152-156 High Street

Yiewsley

West Drayton

Noise Assessment Report

2 December 2022

For

XP Property

Contents

SUMMARY

A development is proposed at the site at 152-156 High Street, Yiewsley in the London Borough of Hillingdon.

The proposed development will contain residential units, therefore **auricl** has undertaken an environmental noise survey to assess noise levels affecting the site in comparison with the industry standard internal noise level requirements.

Based on the noise survey results, calculations have been undertaken to determine the acoustic requirements of the new façades, so as to achieve internal noise levels within the residential properties that are commensurate with the standards.

Our calculations indicate that the internal noise standards should be achievable using suitable glazing and ventilation configurations throughout the development and preliminary recommendations have been made.

In addition, external noise levels affecting future occupants have been assessed in relation to the noise limits of Approved Document O of the Building Regulations, and the Association of Noise Consultants (ANC) guidance document "*Acoustics, Ventilation and Overheating Residential Design Guide*".

It was concluded that consideration of an alternative method of mitigating overheating to open windows should be made, for residential façades that overlook High Street. For other areas, "*use of opening windows as a primary means of mitigating overheating is not likely to result in adverse effect*".

An assessment of the existing glazing was undertaken to determine its viability for residential use. Results of the assessment show that upgrades to the existing façades may be necessary in order to achieve the desirable internal noise level standards in proposed residential dwellings overlooking High Street. This could be achieved using either replacement double glazing, or additional secondary glazing.

For the facades to the rear (east), the existing glazing and external façade build up is predicted to provide suitable mitigation to achieve the internal noise level standards.

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1.0 Introduction

A development is proposed at the site at 152-156 High Street, Yiewsley in the London Borough of Hillingdon.

The proposed development will contain residential units, therefore **auricl** has undertaken an environmental noise survey to assess noise levels affecting the site in comparison with the internal noise level requirements.

The following report presents the methodology and results of an environmental noise survey carried out at the site, an assessment of the findings and our preliminary recommendations.

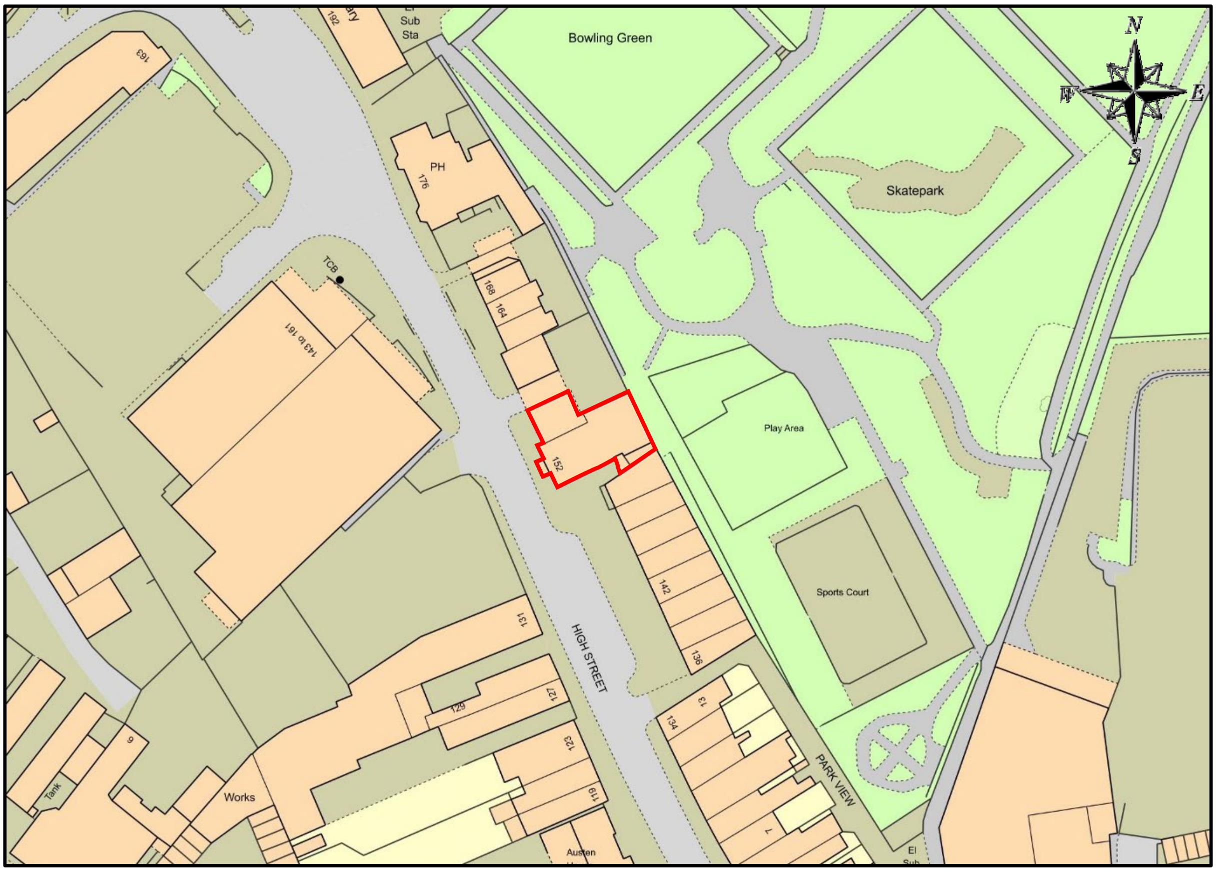
A description of the acoustic terminology used in this report is included in Appendix A.

2.0 Description of Site and Proposals

The site is located at 152-156 High Street, Yiewsley. The existing site is currently a solicitor's office within a converted chapel building to the south, and with first floor areas in the building to the north.

The site is located in a mixed area with a retail parade along High Street with residential properties on the upper floor levels and adjoining roads, a public park for recreation with a children's play area directly adjacent to the east of the site and a skatepark further to the northeast, and an Aldi supermarket to the west of the site on High Street. Figure 2.1 shows the approximate existing site extent in **red** in relation to the surrounding area.

Figure 2.1 Existing Site Extent and Surroundings



Development plans are still in the early stages, however it is understood that the proposals consist of refurbishment of the existing building to form new residential dwellings.

3.0 Noise Survey

3.1 Noise Survey Methodology

An unmanned environmental noise survey was undertaken over a 4-day period between Thursday 10 November 2022 and Monday 14 November 2022.

The noise survey period was selected to determine typical noise levels during the daytime and night-time, over weekday and weekend periods, when the residential elements will be occupied.

The approximate measurement positions are shown in **purple** on Figure 3.1 and described in Table 3.1.

Figure 3.1 Noise Measurement Positions in Relation to Site Extent and Surroundings

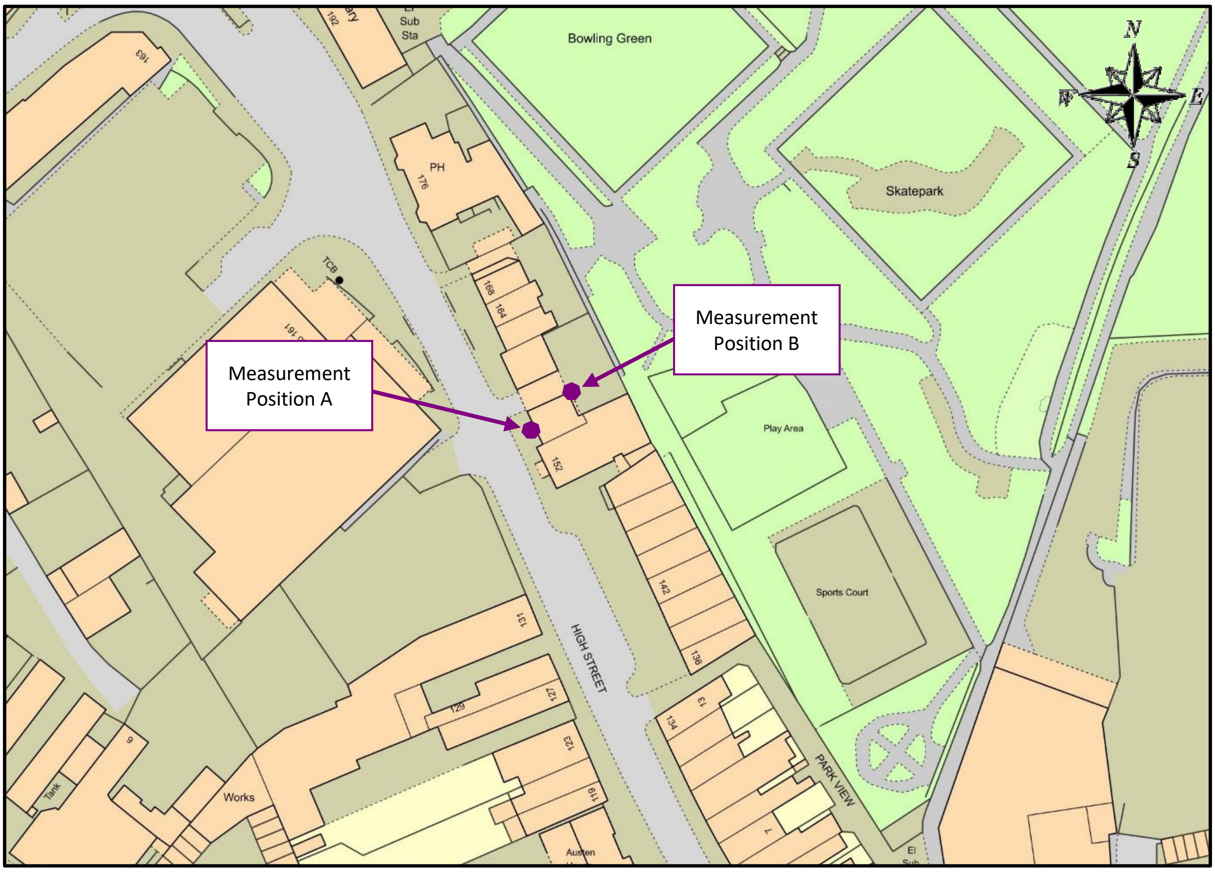


Table 3.1 Description of Measurement Positions

Measurement Position	Description
A	Measurement microphone protruding from a first-floor level window on a pole, overlooking High Street to the west.
B	Measurement microphone protruding from a first-floor level window on a pole, overlooking the car park and recreational park to the rear (east).

Measurement position A was selected as being representative of the worst-case road traffic noise levels affecting the site and the proposed west façades overlooking High Street.

Measurement position B was selected as being representative of environmental noise levels affecting the rear of the proposed residential building from the car park and recreational areas of the park to the east.

The equipment used for the noise survey is summarised in Table 3.2.

Table 3.2 Description of Equipment used for Noise Survey

Measurement Position	Item	Make & Model	Serial Number
A	Type 1 automated logging sound level meter	01dB Fusion	11388
	Type 1 ½" microphone	GRAS 40CE	292539
B	Type 1 automated logging sound level meter	01dB Fusion	11403
	Type 1 ½" microphone	GRAS 40CE	259481
All	Calibrator	01dB CAL21	34375252

L_{Aeq} and L_{Amax} sound pressure levels were measured throughout the noise survey at each measurement position.

Due to the nature of the noise survey, i.e. unmanned, we are unable to comment on the weather conditions throughout the entire noise survey period. However, at both the beginning and the end of the survey period, there was noted to be an overcast sky, low wind speeds and dry conditions. These conditions are considered appropriate for undertaking environmental noise measurements.

The noise monitoring equipment was calibrated before and after the noise survey period. No significant change was found to have occurred.

3.2 Noise Survey Results & Observations

Appendix B presents time history graphs showing the L_{Aeq} and L_{Amax} sound pressure levels measured throughout the noise survey (shown as 15-minute periods) at each position.

Due to the proximity to the façade of the existing building at both measurement positions, the measured levels have been corrected in accordance with the guidance contained in BS 8233: 2014 to account for the façade reflection effect.

The measured ambient ($L_{Aeq,\,T}$) and maximum (L_{Amax}) noise levels at each position are summarised in Table 3.3.

Table 3.3 Summary of Noise Survey Results

Measurement Position	Daytime $L_{Aeq\ (16\ hour)}$ (dB)	Night-time $L_{Aeq\ (8\ hour)}$ (dB)	Night-time $L_{Amax\ (10th\ highest)}$ (dB)
A	66	61	78
B	50	43	57

We would consider the levels measured to be reasonable, taking into account the location of the measurement positions and the dominant nearby noise sources.

At both measurement positions, the daytime noise climate was noted to be dominated by road traffic using High Street. It is anticipated that the same would also be true of night-time periods.

4.0 External Noise Intrusion

It is understood that the existing façades are proposed to be retained. We have therefore predicted the internal noise levels within proposed dwellings based on the results of the noise survey and made recommendations to achieve criteria as follows.

4.1 Internal Noise Level Criteria

We have considered the current industry standard for internal noise levels, which is British Standard (BS) 8233: 2014 "*Guidance on sound insulation and noise reduction for buildings*".

The standard specifies the 'desirable' internal noise level standards shown in Table 4.1.

Table 4.1 BS 8233 Desirable Internal Noise Levels

Activity	Location	07:00 to 23:00 (hours)	23:00 to 07:00 (hours)
Resting	Living room	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 $L_{Aeq,8hour}$

In addition, the World Health Organisation (WHO) document "*Guidelines for Community Noise*" (1999) advises the following:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991)."

Compliance with the above standards is considered to represent appropriate mitigation of the impact of noise on health and quality of life of future residents.

We have therefore based our external noise intrusion assessment on the standards presented above.

4.2 Preliminary Recommendations

Based on the measured external noise levels, we have undertaken calculations to predict the internal noise levels in the proposed dwellings. Results of the calculations show that the standards described in Section 4.1 could be achieved by using suitable external façade constructions.

Table 4.2 presents the minimum acoustic specifications for the glazing and the ventilation strategy for habitable rooms to achieve the internal noise standards.

Table 4.2 Recommended Glazing and Ventilation

Facade	Room	Glazing Recommendation	Ventilation Recommendation
West façades overlooking High Street	Living Rooms	Double or secondary glazing to achieve minimum **R_w 31 dB** (e.g. double glazing typically: 6mm glass / 12mm cavity / 4mm glass)	Mechanical ventilation e.g. MVHR (See Section 4.3 below)
	Bedrooms	Double or secondary glazing to achieve minimum **R_w 42 dB** (e.g. double glazing typically: 8.4mm laminated glass / 12mm cavity / 10mm lamiinated glass)	
East façades overlooking the rear	Living Rooms and Bedrooms	Existing windows to the rear (See Section 5.0 below)	Passive ventilation (e.g. standard trickle ventilators typically: $D_{ne,w}$ 37 dB)

Our calculations have assumed that the non-glazed areas provide a sound insulation performance of at least R_w 52 dB (i.e. standard brick/block cavity wall or suitable lightweight external wall construction), and that trickle ventilators have an open area no greater than $2500mm^2$.

The development design is still in the early stages and room/window dimensions are yet to be finalised, therefore our calculations are based on typical room and window dimensions (i.e. bedrooms $30m^3$, living rooms $40m^3$, with a 25% glazed façade area).

The specifications above are to demonstrate viability for planning guidance only. Further consideration should be undertaken during the detailed project design stage to determine detailed glazing and ventilator acoustic specifications to ensure it meets minimum criteria.

4.3 Overheating and Open Windows

Where windows are open to control overheating, it is prudent to consider the impact on internal noise levels and residential amenity.

Approved Document O (ADO) 2021 of the Building Regulations states the following:

"In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB $L_{Aeq,T,}$ averaged over 8 hours (between 11pm and 7am).

b. 55dB $L_{AFmax,}$ more than 10 times a night (between 11pm and 7am).

***NOTE**: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)."*

The Association of Noise Consultants (ANC) has produced a guidance document entitled "*Acoustics, Ventilation and Overheating Residential Design Guide*", published in January 2020, which states that "*it is considered reasonable to allow higher levels of internal ambient noise for transport sources when higher rates of ventilation are required in relation to the overheating condition*".

A two-stage noise risk assessment is then proposed, based upon the levels of external noise affecting the site as shown in Figure 4.1 and the subsequent internal noise levels shown Figure 4.2.

Figure 4.1 Level 1 Noise Risk Assessment – External Noise Levels

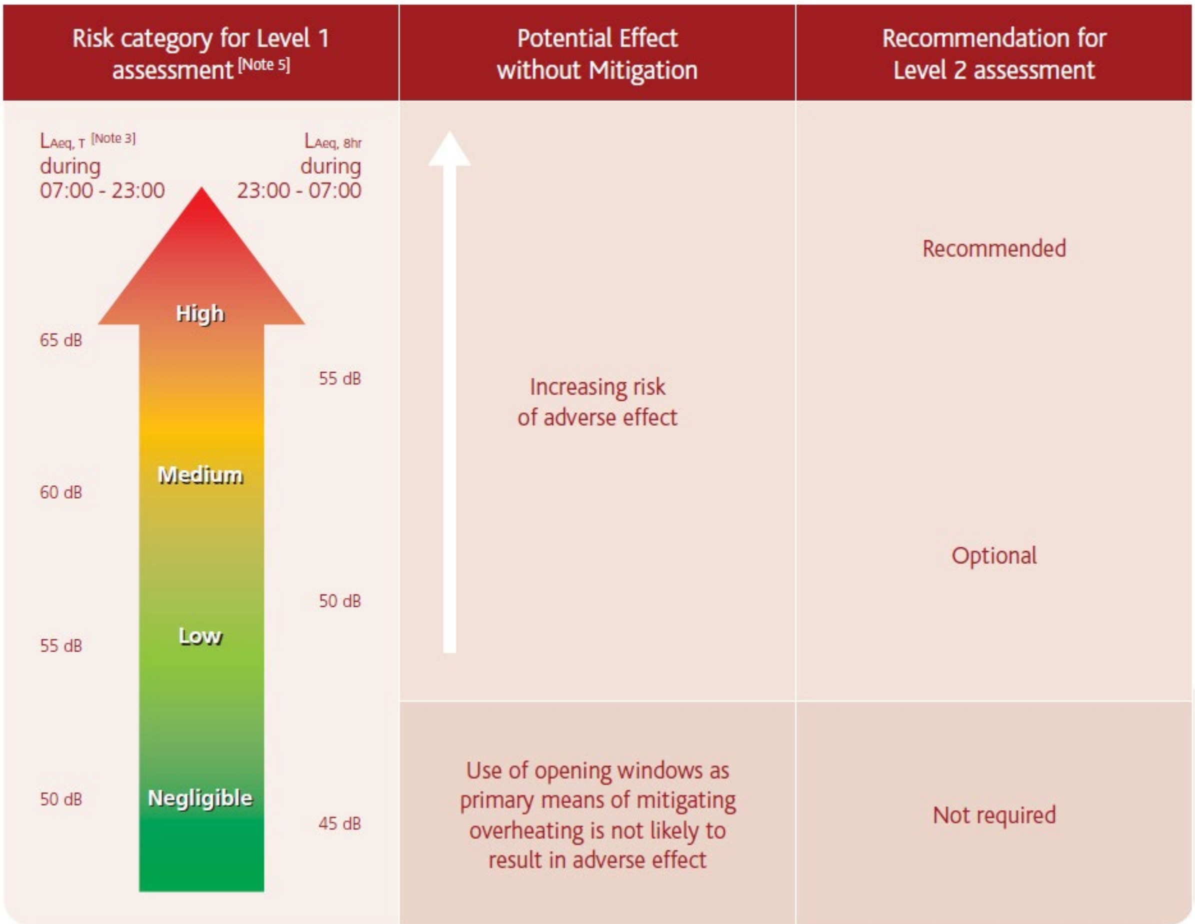


Figure 4.2 Level 2 Noise Risk Assessment – Internal Noise Levels

Internal ambient noise level [Note 2]			Examples of Outcomes [Note 5]	
$L_{Aeq,T}$ [Note 3] during 07:00 – 23:00 [Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 [Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
Increasing noise level			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response[Note 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Figures 4.1 and 4.2 are related by the 13 dB attenuation typically provided by an open window.

For noisier sites, the risk of an adverse effect increases with increasing noise level and further consideration may be required.

Comparing the measured external noise levels with the ADO and ANC criteria gives the daytime and night-time noise risk categories shown in Table 4.3.

Table 4.3 Noise Risk Categories

Location	Predicted External Noise Level at Façade	Noise Risk Category ADO Noise Limits	Internal Noise Level with Windows Open
West façades overlooking High Street	Daytime 66 dB $L_{Aeq\ (16\ hour)}$	**High**	Daytime 53 dB $L_{Aeq\ (16\ hour)}$
	Night-time 61 dB $L_{Aeq\ (8\ hour)}$	**High** **Exceeds ADO Limit**	Night-time 48 dB $L_{Aeq\ (8\ hour)}$
	Night-time 78 dB $L_{Amax\ (10th\ highest)}$	**Exceeds ADO Limit**	Night-time 65 dB $L_{Amax\ (10th\ highest)}$
East façades to the rear	Daytime 50 dB $L_{Aeq\ (16\ hour)}$	**Negligible**	Daytime 37 dB $L_{Aeq\ (16\ hour)}$
	Night-time 43 dB $L_{Aeq\ (8\ hour)}$	**Negligible** **Less than ADO Limit**	Night-time 30 dB $L_{Aeq\ (8\ hour)}$
	Night-time 57 dB $L_{Amax\ (10th\ highest)}$	**Less than ADO Limit**	Night-time 44 dB $L_{Amax\ (10th\ highest)}$

Note: Where areas may achieve the requirements of one or more parameters but not all three, the worst-case has been used to determine the appropriate ventilation strategy.

Assessment noise levels are based on the measured noise levels detailed in the previous sections. The assessment shows that proposed dwellings facing west overlooking High Street are likely to represent a high noise risk category and do not achieve the ADO criteria with windows open, and therefore an alternative method of controlling overheating to open windows should be implemented in these areas (e.g. MVHR).

For other façades to the rear of the building facing east, noise levels are predicted to be within the negligible noise risk category during the daytime and night-time periods and also achieve the ADO criteria with windows open. According to the guidance, for these façades *"use of opening windows as a primary means of mitigating overheating is not likely to result in adverse effect"*.

5.0 Retention of Existing Glazing

It is proposed to retain the existing glazing where possible at the site. The existing windows throughout the building are understood to be mostly double glazed and openable, with windows on the old chapel façade single glazed but sealed and unopenable overlooking High Street.

The sound reduction performance of the existing glazed areas at the site is unknown, therefore measurements were undertaken to assess the in-situ sound reduction performance of the existing façades on the western, eastern, and the old chapel facades on Thursday 10 November 2022.

Noise levels were simultaneously logged both externally and internally for a suitable period across each façade, to obtain the sound reduction values of the closed external façades. A description of each measurement is presented in Table 5.1.

Table 5.1 – Description of Measurements

Façade Location	Internal	External
West overlooking High Street (Double glazed areas)	On a tripod in the centre of an office room containing two medium sized and one larger window (3 windows total to room) that overlook High Street at first floor level of the west façade	Approximately 1.5m above ground level and 1m external to the west facing façade of the building on a tripod on High Street
West overlooking High Street (Single glazed chapel façade)	On a tripod in the centre of an office room containing one large chapel window that overlooks High Street at first floor level of the west façade	Approximately 1.5m above ground level and 1m external to the west facing façade of the building on a tripod on High Street
East overlooking the rear	On a tripod in the centre of an office room containing one large window that overlooks the rear at ground floor level of the east façade	Attached to a boom pole protruding from the window of the adjacent office room at ground floor level

Internal noise levels were measured in rooms with windows fully closed throughout the measurements. Doors to all rooms were fully closed throughout the measurements.

The equipment used for the noise measurements is summarised in Table 5.2.

Table 5.2 - Description of Equipment used for Internal Noise Measurements

Measurement Position	Item	Make & Model	Serial Number
Internal Measurements	Type 1 automated logging sound level meter	01dB Fusion	11403
	Type 1 ½" microphone	GRAS 40CE	259481
External Measurements	Type 1 automated logging sound level meter	01dB Fusion	11388
	Type 1 ½" microphone	GRAS 40CE	292539
All	Calibrator	01dB CAL21	34375252

Weather conditions throughout the measurements consisted of overcast sky, low wind speeds and dry conditions. Weather conditions are not considered to have had any significant effect on the measured noise levels.

Based on the simultaneously measured internal and external noise levels, the calculated apparent sound reduction index ($R'_{tr,s}$) for each façade is summarised in Table 5.3.

Table 5.3 – Apparent Sound Reduction Index of Existing Façades

Location	Apparent Sound Reduction Index (dB)							$R'_{tr,s}$ (dB)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
West/Front Façade	28	25	27	27	24	29	30	**26**
Chapel Façade	37	28	30	29	31	32	32	**30**
East/Rear Façade	31	22	22	20	21	22	20	**21**

The above sound insulation values represent the composite sound reduction performance for each external façade as a whole. Assuming that the non-glazed areas of the façade consist of a typical R_w 52 dB masonry cavity construction, our calculations indicate the resulting existing glazing performance values shown in Table 5.4.

Table 5.4 – Existing Glazing Performance Values

Location	In-Situ Measured Glazing Performance
West/Front Façade	$R'_{tr,s}$ 23 dB
Chapel Façade	$R'_{tr,s}$ 28 dB
East/Rear Façade	$R'_{tr,s}$ 18 dB

By comparison of the results of Table 5.4 with the minimum specifications provided in Table 4.2, it can be seen that upgrades to the existing façades may be necessary in order to achieve the desirable internal noise level standards in proposed residential dwellings overlooking High Street for both the double-glazed areas, and the single-glazed chapel façade. This could be achieved using either replacement double glazing (achieving the specifications in Table 4.2), or additional secondary glazing.

For façades to the rear of the building facing east, external noise levels are suitably low such that the existing façades are expected to provide suitable mitigation of noise levels to achieve the internal noise level standards. Our calculations presenting this are shown in Tables 5.5 to 5.7.

Table 5.5 – Existing Rear Façade, External to Internal Noise level Calculation – Living Rooms During the Daytime

Location	dB at Octave Band Centre Frequency							dBA
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
Measured External $L_{eq\ (16\ hour)}$ Noise Level	56	53	48	48	45	42	37	**50**
Apparent Sound Reduction Index of East Facade	-31	-22	-22	-20	-21	-22	-20	
Correction for Future Room Dimensions, Carpets and Furnishing	-	+3	+4	+4	+2	+2	+1	
Predicted Internal $L_{eq\ (16\ hour)}$ Noise Level	25	34	30	32	26	22	18	**32**

Table 5.6 – Existing Rear Façade, External to Internal Noise level Calculation – Bedrooms During the Night-time

Location	dB at Octave Band Centre Frequency							dBA
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
Measured External $L_{eq\ (8\ hour)}$ Noise Level	52	46	41	39	39	34	28	**43**
Apparent Sound Reduction Index of East Facade	-31	-22	-22	-20	-21	-22	-20	
Correction for Future Room Dimensions, Carpets and Furnishing	-	+4	+5	+5	+3	+2	+2	
Predicted Internal $L_{eq\ (8\ hour)}$ Noise Level	21	28	24	24	21	14	10	**25**

Table 5.7 – Existing Rear Façade, External to Internal Noise level Calculation – Bedrooms During the 10th Highest Night-time L_{max} Noise Event

Location	dB at Octave Band Centre Frequency							dBA
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
Measured External $L_{max\ (10th\ Highest)}$ Noise Level	65	66	56	53	50	46	48	**57**
Apparent Sound Reduction Index of East Facade	-31	-22	-22	-20	-21	-22	-20	
Correction for Future Room Dimensions, Carpets and Furnishing	-	+4	+5	+5	+3	+2	+2	
Predicted Internal $L_{max\ (10th\ Highest)}$ Noise Level	34	48	39	38	32	26	30	**40**

The development design is still in the early stages and room dimensions are yet to be finalised, therefore our calculations are based on typical room dimensions (i.e. bedrooms 30m^3, living rooms 40m^3. The calculations assume that bedrooms and living rooms are carpeted and furnished.

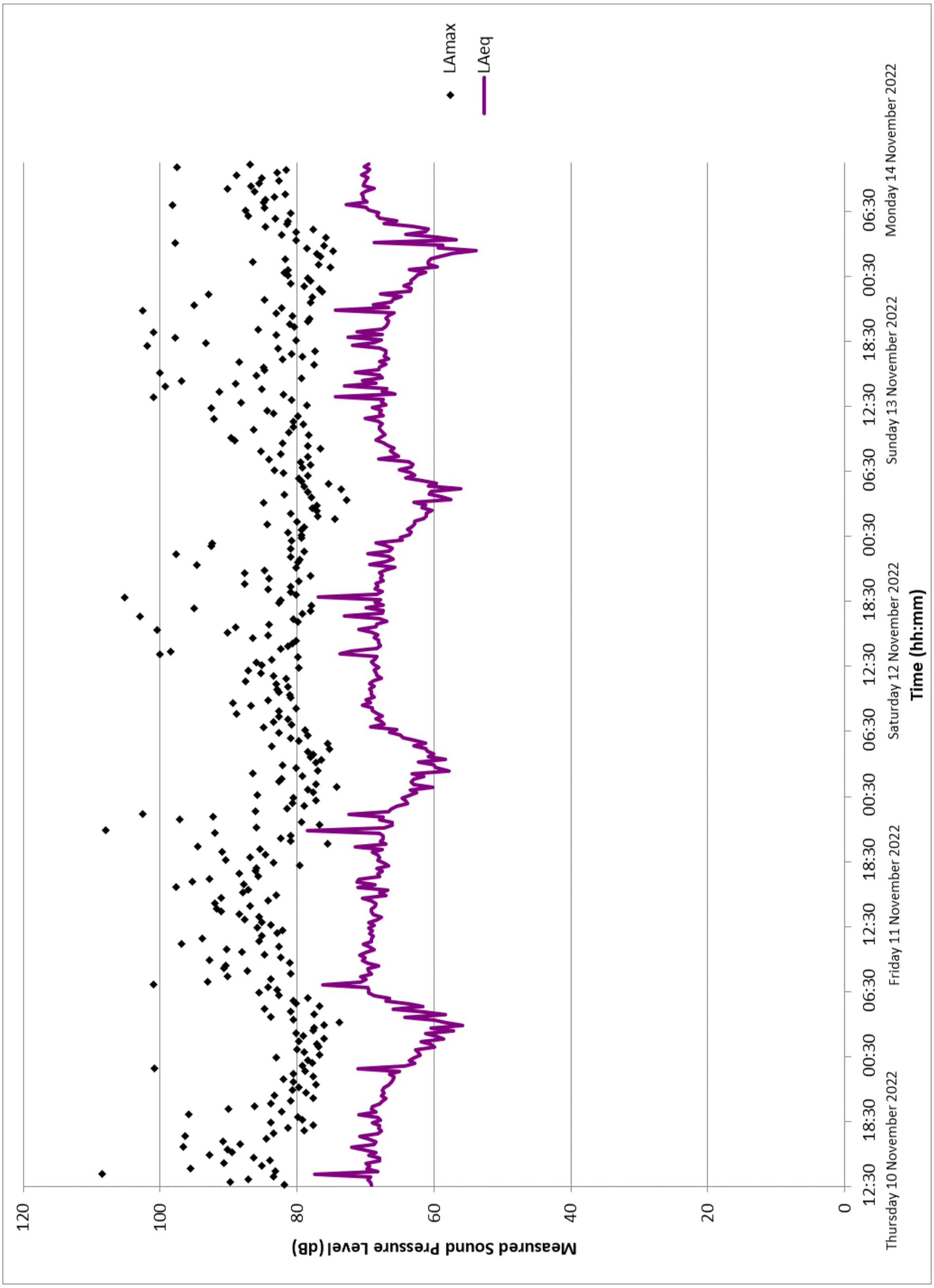
It can be seen that the predicted internal noise levels in proposed dwellings that retain existing façades to the rear/east achieve the internal noise level standards presented in Section 4.1.

Appendix A – Acoustic Terminology

Parameter	**Description**
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
L_{Amax}	The A-weighted maximum noise level measured during the measurement period.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{A90\ (15\ min)}$	The noise level exceeded for 90% of the time (also referred to as the background noise level), measured over a 15-minute period
R_w	The weighted (w) sound reduction index (R), a single figure rating of the laboratory airborne sound insulation performance of a construction, usually measured across the frequency range 100-3150Hz. The higher the value, the greater the sound insulation, and the more onerous the requirement.
$D_{n,e,w}$	The weighted (w) element (e) normalised (n) level difference (D), a single figure indicator of the ability of a small building element (such as a trickle ventilator) to reduce sound. The higher the value, the greater the sound reduction, and vice versa.

Appendix B – Time History Graphs

Measurement Position A



Measurement Position B