

20 Merryweather Close
Wokingham RG40 4YH

Michael.sugiura@sugi.co.uk

Town and Country Planning Act 1990
Town and Country Planning General Regulations 1992

Noise Report

Project Re: 581/22

No.7 Blagrove Street
Reading
RG1 1PJ

Prepared by: Michael Sugiura CEng, BSc, MSc. (Tech), MIOA

Michael.sugiura@sugi.co.uk

November 2022

Project Title: No.7 Blagrove Street, Reading, RG1 1PJ				
Site Address: No. 7 Blagrove Street, Reading, RG1 1PJ				
Document Title:	NOISE REPORT			
Report Number:	581/22			
Prepared by	M S Sugiura			
Document Control Sheet:		Table of Contents	Text	Appendices
		1	35	5

Description	Comment	Author(s)	Approved by	Issue Date
Draft report	AS	M S	MS	23/11/2022
Reviewed by	AS	MS	MS	24/11/2022
Final report issued		MS	MS	25/11/2022

DISCLAIMER

This report was completed on the basis of a defined programme of work and terms and conditions agreed with the client.

The report has been prepared with all reasonable skill, care, and diligence within the terms of the contract and taking into account the project objectives, the agreed scope of work, prevailing site conditions and the degree of manpower and resources allocated to the project.

Michael Sugiura accepts no responsibility whatsoever, following the issue of the report, for any matters arising outside the agreed scope of the works.

This report is issued in confidence to the client and Michael Sugiura Associates has no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their risk

Unless specifically assigned or transferred within the terms of the agreement, Michael Sugiura Associates retains all copyright and other intellectual property rights, on and over the report and its contents.

Table of Contents

	EXECUTIVE SUMMARY	
1.	INTRODUCTION	6
2.	THE NATURE, MEASUREMENT AND EFFECT OF NOISE.....	7
3.	NOISE POLICY AND ASSESSMENT CRITERIA	9
3.1	National Planning Policy Framework.....	9
3.2	Noise Policy Statement England (NPSE).....	10
3.3	The Planning Practice Guidance	12
3.4	Reading Borough Council's Local Plan and Plan Policies.....	14
3.5	British Standard BS 4142:2014.....	17
3.6	British Standard BS 8233:2014.....	18
3.7	World Health Organisation Guidelines for Community Health.....	19
3.8	Noise Impact Matrix.....	20
3.9	IEMA Guidelines for Environmental Noise Impact Assessment	22
3.10	NPL Audit Report of the WHO Guidelines.....	22
4.	NOISE SURVEY.....	24
4.1	Noise Survey Methodology and Measurements	24
5.	ANALYSIS OF MEASUREMENTS.....	28
5.1	External Noise Levels at Rear of 7 Blagrove Street.....	28
5.2	External Road Traffic Noise Levels at Blagrove Street Frontage.....	28
5.3	Noise Level inside a room.....	29
6	DISCUSSION.....	30
6.1	Mitigation of Road Traffic Noise	30
6.2	Building Sound Insulation	32
6.3	Licensed Premises Late Night Activity Noise.....	33
7	CONCLUSIONS	35
	REFERENCES.....	36

List of Appendices

Appendix 1 Glossary of Terms

Appendix 2 Noise Measurements at rear of 7 Blagrove Street

Appendix 3 Noise Measurements at front façade of 7 Blagrove Street

Appendix 4 Calculations of Noise Level inside a Room

Appendix 5 Glazing and Ventilation Options

List of Charts

Chart 1 Time History of Noise Levels at rear of No.7 Blagrove Street, Reading RG1 1PJ

Chart 2 Time History of Noise Levels at front of No.7 Blagrove Street, Reading RG1 1PJ

List of Plans

Location and Site Plan P_00_G100_001 showing Noise Survey Measurement Locations

List of Tables

Table 2.1 Typical Noise Levels.....8

Table 3.1: PPG Noise Exposure Hierarchy.....13

Table 3.2 Internal Ambient Noise Levels for Dwellings BS 8233:2014.....19

Table 3.3: WHO Community Noise Guideline Values.....19

Table 3.4: Sensitivity of Receptor to Noise.....20

Table 3.5: Magnitude of change in noise levels.....21

Table 3.6: Degree of Effect Matrix.....22

Table 3.7: Degree of Effect Matrix Descriptors.....22

Table 4.1 Licensed Premises in the vicinity of No.7 Blagrove Street.....25

Table 4.2 Noise Levels inside Rooms 22 and 23 rear of No. 7 Blagrove Street....26

Table 4.3 Noise Levels inside Room 20 Blagrove Street frontage.....27

Table 5.1 Summary of External Environmental Noise Levels 29

Executive Summary

Noise measurement surveys in 2015 established ambient and background noise levels in the vicinity of the proposed potential noise sensitive rooms at the application site.

Road traffic comprises the principal source of environmental noise in the vicinity to the front elevation of the building. Initial predictions of the sound insulation performance of the building façade overlooking Blagrove Street has assumed the proposed scheme as shown on the application drawings.

To achieve a target “good” internal noise level of 30 $L_{Aeq, T}$ inside bed-and-breakfast bedrooms, 35 $L_{Aeq, T}$ living rooms the design for the windows should incorporate glazing and ventilation specifications shown in Appendix 5.

Sound levels inside the rooms incorporating these window specifications would ensure that a good standard of internal amenity could be achieved in terms of the criterion in BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.

Taking into account the existing transportation and mixed sources of mechanical plant, and late-night activity noise levels at the site we do not anticipate they’re being a problem achieving this standard. Consequently, extraneous noise levels will have no impact on the internal amenity of future occupiers as required by the Local Planning Authority.

1. Introduction

Michael Sugiura Associates have been commissioned by Christopher Bungard Architect on behalf of Mr Murli Bhatti to undertake a noise assessment and prepare a noise report which is required to be submitted in support of a planning application.

The purpose of this noise assessment is to assess the impact of noise on the facades of the new 5-storey building with a café, bed-and-breakfast from environmental noise sources road traffic and noise sources associated with neighbouring licensed premises, late night activity and the operation of mechanical plant in close proximity to the proposed development of additional bed and breakfast accommodation at the application site and to advise on a scheme of noise mitigation measures.

In Section 2 I briefly describe the nature, measurement, and effect of noise.

In Section 3 I refer to National Planning Policy Framework, Noise Policy Statement England, and the Local Planning Authority Reading Borough Council (RBC) Noise Policy and Noise Assessment Criterion. In Section 3 I review the noise standards, which may be appropriate and discuss the specific requirements of RBC Local Planning Authority in respect of noise generated by environmental noise sources.

In Section 4 I describe a noise survey of existing conditions on a weekday that I carried out in November 2015 and discuss the survey results. This report in Section 5 examines the likely implications for noise levels on the new development from road traffic and other environmental noise sources.

In Section 6 I present conclusions on the mitigation of road traffic noise and building sound insulation to achieve a good standard of internal amenity.

2. The Nature, Measurement and Effect of Noise

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to measure the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB (A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels from say 60 dB (A) to 70 dB (A) would represent a doubling in 'loudness'. Similarly, a decrease in noise from 70 dB (A) to 60 dB (A) would represent a halving in 'loudness'. A change of 3 dB (A) is generally considered to be just perceptible. **Table 2.1** details typical noise levels. An acoustic glossary is provided in **Appendix 1**.

Table 2.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

3. Noise Policy and Assessment Criteria

3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) (Ref.1) was first published on 27 March 2012 and revised in 2018, 2019 and most recently on 20 July 2021 and has superseded the Planning Policy Guidance which previously covered planning and pollution control and new development in England. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social, and environmental. The environmental role is to contribute to protecting and enhancing our natural, built, and historic environment; and as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.

One of the core planning principles is to contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser value, where consistent with other policies in the Framework. The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 174 of the NPPF states:

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.

Paragraph 185 of the NPPF states:

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 life¹;

Paragraph 187 of the NPPF states:

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.

The Framework indicates that the Noise Policy Statement for England (NPSE) (Ref.2) should be used to define "significant adverse impacts".

3.2 Noise Policy Statement England (NPSE)

The Noise Policy Statement for England (NPSE) (Ref.2) was developed by DEFRA and published in March 2010. The vision of the NPSE 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 aims to *'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'*

¹ See Explanatory Note to the *Noise Policy Statement for England* (Department for Environment, Food & Rural Affairs, 2010).

The explanatory note of NPSE defines the terms used in the Framework:

Paragraph 2.20 There are two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organisation. They are:

NOEL- No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise effects

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

2.21 Extending these concepts for the purpose of this NPSE lead to the concept of a significant observed adverse effect level.

SOAEL- Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur”

The NPSE clarifies that noise should not be considered in isolation from the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

The NPSE does not provide a numerical value for the SOAEL, stating in paragraph 2.22:

“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.”

3.3 The Planning Practice Guidance-Noise (“PPG-Noise”)

The Planning Practice Guidance (PPG) (Ref.3), published in March 2014, and revised July 2019 provides advice on how to determine the noise impact of development:

“Local planning authorities’ plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.*

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.” (Para 003 Ref.3).

The document goes on to provide a definition for the levels of noise exposure at which an effect may occur:

“Significant observed adverse effect level: this is the level of noise exposure above which significant adverse effects on health and quality of life occur.

Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.

No observed effect level: this the level of noise exposure below which no effect at all on health and quality of life can be detected.” (Para 004 Ref.3)

Table 3.1: PPG- Noise Exposure Hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
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 there is a change in the quality of life.	No observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
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 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 and reduce to a minimum
Significant Observed Adverse Effect Level			
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

The PPG does not provide any advice with respect to specific noise levels/ limits for different sources of noise but acknowledges that it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment.

3.4 Reading Borough Council's Local Plan 2019 and Plan Policies

3.4.1 Description of the Development and the Noise Climate

The Applicant proposes the proposed demolition of the existing 2-storey building and erection of a new 5-storey building with a café, bed-and-breakfast, and ancillary spaces.

The café will be located on the ground floor, the B&B lobby with the main staff area will be located towards the rear of the building and the B&B rooms will be located on the upper floors with an indicative total of 20 rooms ranging between 2 person and 4 person rooms.

The noise climate in the immediate locality of the site is affected principally by noise from the local highway network.

No. 7 Blagrove Street is opposite the Town Hall Museum and La Baguette's B& B comprises a café on the ground floor and B&B accommodation above. This A3 use and other commercial and retail uses in the locality all contribute to the vibrant mixed-use character of Reading centre and its ambient noise climate throughout the day, evening, and night. The site is approximately 5 minutes walking from Reading Station and 25m from a main bus route from the station.

To a lesser or greater extent in comparison to transportation noise sources the site is also affected by noise generated from various items of mechanical plant for internal processes including heating, kitchen extract and ventilation plant serving adjoining premises in the locality. There is also use of the rear areas of adjoining licensed premises for external outside spaces and smoking areas in common with similar commercial development in the Reading City Centre.

3.4.2 Planning Policies Related to Noise

Reading Borough Council (RBC) Local Plan (Ref.4) was adopted on 4th November 2019. It replaces the three previous development plan documents, the Core Strategy (adopted 2008, amended 2015), Reading Central Area Action Plan (adopted 2009) and Sites and Detailed Policies Document (adopted 2012, amended 2015). The Plan sets out the Council's policies for guiding and controlling the way that buildings and land are used and developed. The Local Plan in general states that when the proposed development is the generator of noise, RBC will require the applicant to demonstrate that any noise impacts can be successfully mitigated and where the occupiers of the new B&B accommodation would not be affected by unreasonable levels of environmental noise and where development would be physically integrated with the existing development and respect the character, amenity, and outlook of existing properties.

3.4.3 Reading Borough Council (RBC) Pre application advice

Reading Borough Council (RBC) Local Planning Authority (LPA) pre application advice seeks information and reassurance on the impact of noise pollution issues for users of the proposed B&B accommodation specifically noise from road traffic (buses, delivery/refuse vehicles throughout the night, late night activity in the City Centre together with any other sources of noise for example air handling plant identified as part of the assessment process. Late night activity refers generally to night-time noise attributable to licensed premises that operate until late. Reading Borough Council recommended that the likelihood of music and patron noise from such premises in the evening and early hours of the morning is taken into account as part of the character of the area when undertaking noise surveys or assessments for future development in the area.

3.4.4 Reading Borough Council (RBC) Noise Criteria

Reading Borough Council require an acoustic report to show that the internal noise levels within any residential use at the property will be compliant with the requirements of the Council's Local Plan Policies (Ref.4).

Residential developments that will be exposed to high levels of existing noise will require design, features, and sound insulation to enable residents to be protected from such external noise. These should be designed to enable the following BS 8233:1999 (Ref.5) and its replacement BS 8233:2014 (Ref.6) and WHO guideline levels (Ref.7) to be met in all residential developments.

For new build, RBC expect that the design will meet the 'good' standard. Where a building is being renovated and/or is listed, the 'reasonable' standard might be acceptable where the 'good' standard cannot be met.

Where proposed residential development would be subject to high levels of noise from mixed sources examples of conditions below would be imposed to ensure that the development incorporates effective protection against noise.

- a) Living rooms: Upper limit (reasonable) <40 dB daytime (07:00hrs-23:00hrs), Design criteria (good) <30dB to prevent interference of speech and moderate annoyance
- b) Bedrooms: Upper limit (reasonable) <35 dB, Design criteria (good) <30 dB, night time (23:00hrs-07:00hrs), 45 dBL_{Amax} to prevent sleep disturbance
- c) Gardens and balconies Upper limit (reasonable) <55 dB, Design criteria (good) <50dB

3.4.4 Reading Borough Council (RBC) Local Plan 2019 Policy EN17

Applications which include noise generating plant when there are nearby noise sensitive receptors should be accompanied by an acoustic assessment carried out in accordance with BS4142:2014+A1:2019 methodology (Ref.8). It is likely that this development will include noisy mechanical plant such as air conditioning, kitchen extraction, generator, externally ventilated plant room. The noise assessment needs to establish the predicted noise rating level taking account of any characteristic factors like tonality or impulsiveness of the noise. The rating level should be compared with the background noise level. The noise source specific noise level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor and the rating level should not exceed the background level (as measured in accordance with BS4142:2019+A1:2019 (Ref.8).

3.5 British Standard 4142:2014+A1:2019

BS 4142:2014+A1:2019 which supersedes BS 4142:2014 (Ref.8) describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes a) sound from industrial and manufacturing processes; b) sound from fixed installations which comprise mechanical and electrical plant and equipment; c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from the premises or processes, such as forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site”.

The standard assesses the likely impact from a proposed scheme by considering the difference between the “rating levels” of the sound being assessed with the “background sound level” of the area.

The noise source is assessed in terms of the $L_{Aeq, T}$ statistical index – in effect the average sound energy level (see the Glossary at Appendix 1 for a description of this index). During the daytime period (defined as 0700 hours to 2300 hours) the L_{AeqT} level must be normalised to 1hour ($L_{Aeq, 1hr}$). BS 4142:2014 +A1:2019 terms this level the “specific sound level”.

The specific sound level is then corrected by given decibel factors for any impulsiveness, tonality, intermittency, or other character that may attract attention. These different character corrections are additive. BS 4142:2014+A1:2019 calls the resultant corrected level the “rating level”.

The background sound level is described by the LA_{90} statistical index- the level exceeded for 90% (i.e., almost all of) the time.

Section 11 of BS 4142:2014+A1:2019 (Ref.8) is important and warrants careful consideration and analysis. The following extracts are of note:

“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur.

When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following:-

- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact depending on the context.
- d) 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.”

BS 4142+A1:2019 (Ref.8) employs assessment criteria in terms that are the same as those used within Government policy and practice, i.e., the degree of adverse impact.

However, the standard allows only an “initial estimate” of impact and repeatedly stresses the need to consider context. In this respect other guidance is useful. Such guidance is discussed below. In BS 4142:2014 +A1:2019 (Ref.8) in addition to changing the rating penalty from 0 dB or 5dB to a graduated level theoretically up to 18 dB and altering the night-time reference period to 15 minutes, other significant changes include uncertainty and context. The outcome is no longer a possibly ambitiously estimated likelihood of complaint but consideration of the likely significance of the impact (effect on amenity).

3.6 British Standard BS 8233:2014

BS 8233: 1999 Sound Insulation and Noise Reduction for Buildings – Code of Practice (Ref.5) and its replacement BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (Ref.6) has design criteria and limits for intrusive external noise. The guidelines are designed to achieve reasonable resting/sleeping conditions in bedrooms and good listening conditions in other rooms. Those most appropriate to the residential environment are reproduced in **Table 3.2**.

Table 3.2: Internal Ambient Noise Levels for Dwellings: BS 8233:2014

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	
Sleeping (daytime resting)	Bedrooms	35 $L_{Aeq,16hour}$	30 $L_{Aeq,8hour}$
	Garden	Upper limit of 55dB L_{Aeq}	

3.7 World Health Organisation Guidelines for Community Noise

The World Health Organisation (WHO) (Ref.7) has developed guidelines designed to minimise the adverse effects of noise. The guidelines relevant to residential noise exposure are detailed in **Table 3.3**. For each specific environment the stated noise levels are the maximum noise levels to avoid the health effect noted.

Table 3.3: WHO Community Noise Guideline Values

Specific Environment	Critical health effect(s)	L_{Aeq} dB	Time Base (hours)	L_{Amax} (fast) dB
Outdoor living area	Serious annoyance, daytime, and evening	55	16	-
	Moderate annoyance, daytime, and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime, and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

3.8 Noise Impact Matrix

The Noise Impact Matrix defines a set of parameters from which the magnitude of the impact of noise as a result of the development, on surrounding sensitive receptors, can be categorised. The Noise Impact Matrix parameters have been derived from guidance provided in BS 8233 (Ref.6) and the WHO guidelines (Ref.7).

The criteria used to determine the sensitivity of a receptor is given in **Table 3.4** below. In producing this criterion, it is assumed that all buildings are naturally ventilated via partially open windows, giving 13 dB (A) of noise reduction from outside to inside. This is considered to represent a worst-case scenario.

Table 3.4: Sensitivity of receptor to noise

	High	Medium	Low	Negligible
Humans	Receptors of greatest sensitivity to noise such as World Heritage Sites and churches	Noise sensitive receptors such as dwellings, hospitals, schools, places of quiet recreation and places of recognised tranquillity	Receptors with some sensitivity to noise such as offices, other workplaces and play areas	Receptors of very low sensitivity to noise or marginal to the zone of influence of the proposals

The magnitude of the change in noise levels is considered using the criteria outlined in **Table 3.5** below. The absolute and relative changes are considered in parallel, and the worst case taken. The absolute noise levels are with reference to the recommendations for dwellings made in BS 8233:2014 'Sound insulation and noise reduction for buildings' (Ref.6). and the World Health Organisation's Guidelines for Community Noise (Ref.7) The relative levels are reproduced from the semantic scale found in the Department of Transport's 'Design Manual for Roads and Bridges' guidance document (Ref.9).

Table 3.5: Magnitude of change in noise levels

	Large	Medium	Small	Negligible
Relative change	Greater than 10 dB(A) change in sound level	5 to 9.9 dB(A) change in sound level	3 to 4.9 dB(A) change in sound level	2.9 dB(A) or less change in sound level
Absolute change – Adverse daytime	If $b < 50$ dB $L_{Aeq,16hr}$ and $f \geq 55$ dB $L_{Aeq,16hr}$ If f triggers entitlement to statutory sound insulation	If $b < 50$ dB $L_{Aeq,16hr}$ and $50 \leq f < 55$ dB $L_{Aeq,16hr}$ If $50 \leq b < 55$ dB $L_{Aeq,16hr}$ and $f \geq 55$ dB $L_{Aeq,16hr}$		
Absolute change – Adverse night-time	If $b < 45$ dB $L_{Aeq,16hr}$ and $f \geq 45$ dB $L_{Aeq,16hr}$ If $b < 60$ dB L_{Amax} and $f \geq 60$ dB L_{Amax} If $b \geq 60$ dB L_{Amax} but does not exceed 85 dB L_{Amax} more than twice in a one-hour period and $f \geq 85$ dB L_{Amax} more than twice in a one-hour period	If $b > 85$ dB L_{Amax} though not regularly and f exceeds 85 dB L_{Amax} more than twice in anyone-hour period		
Absolute change – Beneficial daytime	If $b \geq 55$ dB $L_{Aeq,16hr}$ and $f < 50$ dB $L_{Aeq,16hr}$	If $50 \leq b < 55$ dB $L_{Aeq,16hr}$ and $f < 55$ dB $L_{Aeq,16hr}$ If $b \geq 55$ dB $L_{Aeq,16hr}$ and $50 \leq f < 55$ dB $L_{Aeq,16hr}$		
Absolute change – Beneficial night-time	If $b \geq 45$ dB $L_{Aeq,16hr}$ and $f < 45$ dB $L_{Aeq,16hr}$ If $b \geq 60$ dB L_{Amax} and $f < 60$ dB L_{Amax}			

Note: “b” denotes for the existing or future baseline noise levels and “f” stands for the predicted future noise levels.

Finally, to determine the overall noise impact the magnitude and sensitivity criteria are combined into a Degree of Effect matrix as shown in **Table 3.6** below, with the corresponding descriptors in **Table 3.7**.

Table 3.6: Degree of Effect Matrix

		Importance/sensitivity of receptor			
		High	Medium	Low	Negligible
Magnitude/scale of change	Large	Very Substantial	Substantial	Moderate	None
	Medium	Substantial	Substantial	Moderate	None
	Small	Moderate	Moderate	Slight	None
	Negligible	None	None	None	None

Table 3.7: Degree of Effect Matrix Descriptors

Very Substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB L_{Aeq} change in sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB L_{Aeq} change in sound level at a receptor of some sensitivity
None/Not Significant	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals

3.9 IEMA Guidelines for Environmental Noise Impact Assessment 2014

The aim of the guidelines (Ref.10) is to set good practice standards for the scope, content, and methodology of noise impact assessment. It is recognised that an assessment strategy should determine the period when the maximum impact occurs and when the greatest level of change is likely. This precludes the examination solely of peak hour effects, or the use of longer-term parameters for the assessment of noise levels, in favour of the greatest impact of change.

3.10 NPL Audit Report of the WHO Guidelines

This National Physical Laboratory document (Ref.11), which was commissioned by the Department of the Environment, Transport, and the Regions, contains a section entitled: Guide to the Interpretation of the WHO Guidelines. The summary of this section of the NPL report states:

“The WHO guidelines represent a consensus view of international opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached.” “Higher degrees of exposure “is not defined by NPL. However, generally this would equate to around 10 dB (i.e., above the WHO guideline values of 55 dB day and 45 dB night) – around a doubling of the loudness.

4. Noise Survey

Noise measurement surveys were carried out at the site during Friday 13th – Saturday 14th November and Monday 16th - Tuesday 17th November 2015 to record the existing ambient noise climate for the daytime, evening, and night-time periods.

Noise measurement procedures were in accordance with BS 7445:2003 “Description and Measurement of Environmental Noise (Ref.12). The surveys determined the extent to which the rear and front elevations of No.7 Blagrove Street is currently affected by environmental and other noise sources. This baseline noise measurement information forms the basis of the acoustic analysis.

4.1 Noise Survey Methodology and Measurements

4.1.1 Noise Monitoring at rear of 7 Blagrove Street

Unattended semi-permanent automatic environmental noise measurement equipment was installed on the flat roof at the rear elevation of the building (MP1) outside Room 23 on the 1st floor of the B&B , with weather protected microphone) approximately 4m above local ground pre-set to record noise levels L_{Aeq} , L_{Amax} and L_{A90} every 15 minutes continuously for 24hrs.

The noise survey utilised a Rion NA-27 Type 1 Precision Sound Level Meter, which holds a current certificate of calibration. Before and after the measurement period the equipment was calibrated in order to ensure that the equipment had remained within reasonable calibration limits (+/- 0.5 dB).

The weather was dry, mild, and cloudy with some showers prior to the commencement of the survey, light wind (<5 m/s) and a temperature of between 6°C - 11°C.

The semi-permanent noise monitoring position mp1 is shown on Location + Site Plan P_00_G100_001.

This 24hrs survey monitored noise arising from late night activities from licensed premises in the vicinity of 7 Blagrove Street (Table 4.1).

Table 4.1: Licensed Premises in the vicinity of No.7 Blagrove Street

Premises/Location	Opening Times	Premises/Location	Opening Times
Walkabout, Wiston Terrace RG1 1DG	12:00 – 02:00 Mon- Thurs 12:00-03:00 Fri 12:00-00:30 Sun	O'Neill's, 4 Friar Street RG1 1DB	09:00-00:00
Yates Wine Bar, Friar Street RG1 1DB	Permanently Closed 2022	Match Box, 5-6 Friar Street RG1 1DB	Permanently Closed 2022

The full results of “free-field” noise levels from noise monitoring position mp1 are shown in Appendix 2 and Chart 1.

During site attendance on 14th November 2015 external satellite noise monitoring positions (mp3 and mp4) were established on the site to establish noise levels from existing external mechanical plant utilising a Norsonic 140 Type 1 Precision Sound Level Meter.

Noise measurements were recorded of the outdoor plant serving the neighbouring A3 uses outside the plane of a partially open window and on the existing FF roof to ascertain the contribution of the various ventilation plant and other equipment in situ. Noise measurements of existing conditions were also recorded inside the existing bedrooms with windows open and closed. These measurements are presented in Table 4.2.

Table 4.2: Noise Levels inside and outside Room 22 and Room 23

Location	Time	L _{Aeq,10mins}	L _{A90,10mins} (dB)
Inside Room 22, top window fully open	10:51	46	42
Inside Room 22, top window part open	11:04	42	28
Inside Room 22, windows closed	11:19	33	27
Inside Room 23, top window part open (music)	11:24	40	37
Outside Room 22 (plant noise)	11:35	56	55
Outside Room 23 (music noise)	11:40	58	57

4.1.2 Noise Monitoring at Blagrove Street frontage

Unattended semi-permanent automatic environmental noise measurement equipment was installed inside Room 20 on the 1st floor, with weather protected microphone approximately 4m above local ground externally mounted 1.0m outside the plane of the window of the building façade.

The weather was dry, mild, and cloudy and a temperature of between 12°C - 15°C. Noise levels were continuously recorded between 11:30 on Monday 16th to 12 noon on Tuesday 17th November and pre-set to record noise levels every 15 minutes continuously for 24hrs.

The environmental noise climate was moderately affected by road traffic noise from Blagrove Street and Valpy Street.

The noise monitoring position mp2 is shown on Location + Site Plan P_00_G100_001.

The full results of “facade” noise levels from noise monitoring position mp2 are shown in Appendix 3 and Chart 2.

Table 4.3: Noise Levels inside Room No. 20 Blagrove Street frontage

Location	Time	L _{Aeq,5mins}	L _{A90,5mins} (dB)
Inside Room 20, secondary glazing outside window part open	10:20	30	27
Inside Room 20, secondary glazing open	10:28	30	35
Outside Room 20, plane of window	10:34	66	60

5. Analysis of Measurements

5.1 External Noise Levels at Rear of 7 Blagrove Street

At the rear of the building (mp1) daytime background noise levels L_{A90} were consistently measured in the range 54 to 58 dB (A) during 07:00 to 18:00.

Background $L_{A90, 15mins}$ noise levels were measured in the range 59 to 64 dB(A) during the evening 19:00 - 22:00 and were recorded in the range 61 to 70 dB (A) during night time 23:00-03:00 the terminal hour of some of the neighbouring licensed premises.

It was noted that during 23:00 - 03:00 hours higher background and ambient noise levels were recorded than the evening period and this is attributed to the use of an external rear heated outdoors space by patrons of the nearby Walkabout, and other licensed premises outdoors smoking areas. L_{max} noise levels occasionally exceeded 80dB during the late evening and night time extended licensing hours 23:00-03:00.

The lowest $L_{A90, 15mins}$ background noise levels at the rear of the building (mp1) were in the range 54 to 55dB(A) after 03:00 up to 07:00 hours.

The mechanical plant of neighbouring premises would have been selected as low noise emission plant to meet the requirements of the Local Planning Authority. The outdoor equipment is partially screened by the adjoining building (O'Neill's) and their location and distance from the closest potential noise sensitive B&B rooms at 7 Blagrove Street. This ensures that the minimum of noise is transmitted to the property. Under actual operating conditions the performance of the plant produce very low levels of noise to atmosphere.

5.2 External Road Traffic Noise Levels at Blagrove Street frontage

The results show that $L_{A10, 18hr}$ traffic noise levels "façade" at 7 Blagrove Street measured is 74 dB(A) based on traffic flows in 2015. The conversion for L_{A10} (18hr) to L_{Aeq} (16hr) is -2dB. The estimated façade at 7 Blagrove Street $L_{Aeq, 16h}$ are representative of typical conditions daytime $L_{Aeq, 16h}$ (07:00 – 23:00 hours) 72 dB(A) and Night-time (23:00 -07:00 hours) 76 dB(A).

Table 5.1: Summary of External Environmental Noise Levels

Location	Daytime (07:00-23:00)	Night time (23:00-07:00)
Front facade	72	76
Rear	62	68

5.3 Noise Level inside a Room

An initial calculation of noise level inside a room has assumed the form of construction as follows: Block plus cavity plus block. The finishing either brick cladding, wooden cladding, or render. Insulated glass unit, sound attenuated ventilator. The calculation makes assumptions, and it is likely that the estimated levels differ from measured values.

Consideration of the required façade acoustic performance is based upon achieving internal noise levels as advised in British Standard BS 8233:2014 (Ref.7).

6. Discussion

6.1 Mitigation of Road Traffic Noise

Consideration of the required façade acoustic performance is based upon achieving internal noise levels as advised in British Standard BS 8233:2014 (Ref.6). The internal levels set out below are the basis of the façade assessment.

Period	Typical situations	Noise Criterion
Daytime (07:00 -23:00)	Living rooms	35 $L_{Aeq,16hr}$
	Dining rooms	40 $L_{Aeq,16hr}$
Night time (23:00-07:00)	Bedrooms	30 $L_{Aeq,8hr}$

It should be noted that BS8233:2014 no longer advises on a specific L_{Amax} internal noise criterion but comments that *“A guideline value may be set in terms of SEL or $L_{Amax,f}$ depending on the character and number of events per night”*. To maintain consistency with past standards a night-time internal noise control criterion of 45 dB L_{Amax} for bedrooms has been used in this assessment.

The applicable incident spectrum noise levels for each 5dB band used in the façade break in calculations are as shown below: -

	Octave band centre frequency (Hz)						
Daytime	63	125	250	500	1k	2k	4k
	Sound pressure level ref 2x 10 ⁻⁵ Pa						
<50 dB Leq,16hr	52	48	47	47	47	42	37
50-<55 dB Leq,16hr	57	53	52	52	52	47	42
55-<60 dB Leq,16hr	62	58	57	57	57	52	47
60-<65 dB Leq,16hr	67	63	62	62	62	57	52
65-<70 dB Leq,16hr	72	68	67	67	67	62	57
	Octave band centre frequency (Hz)						
Night time	63	125	250	500	1k	2k	4k
	Sound pressure level ref 2x 10 ⁻⁵ Pa						
<45 dB Leq,8hr	47	43	42	42	42	37	32
45-<50 dB Leq,8hr	52	48	47	47	47	42	27
50-<55 dB Leq,8hr	57	53	52	52	52	47	42
55-<60 dB Leq,8hr	62	58	57	57	57	52	47
60-<65 dB Leq,8hr	67	63	62	62	62	57	52
65-<70 dB Leq,8hr	72	68	67	67	67	62	57
	Octave band centre frequency (Hz)						
Night time LA _{max,f}	63	125	250	500	1k	2k	4k
	Sound pressure level ref 2x 10 ⁻⁵ Pa						
<60 dB LA _{max,f}	56	56	57	55	56	53	44
60-<65 dB LA _{max,f}	61	61	62	60	61	58	49
65-<70 dB LA _{max,f}	66	66	67	65	66	63	54
70-<75dB LA _{max,f}	71	71	72	70	71	68	59
75-<80 dB LA _{max,f}	76	76	77	75	76	73	64
80-<85 dB LA _{max,f}	81	81	82	80	81	78	69

BS8233:2014 (Ref.6) makes comment with respect of acceptable noise levels for balconies and private amenity areas as set out below, “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.

Where balconies are small and are not intended for the purposes of relaxation BS8233:2014 (Ref.6) advises that a noise control limit should not be necessary and that where balconies may be used for relaxation consideration should be given to achieving the lowest practical levels”.

6.2 Building Sound Insulation

World Health Organisation's document, "*Night noise guidelines for Europe*" to (2009), sets out that a 15dBA reduction in external noise level can be expected to arise through a window when open sufficiently for ventilation.

Façade assessment is based upon meeting the internal noise criterion set out in Table 3.2.

On this basis the design internal noise criteria above relate to façade incident external noise levels with windows open for background ventilation as shown below: -

- Daytime (living rooms) 50 dB $L_{Aeq,16hr}$;
- Night time (bedrooms) 45 dB $L_{Aeq,8hr}$;
- Night time (bedrooms) 60 dB $L_{Amax,fast}$

Areas of façade with façade incident noise levels at or below those set out above would have no particular acoustic performance requirements. Areas of façade where the incident noise levels are greater than that set out above will require a level of acoustic performance which is dependent upon the incident façade noise levels. These levels are referred to as "base noise levels".

For those areas of façade which require some level of acoustic performance the scheme of sound attenuation in the building design will include windows and balcony doors with appropriate acoustic ratings. It is understood that background ventilation strategy for the residential units is trickle vents.

Based upon the planning application drawings we have considered mitigation measures for the sound insulation of the rooms.

Indicative glazing and ventilator acoustic performance requirements for windows have been assessed and are specified and highlighted in Appendix 3.

The calculated minimum required glazing and ventilator acoustic performances are based upon the highest ratio of glazing to solid façade as indicated on the drawings for the development. The "worst case" ratios of glazing (high proportion) to solid façade (low proportion) are considered to be living rooms and bedrooms.

All glazing systems installed must comply with the performance specification detailed in Appendix 4. The window frame system must provide no less sound insulation than the glazing. Hollow uPVC type frames may not achieve this requirement.

The calculated minimum ventilator acoustic performances are set out in Appendix 3. Attenuated ventilation is only effective when the room windows are closed. There will be occasions when purge ventilation is called for and if this is to be achieved by opening windows the predicted room noise levels would increase significantly. Approved Document F (ADF) at paragraph 0.13 on page 7 describes purge ventilation as being to *“aid removal of high concentrations of pollutants and water vapour released from occasional activities such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water. Purge ventilation is intermittent i.e., required when such occasional activities occur”*

Given the above description of purge ventilation in ADF that such ventilation is intermittent and required to deal with specific short-term events it is considered that it is acceptable for such ventilation to be achieved by opening windows, even if the noise level exceeds the BS 8233 internal noise criteria (Ref.6).

6.3 Licensed Premises Late Night Activity Noise

In general, noise is considered an important consideration for premises where one of the four licensing objectives of the Licensing Act 2003 is ‘prevention of public nuisance’. Proposed noise control measures are required to be included in an application for a premises licence.

Conditions relating to noise are usually attached to an existing or a new licence that address controls on noise, particularly the prevention of public nuisance. If a premises is located in a residential area or adjoining a premises, tighter controls on noise may need to be implemented particularly if the premises is operating after 23:00. Conditions can be attached to the licence on the control of noise from amplified music, noise from smokers congregating outside licensed premises, outdoors spaces, and problem patrons.

Breaching the conditions of a licence is an offence under the Licensing Act 2003, for which the Licensing Authority may prosecute, or interested parties including the Council or local residents can call for a review of the premises licence. This may result in additional conditions being added to a licence, or the licence being suspended or even revoked in serious cases.

The Council can also take action under the Statutory Nuisance provisions of the Environmental Protection Act 1990. If noise amounting to a Statutory nuisance is witnessed then an Abatement notice will be served and failure to comply with an Abatement Notice is a criminal offence.

7. Conclusions

The noise assessment noise terms considered environmental noise levels in 2015 at 7 Blagrove Street, Reading RG1 1PJ.

The proposed scheme in noise terms will meet the requirements of Reading Borough Council the Local Planning Authority Local Plan 2019 and the scheme will be in accordance with National Planning Policy Framework (NPPF) Revised July 2021 (Ref.1) and Noise Policy Statement for England (NPSE) (Ref.2).

The application plans show that good use of internal layout of the proposed B&B accommodation is incorporated to minimise the effect of road traffic noise and other environmental noise sources on the amenity of future occupiers.

The construction of the proposed building would ensure that mitigation measures including site layout and façade treatment including construction detail should result in a good standard for the living conditions of future guests. A night-time maximum noise level 45dB for bedrooms should be achieved to maintain consistency with earlier standards.

The internal noise levels are subject to final detailing of the building insulation including glazing and ventilation specification and the overall resultant sound insulation provided by the façade. The window frame system must provide no less sound insulation than the glazing.

Residential noise standards will be met in line with the latest technical advice. Internal noise criteria as advised in BS8233:2014 Sound Insulation and Noise Reduction for Buildings will be achieved (Ref.7).

References

1. National Planning Policy Framework
2. Noise Policy Statement England
3. The Planning Practice Guidance – Noise
4. Reading Borough Council Local Plan 2019
5. BS 4142:2014 +A1:2019 “Methods for Rating and Assessing Industrial and Commercial Sound”
6. BS 8233:1999 Sound Insulation and Noise Reduction for Buildings Code of Practice
7. BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings
8. World Health Organisation “Guidelines for Community Noise” 1999
9. Department of Transport “Design Manual for Roads and Bridges”
10. IEMA “Guidelines for Noise Impact Assessment
11. National Physical Laboratory Audit Report of the WHO Guidelines
12. BS7445: 2003 Description and Measurement of Environmental Noise Pts 1-3

Appendix 1: Glossary of Terms

Term	Description
'A'-Weighting	<i>This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.</i>
Decibel (dB)	<i>This is a tenth (deci) of a bel. The decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.</i>
$L_{Aeq,T}$	<i>The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.</i>
L_{A10}	<i>The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 10 per cent of a given time and is the L_{A10T}. The L_{A10} is used to describe the levels of road traffic noise at a particular location.</i>
L_{A50}	<i>The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 50 per cent of a given time and is the L_{A50T}.</i>
L_{A90}	<i>The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time and is the L_{A90T}. The L_{A90} is used to describe the background noise levels at a particular location.</i>
L_{Amax}	<i>The 'A'-weighted maximum sound pressure level measured over a measurement period.</i>

Appendix 2: Noise Measurements at rear of 7 Blagrove Street

Name:	M S Sugiura	M-Time:	15 min
Date of survey:	13/11/2015	Measurement mode:	Lx
Location:	7 Blagrove Street-rear	Lmax/Lmin type:	AP
Instrument:	NA-27	F-weight (Main) :	A
Store mode:	Auto store 1	F-weight (Sub) :	A
Description:	Ambient noise levels	T-weight (Main) :	Fast

Time	Lmax	Leq	L1	L10	L90
12:45:54	74.0	58.6	63.0	59.6	57.5
13:00:54	71.7	59.1	62.2	60.2	57.9
13:15:54	64.3	57.1	60.3	58.1	56.0
13:30:54	71.4	58.4	61.1	59.3	57.5
13:45:54	83.5	58.7	62.9	59.6	57.0
14:00:54	62.6	56.8	58.4	57.6	56.2
14:15:54	70.0	57.5	59.7	58.6	56.6
14:30:54	70.9	58.0	61.1	58.6	57.4
14:45:54	69.8	58.0	59.8	58.7	57.3
15:00:54	68.5	57.2	59.7	58.3	55.9
15:15:54	69.2	57.8	62.5	58.6	56.8
15:30:54	64.5	57.6	60.2	58.5	56.8
15:45:54	77.9	57.6	61.1	58.5	55.7
16:00:54	70.2	56.5	61.7	57.0	55.5
16:15:54	64.4	57.3	59.0	58.1	56.5
16:30:54	70.9	58.1	62.9	58.5	57.3
16:45:54	69.6	58.3	60.9	59.0	57.5
17:00:54	73.4	58.2	62.7	58.9	57.1
17:15:54	69.6	58.3	63.2	59.3	57.3
17:30:54	69.9	59.0	63.7	60.2	57.6
17:45:54	70.9	60.4	65.1	62.1	58.4
18:00:54	70.6	60.3	64.5	62.0	58.1
18:15:54	75.1	62.7	67.4	64.4	60.6
18:30:54	76.8	62.3	67.3	63.9	60.2
18:45:54	72.4	62.8	67.4	64.7	60.6
19:00:54	71.9	61.8	66.9	63.8	59.4
19:15:54	72.4	62.8	67.7	64.7	60.5
19:30:54	74.0	62.9	68.5	65.1	60.0
19:45:54	80.0	63.1	71.0	64.5	60.2
20:00:54	73.9	61.3	66.7	63.7	58.7
20:15:54	76.4	61.5	71.0	64.3	56.7
20:30:54	77.3	63.6	70.0	66.0	60.1
20:45:54	77.0	63.5	69.5	65.7	60.4
21:00:54	87.2	66.0	72.5	66.6	61.7
21:15:54	78.5	64.2	70.4	66.6	60.6
21:30:54	82.8	65.8	71.1	68.0	62.5
21:45:54	77.3	66.2	70.7	68.2	63.8
22:00:54	75.2	65.6	70.1	67.5	63.3
22:15:54	79.7	68.8	74.5	71.0	65.8
22:30:54	81.4	70.1	75.6	72.2	67.2
22:45:54	80.4	70.5	74.5	72.3	68.3
23:00:54	79.6	71.0	74.9	72.7	69.0

23:15:54	79.1	71.3	74.7	72.8	69.5
23:30:54	83.4	71.7	75.2	73.2	69.7
23:45:54	79.4	71.9	75.3	73.4	70.1
00:00:54	79.6	72.6	75.8	74.2	70.7
00:15:54	82.1	71.0	74.7	72.7	68.7
00:30:54	79.7	71.3	74.9	72.8	69.4
00:45:54	95.1	72.2	76.6	73.2	69.7
01:00:54	79.1	70.5	74.9	72.2	68.5
01:15:54	85.1	72.5	77.4	74.2	70.1
01:30:54	81.1	71.2	75.4	72.9	69.2
01:45:54	78.2	71.5	75.2	73.1	69.7
02:00:54	83.4	70.5	75.2	72.5	67.3
02:15:54	83.2	69.1	74.6	71.1	66.1
02:30:54	77.4	68.5	73.0	70.7	65.7
02:45:54	80.7	70.3	75.1	72.3	67.8
03:00:54	75.5	65.4	70.8	67.8	60.8
03:15:54	68.6	56.7	62.8	57.6	54.9
03:30:54	70.3	56.8	62.1	57.7	54.7
03:45:54	82.6	58.1	66.0	59.2	54.7
04:00:54	78.1	57.7	65.1	58.8	55.0
04:15:54	72.5	55.8	64.2	55.7	54.1
04:30:54	78.8	56.1	61.2	57.2	53.9
04:45:54	68.9	56.0	60.1	57.2	54.3
05:00:54	65.2	54.4	57.1	55.2	53.5
05:15:54	58.4	56.0	57.5	57.1	54.2
05:30:54	68.7	54.4	55.6	55.0	53.8
05:45:54	64.5	56.3	57.9	57.2	54.8
06:00:54	58.6	56.1	57.5	57.1	53.8
06:15:54	59.2	56.0	57.8	57.2	54.2
06:30:54	61.7	55.0	57.4	56.1	54.1
06:45:54	73.2	55.2	58.6	55.8	54.1
07:00:54	64.7	56.4	58.5	57.3	54.7
07:15:54	61.5	54.8	57.6	55.6	54.0
07:30:54	74.7	56.6	62.6	57.9	54.1
07:45:54	65.0	55.2	58.9	56.9	53.5
08:00:54	63.3	55.7	58.1	57.3	54.1
08:15:54	69.1	55.9	59.6	57.1	53.6
08:30:54	64.0	56.5	58.9	57.6	55.0
08:45:54	62.0	57.2	58.9	58.1	55.9
09:00:54	72.8	58.0	63.5	60.2	55.6
09:15:54	67.1	57.2	62.5	58.3	55.8
09:30:54	68.4	58.2	64.6	59.4	56.0
09:45:54	68.0	57.5	62.0	59.0	55.9
10:00:54	66.8	57.5	60.7	58.8	55.8
10:15:54	61.5	56.4	59.0	57.6	55.3
10:30:54	62.7	57.5	60.3	58.5	56.2
10:45:54	63.2	57.4	60.2	58.6	56.0
11:00:54	65.9	57.2	59.8	58.5	55.6
11:15:54	69.9	58.0	65.4	59.6	55.8
11:30:54	73.4	57.3	62.7	58.5	55.7

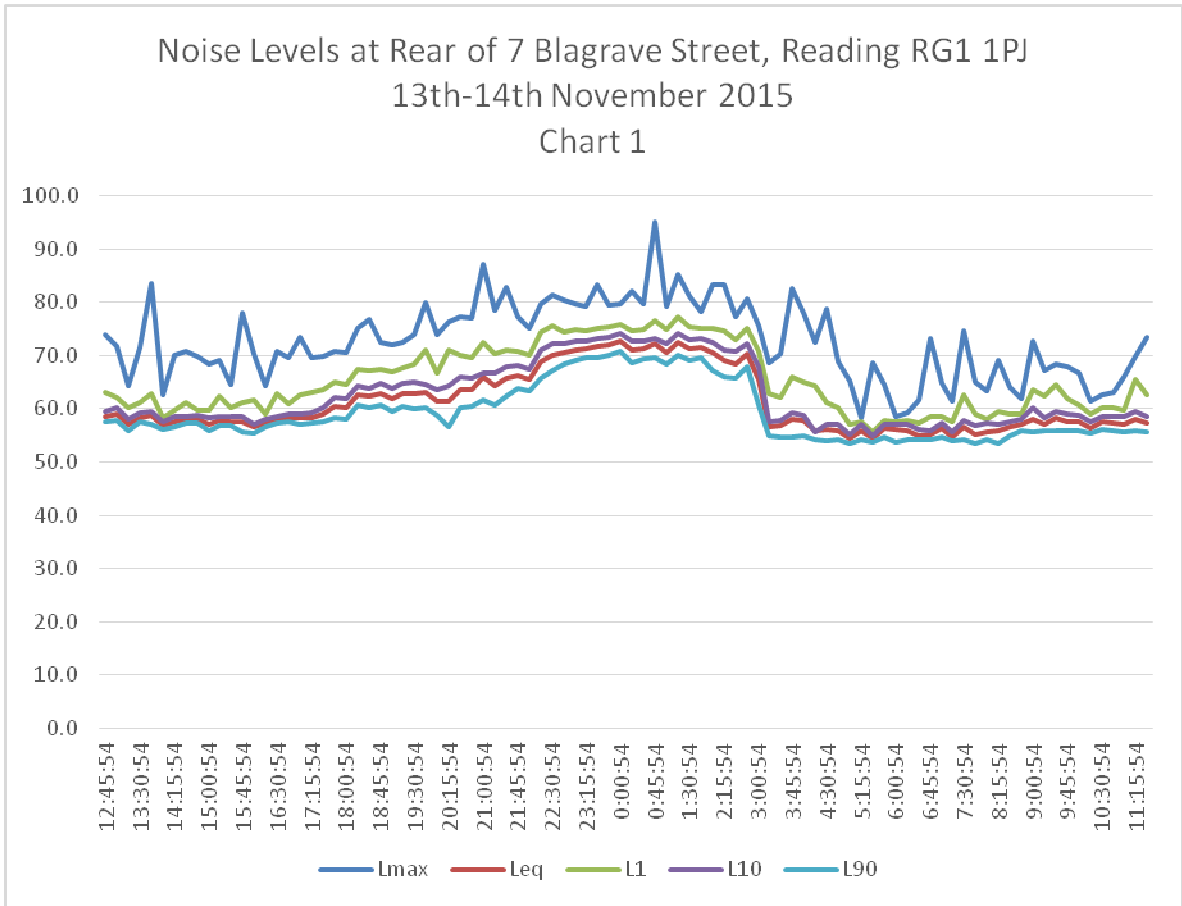
Appendix 3: Noise Measurements at front facade of 7 Blgrave Street

Name: M S Sugiura M-Time: 15 min
 Date of measurement: 16/11/2015 Measurement mode: Lx
 Location: Blgrave Street Lmax/Lmin type: AP
 Instrument: NA-27 F-weight (Main) : A
 Store mode: Auto store 2 F-weight (Sub) : A
 Description: Ambient noise levels T-weight (Main) : Fast

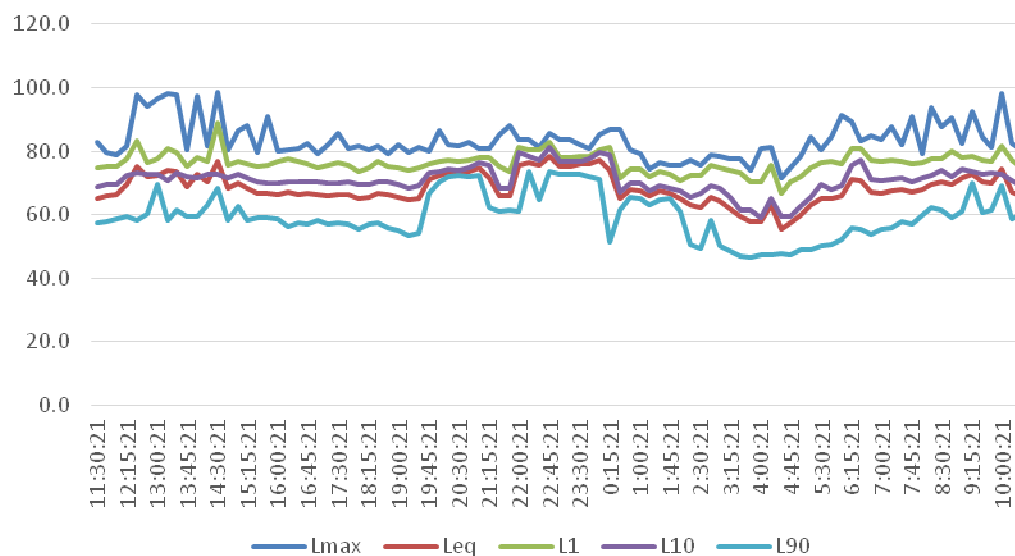
Time	Lmax	Leq	L1	L10	L90
11:30:21	82.7	65.3	74.7	68.6	57.3
11:45:21	79.6	66.0	75.0	69.7	58.0
12:00:21	78.9	66.2	75.2	69.6	58.5
12:15:21	81.8	69.5	77.5	72.3	59.6
12:30:21	97.7	75.1	83.4	73.1	58.4
12:45:21	94.3	71.9	76.5	72.7	60.3
13:00:21	96.4	72.3	77.5	72.8	69.5
13:15:21	98.3	73.8	80.8	70.8	58.2
13:30:21	97.7	73.6	79.7	73.3	61.3
13:45:21	80.5	68.6	75.1	71.9	59.6
14:00:21	97.2	72.9	77.9	71.5	59.4
14:15:21	81.7	70.4	76.9	72.6	63.0
14:30:21	98.7	76.9	88.9	72.6	68.3
14:45:21	80.4	68.5	75.5	71.5	58.1
15:00:21	86.5	70.1	76.9	72.6	62.6
15:15:21	88.2	68.2	76.0	71.5	58.1
15:30:21	79.5	66.7	75.2	70.5	59.0
15:45:21	91.1	66.8	75.4	69.8	59.2
16:00:21	80.0	66.5	76.7	69.8	58.7
16:15:21	80.6	67.0	77.5	70.4	56.3
16:30:21	80.8	66.4	76.8	70.2	57.6
16:45:21	82.3	66.6	76.1	70.3	57.0
17:00:21	79.4	66.5	74.9	70.4	58.3
17:15:21	82.0	66.1	75.5	70.1	56.9
17:30:21	85.6	66.5	76.4	70.0	57.4
17:45:21	80.8	66.4	75.7	70.2	56.9
18:00:21	81.8	65.2	73.6	69.5	55.6
18:15:21	80.3	65.7	74.8	69.5	57.1
18:30:21	81.7	66.7	76.7	70.3	57.4
18:45:21	79.1	66.2	75.1	70.4	55.8
19:00:21	82.0	65.4	74.6	69.5	54.9
19:15:21	79.6	64.7	73.9	68.2	53.6
19:30:21	81.1	65.1	74.9	69.2	54.2
19:45:21	80.2	71.1	76.1	73.0	66.6
20:00:21	86.6	72.5	76.9	73.7	70.2
20:15:21	82.2	73.0	77.2	74.3	72.0
20:30:21	81.8	73.2	76.7	74.0	72.4
20:45:21	82.9	73.4	77.2	74.6	71.8
21:00:21	80.7	74.8	78.0	76.5	72.4
21:15:21	80.7	71.7	77.9	75.5	62.2
21:30:21	85.3	65.8	75.0	68.5	61.0
21:45:21	88.3	65.8	73.7	68.5	61.5

22:00:21	83.6	75.7	81.4	79.8	61.0
22:15:21	83.6	76.6	80.6	78.4	73.7
22:30:21	81.4	75.4	80.3	77.4	64.7
22:45:21	85.7	78.3	82.7	81.3	73.5
23:00:21	83.5	75.2	78.1	76.9	72.7
23:15:21	83.5	75.2	78.0	76.8	72.7
23:30:21	82.2	75.9	78.4	76.9	72.8
23:45:21	80.9	76.2	78.3	77.6	71.9
00:00:21	85.1	77.4	80.6	79.5	71.1
00:15:21	86.8	74.0	81.4	78.9	51.5
00:30:21	86.8	65.1	71.6	67.2	61.5
00:45:21	80.4	67.8	74.5	70.1	65.6
01:00:21	79.1	67.6	74.2	69.8	65.2
01:15:21	74.2	65.8	71.9	67.4	63.3
01:30:21	76.5	67.4	73.7	69.3	64.8
01:45:21	75.7	66.7	72.7	68.2	65.0
02:00:21	75.4	65.2	70.7	67.7	61.0
02:15:21	77.4	63.2	72.2	65.4	50.4
02:30:21	75.7	62.3	72.4	66.6	49.5
02:45:21	79.0	65.4	75.5	69.0	58.2
03:00:21	78.3	64.3	74.9	68.2	50.1
03:15:21	77.6	61.9	74.0	65.4	48.5
03:30:21	77.8	59.4	73.3	61.3	47.0
03:45:21	73.8	57.8	70.3	61.4	46.5
04:00:21	80.9	57.7	70.4	59.1	47.2
04:15:21	81.4	62.9	75.5	65.1	47.2
04:30:21	71.7	55.5	66.6	59.3	47.7
04:45:21	74.7	57.4	70.3	59.5	47.3
05:00:21	78.5	59.8	72.0	62.7	48.8
05:15:21	84.3	62.9	74.6	65.6	48.8
05:30:21	80.4	65.2	76.6	69.5	50.0
05:45:21	84.3	65.2	77.0	68.1	50.5
06:00:21	91.5	65.9	76.2	69.0	52.2
06:15:21	89.2	71.3	80.7	75.7	55.7
06:30:21	83.4	70.8	80.8	77.2	55.6
06:45:21	84.7	67.3	77.1	71.2	53.8
07:00:21	83.5	66.7	76.8	70.7	55.4
07:15:21	87.6	67.5	77.1	71.3	55.7
07:30:21	82.0	67.9	76.7	71.7	57.8
07:45:21	90.8	67.3	76.0	70.5	57.2
08:00:21	79.4	67.8	76.3	71.6	59.9
08:15:21	93.6	69.7	77.8	72.4	62.1
08:30:21	87.9	70.3	77.8	74.1	61.5
08:45:21	90.7	69.5	80.2	71.9	58.9
09:00:21	82.5	71.4	78.2	74.2	61.0
09:15:21	92.5	72.8	78.4	73.7	70.0
09:30:21	84.3	70.3	77.3	72.9	60.7
09:45:21	81.2	70.1	76.8	73.1	61.4
10:00:21	98.0	74.3	81.6	72.9	69.1
10:15:21	82.6	67.3	77.1	70.6	58.7
10:30:21	80.4	66.0	74.9	69.1	60.3

Time Histories of Sound Measurements at No.7 Blagrove Street, Reading RG1 1PJ



Noise levels at front facade of 7 Blagrove Street,
Reading RG1 1PG
16th-17th November 2015
Chart 2



Appendix 4: Calculations of Noise Level in a Room

			Octave band centre frequency			
Blagrove St. front elevation	Room 01 First Floor					
Term from equation	Ref.letter of result	125	250	500	1000	2000
Leq,ff	A	68	67	67	67	62
Dn,e	Sound attenuated	47	46	49	56	66
	ventilator 55dB Dn,e,w					
		0.92	0.36	0.36	0.36	0.36
		0.00	0.00	0.00	0.00	0.00
	B	0.00	0.00	0.00	0.00	0.00
Rwi	Insulated glass unit Rwi 51dB	34	41	47	53	60
		0.75	0.75	0.75	0.75	0.75
		0.00	0.00	0.00	0.00	0.00
	C	0.00	0.00	0.00	0.00	0.00
Rew	.	40	44	45	51	56
		0.25	0.25	0.25	0.25	0.25
		0.00	0.00	0.00	0.00	0.00
	D	0.00	0.00	0.00	0.00	0.00
Rrr		28	34	40	45	49
		3.36	3.36	3.36	3.36	3.36
	E	0.00	0.00	0.00	0.00	0.00
	F	-27.2	-33.2	-38.9	-44.2	-48.5
A(furnished)		11	14	16	16	15
	G	0.0	2.9	2.4	2.4	2.6
LAeq,2	A+F+G+3	43.8	39.7	33.4	28.2	19.1
A-weighting		-16	-9	-3	0	1
LAeq,2 +A-weighting	LAeq,125 etc	27.8	30.7	30.4	28.2	20.1
A-weighted level in room	36					

Term	Derivation					
Sf	Façade area (incl. window)	2.5	2.5	2.5	2.5	2.5
Sr	Roof area (exposed side)					
Swi	Window area	1.88	1.88	1.88	1.88	1.88
Sew	Sf-Swi	1	0.625	0.625	0.625	0.625
Srr	Area of ceiling	8.4	8.4	8.4	8.4	8.4
S	Sf+Srr	10.9	27.5	27.5	27.5	27.5
A0	Reference absorption area given in	10	10	10	10	10
	BS EN ISO 10140-2					

The expected precision of this calculation is plus or minus 2dB

Blagrove St. front elevation	Room 01 First Floor		Octave band centre frequency			
	Ref.letter of result	125	250	500	1000	2000
Leq,ff	A	68	67	67	67	62
Dn,e	Sound attenuated	36	37	37	34	37
	ventilator 55dB Dn,e,w					
		1.54	1.54	1.54	1.54	1.54
		0.00	0.00	0.00	0.00	0.00
	B	0.00	0.00	0.00	0.00	0.00
Rwi	Insulated glass unit Rwi 51dB	34	41	47	53	60
		0.75	0.75	0.75	0.75	0.75
		0.00	0.00	0.00	0.00	0.00
	C	0.00	0.00	0.00	0.00	0.00
Rew		40	44	45	51	56
		0.25	0.25	0.25	0.25	0.25
		0.00	0.00	0.00	0.00	0.00
	D	0.00	0.00	0.00	0.00	0.00
Rrr		28	34	40	45	49
		1.60	1.60	1.60	1.60	1.60
	E	0.00	0.00	0.00	0.00	0.00
	F	-26.4	-31.1	-33.7	-31.9	-34.9
A(furnished)		11	14	16	16	15
	G	-2.3	-3.3	-3.9	-3.9	-3.6
LAeq,2	A+F+G+3	42.3	35.6	32.4	34.2	26.4
A-weighting		-16	-9	-3	0	1
LAeq,2 +A-weighting		26.3	26.6	29.4	34.2	27.4
A-weighted level in room	37					

Term	Derivation					
Sf	Façade area (including window)	2.5	2.5	2.5	2.5	2.5
Sr	Roof area (exposed side)					
Swi	Window area	1.88	1.88	1.88	1.88	1.88
Sew	Sf-Swi	0.625	0.625	0.625	0.625	0.625
Srr	Area of ceiling	4	4	4	4	4
S	Sf+Srr	6.5	6.5	6.5	6.5	6.5
A0	Reference absorption area given in	10	10	10	10	10
	BS EN ISO 10140-2					

The expected precision of this calculation is plus or minus 2dB

Appendix 5: Glazing and Ventilation Options

Glazed elements, including all fixed and open able sections, related framework, mullions, transoms and, where applicable furniture, all as are intended within the front and rear façades, shall provide an airborne sound insulation index rating of not less than those shown below:

Level over base	Example glazing configurations	Acoustic Performance
<base level	4/12/4	R'w 34 dB
+5 dB	4/12/4	R'w 34 dB
+10 dB	4/12/10	R'w 38 dB
+15 dB	6/12/10	R'w 39 dB
+20 dB	10/12/16.8 laminate	R'w 42 dB
+25 dB	16.8/16/12.8 laminate	R'w 43 dB

Performance shall be as measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1:1997, and evidence to this effect shall be published as part of the tender response. Elements as described above shall further offer not less than the minimum airborne sound reduction index (R) when measured in accordance with BS EN ISO 10140-2:2010 shown below:

Glazing Acoustic Performance	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
	Sound reduction index (R), dB						
R'w 31 dB	20	24	20	25	35	38	35
R'w 38 dB	27	29	29	33	39	46	46
R'w 39 dB	27	30	29	35	41	42	47
R'w 42 dB	31	32	33	40	43	42	54
R'w 51 dB	25	34	41	47	53	60	68

Ventilation Specification Options

Ventilators, including all fixed and open able sections and related framework, all as are intended to be included within the building, shall provide a weighted element-normalised level difference ($D_{n,e,w}$) of not less than those shown below:

Level over base	Ventilator	Acoustic Performance
<base level	Non-acoustic trickle vent	-
+5 dB	Non-acoustic trickle vent	-
+10 dB	Trickle vent	37 dB $D_{n,e,w}$
+15 dB	Through the wall vent	40 dB $D_{n,e,w}$
+20 dB	Through the wall vent	47 dB $D_{n,e,w}$
+25 dB	Through the wall vent	55 dB $D_{n,e,w}$
+30 dB	Through the wall vent	55 dB $D_{n,e,w}$

Performance shall be as measured in accordance with BS EN 20140-10:1992 and rated in accordance with BS EN ISO 717-1:1997, and evidence to this effect shall be published as part of the tender response.

Elements as described above shall offer not less than the minimum element-normalised level difference ($D_{n,e}$) when measured in accordance with BS EN 20140-10:1992 shown below.

Ventilation Acoustic Performance	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
	Element-Normalised Level Difference, $D_{n,e}$ (dB)						
37 dB $D_{n,e,w}$	36	36	37	37	34	37	37
40 dB $D_{n,e,w}$	29	29	28	36	44	44	44
47 dB $D_{n,e,w}$	39	39	34	43	55	60	60
55 dB $D_{n,e,w}$	40	47	46	49	56	66	75

Should laboratory acoustic performance information be unavailable or be unrepresentative for the configurations required, or pre-tender laboratory testing cannot be accommodated within tender submittal and evaluation timescale, the contractor's submittal must be supported by third party calculation of sufficient detail to show attenuation contributions arising from framing and suchlike features at tender submittal stage. In this event, the successful tenderer shall be required to promptly undertake laboratory testing and rating to demonstrate conformance of particular test pieces, yet to be selected, with this specification and to make available such substantive evidence to an agreed timescale and at the tenderers cost.

The window frame system must provide no less sound insulation than the glazing – hollow uPVC type frames may not achieve this requirement. The 47 dB $D_{n,e,w}$ and the 55 dB $D_{n,e,w}$ ventilators are high performance through the wall units