

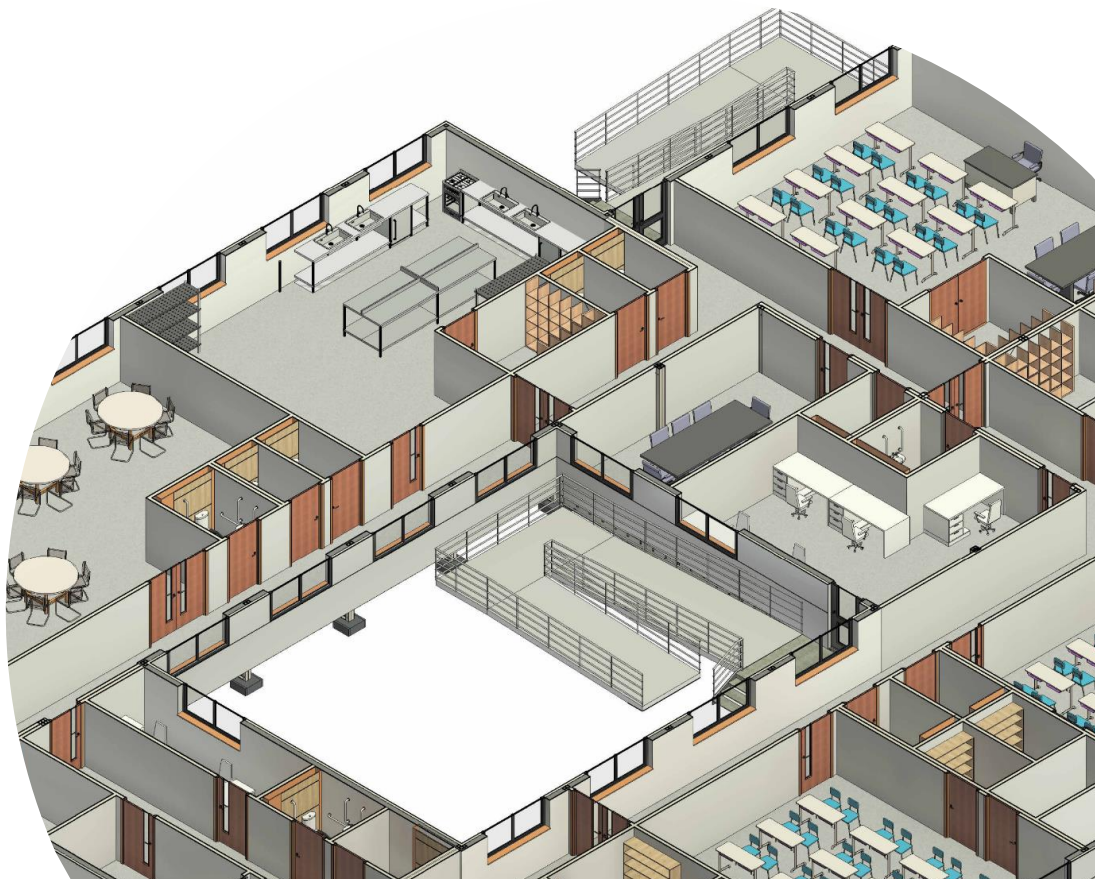
Noise Impact Assessment

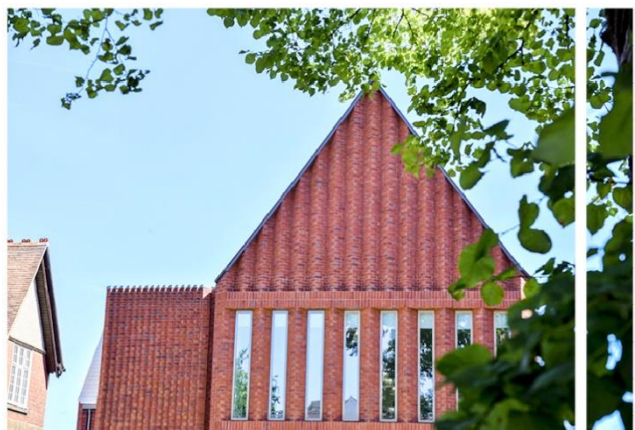
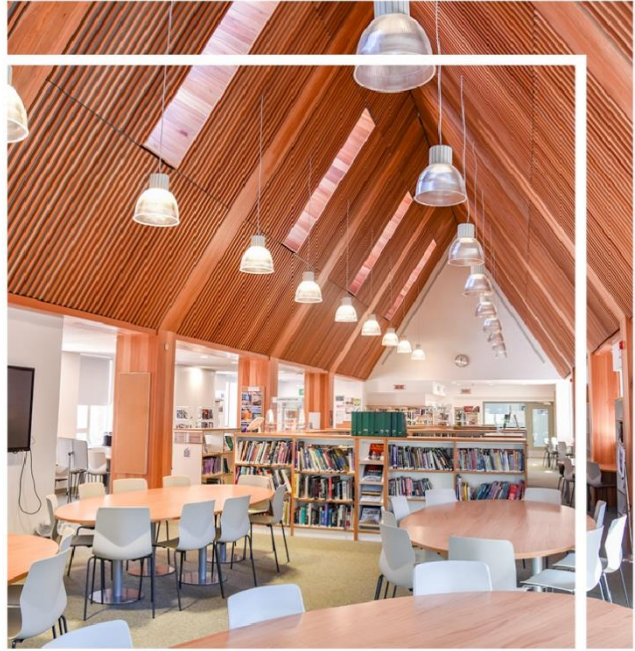
Whittaker Street, Radcliffe
Bury Council

10 December 2024

36689-HML-XX-XX-RP-O-500001

Issue P01





Project Name: Whittaker Street, Radcliffe

Report Name: Noise Impact Assessment

Issue Status: Final

Reference: 36689-HML-XX-XX-RP-O-500001

Date of Issue: 10 December 2024

Issue: P01

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Document History:

Issue	Date	Details
P01	10/12/2024	ISSUE

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Executive Summary

The Applicant is seeking to obtain planning permission for a temporary student referral unit at Whittaker Street, Radcliffe.

A noise impact assessment has been undertaken to determine the key noise considerations and impacts associated with the proposal, with limits set for the Proposed Development to achieve based on relevant guidance documents (BB93 and BS 4142) and Bury Council (BC).

As part of this assessment, a baseline noise survey was undertaken between Wednesday 27th November and Monday 2nd November 2024 to establish and quantify the existing noise levels at the Site. The Site is affected predominantly by noise from road traffic, particularly from the A6053 towards the south.

Based on the measured noise levels affecting the Site, preliminary façade sound insulation calculations have been undertaken to establish the minimum sound reduction performance requirements of the glazing and ventilation systems to comply with the internal noise limits of BB93.

Preliminary façade calculations indicate that suitable internal noise levels can be achieved on the most exposed (noisiest) façade with the use of double glazing achieving a minimum sound reduction performance of 29 dB R_w+C_{tr} and trickle ventilation achieving a minimum weighted, normalised element level difference of 33 dB $D_{n,e,w}$. This is equivalent to standard double glazing (e.g. 8/12/4 mm) and standard trickle vents.

With regards to building services plant, suitable plant noise emission limits have been specified in accordance with relevant assessment criteria. All fixed plant will need to be designed so that their combined noise emissions achieve the limits. Providing careful attention is paid to plant selection, installation and noise attenuation and that the noise limits are met, there can be high confidence that noise from the operation of plant associated with the Proposed Development will have negligible impact upon the existing noise climate and amenity of nearby sensitive receptors.

1. Introduction

This noise assessment has been prepared by Hilson Moran on behalf of Bury Council as part of their application for a temporary student referral unit at Whittaker Street, Radcliffe (hereafter ‘the Site’).

This assessment considers the development’s suitability for educational use in conjunction with the noise constraints of the Site. Furthermore, it evaluates the potential impacts of the development upon nearby, existing, noise sensitive receptors (NSRs).

As part of this assessment the following works have been carried out:

- Consultation with Bury Council (BC) to agree key NSRs, site survey protocol, educational noise criteria and limiting criteria for plant noise;
- Baseline environmental noise survey to quantify the existing noise climate affecting the Site and which is representative of nearby noise sensitive properties to the Site;
- Prediction of internal noise levels within the most noise exposed educational rooms to provide indication of the necessary façade sound insulation and ventilation strategy required to achieve appropriate internal noise levels (with reference to Building Bulletin 93¹ (BB93)); and
- Specification of appropriate noise emission limits for new fixed building services plant to adhere in line with BC guidance.

A glossary of the acoustic terminology used in this report is presented in Appendix A.

¹ Department for Education (DfE) (2015): ‘*Building bulletin 93 – Acoustic design of schools: performance standards*’. DfE, Education Funding Agency.

2. The Site, Site Setting and Proposed Development

2.1. Site Description

The Site is a former Bury Council office building, which has been demolished. The Site is bounded by Whittaker Street to the east and Parsonage Street to the west. The north is bounded by residential gardens and to the south, the boundary abuts domestic property walls to the eastern end and projecting southwards.

Figure 2.1 shows the Site and its surroundings, NSRs, monitoring positions, and the approximate Site boundary.

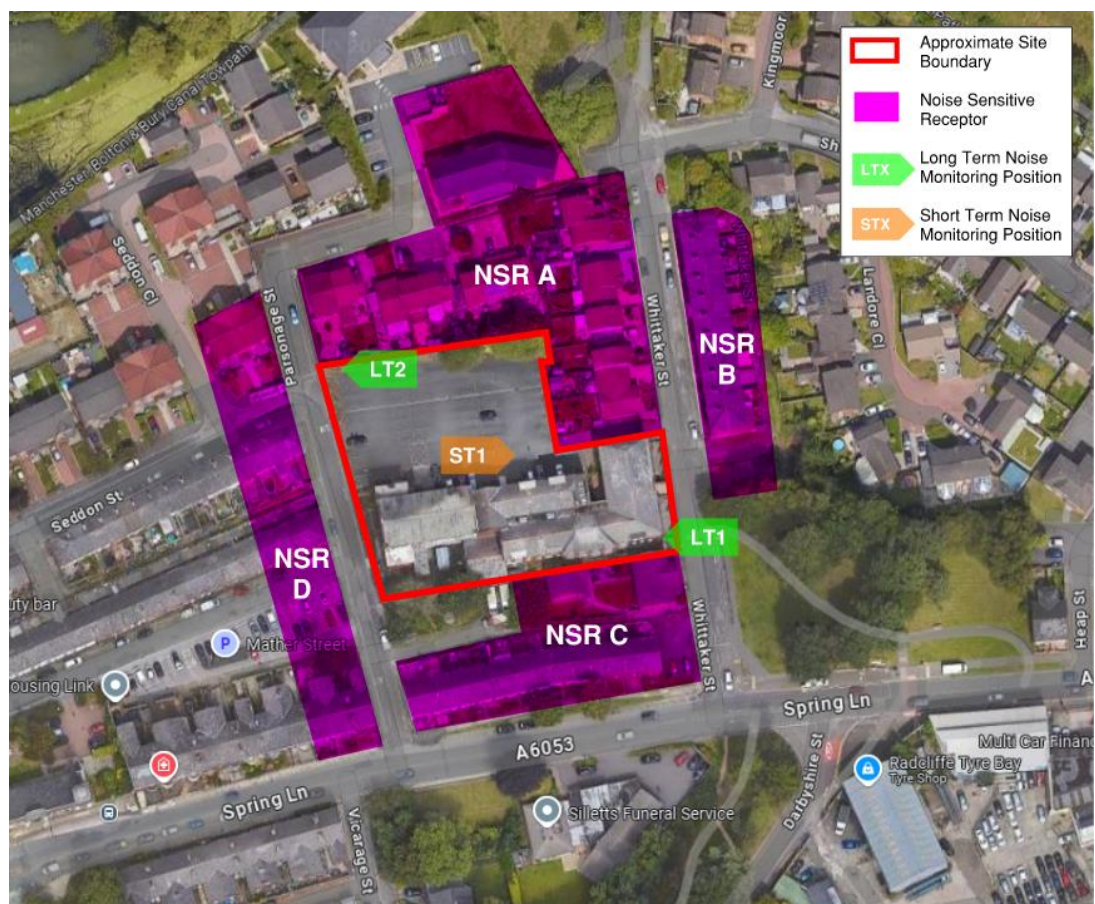


Figure 2.1: Site Location Plan Showing Site Boundary, Sensitive Receptors and Monitoring Positions

2.2. Noise Sensitive Receptors

The closest NSRs to the Site are described in Table 2.1 and illustrated on the Site plan in Figure 2.1. Where a number of receptors are located close to each other, the nearest receptor to the Site is given to represent the immediate area.

Table 2.1: Noise Sensitive Receptors

Receptor Location	Type of Receptor	Name	Approximate Distance from Site Boundary
NSR A	Residential	2-16 Parsonage Street, 1-18 Canalside Gardens and 15-29 Whittaker Street	On northern Site boundary
NSR B	Residential	12-32 Whittaker Street	10 m east of the Site boundary
NSR C	Residential	1-5 Whittaker Street and 37-63 Spring Lane	On southern Site boundary
NSR D	Residential	Properties west of Parsonage Street	8 m west of the Site boundary

2.3. Proposed Development

The proposed development involves the installation of a temporary student referral unit comprised of modular units built offsite. Classrooms of multiple types are proposed, including occupational and active learning spaces (hereafter ‘the Proposed Development’).

3. Assessment Criteria

3.1. Internal Ambient Noise Levels

BB93 presents internal ambient noise level (IANL) limits in terms of dB $L_{Aeq,30min}$ for each unoccupied, but furnished, teaching room type. The IANL criteria given in BB93 specifically exclude contributions from teaching activities, teaching equipment and rain impact generated noise, with the latter assessed separately. The criteria includes contributions from both environmental noise ingress and building services noise. Allowance therefore needs to be made for noise ingress when specifying limits for building services noise and vice versa.

Table 3.1 gives the BB93 IANL performance criteria for the teaching/learning spaces proposed at the new building. Only rooms used for teaching and learning are included

Table 3.1: Upper Indoor Ambient Noise Limit

Room Type/Space	BB93 Upper Indoor Ambient Noise Level Limit, dB $L_{Aeq,30min}$
KS3 Classroom, KS4 Classroom, Hair & Beauty, Construction, Calm Room	35
Reception, Staff Room, Meeting Room, SLT Office, Gym & Sport	40
Dining Room, WC/Acc. WC	45
Hospitality/Kitchen	50

In order to protect students from regular discrete noise events (e.g. aircraft or trains) BB93 also requires indoor ambient noise levels not to exceed 60 dB $L_{A1,30min}$. This is achieved by default for spaces with IANLs up to 40 dB $L_{Aeq,30min}$, but requires assessment in student spaces with higher IANL limits. In line with Table 3.1 this would include the Dining Room and any student WCs.

The IANL limits of BB93 should be met with all building services plant running at normal design duty, representative of a fully occupied building. BB93 details indoor ambient noise limit tolerances for different types of ventilation to encourage natural ventilation systems to be utilised.

3.2. Building Services Plant Noise

BS 4142:2014+A1:2019² (BS 4142) provides an assessment and rating method to assess adverse effects from a range of commercial noise sources, including fixed building services plant. The measured or predicted noise level from the source in

² British Standards Institution (2019); 'BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound', BSI Standards Limited, London.

question, the 'specific noise' level ($L_{Aeq,T}$), immediately outside the NSRs is compared with the 'background noise' level ($L_{A90,T}$). Where the sound contains certain acoustic features at the assessment location (e.g. tones, impulses, intermittency etc.), then a scaled character correction is added to the specific noise level to obtain the 'rating noise' level ($L_{Ar,Tr}$). The significance of effect is dependent on the context, having consideration to pertinent factors such as the sensitivity of the receptor and the level and nature of the sound.

The significance of building services noise impacts depends upon a number of factors. These include:

- the absolute noise level;
- the nature of the noise;
- the time and duration at which the noise occurs;
- whether the noise is temporary, intermittent or permanent;
- whether the impact is as a result of a new source; and
- whether it is a change to an existing source and/or the sensitivity of the receptor.

At this stage in the design of the Proposed Development, specific details of the type, number and configuration of building services plant are not known. As a consequence, it is not possible to reliably undertake predictions to determine how these standards might be met. Consequently, suitable plant noise emission limits have been set to which the plant must adhere and these are based on the measured background (L_{A90}) noise levels and BS 4142 methodology. Regarding the rating level BS 4142 states:

"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant 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, depending on the context."

3.3. Consultation

The Environmental Health Officer of BC was consulted to agree the assessment approach for internal noise levels in classrooms, building services plant noise limits and NSRs for assessment. The criteria presented within this report were agreed with BC. It was noted that a monitoring position should be included to give the background noise levels at NSR C. The monitoring positions chosen account for this and are considered to be representative of all the NSRs identified.

4. Baseline Conditions

4.1. Environmental Noise Survey

In support of the planning application for the Proposed Development, a comprehensive baseline noise survey was undertaken at the Site to establish and quantify the existing noise climate at, and within the vicinity of, the Site.

Long-term unmanned environmental noise measurements were undertaken at positions around the Site between Wednesday 27th November and Monday 2nd December 2024. The survey period was considered to be appropriate in capturing typical conditions noise conditions around the Site and surrounding areas. Manned short-term environmental noise measurements were undertaken at position ST1 on Wednesday 27th November to further inform the baseline assessment.

The measurement positions are shown on Figure 2.1 and described in Table 4.1.

Table 4.1: Description of Noise Measurement Positions

Position	Description	Observations and Predominant Noise Sources
LT1	Free-field, unattended measurement located at the south-east corner of the Site, 3.7 m above ground level (AGL).	The dominant noise source was the A6053 and intermittent traffic on Whittaker Street. Noise from aircraft, pedestrians, nature (birdsong), distant car alarms, and distant construction noise from the north at the site of former Whittaker House also contributed to the noise climate at this location, to a lesser extent.
LT2	Free-field, unattended measurement located at the north-west corner of the Site, 2 m AGL.	The dominant noise source was the A6053 and intermittent traffic on Whittaker Street and Parsonage Street. Noise from aircraft, pedestrians, nature (birdsong) and distant construction noise from the north at the site of former Whittaker House also contributed to the noise climate at this location.
ST1	Free-field, attended measurement located in the centre of the Site, 1.2 m AGL.	The dominant noise source was the A6053 and intermittent traffic on Parsonage Street. Noise from aircraft, pedestrians and nature (birdsong) also contributed to the noise climate at this location.

4.2. Baseline Noise Results

The measured daytime and night-time noise levels are summarised in Table 4.2 below and shown in full in Appendix B. Note that the duration of the daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) periods accord with the advice contained in BS 8233:2014.

Table 4.2: Summary of Baseline Noise Monitoring Results - Free-field Values

Position	Period	Duration	L _{Aeq,T} dB	L _{A1,30min} dB	L _{A90, 15min} dB	L _{AFmax,30sec} dB
			Ave ¹	Min-Max	Ave ²	Min – Max
LT1	Daytime	16 hr	57	58-86	49	41-98
	Night-time	8 hr	50	54-66	39	34-79
LT2	Daytime	16 hr	56	56-86	48	44-98
	Night-time	8 hr	47	46-63	41	34-77
ST1	Daytime	30 min	52	62 ³	47	63 ⁴

Notes: ¹ Logarithmic average over the day / night survey periods; ² Arithmetic average over the day / night survey periods; ³ L_{A1} over the measurement period. ⁴ Maximum over the measurement period.

5. Environmental Noise Intrusion

The degree of environmental noise intrusion to educational areas depends on the acoustic performance of all elements of the façade, but is generally determined by the components providing the least airborne sound insulation, in this case the glazing; especially when occupants open windows to provide natural background or purge ventilation.

The glazing performance requirements are dependent on the use type, what percentage of the façade is glazed, the frequency composition of noise incident on the façade and the ventilation strategy.

Preliminary calculations have been undertaken to determine the sound insulation performance requirements of the glazing for the educational façades exposed to the highest noise levels. The calculations adopt the detailed methodology set out in BS 8233:2014³ and are based on the following assumptions:

- The assessment has been based on determined $L_{Aeq,16hr}$ and $L_{A1,30min}$ daytime values. The maximum $L_{A1,30min}$ value has been used in the assessment to align with BB93 guidance.
- The internal finishes of the room will affect the reverberant component of the overall noise level, with a degree of soft furnishing (carpet and curtains) assumed in the calculations. All walls and ceilings are assumed to be plastered and painted.
- It has been assumed that the external wall element constructed as a part of the development achieves an acoustic performance of not less than 40 dB R_w+C_{tr} , which can be achieved with lightweight cladding.
- The calculated noise levels are based on the glazing areas shown in the Architect's elevation drawings. Should the glazed area change by +/-10% of the façade area then the performance of the proposed glazing units may need to be adjusted accordingly.

The assessment results are presented in Table 5.1 in terms of the Weighted Sound Reduction Index (R_w), a single number quantity used to characterise the airborne sound insulation performance of a system or material over the frequency range 100 to 3150 Hz, with C_{tr} adjustment factor (a negative number) used to take account of the low frequency noise spectrum characteristics from road traffic (R_w+C_{tr}) as incident at the Proposed Development.

³ BSI (2014) 'BS 8233:2014 Guidance on sound insulation and noise reduction for buildings', BSI.

Table 5.1: Indicative Façade Sound Insulation Performance of Glazing

Façade	Façade Noise Levels, Daytime, dB	Target Criterion, dB	Min Sound Insulation of Glazing, dB R_w+C_{tr}	Example Glazing Configuration (or equal and approved)
All	57 dB $L_{Aeq,16hr}$ dB	35	29	8/12/4 mm
	86 dB $L_{A1,30}$ dB	60		

Provided that the glazing system as a whole (including framing, seals, openable lights etc.) meets or exceeds the stipulated performance specified in Table 5.1 then the noise ingress criteria are expected to be met.

The noise levels predicted on the façades of the Proposed Development would be appropriate for natural ventilation solutions such as acoustically rated trickle vents, achieving a minimum sound reduction of 33 dB $D_{n,e,w}$ (per classroom), if desired.

6. Noise Impact Assessment

6.1. Building Services Plant Noise Limits

Any items of fixed plant associated with the operation of the Proposed Development would have the potential to generate noise. At this stage in the design of the Proposed Development, specific details of the type, number and configuration of building services plant have not been fixed and therefore it is not possible to predict plant noise emission levels.

Consequently, based on the results of the baseline noise surveys (Section 4) and assessment criteria (Section 3) suitable noise limits to which fixed building services plant should adhere have been set and are presented in Table 6.1. Noise limits have been set to equal the existing background noise levels measured, considering the guidance of BS 4142 noting that this would indicate a low impact.

While night-time limits have been set, it is considered unlikely that any plant will be operational during night-time hours.

Table 6.1: Plant Noise Limits at 1 m from NSR Façades

Location	Period	Measured Background Noise Level	Cumulative Plant Noise Emission Limits
		L _{A90} dB	L _{Ar,Tr} dB ¹
NSR A	Daytime (07:00 to 23:00)	48	48
	Night-time (23:00 to 07:00)	41	41
NSR B	Daytime (07:00 to 23:00)	49	49
	Night-time (23:00 to 07:00)	39	39
NSR C	Daytime (07:00 to 23:00)	49	49
	Night-time (23:00 to 07:00)	39	39
NSR D	Daytime (07:00 to 23:00)	48	48
	Night-time (23:00 to 07:00)	41	41

Notes: ¹ The plant noise limits are rating limits, meaning that plant noise levels should be corrected for acoustic characteristics such as tonality, intermittency and impulsivity as defined by BS 4142.

The plant noise limits apply to the total contribution of noise from all new plant items associated with the Proposed Development that may run during any particular period and are to be met 1 m from the nearest habitable window of the NSR detailed in Section 2.

For the emission limits in Table 6.1 to be met by the cumulative total level of noise generated by all building services plant, careful attention would need to be paid to plant selection, installation and noise attenuation, which would be addressed prior to installation of plant.

The plant specification is sufficiently flexible to ensure that suitably quiet, non-tonal plant can be procured and/or practical, cost-effective mitigation options incorporated into the design to ensure that guideline noise criteria are met.

During the detailed design of the Proposed Development efforts will focus on optimising the layout of plant and procuring the quietest yet most efficient plant for the job before considering applying individual noise control measures (e.g. silencers, louvres), where assessed as necessary.

Appendix A – Acoustic Terminology

The table below provides a layperson's explanation of the acoustics terms that commonly appear in reports. It is not intended to give full scientific definitions and explanations or go into detail on how and why things are as they are. Some obsolete terms and abbreviations have been included as they still appear in documents from time to time.

Term	Description
Decibel, dB	The decibel is a logarithmic unit of measurement used for quantifying sound. It is derived from the logarithm to base 10 of the ratio of two quantities. Use of a logarithmic scale has the advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers.
Frequency, Hz	In sound, the number of cycles per second of a pressure fluctuation and frequency in sound is proportional to its pitch. Different frequencies are divided into octave and one third octave bands.
Sound Pressure Level, L_p	This is the unweighted or linear level which is measured prior to any weightings being applied. The sound pressure level is 20 times the logarithm to base 10 of the ratio of the reference sound pressure (2×10^{-5}) and the measured sound pressure.
Sound Power Level, L_w	This is the total sound energy radiated from a given source. The sound power level is 10 times the logarithm to base 10 of the ratio of the reference sound power level (1×10^{-12}) and the measured power.
Frequency Weightings	Weightings can be applied to a spectrum of sound and act as a filter to account for different sensitivities and conditions.
Time Weightings	A time weighting to denote the response of the sound level meter. For most measurements the Fast time weighting is selected (F) however, a slow time weighting (S) is often used to for the measurement train noise and vibration.
A-weighted sound pressure level, L_{pA}	The sound pressure level with the A-weighting applied. The A-weighting is used for most environmental noise measurements and is used to weight a spectrum of sound to match the sensitivity of the human ear.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	The L_{Aeq} is an energy average and defined as the level of sound which, over a given period of time, would equate to the same A-weighted sound energy as the actual fluctuating sound.
Octave Bands	A band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Maximum noise Level, L_{AFmax}	The maximum instantaneous noise level measured during a given period of time. The time weighting to which the meter is set for this measurement parameter is always indicated by either an F or S.
Minimum Noise level, L_{AFmin}	The minimum instantaneous noise level measured during a given period of time. The time weighting to which the meter is set for this measurement parameter is always indicated by either an F or S.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting F, which is exceeded for N% of a specified time interval. An example of this is background noise which is quantified with the L_{A90} descriptor, which is the A-weighted level which is exceeded for 90% of the measurement period.
Sound exposure level L_{AE}	A level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.

Rating Level, L_{A,T_r}	The equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Ambient Noise Level	The noise level in a given environment whilst it is subject to all of its normal sources of noise.
Background Sound / Noise Level, L_{A90}	These are amongst the lowest noise levels measured over a given period of time and exclude short term, intermittent noise sources. The background noise level is quantified by the L_{A90} descriptor and is therefore the level which is exceeded for 90% of a given period of time.
Reverberation Time, T	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor T , often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Absorption, A	The acoustic absorption derived from the multiplication of the absorption coefficient by the surface area of a given material.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
Sound Reduction Index, R	The laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
Weighted Sound Reduction Index, R_w	A single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
Weighted Level Difference, D_w	The weighted level difference between a pair of rooms, stated as a single figure.
Standardized Weighted Level Difference, $D_{nT,w}$	The standardized, weighted difference in sound level between a pair of rooms, stated as a single figure. The level difference in octave bands is first normalized to a reference reverberation time and then plotted against a set of reference curves to establish a single figure value.
Weighted, Normalised Flanking Level Difference, D_{nFw}	The normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
Normalised Element Level Difference D_{ne}	The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.
Weighted, Normalised Element Level Difference, D_{new}	The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	A correction term applied to the sound insulation single-number values (R_w , D_w , and $D_{nT,w}$). Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.

Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking on a floor structure.
Weighted standardized impact sound pressure level, $L_{nT,w}$	A single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
Dynamic Insertion Loss, DIL	The reduction of noise level due to the presence of a noise control device such as an attenuator, including any regeneration noise created by its presence.
NR	The Noise Rating level. This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.
Vibration	The vibratory motion of a surface can be characterised by: (a) displacement (m), (b) velocity (m/s), or (c) acceleration (m/s^2). The magnitude of the vibration can be quantified in several ways: Peak to Peak - The total excursion of the oscillation about the zero datum. Peak - This value gives the maximum excursion of the oscillation above or below the zero datum. r.m.s. - This value gives the root mean square of the time history over a specific time interval (time constant). dB - Vibration levels can be expressed in dB. A reference level of $10^{-6} m/s^2$ r.m.s. is usually used for acceleration.
Ground borne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground
Structure borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.
V.D.V,	The VDV is the Vibration Dose a person is expected to be exposed to over the course of the day or night. The VDV is given by the fourth root of the time integral of the fourth power of the acceleration after it has been frequency-weighted.
eVDV	The estimated vibration dose value based on short duration measurements of transients with known durations and occurrences

Appendix B – Baseline Noise Levels

Figure B.1: Noise Level Time History at Position LT1

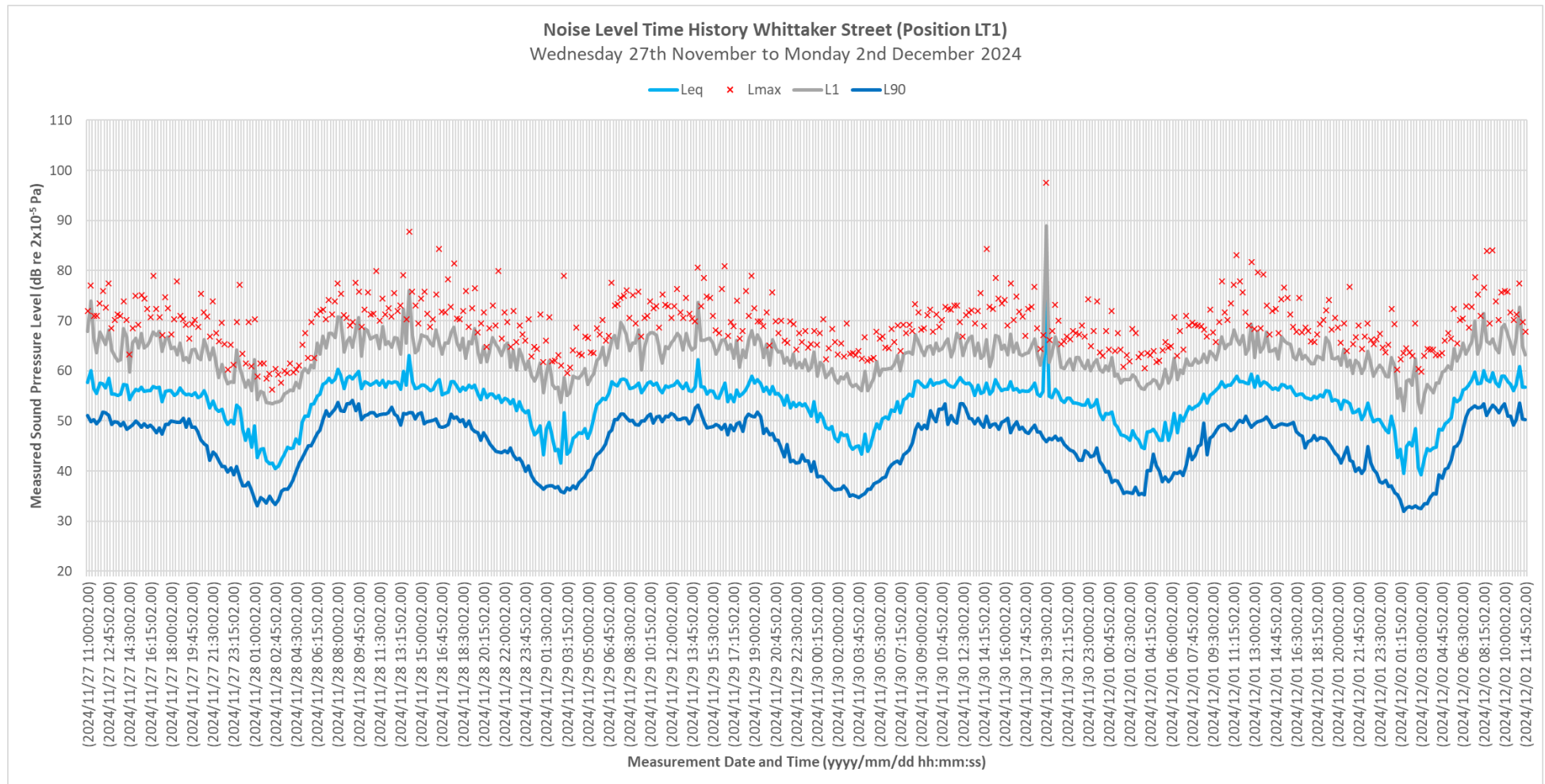
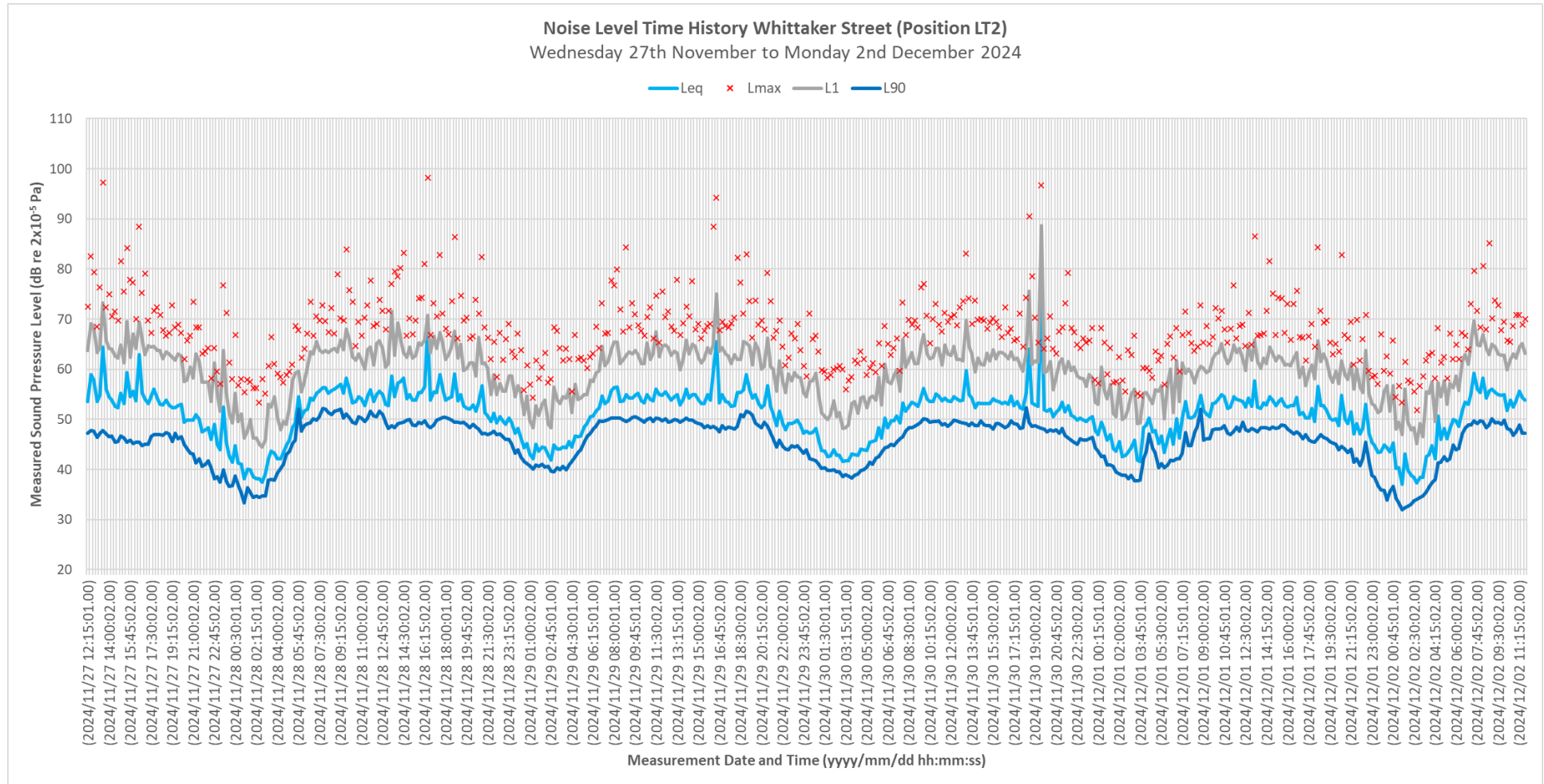


Figure B.2: Noise Level Time History at Position LT2





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