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Environmental Noise Impact Assessment Report for Planning

73, 74 & 74A Broad Street, Reading, Berkshire, RG1 2AP

Report Reference 21063.ENIA-RPT.01. Rev A

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1 INTRODUCTION

ES Acoustics Ltd have been instructed by Broadstreet to prepare a noise impact assessment for the proposed development at 73, 74 & 74A Broad Street, Reading, Berkshire, RG1 2AP.

This report is prepared to support a full planning application for the conversion of the existing second floor at the above address to accommodate 3 x 1-bedroom and 1 x 2-bedroom residential units.

This assessment aligns with the principles of government planning policy on noise, as outlined in the National Planning Policy Framework (NPPF), the National Planning Practice Guidance (NPPG) on Noise, and the Noise Policy Statement for England (NPSE), and follows the recommended approach for the assessment of noise outlined in ProPG: Planning & Noise Professional Practice Guidance (2017).

The structure of this report is as follows:

- Site context and background information, including the location of the application site and details of the proposal.
- A summary of the National and Local Planning Policy, British Standards and Good Practice Guidance relevant to the proposal, which have informed this assessment.
- Details of the environmental noise surveys undertaken on site to determine current ambient and background sound levels.
- The ProPG Stage 1 initial site risk assessment.
- The ProPG Stage 2 Acoustic Design Statement, including:
    - Element 1 – demonstrating a “Good Acoustic Design Process”;
    - Element 2 – observing internal “Noise Level Guidelines” and providing mitigation measures as required;
    - Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
    - Element 4 – consideration of “Other Relevant Issues”.
- An assessment of other relevant noise considerations for the scheme, including:
    - An assessment of noise transfer between the existing ground and first floor commercial restaurant and the proposed second floor residential, to ensure that sufficient resistance to the passage of sound is provided.

2 SITE CONTEXT AND DEVELOPMENT PROPOSAL

2.1 Site Description

The application site is located in Reading town centre on the corner of Broad Street and West Street. The site is located in an area of mixed use and mixed character, comprised of predominantly commercial and residential uses, and is bounded by the pedestrianised Broad Street to the south, West Street to the west, and mixed commercial and residential properties to the east and north. The site boundary is outlined in the figure below:

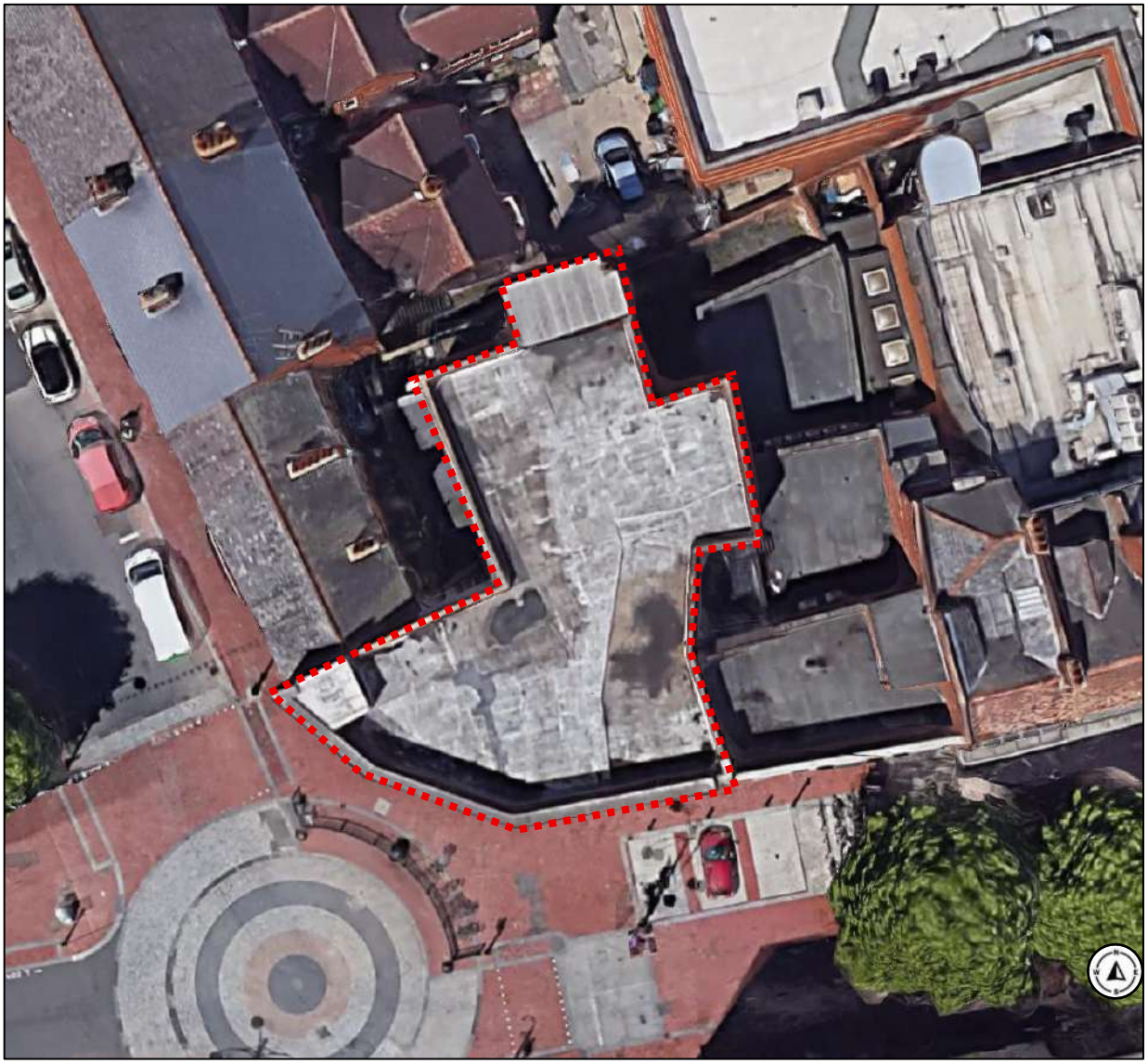


Figure 1 Proposed development site (Image Reference: Google Earth)

2.2 Proposal

Planning permission is sought for the conversion of the existing second floor at the above address to accommodate 3 x 1-bedroom and 1 x 2-bedroom residential units, above an existing KFC commercial restaurant at ground and first floor level within the same building.

The proposed second floor plan is presented on the following page for context when reading this report.

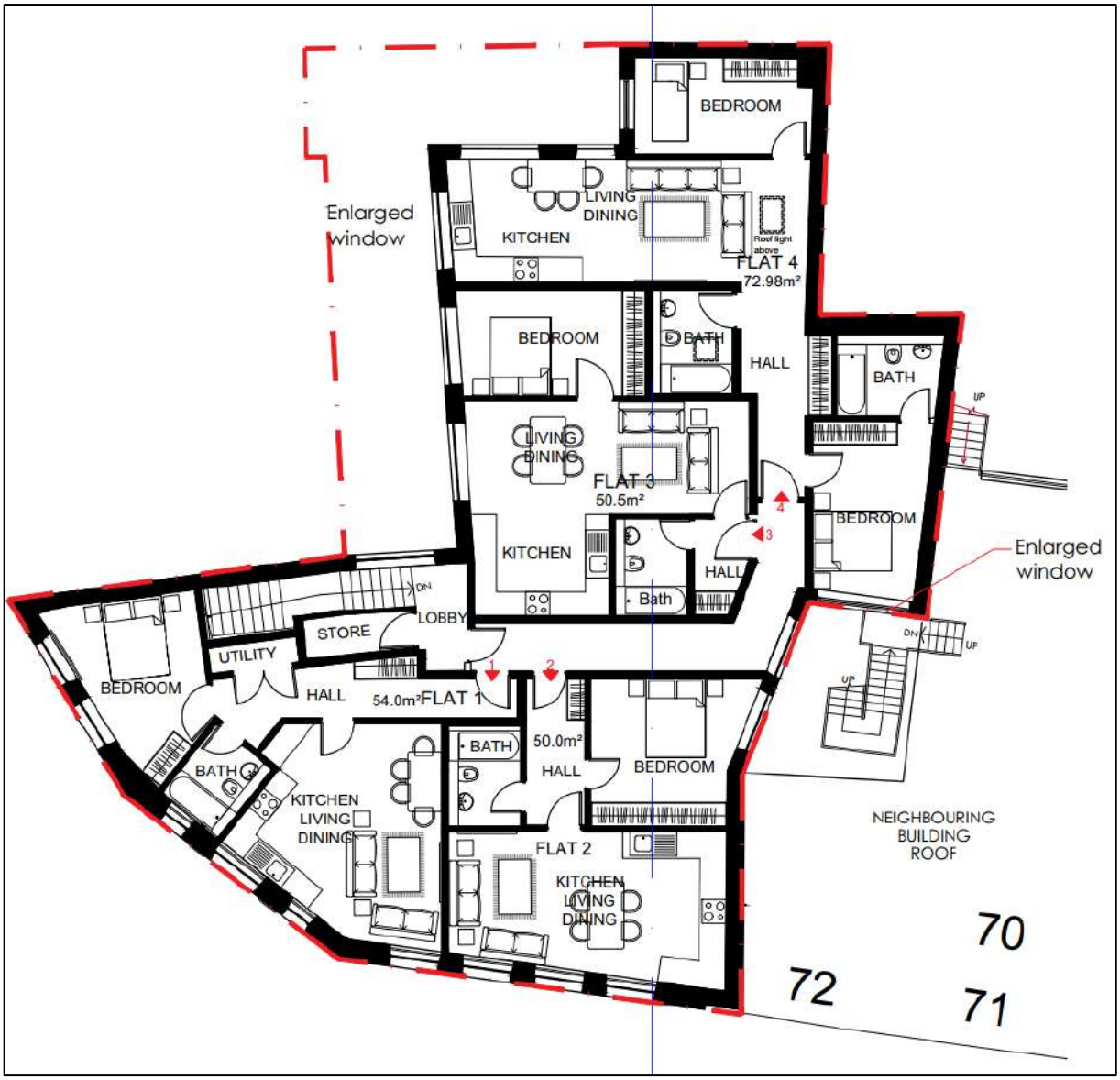


Figure 2 Proposed second floor plan (Image Reference: PR Architecture Ltd)

2.3 Identified Noise Considerations

To the front of the site, the existing noise profile of the area is primarily influenced by pedestrian noise from Broad Street and road traffic noise from the roundabout at the intersection of West Street, Oxford Road and St Mary's Butts. It was observed whilst on site that the adjacent roads and roundabout were a frequent route used by buses serving Reading town centre.

At the rear of the site, the existing noise profile is primarily influenced by noise associated with surrounding commercial premises, specifically external plant installations associated with the commercial restaurant at ground and first floor level of the site building and the rear of the commercial premises to the north-west, north and east.

It was noted that an extraction flue serving the existing KFC restaurant at ground and first floor was installed to the rear of the site, attached to and running vertically up the northern façade of the development building and terminating at roof level.

It is understood that all surrounding noise sources and commercial premises would remain unchanged as the proposal is brought forward. Environmental noise surveys and manual noise measurements will therefore be undertaken to ensure the worst-case levels of all existing noise sources, including the operation of the surrounding commercial premises and installed plant units, are captured.

3 PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE

3.1 Summary

The following planning policy and good practice guidance documents have been reviewed and considered when preparing this report:

- National Planning Policy
  - National Planning Policy Framework (NPPF)
  - Noise Policy Statement for England (NPSE)
  - National Planning Practice Guidance (NPPG)
- Other Acoustic Guidance
  - World Health Organisation Guidelines for Community Noise (1999)
  - WHO Environmental Noise Guidelines for European Region (2018)
  - BS 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'
  - ProPG: Professional Practice Guidance on planning and noise: New Residential Development
  - Possible Options for the Identification of SOAELs and LOAELs in Support of the NPSE (2014)

A summary of the documents reviewed is provided in Appendix B.

3.2 Report Methodology

A hybrid methodology would be used to address all aspects of the scheme, as follows:

1. ProPG Stage 1 (Risk Assessment) - To frame the overall noise risk from transportation and environmental sources.
2. ProPG Stage 2 (Acoustic Assessment) - To structure the narrative, façade strategy, ventilation assessment, and design outcomes. Specific internal noise criteria would be selected using BS 8233 based on each specific planning class use.
3. Assessment of sound insulation requirements – Based on the existing use of the ground floor and first floor as a commercial restaurant, it must be ensured that sufficient resistance to the passage of sound is provided through the separating floor. Relevant British Standards, research papers and publicly available guidance would be used as the basis for this assessment.

4 ENVIRONMENTAL NOISE SURVEY

4.1 Measurement Location and Procedure

Noise surveys were undertaken on the proposed site, as shown in the figure below:

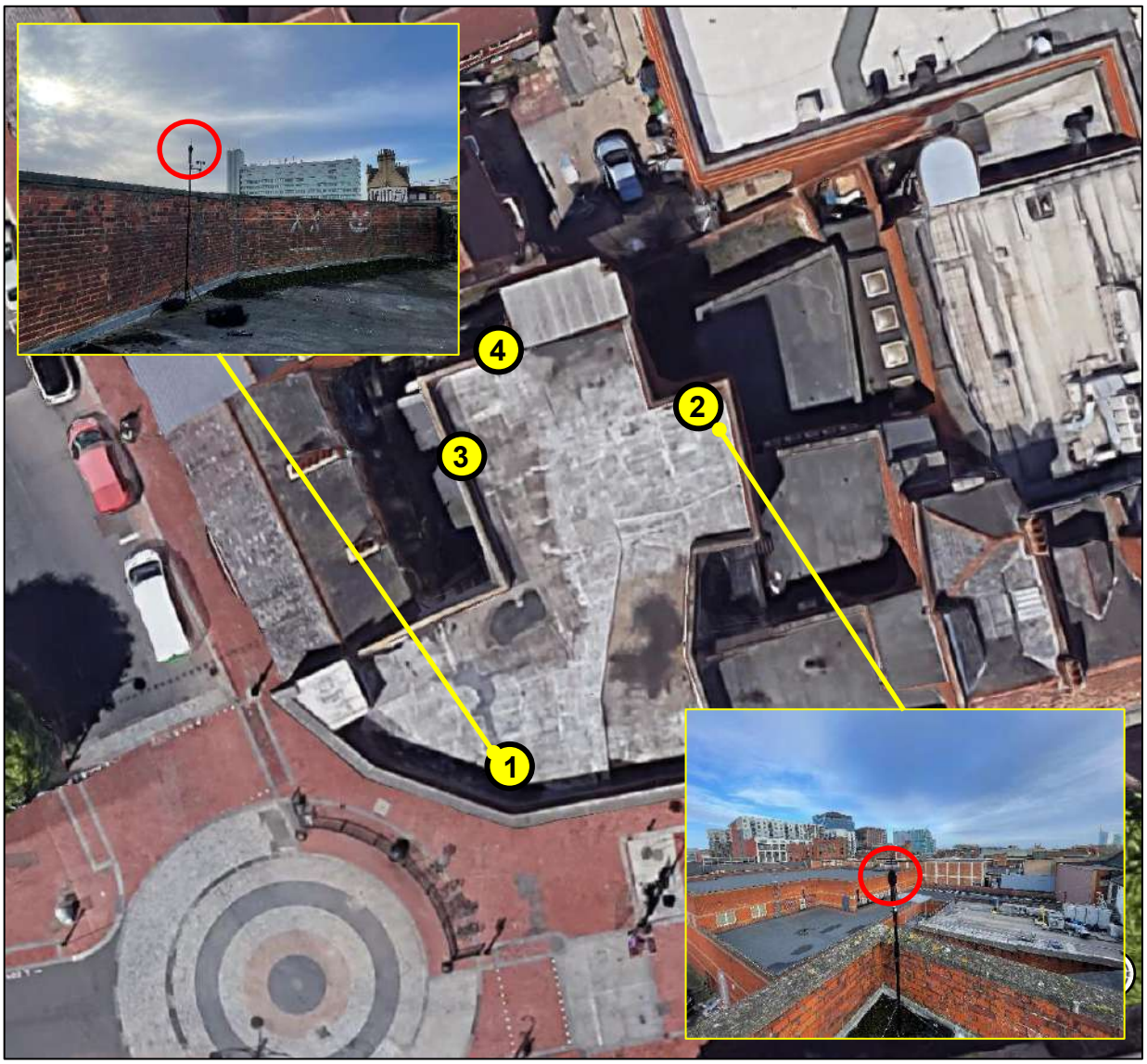


Figure 3 Noise survey measurement locations (Image Reference: Google Earth)

The locations were chosen to collect data representative of the levels expected on the site due to all nearby sources:

1 - *Automated measurement position to capture all sound sources to the front of the site undertaken between 14:00 on 24/01/2025 and 09:00 on 26/01/2025*

2 - *Automated measurement position to capture all sound sources to the rear of the site, undertaken between 15:00 on 27/01/2025 and 15:00 on 28/01/2025*

3 - *Manual measurement position to capture noise specifically from the condenser units and extraction system installed to the rear of the commercial premises to the north-west, undertaken*

between 14:00 and 15:00 on 24/01/2025. Measurements were taken over a representative 1-hour period to capture the cyclic nature of the units.

4 - *Manual measurement position to capture noise specifically from an existing extract flue serving the KFC restaurant, undertaken between 14:45 and 15:00 on 28/01/2025. A measurement period of 15 minutes was deemed suitable due to the constant non-fluctuating sound source under measurement.*

The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

The key acoustic descriptors measured for this assessment are as follows:

- $L_{Aeq,T}$ *(the continuous equivalent A-weighted noise level over a given time period, T);*
- $L_{AFMax,T}$ *, the maximum sound level over each measurement period;*
- $L_{A90,T}$ *(the noise level exceeded for 90% of the measurement period T, referred to as the 'background' noise level).*

4.2 Measurement Equipment

The table below presents the equipment used for the baseline noise surveys. The equipment calibration was verified before and after use and no abnormalities were observed.

Equipment	Make and Model	Serial Number
Sound & Vibration Meter	Svantek 958A	69072
Microphone Capsule	PCB 377B02	
Microphone Preamplifier	PCB 378B02	168159
Sound Level Meter	Svantek 977C Class 1 Sound Level Meter	97547
Microphone Capsule	MTG MK 255	21272
Microphone Preamplifier	Svantek SV 12L	108454
Calibrator	Svantek SV36 Class 1 Sound Calibrator	122255

Table 1 Noise survey equipment

4.3 Weather Conditions

Weather Measurements of temperature and wind speed were undertaken during the survey.

Description	Installation Date 24/01/2025	Interim Date 25/01/2025	Collection Date 26/01/2025
Average Wind Speed (m/s)	4	2	3
Maximum Wind Speed (m/s)	9	7	7
Average Temperature (°C)	7	4	2

Table 2 Weather conditions

From a review of environmental noise data captured, periods of high wind speeds above 5m/s have not affected the results on the days listed above, and as such are not considered to adversely impact the survey findings.

4.4 Automated Environmental Noise Survey Results

A time history of the automated measurements is shown in Appendix C with a summary of the results presented in the table below:

Survey Position	Period	Ambient Noise Level $L_{Aeq,\,T}$ (dB)	10th Highest Maximum Noise Level per Night L_{AFmax} (dB)
1 – Front Facade	Daytime 07:00-23:00	60	n/a
	Night-time 23:00-23:00	56	77, 76
2 – Rear/East Facade	Daytime 07:00-23:00	58	n/a
	Night-time 23:00-23:00	55	72

Table 3 Measured noise levels of full automated noise survey

4.5 Manual Noise Measurement Survey Results

4.5.1 Survey Position 3 - Commercial Noise Sources to the West

The manual survey at position 3 was undertaken over a period of 1 hour to capture the cyclic nature of the plant in question at the closest point of the roof boundary to the adjacent commercial plant installations to the west. The single octave band data and overall A-weighted level for the plant area is shown in the table below:

Source	Linear dB at Octave Band Centre Frequency								dB(A)
	63Hz	125Hz	250HZ	500Hz	1kHz	2kHz	4kHz	8kHz	
All units to rear of commercial premises to the west operating simultaneously	64	60	56	54	52	47	38	29	57

Table 4 Manual noise measurements of plant adjacent to west facade at roof boundary

In the absence of a full survey period undertaken at a location overlooking this façade, the noise levels presented above are considered representative of a reasonable worst-case scenario for noise impact upon the west façade of the proposed development. This assumption is supported by the operational characteristics of the noise sources in this area, which primarily comprise plant serving adjacent commercial premises. The majority of the adjacent plant would be expected to be inactive during non-business and night-time hours, resulting in a reduced noise climate at this façade during these periods, even if some units remain active.

On this basis, it can be concluded that a façade specification designed to mitigate noise ingress during daytime conditions wouldbe expected to provide an adequate level of protection for future occupants during night-time hours, when external noise levels are anticipated to be lower.

However, In order to ensure that night-time noise levels and L_{Amax} noise events are appropriately assessed and the amenity of future occupants at this façade is protected, and given the similarity in noise source characteristics identified between survey Positions 2 and 3, the assessment of night-time and L_{Amax} levels at the west façade has been derived from the survey data obtained at Position 2.

4.5.2 Survey Position 3 – KFC Extract Flue

The manual survey at position 4 was undertaken over a period of 15 minutes at 1m from the exhaust of the KFC extraction flue, which was deemed suitable due to the constant non-fluctuating sound of the source under measurement.

The single octave band data and overall A-weighted level of the flue exhaust is shown in the table below, which has been corrected for a distance of 4m between the flue exhaust and the centre of closest the 2nd floor bedroom windows.

Source	Linear dB at Octave Band Centre Frequency								dB(A)
	63Hz	125Hz	250HZ	500Hz	1kHz	2kHz	4kHz	8kHz	
KFC Extract Flue	70	74	71	64	65	62	59	54	70

Table 5 Manual noise measurements of KFC extract at 1m from exhaust

Although no residential windows would be introduced with direct line of sight to the flue exhaust, it is noted that the windows of the Living Room and Bedroom of Flat 4 overlook the area of flat roof where the flue exits from the commercial premises on the floor below. These bedrooms would therefore be subject to noise exposure due to noise transfer from the flue exhaust above and duct noise breakout from the flue duct.

As it is understood that the commercial restaurant within the lower floors of the site will remain operational post completion of the development, and no proposals have been provided detailing that the extract flue will be removed or relocated, it is assumed as a worst case scenario that the flue will remain and is therefore relevant to be included when considering the impact of external noise ingress upon this façade.

Assessment of this noise source will also ensure that the operation of the existing premises is not subject to any operational limitations due to complaints following the introduction of a new residential receptor property, as per the guidance of the agent of change principle.

As per Section 4.5.1 above, the KFC premises business hours are reported as between 10:00-22:00 Monday to Sunday, and therefore a façade specification designed to mitigate noise ingress during daytime business hours would be expected to provide an adequate level of protection for future occupants during night-time hours also. However, in order to ensure the amenity of future occupants is protected, the assessment of night-time and L_{Amax} levels at this façade will also be derived from the survey data obtained at Position 2, due to the similarity in noise source characteristics identified between survey Positions 2 and 4.

5 PROPG STAGE 1 INITIAL SITE NOISE RISK ASSESSMENT

An initial site risk assessment has been undertaken following the guidance presented in ProPG during daytime and night-time hours. Due to the variations in noise levels across the façades, the risk assessment has been undertaken on a façade-by-façade basis.

LOAEL and SOAEL levels have been established using DEFRA paper "Possible Options for the Identification of SOAELs and LOAELs in Support of the NPSE (2014)" (see Appendix B) based on road traffic noise being the dominant source.

While plant noise was observed to be the primary source at the rear of the site, at Monitoring Position 2, this location is still influenced by adjacent road traffic. Given the broadly similar broadband characteristics of both sources, comparison with the DEFRA criteria is considered appropriate in this context.

Table 6 shows the risk assessments for daytime and night-time, respectively.

Measurement Position	Time	Result	ProPG Noise Risk Category	NPPG Effect Level	NPPG Action
1- Front Facade	Daytime 07:00-23:00	$L_{Aeq, 16 hr}$ 60 dB	Medium	SOAEL (64-68)	Mitigate and reduce to a minimum
	Night-time 23:00-07:00	$L_{Aeq, 8 hr}$ 56 dB	Medium	SOAEL (51-64)	
2- Rear/East Facade	Daytime 07:00-23:00	$L_{Aeq, 16 hr}$ 58 dB	Medium	LOAEL (53-59)	
	Night-time 23:00-07:00	$L_{Aeq, 8 hr}$ 55 dB	Medium	SOAEL (51-64)	
3- West Facade	Daytime 07:00-23:00	$L_{Aeq, 16 hr}$ 57 dB	Low	LOAEL (53-59)	
	Night-time 23:00-07:00	$L_{Aeq, 8 hr}$ 55 dB*	Medium	SOAEL (51-64)	
4- Façade overlooking Flue	Daytime 07:00-23:00	$L_{Aeq, 16 hr}$ 70 dB	High	SOAEL (64-68)	Avoid
	Night-time 23:00-07:00	$L_{Aeq, 8 hr}$ 55 dB*	Medium	SOAEL (51-64)	Mitigate and reduce to a minimum

Table 6 Stage 1 risk assessment during daytime hours
***Data collected at survey position 2**

The Acoustic Design Statement presented in Section 6 would ensure that all potential noise impacts are sufficiently mitigated to ensure that no adverse effect on health and quality of life would occur.

6 PROPG STAGE 2: ACOUSTIC DESIGN STATEMENT

The Stage 1 Initial Site Risk Assessment has identified that the facades of the site fall within the “Low”, “Medium” and “High” noise risk categories, and therefore, a Stage 2 assessment is required.

The Acoustic Design Statement outlined below demonstrates that a good acoustic design process has been followed, and suitable acoustic design advice has been provided to ensure that noise impacts are sufficiently mitigated to ensure ‘no adverse effect on health and quality of life’.

6.1 Element 1: Good Acoustic Design

A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally (inside noise-sensitive parts of the building) and externally (in spaces to be used for amenity purposes).

Good acoustic design does not mean overdesign or gold plating of all new development, but seeking to deliver the optimum acoustic outcome for a particular site.

Good acoustic design is not just compliance with recommended internal and external noise exposure standards. Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements.

It must be acknowledged that the inherent challenge of introducing noise-sensitive development in noisy locations can limit the extent to which good acoustic design can be achieved in harmony with the other factors that influence the overall quality of a scheme and that compromises may need to be made e.g. accepting that it may not always be possible to achieve acoustic standards with windows open or accepting that noise levels in parts of the outdoor amenity areas may not be optimal.

A good acoustic design will be one that continues to minimise noise impacts and to avoid significant noise effects for the lifetime of the development or as long as is practicable, taking into account other economic, environmental and social impacts.

Planning applications for new residential development should consider the following aspects of good acoustic design: Check the feasibility of relocating or reducing noise levels from relevant sources; Consider options for planning the site or building layout; Consider the orientation of proposed building(s); Select construction types and methods for meeting building performance requirements; Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc; Assess the viability of alternative solutions; Assess external amenity area noise.

The above considerations will then inform how best to deal with noise by either:

- Quietening or removing the source of noise;
- Attenuating the sound on its path from source to receptor;
- Obstructing the sound path between the source and receptor location; or

- Providing a suitable specification of the sound insulation of the building envelope to ensure that noise is minimised.

Following review of the proposed plans, it is considered that additional mitigation measures could be implemented for Flat 4 to further obstruct the sound path between the existing KFC extract flue and the proposed bedroom windows.

As the extract flue is owned and operated by the adjacent commercial premises, it is assumed that attenuation, relocation, or removal of the flue is not feasible. Accordingly, improvements in acoustic performance could instead be achieved through optimisation of the internal layout of Flat 2.

Specifically, it is recommended that the proposed bedroom accommodation be re-oriented to overlook an alternative façade with reduced noise exposure. Less noise-sensitive rooms, such as kitchens, living areas, or bathrooms, should be located on the façade facing the extract flue, with associated windows overlooking this elevation. This approach would represent good acoustic design practice and would reduce potential adverse noise impacts within the most sensitive internal spaces.

With the exception of the above, It is considered that a good acoustic design process has been followed, and that no other measures could be reasonably implemented without other compromises that will adversely affect living conditions and the quality of life of the inhabitants.

6.2 Element 2: Internal Noise Level Guidelines

6.2.1 Criteria

The initial site risk assessment has identified that a suitable specification for the external building envelope must be established to ensure that the future occupiers of the building are protected from noise.

The criteria that would inform the design of the acoustic building envelope are presented in BS 8233:2014, as summarised below:

Room	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living Room	≤ 35 dB $L_{Aeq,16hr}$	N/A
Kitchen/Dining Room	≤ 40 dB $L_{Aeq,16hr}$	N/A
Bedroom	≤ 35 dB LAeq,16hr	≤ 30 dB $L_{Aeq,8hr}$

Table 7 Indoor ambient noise levels for dwellings

6.2.2 Assessment Methodology

A scheme of suitable noise mitigation measures to protect the proposed dwellings against external noise relates principally to the sound insulation performance of elements of the overall external building envelope. The composite acoustic performance required of any portion of the building envelope will depend on its location relative to the principal noise sources around the site and the nature of the spaces behind it (noise criteria, size, room finishes, etc.).

By following the rigorous calculation procedure outlined in Section G.2 of Annex G of BS 8233:2014, the sound insulation performance for the whole building envelope is assessed, considering each façade element. Note that this calculation method is based on that given in BS EN 12354-3.

6.2.3 Non-Glazed Specifications

In this case, the existing non-glazed external building fabric construction is comprised of a masonry system that would be expected to provide a sound reduction of at least R_w 50 dB.

6.2.4 Glazing Specifications

Calculations have been undertaken to determine suitable glazing specifications for the various rooms within the scheme.

Calculations have been undertaken to reflect worst-case scenarios with regard to ratios of glazing to non-glazing, room dimensions and room absorption characteristics. In all instances the proposed bedrooms on each façade have been determined as the most sensitive spaces and will therefore inform the design.

Minimum octave band sound reduction index (SRI) values required for new glazed elements to be installed are shown in the table below.

Façade Ref	Octave band centre frequency SRI, dB						R_w (C;C_{tr})
	125Hz	250HZ	500Hz	1kHz	2kHz	4kHz	
Front Façade	25	22	35	41	37	39	36 (-2;-5)
Rear/East Façade	25	22	35	41	37	39	36 (-2;-5)
West Façade	25	22	35	41	37	39	36 (-2;-5)
Façade/Windows Overlooking Flue	28	30	41	47	51	60	44 (-2;-7)

Table 8 Glazing specifications for new window units

Each specification is provided for the whole window unit, including the frame. Sole glass performance data would not demonstrate compliance with this specification. The nominated glazing supplier should verify that their proposed system meets the attenuation figures shown at each centre frequency band.

Example glazing configurations capable of providing the maximum level of sound insulation required are shown in Table 9:

Façade Ref	Example Window Configuration
Front Façade	6mm glass / 12mm air gap / 6mm glass
Rear/East Façade	6mm glass / 12mm air gap / 6mm glass
West Façade	6mm glass / 12mm air gap / 6mm glass
Façade/Windows Overlooking Flue	8mm laminated glass / 12mm air gap / 10mm laminated glass

Table 9 Example window systems for new window units

6.2.5 Ventilation Specifications

Requirement F1(1) of Approved Document F of the Building Regulations requires that ‘there shall be adequate means of ventilation provided for people in the building’.

Calculations have indicated that trickle ventilation would be viable on the front, rear/east and west façades of the building. The minimum acoustic performance required for trickle ventilation on the front facades is shown in the table below:

Façade Ref	Background Ventilation Provision
Front Façade	Minimum performance of 38 dB $D_{n,e,w}$
Rear/East Façade	Minimum performance of 35 dB $D_{n,e,w}$
West Façade	Minimum performance of 35 dB $D_{n,e,w}$

Table 10 Whole dwelling ventilation specifications for each glazing type

In the case of the windows overlooking the extraction flue, mechanical ventilation would be required, due to the noise emissions of the flue. The mechanical system at this position, and if mechanical ventilation is the preferred system for any alternative façade, should be designed to meet the internal noise levels as defined in the table below:

Façade Ref	Room Type	dB L_{Aeq}	NR
Façade overlooking Flue (Or any preferred façade)	Bedrooms / Living Rooms	30	25
	Kitchen / Bathrooms	45	40

Table 11 ADF guidance levels for mechanical building services

Purge Ventilation

The only time windows will be required to be open for the purpose of ventilation will be for occasional 'purge' ventilation. With respect to noise levels during purge ventilation conditions, ProPG states the following:

'…the internal noise level guidelines are generally not applicable under 'purge ventilation' conditions as defined by Building Control Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).'

It is therefore not considered necessary to further consider noise levels during purge ventilation conditions. Using windows for this purpose is unlikely to result in any significant adverse effects due to the limited time the window would be open, with the occupant having full control over the open condition.

6.2.6 Predicted Internal Noise Levels

Based on the design measures outlined above, predicted internal noise levels are summarised in Table 12. Full calculations are presented in Appendix D.

Façade Ref	Room Type	Daytime $L_{Aeq,16hour}$ dB	Night-time $L_{Aeq,\ 8\ hour}$ dB	Night-time L_{Amax} dB
Front Facade	Bedroom	30	26	44
Rear/East Facade	Bedroom	30	26	43
West Façade	Bedroom	28	25	43
Façade overlooking Flue	Bedroom	35	19	36

Table 12 Predicted internal noise levels based on Acoustic Design Statement mitigation measures

As demonstrated above, all internal noise levels would be fully compliant with the ProPG guidelines and recommended internal noise levels presented in BS 8233:2014.

6.3 Element 3: External Amenity Area Noise Assessment

Section 7.7.3.2 of BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* presents desirable guideline levels for amenity areas. The section is presented in its entirety below:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

As per the provided floor plans of the proposed second floor development, no external amenity areas are proposed and therefore an assessment of noise levels in external amenity areas is not required.

6.4 Element 4: Assessment of Other Relevant Issues

The final element of the ProPG Stage 2 Assessment is to review other relevant issues. The ProPG identifies five specific areas to review as detailed below.

6.4.1 Compliance with relevant National and Local Policy

In accordance with the principles outlined in the NPSE and NPPF, the preceding evaluation is considered to have effectively demonstrated that the proposed development prevents any significant detrimental effects due to noise while striving to reduce any residual negative impacts. Furthermore, the assessment has been conducted in alignment with the provisions set out in ProPG and BS 8233:2014.

6.4.2 Magnitude and Extent of Compliance with the ProPG

It is considered that the scheme complies with guidance in the ProPG and that a good acoustic design process has been followed.

6.4.3 Likely Occupants of the Development

It is understood that the scheme contains standard residential dwellings only and that future residents are unlikely to be more sensitive to noise than would typically be expected.

Given that the location of the building is in a busy city centre, it is likely that occupants could well be more accepting of noise than people who might choose to reside in a quieter rural location or a city location that is subjected to lower levels of environmental noise e.g. a property on a close of cul-de-sac, with no major roads, railways or flight paths nearby.

6.4.4 Acoustic Design Versus Unintended Consequences

ESA are not aware of any unintended adverse consequences of the acoustic design measures presented within this report.

6.4.5 Acoustic Design Versus Wider Planning Objectives

ESA are not aware of any reason why the proposed acoustic design outlined in this report conflicts with wider planning objectives.

The additional noise-related aspect which requires consideration is:

1. An assessment of noise transfer between the proposed second floor residential units and the adjoining units, via the party floor between the commercial unit at 1st floor level below and the party walls between neighbouring office units at 2nd floor level , to ensure that sufficient resistance to the passage of sound is provided.

This element is covered in Section 7.

7 NOISE IMPACT ASSESSMENT – PARTY WALL AND FLOOR TRANSFER

With regards to noise into residential properties from an adjoining space via separating walls and/or floors, Approved Document E of the Building Regulations is the relevant Regulatory Framework.

Requirement E1 of Building Regulations Approved Document E provides guidance and minimum standards for sound insulation to be achieved for separating floor and wall constructions to residential flats. The target minimum sound insulation standards of Building Regulations Approved Document E for separating floors and walls of material change of use (i.e. conversion) flats are shown in the table below (reproduced from table 0.1a of the regulations):

Element	Airborne Sound Insulation D_{nTw} + C_{tr} (minimum values)	Impact Sound Insulation L'_{nTw} (minimum values)
Party Walls	43	-
Party Floors	43	64

Table 13 Dwelling-houses and flats – performance standards for separating walls, separating floors that have a separating function

The Approved Document advises that the sound insulation performance standards are appropriate for floors and walls that separate spaces used for normal domestic purposes, and that a higher standard of sound insulation may be required between spaces used for domestic purposes and those used for non-domestic purposes. In these situations, the appropriate level of sound insulation will depend on the noise generated in the non-domestic space, and the document further advises that specialist advice may be needed to establish if a higher standard of sound insulation is required, and if so, to determine the appropriate level.

In situations where the non-domestic (commercial) space is a workshop, gym, restaurant, public house or bar etc, where relatively high internal activity noise levels are potentially / routinely generated and in the case of a restaurant, public house or bar including with loud amplified music, TV sports and large / concentrated groupings of customers talking with raised voices, then it is appropriate to set a substantially higher standard of sound insulation especially as peak times (with higher generated noise) for these uses generally occurs late at night and into the early morning hours.

However, it should be noted that in many cases, an adjacent Class E unit would not generate high or even moderately high internal noise levels and can even be considered to have less potential for noise impact than if the adjacent spaces were residential use. This is due to the fact that a Class E unit would generally be occupied during normal daytime hours only, whereas residential use is typically occupied 24 hours a day with domestic noise occurring at any time, including during the night (e.g. loud music, televisions, or white goods such as a washing machine/tumble driers, etc). There is typically no noise at all during the late evening, night or early morning from within Class E use, which are the times most likely to cause disturbance when residents are preparing for sleep and/or sleeping.

In the case of the specific commercial units in question adjacent to the application site:

- KFC at ground and first floor of 73-74 Broad Street , sharing a party floor with the application site. The business operates from 10:00-22:00 Monday to Sunday.

- Second Floor Office Use at 21 West Street, sharing a party wall with the application site. The nature of the use would not involve high levels of noise generation, and we would expect that sound insulation targets commensurate with the Building Regulations requirement would be sufficient.
- Second Floor Office Use at 71-72 Broad Street, sharing a party wall with the application site.

In all cases, the nature of the adjacent commercial/office uses would not involve high levels of noise generation, and we would expect that sound insulation targets commensurate with the Building Regulations requirement would be sufficient.

Notwithstanding the above, to ensure protection of the amenity of future occupiers of the proposed change of use dwelling, it is advised that airborne sound insulation performance for the separating walls between the flats and adjoining commercial units aims to have an uplifted performance with target to be at least 3dB higher (better) than the minimum standard noted in Approved Document E i.e. to have airborne sound insulation $D_{nT,w} + C_{tr} \geq 46$dB.

The existing party floor is a substantial masonry construction, which will provide a good level of noise insulation by default. The project architect has confirmed that the separating floor construction is a 150mm concrete slab, with a suspended ceiling below. The party floor would therefore provide a sound reduction of at least $D_{nT,w} + C_{tr} \geq 55$dB, which would comfortably exceed the Building Regulations requirements for airborne sound insulation, and would be expected to protect residents from noise transfer from the restaurant.

The party walls to the adjacent buildings at 21 West Street and 71-72 Broad Street are understood to be solid brickwork. From a visual inspection, the walls have been created independently from one another, as shown in the figure below:

Figure 4 Application site and adjacent buildings in office use (Image Ref: Google Earth)

The construction from room to room would therefore be a 200mm solid brickwork wall of the application site, and then a further 200mm solid brickwork wall of the adjacent building, for an overall wall construction of 400mm solid brickwork. The party walls to either side of the application site would therefore provide a sound reduction of at least $D_{nT,w} + C_{tr} \geq 55$dB, which would vastly exceed the Building Regulations requirement.

It is confirmed that the existing floor and wall construction would provide a suitable reduction to the passage of sound and therefore no further mitigation measures would be required.

8 CONCLUSION

ES Acoustics Ltd have been instructed by Broadstreet to prepare a noise impact assessment for the proposed development at 73, 74 & 74A Broad Street, Reading, Berkshire, RG1 2AP.

This report is prepared to support a full planning application for the conversion of the existing second floor at the above address to accommodate 3 x 1-bedroom and 1 x 2-bedroom residential units.

This assessment aligns with the principles of government planning policy on noise, as outlined in the National Planning Policy Framework (NPPF), the National Planning Practice Guidance (NPPG) on Noise, and the Noise Policy Statement for England (NPSE), and follows the recommended approach for the assessment of noise in relation to residential development, as outlined in the Professional Practice Guidance on Planning and Noise: New Residential Development (ProPG).

The site has been assessed via environmental noise surveys to ensure that worst-case environmental noise scenarios are considered.

An initial site risk assessment has been undertaken following the guidance presented in ProPG. It has been found that the site falls within the “Low”, “Medium” and “High” noise risk categories, depending on the façade.

An Acoustic Design Statement has been produced to ensure that significant adverse effects due to noise are avoided, or minimised and mitigated.

The assessment of external noise ingress has concluded that significant adverse effects are unlikely to occur at the proposed residential development if appropriate mitigation measures are implemented.

With regards to sound transference between commercial and residential areas, it is confirmed that the existing floor and wall construction would provide a suitable reduction to the passage of sound and therefore no further mitigation measures would be required.

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel scale - dB

The decibel (dB) is a relative unit of measurement used in acoustics. The dB is a logarithmic ratio between a measured level and a reference level of 0 dB (i.e the threshold of human hearing). Simply put, the decibel compresses the wide range of sounds we hear into more manageable numbers.

Addition of noise from several sources

Sound produced by multiple sound sources are added logarithmically e.g. power ratio of 2 = 3dB, power ratio of 10 = 10dB. Therefore, two equally intense sound sources operating simultaneously produce a sound level which is 3dB higher than a single source e.g. 60dB + 60dB = 63dB.

Subjective impression of noise

Human response to sound is highly individualized and often based on psychological factors such as emotion and expectation. Sensitivity to sound typically depends on the loudness, pitch, duration of the occurrence, and time of occurrence (e.g. a sound source could cause annoyance during the night where it would not during the day). The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level	Change in perceived loudness
1 dB	Imperceptible
3 dB	Just barely perceptible
6 dB	Clearly noticeable
10 dB	About twice as loud

'A' Weighted Frequency Filter - dB(A)

The human ear is not equally sensitive in all frequencies. The A-weighting filter was devised to take this into account when undertaking noise measurements and allows a sound level meter to replicate the human ears response to sound.

$L_{Aeq, T}$

Sound can fluctuate widely over a given period. L_{Aeq} is the A-weighted equivalent continuous sound level, with T denoting the time period over which the fluctuating sound levels were averaged e.g. $L_{Aeq,16h}$ is the equivalent continuous noise level over an 16 hour period.

L_{A90}

A-weighted sound level exceeded for 90% of the measurement period, calculated via statistical analysis. The L_{A90} descriptor is typically used to establish background sound levels for noise impact assessments

L_{A10}

A-weighted sound level exceeded for 10% of the measurement period, calculated via statistical analysis.

L_{AFmax}

A-weighted sound level maximum sound pressure level that has been measured over a given time period

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

Octave Bands

The audio or frequency spectrum of the human ear is in the range of 20Hz to 20 kHz. The spectrum tells how the energy of the sound signal is distributed in frequency. Octave bands divides the audio spectrum into 10 equal parts. The International Standards Organisation defines the centre frequency of these bands as 31.5Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1kHz, 2kHz, 4kHz, 8kHz and 16kHz.

Noise Rating (NR) Curves

A method of rating noise using a set of curves relating octave band sound pressure levels. Typically used for building services systems within offices

Airborne sound

Sound radiated from a source into the surrounding air e.g. musical instruments, tv/radio, machinery/equipment. Airborne sound insulation refers to the reduction or attenuation of airborne sound, usually via a solid partition between a source and receiver.

Impact sound

Sound resulting from the impact between colliding objects, e.g. footfall impact upon a floor. Impact sound insulation refers to the resistance of a floor to the transmission of impact sound, typically via the installation of a 'resilient layer'

Flanking sound

The transmission of airborne sound between two adjacent rooms by paths other than via the separating partition between the rooms, e.g. the abutment point of a wall and floor.

Structure-borne noise

Noise caused by the vibration of elements of a structure. This can result in reradiated noise, whereby the vibrating element transmits airborne sound into a space e.g. vibration caused by mechanical plant installed within a plant room which is not adequately isolated from the structure, or construction/demolition work in an adjacent building.

Reverberant sound

Sound in an enclosed space (usually a room), which results from repeated reflections at the boundaries. Reverberation time is the time taken for a steady sound level in an enclosed space to decay by 60dB, measured from the moment the sound source is switched off. A example of a typically reverberant space would be a classic church. Absorptive materials can be used to reduce reflections and reverberation times.

APPENDIX B

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

1 NATIONAL POLICY

1.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) covers issues relating to noise and planning in England.

The paragraphs relating to noise state:

187. Planning policies and decisions should contribute to and enhance the natural and local environment by; […]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

198. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; […]

200. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

1.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010. The long-term vision of the Government noise policy is to '*Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development*.'

The NPSE vision noted above is supported by the following aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *Avoid significant adverse impacts on health and quality of life;*

- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life*

The NPSE outlines observed effect levels relating to the above, as follows:

- *No observed effect level (NOEL): this is the level of noise exposure below which no effect at all on health or quality of life can be detected;*
- *Lowest observed adverse effect level (LOAEL): this is the level of noise exposure above which adverse effects on health and quality of life can be detected;*
- *Significant observed adverse effect level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;*

Noise effect levels are not set at absolute noise level targets, but instead vary depending on the context and character of the noise and site-specific factors which may impact on the severity of the effect. The NPSE states:

'It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

1.3 National Planning Practice Guidance (NPPG)

The NPPG provides practical guidance on how the NPPF should be applied as well as and guidance on the factors influencing whether noise may be a concern at the planning stage and how adverse effects can be mitigated. The table below summarises the effect levels presented within the NPSE, as follows:

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific Measures required
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate & reduce to a minimum

Response	Examples of Outcomes	Increasing Effect Level	Action
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, 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.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1 Noise exposure hierachy

2 BEST PRACTICE AND GUIDANCE

2.1.1 World Health Organization (WHO) Guidelines

WHO Guidelines for Community Noise (1999) provides guideline values for community noise in specific environments. This has since been supplemented by WHO Environmental Noise Guidelines for European Region (WHO, Regional office for Europe, 2018).

The WHO guideline values most relevant to new residential development are outlined in the table below:

Specific Environment	Critical Health Effects	$L_{Aeq, T}$ [dB]	L_{Afmax} [dB]	Time Base
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	n/a	07:00-23:00
	Sleep disturbance night-time	30	45	23:00-07:00
Dwelling, outdoors	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00
Outdoor living area	Serious annoyance, daytime and evening	55	n/a	07:00-23:00
	Moderate annoyance, daytime and evening	50	n/a	07:00-23:00

Table 2 Guideline Values from WHO Guidelines for Community Noise (1999)

The effects of noise in dwellings are typically sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms at night are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events, but the guidance also notes that lower noise levels may be disturbing depending on the nature of the noise source.

2.2 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Table 4 of BS 8233:2014 (reproduced below) provides guidance on recommended internal ambient noise levels in residential spaces based on World Health Organization (WHO) research.

Room	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living Room	≤ 35 dB $L_{Aeq,16hr}$	N/A
Dining Room	≤ 40 dB $L_{Aeq,16hr}$	N/A
Bedroom	≤ 35 dB $L_{Aeq,16hr}$	≤ 30 dB $L_{Aeq,8hr}$

Table 3 BS 8233:2014 indoor ambient noise levels for dwellings

The following notes should be considered alongside the levels presented above:

- *The levels presented above are for steady external noise sources without a specific character. Noise is considered to have a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate*
- *The levels are based on annual average data and do not have to be achieved in all circumstances e.g. it is normal to exclude occasional events, such as fireworks night or New Year's Eve*
- *Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved*
- *If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level*
- *The levels outlined above are not applicable under "purge ventilation" conditions as defined by Approved Document F of the Building Regulations, as this should only occur occasionally e.g. to remove odour from painting or burnt food). However, the levels above should be achieved whilst providing sufficient background ventilation, either via passive or mechanical methods*

It should be noted that the 2014 version of BS 8233:2014 does not include any specific requirement for maximum instantaneous noise levels (L_{max}) within dwellings. However, methodology for the assessment of maximum noise levels is included in ProPG and referenced in WHO guidelines.

Section 7.7.3.2 of BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* presents desirable guideline levels for amenity areas. The section is presented in its entirety below:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these

locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

2.3 ProPG: Professional Practice Guidance on Planning and Noise

ProPG was published to provide practitioners with guidance and a recommended approach for the assessment of noise impact on residential developments during the planning stage.

The guidance can be seen as the missing link between the current NPPF and its predecessor, PPG24 (Planning Policy Guidance 24: Planning and Noise), which provided a prescriptive method for assessing sites for residential development but without the nuance of the key elements described in ProPG.

The guidance seeks to assist in the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise and encourage a good acoustic design in and around proposed new residential development whilst considering national policy on planning and noise.

The recommend approach for assessment is summarised below:

- *Stage 1 – an initial noise risk assessment of the proposed development site*
- *Stage 2 – a systematic consideration of four key elements:*
    - *Element 1 – Demonstrating a "Good Acoustic Design Process" (including feasibility of reducing or relocating existing noise sources, site orientation and building layout and appropriate constructions methods to meet performance requirements);*
    - *Element 2 – Observing internal "Noise Level Guidelines" (as presented in Section 3.3.1 of this report, with additional consideration of individual noise events which should normally not exceed L_{AFmax} 45 dB more than 10 times in bedrooms at night);*
    - *Element 3 – Undertaking an "External Amenity Area Noise Assessment" (ProPG aligns with BS 8233:2014 and suggests that noise levels in external amenity areas should ideally not be above $L_{Aeq,16hr}$ 50-55dB. However, there is an acceptance that these guideline values may not be achievable in all circumstances where development might be desirable, and in such situations, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.); and*
    - *Element 4 – Consideration of "other relevant issues" (including compliance with national and local policy, acoustic design vs unintended adverse consequences, acoustic design vs wider planning objectives)*

APPENDIX B

PLANNING POLICY AND RELEVANT ACOUSTIC GUIDANCE REVIEW

To help consider noise at a site at an early stage an initial noise risk assessment should assess the Noise Risk Category of the site to help provide an indication of the likely suitability of the site for new residential development from a noise perspective. The table below sets out the indicative noise levels for the Noise Risk Categories and a description of the potential effect of noise where no further noise mitigation is to take place as well as additional guidance.

NOISE RISK ASSESSMENT		POTENTIAL EFFECT WITHOUT NOISE MITIGATION	PRE-PLANNING APPLICATION ADVICE
Indicative Daytime Noise Levels $L_{Aeq,16hr}$	Indicative Night-time Noise Levels $L_{Aeq,8hr}$		
High		Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.
70 dB	60 dB		As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
Medium			
65 dB	55 dB		
60 dB	50 dB		At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
Low			
55 dB	45 dB		
50 dB	40 dB		
Negligible		No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F}$ > 60 dB means the site should not be regarded as negligible risk.

Figure 1. Stage 1– Initial Site Noise Risk Assessment

2.3.1 Possible Options for the Identification of SOAELs and LOAELs in Support of the NPSE (2014)

Commissioned by Defra and developed through research conducted by AECOM, the study titled "Possible Options for the Identification of SOAELs and LOAELs in Support of the NPSE" explores potential numerical values for SOAELs and LOAELs, which are concepts introduced within the Noise Policy Statement for England (NPSE). Following the revocation of PPG24: Planning and Noise in 2012, which previously outlined Noise Exposure Categories with defined numerical thresholds, the NPSE faced criticism for lacking specific quantitative guidance. Although both the NPSE and the National Planning Policy Framework (NPPF) advocate for context-driven, location-specific noise criteria, the absence of numerical benchmarks posed challenges in applying the NPSE effectively.

To address this, the research project proposes indicative values and potential value ranges for SOAELs and LOAELs across various noise sources, with the findings summarised in Table 4.

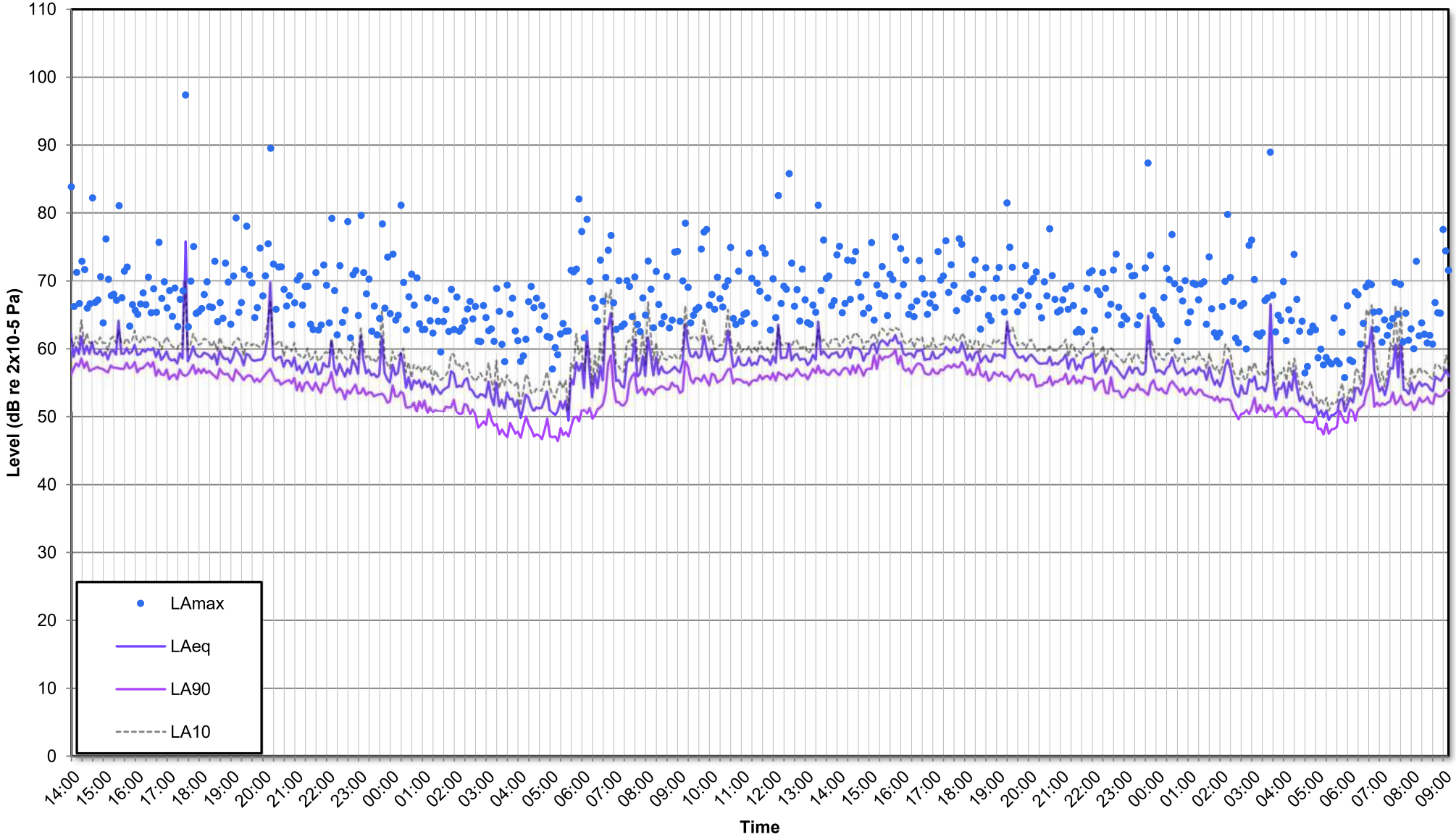
Source	Effect	LOAEL	SOAEL
Road	Annoyance (Daytime)	**56** (53-59)	**66** (64-68)
	Sleep (Night-time)	**46** (43-52)	**56** (51-64)
Rail	Annoyance (Daytime)	**63** (61-66)	**72** (70-74)
	Sleep (Night-time)	**55** (52-63)	**68** (61-77)
Air	Annoyance (Daytime)	**52** (50-54)	**60** (58-62)
	Sleep (Night-time)	**41** (40-49)	**53** (47-60)

Table 4 Possible Value & Ranges of Values for LOAEL & SOAEL

APPENDIX C

ENVIRONMENTAL NOISE TIME HISTORY

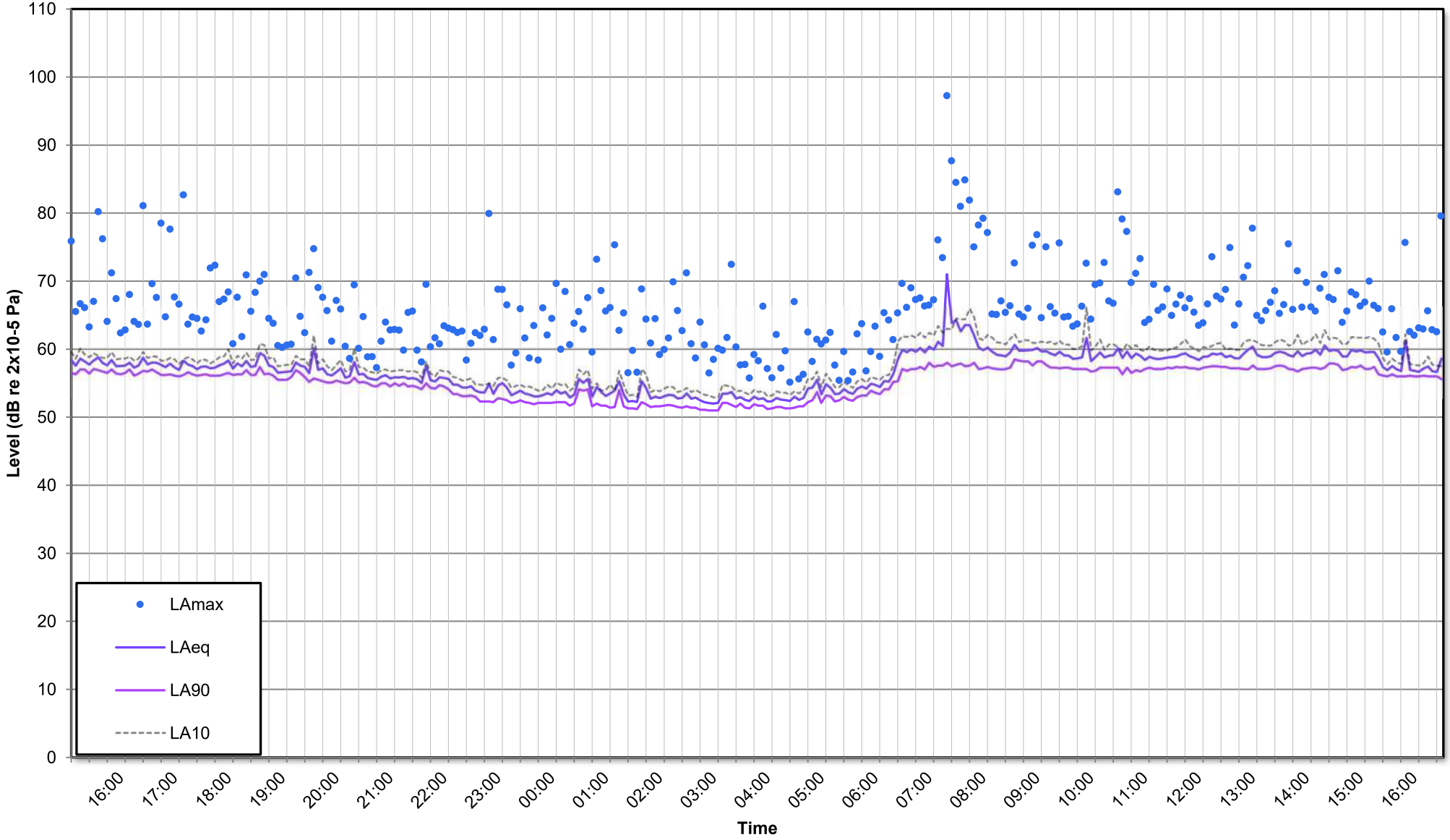
21063.PDNIA-RPT.01
Noise Survey Position 1 - Front
14:00 on 24th and 09:00 on 26th January 2025



APPENDIX C

ENVIRONMENTAL NOISE TIME HISTORY

21063.PDNIA-RPT.01
Noise Survey Position 2 - Rear
15:00 on 27th and 15:00 on 28th January 2025

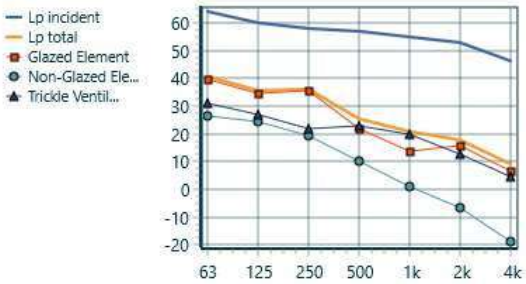


APPENDIX D

External Building Fabric Noise Ingress Calculations on Following Pages

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Front Daytime.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	64.0	60.0	58.0	57.0	55.0	53.0	46.0	59.9
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 8 m²	9.0	9.0	9.0	9.0	9.0	9.0	9.0	
Element sound level contribution	40	35	36	22	14	16	7	28.9
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Element sound level contribution	26	24	19	10	1	-7	-19	14.1
Element 3 , STL	-34	-34	-37	-35	-36	-41	-42	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	31	27	22	23	20	13	5	24.0
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	40	36	36	25	21	18	9	30.2
Level difference								LpAinc - LpARev,T0
D2m,nT	26.7	27.4	25.1	34.7	37.4	38.6	40.2	29.7

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

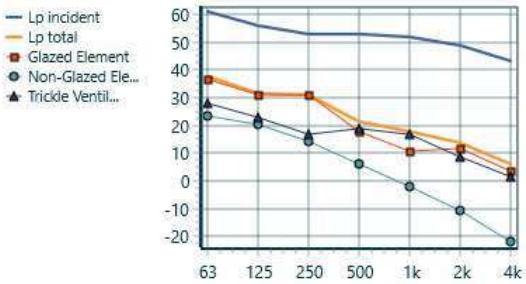
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Front Night-time.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	61.0	56.0	53.0	53.0	52.0	49.0	43.0	56.3
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 8 m²	9.0	9.0	9.0	9.0	9.0	9.0	9.0	
Element sound level contribution	37	31	31	18	11	12	4	24.3
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Element sound level contribution	23	20	14	6	-2	-11	-22	9.8
Element 3 , STL	-34	-34	-37	-35	-36	-41	-42	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	28	23	17	19	17	9	2	20.3
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	37	32	31	21	18	14	6	25.9
Level difference								LpAinc - LpARev,T0
D2m,nT	26.7	27.4	25.1	34.7	37.4	38.6	40.2	30.4

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

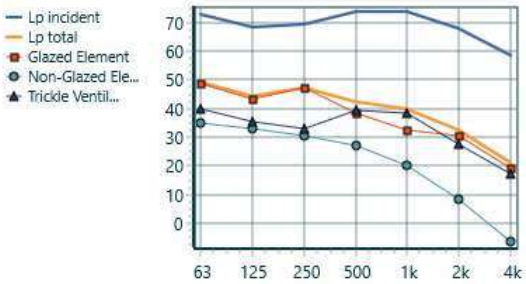
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Front LAmax.inz



Source	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	72.9	68.6	69.3	73.6	73.8	67.9	58.3	76.6
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 8 m²	9.0	9.0	9.0	9.0	9.0	9.0	9.0	
Element sound level contribution	49	43	47	38	33	31	19	41.6
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Element sound level contribution	35	33	31	27	20	8	-6	27.4
Element 3 , STL	-34	-34	-37	-35	-36	-41	-42	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	40	35	33	39	39	28	17	41.0
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	49	44	47	42	40	32	21	44.4
Level difference								LpAinc - LpARev,T0
D2m,nT	26.7	27.4	25.1	34.7	37.4	38.6	40.2	32.2

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

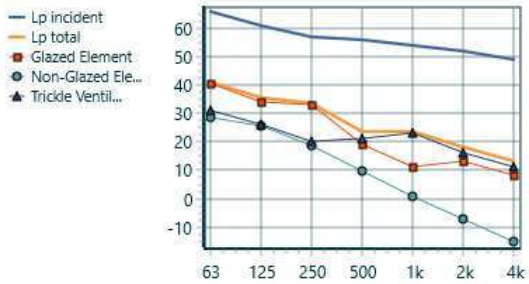
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Rear Daytime.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	66.0	61.0	57.0	56.0	54.0	52.0	49.0	59.3
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 5 m²	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Element sound level contribution	40	34	33	19	11	13	8	26.9
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Element sound level contribution	29	26	19	10	1	-7	-15	14.5
Element 3 , STL	-36	-36	-38	-36	-32	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	31	26	20	21	23	16	11	25.9
Receiver								
Room volume (-10LogV), 45.00 m³	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	41	36	34	24	24	18	13	29.6
Level difference								LpAinc - LpARev,T0
D2m,nT	28.0	28.6	26.4	35.5	33.5	37.0	39.0	29.8

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

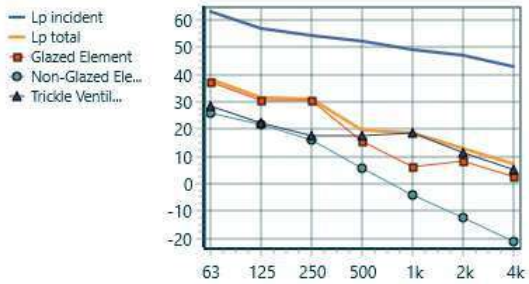
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Rear Night-time.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	63.0	57.0	54.0	52.0	49.0	47.0	43.0	54.7
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 5 m²	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Element sound level contribution	37	30	30	15	6	8	2	23.5
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Element sound level contribution	26	22	16	6	-4	-12	-21	10.9
Element 3 , STL	-36	-36	-38	-36	-32	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	28	22	17	17	18	11	5	21.2
Receiver								
Room volume (-10LogV), 45.00 m³	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	38	32	31	20	19	13	7	25.6
Level difference								LpAinc - LpARev,T0
D2m,nT	28.0	28.6	26.4	35.5	33.5	37.0	39.0	29.1

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

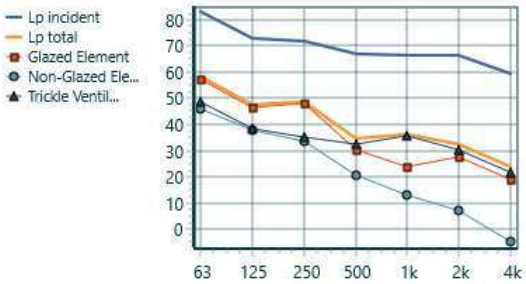
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Rear LAmax.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	83.0	73.0	71.8	66.9	66.5	66.1	59.5	72.1
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 5 m²	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Element sound level contribution	57	46	48	30	24	27	19	41.2
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 7 m²	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Element sound level contribution	46	38	34	21	13	7	-5	28.1
Element 3 , STL	-36	-36	-38	-36	-32	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	48	38	35	32	36	30	22	38.5
Receiver								
Room volume (-10LogV), 45.00 m³	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	58	48	49	35	36	32	24	43.2
Level difference								LpAinc - LpARev,T0
D2m,nT	28.0	28.6	26.4	35.5	33.5	37.0	39.0	29.0

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

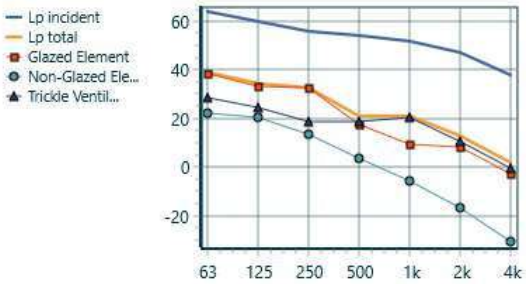
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 West Daytime.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	64.0	60.0	56.0	54.0	52.0	47.0	38.0	56.4
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 6 m²	7.8	7.8	7.8	7.8	7.8	7.8	7.8	
Element sound level contribution	39	34	33	18	10	9	-2	25.6
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 3 m²	4.8	4.8	4.8	4.8	4.8	4.8	4.8	
Element sound level contribution	23	21	14	4	-5	-16	-30	8.9
Element 3 , STL	-36	-36	-38	-36	-32	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	29	25	19	19	21	11	0	22.8
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	39	34	33	21	21	13	2	27.5
Level difference								LpAinc - LpARev,T0
D2m,nT	28.1	28.9	26.4	35.9	34.1	37.3	39.3	28.9

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

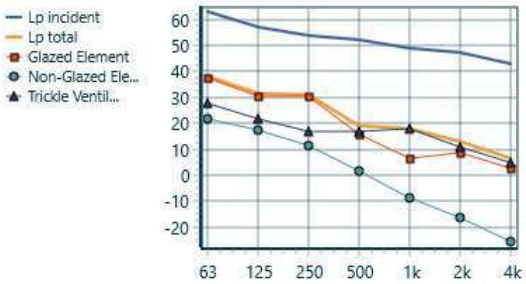
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 West Night-time.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	63.0	57.0	54.0	52.0	49.0	47.0	43.0	54.7
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 6 m²	7.8	7.8	7.8	7.8	7.8	7.8	7.8	
Element sound level contribution	38	31	31	16	7	9	3	23.6
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 3 m²	4.8	4.8	4.8	4.8	4.8	4.8	4.8	
Element sound level contribution	22	18	12	2	-8	-16	-25	6.6
Element 3 , STL	-36	-36	-38	-36	-32	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	28	22	17	17	18	11	5	20.6
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	38	31	31	19	18	13	7	25.4
Level difference								LpAinc - LpARev,T0
D2m,nT	28.1	28.9	26.4	35.9	34.1	37.3	39.3	29.3

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

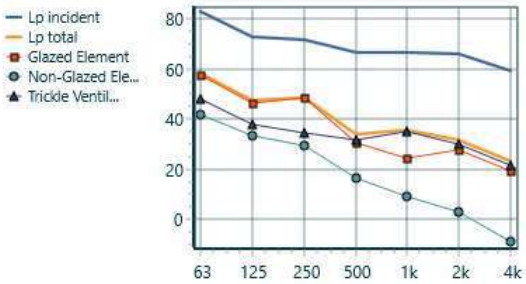
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 West LAmax.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	83.0	73.0	71.8	66.9	66.5	66.1	59.5	72.1
Path								
Element 1 , STL	-24	-25	-22	-35	-41	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 6 m²	7.8	7.8	7.8	7.8	7.8	7.8	7.8	
Element sound level contribution	58	47	48	30	24	28	19	41.3
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 3 m²	4.8	4.8	4.8	4.8	4.8	4.8	4.8	
Element sound level contribution	42	34	29	16	9	3	-9	23.8
Element 3 , STL	-36	-36	-38	-36	-32	-37	-39	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 10 m²	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Element sound level contribution	48	38	35	32	35	30	21	37.9
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	58	47	49	34	36	32	23	43.0
Level difference								LpAinc - LpARev,T0
D2m,nT	28.1	28.9	26.4	35.9	34.1	37.3	39.3	29.1

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 6 mm Glass
- Cavity: : 12 mm
- Pane 2: 1 x 6 mm Glass
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 29.2 kg/m², Mass-air-mass resonant frequency = : 200 Hz

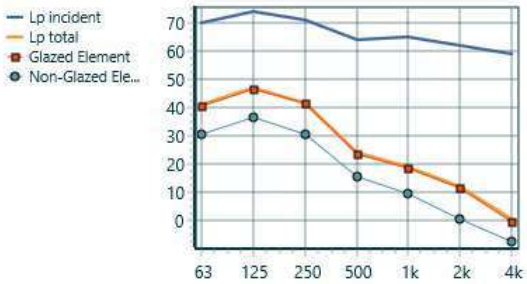
#2: Non-Glazed Element

Wall (Single):
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

#3: Trickle Ventilation

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Facade Overlooking Flue Daytime.inz



Source	Octave Band Centre Frequency (Hz) 63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	70.0	74.0	71.0	64.0	65.0	62.0	59.0	69.9
Path								
Element 1 , STL	-30	-28	-30	-41	-47	-51	-60	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 9 m²	9.5	9.5	9.5	9.5	9.5	9.5	9.5	
Element sound level contribution	40	46	41	23	18	11	-1	34.9
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 5 m²	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
Element sound level contribution	30	36	30	15	9	0	-8	24.5
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	41	47	42	24	19	12	0	35.3
Level difference								LpAinc - LpARev,T0
D2m,nT	32.4	30.4	32.5	43.2	49.3	53.5	62.1	34.6

** Element descriptions:

#1: Glazed Element

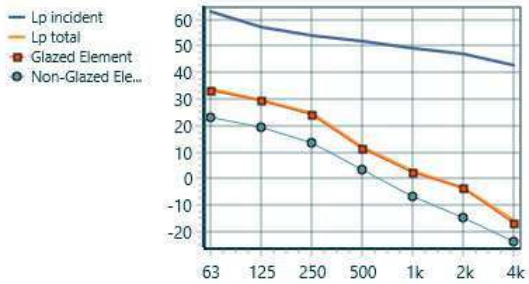
Glazing (Double):
- Pane 1: 1 x 8.38 mm Laminated Glass (generic PVB)
- Cavity: : 12 mm
- Pane 2: 1 x 10.38 mm Laminated Glass (generic PVB)
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 44.6 kg/m², Mass-air-mass resonant frequency = : 162 Hz

#2: Non-Glazed Element

Wall (Single)
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Facade Overlooking Flue Night-time.inz



	Octave Band Centre Frequency (Hz)							
Source	63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	63.0	57.0	54.0	52.0	49.0	47.0	43.0	54.7
Path								
Element 1 , STL	-30	-28	-30	-41	-47	-51	-60	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 9 m²	9.5	9.5	9.5	9.5	9.5	9.5	9.5	
Element sound level contribution	33	29	24	11	2	-4	-17	18.6
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 5 m²	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
Element sound level contribution	23	19	13	3	-7	-15	-24	8.3
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	34	30	25	12	3	-3	-16	19.0
Level difference								LpAinc - LpARev,T0
D2m,nT	32.4	30.4	32.5	43.2	49.3	53.5	62.1	35.8

** Element descriptions:

#1: Glazed Element

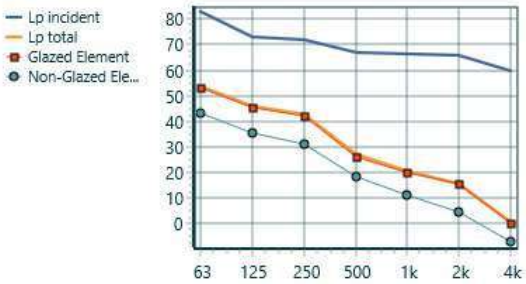
Glazing (Double):
- Pane 1: 1 x 8.38 mm Laminated Glass (generic PVB)
- Cavity: : 12 mm
- Pane 2: 1 x 10.38 mm Laminated Glass (generic PVB)
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 44.6 kg/m², Mass-air-mass resonant frequency = : 162 Hz

#2: Non-Glazed Element

Wall (Single)
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²

Outdoor To Indoor Sound Transmission (v10.0.7)

Program copyright Marshall Day Acoustics
Margin of error is generally within ±3 dB
- Key No. 5203
Job Name: 73,74 & 74A Broad Street, Reading, Berkshire, RG1
Job No.: 21063 Initials:BC
Date:03/02/2026
File Name:21063 Facade Overlooking Flue LAmax.inz



Octave Band Centre Frequency (Hz)								
Source	63	125	250	500	1k	2k	4k	Overall dBA
Incident sound level (freefield)	83.0	73.0	71.8	66.9	66.5	66.1	59.5	72.1
Path								
Element 1 , STL	-30	-28	-30	-41	-47	-51	-60	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 9 m²	9.5	9.5	9.5	9.5	9.5	9.5	9.5	
Element sound level contribution	53	45	42	26	20	15	0	35.9
Element 2 , STL	-37	-35	-38	-46	-53	-59	-64	
Facade Shape factor Level diff.	0	0	0	0	0	0	0	
Insertion Loss	0	0	0	0	0	0	0	
Area (+10LogA), 5 m²	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
Element sound level contribution	43	35	31	18	11	4	-7	25.6
Receiver								
Room volume (-10LogV), 52.00 m³	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10LogT)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	54	46	42	27	20	16	1	36.3
Level difference								LpAinc - LpARev,T0
D2m,nT	32.4	30.4	32.5	43.2	49.3	53.5	62.1	35.8

** Element descriptions:

#1: Glazed Element

Glazing (Double):
- Pane 1: 1 x 8.38 mm Laminated Glass (generic PVB)
- Cavity: : 12 mm
- Pane 2: 1 x 10.38 mm Laminated Glass (generic PVB)
- Details: Energy-based model, Panel Size 1.3 m x 1.5 m, Partition surface mass = 44.6 kg/m², Mass-air-mass resonant frequency = : 162 Hz

#2: Non-Glazed Element

Wall (Single)
- Panel 1: 1 x 170 mm Brick
- Details: Panel Size 2.7 m x 4.0 m, Partition surface mass = 272 kg/m²