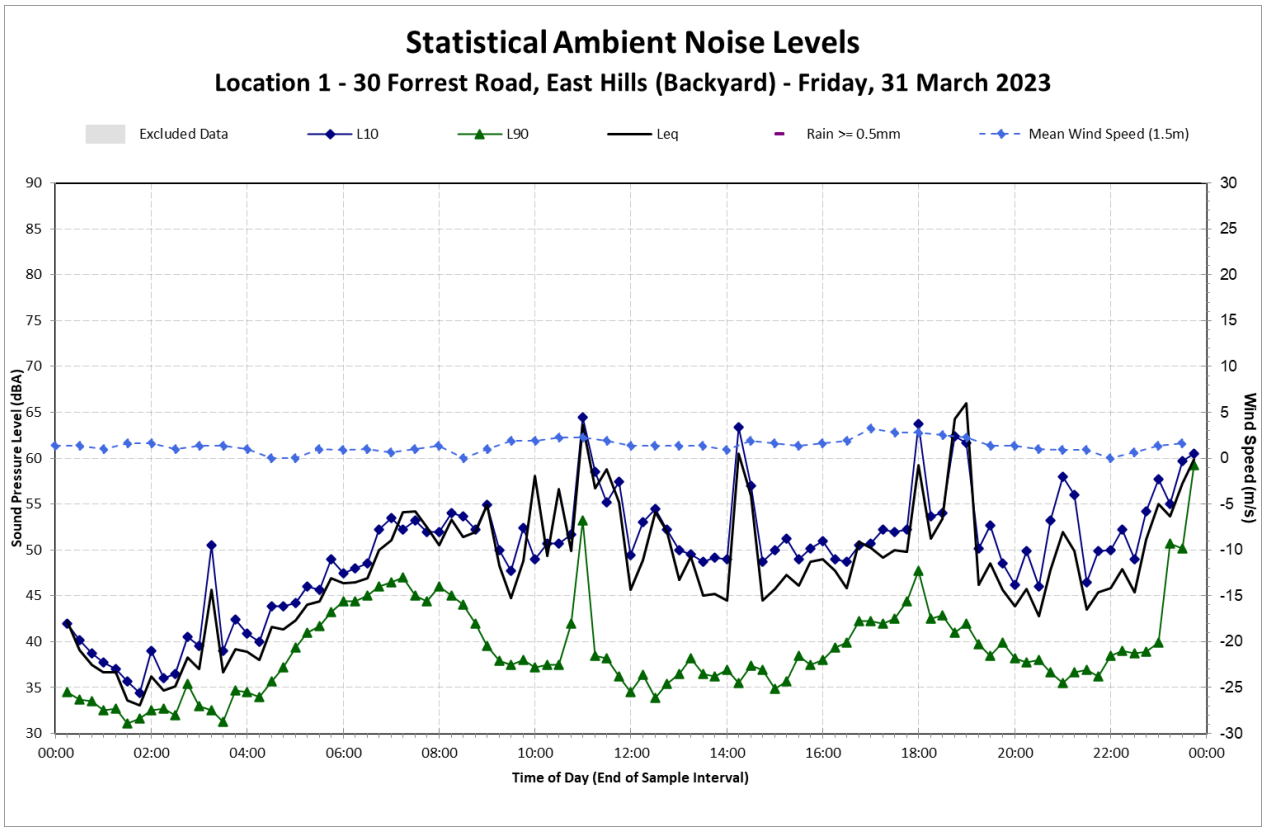
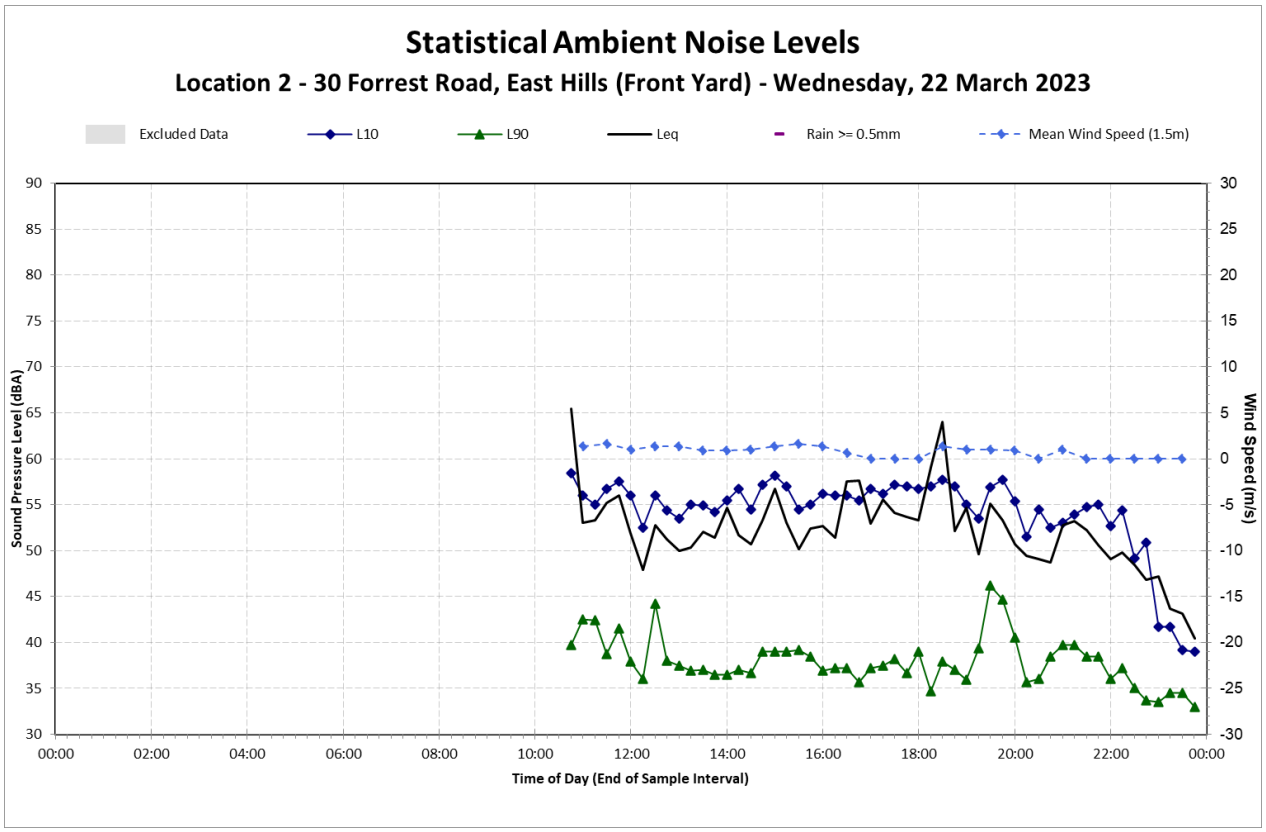
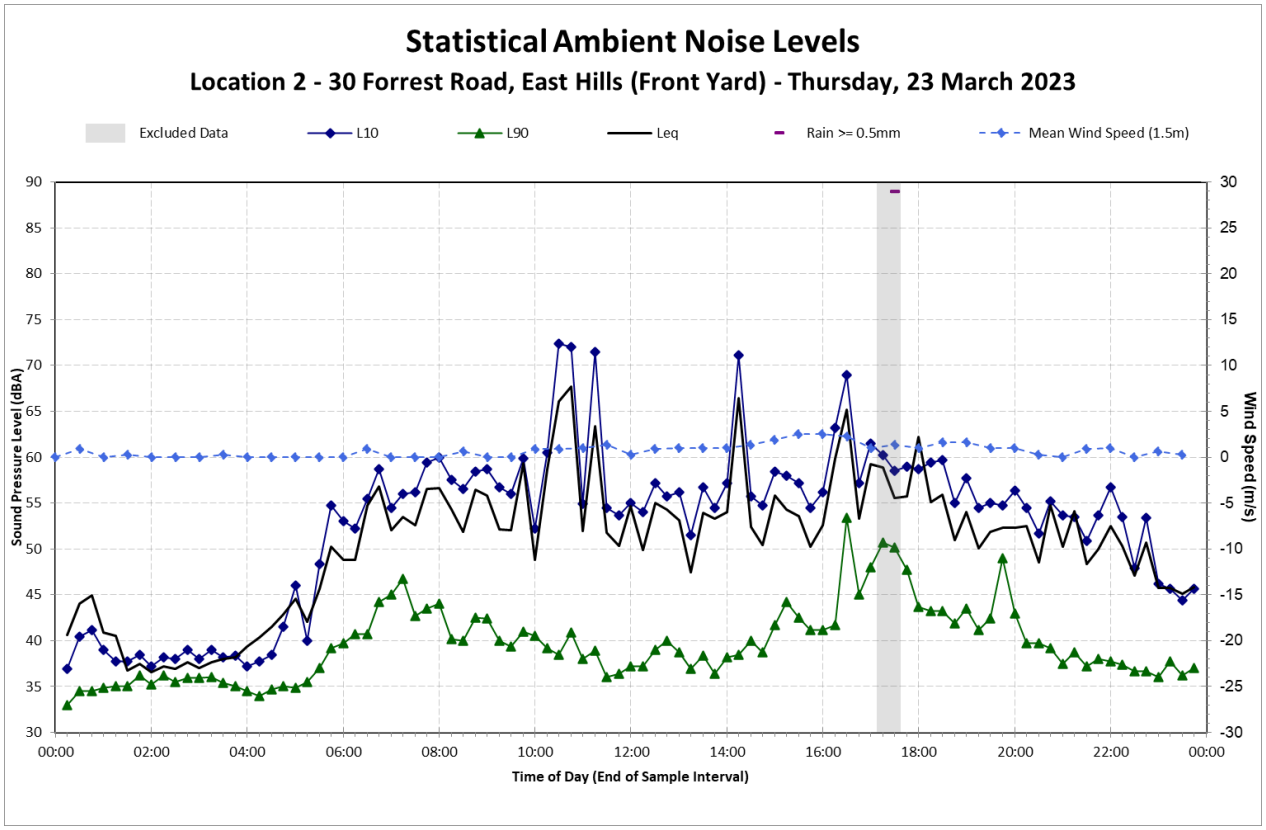
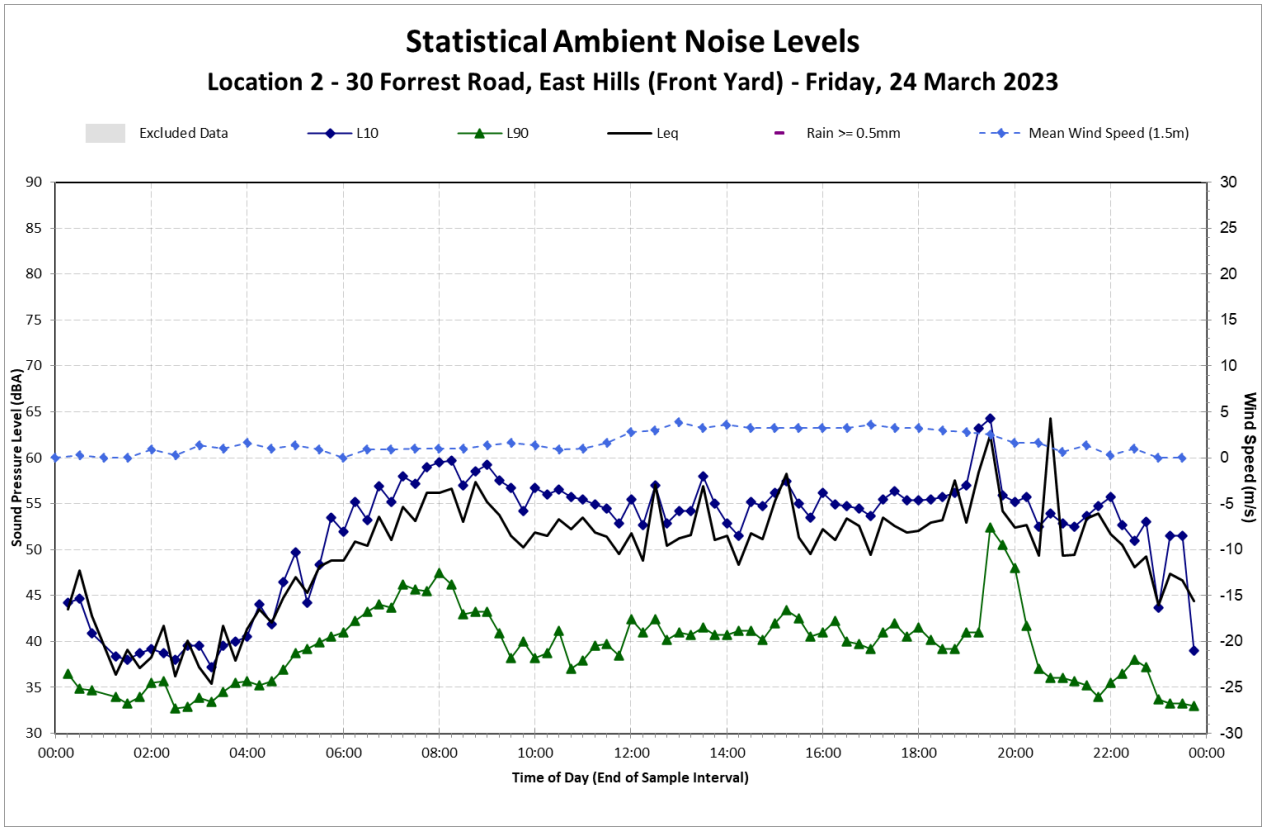
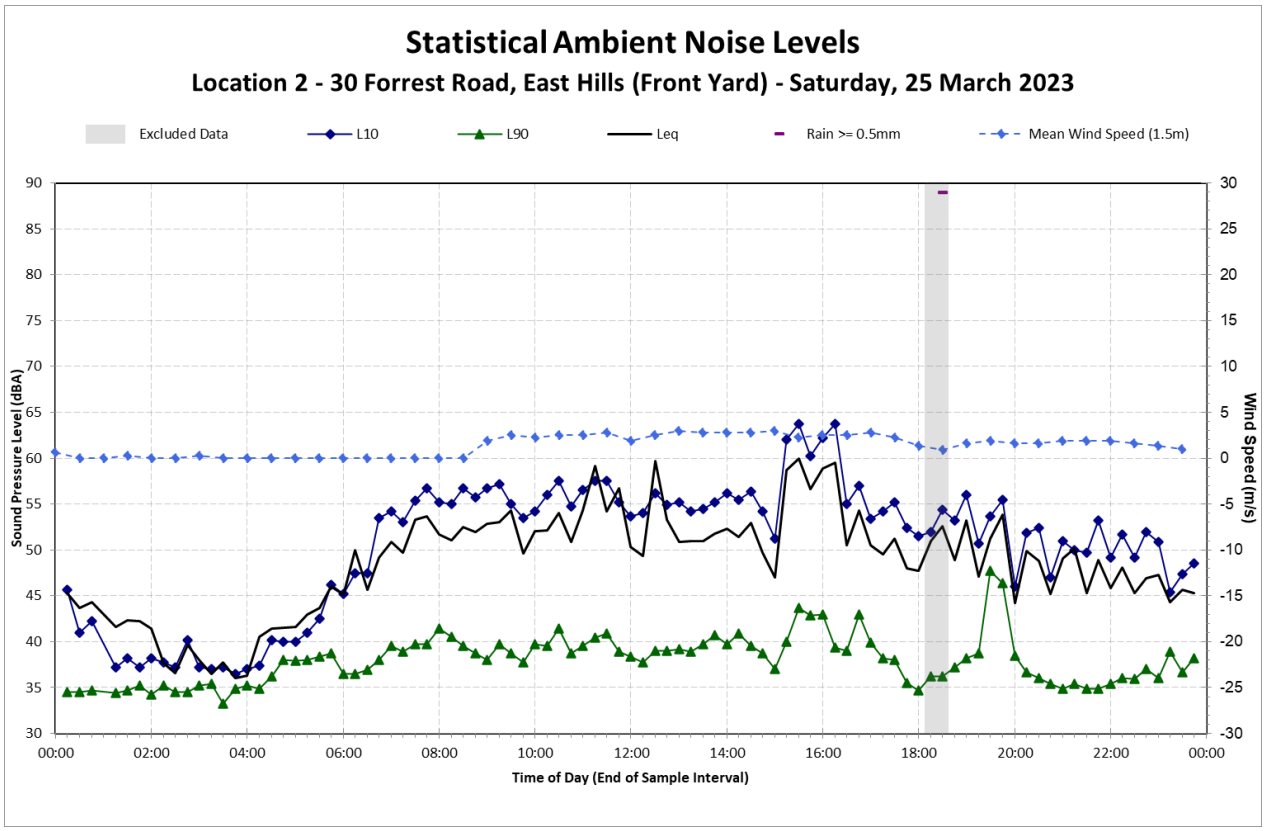
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

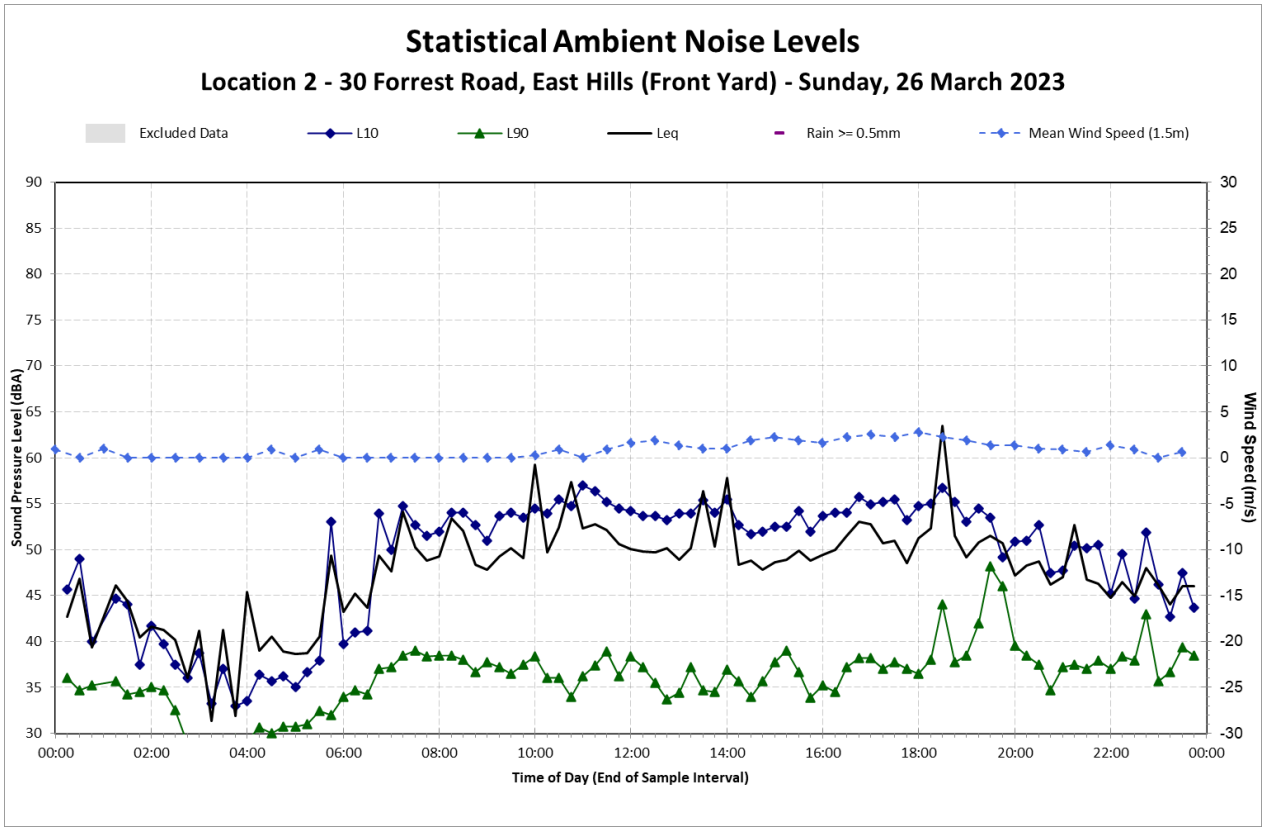

Statistical Ambient Noise Levels
Location 1 - 30 Forrest Road, East Hills (Backyard) - Friday, 31 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

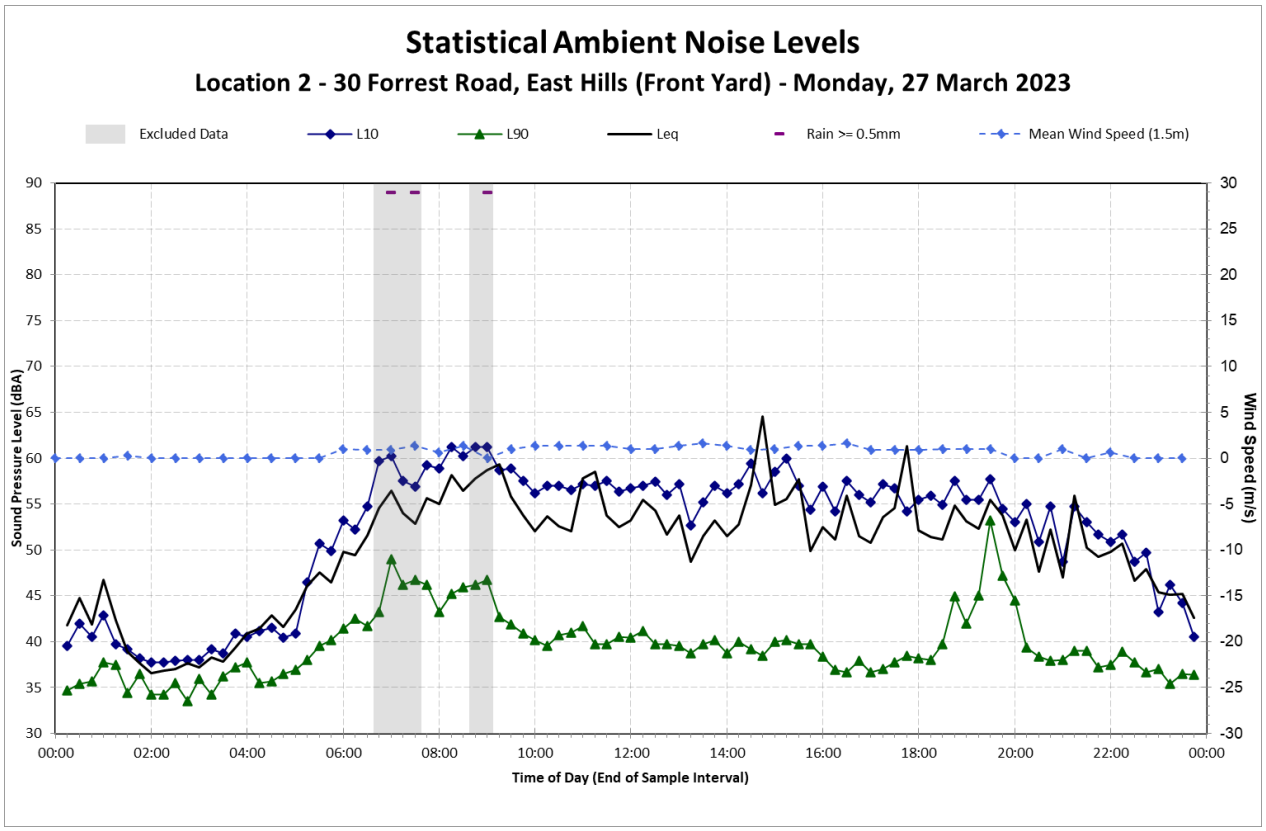

Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Wednesday, 22 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

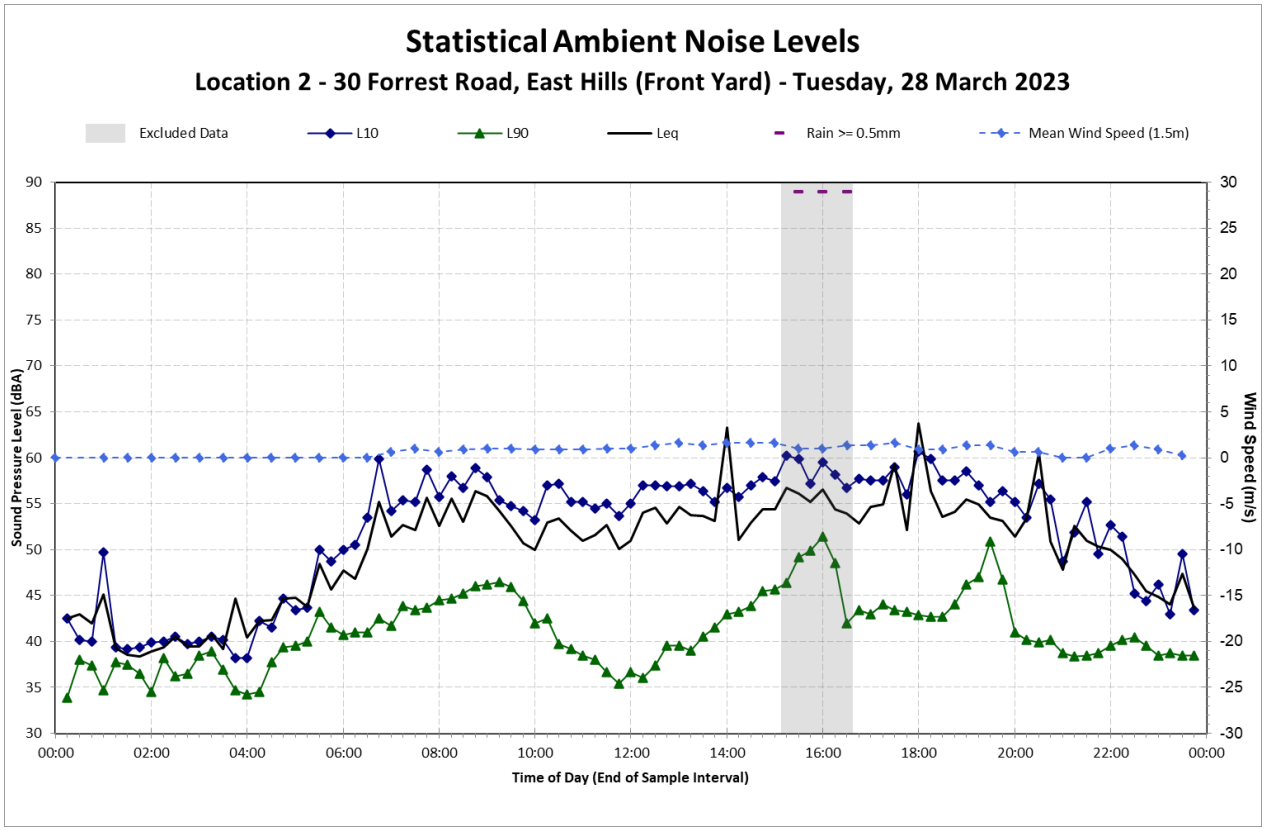

Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Thursday, 23 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

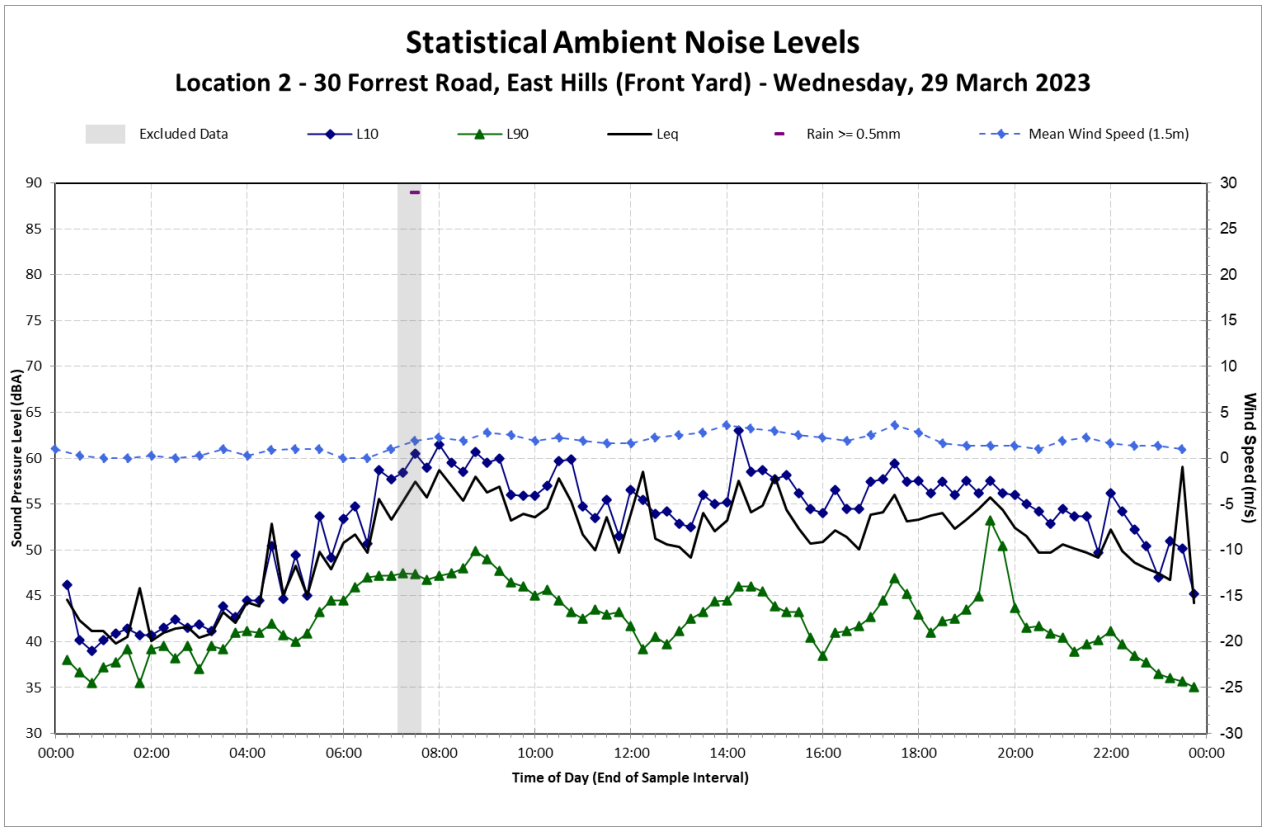

Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Friday, 24 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

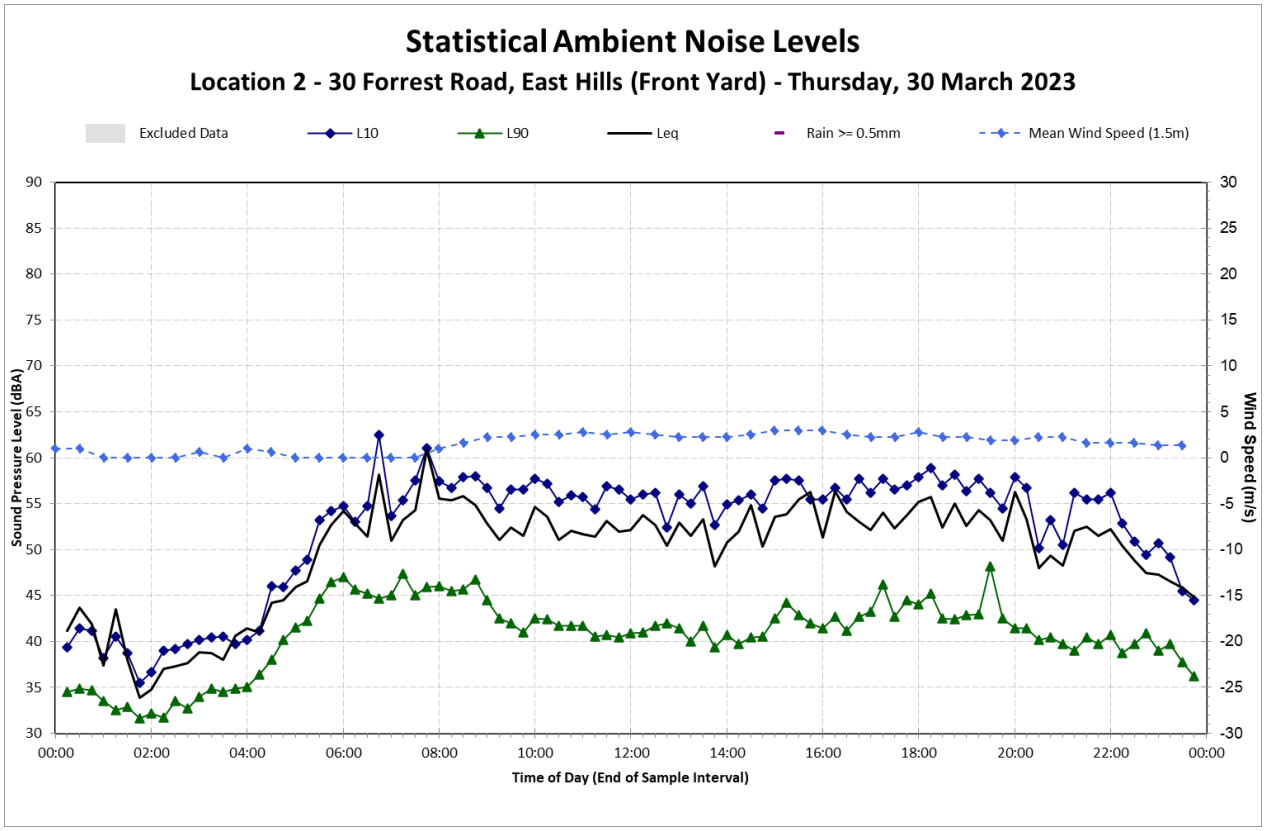

Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Saturday, 25 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

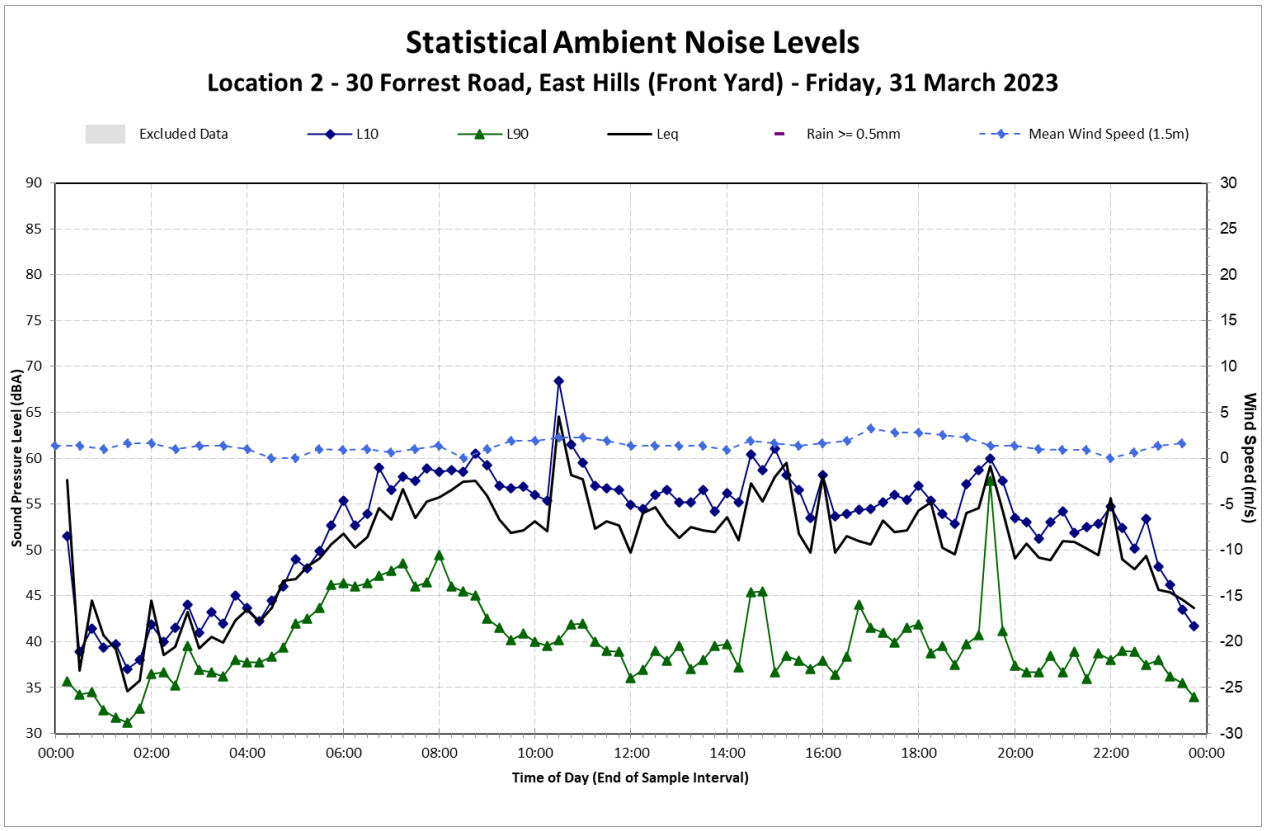

Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Sunday, 26 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Monday, 27 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Tuesday, 28 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Wednesday, 29 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Thursday, 30 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Location 2 - 30 Forrest Road, East Hills (Front Yard) - Friday, 31 March 2023
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)