

Noise Impact Assessment

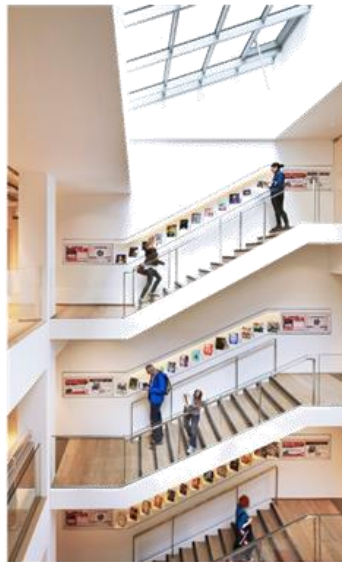
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Liverpool FC

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Executive Summary

The Applicant is seeking to obtain planning permission for the extension and refurbishment of the existing Liverpool FC Academy training centre.

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.

As part of this assessment, a baseline noise survey was undertaken between Thursday 23rd October and Wednesday 29th October 2025 to establish and quantify the existing noise levels at the Site. The Site is affected predominantly by noise from road traffic, particularly from Simonswood Lane towards the north-west and Arbour Lane towards the east.

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.

The project replaces the current outdoor show pitch with a new indoor facility on the site of the existing artificial pitch, significantly reducing noise breakout. A new stand will serve another outdoor pitch, and because it is no closer to sensitive receptors and is now better screened and oriented away its noise impact is expected to be the same or lower than the existing stand. As a result, no operational noise assessment has been required.

1. Introduction

This noise assessment has been prepared by Hilson Moran on behalf of Liverpool FC as part of the application for the redevelopment of the existing Liverpool FC Academy training centre (hereafter 'the Site').

This assessment 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 Knowsley Council (KC) to agree key NSRs, site survey protocol 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;
- Specification of appropriate noise emission limits for new fixed building services plant to adhere in line with KC guidance.

The proposal includes the replacement of the current outdoor show pitch with a new indoor pitch. The new show pitch is to be located where there is already an existing artificial pitch. As the new pitch will be enclosed the noise breakout from operational activities will be reduced from the existing scenario.

A new stand will be provided for a new outdoor show pitch (which replaces an existing outdoor pitch). As the stand is located the same distance away from noise sensitive receptors as the existing stand, but is now orientated away from them and with increased building/features in-between that will screen noise, it is expected that the impacts from the stand will be similar or less than the existing stand used for the show pitch. For these reasons an operational noise assessment has not been included.

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

2. The Site, Site Setting and Proposed Development

2.1. Site Description

The Site is an existing training centre for Liverpool FC's youth academy players. The Site comprises an existing academy building, an indoor arena, and two outdoor pitches, along with associated carparking. The Site is bounded by Simonswood Lane to the east, the AXA Training Centre to the north (senior team training ground) and Arbour Lane to the east. To the south is a David Lloyd leisure centre and to the south west is approximately 5,000 sqm of unused land with the Northwood Family Hub at The Pride Centre beyond.

Figure 2-1 shows the Site and its surroundings, NSRs, monitoring positions, and the approximate Site boundary.

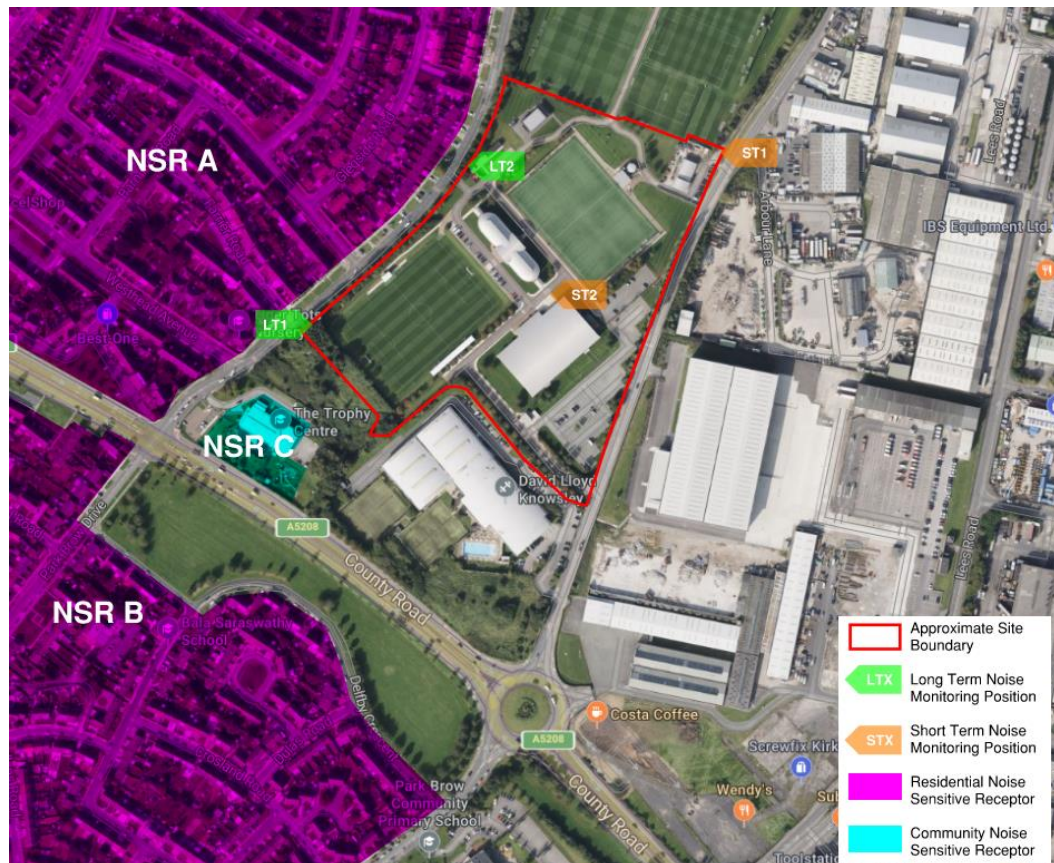


Figure 2-1: Site Location Plan Showing Site Boundary, Sensitive Receptors and Monitoring Positions

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	Description / Name	Type of Receptor	Approximate Distance to Site Boundary
NSR A	Residential properties west of Simonswood Lane	Residential	30m west
NSR B	Residential properties south of Country Road/A5208	Residential	150m southwest
NSR C	Northwood Family Hub at The Pride Centre	Community	40m southwest

2.3. Proposed Development

The masterplan proposals consist of:

- Extending and refurbishing the academy building
- A new full-size artificial indoor pitch
- Relocated full-size show pitch
- A 499 (maximum) seat spectator stand and associated accommodation such as changing rooms, officials rooms and spectator facilities.
- Replacement of lost parking spaces and some additional parking spaces with coach and minibus parking.
- Landscaping, pitch access, and replacement trees.

3. Assessment Criteria

3.1. Building Services Plant Noise

BS 4142:2014+A1:2019¹ (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 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 fixed. 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."

¹ British Standards Institution (2019); 'BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound', BSI Standards Limited, London.

3.2. Consultation

The Environmental Health Officer of KC was consulted to agree the assessment approach for building services plant noise limits, monitoring positions and NSRs for assessment. KC provided the following plant noise limit criteria:

‘With regards to the noise from fixed plant, Knowsley Councils standard fixed plant condition requires a level that is at least 5dB(A) below the existing representative background sound levels ($L_{A90,T}$), when measured 1 metre from the window of the identified noise-sensitive receptor(s).’

It is understood that plant used solely for emergencies is not required to meet the level above.

Limits set in Section 5 are in line with KC’s criteria.

4. Baseline Conditions

4.1. Environmental Noise Survey

A comprehensive baseline environmental noise survey was undertaken to establish and quantify the existing noise climate at, and within the vicinity of, the Site. The results of the survey have been used to define building services noise emission limits to be achieved at the nearest NSRs.

Long-term unattended noise monitoring was carried out between Thursday 23rd October and Wednesday 29th October 2025 at key locations described in Table 4-1 and illustrated in Figure 2-1. Attended daytime measurements were also taken at the Site on Thursday 23rd October 2025 to quantify the spatial variation in noise level across the Site and at NSRs.

Weather conditions, whilst not actively measured during the survey period, were monitored remotely throughout. Weather conditions were ideal for the measurement of noise except at night-time on the 26th and 27th where high wind speeds ($>5 \text{ ms}^{-1}$) occurred and appeared to influence the data. Data from these two nights has therefore been excluded from the dataset.

Table 4-1: Description of Noise Monitoring Locations

Monitoring Location (Figure 2-1)	Period	Description	Observation and Dominant Noise Sources
LT1	6 days	Unattended free-field measurement on northwest boundary adjacent to main building. Microphone positioned approximately 2.5m above ground level (AGL).	The noise climate at this location is dominated by traffic noise from Simonswood Lane. Distant traffic noise from Country Road/A5208, dog barking from residential property on Simonswood Lane, intermittent aircraft and noise associated with the Site also contribute to the noise climate at this location.
LT2	5 days	Unattended free-field measurement at sound east corner of the site.	The noise climate at this location is dominated by traffic noise from

		Microphone positioned approximately 2.5m AGL.	Simonswood Lane. Intermittent aircraft and noise associated with the Site also contribute to the noise climate at this location.
ST1	30 minutes	Attended free-field measurement in the northeast corner of the Site. Microphone positioned approximately 1.5m AGL.	The noise climate at this location is dominated by traffic noise from Arbour Lane. Intermittent aircraft, industrial noise from the site opposite, pedestrians and noise associated with the site also contribute to the noise climate at this location.
ST2	30 minutes	Attended free-field measurement between The Academy and Indoor Areana Buildings. Microphone positioned approximately 1.5m AGL.	The noise climate at this location is dominated by distant traffic noise from Arbour Lane and Simonswood Lane. Intermittent aircraft and noise associated with the Site also contribute to the noise climate at this location.

4.2. Baseline Noise Results

A summary of the measured daytime (07:00 to 23:00) and night-time (23:00 to 07:00) noise levels at each monitoring location is presented in Table 4-2 , with the full results displayed graphically in time-history format in Appendix B.

Table 4-2: Summary of Baseline Noise Monitoring Results

Monitoring Location (Figure 2-1)	Period	Duration	$L_{Aeq,T}$ dB	$L_{A10,T}$ dB	$L_{A90,15min}$ dB	$L_{AFmax,30s}$ dB
			Ave ¹	Ave ²	10th%ile ³	Range
LT1	Day	8 hr	59	62	46	42 - 93
	Night	16 hr	52	53	38	35 - 84
LT2	Day	8 hr	63	67	45	37 - 93
	Night	16 hr	56	55	35	35 - 85
ST1	Day	30 minutes	67	71	51 ⁴	83 ⁵
ST2	Day	30 minutes	52	53	49 ⁴	72 ⁵

Notes: ¹ Logarithmic average over the day/night survey periods; ² Arithmetic average over the day/night survey periods; ³ 10th percentile of the $L_{A90,15min}$ values over the day/night survey period; ⁴ L_{A90} over the short-term measurement period; ⁵ Maximum value over the survey period. All figures rounded to nearest whole decibel.

5. Noise Impact Assessment

5.1. 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 accurately predict plant noise emission levels. Consequently, suitable limits to which plant should adhere have been set.

It should be noted that BS 4142 recognises that its method of assessment is not suitable when background and rating noise levels are both very low. Background noise levels below about 30 dBA and rating levels below about 35 dBA are considered to be very low (as supported by the Association of Noise Consultants (ANC) document 'BS 4142:2014+A1:2019 Technical Note'²). In such circumstances, it is recommended that a minimum plant noise limit of 35 dB $L_{A,r,Tr}$ is set acknowledging that very low noise levels are less likely to cause significant disturbances, and preventing unnecessary and potentially costly noise mitigation measures that would yield negligible benefits.

Based on the results of the baseline noise survey (Section 4) and KC's plant noise policy (Section 3), suitable noise limits to which fixed building services plant should adhere have been set and are presented in Table 5-1.

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

Table 5-1: Plant Noise Emission Limits

Sensitive Receptor	Period	10th%ile Background Noise Level (dB $L_{A90,15min}$)	Plant Noise Emission Limit at 1 m from Façade (dB $L_{A,r,Tr}$) ¹
All NSRs	Daytime	45	40
	Night-time	35	35

Notes: ¹ Note that these are rating level limits, so plant noise will need to be corrected for acoustic characteristics as defined in 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

² ANC (2020); 'BS 4142:2014+A1:2019 Technical Note', Association of Noise Consultants, Northallerton.

particular period and are to be met 1 m from the nearest habitable window of the NSRs detailed in Section 2.

For the emission limits in Table 5-1 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.

5.2. Outline Mitigation Recommendations

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 accurately predict plant noise emission levels.

However this does mean that the building services design is sufficiently flexible to enable a bespoke scheme of noise control measures to be developed during the detailed design stages to achieve the noise limits presented in Section 5.1.

To meet the noise emissions limits in Section 5.1, careful attention should be paid to the selection, location, and design of all building services plant. Some items that should be considered through following design stages are:

- Selection of low noise plant, including consideration of frequency spectrum to avoid tonal components.
- Plant shall generally be specified at the peak operating efficiency. Poorly sized plant is likely to create excessive noise and/or have tonal components.
- Utilisation of screening, using acoustically robust methods can significantly reduce noise at nearby NSRs. Airflow paths which allow efficient operation of the plant by reducing short cycling (in the case of air-source systems) may need to be acoustically treated.
- Positioning of plant to maximise separation distance, or in the case of acoustically screened plant, increase path length differences to maximise screening potential.

The operation of the plant will need to be considered collectively as multiple items of plant at or near the noise emission limits, could summate to an overall exceedance.

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.

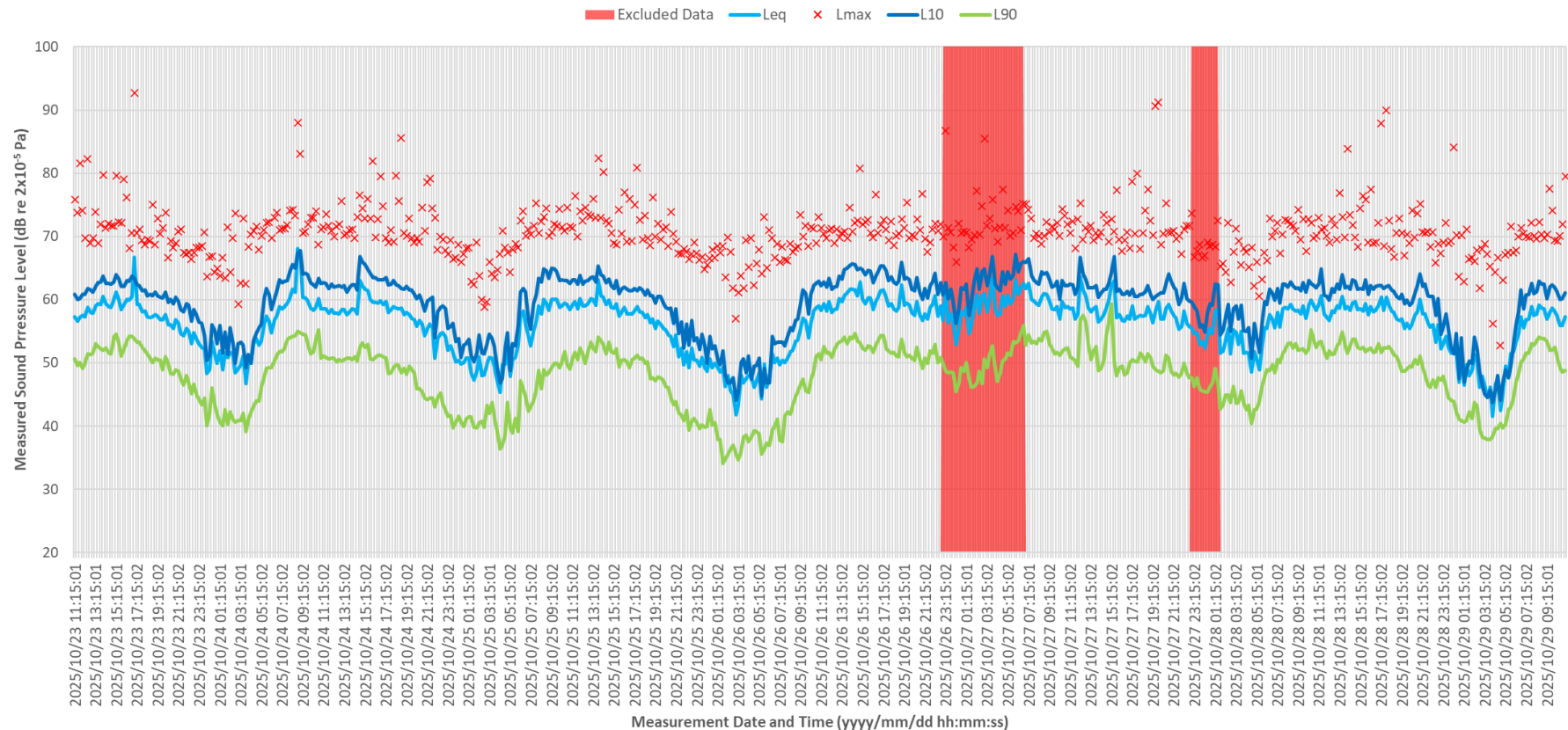
Term	Description
Decibel, dB	The decibel is a logarithmic unit of measurement used for quantifying sound. It is derived from the logarithm to base 10 of the ratio of two quantities. Use of a logarithmic scale has the advantage that it compresses the very wide range of sound pressures to which the ear 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.

Term	Description
Rating Level, $L_{Ar,Tr}$	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

Term	Description
	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

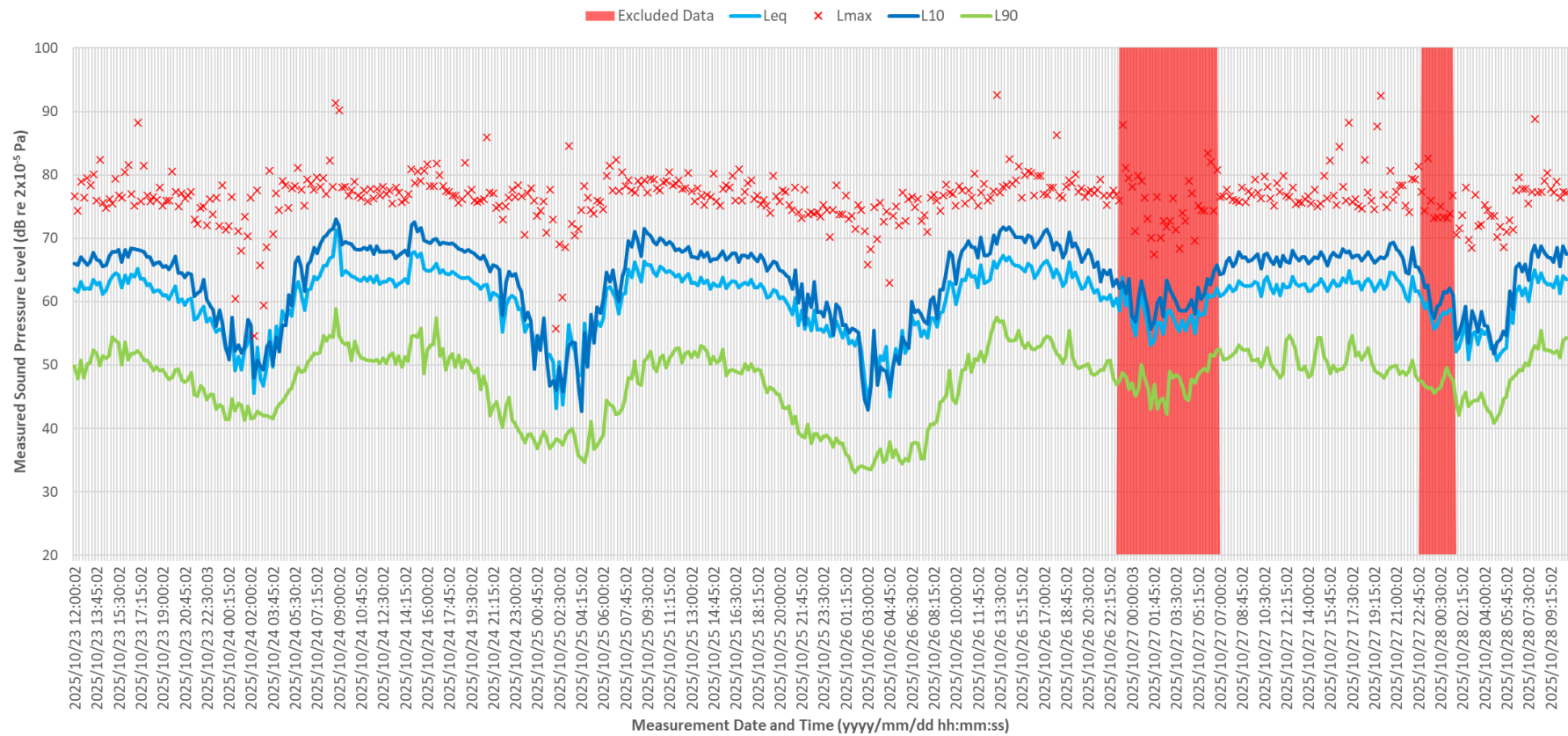
Appendix B – Baseline Noise Levels

Noise Level Time History Liverpool FC Academy (Position LT1)
Thursday 23rd October to Wednesday 29th October 2025



Noise Level Time History Liverpool FC Academy (Position LT2)

Thursday 23rd October to Tuesday 28th October 2025





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