



Unit 3, Westgate Building
175 Commercial Street, Newport, NP20 1JN

Noise Impact Assessment

21st July 2022
First Issue





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Revision History

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Executive Summary and Conclusions

This document, a Noise Impact Assessment (NIA), has been written to assess the proposals for the redevelopment of the 1st floor from office use into an HMO (residential), at Unit 3 of the Westgate Building at 175 Commercial Street, Newport, NP20 1JN.

As covered in **Section 5.0**, internal ambient noise level (IANL) targets can be met with closed windows and glazing with a moderate-to-high level of acoustic performance. This does not mean that windows should be sealed shut – but does mean that an alternative ventilation system should be used which can meet IANL targets whilst providing adequate background ventilation. Glazing and ventilators (unless mechanically ventilated) must meet the minimum sound reduction indices in **Table 5.1 / Figure 5.1** of **Section 5.2**.

Regarding internal sound transfer (**Section 6.0**), PJA has recommended that an on-site weighted sound level difference of at least $53 \text{ dB } D_{nT,w} + C_{tr}$ should be achieved across the intermediate floors between the 1st floor and those above and below (most notably below). This is a 10 dB uplift on the minimum requirement between dwellings from Approved Document E of the Building Regulations. This is to provide additional protection to future residents from internal sound transfer, which is likely to be higher from the ground floor in particular (retail outlet) than from neighbouring dwellings. Example constructions have been given in Table 6.1 that are capable of achieving this level of reduction – which suggests (depending on the exact base floor construction) that a floating floor and plasterboard ceiling may be required. For the sound insulation across walls, the thick masonry constructions that are already present will provide a more than adequate level of insulation, and new walls should be installed using standard constructions implemented to achieve Part E (Building Regulation) requirements.

Regarding the noise impact on other properties (**Section 6.1.1**), if mechanical plant is to be installed, then noise emissions should not exceed a rating level limit of 21 dB $L_{Aeq,15mins}$ at night (23:00 – 07:00) and 26 dB $L_{Aeq,1hr}$ during the day (07:00 – 23:00). This rating level limit should not be exceeded at 1m outside of nearby residential windows, when assessed in accordance with BS 4142:2014+A1:2019. Whilst the exact details of the plant have not been developed at this stage, it is anticipated that this target can be achieved providing the applicant follows the recommendations detailed in **Section 7.3**. PJA recognises that this aspect is likely to be conditioned with the requirement for a further assessment to demonstrate that the rating level targets will be achieved once the project reaches the technical design stage.

Therefore, PJA, as suitably qualified acoustic consultants, recommends that noise should not pose a constraint to achieving planning permission for the proposed development, on the basis that the applicant follows the recommendations herein.

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1.0 Introduction

ParkerJones Acoustics Limited (PJA) has been instructed to undertake a Noise Impact Assessment as part of a planning application for the redevelopment of the 1st floor from office use into an HMO (residential), at Unit 3 of the Westgate Building at 175 Commercial Street, Newport, NP20 1JN.

1.1 Scope of Report

This Report has been written to:

- assess the site suitability in terms of the noise impact from the residual noise environment on amenities of the future occupants of the proposed development;
- advise on mitigation measures to ensure that the proposed residential apartments are not disturbed from noise transfer through the separating floor above the ground floor retail (currently occupied by *BargainBuys*).
- assess the risk of plant noise impacting other properties in the area, should mechanical ventilation be installed to service the dwellings.

The objective is to ensure that the noise impact is being considered and controlled sufficiently. Therefore, where considered necessary, mitigation measures have been suggested to ensure that identified impacts are minimised.

Whilst every attempt has been made to ensure that this report communicates effectively to a reader who might not have much knowledge of acoustics, some parts are necessarily technical. A glossary of acoustic terminology and concepts is provided in **Appendix A**.

1.2 Assessment Criteria

The assessment takes into account a number of guidelines, including:

- 'Technical Advice Notes (Wales) 11, Noise – October 1997';
- the Professional Practice Guidance on Planning and Noise (ProPG) (2017);
- BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*;
- The World Health Organisation (WHO) 'Guidelines for Community Noise' (1999) and 'Night Noise Guidelines for Europe' (2009) documents; and
- Approved Document E (ADE) of the Building Regulations 2010 for England and Wales.;

The assessment is aimed at limiting the impacts to no greater than the Lowest Observed Adverse Effect Level (the level above which adverse effects on health and quality of life can be detected).

2.0 Site and Development Description

The site of the proposed development is located on the 1st floor of Unit 3 of the Westgate Building at 175 Commercial Street, Newport, NP20 1JN.

As shown in **Figure 2.1**, the property is located on the west side of Commercial Street, a busy pedestrianised high street in the city centre, close to one of the entrances to Friars Walk Shopping Centre.

The 1st floor of the property (currently offices), sits directly above a ground floor retail outlet (*BargainBuys*), with similar retail premises adjacent to the sides, and the opposite side of the high street, such as *Sports Direct*, *Card Factory*, *Barclays Bank* and *The Works*. Around the rear of the property are the Westgate Hotel, St Mary's Church, and Westgate Apartments. Access to the building is directly from Commercial Street.

The building itself appears to be mostly masonry construction from around the 1900s.

The application involves a change of use from an office to a house of multiple occupancy comprising of 6 bedrooms, a kitchen, dining and living space. Existing and proposed floor plans are shown in **Figures 2.2** and **2.3**.

Figure 2.1 – Aerial view of the site and surrounding area (top) – Street view (bottom)

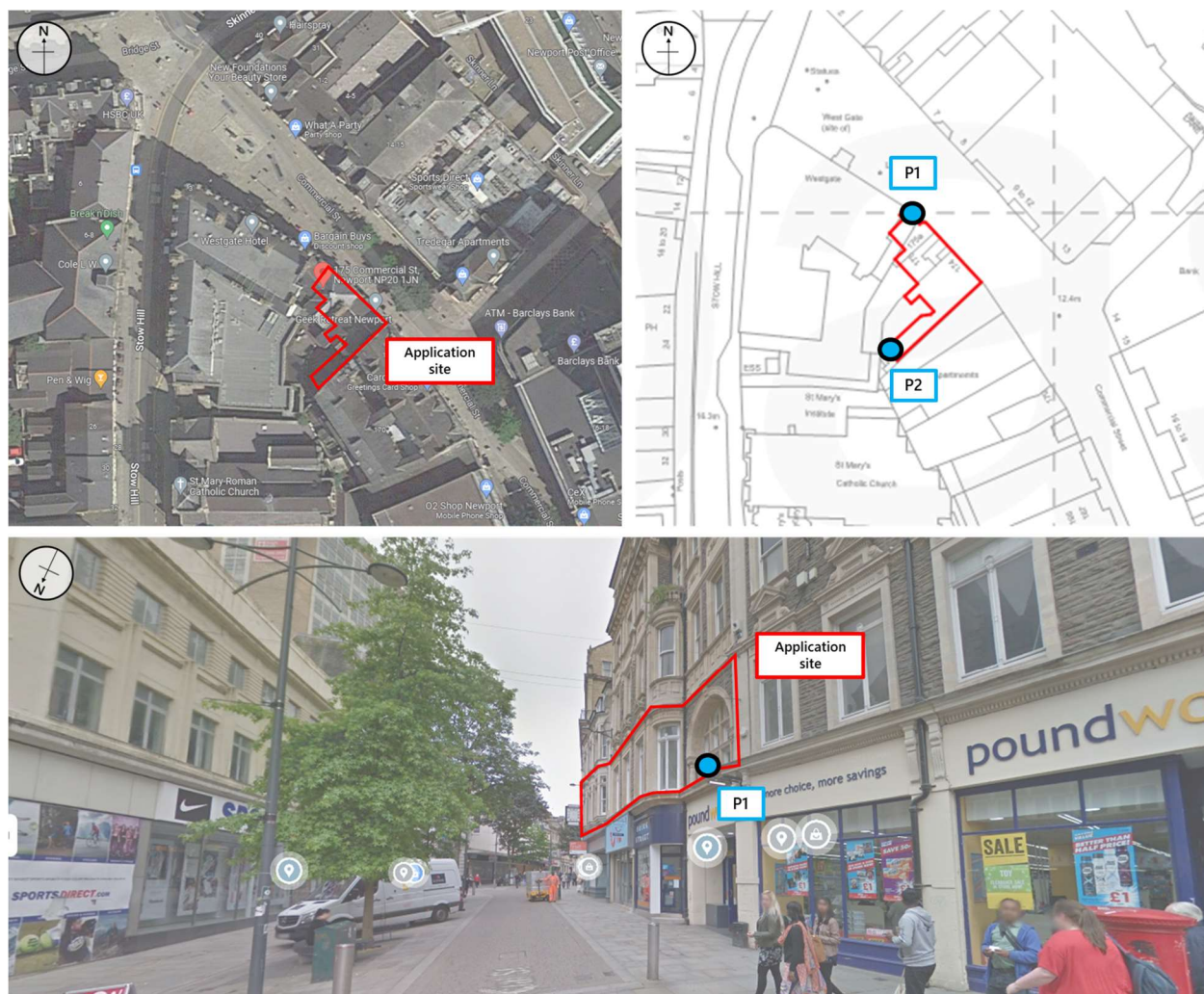


Figure 2.2 – Existing floor plans

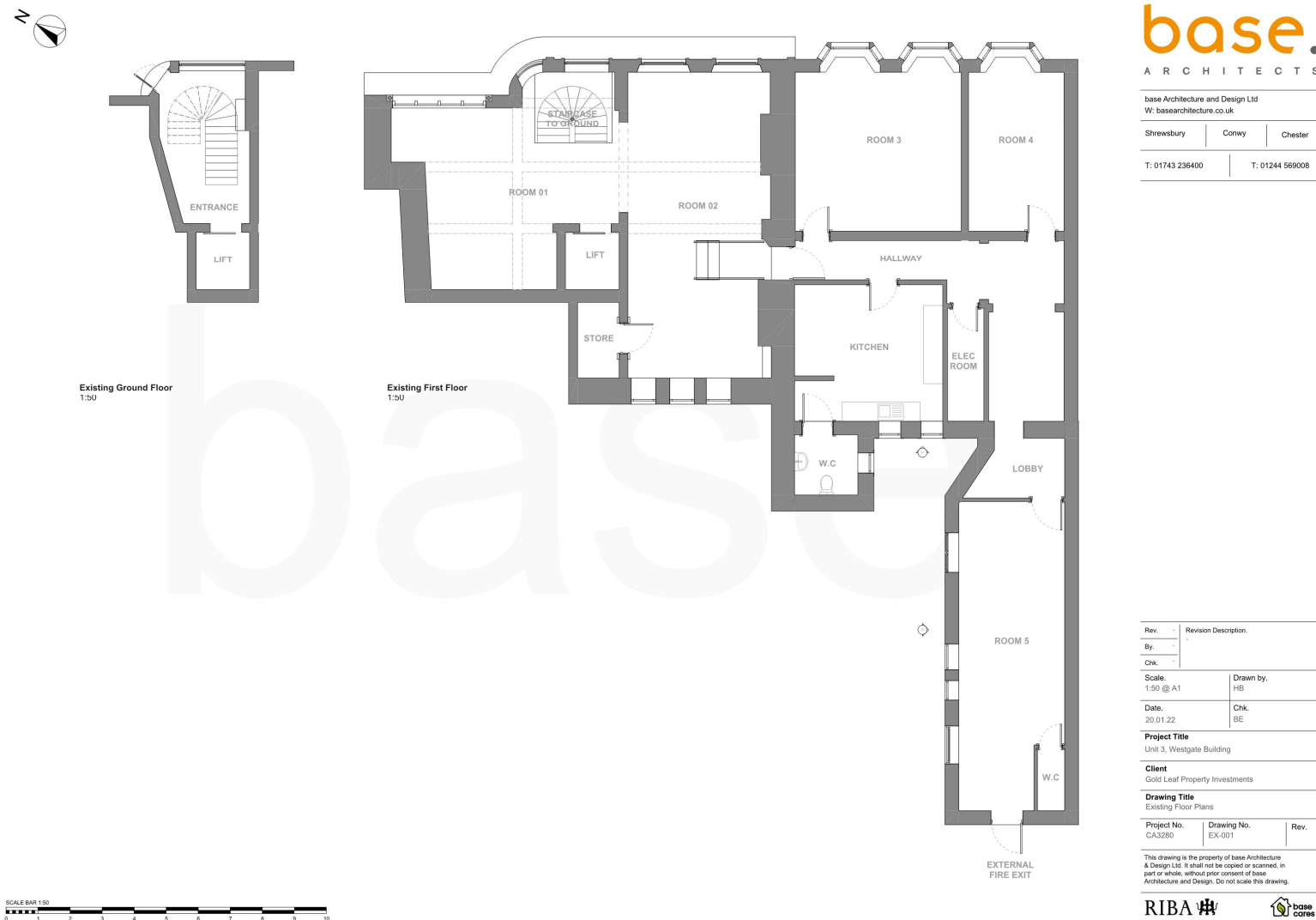


Figure 2.3 - Proposed floor plans



3.0 Relevant Guidelines

3.1 Technical Advice Note 11 (TAN 11)

'Technical Advice Notes (Wales) 11, Noise – October 1997' gives guidance on the control of noise to sensitive developments which may be affected by noise and vice versa.

This subsequently states that '*Noise Exposure Categories (NECs) have been derived to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources.*'

'When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC.'

The NEC (Noise Exposure Categories) are summarised within **Table 3.1** and **Table 3.2**, indicating levels for road traffic, as this is considered to be the dominant source in this case.

Table 3.1 – TAN 11 noise exposure categories

NEC	Action
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 3.2 - Noise exposure categories for new dwellings near existing noise sources

Noise Levels corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB				
Period	Noise Exposure Category (NEC)			
	A	B	C	D
Daytime (07:00 – 23:00)	<55	55-63	63-72	>72
Night-time (23:00 – 07:00)	<45	45-57	57-66	>66

3.2 World Health Organisation (WHO) Environmental Noise Guidelines

The WHO document *Guidelines for Community Noise 1999* has recently been superseded by the *Environmental Noise Guidelines for the European Region*. However, the updated guidance states that 'all WHO guidelines for community noise (CNG) indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid'.

The 1999 document gives the following description of community noise:

"Community noise (also called environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood. Typical neighbourhood noise comes from premises and installations related to the catering trade (restaurant, cafeterias, discotheques, etc.); from live or recorded music; sport events including motor sports; playgrounds; car parks; and domestic animals such as barking dogs."

The GCN recommends an indoor guideline value (between 23:00 and 07:00) for bedrooms of 30 dB $L_{Aeq,8hr}$ and 45 dB L_{Amax} to prevent sleep disturbance

3.3 BS 8233:2014

BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' suggests appropriate criteria and limits for different situations. This includes internal noise criteria for residential developments and is probably the most commonly applied residential noise standard in the UK.

The limits with BS 8233:2014 are similar to those in the WHO's 'Guidelines for Community Noise and Night Noise Guidelines for Europe' document. Generally, the two sets of guidance go hand-in-hand and therefore BS 8233:2014 appears relevant in this case.

Table 4 of BS 8233:2014 provides 'desirable' internal ambient noise level (IANL) limits for dwellings from "steady external noise sources". The standard also indicated that internal target levels may be relaxed by up to 5 dB and 'reasonable' internal conditions still achieved. These targets are summarised in **Table 3.3** below.

Table 3.3 – BS 8233:2014 internal ambient noise level (IANL) upper limits

Activity	Location	Daytime (07:00 – 23:00)		Night-time (23:00 – 07:00)	
		Desirable conditions	Reasonable conditions	Desirable conditions	Reasonable conditions
Resting	Living Room	35 dB $L_{Aeq,16hr}$	40 dB $L_{Aeq,16hr}$	-	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	45 dB $L_{Aeq,16hr}$	-	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	40 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$	35 dB $L_{Aeq,8hr}$

Annex G.1 of BS 8233:2014 suggests that “if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB”. Therefore, a noise limit directly outside of the nearest residential windows could be set based upon the values above plus 15 dB, as per below:

- Desirable internal conditions – Façade noise levels <50 dB $L_{Aeq,16hr}$
- Reasonable internal conditions – Façade noise levels <55 dB $L_{Aeq,16hr}$

3.4 The Professional Practice Guidance on Planning and Noise (ProPG)

The ProPG, published in 2017, extends on the guidance and numerical targets within BS 8233:2014 and WHO guidelines, new and extended recommendations where these standards are considered to fall short. Therefore, it is considered to be the most relevant and up to date design standard for assessing the noise impact on new residential developments.

The ProPG provides internal ambient noise level targets based upon BS 8233:2014 and WHO guidelines, as shown in the table below. The targets are essentially the same as BS 8233:2014 guidelines but with the addition of an $L_{Amax,F}$ target overnight based on WHO guidelines.

The ProPG indicates that the guidance can be relaxed by up to 5 dB (as does BS 8233:2014) where development is considered necessary or desirable, despite high external noise levels.

Table 3.4 – The ProPG internal ambient noise level (IANL) upper limits

Activity	Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,F}$ ¹
¹ a threshold by which ‘good acoustic design’ is achieved by not exceeding this threshold more than 10 times a night			

Whilst it is desirable to achieve the recommended IANLs with windows open, an assessment can be made with closed windows and open ventilators (i.e., trickle vents) which provide “whole dwelling ventilation” (as defined by Building Regulations Approved Document F).

Closed windows do not mean sealed shut/un-openable windows, as occupants would favour the ability to open the windows (especially during the hotter months of the year) even if the resultant internal acoustic conditions aren’t as satisfactory.

3.5 Approved Document E of the Building Regulations

Approved Document E (ADE) was issued by the Secretary of State to provide practical guidance with respect to the requirements of Schedule 1 to, and Regulation 7 of, the Building Regulations 2010 for England and Wales.

Requirement E1 covers the protection of sound from other parts of the building and adjoining buildings (separating walls and floors), stating that:

"Dwelling-houses, flats and rooms for residential purposes shall be designed and constructed in such a way that they provide reasonable resistance to sound from other parts of the same building and from adjoining buildings."

Requirement E1 indicates that: *"In the Secretary of State's view the normal way of satisfying Requirement E1 will be to build separating walls, separating floors, and stairs that have a separating function, together with the associated flanking construction, in such a way that they achieve the sound insulation values for dwelling-houses and flats set out in Table 1a"*. The relevant performance standards from Table 1a of ADE are reproduced in the table below.

Table 3.5 - Requirement E1 - on-site sound insulation performance targets for party walls and floors between dwellings

Building Type	Separating Element	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (minimum values)	Impact sound insulation $L'_{nT,w}$ dB (maximum values)
Dwelling-houses and flats formed by material change of use (refurbishment)	Walls	43	N/A
	Floors	43	64

3.6 Sound Insulation from Non-Residential Areas

Many Local Planning Authorities (LPAs) have specific supplementary planning documents (SPDs) which contain guidance for noise limits in residential dwellings from neighbouring retail/commercial usage.

PJA has reviewed the SPDs used by Newport City Council but has not found any specific noise guidance for this development.

In PJA's experience, the following guidelines are often applied, requiring that the weighted sound level difference between commercial spaces and residential dwellings across a party wall/floor is at least:

- 48 dB $D_{nT,w} + C_{tr}$ if the commercial space is used as an office or similar;
- 53 dB $D_{nT,w} + C_{tr}$ if the commercial space is used as a retail unit, a food/drink establishment, or other types of commercial unit which would be expected to generate higher noise levels than an office – i.e., those that have a continuous low level of background music.

The $D_{nT,w} + C_{tr}$ targets above are 5 and 10 dB above minimum ADE requirements (see **Table 3.5**) between two dwellings respectively. The higher ratings reflect the fact that commercial units are typically consistently noisier than a residential property and therefore greater protection is required against sound from a neighbouring commercial unit than from a neighbouring resident.

4.0 Noise Survey

4.1 Methodology

PJA has attended the site and surrounding area to conduct an environmental noise survey between Thursday the 14th of July and Monday the 18th of July 2022. The results of the survey have been used to quantify the typical residual noise levels that would be incident on the site and subsequently the proposed development on a day-to-day and night-by-night basis.

Two monitoring positions were employed simultaneously, as described in **Table 4.1**. The two positions are denoted in **Figure 2.1** in **Section 2.0**.

Table 4.1 – Description of measurement positions

Position	Description of Location	Measurement Period
P1	Propped out of a 1 st floor window (around 30cm from façade) on the east elevation overlooking Commercial Street, directly above the entrance to <i>BargainBuys</i>	Thursday 14 th July 13:45 – Monday 18 th July 09:10
P2	On a tripod 1.5m above ground outside the 1 st floor fire escape on the east elevation. ¹	Thursday 14 th July 14:15 – Monday 18 th July 09:20

The sound level meters were set to log noise levels over continuous 5-minute averaging periods with a 1-second time history rate. The monitoring equipment was left unattended for the majority of the survey with the exception for a short period around the installation and collection.

The following noise indices were recorded (amongst others):

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period T. This parameter is typically considered as a good representation of the average ambient sound level;
- $L_{AFmax,T}$: The maximum A-weighted noise level during the measurement period T and the best representation of short high noise levels ‘events’ – i.e., emergency services sirens;
- $L_{A90,T}$: The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the ‘average minimum level’ and is therefore used in determining the representative background noise level – or noise levels from continuous noise sources such as plant; and
- $L_{A10,T}$: The A-weighted noise level that is exceeded for 10% of the measurement period T. This parameter is often considered as the ‘average maximum level’ and a good representation of traffic noise contributions.

Appendix B contains further information on the methodology of the survey; including the equipment used; photographs from site; and the weather conditions.

1 - Unfortunately, as all windows facing this direction were fixed/painted shut, the fire escape offered the only accessible location to place the equipment.

4.2 Results

4.2.1 P1 - East Elevation overlooking Commercial Street

A graph of the measured noise levels at position P1 is given in **Figure 4.1**, with a summary provided in **Table 4.2**.

The noise climate is typically affected by pedestrian noise given it is a busy commercial high street, with mainly pedestrian access during the day. Earlier in the day (as expanded upon below), noise is generated by delivery vans to the retail outlets, including the *BargainBuys* directly below the 1st floor site, as well as likely bin lorries/street sweepers. Shop alarms are also occasionally audible. Distant road traffic is heard from the surrounding area. There is no notable plant noise on this elevation.

Table 4.2 suggests that the night-time period of the 14th/15th is the noisiest, albeit the graph shows that on average, this was quieter than Friday and Saturday nights (with more people in the town centre than weekday nights) but is influenced by a period of high noise levels from around 05:20 until 07:00.

A similar pattern is observed on the morning of Monday the 18th, with these levels continuing (and increasing) beyond 07:00 – as evidenced by the significantly higher L_{Aeq} values (69 dB) for this period in **Table 4.2**. The surveyor observed that a shop alarm was sounding when collecting the equipment, the results suggest this may have been going off from 08:30 till around 09:05. The surveyor also observed vans for good deliveries, which would appear to explain intermittent peaks in the level before this, including most notably at 08:15 – 08:20 at 80 dB $L_{Aeq,5min}$ – likely to be a van loading/unloading and perhaps idling directly by the monitoring position / in front of the entrance to *BargainBuys* (which doesn't appear to have rear access). Other peaks could again be delivery vans or early morning bin lorries/street sweepers.

Histograms of the background sound level L_{A90} are given in **Figure 4.2**, indicating that background noise levels reach minimum values of 42 dB during the day and 36 dB at night.

Table 4.2 – Summary of measured noise levels - position P1 – east elevation overlooking Commercial Street

Period	Logarithmic Average L _{Aeq,T} (dB)	95 th Percentile L _{AFmax} (dB)	Median L _{A90} (dB)	Median L _{A10} (dB)
Daytime (07:00 – 23:00) T = 16-hours				
Thursday 14th July; 13:45 - 23:00	57	82	50	58
Friday 15th July; 07:00 - 23:00	57	80	50	58
Saturday 16th July; 07:00 - 23:00	59	79	50	58
Sunday 17th July; 07:00 - 23:00	54	78	46	55
Monday 18th July; 07:00 - 09:10	69	82	55	68
Night-time (23:00 – 07:00) T = 8-hours				
Thursday 14th July / Friday 15th July; 23:00 - 07:00	60	78	40	50
Friday 15th July / Saturday 16th July; 23:00 - 07:00	54	80	45	54
Saturday 16th July / Sunday 17th July; 23:00 - 07:00	57	79	47	57
Sunday 17th July / Monday 18th July; 23:00 - 07:00	56	76	39	48
Short measurement period of just over 2 hours which was heavily influenced by a shop alarm and delivery vehicles. Not representative of a full 16-hour daytime period				

Figure 4.1 – Graph of measured noise levels - position P1 – east elevation overlooking Commercial Street

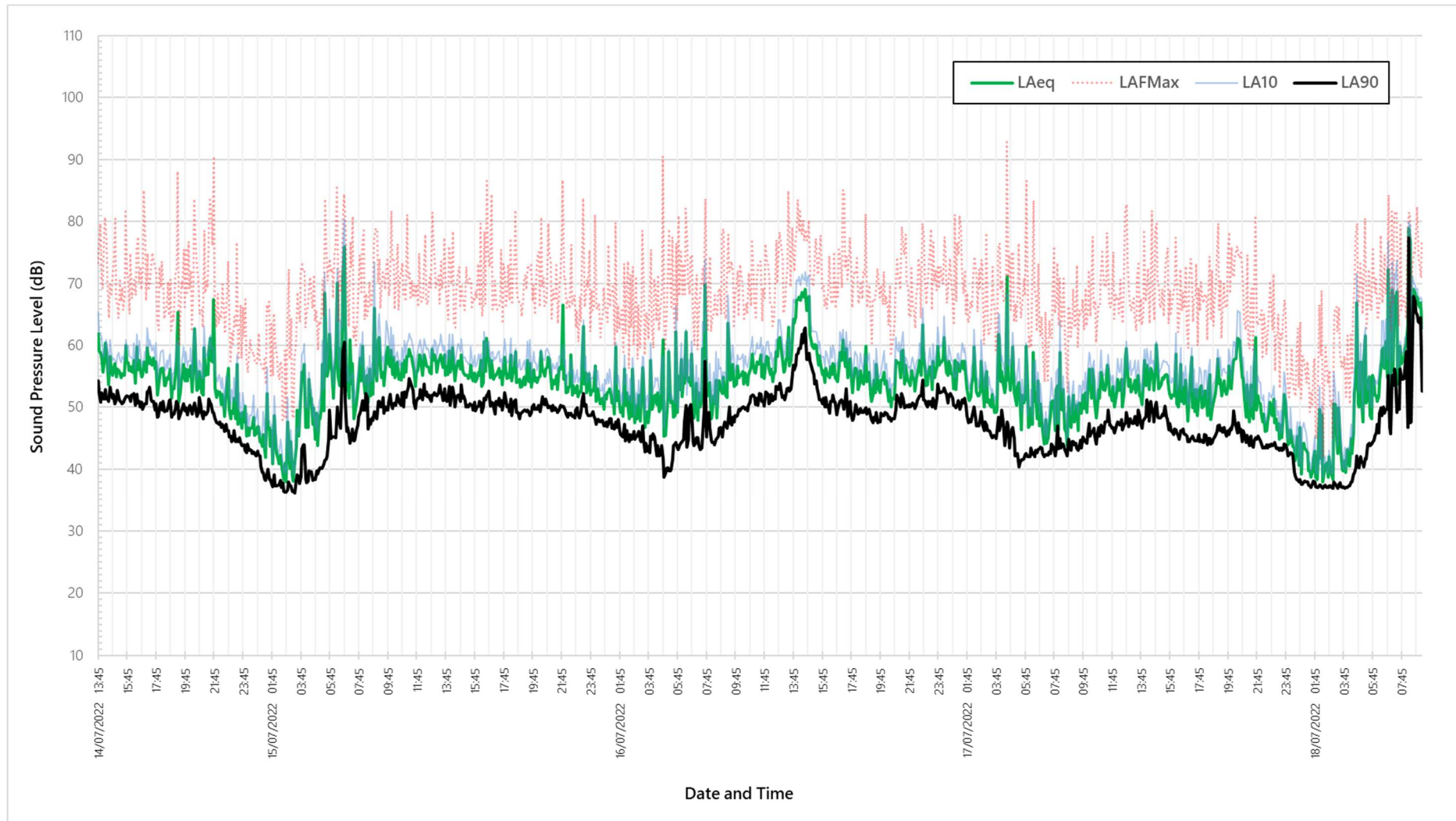
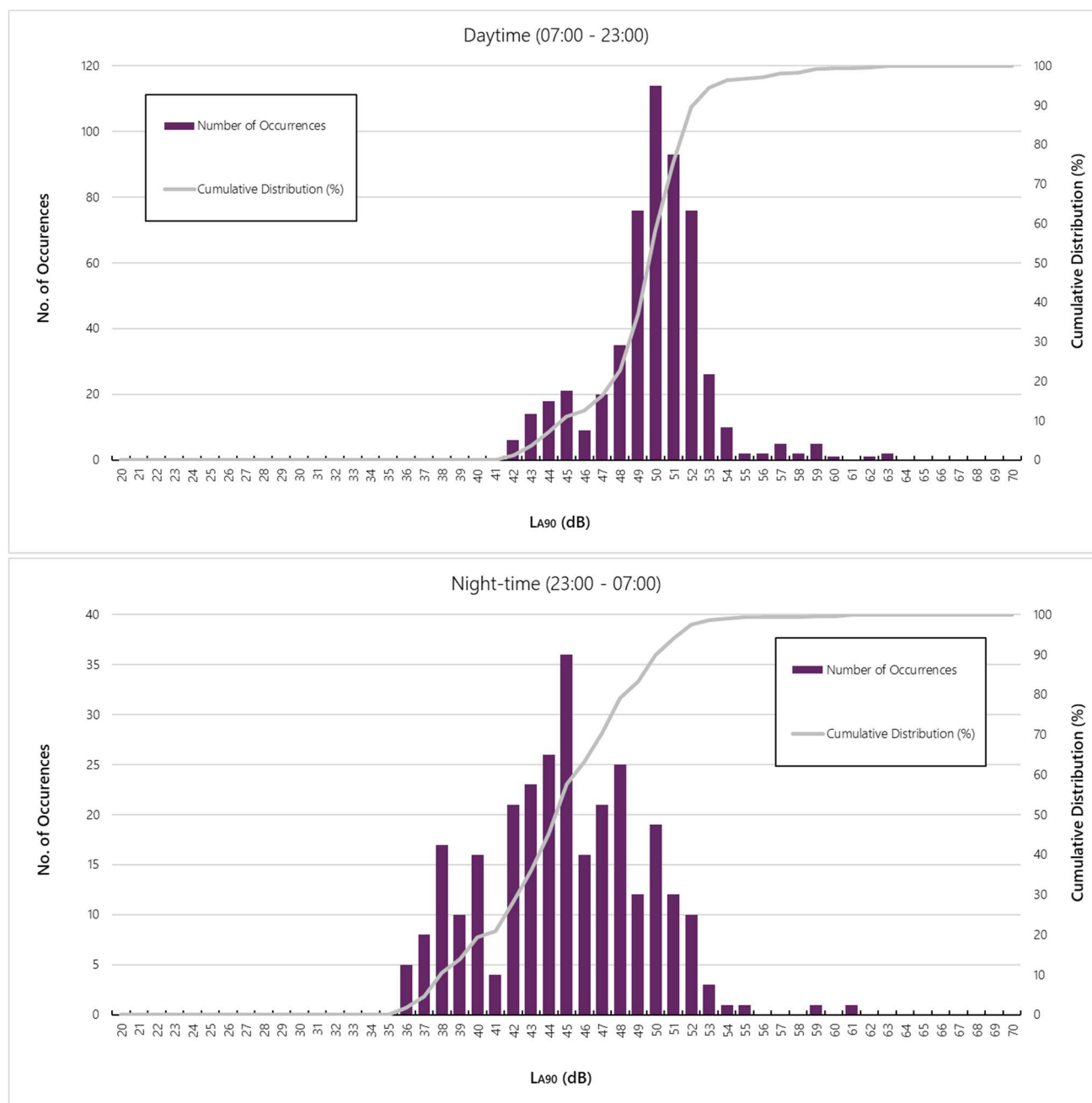


Figure 4.2 – Histograms of measured $L_{A90,5min}$ values - position P1 – east elevation overlooking Commercial Street



4.2.2 P2 – West Elevation Fire Exist

A graph of the measured noise levels at position P2 is given in **Figure 4.3**, with a summary provided in **Table 4.3**.

This position is more sheltered from noise sources in close proximity to the microphone when compared to the east elevation (i.e., there are no delivery vans, alarms, or pedestrians walking close by to the microphone). Pedestrian noise is less audible, with distant road traffic being more noticeable, albeit it is believed that night-life noise may be slightly more audible here given the *Pen and Wig* on Stow Hill – which appears to correlate with increased noise levels on Friday night. The surveyor also noticed music out of the window of a neighbouring flat though this is unlikely to have been frequent.

The surveyor did not notice any significant plant noise, which ties in with the results shown in the graph, where a more consistent and higher background noise level (L_{A90}) would be expected if the position were affected significantly by condensers or extraction flues. It is not clear whether this would also be the case for the windows on this side of the building, as these were painted shut and thus no measurements or photographs could be taken.

Average noise levels are generally relatively low, though night-time maximum levels (L_{AFmax}) are relatively high in comparison to the night-time L_{Aeq} , which is at its highest on Friday night, suggesting the peaks are caused by pedestrians/revellers at the local drinking establishments. But given the city centre location, it is also possible that pigeons/seagulls nesting on the rooftops around the position are a factor.

Histograms of the background sound level L_{A90} are given in **Figure 4.4**, indicating that background noise levels reach minimum values of 31 dB during the day and 26 dB at night, much lower than the east elevation.

Table 4.3 – Summary of measured noise levels - position P2 - west elevation fire exit

Period	Logarithmic Average L _{Aeq,T} (dB)	95 th Percentile L _{AFmax} (dB)	Median L _{A90} (dB)	Median L _{A10} (dB)
Daytime (07:00 – 23:00) T = 16-hours				
Thursday 14th July; 14:15 - 23:00	52	73	38	45
Friday 15th July; 07:00 - 23:00	52	74	37	44
Saturday 16th July; 07:00 - 23:00	53	76	37	47
Sunday 17th July; 07:00 - 23:00	54	74	36	44
Monday 18th July; 07:00 - 09:20	48	73	38	47
Night-time (23:00 – 07:00) T = 8-hours				
Thursday 14th July / Friday 15th July; 23:00 - 07:00	46	74	30	40
Friday 15th July / Saturday 16th July; 23:00 - 07:00	51	78	32	45
Saturday 16th July / Sunday 17th July; 23:00 - 07:00	47	74	33	42
Sunday 17th July / Monday 18th July; 23:00 - 07:00	47	75	31	41
Short measurement period of just over 2 hours - not representative of a full 16-hour daytime period				

Figure 4.3 – Graph of measured noise levels - position P2 - west elevation fire exit

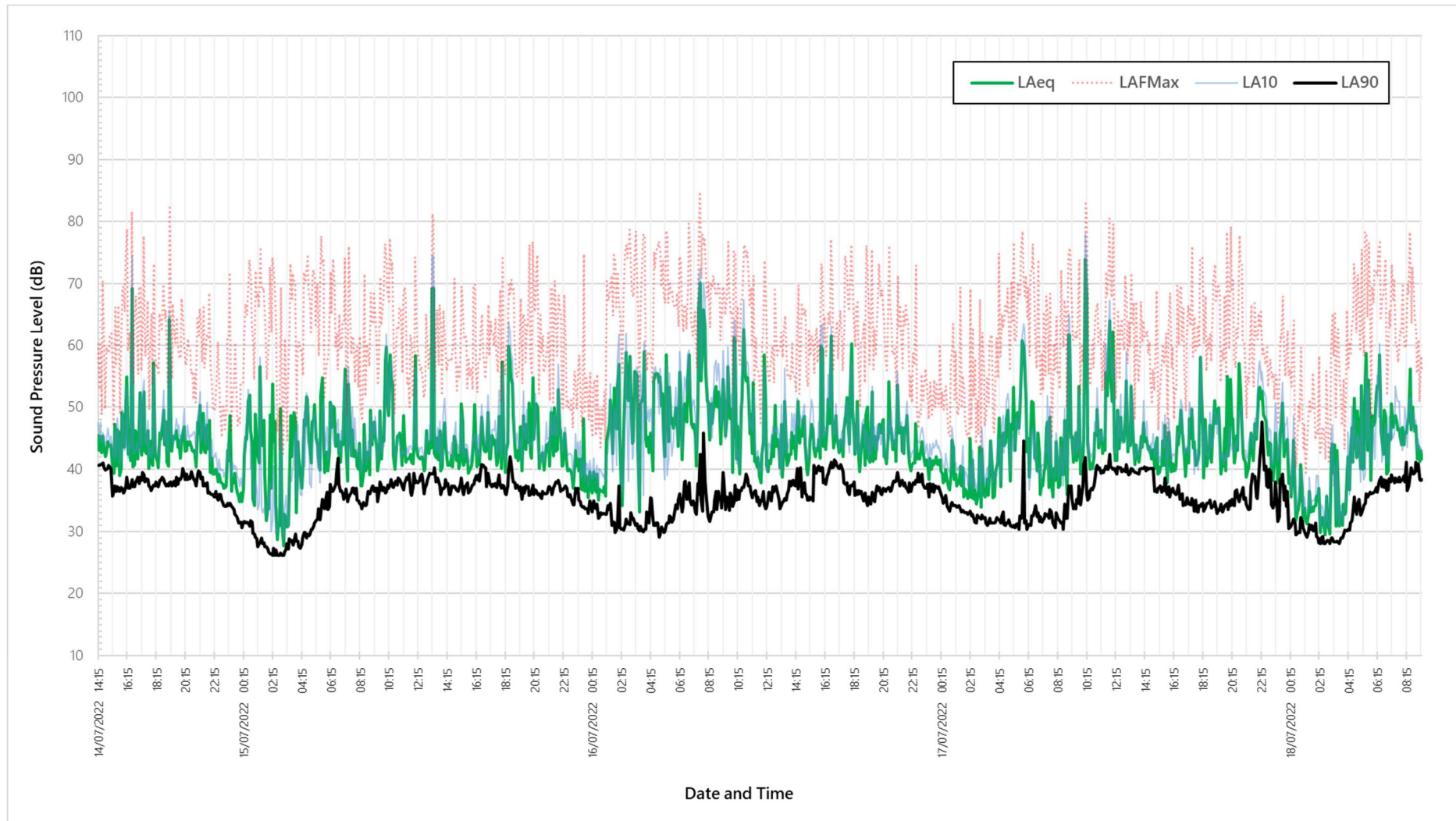
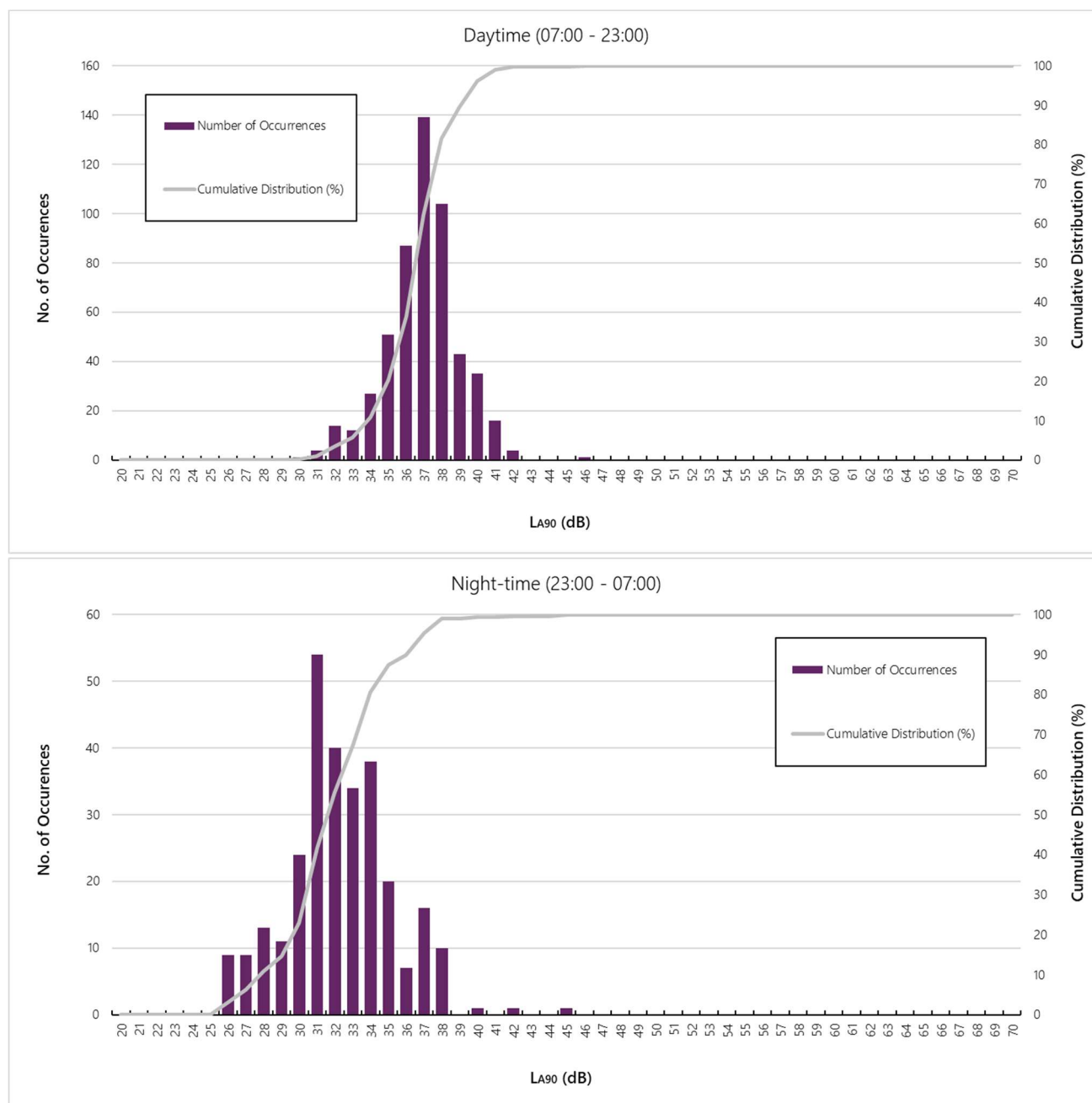


Figure 4.4 – Histograms of measured $LA_{90,5min}$ values - position P2 - west elevation fire exit



5.0 External Noise Ingress

This section details the impact the existing noise environment would have on the proposed residential dwellings in the development, including the implications this has on the ventilation strategy and the construction types required within the façade to reduce external noise ingress to an acceptable level for the future occupants.

Firstly, the existing ambient noise environment at the site is assessed with the support of an environmental noise survey (Section 4.0). Noise ingress into living spaces is then assessed against the IANL limits of the ProPG, to determine the sound reduction requirements of the building envelope and determine whether background ventilation can be provided by open windows, trickle ventilators, or mechanical ventilation (to meet IANL limits).

5.1 Internal Ambient Noise Limits

The criteria for internal ambient noise levels (IANLs) are based upon guidance from BS 8233:2014 and the ProPG. In summary, the proposed development should seek to control IANLs from external noise sources to no greater than:

- Daytime – 35 dB $L_{Aeq,16hr}$; and
- Night-time – 30 dB $L_{Aeq,8hr}$, and 45 dB L_{AFmax} (no more than 10 times per night).

The criteria apply to bedrooms, the most sensitive room type. The daytime target applies to living rooms (no night-time target is applied to living rooms). A 5 dB relaxation to the daytime target is applied to dining rooms/kitchens.

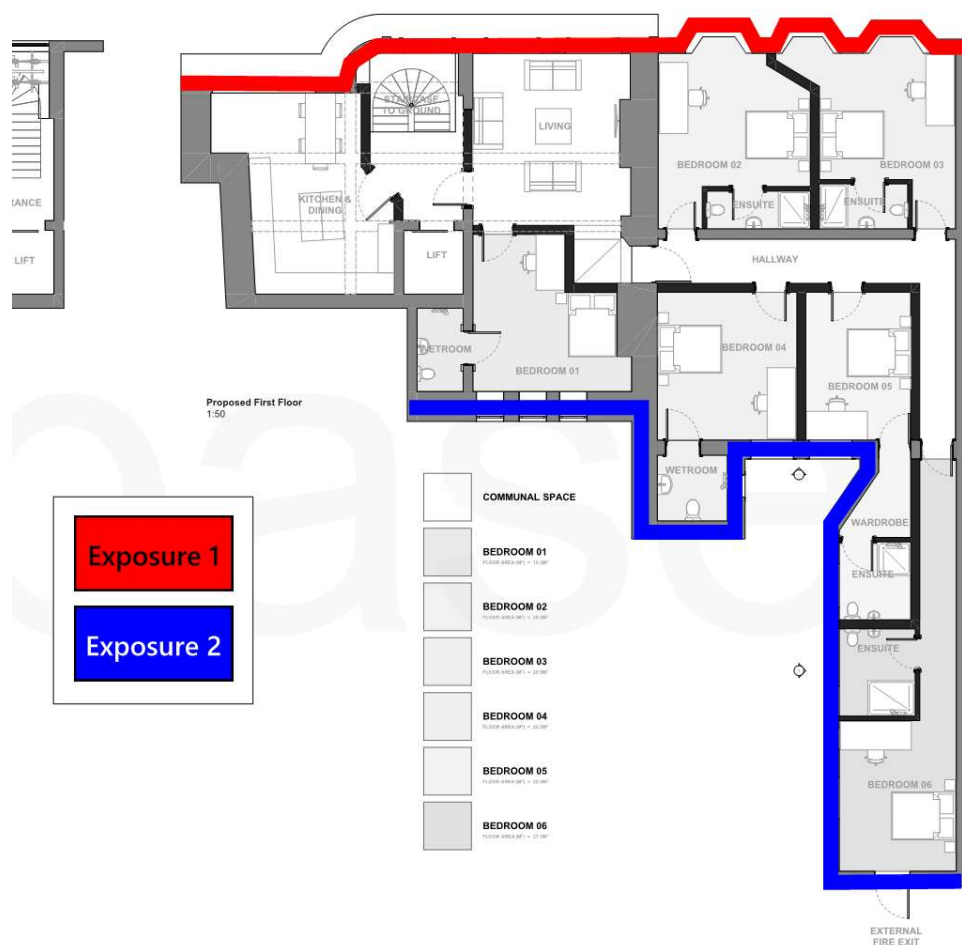
5.2 Building Envelope

To assess the required sound reduction performance for the building envelope, façade exposure levels have been defined as shown in Figure 5.1.

Table 5.1 defines the external façade noise levels for the two exposure categories in Figure 5.1.

The weakest elements of a façade in terms of sound reduction are the windows/glazing. This is particularly true when windows are open (as an open window will typically provide around 15 dB reduction). Alternative forms of natural background ventilation (such as trickle vents) are also a weak point but can be treated to achieve a much higher level of sound reduction than an open window – so that IANL targets *can* be met with natural ventilation in areas where the targets would be exceeded when opening the windows. Alternatively, mechanical ventilation could be implemented where trickle vents are unlikely to provide sufficient cooling to prevent overheating which then effectively forces the occupants to open the windows to achieve thermal comfort, at the expense of noise ingress.

Figure 5.1 – Façade Exposure Levels



It is seen that IANLs will not be met with open windows – though this is not unusual by any means in a central urban location. It should also not be assumed that windows have to be sealed shut, as many occupants will favour the ability to open their windows at will during the hotter months of the year. What it does mean, is that an alternative form of background ventilation should be provided so that IANL targets can be met whilst providing background ventilation to the dwellings with the windows closed (but openable at the occupants' discretion, rather than through necessity).

Therefore, **Table 5.1** also provides the minimum sound reduction indices for glazing and ventilators (the weakest elements acoustically) on each exposure category – to meet IANL targets with windows closed but alternative ventilators open/ventilation system operating to provide background ventilation.

The assessment has been based upon a simplified calculation method where only the weakest elements are considered (glazing and ventilators), as the sound reduction provided by the masonry external wall would inherently be considerably higher. The calculation method effectively treats the whole façade as being glazed – this means that a slightly higher and thus more-robust sound reduction index is determined for glazing/trickle ventilators given that a full composite noise ingress calculation in accordance with BS 12354 would include for the high level of external wall performance, and thus require a lesser rating from the glazing to achieve the same overall composite sound reduction index. Hence this approach is seen to be a worst-case approach which results in a better end result for the future occupants.

The main driver behind the minimum sound reduction indices is the night-time L_{AFmax} levels. For example, on Exposure 1, the difference between the upper range of L_{AFmax} (80 dB) and the internal target (45 dB) is 35 dB, whereas the difference between the two for daytime L_{Aeq} is 24 dB, and night-time L_{Aeq} is 30 dB.

This difference is even greater on Exposure 2. As alluded to earlier, it was not possible to open or see through windows on the rear elevation, hence whilst no noticeable plant was detected at the fire escape monitoring position, this does not rule out that there may be other plant around/opposite the windows. However, the specification (of 33 dB $R_w + C_{tr}$) is likely to provide adequate protection should there be plant in close proximity, to reduce plant noise levels to an imperceptible level inside the dwelling.

A non-exhaustive list of example glazing constructions and ventilator products such as trickle vents and air bricks have been provided in **Appendix C**, which are capable of achieving the required $R_w + C_{tr}$ and $D_{n,e,w} + C_{tr}$ indices.

Table 5.1 – Minimum sound reduction requirements of the building envelope

Elevation	External Noise Level @ 1m outside of a window			Minimum sound reduction indices/construction examples	
	Daytime average (07:00 – 23:00) dB $L_{Aeq,16hr}$	Night-time average (23:00 – 07:00) dB $L_{Aeq,8hr}$	Night-time maximum ¹ (23:00 – 07:00) dB L_{AFmax}	Glazing ² See Appendix C.1	Ventilators ³ see Appendix C.2
Exposure 1	57 – 59*	54 – 60	76 – 80	35 dB $R_w + C_{tr}$ Acoustic glass double glazing, i.e. - 10mm standard float - 6mm air cavity - 8.8mm acoustic laminated	38 dB $D_{n,e,w} + C_{tr}$ i.e., Duco DucoMax Alto 25
Exposure 2	52 – 54	46 – 51	74 – 78	33 dB $R_w + C_{tr}$ Thick standard glass double glazing, i.e. - 10mm standard float - 6mm air cavity - 4mm standard floor	36 dB $D_{n,e,w} + C_{tr}$ i.e., Duco DucoMax Corto 15
Criteria ⁴	<35	<30	<45	-	-

* Value may be higher on the last day of the survey.

1. 95th percentile value per night.
2. A non-exhaustive list of suitable glazing products is given in **Appendix C.1**. Standard double glazing will usually achieve a minimum sound reduction of 26 dB $R_w + C_{tr}$.
3. A non-exhaustive list of suitable ventilator products is given in **Appendix C.2**. The acoustic performance should meet these values when the vent is open. They may not be required if the development uses mechanical ventilation. Low-performance trickle vents will usually achieve a minimum sound reduction of 25 dB $D_{n,e,w} + C_{tr}$.
4. Based on the criteria for bedrooms (the most noise-sensitive room type).

5.3 Summary

In summary, PJA believes that the noise impact on future occupants at the proposed development can be controlled to an acceptable level and that this aspect of the noise assessment should not pose a constraint to achieving planning permission for the proposed development, providing the recommendations herein are followed.

Internal ambient noise level (IANL) targets can be met with closed windows and glazing with a moderate-to-high level of acoustic performance. This does not mean that windows should be sealed shut – but does mean that an alternative ventilation system should be used which can meet IANL targets whilst providing adequate background ventilation. Glazing and ventilators (unless mechanically ventilated) must meet the minimum sound reduction indices in **Table 5.1 / Figure 5.1** of **Section 5.2**.

6.0 Internal Sound Insulation

6.1 Floors

6.1.1 Design Criteria

The absolute minimum level of airborne sound insulation required across the intermediate floors should be in accordance with Approved Document E of the Building Regulations, that is, a weighted sound level difference of 43 dB $D_{nT,w} + C_{tr}$.

However, this minimum target is based on the level of sound insulation required between two dwellings. As discussed in **Section 3.6** a higher level of sound reduction should be achieved based upon the fact that non-residential spaces are typically consistently noisier than a residential property and therefore greater protection is required against sound from a neighbouring commercial unit than from a neighbouring resident.

Therefore, PJA recommends that the intermediate floors between the dwellings and the uses both below and above should be able to achieve a weighted on-site sound level difference of at least 53 dB $D_{nT,w} + C_{tr}$, 10 dB above the minimum requirements of Approved Document E of the Building Regulations.

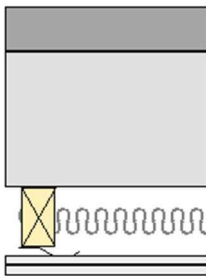
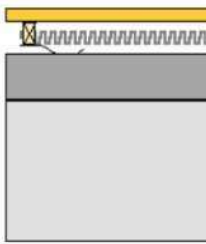
6.1.2 Construction

At this stage, PJA has no information on the likely construction of the intermediate floor. Based on the age of the building and the thick masonry walls, it is thought likely that the floor would be of a concrete base construction, likely at least 200mm thick. The shops below appear to have a lay-in grid ceiling tile system.

Some example constructions have also been provided in **Table 6.1**, that are capable of meeting the 53 dB target. Hence the suggestion is that:

- the floor to the dwellings may need upgrading (depending on the base floor construction/depth) using a cradle and batten floating timber floor;
- a plasterboard MF ceiling to the dwellings may be required (again depending on the base floor construction/depth).

Table 6.1 – Floor constructions capable of achieving at least 53 dB $D_{nT,w} + C_{tr}$

Description	
	Concrete Plank (200mm), Screed and Insulated MF Ceiling • 65mm screed ($\geq 80 \text{ kg/m}^2$) • 200mm hollowcore plank or RC structural floor ($\geq 305 \text{ kg/m}^2$) • 100mm deep suspended MF ceiling with one layer of 15mm Gyproc Soundbloc suspended and 50mm mineral wool insulation ($10 - 60 \text{ kg/m}^3$).
	Concrete Plank (200mm), Screed and Resilient Timber Batten Floating Floor • 18mm tongue and groove floorboards • $\geq 45\text{mm}$ depth batten and resilient/acoustic cradle system with $\geq 25\text{mm}$ mineral wool insulation ($10 - 60 \text{ kg/m}^3$) • 65mm screed ($\geq 80 \text{ kg/m}^2$) • 200mm hollowcore plank or RC structural floor ($\geq 305 \text{ kg/m}^2$)

6.2 Walls

6.2.1 Design Criteria

As per **Section 6.1.1**, the absolute minimum level of airborne sound insulation required across party walls should be in accordance with Approved Document E of the Building Regulations, that is, a weighted sound level difference of 43 dB $D_{nT,w} + C_{tr}$.

This applies to the new party walls between bedrooms (if treated as an HMO), and the party wall to the adjacent parts of the building, unless these are occupied by non-residential, in which case a higher level of performance may be required, i.e., 53 dB $D_{nT,w} + C_{tr}$.

6.2.2 Constructions

Whilst on site (and also from observations off the floor plan), the walls which are to remain all appear to be of thick masonry construction, i.e., between 430mm and 840mm thick to neighbouring properties, and between 740mm and 1,080mm thick internally (room 02 to room 03 on the existing floor plans).

These thick masonry walls are expected to provide a level of performance comfortably in excess of the design criteria.

New walls should be installed that ideally follow the construction types outlined in either Part E or the Robust Details Scheme, or if not, shall be constructions which have been well tested and found to meet the required standard.

7.0 Plant Noise Emissions

The assessment of the noise impact on nearby residential noise-sensitive receptors (NSRs) concerning the operational noise produced by the proposed development should be undertaken in accordance with BS 4142:2014.

At the time of writing, no mechanical plant has been shown on drawings – it is not known whether this will change, hence this section has been included in case plant is to be installed.

The assessment at this stage is based upon setting a rating level $L_{A,r,T,r}$ for noise emissions from plant based upon the existing background noise level, $L_{A90,T,r}$. The rating level is the specific noise level L_s plus the addition of any ‘penalties’ which account for the characteristic features of the sound which may attract attention to it, such as tonality, impulsivity, intermittency, and any other sound characteristics that “are readily distinctive against the residual acoustic environment”.

The operational hours of the proposed plant are currently unknown, therefore, plant limits for day and night-time have been set.

It will then be the responsibility of the developer and design team involved with the mechanical plant design to ensure that the proposed rating levels are not exceeded.

7.1 Background Sound Levels

In accordance with BS 4142:2014, the predicted rating level should be assessed against a ‘representative’ background sound level.

For a worst-case assessment, the minimum values of the background sound level $L_{A90,5mins}$ of the survey have been set as the representative background sound level - see **Table 7.1**.

Table 7.1 – Derived representative background sound level $L_{A90,T}$ at nearby residential NSRs

Noise-Sensitive Receptor (NSR)	Time Period	Representative Background Sound Level $L_{A90,T}$ (dB)
All nearby residential properties	Daytime (07:00 to 23:00)	31
	Night-time (23:00 – 07:00)	26

7.2 Maximum Rating Levels

In accordance with BS 4142:2014, the predicted rating level should be assessed against a 'representative' background sound level.

BS 4142:2014 states in general that "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."

PJA recognises that a rating level limit is often subject to a planning condition. PJA believe from reviewing other planning applications nearby, that this condition would likely be similar to the following: *"Plant and Equipment Noise emitted from plant and equipment located at the site shall be controlled such that the rating level, calculated in accordance with BS4142 2014, does not exceed a level of 5dB below the existing background level, with no tonal element to the plant."*

Therefore, PJA proposes the rating level limits given in the table below.

Table 7.2 – Maximum rating level $L_{A,r,Tr}$ for all nearby residential NSRs

Noise-Sensitive Receptor (NSR)	Time Period	Maximum Rating Level $L_{A,r,Tr}$ at 1m from the outside of the nearest residential window (dB)
1m outside the façade of all nearby residential properties	Daytime (07:00 to 23:00)	26
	Night-time (23:00 – 07:00)	21

7.3 Site Suitability

At this stage, the plant design has not been fully developed. If any new plant is to be installed, it is anticipated that the rating level limits can be achieved with practical and common solutions.

MVHR systems are likely to require an in-duct silencer (noise attenuator) which is around 600 – 1200mm in length on the atmospheric side. This is not an unusual requirement as such measures are included in the large majority of ventilation systems. Noise from small extract fans, i.e., toilet extract fans, are likely to be relatively quiet without requiring mitigation.

Small domestic ASHP units (which are less than 1.2m tall) from Mitsubishi, Panasonic, and Daikin typically have a breakout sound pressure level of around 50 – 60 dB @ 1m in front of the fan outlet. Larger units (around 1.6 – 2m tall) can be much louder at around 75 dB @ 1m above the unit (as the fan outlet is usually at the top on larger units). Hence from a noise perspective, it is better to have several small units rather than a single large unit. These are not considered to be unusual or onerous requirements.

PJA recognise that this aspect is likely to be conditioned with the requirement for a further assessment to demonstrate that the noise limits will be achieved once the project reaches the technical design stage.

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
Airborne sound	Airborne sound is sound that is transmitted through the air. Airborne sound can be transmitted through elements, by causing the element to vibrate (imperceptible to the eye), in turn transmitting vibrations into the air on the other side. Most noise in a typical acoustic assessment is 'airborne' sound and is generated by sources such as speech, music and transport.
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
C_{tr}	A weighting curve applied to level differences to account for low-frequency noise, typically associated with traffic noise. This is often applied as an addition to $D_{nT,w}$ and R_w ratings used to describe levels of sound insulation.
$D_w / D_{nT,w}$	The D_w weighted level difference used to characterize the sound insulation between rooms in a building as they are. Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. A $D_{nT,w}$ is a D_w which is then 'normalised' to account for the reverberation time of the room (the 'nT'), recognising that the level difference is dependent on how reverberant the receiver room is and that every room will have a slightly different reverberation time, hence the $D_{nT,w}$ is adjusted to reference conditions.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, when considering a separating wall, as well as transmitting directly through the wall, sound can also travel around the wall by the floor, ceiling, corridor wall, and external wall.
Frequency	Sound is generally assessed over the frequency range of 63 Hz to 4000 Hz (4 kHz), although humans can potentially hear between 20 Hz and 20 kHz. Frequency is often divided into ('first') octave bands for analysis, with the range above considered within 7-octave bands with centre frequencies at 63 Hz, 125 Hz, 250 Hz, 1 kHz, 2 kHz and 4 kHz. 'Third' octave bands split this further into smaller frequency bands.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A).
$L_{A90,T}$	The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level'.
$L_{A10,T}$	The A-weighted noise level that is exceeded for 10% of the measurement period T. This parameter is often considered as the 'average maximum level' and a good representation of traffic noise contributions.
$L_{AFmax,T}$	The maximum A-weighted noise level during the measurement period T.
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.
Sound insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to stop sound travelling through it.
Structure-borne sound	Transmission of sound energy as vibrations inside the structure of a building. Can be used an alternative term to impact sound, however, structure-borne will usually refer to noise transmitted into a structure from mechanical sources, rather than human sources.

A.2 – Subjective Changes in Sound Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	1/2	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B – Noise Survey Details

B.1 – Survey Equipment

The monitoring equipment used for the baseline noise survey is detailed in the table below. The sound level meter was calibrated before and after the survey, with no significant drifts of greater than 0.5 dB observed. The sound level meter has been calibrated to a traceable standard within the 24 months preceding the survey, and the calibrators have been calibrated to a traceable standard within the 12 months preceding the survey. The equipment complies with the standards of as BS EN 60942:2003 Class 1 device.

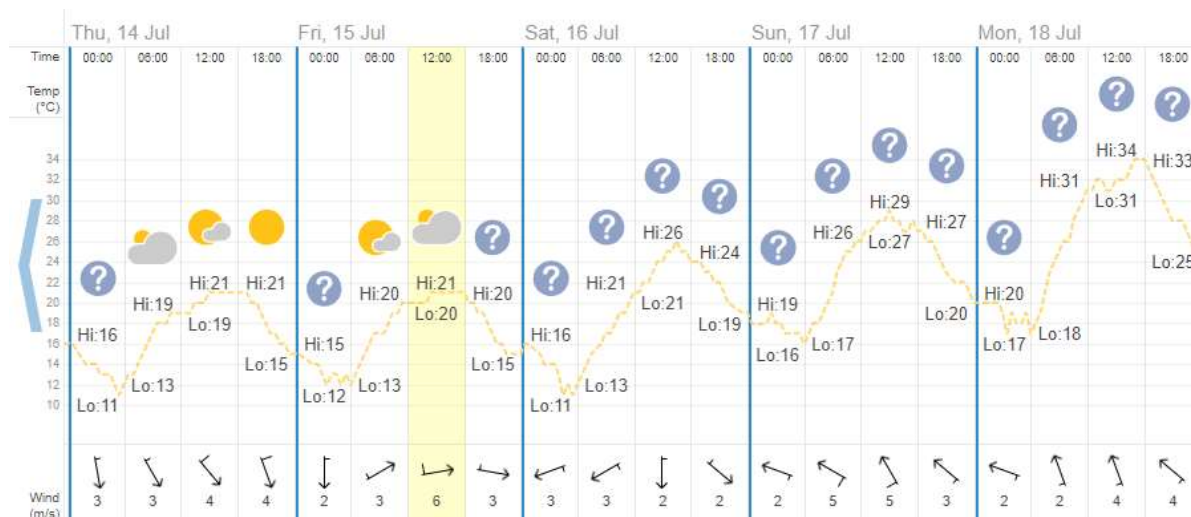
Table B.1 – Equipment used for the noise survey

Name	Serial Number	Last Calibrated	Calibration Due
SVAN 949 Class 1 Sound Level Meter	9720	Nov-21	Nov-23
SV22 Class 1 Microphone	4012386	Nov-21	Nov-23
SVAN 949 Class 1 Sound Level Meter	9719	Nov-21	Nov-23
SV22 Class 1 Microphone	4011862	Nov-21	Nov-23
Cirrus CRL511E Class 1 Acoustic Calibrator	035235	Nov-21	Nov-22

B.2 – Meteorological Conditions

During the survey, weather conditions were warm and dry with wind speeds to a maximum of 6 ms⁻¹, averaging around 2 – 4 ms⁻¹. The microphone was fitted with a weather protection kit/windshield. These weather conditions are suitable for the measurement of environmental noise in accordance with BS 7445 'Description and Measurement of Environmental Noise'. The weather data below has been sourced from <https://www.timeanddate.com/weather/uk/newport/historic?month=7&year=2022>.

Figure B.1 – Meteorological conditions during the survey

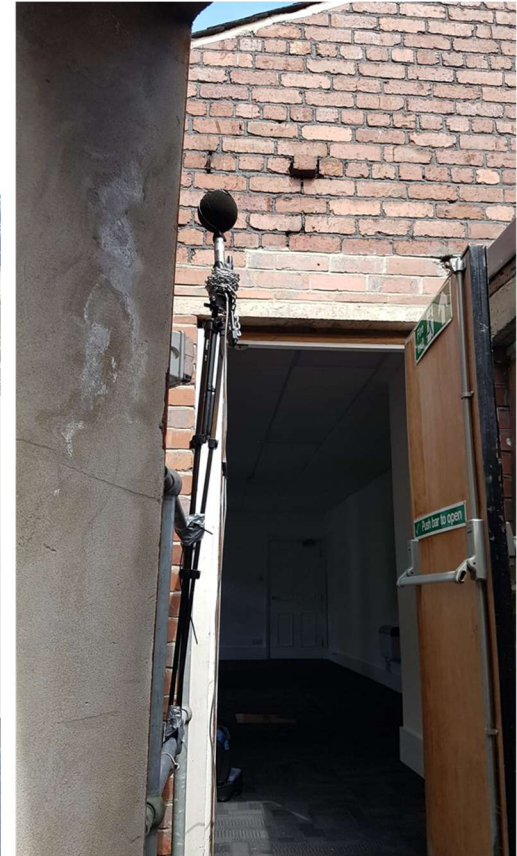


B.3 – Photographs

Figure B.2 – Photographs of position P1 and the shops opposite



Figure B.3 – Photographs of position P2



Appendix C – Example Façade Constructions

C.1 - Glazing

Table C.1 – Example secondary glazing constructions (retaining existing glazing) and associated sound reduction indices

Glazing Type	Configuration (Glass/Void/Glass mm)	$R_w + C_{tr}$ (dB)
Double (secondary)	4 (50) 6	34
	4 (100) 6	37
	6 (100) 6	37
	10 (100) 6	39
	4 (150) 6	40
	4 (100) 6.8 laminated/toughened ¹	40
	4 (100) 8.8 laminated/toughened ¹	42
	6 (100) 6.8 laminated/toughened ¹	43
	4 (100) 12.8 laminated/toughened ¹	44
	6 (100) 8.8 laminated/toughened ¹	45
	6 (100) 12.8 laminated/toughened ¹	47
1 – i.e., Pilkington Optiphon or Saint Gobain Stadip Silence		
Suitable for:	Exposure 1	Exposure 2

Table C.2 – Example new double/triple glazing constructions and associated sound reduction indices

Single / Double / Triple	Configuration	Manufacturer	R _w + C _{tr} (dB)
Double	4 (12) 6	Saint Gobain	29
Double	5 (12) 4	Saint Gobain	29
Double	4 (16) 8	Saint Gobain	30
Double	4 (12) 6.8P	Pilkington	30
Double	4 (10) 10	Saint Gobain	31
Double	6 (25) 4	Saint Gobain	31
Double	8 (18) 6	Saint Gobain	32
Double	8.8L (12) 8.8P	Pilkington	32
Double	4 (6) 10	Saint Gobain	33
Triple	4 (12) 4 (12) 8.4S	Saint Gobain	33
Double	4 (16) 8.8P	Pilkington	33
Double	10 (15) 6	Saint Gobain	34
Double	8 (6) 8.8S	Saint Gobain	34
Double	6 (16) 8.8P	Pilkington	34
Double	10 (6) 8.8S	Saint Gobain	35
Double	6 (24) 10	Saint Gobain	35
Double	6 (12) 9.5A	Saint Gobain	35
Triple	8 (12) 4 (12) 8.8P	Pilkington	35
Double	8 (12) 8.8A	Saint Gobain	36
Double	10 (12) 8.8A	Saint Gobain	37
Double	8.4A (16) 10.4A	Saint Gobain	38
Double	8.8P (16) 12.8P	Pilkington	39
Double	10 (16) 12.4A	Saint Gobain	40
Double	12.8A (15) 12.8A	Saint Gobain	41
Double	9.1P (20) 13.1P	Pilkington	42
Double	9.1P (20) 17.1P	Pilkington	43
Double	16.8A (15) 16.8A	Saint Gobain	44
Double	9.1P (20Arg) 17.1P	Pilkington	44
NOTATION A = Stadip Silence S = Stadip P = Optiphon L = Optilam Arg = Argon Cavity			
Further data at https://techhub.uk.saint-gobain-building-glass.com/acousticcalculator			
Suitable for:	Exposure 1	Exposure 2	

C.2 - Ventilators

For each additional ventilator, the required $D_{n,e,w} + C_{tr}$ should be increased by $10\log(n)$, where 'n' is the number of ventilators. The $D_{n,e,w} + C_{tr}$ must be assessed in the **open position**.

Table C.3 – Example ventilator products and associated sound reduction indices

Product	$D_{n,e,w} + C_{tr}$ (dB)
Duco DucoTop 60 SR (over window frame) – Corto STD	25
Duco DucoTop 60 SR (over window frame) – Corto AK	26
Duco DucoTop 60 SR (over window frame) – Grando STD	27
Duco DucoTop 60 SR (over window frame) – Corto AK+	28
Duco DucoTop 60 SR (over window frame) – Alto AK	30
Duco DucoTop 60 SR (over window frame) – Basso AK+	30
Titon Invent	30
Duco DucoTop 60 SR (over window frame) – Grando AK	31
Titon Hit & Miss HM5050	31
Duco DucoTop 60 SR (over window frame) – Medio AK+	32
Duco DucoStrip Slimline	32
Duco GlasMax – Air slot 20mm	32
Rytens R2700 Window trickle ventilator (412mm wide)	33
Titon SF 3300 EA Vent	33
Greenwood Slotvent 3000S	33
Duco GlasMax – Air slot 10mm	34
Greenwood 2000D	35
Duco DucoTop 60 SR (over window frame) – Largo AK+	35
Duco DucoMax Corto 15	36
Duco DucoTop 60 SR (over window frame) – Grando AK+	37
Duco DucoMax Medio 25	37
Duco DucoMax Alto 25	38
Titon SF Xtra Sound Attenuator	39
Willan Fresh 100dB	40
Greenwood Airvac Acoustic Air Brick AAB-4000	40
Duco DucoMax Corto 10	41
Duco DucoMax Medio 15	42
Greenwood EHA574	42
Duco DucoMax Alto 15	43
Duco DucoMax Alto 10	45
Suitable for:	Exposure 1 Exposure 2



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