Noise and Sound Services

Proposed Landscaping Materials Supply and Associated Earthworks - Noise Assessment

Located at:-

11 Addison Road,
Ingleside
NSW 2101

January 2022

Report No. nss23569 – Final

Prepared at the Request of:-

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C O N T E N T S

EXECUTIVE SUMMARY

A noise assessment of the proposed landscaping materials supply and associated earthworks at 11 Addison Road, Ingleside, NSW 2101 has been carried out. The purpose of the noise assessment is to provide an accurate assessment of potential noise emissions from mechanical plant associated with the operation of the bulk soil storage bins and shed as required by Northern Beaches Council. This is at, and in addition to, the long-time existing Matthews Contracting business on the site.

All the neighbouring residential premises to the proposed site have been identified. The nearest noise sensitive dwelling to the site is the cottage, which is associated with the main house at 5, Addison Road. Here the most affected point on or within the cottage residential property boundary is at approximately 63 metres (i.e., 93 – 30 metres) from the site proposed for the soil storage bins.

This acoustical assessment report for the proposed development is to assess the on-site noise in accordance with the NSW Environment Protection Authority's 'Noise Policy for Industry' (2017). Existing ambient noise levels have been measured continuously for a period of 7 days using an unattended noise logger. The placement of the noise logger has been chosen to provide representative L_{AF90} background noise levels (L_{AF90}) for the neighbouring residential properties.

Based on the background noise measurements, the intrusive noise goal ($L_{Aeq,\ 15\ minute}$) for the day period is 56 dBA (51 dBA + 5 dB) and amenity noise goal of 51 dBA. Hence, the project noise trigger level is 51 dBA. The long-term background noise level is generated by high flows of road traffic using the steep incline at the nearby Mona Vale Road.

The hours of operation will be typically 7:30am – 5:00pm – Monday-Friday; and 7:30am-4:00pm Saturday (Closed Sunday). Contract staff will typically arrive at 7:00am; depart by 7:30am and return around 3:00pm.

Noise models have been carried out for the proposed mechanical plant, and on-road traffic. The noise assessment confirms that feasible and reasonable mitigation measures should be implemented. The modelled noise impact can be mitigated by constructing a suitable fence / noise barrier along one site boundary. This involves a noise barrier between the site and the nearest residential dwelling, being the cottage of 5 Addison. In addition to the barrier good on-site work practices and good community relations is recommended to avoid negative reactions to noise.

The day noise goal for on road traffic ($L_{Aeq,\ 1\ hour}$) of 55 dBA is likely to be exceed during peak hours, however no significant increase in the existing road traffic noise is predicted for the proposed development.

1. INTRODUCTION

Noise and Sound Services was requested by Barnett and May of PO Box 365 Belrose NSW 2085 to carry out a noise assessment, on behalf of Matthews Contracting, Demolition and Excavation, for the proposed use of a for a proposed landscape materials supply enterprise and associated earthworks at Lot 1831 DP 812302 No. 11 Addison Road, Ingleside, NSW 2101. This is in addition to the established use of the site where heavy machinery such as Mack bogie truck and trailers, Volvo excavators and Victory forklifts are stored and maintained. Matthews Contracting currently offers services including demolition of existing buildings, all types of excavation, rock sawing, rock grinding, piering, vegetation mulching, site remediation, land clearing and retention systems and the 11 Addison Road site is the main depot. Matthews Contracting are a family owned business which commenced operations in 1992.

The purpose of the noise assessment is to provide an independent and accurate assessment of potential noise emissions from the proposed development. This is in line with the NSW Government's Noise Policy for Industry - 2017 (NPfI) and road traffic noise in line with the Government's NSW Road Noise Policy - 2011 (RNP).

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The proposal area is a RU2 – Rural Landscape zone, Lot 1831 DP 812302 No. 11 Addison Road, Ingleside, (the subject site) the land is located on the western side of Addison Road with vehicular access off Wirreanda Road, the subject site is approximately 200 metres north of the busy Mona Vale Road. See Figure 1 below.

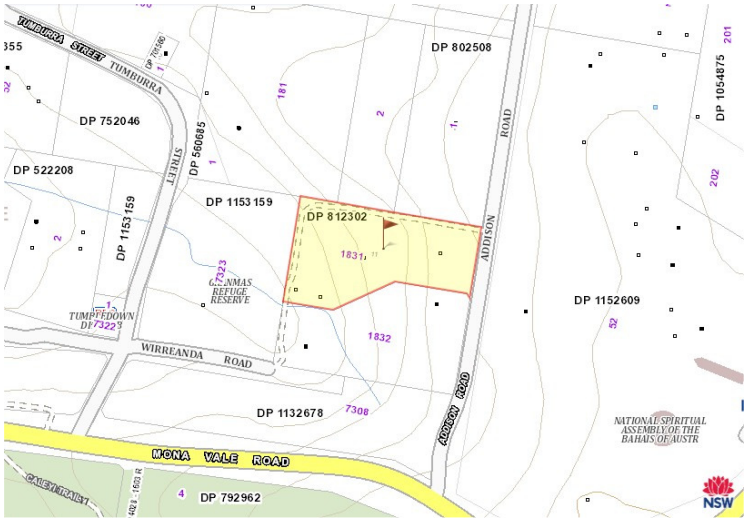


Figure 1: Site and Noise Measurement Location. Source: (Six Maps).

The residential property at 11 Addison Road is the applicant's home. Neighbouring residential premises have been identified as 2, 5, and 21 Addison Road as shown in Figure 2 below.

Figure 2: Site and Noise Measurement Location.
Original Source: (Google Earth).

The neighbouring premises have been identified in a site visit on Friday 14th January 2022. The neighbouring residential premises are shown in Table 1 below.

TABLE 1. NEIGHBOURING RESIDENTIAL PREMISES

Property	**Approximate Distance from centre of the site (metres)**	**Approximate Elevation (metres)**
Site	N/A	130 to 136
House 2, Addison Road	200	182
House 5, Addison Road	125	165
Cottage 5, Addison Road Boundary	45	131
Cottage 5, Addison Road Dwelling	85	131
House 21, Addison Road	185	175

There is also a community centre, Granma's Refuge 4 Tumburra Street is the base for a charity supporting youth in Northern Sydney known as the Business Education Network. The building is approximately 100 metres from the centre of

the subject site. The cottage at 5, Addison Road is affected with road traffic noise as it is approximately 100 metres from the steep incline at Mona Vale Road.

There are at least three other excavations and earth moving businesses to the west of the subject site. Hence the area is defined as Urban in accordance with the NSW Government's Noise Policy for Industry (2017). It is an area with an acoustical environment that has a combination dominated by 'urban hum' and industrial source noise, mostly traffic and/or industrial related sound sources, through-traffic with characteristically heavy and continuous traffic flows during peak periods and is near commercial districts or industrial districts

2.2 Development Description

In the development application the project is described as proposed landscaping materials supply & associated earthworks including replacement of existing metal clad shed.

The plans and Figure 3 below indicate the location of proposed bulk soil storage bins. These are four bins initially and three bins (to the north of the site) for future development. The bulk material store bins will house a range of product likely to include topsoil, sand, aggregates, decorative gravels, and mulch. The proposed bins will be approximately 50 metres to the nearest residential boundary and 93 metres to the nearest residential dwelling.

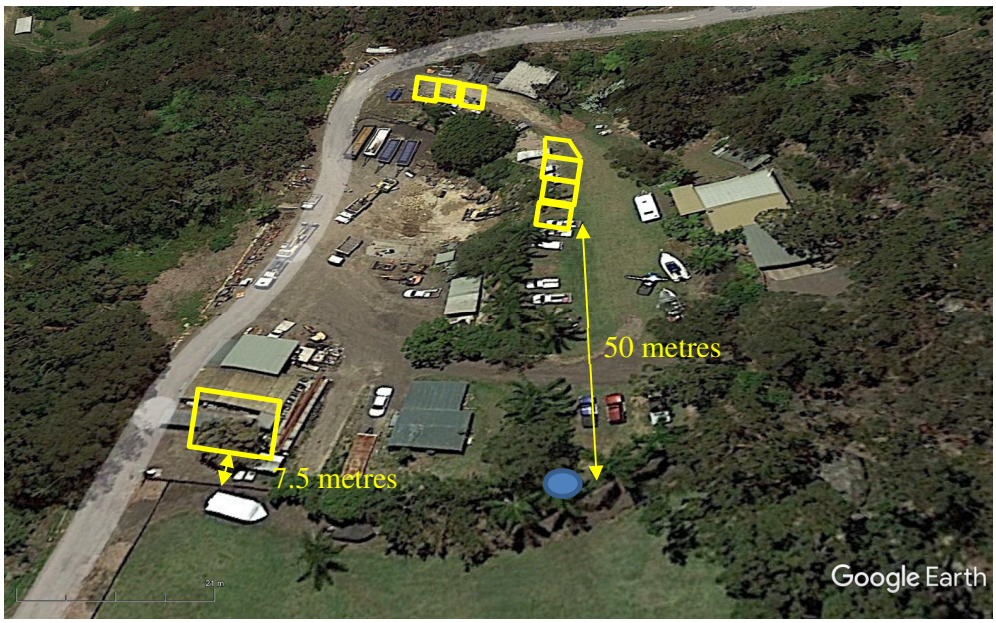


Figure 3: Site and Noise Logger Measurement Location (Blue Circle). Original Source: (Google Earth).

The three proposed future bins will be approximately 100 metres to the nearest residential boundary. The metal shed clad is proposed to be steel framed and steel-clad shed with overall dimensions 12 metres x 17.5 metres and will be set back 7.5 metres from the nearest residential boundary and 46 metres to the nearest residential dwelling. No air conditioning or the like is proposed for the shed. The demolition of the existing shed and construction of the new shed is expected to be carried out with a few days without any significant noise impact. Works should only be carried out in day time hours.

The hours of operation will be typically 7:30 am – 5:00 pm – Monday-Friday; and 7:30 am-4:00 pm Saturday (closed Sunday). Contract staff will typically arrive at 7:00 am; depart by 7:30 am and return around 3:00 pm.

Staff of Matthews Contracting comprise in the order of 20 to 24 individuals, the majority of whom are employed in remote work locations. On-site employment would likely increase from the current levels to an estimate of 6 individuals with 3 associated with office/administration activities and 3 associated with landscape supply, loading and dispatch.

3. NOISE LEVEL GUIDELINES

3.1 Pittwater 21 Development Control Plan

Pittwater 21 Development Control Plan, Controls states that industrial premises must be designed, constructed, maintained and operated in a proper and efficient manner to noise pollution. The development and business operation must comply with the Protection of the Environment Operations Act, 1997, and any relevant legislation. Development and business operation must comply with the Environment Protection Authority's NSW Industrial Noise Policy, January 2000. (Now superseded by the Noise Policy for Industry - 2017).

3.2 Protection of the Environment Operations Act, 1997

If offensive noise occurs, a person can be served with noise abatement direction given under section 276 (b) of the Protection of the Environment Operations Act, 1997. In this case the person must not, without reasonable excuse, while the direction remains in force –

(a) fail to promptly cease making or contributing to the making of the offensive noise, or

(b) at any time within 28 days following the time at which the direction was given (or such shorter period as is specified in the direction), make or

contribute to the making of offensive noise that is emitted from the premises.

offensive noise means noise—

a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances —

i. is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or

ii. interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

b) that is of a level, nature, character, or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.

3.3 NSW Noise Policy for Industry (2017)

The assessment procedure for industrial and commercial noise sources given in the Noise Policy for Industry (2017) has two components:-

- **Controlling intrusive noise impacts; and**
- **Maintaining noise level amenity.**

Both components are taken into account when determining a project noise trigger level. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response. The project noise trigger level reflects the most stringent noise level requirement.

3.3.1 Intrusive Noise Impacts

The NSW Government in their Noise Policy for Industry (2017) states that:- '*The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the LAeq descriptor), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold.'*

The perception of noise and its level of offensiveness depend greatly on the broader situation within which it occurs. Noise that might intrude into a resting or sleeping place may be found offensive whereas the same noise occurring in a market place or noisy working area may pass unnoticed. The concept of *'background + 5 dB'* derives from this consideration.

The Noise Policy for Industry defines the background noise level as *'the underlying level of noise present in ambient noise, generally excluding the noise source under investigation, when extraneous noise is removed'*.
'*Sound levels contributing to background levels can include sound from nearby traffic, birds, insects, animals, machinery and similar sources, if these sounds are a normal feature of the location. The background noise level is represented by the* $L_{AF90,15min}$ *descriptor when undertaking short-term monitoring.'*

The Rating Background Level (RBL) is used for assessment purposes. This is the single-figure background noise level derived from monitoring over a representative period of time, typically one full week. The outcome of this approach aims to ensure that the intrusiveness noise level is being met for at least 90% of the time periods over which annoyance reactions can occur (taken to be periods of 15 minutes).

3.3.2 Protecting Noise Amenity

In the Noise Policy for Industry, it is stated that *'To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined, should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable.'*

The relevant parts of the NSW Government's recommended levels are given in Table 1 below.

TABLE 1: AMENITY NOISE LEVELS

Receiver	Noise Amenity Area	Time of Day	Recommended Amenity Noise Level - L_{Aeq}, dB(A)
Residential	Rural	Day Evening Night	50 45 40
	Suburban	Day Evening Night	55 45 40
	Urban	Day Evening Night	60 50 45
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface – residential receiver only	All	All	Plus 5 dB to recommended amenity noise level

According to the definition in the NSW Noise Policy for Industry, 11 Addison Road, Ingleside is classified as located within a urban area. The recommended amenity noise level (ANL-L_{Aeq}) for urban areas is **60 dBA** day time, **50 dBA** evening time and **45 dBA** night time. Day time is defined as 07:00 to 18:00 hours, evening is 18:00 to 22:00 hours and night time is defined as 22:00 hours to 07:00 hours.

3.2.3 Modifying Factor Adjustments

Where a noise source contains certain characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same sound pressure level. A correction should be applied to both the intrusive and the amenity measurement before a comparison is made with the criteria. An abbreviated version of the correction factors is shown in Table 2 below:-

TABLE 2 – MODIFYING FACTOR CORRECTIONS

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (500-10000 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only
Duration	Single event noise 1.5 min to 2.5 hr	One event in any assessment period	0 to 20 dB(A)	Conditional on duration
Maximum adjustment		Where two or more modifying factors are indicated	10 dB(A)	Excludes duration correction

Note: Tonal noise - Level of one third octave band exceeds the level of the adjacent bands on both sides by 5 dB or more if the centre frequency of the band containing the tone is in the range 500-10000 Hz; 8 dB or more if the centre frequency of the band containing the tone

is in the range 160 to 400 Hz; or 15 dB or more if the centre frequency of the band containing the tone is in the range 25-125 Hz.

3.4 NSW Road Traffic Noise (2011)

The NSW Government has produced criteria for road traffic noise *'NSW Road Noise Policy'* (RNP), March 2011. This provides criteria for land use developments with potential to create additional traffic on sub-arterial and local roads. Here the criterion for local roads is **55 dBA $L_{Aeq, 1 hour}$ for day time** (7:00 hours until 22:00 hours) and **50 dBA $L_{Aeq, 1 hour}$ for night time** (22:00 hours until 07:00 hours). The RNP 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."

These criteria refer to additional traffic created by the development not to the existing traffic or traffic from other developments.

These criteria are for assessment against façade corrected noise levels. The noise level should be assessed at 1 metre from the nearest neighbouring residential façade and at a height of 1.5 metres from the ground. Separate noise criteria should be set, and assessments carried out for each façade of a residence, except in straightforward situations where the residential façade most affected by road traffic noise can be readily identified.

The residential noise level criterion includes an allowance for noise reflected from the façade ('façade correction'). Therefore, when taking a measurement in the free field where reflection during measurement is unlikely as, for instance when measuring on open land before a residence is built, an appropriate correction generally, 2.5 dB should be added to the measured value. The 'façade correction' should not be added to measurements taken 1 metre from the façade of an existing building. Free field measurements should be taken at least 15 metres from any wall, building or other reflecting pavement surfaces on the opposite side of the roadway, and at least 3.5 metres from any wall, building or other pavement surface, behind or at the sides of the measurement point which would reflect the sound.

4. AMBIENT NOISE MEASUREMENTS

Existing ambient noise levels have been measured continuously for a period of 7 days by the placement of a noise logger (see Figure 1 above). The following sections describe the instrumentation, measurement procedure, and results.

4.1 Background and Ambient Noise Logging - Instrumentation

The instrumentation used for measurement of the existing environment consisted of an 'ARL' - Rion NL-42, Environmental Noise Logger serial number 509377. This instrument conforms to IEC 61672-1: 2013/2002 class 2 and has an accuracy suitable for both field and laboratory use.

The calibration of the logger was checked before and after the measurement period with a Brüel and Kjær acoustical calibrator model 4230, serial number 3011545. No significant system drift occurred over the measurement periods.

The environmental noise logger has been checked, adjusted, and aligned to conform to the ARL factory specifications and issued with a conformance certificate within the last 24 months as required by the regulations. The internal test equipment used is traceable to the National Measurement Laboratory at C.S.I.R.O., Lindfield, NSW, Australia.

The calibrator has been checked, adjusted, and aligned to conform to the Brüel and Kjær factory specifications and issued with a conformance certificate within the last 12 months as required by the regulations. The internal test equipment used is traceable to the National Measurement Laboratory at C.S.I.R.O., Lindfield, NSW, Australia.

4.2 Background and Ambient Noise Logging Procedure

Free field continuous noise monitoring was carried out from Friday 14th January 2022 through to Friday 21st January 2022. The logger was located at the boundary (see Figure 3 above). This location was chosen to provide representative L_{AF90} background noise levels for all of the neighbouring residential properties.

We confirm that the noise monitoring was completed during typical representative conditions and that no unusual circumstances or activities are likely to have affected the noise monitoring results. Noise measurements were carried out in accordance with Australian Standard AS 1055-2018, 'Acoustics – Description and measurement of environmental noise'. Any adverse weather conditions throughout the logging period were disregarded from the background assessment. The 'A' frequency weighting and the 'fast' time weighting were used exclusively.

4.3 Noise Logging Results

Measured ambient noise levels are assessed according to the NSW Noise Policy for Industry in terms of ambient noise (L_{Aeq}) and background noise (L_{AF90}) for the time periods defined as: Day: 7:00 am – 6:00 pm, Evening: 6:00 pm – 10:00 pm and Night: 10:00 pm – 7:00 am.
The recorded L_{AF90} levels determine the Rating Background Level (RBL). The RBL is defined as the median value of the tenth percentile value for the recorded L_{AF90} levels for the complete monitoring period. The tenth percentile is also referred to as the Assessment Background Level (ABL).

The resultant RBL (L_{AF90}) and ambient (L_{Aeq}) levels for each period are summarised below in Table 3. The full statistical noise measurement results are shown in graphical form in Appendix A.

TABLE 3 – SUMMARY OF EXISTING NOISE LEVELS

Time of Day	Rating Background Noise Levels ($L_{AF90, 15\ min}$) dBA	Existing Noise Levels ($L_{Aeq, period}$) dBA
Day (07:00 – 18:00)	51	61
Evening (18:00 – 22:00)	44	59
Night (22:00 – 07:00)	44	53

Note 1- All levels rounded to the nearest whole decibel.

5. PROJECT NOISE TRIGGER LEVEL

The procedure to determine noise goals are described below. The noise sources will not contain characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content.

5.1 Intrusive Noise Level

To ensure that on-site noise sources are not intrusive, the $L_{Aeq, 15\ minute}$ noise level should not exceed the Rating Background Level (RBL) for each period of day and evening by more than 5 dB when measured at the most affected residential property boundary. The intrusive noise goal ($L_{Aeq, 15\ minute}$) for the day period is **56 dBA** (51 dBA + 5 dB). Only day time work will be carried out.

5.2 Amenity Noise Levels

The amenity noise criteria are used to limit the maximum ambient noise levels within an area from noise sources associated with the proposed development. To protect the acoustic amenity of land users the combined noise from all noise sources should not exceed the recommended amenity noise level calculated

according to the procedures as given in the NSW Noise Policy for Industry. The amenity assessment relates only to industrial-type noise and does not include road, rail or community noise.

Modifications are made to the recommended ANL to account for the existing level of industrial (or commercial) noise. As the existing environment at the residential properties is unaffected by industrial or commercial type noise the ANL is not modified and the recommended ANL therefore represents the amenity criteria. The recommended amenity noise levels for the development are shown in Table 4 below.

TABLE 4 – SUMMARY OF AMENITY CRITERIA

Type of Receiver	Time of Day	Recommended Amenity Noise Level ($L_{Aeq, period}$)	Existing Noise Level ($L_{Aeq, period}$)	Project Amenity Noise Level ($L_{Aeq, 15\ min}$)
Urban	Day	60	61	51
	Evening	50	59	50
	Night	45	53	45

5.3 Project Noise Trigger Levels

Applying both the amenity and intrusive criteria to the development and adopting the more stringent of the two, determines the project noise trigger levels. Project noise trigger levels at the most affected point on or within any residential property boundary are given below in Table 5.

As the development proposal involves a discrete process, a project noise trigger level for noise from new/modified components (not the whole site) of the operation may be set at 10 dB(A) or more below existing site noise levels or requirements. This approach means that the increase in noise from the whole site is minimised and provides scope for existing components to achieve noise reductions over time.

TABLE 5 – PROJECT NOISE TRIGGER LEVELS

Time of Day	Intrusive Noise Level dB - ($L_{Aeq, 15\ minute}$)	Project Amenity Noise Level dB - ($L_{Aeq, 15\ min}$)	Project Noise Trigger Level dB - ($L_{Aeq, 15\ min}$)
Residential Receivers			
Day (07:00 – 18:00)	56	51	**51**
Commercial Receivers			

When in use	N/A	65	**65**

Note - All levels rounded to the nearest whole decibel.

The project noise trigger level ($L_{Aeq,\ 15\ minute}$) for noise emissions from the proposed development is **51 dBA** at the nearest residential boundary for operations at any time during the day and evening periods (6.30 am – 10.00pm).

5.4 Assessment Locations

The project noise trigger level and maximum noise levels are to be assessed at the reasonably most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the reasonably most-affected point within 30 metres of the residence, but not closer than 3 metres to a reflective surface and at a height of between 1.2–1.5 metres above ground level. This should not be read to infer that the project noise trigger level (or a limit in a statutory document) applies only at the reasonably most-affected location. The assessed/measured noise level is to be suitably adjusted to reflect a 'free field' (that is, nominally no reflective signals) assessment/measurement location.

6. NOISE SOURCE MODELS

This section provides details of the calculations used for predicting the propagation of noise and the resulting noise levels at the nearest residential boundaries.

6.1 Noise Modelling Specifications

The source noise has been modelled using the International Standard ISO 9613-2 (1996(E)), '*Acoustic – Attenuation of sound during propagation outdoors, Part 2 General method of calculation'*. This Standard specifies methods for the description of noise outdoors in community environments. The method described in the Standard is general in the sense that it may be applied to a wide variety of noise sources and covers the major mechanism of attenuation. The method allows for downwind propagation conditions namely:-

- wind direction within an angle of ± 45° of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and
- wind speed between approximately 1 m/s and 5 m/s measured at a height of 3 to 11 metres above the ground.

6.2 Basic Noise Modelling Equations

The equivalent continuous downwind sound pressure level (L_{Aeq}) at each receiver point is calculated for each noise source using the equation below:-

$$\mathbf{L_{Aeq} = L_w + D_c - A}$$

Where:

L_w is the sound power level of the noise source;
D_c is directivity correction; and
A is the attenuation that occurs during the propagation from source to receiver.

The attenuation term A in the equation above is given by:-

$$\boldsymbol{A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{misc}}$$

Where:

A_{div} is the attenuation due to geometric divergence;
A_{atm} is the attenuation due to atmospheric absorption;
A_{gr} is the attenuation due to the ground effects;
A_{bar} is the attenuation due to a barrier; and
A_{misc} is the attenuation due to miscellaneous other effects.

The last term (A_{misc}) generally refers to miscellaneous propagation through foliage, industrial sites and areas of houses.

6.3 Noise Model - On-Site

This section provides typical 'A' frequency weighted sound pressure levels in decibels re 20 µPa for the equipment to be used at the site, see Table 6 below. The measured sound pressure levels are converted from the sound power levels in decibels, re 10^{-12} Watts, for the overall 'A' frequency weighted level.

Noise emissions from plant and equipment are extracted from Australian Standard AS 2436 – 2010, Table B.1 of the draft NSW Construction Noise Guideline (August 2008) and/or the NSW Transport Infrastructure Development Corporation Construction Noise Strategy (November 2007).

TABLE 6 – PLANT NOISE LEVELS

Plant	**Sound Power Level re 10^{-12} Watts dBA**	**Typical Average Sound Pressure Level ($L_{Aeq,\ 15\ minute}$) re 20 µPa. (dBA)**		
		at 10 metres	**at boundary (30 metres from nearest dwelling) 63 metres**	**at dwelling 93 metres**
Excavator 10 Tonne	100	72	51	46

Excavator 30 Tonne	110	82	61	56
Forklift	106	78	57	52
Mack Trucks / Semi Trucks	107	79	58	53

Source: Australian Standard AS 2436 – 2010, Table B.1 of the draft NSW Construction Noise Guideline (August 2008) and the NSW Transport Infrastructure Development Corporation Construction Noise Strategy (November 2007).

6.4 Noise Model - On-Road Traffic

Varga Traffic Planning Pty Ltd reported on matters relevant in relation to the traffic and parking discipline in May 2013. It is reported that the traffic generation associated with the proposal will remain comparable in gross vehicle movement terms to that usual traffic generated from the site to date.

Two-way traffic flows in the order of 50-60 vehicle movements in Tumburra Street, two-way traffic flows in Wirreanda Road (west) of about 20 vehicle movements per hour in peak periods, and about 10 vehicles per hour in Wirreanda Road (east).

The road traffic noise level ($L_{Aeq,\ 1\ hour}$) during the peak periods has been calculated (from the Calculation of Road Traffic Noise – 1988, Department of Transport, Welsh Office, GB) to be **60 dBA** This exceeds the day noise goal ($L_{Aeq,\ 1\ hour}$) of 55 dBA, however no significant increase in road traffic noise is predicted for the proposed development.

7. NOISE ASSESSMENT

The proposed development noise levels have been assessed and will meet the project specific noise trigger levels at the most affected point on or within all neighbouring residential property boundaries. This is with the exception of the boundary with the cottage at 5 Addison Road. Here, it is found that the predicted noise levels from the use of extractors, forklifts, and trucks (individually or cumulatively) could exceed the project noise trigger level ($L_{Aeq,15\ minute}$) of **51 dBA** based on the '*NSW Noise Policy for Industry - 2017'*. Hence, feasible and reasonable mitigation measures should be implemented to reduce noise towards the relevant project noise trigger level. If it is reasonable to achieve these levels, the proponents should do so. If not, then achievable noise levels should be identified. It is not mandatory to achieve the trigger levels, but the assessment should provide justification if they cannot be met.

8. MITIGATION

Mitigation measures that are considered to be feasible and reasonable to reduce noise towards the relevant project noise trigger level are given below.

8.1 Feasible and Reasonable Mitigation

A feasible and reasonable mitigation measure is considered to be the construction of a noise barrier, approximately 2.0 metres high and at least 55 metres in length at the boundary between the subject site and the cottage at 5 Addison Road. See Figure 4 below.

Figure 4: Site and Proposed 2.0 Metre High Noise Barrier (Yellow Curve). Original Source: (Google Earth).

The noise barrier, fence or screen may be constructed of earth mound, timber, masonry, metal sheets or one or more of the following materials as shown in Table 7 below.

TABLE 7 – RECOMMENDED MATERIALS FOR CONSTRUCTION OF NOISE BARRIERS

Material	Typical Thickness (mm)	Surface Density (kg/m^2)

Polycarbonate	8 to 12	10-14
Acrylic	15	18
Timber	15 to 30	22
Aerated Concrete	75	45

Timber fences should be constructed of not less than 15 mm thick lapped and capped timber provided such thickness can be maintained to prevent warping. For all constructions, the barrier must not contain any acoustically untreated holes or gaps. Occasional small gaps at the base of the barrier to allow drainage may be necessary but should be kept to a minimum and these gaps should not provide a line of sight from the noise source to the receiver. The barrier must be professionally constructed using a safe and secure method to ensure total stability in all predictable wind and weather conditions.

The noise assessment is based on good on-site work practices and good community relations. Hence, it is recommended that the following work practices and community relations are implemented to minimise any adverse reaction from neighbouring residents.

8.2 Environmental Noise Awareness Employee Training

All employees involved in the loading and unloading operations (including operators of excavators, forklifts and trucks,) must be adequately trained in environmental noise awareness issues. They must have attended an induction training session which includes environmental noise awareness before starting employment. The use of music, radios or any form of amplified music should not be allowed on the site or in cabs if audible at neighbouring premises. Shouting or loud voice should only occur in an emergency situation.

8.3 Truck Access to the Site

Planned access to the site should occur quietly and efficiently. Parking of trucks should be organised only within designated areas which are located away from the sensitive receivers where practicable. Other measures include optimizing the number of deliveries to the site by amalgamating loads where possible and arrivals within designated hours (i.e. not before 7:00 am) and designating and maintaining access routes to the site to minimise impacts.

8.4 Community Relations

Community relations are addressed in Australian Standard AS 2436 - 2010. The following is based on this standard.

An effective community relations program is essential to keep the neighbouring residents informed. The community is likely to be more understanding and

accepting of the noise where the information provided (such as special events) is forthright, does not attempt to understate the likely noise impacts and where commitments made are firmly adhered to.

It is important for all personnel on the site to be considerate of people who live or work nearby so they are not subjected to unnecessary or excessive noise, particularly at early morning times. Site personnel should be aware of the need to take all necessary steps to minimize such adverse impacts on neighbouring residents.

Contact details for complaints and further information, including emergency phone numbers, should be readily available to the community. Complaints should be recorded and managed in conformity with the plan to ensure a prompt and fair response.

9. CONCLUSION

The proposed development has been shown to meet the project noise trigger levels as given in the '*NSW Noise Policy for Industry'* at the most affected point on or within all neighbouring residential property boundaries. This is with the exception of the boundary with the cottage at 5 Addison Road. Here, feasible and reasonable mitigation measures are recommended. This, with good on-site work practices and good community relations will minimise any adverse reaction for neighbouring residents. No significant increase in road traffic noise is predicted for the proposed development.

Status	**Date**	**Prepared by:**
Draft	22nd January 2022	Ken Scannell MSc., MAAS
Status	**Date**	**Checked by:**
Draft	23rd January 2022	Mark Scannell BA, MAAS

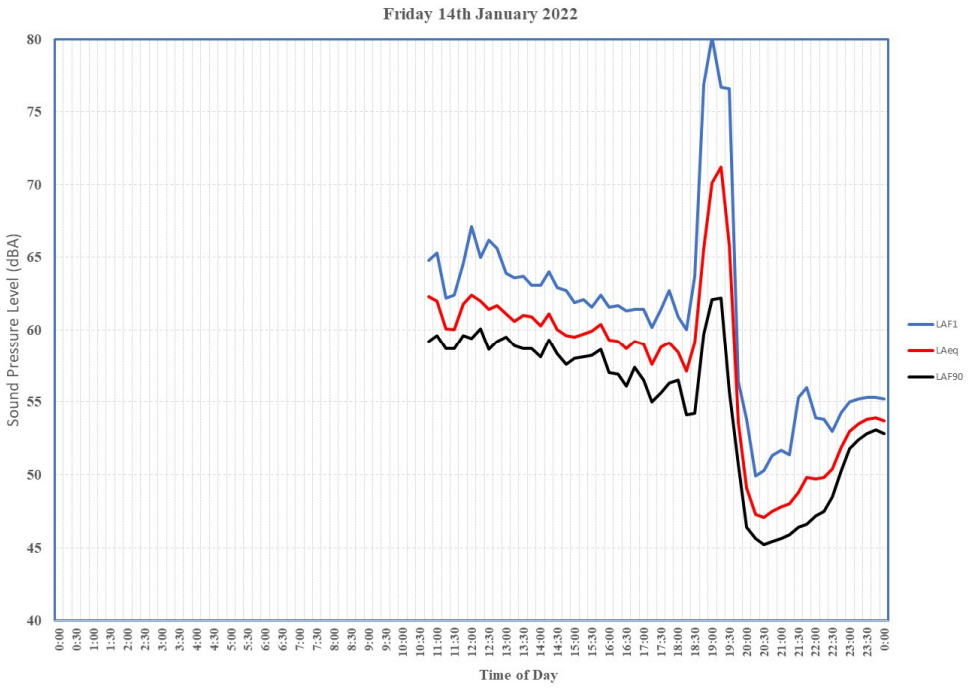
Important Note. *All products and materials suggested by 'Noise and Sound Services' are selected for their acoustical properties only. All other properties such as air flows, aesthetics, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, grout or tile cracking, loading, shrinkage, smoke, ventilation etc are outside of 'Noise and Sound Services' field of expertise and* ***must be*** *checked with the supplier or suitably qualified specialist before purchase.*

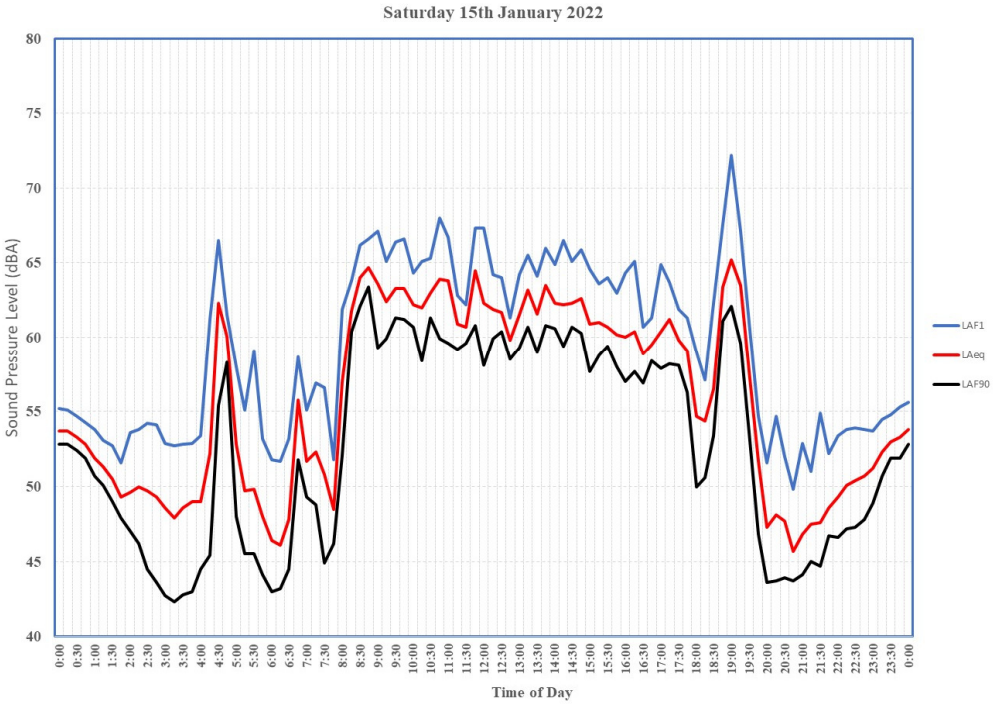
APPENDIX A – MEASURED SOUND PRESSURE LEVELS

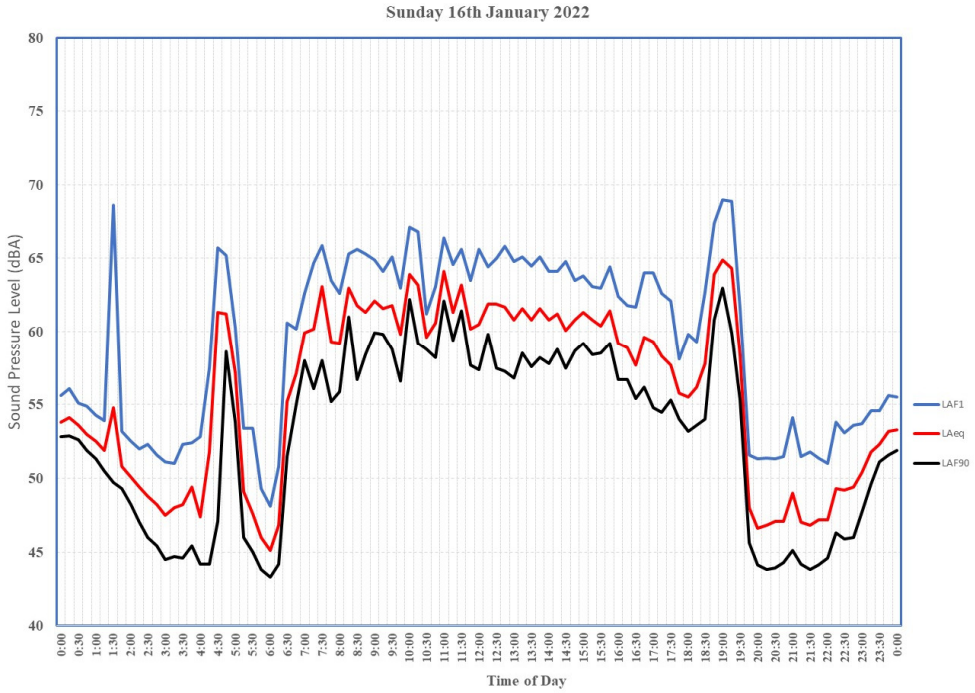
Environmental noise levels can vary considerably with time; therefore, it is not adequate to use a single number to fully describe the acoustic environment. The preferred, and now generally accepted, method of recording and presenting noise measurements is based upon a statistical approach. For example, the L_{AF10} noise level is the level exceeded for 10% of the time and is approximately the average maximum noise level. The L_{AF90} level is the noise level that is exceeded for 90% of the time and is considered to be approximately the average of the minimum noise level recorded. This level is often referred to as the "background" noise level. The L_{Aeq} level represents the average noise energy during the measurement period. This level is often referred to as the 'ambient' noise level.

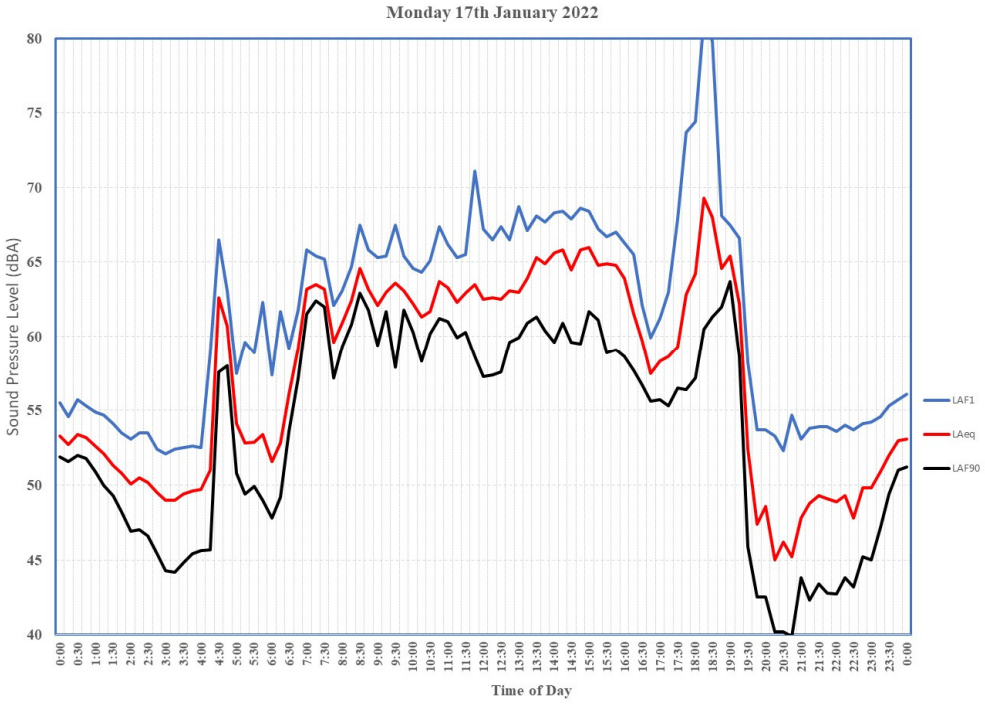
The measurements results from noise monitoring are shown below.

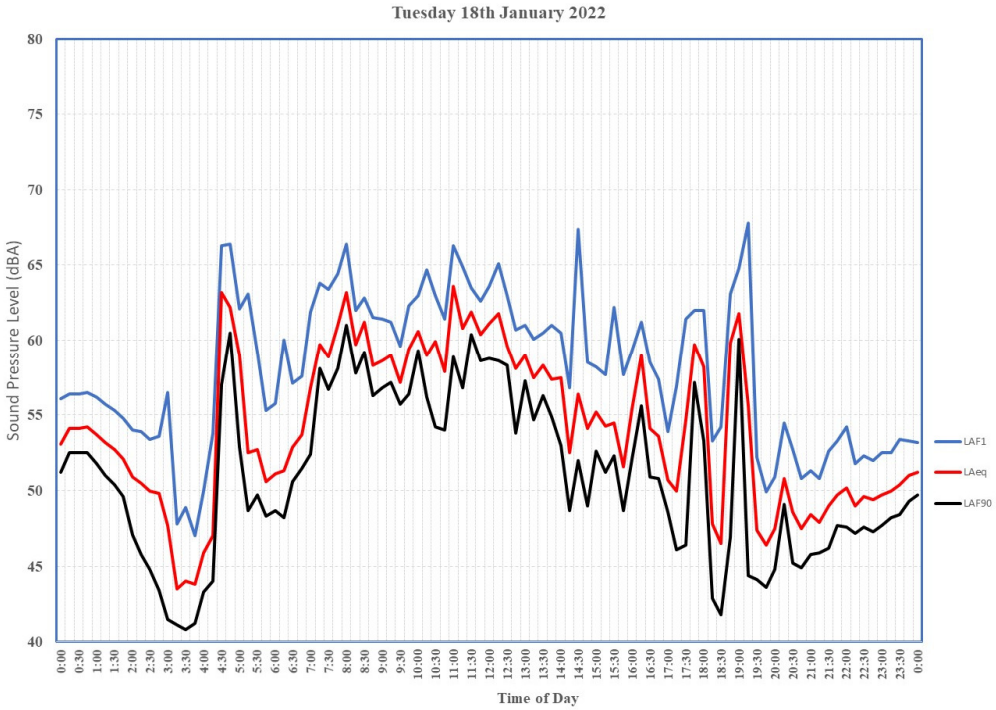
Logged Ambient Noise Levels

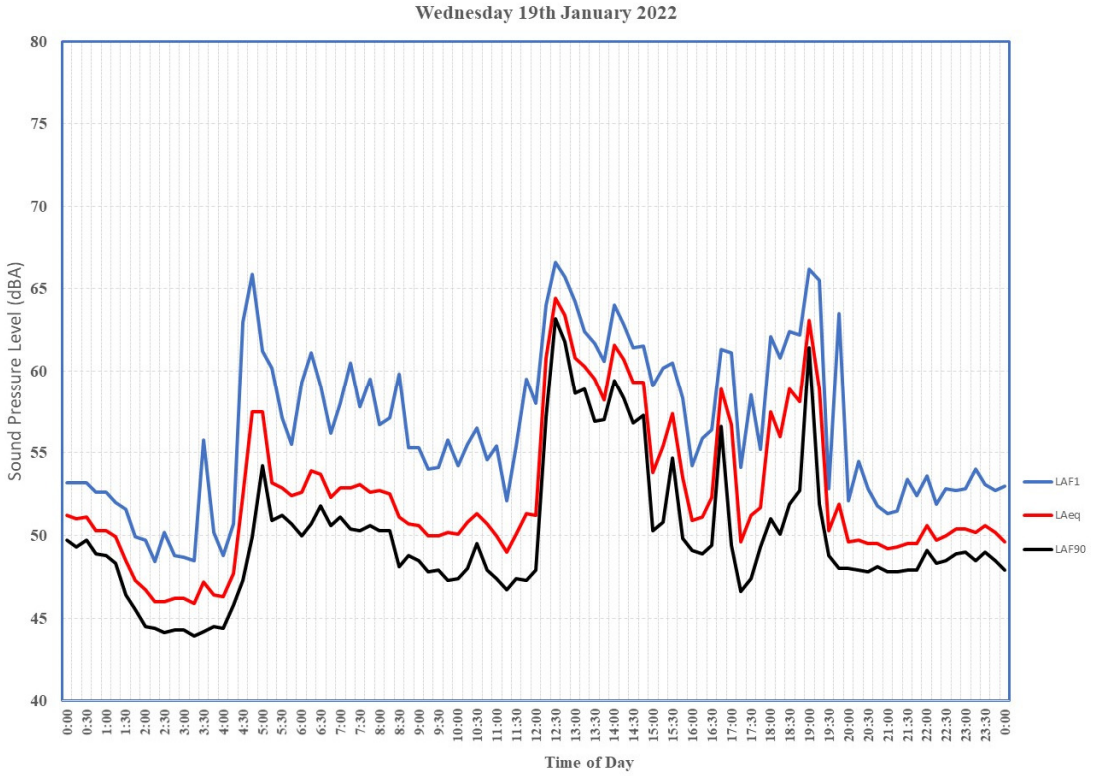


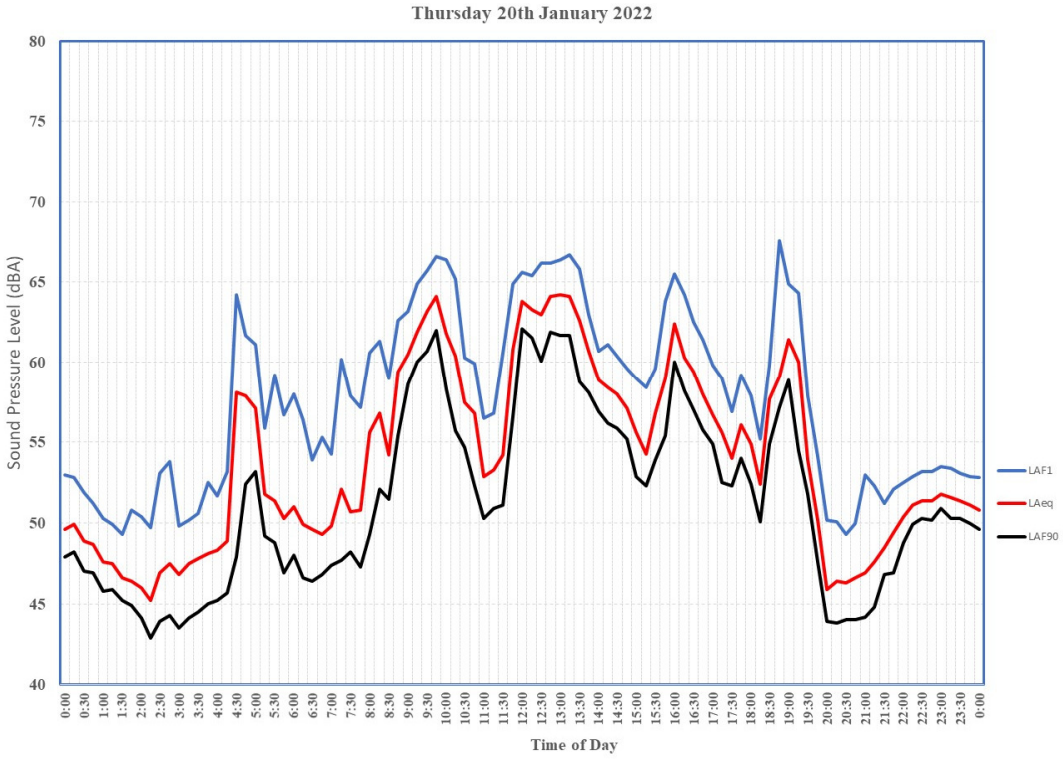

Saturday 15th January 2022
Sound Pressure Level (dBA)
Time of Day
LAF1
LAeq
LAF90

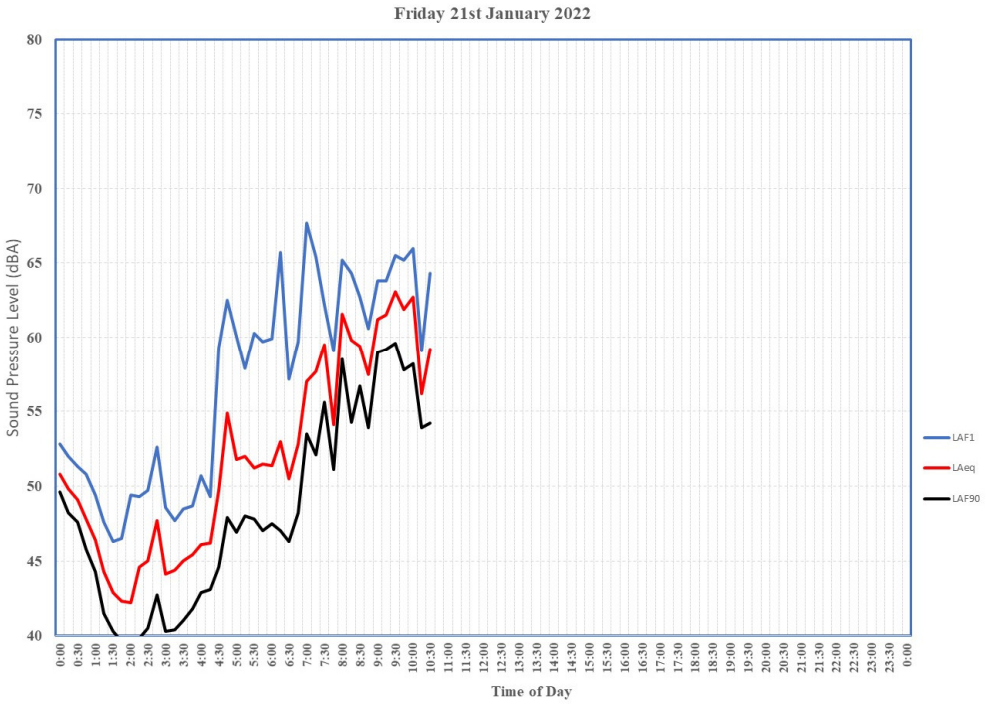

Sunday 16th January 2022
Sound Pressure Level (dBA)
Time of Day
LAF1
LAeq
LAF90


Monday 17th January 2022
Sound Pressure Level (dBA)
80
75
70
65
60
55
50
45
40
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30 0:00
Time of Day
LAF1
LAeq
LAF90


Tuesday 18th January 2022
Sound Pressure Level (dBA)
80
75
70
65
60
55
50
45
40
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30 0:00
Time of Day
LAF1
LAeq
LAF90


Wednesday 19th January 2022
Sound Pressure Level (dBA)
80
75
70
65
60
55
50
45
40
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30 0:00
Time of Day
LAF1
LAeq
LAF90


Thursday 20th January 2022
Sound Pressure Level (dBA)
80
75
70
65
60
55
50
45
40
0:00 0:30 1:00 1:30 2:00 2:30 3:00 3:30 4:00 4:30 5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30 11:00 11:30 12:00 12:30 13:00 13:30 14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30 20:00 20:30 21:00 21:30 22:00 22:30 23:00 23:30 0:00
Time of Day
LAF1
LAeq
LAF90


Friday 21st January 2022
Sound Pressure Level (dBA)
80
75
70
65
60
55
50
45
40
0:00
0:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
5:00
5:30
6:00
6:30
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18:00
18:30
19:00
19:30
20:00
20:30
21:00
21:30
22:00
22:30
23:00
23:30
0:00
Time of Day
LAF1
LAeq
LAF90

APPENDIX B – GLOSSARY OF TECHNICAL TERMS

'A' Frequency Weighting – The most widely used sound level frequency filter is the A scale, which roughly corresponds to the inverse of the 40 dB (at 1 kHz) equal-loudness curve. Using this filter, the sound level meter is less sensitive to very high and, in particular, very low frequencies. Sound pressure level measurements made with this filter are commonly expressed as **dBA.**

Ambient Sound – The all-encompassing sound associated with that environment being a composite of sounds from many sources, near and far.

Assessment Background Level (ABL) – The tenth percentile value of the recorded L_{AF90} level for each day, evening and night period.

Background Noise Level ($L_{AF90, T}$) – A statistical parameter used for assessments of constantly varying noise levels. The L_{AF90} is the 'A' frequency weighted noise level that is exceeded for 90 % of the measurement period, 'T'. The measurement period is normally 15 minutes. The background noise is therefore the lowest noise level that occurs for 1.5 minutes in any 15 minute period.

Decibel (dB) – The logarithmic ratio of any two quantities and relates to the flow of energy (power). A scale used in acoustical measurement related to power, pressure or intensity. Expressed in dB, relative to standard reference values.

Energy Average Noise Level ($L_{Aeq, T}$) – The L_{Aeq} noise level is also known as the equivalent continuous sound pressure level. This is the 'A' frequency weighted logarithmic average of the sound energy of the measurement time 'T'. When measured over a 15 minute time period the symbol $L_{Aeq, 15\ minute}$ is used. This is the standard descriptor used for source noise measurements and ambient noise measurements.

Percentile Level (L_{90}, L_{10}, etc) – A statistical measurement giving the sound pressure level which is exceeded for the given percentile of a specified time period, e.g. L_{90} is the level which is exceeded for 90% of a measurement period.

Rating Background Level (RBL) – The median value of the tenth percentile value (ABL) for the recorded L_{AF90} levels for each day, evening and night period over the complete 7 days or more of noise monitoring. The tenth percentile is also referred to as the Assessment Background Level (ABL).

Sound Pressure Level (SPL) – 20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure of 20 micro Pascals.