Acoustic Assessment for a Proposed Residential Development over Upper Floors above the Black Cap, 171 Camden High Street, Camden, London, NW1 7JY

Report Reference: 121007-009A

Date: March 2014

ACA Acoustics Limited
Hamilton House, Mabledon Place, Bloomsbury, London WC1H 9BB
Tel: 0207 554 8567
Email: info@aca-acoustics.co.uk
Website: www.aca-acoustics.co.uk

Registered in England & Wales No: 08228154

Site Address:	The Black Cap 171 Camden High Street Camden London NW1 7JY
Client:	Faucet Inn Limited Union 88-90 George Street London W1U 8PA
Report Reference:	121007-009
Revision:	A: First Issue
Author:	Rob Cant MIOA
Date:	March 2013

ACA ACOUSTICS

CONTENTS

0. SUMMARY 4
1. INTRODUCTION 6
2. LONDON BOROUGH OF CAMDEN COUNCIL PLANNING CONSENT ACOUSTIC REQUIREMENTS 7
2.1 Camden Development Policies 2010-2025: Local Development Framework – Policy DP28 7
2.2 Planning Policy Guidance 24: Planning and Noise (PPG24) 7
2.3 National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE) 8
2.4 British Standard BS8233:1999 10
2.5 World Health Guidance 10
3. REVIEW OF PLANNING APPLICATION HISTORY 12
3.1 Decision Notice Reference 2012/1444/P 12
3.2 Delegated Report: Summary of Consultation Responses 12
3.3 Delegated Report: Residential Accommodation – Noise Impact 13
3.4 The Planning Inspectorate Appeal Decision Reference APP/X5210/A/12/2184317 16
4. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS 17
5. NOISE SURVEYS 19
5.1 Background Noise Survey External to Proposed Façade Overlooking Camden High Street 19
5.2 Survey of Noise Transfer from Ground Floor Bar to First Floor Level 21
5.3 Background Noise Survey External to Rear Façade 23
6. NOISE ASSESSMENTS 25
6.1 London Borough of Camden Policy DP28 25
6.2 Entertainment Noise 26
6.3 External Smoking Area 28
6.4 Noise from Mechanical Services Equipment 31
7. SCHEME OF NOISE MITIGATION MEASURES 34
7.1 Walls 34
7.2 Glazing 34
7.3 Ventilation Scheme 36
7.4 Separating Floor Between Retained Bar and Residential Flats 36
7.5 Acoustic Wall Linings to Bar Areas 37
7.6 Floating Floor to Ground Floor Bar 38
7.7 Entrance Door to Ground Floor Public House 38

7.8 Music Volume Limiter 39
7.9 Loudspeakers 39
7.10 In-Duct Silencers to Supply & Extract Fans 39
7.11 Acoustic Louvres to Ground Floor Supply Fan Plantroom 40
7.12 Vibration Isolators to Supply & Extract Fans 40
7.13 Wall Lining and Acoustic Ceiling to Ground Floor Supply Fan Plantroom 41
7.14 Acoustic Screen and Wall Lining Panels to Proposed Rear Smoking Area 42
APPENDIX A A1
APPENDIX B B1
APPENDIX C C1
APPENDIX D D1
APPENDIX E E1

0. SUMMARY

- The client, Faucet Inn Limited, propose to convert rooms at first, second and third floor levels associated with a public house at The Black Cap, 171 Camden High Street, Camden, London, NW1 7JY to residential flats. An original application for planning permission for the development was rejected at appeal. The reasons stated for refusal of the original application and appeal decision both include reference to noise intrusion to the proposed residential flats.

- ACA Acoustics Limited has been commissioned by Hillman Design Limited on behalf of the client to review noise issues of the original decision, undertake additional noise surveys and then carry out technical noise assessments and provide recommendations as necessary for any noise control measures to address the issues of concern about noise intrusion. This report presents results of the noise surveys and assessments and is intended to be submitted to London Borough of Camden Council in support of a new planning application for the scheme.

- A noise survey has previously been carried out at the site by the author whilst working at Philip Acoustics Limited over nominally a 4-day period between 9 December and 12 December 2011. Results have been used to assess the site's separate daytime, evening and night time LAeq noise levels in accordance with London Borough of Camden's Local Development Framework Policy DP28. It is considered that the noise climate in the vicinity will not have altered significantly in the intervening period and results of this previous survey remain valid. An additional survey has been undertaken simultaneously at 1m outside the front façade at first and second floor levels on the night of 20th to 21st September 2013. Results of this survey confirm that noise levels at first floor level are within 1dBA of those measured at 2nd floor level; therefore results of the initial survey can be taken to be representative of noise incident to all proposed flats overlooking the front façade.

- Existing ambient noise levels incident on the front façade of the proposed development, overlooking Camden High Street, are comprised mostly of traffic directly passing the site, more distant traffic on other local routes and pedestrian activity in the area, particularly on busy weekend evenings; music entertainment noise was not audible outside of the upper floor windows.

- Noise levels at the front façade overlooking Camden High Street during daytime and evening periods are within the range of levels requiring attenuation measures to be implemented as defined by London Borough of Camden Council's Policy DP28. Noise levels during night time periods over a busy weekend are above the range of values shown in Table A of Policy DP28.

- Although noise levels at night over a busy weekend are at a level above the range of values at which, in accordance with London Borough of Camden Council's Policy DP28, planning permission would not normally be granted, it is the author's opinion that the site is suitable for residential development, subject to implementation of a very high performance scheme of noise insulation measures to ensure that noise levels inside rooms of the new residential properties are reasonable and achieve the guidance limits for noise intrusion into residential properties advised

within British Standard BS9233:1999. A scheme of noise insulation measures is included in this report. Note that the proposed scheme of improvements to the external façade are to control general (e.g. traffic and pedestrian) noise; entertainment noise outside the external façade achieves London Borough of Camden's criteria detailed in Table D of Policy DP28.

- The proposed residential development is to be located above an existing public house therefore an assessment of entertainment noise from the public house to the residential flats has been carried out in accordance with London Borough of Camden Council's Policy DP28. A scheme of noise insulation measures is included in the report to control noise through the separating floor and common structure.

- The new scheme includes retention of an external smoking area for patrons of the public house. Assessment of noise from patrons using the smoking area to external amenity areas of the new residential properties and to inside of the new properties has been carried out in accordance with London Borough of Camden's Policy DP28, along with guidance contained in British Standard BS8233:1999. A scheme of noise mitigation measures is included in the report to control noise from the terrace to comply with recommended criteria.

- Existing mechanical services equipment is to be removed during the refurbishment of the site with new kitchen supply and extract fans installed to the new basement kitchen and whole-house ventilation provided to the new residential flats. An assessment of noise from the proposed new mechanical equipment has been carried out in accordance with London Borough of Camden's Policy DP28. A scheme of noise and vibration control treatments is included in the report to comply with the recommended criteria.

- In summary it is recommended that the site is suitable for change of use to residential development, subject to implementation of the very high performance noise mitigation measures as set out in this report.

1. INTRODUCTION

A previous planning application for the proposed change of use to residential flats of upper floors above an existing public house at The Black Cap, 171 Camden High Street, Camden, London NW1 7JY was rejected at appeal. The client, Faucet Inn Limited, is to submit a new planning application for the development.

ACA Acoustics Limited has been commissioned by Hillman Design Limited on behalf of the client to review noise issues of the original decision and then carry out technical noise assessments and provide recommendations as necessary for any noise control measures to address the issues of concern about noise intrusion to the new residential flats.

The objective of the assessment is to determine the impact that existing noise sources would have on the proposed new development in accordance with London Borough of Camden Council's Local Development Framework Policy DP28 "*Noise and Vibration*" along with British Standards BS8233:1999 "*Sound insulation and noise reduction for buildings – Code of practice*" and other relevant British Standards and guidance documents.

This report presents results of the noise survey and assessment along with recommendation for noise mitigation measures such that noise levels within the proposed residential development comply with guideline limits and includes:

- Description of the site and development proposals;
- Review of original planning application refusal (noise issues) by London Borough of Camden Council along with reasons for refusal at appeal;
- Confirmation of London Borough of Camden Council planning consent requirements for noise;
- Measurement and assessment of existing ambient noise levels at the site;
- Assessment of entertainment noise from the existing public house to the proposed new residential flats;
- Assessment of patron noise from the retained smoking area at the rear of the property to the proposed new residential flats;
- Review of noise mitigation measures required to comply with London Borough of Camden Council's limits.

2. LONDON BOROUGH OF CAMDEN COUNCIL PLANNING CONSENT ACOUSTIC REQUIREMENTS

The proposed noise measurement and assessment methodology is based on ACA Acoustics Limited's experience of undertaking noise assessments for similar developments along with discussions between the author and Helen Masterson of London Borough of Camden Council's Environmental Health Department.

A review of relevant parts of each of the routinely used planning guidance documents and British Standards is provided below:

2.1 Camden Development Policies 2010-2025: Local Development Framework – Policy DP28

Policy DP28 of London Borough of Camden Council's Local Development Framework states that "*the Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for … development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided*".

Paragraph 28.3 of the supporting text to Policy DP28 advises that "*where uses sensitive to noise are proposed close to an existing source of noise … the Council will require an acoustic report to ensure compliance with PPG24: Planning and noise*". Discussion of Planning Policy Guidance 24 (PPG24) is provided below.

In addition to the requirements of PPG24, London Borough of Camden have specific requirements for noise and vibration thresholds, set out in Tables A to E of paragraph 28.4. Copy of Policy DP28 and the associated supporting text is included in Appendix A.

ACA Acoustics Limited has carried out an assessment of general (traffic and pedestrian) noise and specific entertainment noise to the proposed residential development in accordance with Policy DP28.

2.2 Planning Policy Guidance 24: Planning and Noise (PPG24)

PPG24 has been used extensively at the planning stage of many new residential developments to determine the suitability of the land for residential development and what noise insulation measures are required.

The document provides a simple mechanism for determining whether noise should be a major factor when granting planning permission and considering suitable planning conditions for a development. The method introduces the concept of Noise Exposure Categories (NEC) to rate the importance of noise in the planning process. The objective of the noise survey and assessment is to determine the noise impact that existing sources would have on the proposed residential development and advise on any mitigating measures to ensure that noise levels inside rooms of

new residential properties are reasonable and comply with guidance limits for noise intrusion advised in British Standard BS8233:1999 "*Sound insulation and noise reduction for buildings – Code of practice*" (to which PPG24 makes reference).

PPG24 has recently been withdrawn; however no replacement technical guidance document has been issued by central Government to date.

It is acknowledged that Local Authorities will need significant time to establish and issue new policies relating to noise to replace PPG24 and therefore the author considers that although withdrawn, continued use of the measurement methodology of PPG24, and in particular consideration of internal noise level limits provided in BS8233 - as discussed in PPG24 - in the interim period will allow Local Authorities to readily evaluate the effect of existing noise sources on proposed new residential developments.

London Borough of Camden's Policy DP28 states that assessment should be carried out in accordance with guidelines set out in PPG24 with the results compared against criteria set out in Tables A to E (which in turn are based on the guidance in PPG24); in view of the above, ACA Acoustics Limited considers that although withdrawn, continued use of the PPG24 measurement methodology in this situation remains valid, albeit that adherence to the internal noise limits set out in the, still current, British Standard BS8233:1999 should take precedence above the outdated assessment conclusion of the withdrawn PPG24.

2.3 National Planning Policy Framework (NPPF) and Noise Policy Statement for England (NPSE)

The National Planning Policy Framework (referred to as NPPF) was published by the Department for Communities and Local Government in March 2012 and replaces the previous Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) documents, including PPG24: Planning and Noise.

The NPPF sets out the Governments planning policies for England and provides guidance on how these are expected to be applied, providing a framework within which Local Authorities can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Paragraph 109 of the NPPF states that "*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*".

It also talks specifically about noise and states that "*Planning policies and decisions should aim to:*

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*

- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational amenity value for this reason.*"

In March 2010 the Department for Environment, Food and Rural Affairs (Defra) issued Noise Policy Statement for England (referred to as NPSE). This sets out the Government's long-term policy aims that are intended to be considered by Local Planning Authorities when development their own Local Policies relating to noise. Stated aims of NPSE are "*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy of 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.*"

Paragraphs 2.19 to 2.24 clarify the above aims, referring to established concepts from toxicology; NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). It also introduces a new concept relating to *"significant adverse*" of SOAEL (Significant Observed Adverse Effect Level), however stating that "*it is not possible to have a single objective noise-based measure that describes 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*".

The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development, as set out in the NPPF.

It is considered that the "reasonable" internal noise criteria set out in BS8233:1999 (discussed below) would constitute the LOAEL and that the "good" criteria equates to the NOEL; thus achieving the "reasonable" internal criteria should be considered to comply with the principle of the NPSE and that where practical internal noise levels closer to the BS8233:1999 "good" criteria is desirable to "*mitigate and minimise adverse impacts on health and quality of life*".

Paragraph 2.7 states that "*… the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications*". This provides clear guidance that noise must not be considered in isolation but as part of the overall scheme taking into account the overall sustainability and associated impacts of the proposed development; there is no benefit in reducing

noise to an excessively low level if this creates or increases some other adverse impact. Similarly it may be appropriate in some cases for noise to have an adverse impact if this is outweighed by the reduction or removal of some other adverse impact that is of greater significance to the development as a whole.

Paragraph 2.8 of NPSE states that "*in the longer term, the Government hopes that existing policies could be reviewed (on a prioritised basis), and revised if necessary, so that the policies and any noise management measures being adopted accord with the vision, aims and principles of the NPSE*".

As discussed above, it is acknowledged that Local Authorities will need significant time to establish and issue new policies relating to noise to replace PPG24 and to comply with the guiding principles of NPSE and NPPF and therefore the author considers that although withdrawn, continued use of the measurement methodology of PPG24, and in particular consideration of internal noise level limits provided in BS8233, in the interim period will allow Local Authorities to readily evaluate the effect of existing noise sources on proposed new residential developments.

2.4 British Standard BS8233:1999

In advising guidance on permissible noise levels inside residential dwellings and appropriate noise mitigation measures PPG24 makes frequent reference to British Standard BS8233:1999 "*Sound insulation and noise reduction for buildings – Code of practice*". Guidance limits for internal noise within living rooms and bedrooms, taken from Table 5 of BS8233, are shown in Table 1 below:

Room	Reference Time	Design Range – LAeq, T	
		Good	Reasonable
Living Rooms	Daytime (07:00 – 23:00)	30dB	40dB
Bedrooms	Night time (23:00 – 07:00)	30dB	35dB
		LAFmax ≤45dB	

Table 1: BS8233 guideline internal noise levels

ACA Acoustics Limited's standard approach is to design noise to bedrooms to the lower "good" limit of Leq 30dBA and to the mid-range of maximum Leq 35dB for living rooms. As discussed in Section 2.3 above, this equates to achieving a level within bedrooms below the "*No Observed Effect Level*" and noise levels within living rooms in the range of values between the NOEL and LOAEL, thus complying with the requirements of the NPSE.

2.5 World Health Guidance

The World Health Organisation's guidance "*Community Noise 1999*" recommends a limit of Leq 30dBA with occasional maximum levels of Lmax 45dBA for bedrooms at night as preventing sleep disturbance to vulnerable people.

The 1999 guidance also states that "*to protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed LAeq 55dB on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed LAeq 50dB. Where it is practicable and feasible, the lower outdoor level should be considered the maximum desirable sound level for new development*".

The levels advised in The World Health Organisation's guidance correlate very well with those in BS8233 described above.

3. REVIEW OF PLANNING APPLICATION HISTORY

London Borough of Camden Council has previously refused planning permission for the change of use of upper floors of the development to residential flats (Planning Application reference 2012/1444/P). The reasons stated for refusal of the application, provided in the refusal notice itself and the associated delegated report include reference to noise intrusion to the proposed residential flats.

The development was also refused on appeal following London Borough of Camden's original decision. The reasons stated for refusal include reference to noise transfer between the retained ground floor public house and first floor flats.

Review of the noise issues of the original decision and appeal decision is provided below.

3.1 Decision Notice Reference 2012/1444/P

Reason 2 – The application fails to adequately demonstrate whether the residential flats would experience an acceptable level of internal noise contrary to policies CS5 (Managing the impact of growth and development), DP26 (Managing the impact of development on occupiers and neighbours) and DP28 (Noise and vibration) of Camden's Local Development Framework

The author, while working at Philip Acoustics Limited, provided an acoustic report reference 11254-002 dated February 2012, in support of the planning application. This acoustic report included detailed technical assessment of noise intrusion to the proposed new residential flats.

A scheme of high performance sound insulation measures were set out in the report, complemented by print-outs from a building envelope calculation program, demonstrating that intrusive noise levels into rooms of the proposed flats would be significantly lower than recommended limits set out in BS8233:1999. In addition consideration of entertainment noise to the proposed flats was included. Through specification of various noise mitigation measures it was demonstrated that criterion 3 of Policy DP28, Table D will also be achieved.

It is considered that the original report provided adequate information, supported by technical calculations, to demonstrate that noise levels within the new residential flats would be acceptable.

This report includes similar consideration of external noise intrusion to the new proposed scheme along with further consideration of entertainment noise through the separating floor between the ground floor bar and first floor flats.

3.2 Delegated Report: Summary of Consultation Responses

The proposed flats would likely result in future restrictions to the ground floor use in terms of opening hours because of noise pollution

The original report considered noise transfer from the ground floor bar to the proposed residential flats above.

Through installation of a comprehensive noise mitigation scheme it was demonstrated that entertainment noise to the flats above can be adequately controlled such that noise would not be disturbing nor detrimental to the amenity of future residents.

This report considers noise from the ground floor bar to the adjoining residential flats. A comprehensive scheme of noise mitigation measures is included such that continued use of the ground floor bar area would not be affected by the proposed residential flats above and there would be no need for any future restrictions to be placed on the public house.

3.3 Delegated Report: Residential Accommodation – Noise Impact

The noise assessment revealed that the existing noise levels are above the threshold limit provided in Table A of DP28 'at which planning permission will not be granted' not Table B where 'attenuation measures will be required'. The noise assessor has however proposed mitigation measures to be considered which they believe would ensure that noise levels within rooms would be reasonable

The Delegated Report has not disputed that internal noise levels within rooms can achieve acceptable levels and as such it is considered that although existing external noise levels are above the threshold limits of Table A, the Council have not raised this as an immediate concern.

Notwithstanding the above, further discussion of the threshold limits is provided below.

The threshold limit provided in Table A of DP28 is taken from the noise levels corresponding to NEC D of PPG24. Annex B of PPG24 provides "*an explanation of how the noise levels in the NEC table in Annex 1 have been calculated or derived".* Paragraph 11 of Annex B states that *"The upper limit is based on a Building Research Establishment (BRE) survey which has shown that the insulation package supplied under the Noise Insulation Regulations is inadequate for road traffic noise levels of 78dB LA10, 18h and above at a façade. This figure is equivalent to a 'free-field' level of 75dB LA10, 18h; which in turn is equivalent to 73dB LAeq, 16h. The 73dB LAeq 16h has been reduced by 1dB to 72dB LAeq 16h in the table, which is the maximum external level that the standard noise insulation package will reduce to an acceptable internal level"*.

The Noise Insulation Regulations to which PPG24 refers were issued in 1975 and included recommendation for mitigation measures to improve the sound insulation performance of external facades to an existing residential dwelling. Recommendations included installation of secondary glazing to windows with the new secondary glazing formed from glass of minimum 3mm thickness. Through-wall type acoustic ventilators were also recommended.

Design of modern secondary glazing is significantly superior to the 3mm thickness glass proposed in the Noise Insulation Regulations, often incorporated either single- or double-glazed units with toughened or laminated panes of glass. In addition improvements in design of acoustic seals to glazed units greatly increases the sound insulation performance achieved on site.

Use of whole-house ventilation systems (such as MVHR units) negates the requirement for through-wall type ventilators specified in the Noise Insulation Regulations.

Ventilators directly supplying a room through an external wall or window frame are often the dominant source of noise transfer and by removing this noise path the overall sound insulation performance of the façade can be significantly enhanced.

Paragraph 14 of PPG24 Annex 2 states that "*The standard noise insulation package provides insulation of about 35dBA*". Use of modern high specification secondary glazing and whole-house mechanical ventilation systems can provide sound insulation in excess of 45dBA; at least 10dBA better than that proposed in the Noise Insulation Regulations.

It is to be expected that advances in construction techniques and proprietary acoustic products over the past 38 years have significantly increased the level of sound insulation performance possible and the above demonstrates that although use of the NEC limits of PPG24 (and in turn the values shown in London Borough of Camden Council's Policy DP28) is useful to provide an indication of the noise character of an area, the prescriptive limits provided in NEC D or Table A of DP28 are outdated and acceptable internal noise levels are readily achievable even at higher external noise levels.

The author considers that the overly prescriptive nature of the PPG24 assessment conclusion is likely one of the reasons for its withdrawal and that a more detailed assessment, considering actual noise levels *inside* a residential property, allowing for high performance façade sound insulation, rather than noise levels incident on the external façade, is of more benefit and will ensure that the amenity of future occupants is not compromised while allowing for much needed development within town and city centre locations.

Noise levels were recorded within the existing second floor staff accommodation and offices during a busy weekend evening with music playing below; there was a level increase of 12dBA when compared to levels measured when no music was playing. Although the noise assessor has stated that a high performance ceiling should mitigate noise transfer, officers would note that the noise levels were not taken from the existing first floor pub where noise transfer from the ground floor use would likely be greater

Both the ground and first floor bar areas are in operational use and therefore at the time of the original survey it was considered impractical to measure noise transfer from the ground floor bar to first floor bar on a busy weekend evening due to the existing high noise levels in the first floor bar.

However, to ensure that noise transfer from the retained ground floor bar to first floor flats would not cause nuisance or be detrimental to the amenity of future residents, the client agreed to close the first floor bar during an evening to allow technical noise measurements to be undertaken to determine the existing sound insulation performance of the separating floor and allow specification of suitable acoustic ceiling and wall lining treatments etc. to be developed such that internal noise levels within the first floor flats achieve the requirements of London Borough of Camden. A further noise survey has been undertaken between ground and first floor levels on a busy Friday night to ensure that the proposed mitigation measures are robust and resultant internal noise levels will be acceptable.

The following mitigation measures have been recommended by the noise assessor; new glazing system, ventilators, high performance ceiling, acoustic wall linings to ground floor bar; alteration to ground floor hall arrangement. Ventilators have been proposed as a measure to meet criterion 3 of Table D, where there should be no increase in dB during the hours of 2300-0700 compared to levels when no music is playing when windows are open or closed. This would not provide an appropriate solution to the impact of noise for future residents, residents should be able to open their windows at night without being unduly impacted upon.

Section 5.3 of Philip Acoustics Limited's original report reference 11254-002, submitted in support of the original application states that "*measured noise levels at 1m from the windows of the proposed residential flat comply with items 1 and 2 above* [items 1 and 2 of Policy DP28]*, such that entertainment noise from The Black Cap does not increase the LAeq, 5 min by more than 3dB compared to when music is not playing*".

The report recommends that a door lobby be retained for the new layout to the main entrance door of the ground floor bar to ensure that entertainment noise from the bar does not exceed these external limits. As such, London Borough of Camden Council's statement that "*ventilators have been proposed as a measure to meet criterion 3 of Table D*" is incorrect; the whole-house mechanical ventilation system has been proposed to protect residents from general (traffic and pedestrian) noise, not from entertainment noise transfer via the external façade.

Similar assessment of both general (traffic and pedestrian) and entertainment noise is included within this report. Again it should be noted that recommendations for high-performance acoustic glazing systems and ventilators are to ensure internal noise levels within rooms overlooking Camden High Street are adequately protected against general noise and not to protect against entertainment noise which already achieves the limits set out in London Borough of Camden's Policy DP28; noise levels external to the façade are dominated by traffic and pedestrian noise – entertainment noise was not subjectively audible outside the front façade during any of the author's visits to site.

3.4 The Planning Inspectorate Appeal Decision Reference APP/X5210/A/12/2184317

In terms of noise generated within the building, measurements were taken on the second floor of the building over the current first floor bar on a busy Friday evening. It was noted club style music with a high volume bass beat was being played but that the overall music volume was lower than a pub/club with a dance floor. The proposal would mean that the first floor flats would be directly above the cabaret/dance floor/bar area on the ground floor. However, the noise survey did not measure the effect of noise from the ground floor, such as amplified music and vocals, on the first floor as it was in use as a bar at the time, despite having accepted that noise levels would be greater than those measured on the second floor. Therefore the impact of noise and vibration from the ground floor activities on the new residential use at the first floor level has not been adequately assessed. As such, it would not comply with policies DP26, which seeks to manage the impact of development on occupiers and neighbours, and DP28, which seeks to manage noise and vibration.

As discussed in Section 3.3 above, assessment of noise from the ground floor bar to first floor level has now been undertaken to ensure the amenity of future occupants of the residential flats.

Results of the noise survey and recommendations for suitable mitigation measures are included within this report.

4. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The site is currently an existing licensed property at ground and first floor levels with associated cellars/storage at basement level and kitchen along with staff/manager's accommodation and associated offices over second and third floor level above at The Black Cap, 171 Camden High Street, Camden, London NW1 7JY.

A planning application is to be submitted to London Borough of Camden Council for change of use of the first, second and third floor levels to independent, non-associated residential use.

The surrounding area is primarily of commercial premises including various shop units, restaurants/take-aways and public houses/bars. Upper floors above many of the shop units appear to be to commercial developments, although a number of these have been converted to residential use.

Camden High Street is a very busy street with high volume traffic during both day and night time hours. Traffic flow directly passed the site is one-way, leading to the junction with the A4201 Parkway, A400 Kentish Town Road and A503 Camden Road approximately 30m – 40m north of the site. There is significant pedestrian activity throughout the day and particularly during the evening and night times over weekends in the vicinity.

Architect's layout drawing of the current development, provided to ACA Acoustics Limited, is shown in Figure A on the following page:

Figure A: Architect's layout drawing

5. NOISE SURVEYS

5.1 Background Noise Survey External to Proposed Façade Overlooking Camden High Street

To assess the impact of existing noise sources, noise samples were recorded at the development site by the author whilst working at Philip Acoustics Limited generally in accordance with procedures set out in PPG24.

A single noise measurement position was selected as being representative of the nearest part of the proposed residential façade overlooking Camden High Street. Other parts of the development to the side and rear facades will be set back further from the main noise source of Camden High Street and with greater screening provided by the building itself.

The noise survey was carried out using an unmanned logging type sound level meter over nominally a four-day period between Friday 9 December and Monday 12 December 2011, to include both weekdays and a weekend. It is considered that the noise climate within the vicinity will not have altered significantly from this time and the results obtained remain valid.

In addition to the unmanned logging noise measurements carried out over the four-day period, a manned noise survey was undertaken on the night of 20 to 21 September 2013 with noise levels measured concurrently at a position 1m external to first and second floor level windows, such that any variation in measurement results at different floor levels may be obtained. The first floor bar was closed for the duration of this noise survey.

The following equipment was used during the noise surveys; the sound level meters were calibrated before and after the survey measurements:

Equipment	Serial Number
Rion sound level meter type NL-31 Class 1 complete with weatherproof and lockable outdoor environmental kit	00431030
NTi Audio sound level meter type XL2 Class 1 complete with microphone type MA220	A2A-06294-E0 2496
Bruel & Kjaer calibrator type 4231 (UKAS Certified)	02326801

Table 2: Equipment used

Complete results of the 4-day noise survey are provided in graphical form in Figure B. Summary of the 12-hour daytime, 4-hour evening and 8-hour night time period noise levels are show in Table 3 on the following page.

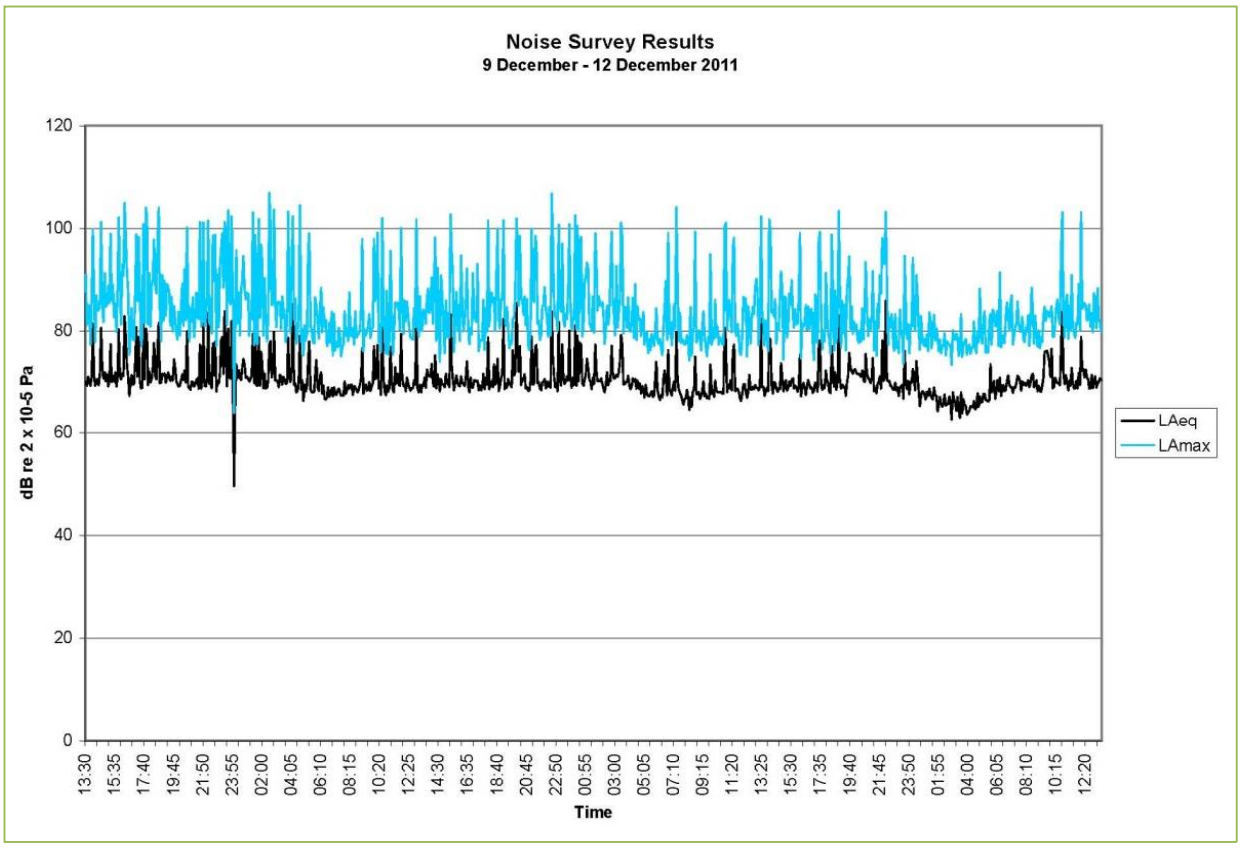


Figure B: Graph of noise survey results

Description	Daytime (07:00 – 19:00) Leq (12 hour)	Evening (19:00 – 23:00) Leq (4 hour)	Night Time (23:00 – 07:00) Leq (8 hour)
Friday 9th December 2011	74.9 dBA	73.6 dBA	78.1 dBA
Saturday 10th December 2011	71.8 dBA	74.9 dBA	73.6 dBA
Sunday 11th December 2011	71.7 dBA	73.3 dBA	71.9 dBA
Monday 12th December 2011	72.2 dBA	-	67.8 dBA

Table 3: Summary noise survey results for daytime, evening and night time periods

During the survey visits subjectively noise levels at the front façade of the development are comprised of noise from traffic directly passed the site, more distant traffic on other local routes and pedestrian activity within the area.

Noise levels at the site during weekend evenings increase significantly, primarily due to the high level of pedestrian activity on Camden High Street and other surrounding areas.

Results of the noise survey undertaken simultaneously at first and second floor levels are shown in Figure C and Table 4 on the following page. Noise levels were dominated by traffic directly passed the site, including from a bus stop immediately outside the site, and pedestrian activity in the area.

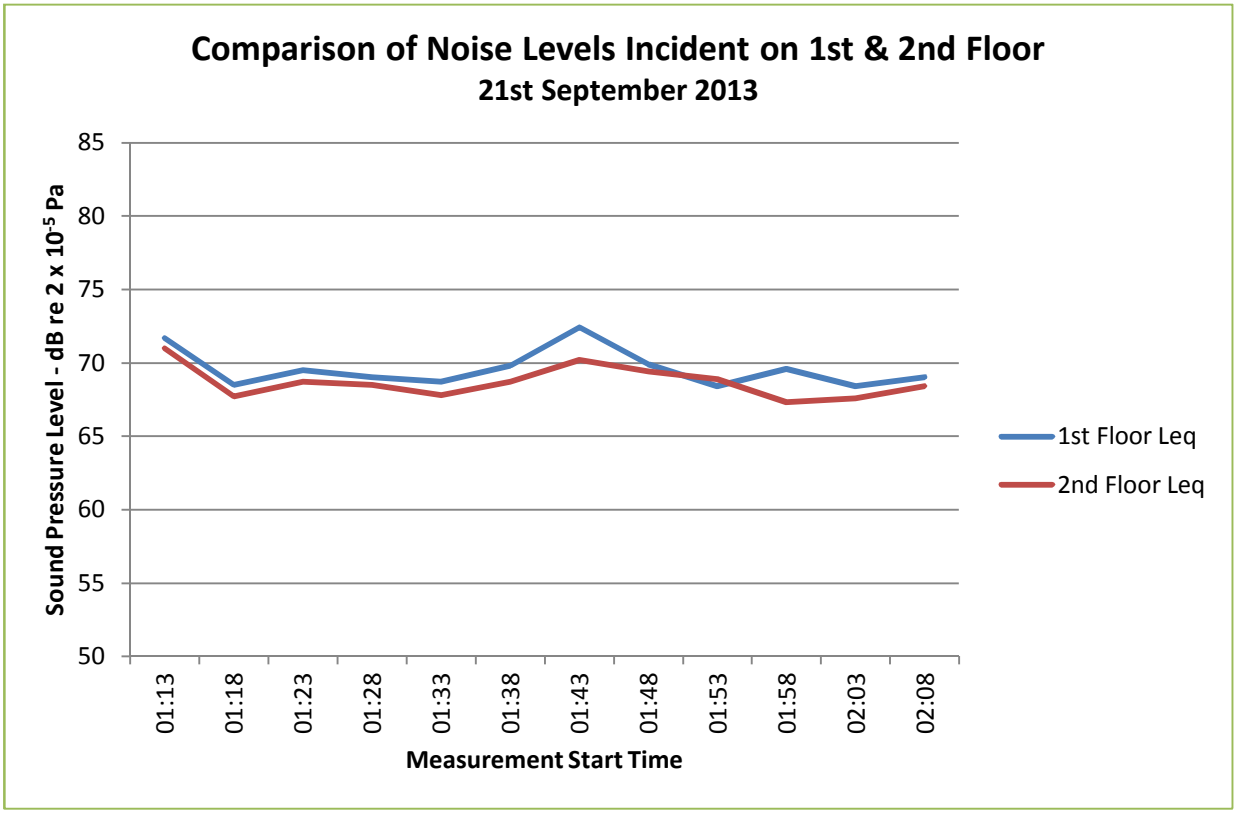


Figure C: Graph of noise survey results

Description	Leq (1 hour)
First Floor Level	69.8 dBA
Second Floor Level	68.8dBA

Table 4: Summary noise survey results simultaneously measured at first and second floor levels

From the results obtained during the measurements on 21 September 2013, it is demonstrated that the difference between noise levels measured at first floor level and those incident on second floor level is 0.95dBA; a difference in noise levels of less than 1dBA is considered insignificant and thus it is considered reasonable that the results of the full four-day survey previously obtained are valid for the flats overlooking Camden High Street.

5.2 Survey of Noise Transfer from Ground Floor Bar to First Floor Level

A manned noise and observations survey of entertainment noise from the public house to the proposed upper floor flats was carried out during the evening of Friday 9th December 2011.

A further manned noise survey was also carried out during a typical busy cabaret performance in the ground floor bar to assess noise transfer through the existing separating floor to first floor levels on the evening of 3rd April 2013. The first floor bar was closed for the duration of this noise

survey. On the request of Helen Masterson of London Borough of Camden Council, an additional survey was also carried out during a busy weekend cabaret performance in the ground floor bar on 21st September 2013 to ensure that noise levels during the weekend period do not exceed those measured on a midweek evening. Results of this survey confirm that music noise levels remain almost identical to those previously recorded; this is to be expected as music noise levels are limited by the music system which is already set at very high volume levels.

The following equipment was used during the noise surveys; the sound level meters were calibrated before and after the survey measurements:

Equipment	Serial Number
Short-term Measurements – 3rd April 2013 Bruel & Kjaer sound level meter type 2260 complete with Bruel & Kjaer microphone type 4187	2627604 2625249
Short-term Measurements – 21st September 2013 NTi Audio sound level meter type XL2 Class 1 complete with microphone type MA220	A2A-06294-E0 2496
Bruel & Kjaer calibrator type 4231 (UKAS Certified)	02326801

Table 5: Equipment used

Results of noise levels measured within the ground floor bar area of The Black Cap public house during a busy cabaret performance are shown in Table 6 below. The bar was witnessed as being busy with a variety of music styles playing although all at high overall volume and with very high levels of low frequency (bass).

Description		Octave Band Centre Frequency – Hz (dB)							Comments
		63	125	250	500	1k	2k	4k	
Measured noise within ground floor bar area	Leq	101	101	96	95	90	81	76	Music witnessed playing at subjectively "high" volume with significant bass content
	Lfmax	108	110	104	105	103	91	84	

Table 6: Measured noise levels within The Black Cap ground floor bar area

Music noise, particularly low frequency (bass) levels were clearly audible within the existing first floor bar area directly above the ground floor bar during the busy cabaret performances. Typical results are shown in Figure D on the following page.

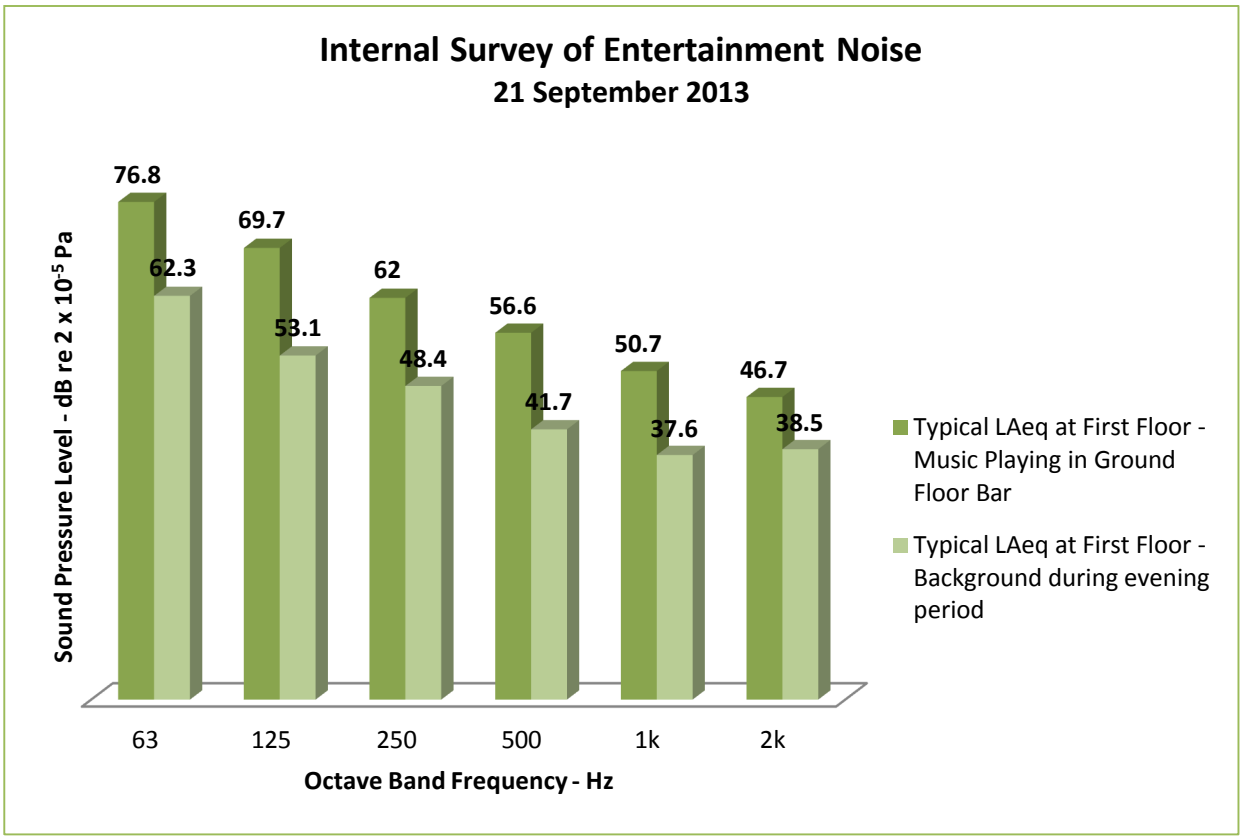


Figure D: Graph of noise survey results

5.3 Background Noise Survey External to Rear Façade

A manned noise and observations survey was undertaken to the rear of the development on the existing first floor terrace area on the evening of Monday 12th November 2012.

The purpose of this additional survey is to provide noise criteria for the smoking area at lower level to the rear of the site.

The following equipment was used during the noise survey; the sound level meter was calibrated before and after the survey measurements:

Equipment	Serial Number
Rion sound level meter type NL-31 Class 1 complete with weatherproof and lockable outdoor environmental kit	00431030
Bruel & Kjaer calibrator type 4231 (UKAS Certified)	02326801

Table 7: Equipment used

Results of noise levels measured to the rear façade of the property during the manned noise survey on the evening of 12th November 2012 are provided in Table 8 below. These levels are used as basis for design of mitigation measures to control noise from the retained external smoking area of the public house.

Description	Lowest Measured Leq	Lowest Measured L90	Average Leq (2 hour) over Survey Period
Monday 11th November 2012	48.0 dBA	45.9 dBA	51.3 dBA

Table 8: Summary noise survey results to rear façade on evening of Tuesday 12 November 2012

6. NOISE ASSESSMENTS

6.1 London Borough of Camden Policy DP28

London Borough of Camden Council's Policy DP28 assesses the impact of noise in terms of daytime LAeq, 12 hours (07:00 – 19:00), evening LAeq, 4 hours (19:00 – 23:00) and night time LAeq, 8 hours (23:00 – 07:00).

Equivalent free-field noise levels at the façade of the proposed residential flats, compared with the noise limits specified in Policy DP28 are shown in Table 9 below. *Note that in accordance with procedures in PPG24, the 1m façade measured levels (shown in Section 5) are taken to be 3dBA higher than the levels incident on the façade. Note also that the night time period for Friday 9th December has not been included, as measured levels only include between 2300 hours to 0000 hours and therefore are not representative of the entire 8-hour assessment period.*

Description	LAeq (dB)	Camden Policy DP28 Category
Friday 9th December 2011		
Daytime	71.9	Table B – Attenuation Required
Evening	70.6	
Night time	-	
Saturday 10th December 2011		Daytime & Evening: Table B – Attenuation Required Night Time: Table A – Planning Not Normally Granted
Daytime	68.8	
Evening	71.9	
Night time	70.6	
Sunday 11th December 2011		Daytime & Evening: Table B – Attenuation Required Night Time: Table A – Planning Not Normally Granted
Daytime	68.7	
Evening	70.3	
Night time	68.9	
Monday 12th December 2011		
Daytime	69.2	Table B – Attenuation Required
Evening	-	
Night time	64.8	

Table 9: LAeq noise level and corresponding Policy DP28 Table requirement

Noise levels during daytime, evening and mid-week night time periods are within the range of values shown in Table B of Policy DP28, requiring attenuation measures to be considered. During night time periods over a busy weekend noise levels are above the threshold limits provided in Table A of Policy DP28. Development sites with measured noise levels exceeding the limits of Table

A are indicative of a very noisy area; London Borough of Camden would not normally grant planning permission for residential development in these locations.

However, a very high performance scheme for sound insulation is proposed to ensure that noise levels inside rooms of the new flats are reasonable and comply with the requirements of BS8233:1999.

By achieving the internal noise limits of BS8233:1999 it is therefore considered that although external noise levels are above London Borough of Camden's typical maximum threshold, amenity of future residents would not be compromised and the site should be considered suitable for residential use.

The author considers that this approach fully complies with the aims of The Noise Policy Statement for England (NPSE) and National Planning Policy Framework (NPPF), whereby potential adverse impacts on health and quality of life due to noise are adequately mitigated and minimised through the careful design of façade sound insulation such that acceptable internal noise levels are achieved.

There are various existing residential flats within the vicinity of the proposed development, including at 187 Camden High Street, which the author understands has previously been granted planning permission for the change of use from offices to residential. Whilst it is acknowledged that existing residential properties might not be retrospectively assessed for noise intrusion, presence of these properties does establish the nature of the area. This proposed development would therefore not be introducing a noise-sensitive use to an area where there are no existing noise-sensitive uses.

In summary it is considered the site is suitable for residential development providing that a high specification of appropriate sound insulation measures are incorporated into the scheme design to ensure noise levels inside rooms of the new residences achieve the guideline limits in British Standard BS8233:1999.

6.2 Entertainment Noise

In accordance with Table D of Policy DP28, noise levels from places of entertainment must comply with the following criteria at adjoining residential development:

Description	Period	Time	Criteria
Noise at 1m external to a sensitive façade	Day and Evening	0700 – 2300	LAeq, 5min shall not increase by more than 5dB
	Night	2300 – 0700	LAeq, 5min shall not increase by more than 3dB
Noise inside any living room of any noise sensitive premises, with the windows open or closed	Night	2300 – 0700	LAeq, 5min (in the 63Hz octave band measured using the 'fast' time constant) should show no increase in dB

Table 10: Criteria for entertainment noise taken from Table D of Policy DP28

Each of the above criteria is as compared to the same measure, from the same position and over a comparable period with no entertainment taking place.

Measured noise levels at 1m from the windows of the proposed residential flat **comply** with items 1 and 2 above, such that entertainment noise from The Black Cap does not increase the LAeq, 5min by more than 3dB compared to when music is not playing. This is demonstrated through comparison of the unattended measurements during times when music is playing compared to periods shortly before and after the public house opens and closes, as well as witnessed by the author during visits to site including on a busy weekend evening when high volume music was playing inside the bar.

The current layout of the ground floor bar includes a door lobby arrangement at the entrance. To ensure that the above criteria is not compromised when customers are entering or existing the premises it is recommended that the door lobby arrangement be retained for the new layout to the main entrance door. Details for the door lobby are included in Section 7.

Noise levels were measured within the ground and first floor bar areas during a busy cabaret performance with music playing in the ground floor bar below. The first floor bar was kept closed for the duration of the survey to ensure that noise from music or customers in the first floor bar did not contaminate the measured levels. Measured LAeq levels in the 63Hz octave band increased by up to 15dB compared to levels measured with no music playing. Results of typical measured levels are shown in Figure D in Section 5.2 above.

Based on the measured levels it is recommended that music noise transfer is reduced by approximately 25dB in the 63Hz octave band. This is a significant improvement and will require very high performance sound insulation scheme to be developed.

Details of the proposed mitigation measures are included in Section 7.

6.3 External Smoking Area

With laws prohibiting smoking in enclosed public spaces, the client proposes to retain an area to the rear of the property for use by patrons of the public house as an external smoking area, such that patrons do not need to congregate on the public pavement outside the development.

There is no specific formal assessment method or guidance for noise generated by people using an outdoor area such as a smoking terrace potentially affecting adjacent residential occupiers. However, a general principle that is widely used in many situations of potential noise disturbance is that of considering whether a new noise source would likely cause a significant increase in the level of noise of the existing ambient noise climate.

The basis for this form of assessment is discussed in the consultation draft document "*Guidelines for Noise Impact Assessment*", written by the Institute of Environmental Management and Assessment and the Institute of Acoustics. Having established the likely change in noise levels due to the new activity, the significance of the change can be determined from the following table:

Change in LAeq Level (dB)	**Interpretation**	
	Subjective Impression	**Impact Description**
0.0	No change	None
0.1 to 2.9	Imperceptible change in loudness	Slight
3.0 to 4.9	Perceptible change in loudness	Moderate
5.0 to 9.9	Up to doubling or halving of loudness	Substantial
10.0 or more	More than doubling or halving of loudness	Severe

Table 11: Impact of change in noise level taken from Guidelines for Noise Impact Assessment

Note that defining the change of loudness to one decimal place is not a reflection of the accuracy of any assessment undertaken but rather to provide a clear threshold between adjacent impact descriptions.

Item 2 of London Borough of Camden's Policy DP28, Table D (as reproduced in Table 10 in the preceding section of this report) also provides noise limits from entertainment premises to noise sensitive properties, and recommends that the LAeq should not increase by more than 3dB at the façade of the residential property due to entertainment sources. Whilst it is anticipated that this criteria has primarily been developed to control music noise, it is considered that adherence to this standard for noise from the smoking area is reasonable and will ensure that there is no perceptible change in loudness and the impact is slight.

Another principle that is often used to assess noise into residential properties is to consider guidance limits for external noise intrusion contained in British Standard BS8233:1999.

To assess noise emissions from the proposed external smoking area two methods have therefore been used;

a) Comparison of noise emissions from use of the smoking area with existing ambient noise levels to the external façade of the new residential flats, and

b) Comparison of noise emissions from use of the smoking area with guideline limits in BS8233 for external noise intrusion into residential properties.

6.3.1 Source Noise data

To be able to calculate noise emissions from people using the smoking area it is necessary to establish what the typical noise levels will be from people using the area, this is called the source noise data.

Note that it is considered not possible to obtain this source noise data by direct measurement as the smoking area is not in existing use in the form proposed and even if a temporary area could be arranged then people would be doing so under "staged" conditions and would not behave or talk as they would normally. Also, any direct noise measurements of people at the terrace would include contribution from existing ambient noise sources and thus the noise measurements would be contaminated.

To be able to establish uncontaminated "source" noise emissions from people using the proposed smoking area it is therefore necessary to consider the volume of an adult person's typical speech. It is well documented that average conversational speech of an adult produces around Leq 60dBA to 65dBA at a distance of 1m from the speaker (*Kinsler, Frey, Coppens, Sanders – Fundamentals of Acoustics, 3rd Edition, p275*); 60dBA at 1m representing normal speech and 65dBA at 1m a slightly raised voice.

The author has worked on similar projects where it has been possible to measure actual noise of people in groups talking which confirm validity of using Leq 60dBA to 65dBA at 1m as source noise level per adult person talking.

Another noise source that might potentially happen in the smoking area would be of a person's mobile phone ringing. Whilst the author was working at Philip Acoustics Limited, a colleague undertook noise measurements of a number of different mobile telephones, results of which confirm a sound pressure level at 1m of typically Leq 58dBA to 62dBA on a moderate to loud volume setting, being similar for a number of different handset manufacturers and models. Thus using a source noise level of Leq 60dBA to 65dBA per person talking is considered as being valid as including the effect of any mobile phones ringing.

6.3.2 Calculation and assessment of noise from use of the smoking area

To calculate noise emissions from the proposed smoking area to the proposed residential flats a computer calculation model has been used. The model is based on the environmental noise

propagation calculation set out in ISO 9613:1996 *Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation* and takes account of source noise level from the maximum number of people using the area and talking at the same time, distance between the smoking area and proposed residential flats (including external amenity areas) acoustic reflections and acoustic directivity.

The model also takes account of proposed noise mitigation measures of acoustic screening to the perimeter of the smoking area and absorptive lining to the side and rear walls within the smoking area.

Specification details for the acoustic treatments are included in Section 7 of this report.

Print-outs from the computer calculation model are provided in Appendix C.

The calculation uses a source noise level of Leq 65dBA at 1m from a person talking loudly as would be expected on a busy weekend evening and is based on up to 20 people using the smoking area at any one time, with up to 10 of the 20 people talking simultaneously at any one time.

Calculated noise emissions from people using the smoking area to outside of the proposed new residential flats are shown in Table 12 below, along with lowest measured ambient noise levels during a quiet weekday evening and night time period.

Description	**Noise from Smoking Area to Outside Residential Property Leq**	**Lowest Existing Ambient Noise Level on Quiet Weekday Night**	
		Leq	**L90**
First Floor Flat External Terrace	43 dBA	48 dBA	46 dBA
Second Floor Flat Balcony	44 dBA		

Table 12: Calculated noise levels from smoking area to outside flats compared with existing ambient noise

Table 12 shows that noise emissions from people using the retained smoking area will be below the lowest existing background noise level outside the façade of the proposed residential properties.

At these levels, allowing for accumulation of sources with the existing background noise, it is demonstrated that noise emissions from up to 20 people using the smoking area at any one time will not increase the background noise level by more than 3dBA, therefore providing no perceptible increase in loudness and achieving a noise impact description of "*slight*" as shown in Table 11. This complies with London Borough of Camden Council's Policy DP28, Table D.

It is important to note that the assessment is considered cautious because the assessment uses lowest ambient noise levels measured on a Monday evening. It is anticipated that the ground floor bar is unlikely to normally be busy on a Monday evening and the actual number of customers using

the smoking area on a night early in the week would often be lower than those used in the assessment. For days later in the week and at weekends, when the bar will be busier, existing ambient noise levels will be higher than those shown in the table as the surrounding area will also be busier.

Using the calculated noise emissions from people using the smoking area to outside of the proposed residential properties as detailed above, the overall noise levels to inside the residential properties are shown in Table 13 below.

The noise levels to inside the residential properties allow for open or closed windows. For closed windows the calculation is based on double-glazing 6mm glass/16mm cavity/10mm glass as proposed within this report. The table also shows guideline limits for noise intrusion into residential properties from BS8233:1999.

Description	Noise from Smoking Area into Property Windows Closed Leq	Noise from Smoking Area into Property Windows Open Leq	BS8233:1999 Guideline Noise Level for Bedrooms Leq
First Floor Flat – Bedroom	8 dBA	28 dBA	30dBA to 35dBA
Second Floor Flat – Bedroom	9 dBA	29 dBA	

Table 13: Calculated noise levels from smoking area to inside flats compared with BS8233:1999 limits

Table 13 shows that noise emissions to inside the proposed residential properties, allowing for open or closed windows, will be lower than guideline limits for noise intrusion into bedrooms contained within British Standard BS8233.

At these levels noise from patrons using the smoking area should not generally be audible nor cause disturbance detrimental to the amenity of future occupants of the proposed residential flats.

6.4 Noise from Mechanical Services Equipment

There are a significant number of existing mechanical services equipment items currently installed at the site, some of which are currently operational while other redundant units have not been removed and remain in-situ.

The author has been advised by the client that all existing equipment items are to be removed and replaced with new units.

Based on results of the noise survey undertaken to the rear of the property, and London Borough of Camden Council's Policy DP28, it is recommended that the cumulative noise from all new mechanical services equipment should not exceed a level of 36dBA at 1m outside windows of the closest noise-sensitive property (likely to be windows to the proposed upper floor flats). This is at least 10dBA below the lowest measured LA90 to the rear façade. At this level noise from any new mechanical equipment should not be detrimental to the amenity of any residential occupiers.

New kitchen supply and extract fans are to be installed to the new basement level kitchen; the extract ducted to high level and the supply fan served by louvred doors to its location at ground floor level.

A computer noise model has been used to calculate the noise contribution from the new fans to outside nearest noise-sensitive windows. The model takes account of losses within the ductwork system, distance between the terminal and noise sensitive windows, acoustic screening and acoustic reflections.

The cumulative calculated noise level from the proposed fans outside the nearest noise-sensitive windows compared with the planning requirement is shown in Table 14. Summary print-outs from the calculation models are included in Appendix D.

Description	Calculated Equipment Noise Levels	London Borough of Camden Noise Limit
All equipment operating	34dBA	≤ 36dBA

Table 14: Calculated equipment noise at nearest noise-sensitive windows

Table 14 shows that the overall noise level from the new fans is at least 12dBA below the lowest recorded background noise and achieves London Borough of Camden Council's planning consent requirements. Resultant noise from the fans will not be disturbing or detrimental to the amenity of nearby occupants. The calculation includes benefit of in-duct silencers to the fans.

It will also be necessary to control noise breakout from the supply fan plantroom to the residential flat above; it is recommended that acoustic louvred doors are installed to the plantroom and that an acoustic ceiling is installed to the separating floor.

The new fans will be structurally linked to the proposed new residential flats and therefore it is considered possible that vibration from the fans could transmit into these properties. As such it is recommended that the fans are installed on proprietary high performance vibration isolators and that flexible connections are incorporated between the fans and adjoining ductwork sections.

Details of suitable noise and vibration control treatments are provided in Section 7 below.

It is considered that separate planning approval would be necessary for any further external mechanical equipment that may be required, for example air conditioning condensers; the cumulative noise of all mechanical equipment must not exceed LAeq 36dB at 1m outside the closest noise-sensitive windows.

7. SCHEME OF NOISE MITIGATION MEASURES

Noise mitigation measures are necessary to ensure that noise levels inside rooms of the new residences are reasonable and comply with guidance on suitable internal noise levels provided in British Standard BS8233:1999.

The development has traditional masonry construction external walls and therefore the dominant path for external noise to enter rooms of the new flats will be via glazing and ventilators. By following the calculation procedures outlined in BS EN ISO 12354-3:2000 and Section 6.7 of BS8233:1999 a specification for the acoustic performance of façade elements has been established.

Copy of example acoustic calculation for noise intrusion into rooms within the development directly overlooking Camden High Street is provided in Appendix B. The calculations use ACA Acoustics Limited's in-house computer calculation model based on BS EN ISO 12354-3 and BS8233. The calculations confirm that intrusive noise levels into rooms of the proposed residential dwellings will comply with guidance limits in British Standard BS8233 as set out in Section 2.4 of this report.

An item by item scheme for noise insulation measures to the proposed residential dwellings is provided below.

Note that consideration of non-acoustic aspects such as structural, visual, airflow and construction material are outside the scope of ACA Acoustics Limited and should be considered by others accordingly.

7.1 Walls

External walls are of traditional masonry construction. Values in Table 15 below show the expected sound insulation performance for this type of wall construction. This will provide more than adequate sound insulation and no additional treatments are required.

Description	Octave Band Centre Frequency – Hz (dB)						Rw
	125	250	500	1k	2k	4k	(dB)
Wall	41	45	47	55	60	60	53

Table 15: Traditional solid masonry external wall Sound Reduction Index R dB

7.2 Glazing

Existing glazing to the property is of single pane float glass nominally 4mm thick within casement style timber frame. This type of glazing provides limited acoustic performance and it is recommended that the sound insulation performance of the glazing to façades with line-of-sight to Camden High Street be improved significantly.

It is anticipated that due to conservation reasons, existing glazing will likely be retained. Values in Table 16 show a specification schedule of glazing sound insulation performance for different parts of the development.

It is considered likely that glazed doors to the rear façade will be formed from new units to match the appearance of existing windows.

Note that there are many permutations of possible configurations and different glazing suppliers will tend to use their own preferred configuration. Providing that the overall Rw performance and the individual octave band performance are not less than those shown in Table 16 then any alternative configuration can be used.

Description	Octave Band Centre Frequency – Hz (dB)						Rw (dB)	Comments
	125	250	500	1k	2k	4k		
Living room on front façade and side passage	26	34	44	46	53	52	47	Secondary glazing such as 6/16/4 IGU inner window, 200mm cavity, 4mm outer
Bedrooms on front façade and side passage	35	46	47	48	56	55	50	Secondary glazing such as 6/16/10 IGU inner window, 200mm cavity, 4mm outer
Living rooms and bedrooms on rear façade	24	24	32	37	37	44	35	Double glazing such as 6/16/10 IGU
Non-habitable rooms e.g. corridors	20	22	28	32	33	32	30	Existing 4mm single pane windows retained or any equivalent replacement

Table 16: Specification for glazing Sound Reduction Index R dB

Suitable secondary glazing system to the Camden High Street façade would be to use a high-performance double-glazed unit inside of the existing retained outer window.

The size of the airgap between the outer window and inner secondary glazing is important; the bigger the gap the better the performance. It is recommended that the gap between the outer window and the inner secondary glazing must be at least as shown in Table 16.

The sound insulation performance of glazing is often limited by the seals around the frame. Effective acoustic seals are rubber or neoprene beaded “P” or “O” profile type that compress all around on closure of the windows.

Plastic type or brush type weathering seals are not classed as effective acoustic seals.

7.3 Ventilation Scheme

It is anticipated that it will be necessary to incorporate an acoustic ventilation scheme into the design such that residents are able to have background ventilation without necessarily needing to open windows.

To control night time LAFmax noise levels from general (traffic and pedestrian) sources on the Camden High Street and side passage façades into bedrooms it is necessary for background ventilation to be provided by mechanical system incorporating inline silencing; in-window or through-wall type ventilators would not provide sufficient acoustic performance.

Suppliers such as Vent Axia and Nuaire or equivalent would be able to offer suitable whole-house ventilation systems such as MVHR (mechanical ventilation heat recovery).

It is important that any self-noise (i.e. noise from the fans) must not cause internal noise levels to exceed the design requirements. To achieve these limits then it is recommended that the overall noise from any mechanical ventilation system will need to be no higher than LAeq 30dB within living rooms (daytime) and LAeq 25dB within bedrooms (night time) to allow for accumulation of noise sources.

Note that the proposed mechanical ventilation scheme is required to control general (traffic and pedestrian) noise and not to control entertainment noise to within the proposed new residential dwellings. As discussed in Section 6.2 above, entertainment noise at the external façade already complies with the requirements of London Borough of Camden Council.

7.4 Separating Floor Between Retained Bar and Residential Flats

Separating floors between the ground floor bar area and first floor flats and between the new flats will need to comply fully with performance standards in the Building Regulations 2010 (2003 Edition) Approved Document E.

Paragraph 0.8 of Approved Document E (ADE) states "*The performance standards set out in Tables 1a and 1b (*of ADE) *are appropriate for walls, floors and stairs that separate spaces used for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level."*

As discussed in Section 6 it is recommended that the sound insulation performance of the separating floor between the bar area and adjoining residential flats should be improved by at least 25dB in the 63Hz octave band. This is a significant improvement required and will require the ground floor bar area to be isolated from the adjoining structure.

To achieve the performance standard specified above a high performance acoustic ceiling should be installed throughout the ground floor and first floor bar areas. The existing ceiling would be retained and then new acoustic ceiling as the British Gypsum (or equivalent) MF system installed below, consisting of minimum three layers of plasterboard (two layers 19mm Plank plasterboard and one layer of 15mm Gyproc SoundBloc).

The ceiling should be hung as low as possible to create as large a cavity void as possible (the bigger the cavity the better the performance, cavity minimum 450mm). Minimum 100mm thick mineral wool insulation to be placed in cavity (minimum density 30kg/m^2); the insulation should be laid loose and not compressed.

The ceilings should be imperforate and should not touch or be fixed to the sidewalls or any columns. Note that if electrical cables pass through the acoustic ceiling these should be sealed airtight with non-setting flexible mastic. No services such as ventilation ducts or pipework should penetrate the acoustic ceiling. The ceiling shall be hung using resilient hangers.

Separating floors between residential flats should be designed to achieve at least the minimum requirements of Approved Document E. It is anticipated that this would be achieved by installing a new independent ceiling below the existing retained floor, nominally as Floor Treatment 1 method of ADE.

Note that for first floor flats, in accordance with Diagram 0.1 of Approved Document E there is no requirement for minimum standard of impact sound insulation for this separating floor. Separating floors between first and second floor residential flats will require airborne and impact sound insulation performance to comply with requirements of Approved Document E.

7.5 Acoustic Wall Linings to Bar Areas

To minimise any flanking transmission via common structural walls rising from the ground floor bar areas to the proposed residential flats above, it is recommended that acoustic linings are installed to the walls and any structural columns of the bar.

Suitable acoustic linings would be independent plasterboard linings fixed on new independent timber or metal studwork. The studwork should be fixed top and bottom and should not be fixed directly to the structural side walls. If ties are required for structural reasons these should be resilient type; minimum number of ties practical should be used.

The linings should incorporate two layers of 12.5mm plasterboard. Inner face of the plasterboard should be set off the existing walls by minimum 75mm with 50mm mineral wool insulation hung in the cavity.

7.6 Floating Floor to Ground Floor Bar

To minimise any flanking transmission into the common structure via the floor of the ground floor bar and to control any potential structure-borne noise from customers jumping or dancing in the bar, it is recommended that a floating floor be installed throughout the ground floor bar. In conjunction with the proposed independent ceiling and acoustic wall linings discussed in Sections 7.4 and 7.5 respectively, this will in effect completely isolate the bar from the adjoining structure, creating a box-within-a-box design.

Suitable floating floor system would typically be as Total Vibration Solutions' Model RIM-W Wood Floating Floor or equal and approved (Total Vibration Solutions – Contact: Patrick Dent – Tel: 01706 260 220).

The existing stage should be removed and reinstated above the floating floor and abutting the proposed new wall linings such that it is within the new structure and does not bridge the proposed acoustic treatments.

7.7 Entrance Door to Ground Floor Public House

It is recommended that a door lobby arrangement is retained for the main entrance to the ground floor bar area within the public house. This lobby should extend across the entire frontage of the bar area, such that the existing windows to Camden High Street are located within the lobby and not directly open to the bar. Alternatively very high performance secondary glazing will be required to these windows.

This is the normal way to prevent noise breakout from bar entrances and will provide a high level of sound insulation by ensuring that at least one set of doors is closed most of the time. It is recommended that the doors should each have a sound insulation performance not less than Rw 25dB. This equates to a good quality solid core timber door or equivalent with weather type brush seals, intumescent seals or similar in the rebate of the frame.

It is recommended that the door lobby has some acoustic absorption fitted to make it acoustically "soft" as opposed to having all hard reflective surfaces. It is anticipated this will be achieved by using carpet on the floor or absorptive tiles to the ceiling of the lobby.

Any other doors that are not regularly opened for access, including potentially the side fire exit doors if these would be normally closed should be solid hardwood construction with effective airtight seals all around which will have sound insulation performance not less than Rw 30dB.

7.8 Music Volume Limiter

The reason for recommending a music volume limiter is not necessarily to restrict volumes to very low levels; it is to provide a mechanism to control the potential for excessive music volumes and to trim noise levels in individual octave bands where necessary such that, once structural works have been completed and slight excess of music noise may be reduced to be inaudible in the adjoining flats.

The limiter should be a compressor or electronic type with adjustable levels at different frequencies. This type of limiter would normally be set by playing music within the ground and first floor bar areas whilst simultaneously listening and measuring inside the new residential flats.

Suitable limiter model is dependent on the exact music system installed in the venue; advice from your music system supplier should be taken prior to purchase and fitment of the music volume limiter.

7.9 Loudspeakers

It is recommended that the music system incorporates greater number of good-quality small loud speakers rather than few large speakers. Through careful placement and direction this helps to limit the bass (low) frequencies without impairment to customer perception of music.

Loudspeakers should be installed on resilient rubber or neoprene mounts to reduce structure-borne vibration to the building fabric.

7.10 In-Duct Silencers to Supply & Extract Fans

As discussed in Section 6.4, it is recommended that in-duct silencers are installed to the supply and extract fans.

Minimum dynamic insertion losses for the required silencers, along with typical suitable selections, are shown in Table 17 on the following page. It is anticipated that the silencers to EF1 will require Melinex facing to the acoustic linings, suitable for grease-laden atmosphere.

Description	Minimum Dynamic Insertion Loss – dB (Hz)						Comments
	125	250	500	1k	2k	4k	
SF1 Inlet	16	21	30	34	22	17	Nominally 40% free area silencer, 1250mm long
SF1 Supply	10	14	20	22	15	12	Nominally 45% free area silencer, 900mm long
EF1 Exhaust	13	18	25	28	19	15	Nominally 45% free area silencer, 1250mm long
EF1 Extract	7	10	14	15	10	8	Nominally 45% free area silencer, 600mm long

Table 17: Silencer minimum insertion loss performance

The silencers should be installed as close to the fan as possible, and inside of the building. Should the silencers be installed external to the building then any preceding ductwork sections must be manufactured from double-skin casings.

7.11 Acoustic Louvres to Ground Floor Supply Fan Plantroom

To control casing radiated noise and residual duct-borne noise via the inlet terminal, it is recommended that the louvres to the supply fan plantroom are acoustic type.

Suitable acoustic louvred doors are nominally 150mm deep with 150mm blade pitch angle. Minimum dynamic insertion loss performance for the acoustic louvred doors is shown in Table 18 below.

Description	Minimum Dynamic Insertion Loss – dB (Hz)						Comments
	125	250	500	1k	2k	4k	
Acoustic louvred door	4	5	8	12	16	15	150mm deep louvre

Table 18: Acoustic louvre minimum insertion loss performance

7.12 Vibration Isolators to Supply & Extract Fans

As the proposed fans and associated ductwork are directly structurally connected to the residential flats above, to control structure-borne noise to these properties it is recommended that the fans are installed on vibration isolators. Suitable isolators are typically steel spring type mounts providing a deflection of not less than 25mm at the working load.

The isolators shall incorporate rubber or neoprene high-frequency isolation pads.

Flexible connections should be incorporated between the fan and adjoining ductwork sections; note that to control noise breakout within the supply fan plantroom it is recommended that the silencers either side of the fan are also installed on vibration isolators and the flexible connections fitted between the silencers and adjoining ductwork sections.

7.13 Wall Lining and Acoustic Ceiling to Ground Floor Supply Fan Plantroom

As discussed in Section 6.4, it is recommended that the sound insulation performance of the supply fan plantroom and adjoining flat above is improved.

An independent acoustic ceiling should be installed to the plantroom, comprising of a British Gypsum (or equivalent) MF system installed below the existing separating floor, consisting of minimum two layers of 15mm Gyproc SoundBloc plasterboard.

The ceiling should be hung as low as possible to create as large a cavity void as possible (the bigger the cavity the better the performance, cavity minimum 150mm). Minimum 100mm thick mineral wool insulation to be placed in cavity (minimum density 30kg/m^2); the insulation should be laid loose and not compressed.

The ceiling should be imperforate and should not touch or be fixed to the sidewalls or any columns. Note that if electrical cables pass through the acoustic ceiling these should be sealed airtight with non-setting flexible mastic. No services such as ventilation ducts or pipework should penetrate the acoustic ceiling. The ceiling shall be hung using resilient hangers.

To control structure-borne flanking noise, it is recommended that acoustic wall linings are installed to the inner face of the plantroom walls. Suitable acoustic linings would be independent plasterboard linings fixed on new independent timber or metal studwork. The studwork should be fixed top and bottom and should not be fixed directly to the structural side walls. If ties are required for structural reasons these should be resilient type; minimum number of ties practical should be used.

The linings should incorporate two layers of 12.5mm plasterboard. Inner face of the plasterboard should be set off the existing walls by minimum 75mm with 50mm mineral wool insulation hung in the cavity.

Where the supply ductwork passes through the wall this should not touch either the acoustic lining or the structural wall; maximum 5mm gap should be retained around the ductwork and sealed airtight using a non-hardening, flexible mastic.

7.14 Acoustic Screen and Wall Lining Panels to Proposed Rear Smoking Area

The proposed acoustic screen would extend the full length of the proposed rear smoking area, installed at the existing upper level such that the height of the screen is increased compared with the lower smoking area.

Note that consideration of non-acoustic aspects such as structural, visual and construction material aspects are outside the scope of ACA Acoustics Limited and should be considered by others accordingly.

It is recommended that the acoustic screen is installed as proposed at a height of 2635mm such that line of sight to the top of the rear reflecting wall is broken by the screen to the second floor balcony. Sketch of the proposed noise control scheme is included in Appendix D.

The construction and specification of suitable acoustic panels is typically:

- Outer casing formed from plain sheet steel minimum 1.0mm thickness;
- Inner casing (facing in to smoking area) formed from perforated sheet steel;
- Panels containing a fibrous sound absorbent infill that is non-shedding, non-combustible, non-hygroscopic and chemically inert. This infill shall be faced with glass cloth to prevent fibre migration;
- Infill density minimum 45kg.m^{-3}. Infill thickness minimum 100mm;

The panels shall provide the following minimum sound reduction index (R):

Description	Octave Band Centre Frequency – Hz (R – dB)							
	63	125	250	500	1k	2k	4k	8k
Acoustic Panel	18	20	26	31	35	39	40	41

Table 19: Acoustic panel minimum sound reduction index

Panels shall provide the following minimum sound absorption when assessed in accordance with BS EN ISO 354:2003

Description	Octave Band Centre Frequency – Hz (R – dB)							
	63	125	250	500	1k	2k	4k	8k
Acoustic Panel	0.15	0.35	0.75	0.90	1.00	1.00	0.95	0.90

Table 20: Acoustic panel minimum sound absorption coefficient

Similar acoustic panels shall be installed to the side and rear walls of the smoking area to reduce reverberant and reflected noise from these hard surfaces. Specification for these acoustic wall lining panels is as above, however the solid outer casing is not required and can be excluded if deemed unnecessary for structural stability of the panels by the successful supplier accordingly.

The acoustic panels have been based on Allaway Acoustics Limited's standard range; contact Chris Williams, Tel: 01992 550825.

Alternative methods of attenuation may be acceptable. Full details of any alternative scheme, including detailed design drawings and manufacturer's certified performance tests should be submitted to ACA Acoustics Limited and approved prior to manufacture.

ACA ACOUSTICS

APPENDIX A

London Borough of Camden Council LDF Policy DP28

DP28. Noise and vibration

28.1 Noise and vibration can have a major effect on amenity and health and therefore quality of life. Camden's high density and mixed-use nature means that disturbance from noise and vibration is a particularly important issue in the borough. Camden's Core Strategy recognises the importance of this issue for Camden's residents and policy DP28 contributes to implementing a number of Core Strategy policies, including CS5 – *Managing the impact of growth and development*, CS9 – *Achieving a successful Central London*, CS11 – *Promoting sustainable and efficient travel* and CS16 – *Improving Camden's health and well-being*.

DP POLICY

DP28 – Noise and vibration

The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:

a) development likely to generate noise pollution; or

b) development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.

Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted.

The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds.

The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact.

28.2 The effect of noise and vibration can be minimised by separating uses sensitive to noise from development that generates noise and by taking measures to reduce any impact. Noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces, while noise is generated by rail, road and air traffic, industry, entertainment (e.g. nightclubs, restaurants and bars) and other uses.

28.3 The Council will only grant planning permission for development sensitive to noise in locations that experience noise pollution, and for development likely to generate noise pollution, if appropriate attenuation measures are taken, such as double-glazing. Planning permission will not be granted for development sensitive to noise in locations that have unacceptable levels of noise. Where uses sensitive to noise are proposed close to an existing source of noise or when development that generates noise is proposed, the Council will require an acoustic report to ensure compliance with PPG24: *Planning and noise*. A condition will be imposed to require that the plant and equipment which may be a source of noise pollution is kept working efficiently and within the required noise limits and time restrictions. Conditions may also be imposed to ensure that attenuation measures are kept in place and effective throughout the life of the development.

28.4 In assessing applications, we will have regard to the Noise and Vibration Thresholds, set out below. These represent an interpretation of the standards in PPG24 and include an evening period in addition to the day and night standards contained in the PPG, which provide a greater degree of control over noise and vibration during a period when noise is often an issue in the borough.

Table A: Noise levels on residential sites adjoining railways and roads at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	74 dB L_{Aeq},12h	72 dB L_{Aeq},12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	74 dB L_{Aeq},4h	72 dB L_{Aeq},4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	66 dB L_{Aeq},8h	66 dB L_{Aeq},8h

Table B: Noise levels on residential streets adjoining railways and roads at and above which attenuation measures will be required

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	65 dB L_{Aeq},12h	62 dB L_{Aeq},12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	60 dB L_{Aeq},4h	57 dB L_{Aeq},4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	55 dB L_{Aeq},1h	52 dB L_{Aeq},1h
Individual noise events several times an hour	Night	2300-0700	>82 dB L_{Amax} (S time weighting)	>82 dB L_{AMAX} (S time weighting)

Table C: Vibration levels on residential sites adjoining railways and roads at which planning permission will not be granted

Vibration description and location of measurement	Period	Time	Vibration levels
Vibration inside critical areas such as a hospital operating theatre	Day, evening and night	0000-2400	0.1 VDV ms-1.75
Vibration inside dwellings	Day and evening	0700-2300	0.2 to 0.4 VDV ms-1.75
Vibration inside dwellings	Night	2300-0700	0.13 VDV ms-1.75
Vibration inside offices	Day, evening and night	0000-2400	0.4 VDV ms-1.75
Vibration inside workshops	Day, evening and night	0000-2400	0.8 VDV ms-1.75

Where dwellings may be affected by ground-borne regenerated noise internally from, for example, railways or underground trains within tunnels, noise levels within the rooms should not be greater than 35dB(A)max

Table D: Noise levels from places of entertainment on adjoining residential sites at which planning permission will not be granted

Noise description and measurement location	Period	Time	Sites adjoining places of entertainment
Noise at 1 metre external to a sensitive façade	Day and evening	0700-2300	L_{Aeq} 5m shall not increase by more than 5dB*
Noise at 1 metre external to a sensitive façade	Night	2300-0700	L_{Aeq} 5m shall not increase by more than 3dB*
Noise inside any living room of any noise sensitive premises, with the windows open or closed	Night	2300-0700	L_{Aeq} 5m (in the 63Hz Octave band measured using the 'fast' time constant) should show no increase in dB*

* As compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL_{Aeq}

Key evidence and references

- Camden's Noise Strategy, 2002
- The London Plan (Consolidated with Alterations since 2004), 2008
- Planning Policy Guidance 24: Planning and noise

ACAACOUSTICS

APPENDIX B

Acoustic Calculations – Façade Sound Insulation

Project: The Black Cap, 171 Camden High Street, London
Calculation Reference: 121007-C07-A
Date: 06/03/2014

BS EN ISO 12354-3 - FAÇADE SOUND INSULATION CALCULATION

Room Reference: Flat A - Kitchen/Lounge

Equivalent Free-Field External Sound Pressure Level Outside Sample Room:

Daytime 16hr (7am - 11pm)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,ff	72	71	71	69	67	64	60

Building Envelope Details For Sample Room:

Element	Area (m^2) or Vent No	Element Specification / Description
Walls	36	Solid Masonry
Windows	6	6/16/4-100-4 Secondary Glazing
Doors	0	
Roof / Ceiling	0	
Ventilators	1	High performance mechanical

Element Sound Reduction Index:

		dB at Octave Band Centre Frequency					
Element	Area (m^2) or Vent No	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	36.0	41	45	47	55	60	60
Windows	6.2	26	34	44	46	53	52
Doors	0						
Roof / Ceiling	0						
Ventilators (Dn,e)	1	45	50	55	60	65	65
Overall Sound Reduction All Elements Combined		**-33.5**	**-40.6**	**-46.3**	**-51.8**	**-57.8**	**-57.3**

Sample Room Volume (m^3):	122
Sample Room Building Envelope Surface Area (m^2):	42.2

Sample Room Characteristics:

		Reverberation Time (seconds) at Octave Band Centre Frequency					
Sample Room Type:	Living Space	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.70	0.60	0.50	0.50	0.50	0.50

Calculated Internal Sound Pressure Level In Sample Room:

Daytime 16hr (7am - 11pm)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,2	30.3	42.3	34.6	26.1	18.5	9.6	6.0

Project: The Black Cap, 171 Camden High Street, London
Calculation Reference: 121007-C08-A
Date: 06/03/2014

BS EN ISO 12354-3 - FAÇADE SOUND INSULATION CALCULATION

Room Reference: Flat C, Bedroom 1
Night

Equivalent Free-Field External Sound Pressure Level Outside Sample Room:

Night-time (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,ff	71	69	69	68	66	64	61

Building Envelope Details For Sample Room:

Element	Area (m^2) or Vent No	Element Specification / Description
Walls	20	Solid Masonry
Windows	3	6/16/10-200-4 Secondary Glazing
Doors	0	
Roof / Ceiling	0	
Ventilators	1	High performance mechanical

Element Sound Reduction Index:

		dB at Octave Band Centre Frequency					
Element	Area (m^2) or Vent No	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	20	41	45	47	55	60	60
Windows	3	35	46	47	48	56	55
Doors	0						
Roof / Ceiling	0						
Ventilators (Dn,e)	1	45	50	55	60	65	65
Overall Sound Reduction All Elements Combined		**-39.1**	**-44.5**	**-46.7**	**-52.8**	**-58.7**	**-58.5**

Sample Room Volume (m^3):	57
Sample Room Building Envelope Surface Area (m^2):	23

Sample Room Characteristics:

		Reverberation Time (seconds) at Octave Band Centre Frequency					
Sample Room Type:	Bedroom	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.30	0.25	0.20	0.20	0.20	0.20

Calculated Internal Sound Pressure Level In Sample Room:

Night-time (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,2	22.5	31.7	25.5	21.3	13.2	5.3	2.5

Project: The Black Cap, 171 Camden High Street, London
Calculation Reference: 121007-C09-A
Date: 06/03/2014

BS EN ISO 12354-3 - FAÇADE SOUND INSULATION CALCULATION

Room Reference: Flat C - Bedroom 1
Night - Lmax

Equivalent Free-Field External Sound Pressure Level Outside Sample Room:

Night-time (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Typical High Lfmax,ff	94	92	93	89	88	87	84

Building Envelope Details For Sample Room:

Element	Area (m^2) or Vent No	Element Specification / Description
Walls	20	Solid Masonry
Windows	3	6/16/10-200-4 Secondary Glazing
Doors	0	
Roof / Ceiling	0	
Ventilators	1	High performance mechanical

Element Sound Reduction Index:

		dB at Octave Band Centre Frequency					
Element	Area (m^2) or Vent No	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	20	41	45	47	55	60	60
Windows	3	35	46	47	48	56	55
Doors	0	0	0	0	0	0	0
Roof / Ceiling	0	0	0	0	0	0	0
Ventilators (Dn,e)	1	45	50	55	60	65	65
Overall Sound Reduction All Elements Combined		**-39.1**	**-44.5**	**-46.7**	**-52.8**	**-58.7**	**-58.5**

Sample Room Volume (m^3):	57
Sample Room Building Envelope Surface Area (m^2):	23

Sample Room Characteristics:

		Reverberation Time (seconds) at Octave Band Centre Frequency					
Sample Room Type:	Bedroom	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.30	0.25	0.20	0.20	0.20	0.20

Calculated Internal Sound Pressure Level In Sample Room:

Night-time (11pm - 7am)	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Lfmax,ff	45.0	54.7	49.5	42.3	35.2	28.3	25.5

ACAACOUSTICS

APPENDIX C

Acoustic Calculations – Proposed Smoking Area

Project Information

Project: Black Cap, Camden
Client: Faucett Inn / Hillman Design
Reference: 121007-C02
Date: 28/11/2012

ISO 9613-2:1996 ENVIRONMENTAL NOISE PROPAGATION CALCULATION

Calculation Model: Smoking Area to Second Floor Terrace

Description				Octave Band Centre Frequency - Hz (dB) 63	125	250	500	1k	2k	4k	8k	Notes
Source Lw	Type:	Patrons Talking Loudly		58	69	78	81	79	74	65	52	Published Lp for single person talking loudly - 65dBA at 1m; equates to Lw 73dBA. Allow maximum of 20 people in smoking area with half talking at any one time (10 people talking = +10dB correction)
	Source:	Published Data	83 dBA									
Directivity Correction (Dc)				2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
	Source Height	1.5	m									
	Receiver Height	4.1	m									
	Distance	15.1	m									
	Directivity Index	0										
Geometrical Divergence (Adiv) - 15.1m				34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	
Atmospheric Absorption (Aatm)				0	0	0	0	0.1	0.2	0.5	1.9	
	Temperature	15	^{O}C									
	Relative Humidity	50	%									
Ground Effect (Agr)				-3	-3	-3	-3	-3	-3	-3	-3	
	Source Height	1.5	m									
	Receiver Height	4.1	m									
	Source Ground	Hard Ground - G = 0										
	Receiver Ground	Hard Ground - G = 0										
	Middle Ground	Hard Ground - G = 0										
Screening (Abar)				2.9	6.8	8.2	10	12.3	15	17.7	20	Proposed acoustic screen to boundary of smoking area
	Source to Barrier	4.0	m									
	Barrier to Receiver	11.3	m									
	Parallel Distance	0	m									
Miscellaneous (Amisc)				0	0	0	0	0	0	0	0	
Reflections (Lw,im + A)				17.2	25.2	34.2	37.2	35.1	29.9	20.2	5.1	
Calculated Lp at Receiver:		**43.9 dBA**		**26.8**	**34**	**41.8**	**43.4**	**39.7**	**33**	**22.2**	**6.6**	
Attenuation												Proposed acoustic screen and absorptive acoustic wall lining included within screening and reflections corrections
Attenuated Lp at Receiver:		**44 dBA**		**26.8**	**34**	**41.8**	**43.4**	**39.7**	**33**	**22.2**	**6.6**	

Project Information

Project: Black Cap, Camden
Client: Faucett Inn / Hillman Design
Reference: 121007-C01
Date: 28/11/2012

ISO 9613-2:1996 ENVIRONMENTAL NOISE PROPAGATION CALCULATION

Calculation Model: Smoking Area to First Floor Patio

Description				Octave Band Centre Frequency - Hz (dB) 63	125	250	500	1k	2k	4k	8k	Notes
Source Lw	Type:	Patrons Talking Loudly		58	69	78	81	79	74	65	52	Published Lp for single person talking loudly - 65dBA at 1m; equates to Lw 73dBA. Allow maximum of 20 people in smoking area with half talking at any one time (10 people talking = +10dB correction)
	Source:	Published Data	83 dBA									
Directivity Correction (Dc)				2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
	Source Height	1.5	m									
	Receiver Height	2.5	m									
	Distance	11.7	m									
	Directivity Index	0										
Geometrical Divergence (Adiv) - 11.7m				32.4	32.4	32.4	32.4	32.4	32.4	32.4	32.4	
Atmospheric Absorption (Aatm)				0	0	0	0	0	0.1	0.4	1.5	
	Temperature	15	^{O}C									
	Relative Humidity	50	%									
Ground Effect (Agr)				-3	-3	-3	-3	-3	-3	-3	-3	
	Source Height	1.5	m									
	Receiver Height	2.5	m									
	Source Ground	Hard Ground - G = 0										
	Receiver Ground	Hard Ground - G = 0										
	Middle Ground	Hard Ground - G = 0										
Screening (Abar)				4.2	8.7	10.7	13.2	15.8	18.7	20	20	Proposed acoustic screen to boundary of smoking area
	Source to Barrier	4.0	m									
	Barrier to Receiver	8.3	m									
	Parallel Distance	0	m									
Miscellaneous (Amisc)				0	0	0	0	0	0	0	0	
Reflections (Lw,im + A)				18.4	26.2	34.9	37.2	34	27.3	15.8	0	
Calculated Lp at Receiver:		**43 dBA**		**27.7**	**34.4**	**41.7**	**42.7**	**38.5**	**31**	**20**	**5.4**	
Attenuation												Proposed acoustic screen and absorptive acoustic wall lining included within screening and reflections corrections
Attenuated Lp at Receiver:		**43 dBA**		**27.7**	**34.4**	**41.7**	**42.7**	**38.5**	**31**	**20**	**5.4**	

APPENDIX D

Acoustic Calculations – Proposed Mechanical Equipment

Project: The Black Cap, Camden
Calculation Reference: 121007-C05-A
Date: 06/03/2014

DUCTWORK SYSTEM ATMOSPHERIC NOISE CALCULATION

System Reference: EF1 Exhaust to closest residential properties
Systemair MUB 062 630D4-A2 IE2

Fan/Equipment Sound Power Level Spectra

Manufacturers Data	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
System Volume: 2m3/s at 1050Pa	88	93	90	86	82	78	73

Ductwork System Elements

Element	Duct Size (W x H) - mm		Attenuation - dB at Octave Band Centre Frequency					
			125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Silencer	720	720	13	18	25	28	19	15
Unlined Rectangular Duct	500	500	0.4	0.3	0.1	0.1	0.1	0.1
Square Bend c/w Vanes	500	500	1	4	6	4	4	4
Square Bend c/w Vanes	500	500	1	4	6	4	4	4
Square Bend c/w Vanes	500	500	1	4	6	4	4	4
Unlined Rectangular Duct	500	500	0.8	0.6	0.2	0.2	0.2	0.2
Radius Bend	500	500	2	3	3	3	3	3
Unlined Rectangular Duct	500	500	3.6	2.7	0.9	0.9	0.9	0.9
End Reflection	500	500	4	1.5	0.5	0.1	0	0
Radiating Lw at System Termination - 52dBA			**66.2**	**51.9**	**38.3**	**37.7**	**42.8**	**41.8**

Environmental Noise Propagation

		Acoustic Corrections - dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Geometrical Divergence:	4m	23	23	23	23	23	23
Directivity Correction:		0.3	0.3	0.3	0.3	0.3	0.3
Atmospheric Absorption:		0	0	0	0	0	0
Ground Effect:	Mixed Ground	2	-1.9	-2	-2	-2	-2
Acoustic Screening:							
Acoustic Reflections:		34.4	24	10.5	9.9	15	14

Calculated Lp at Receiver

	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq	**30.6**	**42.3**	**31.9**	**18.4**	**17.8**	**22.9**	**21.9**
Criterion	36						
Attenuation Required	0						

Project: The Black Cap, Camden
Calculation Reference: 121007-C06-A
Date: 06/03/2014

DUCTWORK SYSTEM ATMOSPHERIC NOISE CALCULATION

System Reference: SF1 Inlet to closest residential properties
Systemair MUB 042 500D4-A2 IE2

Fan/Equipment Sound Power Level Spectra

Manufacturers Data	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
System Volume: 1.7m3/s at 350Pa	77	82	79	75	71	67	62

Ductwork System Elements

Element	Duct Size (W x H) - mm		Attenuation - dB at Octave Band Centre Frequency					
			125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Silencer	720	720	16	21	30	34	22	17
End Reflection	500	500	4	1.5	0.5	0.1	0	0
Acoustic Louvre			4	5	8	12	16	15
Radiating Lw at System Termination - 46dBA			**58.0**	**51.5**	**36.5**	**24.9**	**29.0**	**30.0**

Environmental Noise Propagation

		Acoustic Corrections - dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Geometrical Divergence:	5m	25	25	25	25	25	25
Directivity Correction:		1.9	1.9	1.9	1.9	1.9	1.9
Atmospheric Absorption:		0	0	0	0	0	0.1
Ground Effect:	Hard Ground	-3	-3	-3	-3	-3	-3
Acoustic Screening:		8.2	10.1	12.4	15.1	17.9	20
Acoustic Reflections:		43.7	35.3	18	3.7	5	3.8

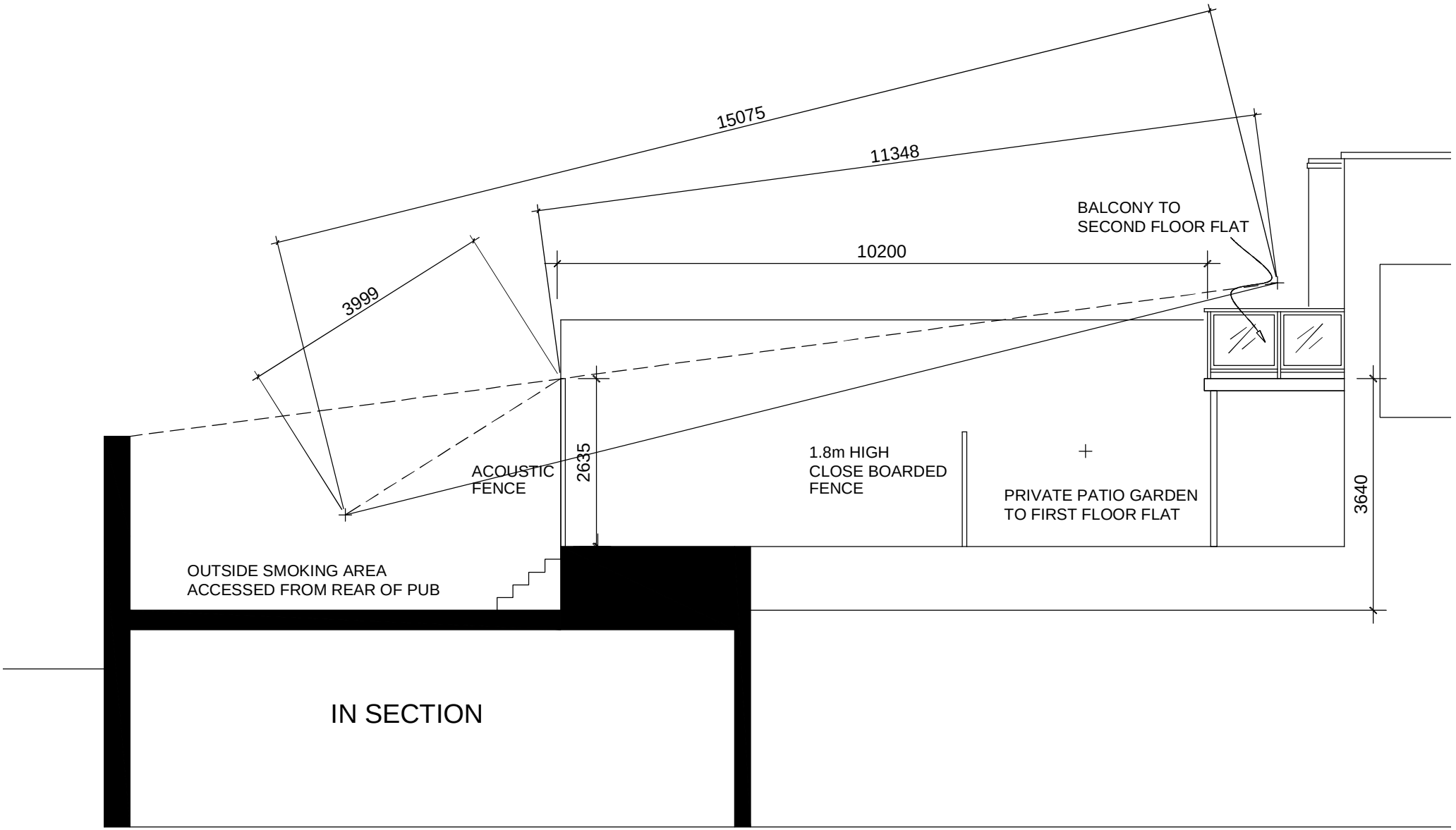
Calculated Lp at Receiver

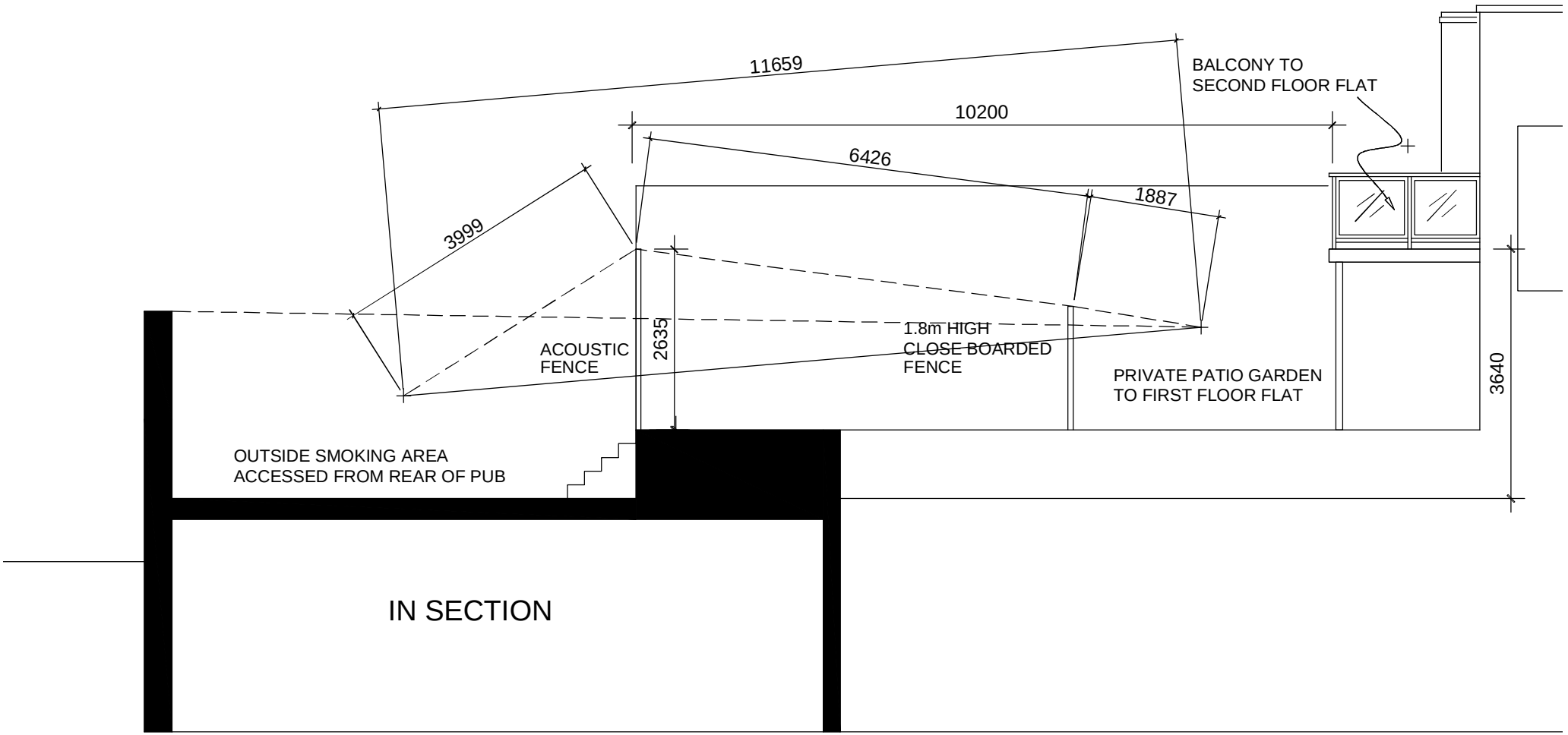
	Overall dBA	Linear dB at Octave Band Centre Frequency					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq	**30.4**	**43.9**	**35.5**	**18.2**	**3.9**	**5.2**	**4.0**
Criterion	36						
Attenuation Required	0						

ACAACOUSTICS

APPENDIX E

Typical Noise Mitigation Treatments


15075
11348
10200
3999
BALCONY TO
SECOND FLOOR FLAT
2635
ACOUSTIC
FENCE
1.8m HIGH
CLOSE BOARDED
FENCE
PRIVATE PATIO GARDEN
TO FIRST FLOOR FLAT
3640
OUTSIDE SMOKING AREA
ACCESSED FROM REAR OF PUB
IN SECTION


11659
BALCONY TO
SECOND FLOOR FLAT
10200
6426
1887
3999
2635
ACOUSTIC
FENCE
1.8m HIGH
CLOSE BOARDED
FENCE
PRIVATE PATIO GARDEN
TO FIRST FLOOR FLAT
3640
OUTSIDE SMOKING AREA
ACCESSED FROM REAR OF PUB
IN SECTION

DATA SHEET E60c

ACOUSTIC ENCLOSURE PANEL MODEL EP100/UF

IMPORTANT : THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A DATED AND CERTIFIED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

SPECIFICATION

THE ACOUSTIC ENCLOSURE PANEL COMPRISES A COMBINATION OF SOUND ABSORBENT MATERIALS AND HIGH MASS BARRIERS CONTAINED WITHIN A METAL CASING HAVING AN PLAIN OUTER AND PERFORATED INNER FACE, OFFERING EXCELLENT SOUND REDUCTION AND ABSORPTION PROPERTIES.

PANELS ARE CONSTRUCTED FROM GALVANISED STEEL (SUFFIX G), ZINTEC (SUFFIX Z), PLASTIC COATED STEEL (SUFFIX L) OR ALUMINIUM (SUFFIX A).

THE OUTER CASING IS FORMED FROM PLAIN SHEET METAL AND INSIDE FACE FROM PERFORATED METAL.

PANELS CONTAIN A FIBROUS SOUND ABSORBENT INFILL THAT IS NON-SHEDDING, NON-COMBUSTIBLE, NON-HYGROSCOPIC AND CHEMICALLY INERT. THE INFILL IS FACED WITH GLASS CLOTH TO PREVENT FIBRE MIGRATION.

INFILL DENSITY- 45kg/m3.

INFILL THICKNESS -100mm.

THE CASING CAN BE SUPPLIED WITH A PERIMETER FLANGE FOR FIXING ADJACENT SECTIONS TOGETHER, FIXING THE PANELS INTO THE BUILDERSWORK OPENING OR FIXING INTO THE FRAMEWORK OF AN ACOUSTIC ENCLOSURE (OPTION F).

POLYESTER POWDER FINISH AVAILABLE (SUFFIX P)

FEATURES

ARCHITECTURAL/INDUSTRIAL APPLICATION

ALL METAL CONSTRUCTION

HIGH SECURITY

HIGH ACOUSTIC RATING

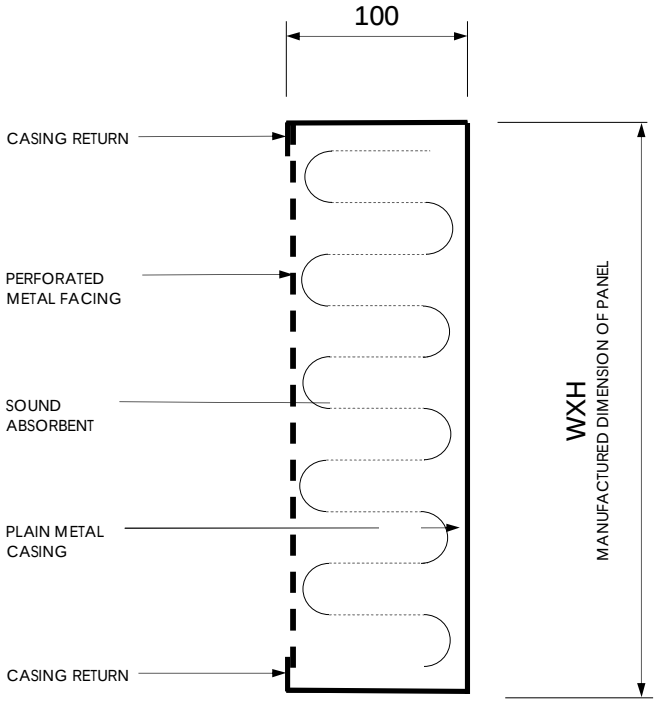
HIGH SOUND ABSORPTION

OPTIONAL POLYESTER FINISH

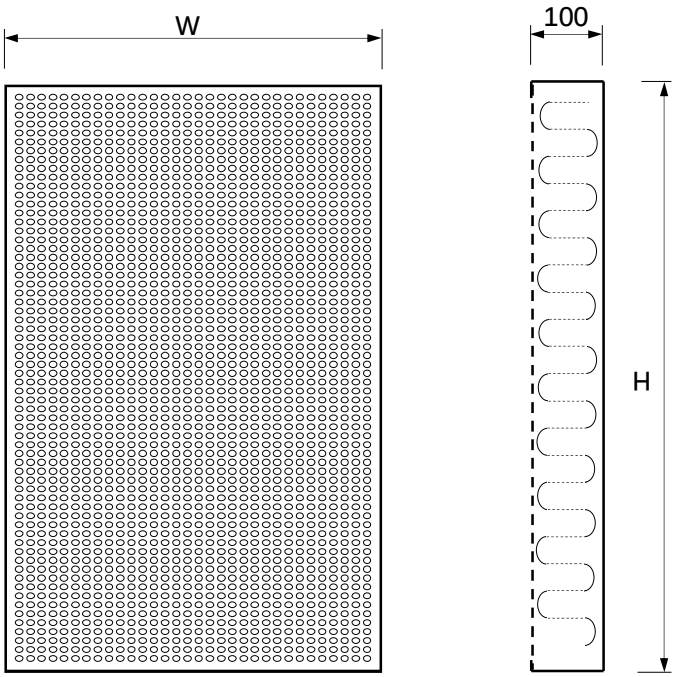
OPTIONAL FIXING FLANGES

ALLAWAY ACOUSTICS LIMITED

CONSTRUCTION



DIMENSIONS



ACOUSTIC PERFORMANCE

SOUND REDUCTION INDEX B.S.2750/3-1980

63	125	250	500	1000	2000	4000	8000	HZ
18	20	26	31	35	39	40	41	dB

SOUND ABSORPTION B.S.3638 -1987

63	125	250	500	1000	2000	4000	8000	HZ
.15	.35	.75	.9	1.0	1.0	.95	.9	-

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE

PANELS WILL BE SUPPLIED WITHOUT SUPPORT STEELWORK, BRACKETS, FIXINGS OR MASTIC UNLESS OTHER-WISE STATED.

PANELS MORE THAN 1800 WIDE OR 2500 HIGH MAY BE MANUFACTURED IN SECTIONS FOR ON SITE ASSEMBLY.

SUFFIX

A - ALUMINIUM SUBSTRATE

G - GALVANISED STEEL SUBSTRATE

Z - ZINTEC SUBSTRATE

L - PLASTIC COATED STEEL

P - STOVED POLYESTER POWDER COAT

F - PERIPHERAL FIXING FRAME

SP - SPECIAL CONSTRUCTION, REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

WEIGHT

ACTUAL PANEL WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE.
APPROXIMATE WEIGHT:
40kg/M² GALVANISED
34kg/M² ALUMINIUM

BUILDERSWORK

THE W AND H DIMENSIONS GIVEN ON THE CERTIFIED EQUIPMENT SCHEDULE ARE AS MANUFACTURED.

ADEQUATE CLEARANCE MUST BE ALLOWED WHEN CONSTRUCTING THE BUILDERSWORK OPENING, MIN 10mm IS RECOMMENDED.

STANDARD SIZES

THERE ARE NO STANDARD SIZES.

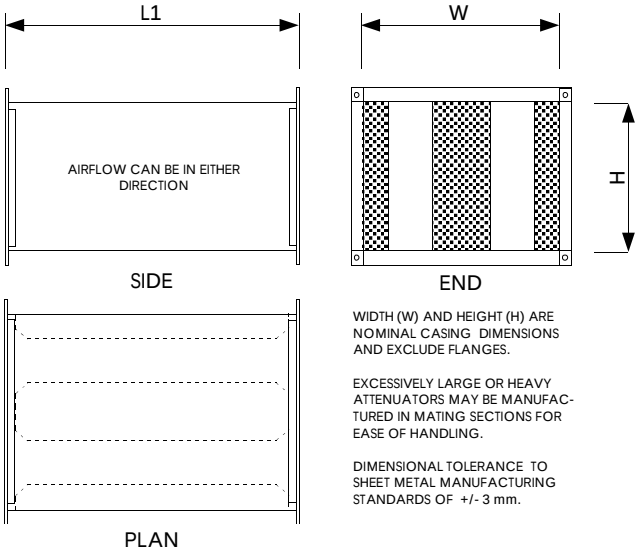
PANELS ARE MANUFACTURED TO ORDER.

DATA SHEET A02E
RECTANGULAR ATTENUATOR MODEL SP

THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A DATED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

ALLAWAY ACOUSTICS
LIMITED
www.allawayacoustics.co.uk

DIMENSIONS



WIDTH (W) AND HEIGHT (H) ARE NOMINAL CASING DIMENSIONS AND EXCLUDE FLANGES.

EXCESSIVELY LARGE OR HEAVY ATTENUATORS MAY BE MANUFACTURED IN MATING SECTIONS FOR EASE OF HANDLING.

DIMENSIONAL TOLERANCE TO SHEET METAL MANUFACTURING STANDARDS OF +/- 3 mm.

SPECIFICATION

ATTENUATORS ARE CONSTRUCTED TO DW144 SPECIFICATION FOR MEDIUM PRESSURE DUCTWORK.

CASES ARE FORMED FROM PRE-GALVANISED STEEL OF THE SPECIFIED GAUGE, BUT IN NO INSTANCE LESS THAN 0.8 mm. CASE SEAMS ARE LOCK FORMED AND MASTIC SEALED.

CASES ARE STIFFENED AND FITTED WITH PROPRIETARY FLANGES.

SOUND ABSORBENT ELEMENTS ARE ARRANGED WITHIN THE CASING TO FORM A SERIES OF CENTRAL SPLITTERS AND SIDE LININGS. SPLITTER FRAMES ARE FORMED FROM PRE-GALVANISED STEEL, AND CONTAIN A FIBROUS INFILL THAT IS NON-SHEDDING, NON-COMBUSTIBLE, NON-HYGROSCOPIC AND CHEMICALLY INERT. THE INFILL IS FACED WITH GLASS CLOTH AND PRE-GALVANISED PERFORATED STEEL.

SPLITTER ELEMENTS HAVE AERODYNAMIC FAIRINGS ON AIR ENTRY AND AIR EXIT END OF ATTENUATOR.

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE.

EXCESSIVELY LARGE OR HEAVY ATTENUATORS MAY BE MANUFACTURED IN MATING SECTIONS FOR EASE OF HANDLING.

ATTENUATORS WILL BE SUPPLIED WITHOUT SUPPORT STEELWORK, BRACKETS, FIXINGS, GASKET, MASTIC OR OTHER SUCH ITEMS, UNLESS OTHERWISE STATED.

ATTENUATOR SEAMS AND JOINTS WILL BE FACTORY SEALED, HOWEVER, THE FLANGE CONNECTION SEAL , INCLUDING THE FLANGE CORNERS, IS THE RESPONSIBILITY OF THE INSTALLER.

THE PRESSURE LOSS STATED ON THE EQUIPMENT SCHEDULE IS DERIVED FROM TESTS CARRIED OUT IN ACCORDANCE WITH ISO 7235.

DIMENSIONAL TOLERANCE TO SHEET METAL MANUFACTURING STANDARDS OF +/- 3 mm.

WEIGHT

WEIGHTS ARE GIVEN ON THE EQUIPMENT SCHEDULE.

CODE

THE ATTENUATOR CODE DEFINES THE SPLITTER AND AIRWAY DIMENSIONS AND IS GIVEN ON THE EQUIPMENT SCHEDULE.

SUFFIX

THE SUFFIX DEFINES ADDITIONAL FEATURES OR SPECIAL CONSTRUCTIONAL DETAILS.

G - GALVANISED STEEL CONSTRUCTION.

S - STAINLESS STEEL CONSTRUCTION.

U - UPVC/GRP CONSTRUCTION TO DW154 SPECIFICATION (SEPARATE DRAWING)

H1 - 2 HOUR/300°c CONSTRUCTION.

H2 - FIRE DUCT CONSTRUCTION (FINAL TREATMENT BY SPECIALIST CONTRACTOR)

C - CHLORINATED RUBBER PAINT TO INSIDE SURFACES.

J - SPLITTERS ARRANGED HORIZONTALLY.

L - SPLITTERS ONLY (REFER TO DATA SHEET A10 FOR DETAILS).

D - DOUBLE SKIN CASING.

M1 - MELINEX LINED INFILL.

M2 - MELINEX ENCAPSULATED INFILL.

X - SPECIAL CONSTRUCTION, REFER TO EQUIPMENT SCHEDULE FOR DETAILS.

FLANGE DETAILS

ATTENUATORS ARE FITTED WITH PROPRIETARY FLANGES AS FOLLOWS:

GREATEST DIMENSION (W or H)	FLANGE
0 - 1000 mm	DOBY 20
1001 - 1250 mm	DOBY 30
1251 and above	DOBY 40

NOTE: IT IS THE INSTALLERS RESPONSIBILITY TO PROVIDE THE FLANGE SEAL TO THE CONNECTING DUCT, INCLUDING THE FLANGE CORNERS.

STANDARD SIZES

THERE ARE NO STANDARD SIZES. ALL ATTENUATORS ARE MADE TO ORDER.

DATA SHEET L360C
SINGLE ACOUSTIC LOUVRED DOOR
MODEL SAL1515
RAISED THRESHOLD

THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A CERTIFIED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

SPECIFICATION

DOORSET WILL COMPRISE OF FLUSH LEAF, LOUVRE, FRAME AND THRESHOLD .

FACE OF THE FRAME AND DOOR LEAF TO HAVE NO RIVETS, WELDS OR OTHER VISIBLE FIXING.

DOOR LEAF TO BE FORMED FROM GALVANISED STEEL (SUFFIX G) OR ALUMINIUM (SUFFIX A) TO PROVIDE A DOUBLE SKIN CONSTRUCTION SO AS TO ACHIEVE THE STATED ACOUSTIC RATING.

DOOR TO HAVE A MINIMUM OF 3 STAINLESS STEEL BEARING WASHERED HINGES PER LEAF.

FRAME TO BE FORMED FROM ZINC PLATED STEEL, REBATED AND INTERNALLY RE-INFORCED TO ACCEPT FLUSH MOUNTED HINGES AND STRIKES.

WELDED FIXING PLATES TO BE CONCEALED WITHIN THE DOOR FRAME FOR MASONRY ANCHORS. ACCESS HOLES TO BE COVERED BY DECORATIVE CAPS AND LOCATED IN THE FRAME REBATE SO AS TO BE HIDDEN FROM VIEW WHEN DOORS ARE CLOSED.

LOUVRED OPENINGS TO HAVE A NOMINAL 50% FREE AREA AND HAVE BIRD SCREENS FITTED AS STANDARD. OPTIONAL INSECT SCREEN AVAILABLE.

DOORSETS TO HAVE STOVED POLYESTER COAT AS STANDARD.

DOORSETS TO BE FITTED WITH IRONMONGERY AS DESCRIBED ON THE EQUIPMENT SCHEDULES.

FIRE PERFORMANCE

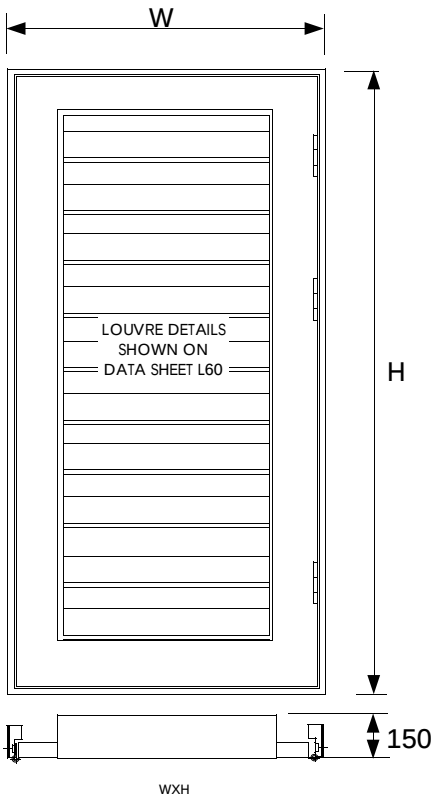
FIRE RESISITANCE HAS NOT BEEN TESTED AS THE DOOR IS NOT INTENDED FOR USE AS A FIRE DOOR.

ACOUSTIC PERFORMANCE

SOUND REDUCTION INDEX B.S.2750/3-1980 (ISO 140/3 -1978)

63	125	250	500	1000	2000	4000	8000	HZ
4	4	5	8	12	16	15	12	dB

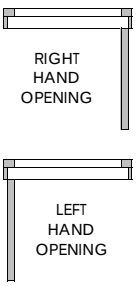
DIMENSIONS



WXH
W=MANUFACTURED FRAME WIDTH
H=MANUFACTURED FRAME HEIGHT

BUILDERSWORK OPENINGS MUST ALLOW CLEARANCE - RECOMMENDED MINIMUM IS 10mm

HANDING



FEATURES

: ARCHITECTURAL APPLICATION

: ALL METAL CONSTRUCTION

: RAISED THRESHOLD

: HIGH ACOUSTIC RATING

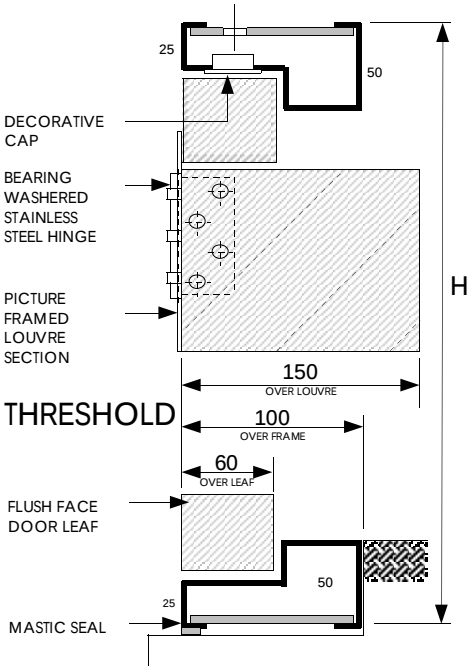
: HIGH SECURITY

: HIGH FREE AREA

: INTEGRAL BIRD SCREEN

: POLYESTER FINISH

HEAD



THRESHOLD

STANDARD SIZES

THERE ARE NO STANDARD SIZES AND ALL DOORSETS ARE MANUFACTURED TO ORDER.
MAXIMUM AVAILABLE SIZE AS FOLLOWS :

FRAME WIDTH	FRAME HEIGHT
1350	2700

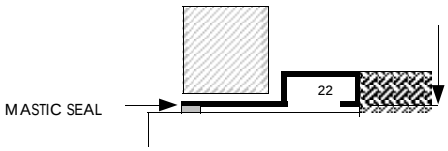
WEIGHT

OVERALL DOORSET WEIGHT MAY BE ESTIMATED AT
35Kg/M² GALVANISED
OR
25Kg/M² ALUMINIUM
EXCLUDING IRONMONGERY

T1-FULL PROFILE

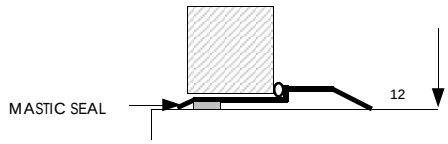
50 mm DEEP. SUITABLE FOR RECESSING INTO FLOOR. FABRICATED FROM SHEET.

T2-MED PROFILE



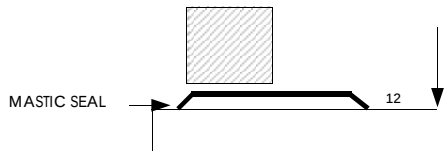
22 mm DEEP. SUITABLE FOR USE WITH FLOOR FINISHES OF SIMILAR THICKNESS. FABRICATED FROM SHEET.

T3-LOW PROFILE

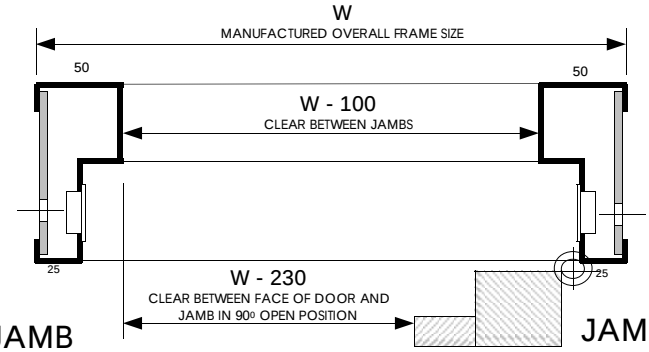


12 mm DEEP. FOR DIRECT APPLICATION ON FINISHED FLOOR.
EXTRUDED ALUMINIUM

T7-LOW PROFILE



12mm DEEP. FOR DIRECT APPLICATION ON FINISHED FLOOR.
EXTRUDED ALUMINIUM



JAMB JAMB

DATA SHEET V110F
SPRING MOUNT
M10 RANGE
OPEN COIL

THIS IS NOT A STAND ALONE DOCUMENT AND UNLESS REFERRED TO IN A CERTIFIED EQUIPMENT SCHEDULE IS SUBJECT TO REVISION WITHOUT NOTICE.

FEATURES

OPEN COIL

FULLY CAPTIVE

HIGH LOAD CAPACITY

HIGH DEFLECTION

ALL STEEL CONSTRUCTION

HIGH FREQUENCY ISOLATION

ZINC PLATED COMPONENTS

POWDER COATED SPRING

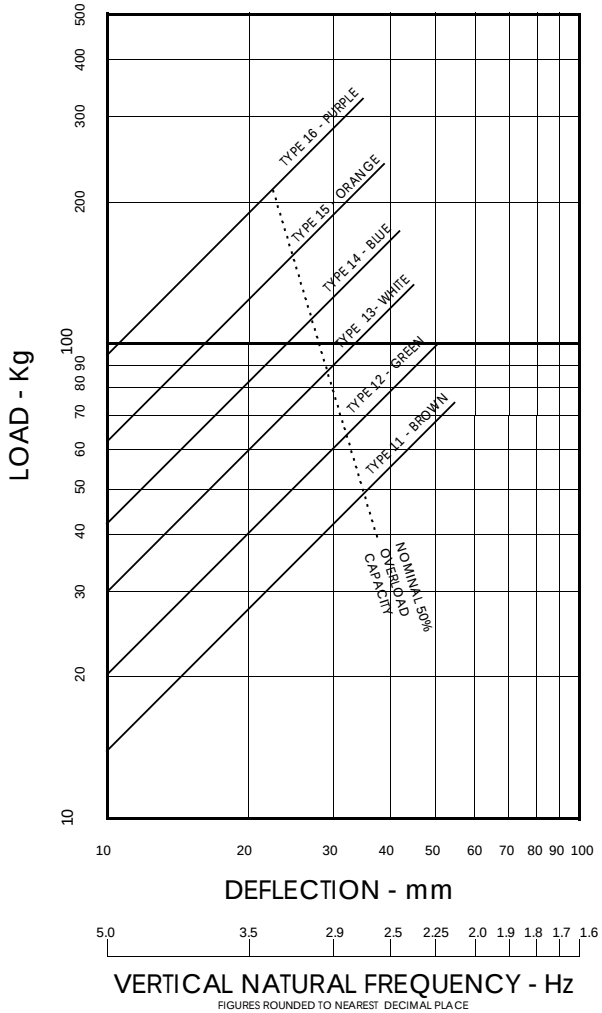
ALLAWAY ACOUSTICS LIMITED
www.allawayacoustics.co.uk

CAPACITY

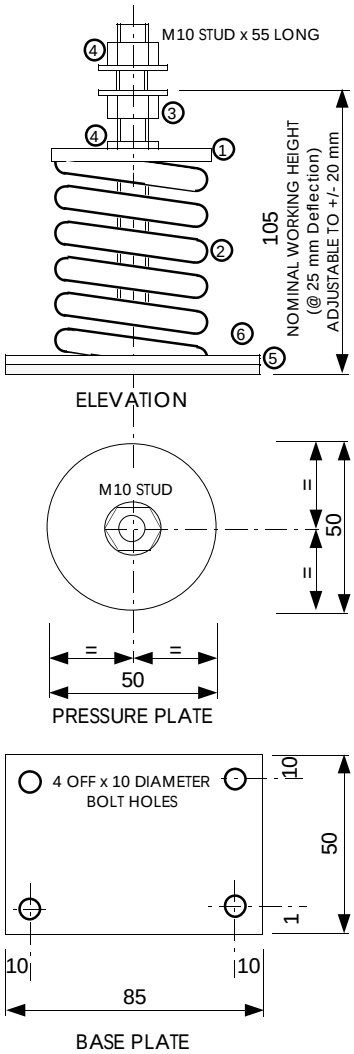
TYPE	COLOUR CODE	LOAD * Kg	DEFLECTION * mm
11	BROWN	74	54
12	GREEN	102	51
13	WHITE	131	43
14	BLUE	175	41
15	ORANGE	234	39
16	PURPLE	331	35

*IMPORTANT : VALUES SHOWN ARE MAXIMUM WITH SPRING IN SOLID CONDITION. RECOMMENDED OVERLOAD CAPACITY IS 50%.

LOAD/DEFLECTION GRAPH



DIMENSIONS



COMPONENTS

1. SPRING PRESSURE PLATE.
2. COLOUR CODED HIGH DEFLECTION STEEL SPRING (TYPE N HAS NESTED SPRING).
3. ADJUSTING NUT. INSTALLERS TO LUBRICATE WITH FREEING OIL (WD40)
4. LOCKING NUT.
5. HIGH FREQUENCY ISOLATION PAD.
6. 10 mm HOLDING DOWN BOLT HOLES.

FINISH

PASSIVATED ZINC PLATING TO METAL COMPONENTS.

POLYESTER COATING TO SPRING (COLOUR CODED).

SUITABLE FOR USE IN NON-CORROSIVE EXTERNAL

NOTES

THIS DATA SHEET IS TO BE READ IN CONJUNCTION WITH THE EQUIPMENT SCHEDULE.

THE SPRING WILL NEED ADJUSTING AFTER INSTALLATION.

HOLDING DOWN BOLTS TO BE SUPPLIED AND FITTED BY OTHERS.

SUITABLE FOR USE IN NON-CORROSIVE EXTERNAL APPLICATIONS.

SUFFIX

M(-) -OPEN COIL SPRING MOUNT

SP - SPECIAL CONSTRUCTION. SEE EQUIPMENT SCHEDULE FOR DETAILS

OLD POLICE STATION, 1 QUEENS ROAD, HERTFORD, HERTS SG14 1EN. TEL : 01992 550825 FAX : 01992