

Halifax Wrexham

Environmental Noise Survey and Plant Noise Assessment Report

30334/PNA (Wrexham)

2 May 2023

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Document Control

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1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by ISG Limited to support a planning application for the installation of new building services plant at the Halifax branch located on Hope Street, Wrexham.

Hann Tucker Associates has therefore been commissioned to conduct an environmental noise survey and subsequently assess plant noise emissions from the new plant installations and evaluate the impact on nearby noise sensitive receptors.

This report presents the plant noise assessment and our advice on further mitigation measures, where/if necessary.

2.0 Objectives

To establish by means of an unmanned 24-hour survey the existing L_{Amax} , L_{Aeq} and L_{A90} road, rail and air traffic noise levels at up to 1no. secure and accessible on-site positions, using fully computerised noise monitoring equipment.

Measurement procedures shall be in general accordance with British Standard BS 7445 "Description and measurement of environmental noise."

Measurement procedures shall also be in general accordance with those described in BS 4142: 2014 , Method for rating industrial noise affecting mixed residential areas, published by the British Standards Institution.

The survey will enable noise emission limits from the development to be identified with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 and to minimise possibility of noise nuisance to neighbours.

To assess the noise emissions from the proposed plant, based upon data with which we are provided, and comment upon the acceptability. To advise on noise control measures if required with reference to the requirements of the Local Authority.

3.0 Acoustic Terminology

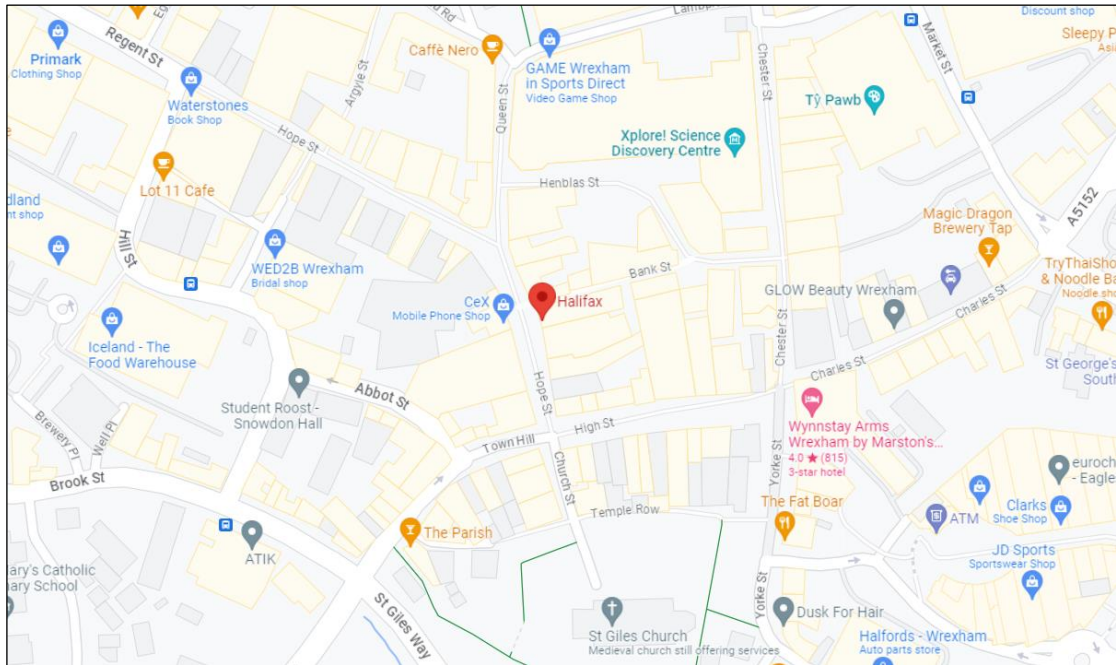
For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.



4.0 Site Description

4.1 Location

The branch 'Halifax' is located on Hope Street in Wrexham. The location is shown on the Location Map below.



Location Map (Map data © 2023 Google)

4.2 Description

The site lies on Hope Street and is primarily surrounded by commercial buildings, with the nearest building (WHSmith) being adjoined to the South. There are no entertainment buildings within 50m of the site. The nearest residential receptor is approximately 40m to the South of the site. The site is shown on the site plan below.



Site Plan (Map Data ©2021 Google)

5.0 Project Proposals

5.1 Proposed Plant

We have reviewed the following documents for the assessment:

Plant Description	Location	Qty	Plant Make	Model Number
CU-1.1	Roof	1	Mitsubishi	PUZ-ZM35VKA
CU-1.2	Roof	1	Mitsubishi	PUZ-ZM140VKA

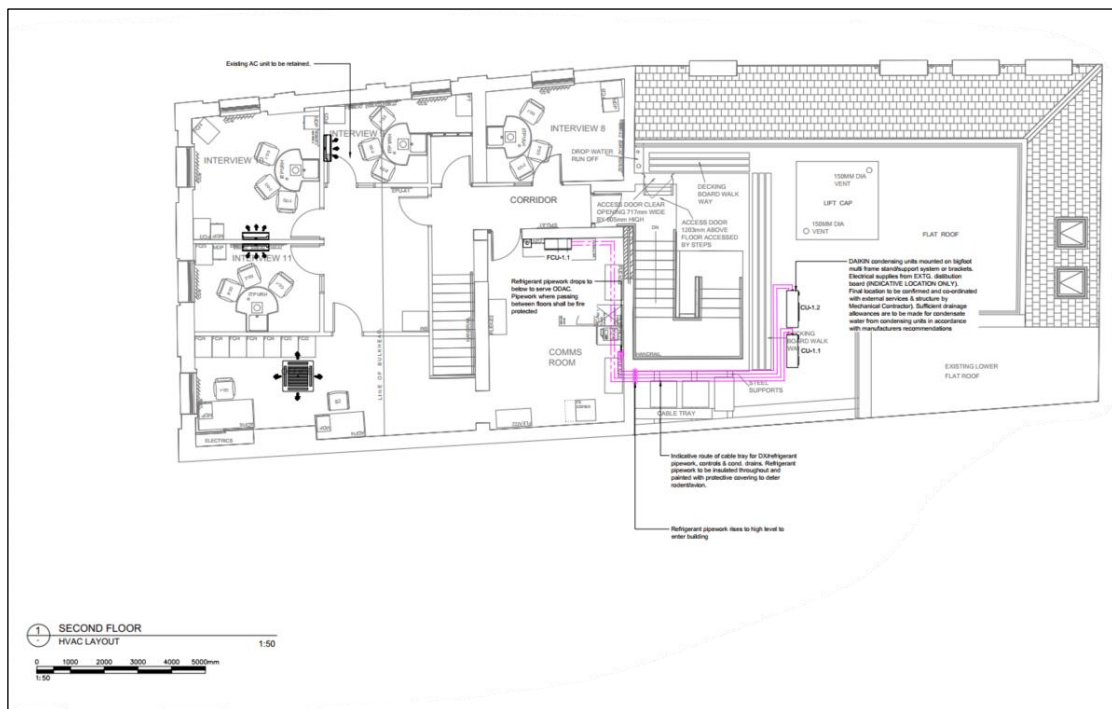
5.2 Operating Hours

We have assumed that the proposed plant could operate during both daytime and night-time.

5.3 Drawings

Our acoustic assessment is based on the following drawings.

Reference	Title	Date
50960570-79G-RD-02-M2-ME-2601	Second Floor HVAC Layout	18/11/2022



6.0 Acoustic Standards and Guidelines

6.1 National Planning Policies

In order to provide a suitable assessment a number of national planning policies have been considered, including:

- The National Planning Policy Framework (NPPF), 2021
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance – Noise (PPGN), 2019

The above documents highlight the importance of considering the potential noise effects on any new residential development and provide a qualitative approach to assessment. However, each of the above does not provide any quantitative guidance. As such, all quantitative guidance used to form a noise impact assessment is taken from various other standards and guidance s as detailed in the following sections.

6.2 BS 4142:2014 + A1:2019

BS 4142: 2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *“on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”*.



The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections). The standard states that:

- “a difference of around +10dB or more is likely to be an indication of a significant adverse impact”;
- “a difference of around +5dB is of marginal significance is likely to be an indication of an adverse impact”;
- “where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”.

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq, T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90, T}$ noise level. T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00) and 15-minutes for operations during night-time hours (23:00 to 07:00).

BS 4142:2014 states that if a noise source contains an 'acoustic feature', such as tonality, intermittency or impulsiveness, an appropriate penalty should be applied.

6.3 BS 8233: 2014

British Standard 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” provides guidance for the control of noise in and around buildings.

BS8233:2014 Section 7.7.2 titled “Internal ambient noise levels for dwellings” states:

“In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 - 23:00	23:00 - 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$



6.4 Local Planning Authority

The site lies within the jurisdiction of Wrexham County Borough Council. We have contacted the Local Authority to confirm our methodology with their requirements however at the time of writing we have not received a response. As such, we propose to follow the guidance set out within BS 4142: 2014 as part of our assessment presented herein.

7.0 Baseline Noise Survey

7.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 14:30 hours on Thursday 1st December 2022 to 14:30 hours on Friday 4th December 2022.. The equipment was set-up to broadband and spectral (octave band) sound pressure levels over discrete 15-minute periods.

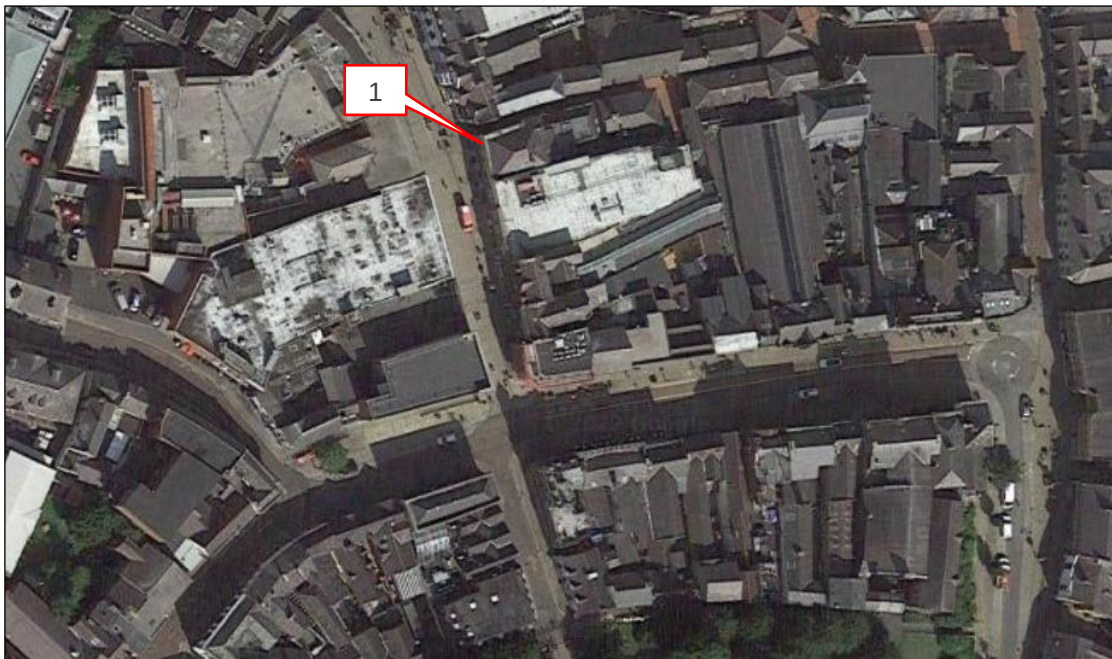
Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels.

The survey was undertaken by Cameron Maskew BEng (Hons) AMIOA. All measurements were collated in general accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

7.2 Measurement Positions

The noise level measurements were undertaken at three positions as described in the table below.

Position No	Type	Description
1	Unattended	Microphone positioned outside of first floor window overlooking Hope Street, approximately 9m above ground. Microphone in façade conditions.



Plan Showing Measurement Positions (Map Data ©2021 Google)

7.3 Weather Conditions

During the periods we were on site the wind conditions were light and the sky was generally overcast. We understand that generally throughout the survey period the weather conditions were stable with minor patches of rainfall. These conditions are considered suitable for obtaining representative measurement results.

7.4 Instrumentation

The instrumentation used during the survey is presented in the Table below:

Position	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 Data Logging Sound Level Meter	Larson Davis	824	5111	15/07/2021
All	Type 1 Calibrator	Larson Davis	CAL200	3083	06/05/2021

The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphone was fitted with a windshield.

The sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.3dB).



7.5 Measurement Results

The results have been plotted on Time History Graphs 30334/TH1 enclosed, presenting the 15-minute A-weighted (dBA) L_{90} , L_{Max} and L_{eq} noise levels at each measurement position throughout the duration of the survey.

The microphone was positioned outside of the window over a 3-day period whilst the branch was open. For security reasons the window had to be closed whilst the building was empty, and therefore our measurement data is considered representative of daytime hours between 09:30 – 16:00 each day.

BS 4142 states that “the background sound level must be reliable and suitably represent the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

Based on the above, the typical lowest $L_{A90(15\text{ min})}$ measurements recorded during the survey when the branch was open (ie between 09:30 and 16:00) are presented in the table below as façade sound pressure levels:

Position	Typical Measured $L_{A90(15\text{ min})}$ Background Noise Level (dB re 2×10^{-5} Pa)
	Daytime (09:30 – 16:00) Hours
1	50

7.6 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by road traffic noise from the surrounding roads, particularly High Street, as well as pedestrian passbys along Hope Street.

8.0 Plant Noise Emission Criteria

On the basis of the results of the environmental noise survey, and on the guidance set out within BS 4142 (see Section 6.2), we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window. These limits are presented as façade levels, and include influence of a building façade as would be present at the assessment location (ie 1m from receptor window).



For the night-time period, as we do not have any measured night-time data due to security reasons when surveying at the branch, we propose that the night-time plant noise limit be set with consideration to the guidance set out in BS 8233: 2014. This standard covers noise control in buildings, and sets out good practice internal noise targets within dwellings. If we were to set a noise limits from plant at 1m from the window for the noise sensitive receptor equal to that of the internal noise target, when considering noise attenuation afforded by a partially open window (assumed for ventilation at NSR), the resultant internal noise level from plant would be circa 10 dB below that of the BS 8233 target level.

Noise Rating Limit, $L_{A,T,r}$ dB	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
50	30

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality.

It should be noted that the above are subject to the final approval of the Local Authority.

9.0 Plant Noise Impact Assessment

9.1 Plant Noise Data

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Description	Broadband Sound Pressure Level (dB re 2×10^{-5} Pa) at 1 metre
CU-1.1	44
CU-1.2	50-52

The above tables contain the manufacturer's broadband noise data for the respective units. At the time of writing no further information (ie octave band noise data) was available to us. However, given the nature of the site and locale we believe it is sufficient to complete a BS4142 assessment based on the broadband information as we are not reliant on barrier attenuation which would be frequency dependent.



9.2 Worst Affected Receptors

It is noted that the nearest off-site noise sensitive premises is the residential building, as illustrated in Section 4.2. Our calculations have been undertaken to this receptor from each item of plant around the building, and accounts for attenuating factors such as distance attenuation.

9.3 Plant Noise Impact Assessment

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems.

The following table summarises our predictions of atmospheric noise emissions from each item of plant to the nearest noise sensitive residential window.

	Sound Pressure Level (dBA)
Sound Pressure Level of CU-1.1 at 1m	44
Distance Correction to 40m	-32
Barrier Correction	0
Intermittency Correction (ref BS4142)	0
Tonality Correction (ref BS4142)	0
Impulsivity Correction (ref BS4142)	0
"Distinctive" Correction (ref BS4142)	0
Calculated Noise Level at Receptor	12
Sound Pressure Level of CU-1.2 at 1m	52
Distance Correction to 40m	-32
Barrier Correction	0
Intermittency Correction (ref BS4142)	0
Tonality Correction (ref BS4142)	0
Impulsivity Correction (ref BS4142)	0
"Distinctive" Correction (ref BS4142)	0
Calculated Noise Level at Receptor	20
Cumulative Sound Pressure Level at 1m from Nearest Sensitive Receptor	21
Criteria	30



	Sound Pressure Level (dBA)
Exceedance	-9

Our calculations indicate that the proposed plant should be capable of achieving the plant noise limits proposed within this report within the need for additional attenuation measures.

10.0 Conclusions

An environmental noise survey has been undertaken to establish the prevailing noise levels in the vicinity of the site.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's typical planning requirements.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window from the proposed plant selections. The assessment indicates that the proposed plant should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential window.

Appendix A

The acoustic terms used in this report are defined as follows:

dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
L _{eq,T}	L _{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, <i>T</i> .
L _{max}	L _{max} is the maximum sound pressure level recorded over the period stated. L _{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L _{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Branch closed from 16:00 – 09:30

Hope Street, Wrexham

Position 1

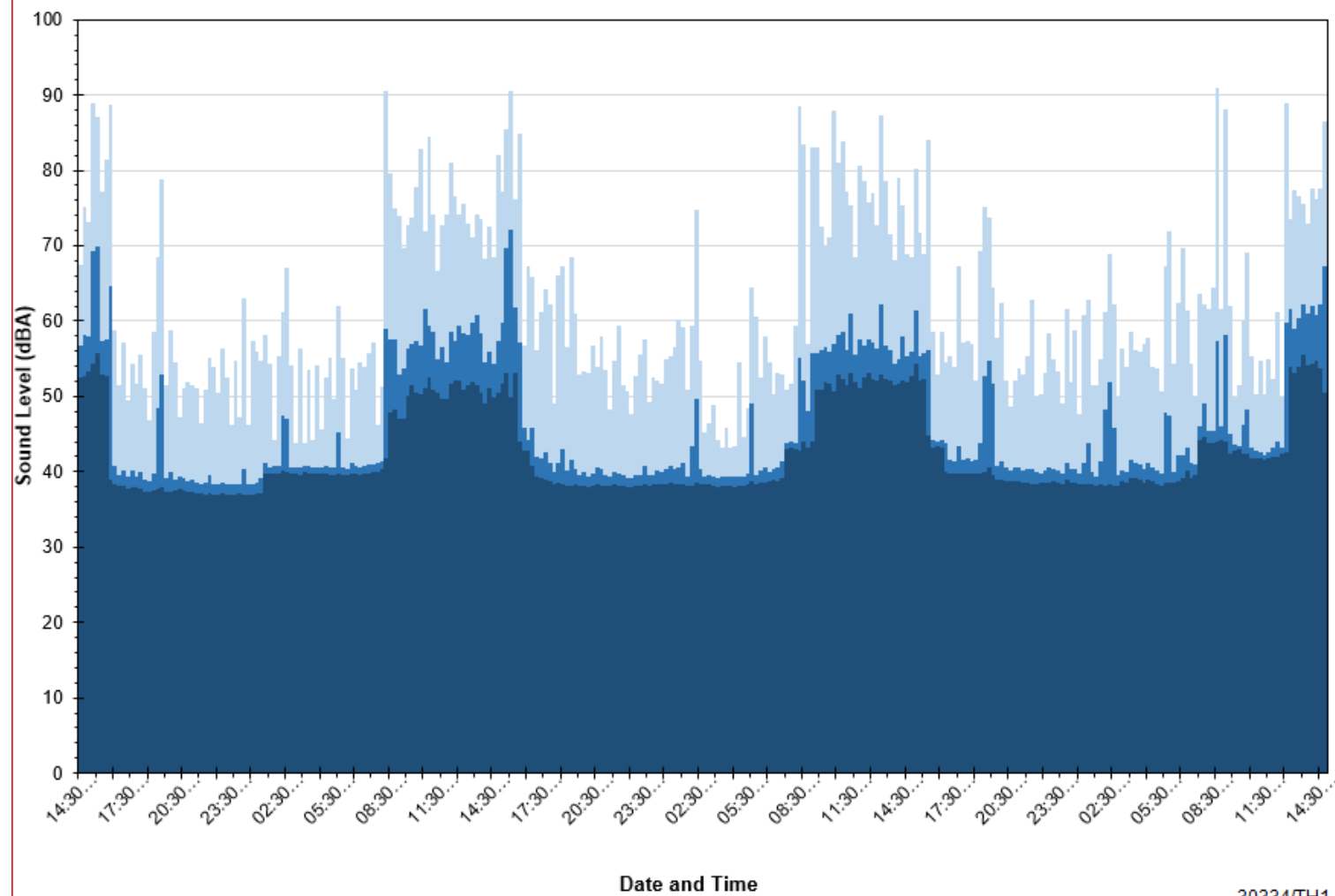
L_{eq} , L_{max} and L_{90} Noise Levels

Thursday 1 December 2022 to Saturday 3 December 2022

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



30334/TH1