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# Acoustic assessment of mechanical equipment and sound insulation of proposed café, at 43-45 Camden Road, London

**Report Reference: 170711-R001B**

**Date: August 2017**


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| | |
|---|---|
| **Site Address:** | 43-45 Camden Road<br>London<br>NW1 9NR |
| **Client:** | Arc Planning |
| **Report Reference:** | 170711-R001B |

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| - | First issue | 04/08/2017 | Tommy Burn BSc(hons) AMIOA |
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## CONTENTS

# 0. SUMMARY


- ACA Acoustics Limited have been commissioned to assess the acoustic impact of a proposed cafe at 43-45 Camden Road, London.

- Assessment of mechanical services equipment associated with the new cafe is required to provide evidence that noise emissions from the new plant is not detrimental to the amenity of nearby residents and complies with London borough of Camden Council's acoustic requirements. London borough of Camden Council's requirement, applicable at this site, is that noise from the new equipment shall be designed so that the rating level of the new equipment is 10dB below the prevailing background sound level outside windows of the most affected noise-sensitive property.

- A survey has been carried out in the vicinity to establish existing background sound levels. Whilst on site the author identified closest non-associated noise sensitive properties as residential apartments at 14 Bonny Street. Representative background sound levels until the latest proposed operating times of the equipment were LAF90 51dB.

- Calculations using manufacturer's sound level data for the new mechanical equipment, confirm that the cumulative specific sound level for all the new plant operating will be LAeq 20dB outside windows of the nearest residential property. These are more than 10dB below the lowest measured background sound level, and is below London borough of Camden Council's criteria; no noise control treatments are required to ensure no loss of amenity of any nearby residential occupants.

- In addition to assessment of mechanical services noise, an assessment of operational noise transmission from the new cafe to the adjoining residential dwelling has been carried out. Calculated noise transmission to habitable rooms of the flat are LAeq 20dB / NR16. This complies with London Borough of Camden Council's criteria of NR35 for habitable rooms during daytime periods and no further noise mitigation is required.

- The author considers the site is suitable for development as a cafe and the proposed scheme should ensure no loss of amenity for nearby residents.

# 1. INTRODUCTION

ACA Acoustics Limited has been commissioned to carry out an assessment of external sound levels in the vicinity of proposed mechanical services equipment, along with assessment of operational noise transmission to adjoining residential properties at 43-45 Camden Road, London.

The objective of the assessment is to determine the impact that the proposed noise sources would have on existing noise sensitive properties in the vicinity, and recommend noise mitigation treatment where required.

This report presents results of the sound level survey and assessment.

## 2. ACOUSTIC CRITERIA

London Borough of Camden Council's policies relating to noise are set out in the new Local Plan. It is of benefit to note that compliance with the new 'Green' criteria (discussed below), will ensure that sound emissions from new equipment are no greater than, and in most cases lower, than criteria required to comply with DP28 of the recently replaced Local Development Framework.

Appendix 2 of the Local Plan provides detailed noise thresholds to determine the potential acoustic impact of new development.

In Summary, London Borough of Camden requires an assessment of noise from new mechanical services equipment to be carried out in accordance with British Standard 4142:2014 and the results compared against noise-related conditions set out in Table C of the Appendix, as shown in Table 1 below:

| Existing Noise Sensitive Receptor | Assessment Location | Design Period | LOAEL (Green) | LOAEL to SOAEL (Amber) | SOAL (Red) |
|---|---|---|---|---|---|
| Dwellings | Garden used for main amenity (free field) and outside living or dining or bedroom window (façade) | Day | Rating level 10dB below background | Rating level between 9dB below and 5dB above background | Rating level greater than 5dB above background |
| Dwellings | Outside between window (façade) | Night | Rating level 10dB below background and no events exceeding 57dB LAmax | Rating level between 9dB below and 5dB above background or noise events between 57dB and 88dB LAmax | Rating level greater than 5dB above background and/or events exceeding 88dB LAmax |

*Table 1: London Borough of Camden Noise Limits*

The scope of BS 4142:2014 advises that "*this British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature … to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident*". BS 4142:2014 is commonly used to assess the potential for loss of amenity due to noise from mechanical services equipment and is considered appropriate for this application.

The assessment method of BS 4142:2014 corrects the specific sound level from the source under investigation to account for characteristics that could make the sound more intrusive to obtain a rating level. This rating level is compared against the prevailing background sound level outside the

noise-sensitive property. Section 11 of BS 4142:2014 provides a commentary of the assessment result and advises that:

a) The greater the difference between the rating level and the background sound level, the greater the magnitude of the impact;
b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context;
d) The lower the rating level is to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Assessment results within Appendix 2 of Camden's new Local Plan are shown to be more stringent than those set out in the British Standard and can therefore be taken to ensure a robust assessment. Compliance with the "Green" criteria or lower half of the "Amber" range will generally ensure no loss of amenity to nearby residents, albeit, the context of the development must also be considered on a project-by-project basis which can alter the initial assessment result. This is discussed in more detail in Section 4 below.

London Borough of Camden Council's criteria for operational noise transmission from entertainment and leisure premises are also contained within Appendix B of the Local Plan.

In summary, for premises adjoining residential dwellings the operational noise of the entertainment venue, including amplified and unamplified music, human voices and other general activity, should not exceed a level of NR35 within habitable rooms of the dwellings during daytime hours 07:00 - 23:00).

## 3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 43-45 Camden Road, London. A single new kitchen extract fan is proposed to the front of the property, to serve a new cafe. The fan will be situated internally, and ducted to discharge at 1st floor level.

Most affected noise sensitive properties to the proposed mechanical equipment are flats at 14 Bonny Street, scaled at around 30m from the proposed fan. Adjoining residential properties on Camden Road are closer, however they are heavily screened from the equipment by 43-45 Camden Road.

Aerial photograph of the location of the proposed mechanical services equipment and nearest residential properties is provided in Figure 1.

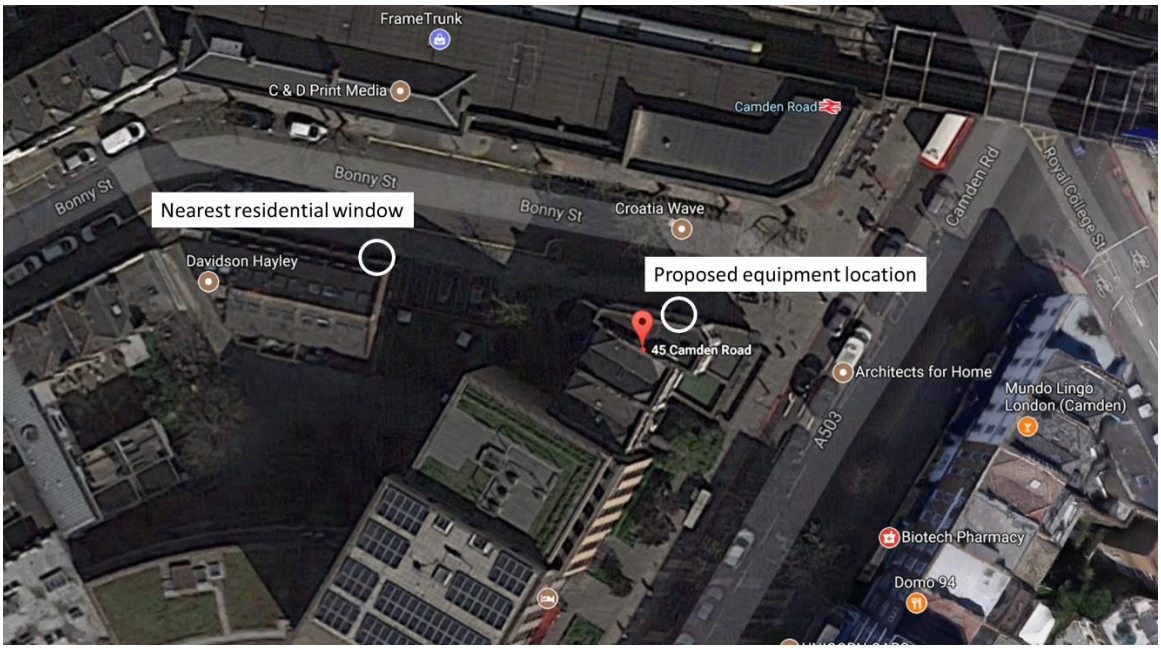


*Figure 1: Drawing showing proposed equipment location*

# 4. SOUND LEVEL SURVEY

In order to assess noise from the mechanical services equipment in accordance with London borough of Camden's acoustic requirements it is necessary to establish representative background sound levels at the nearest noise-sensitive properties.

## 4.1 Sound Level Survey Measurement and Assessment Procedure

The proposed equipment will operate nominally from 07:00 – 19:00hrs, around an hour before and after the proposed café opening hours of 08:00 – 18:00hrs.

A single measurement position was selected for the survey first floor level overlooking Bonny Street, at a position equivalent to that of the closest residential windows.

The site was considered secure and therefore an unmanned survey was carried out between 27th – 28th July 2017. The weather remained dry and calm during the survey period. Sound level measurements were recorded in consecutive short-term samples of overall LAeq and L90 values along with other statistical indices.

## 4.2 Instrumentation

The following equipment was used during the survey; the sound level meter was calibrated before the survey and checked after with no change noted.

| Equipment | Serial Number |
|---|---|
| NTi Audio sound level meter type XL2 Class 1 complete with weatherproof and lockable outdoor environmental kit | A2A-06294-E0 |
| NTi Audio calibrator type CAL200 94/114dB. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST) | 11441 |

*Table 2: Equipment used*

Results of the survey are provided in graphical form in Figure 2 on the following page.

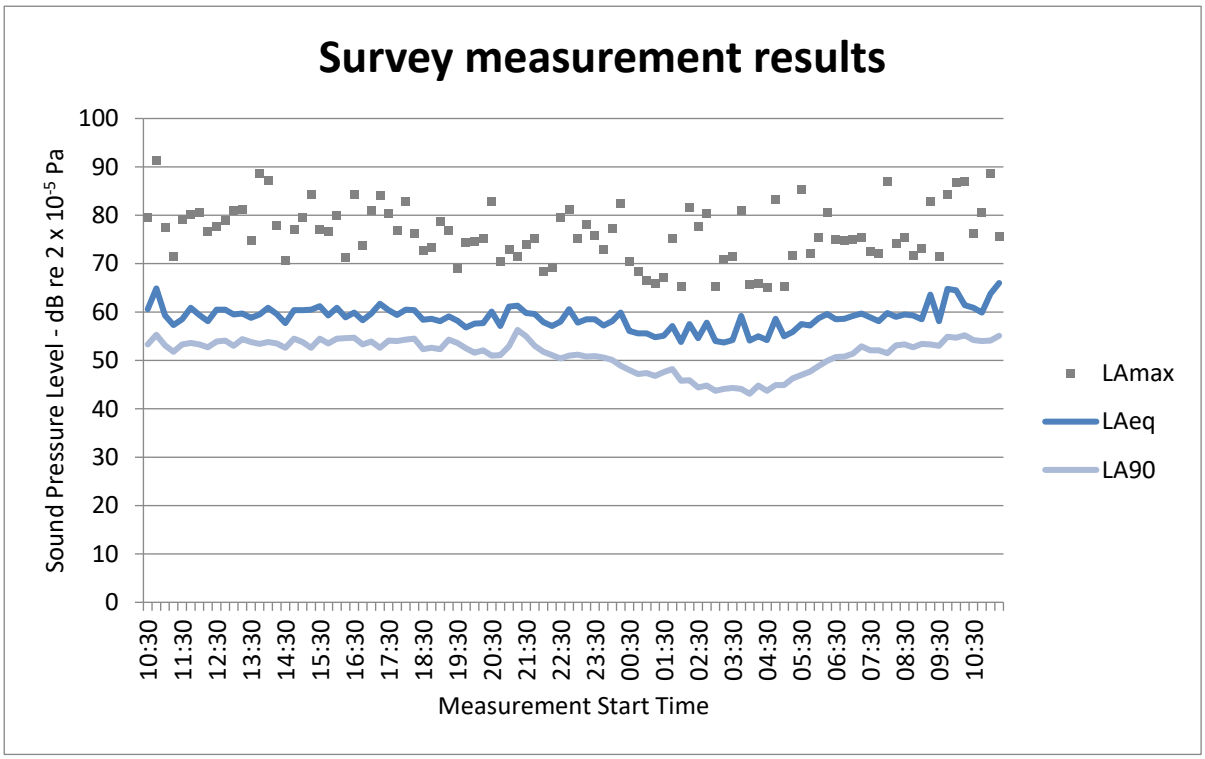


*Figure 2: Sound level survey results*

A statistical analysis of the measured sound levels has been carried out, generally following suggested guidance contained in Section 8 of the Standard. Distribution of the measured LA90 sound levels between the operating times of the new equipment of 07:00 to 19:00, during daytime hours, are shown in Figure 3 below

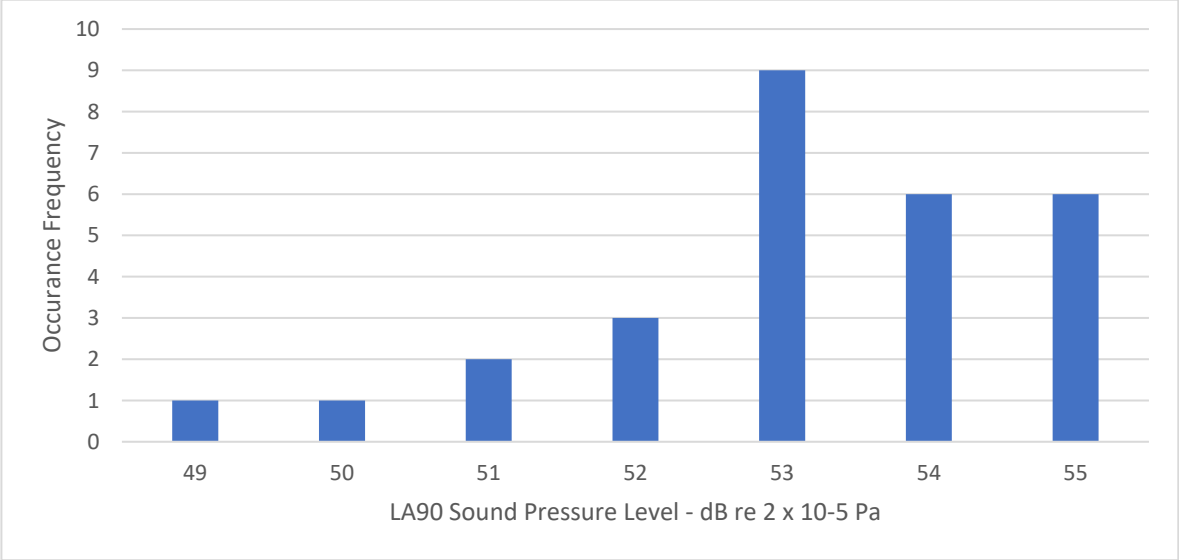


*Figure 3: Statistical analysis of measured LA90 results during earliest and latest fan operating times*

Based on analysis in Figure 3, the representative background sound level has been selected to be LA90 53dB.

The values recorded by ACA Acoustics Limited are used as basis for acoustic design such that sound levels from the proposed new equipment are ≤43dBA outside the closest noise sensitive windows; this is at least 10dBA below the representative background sound level and at least 6dBA below the lowest measured background sound level. From results in Figure 3 it can be seen this will ensure noise from the new equipment is at least 10dBA below the typical measured background sound level between 7am through to 7pm.

Confirmation of the background sound level used in the assessment is shown in Table 3 below.

| Survey Date | Existing Measured Background LA90, 15 min |
|---|---|
| 27th to 28th July 2017 | 53dB |

*Table 3: Summary background sound level survey results*

## 5. ACOUSTIC ASSESSMENT OF MECHANICAL EQUIPMENT

The development includes the installation of a single kitchen extract fan installed internally and ducted to discharge at Bonny Street, London. Confirmation of the equipment models used in the assessment is provided in Table 4 below.

| Description | Equipment Model |
|---|---|
| Cap Extract fan serving pizza oven flue | Vent Axia ACM 150 |

*Table 4: Proposed new mechanical equipment*

Sound emissions from the mechanical equipment can be determined from manufacturer's published data. Note that alterations in equipment selections may be possible, so long as sound power levels for the new items do not exceed level used in the calculation model as shown in Appendix A.

A computer model has been used to calculate the noise contribution from the proposed plant to outside nearest noise-sensitive windows. The model for the extract fan incorporates losses within the ductwork system based on the calculation method of CIBSE Guide B5 Noise and vibration control for HVAC along with environmental corrections set out in ISO 9613-2:1996.

The cumulative calculated specific sound level from the plant to outside the most affected noise sensitive windows with the new fan operating is shown in Table 5. Summary print-outs from the calculation models are included in Appendix A.

| Description | Calculated Equipment Sound Levels |
|---|---|
| Residential window at 14 Bonny Street | 20dBA |

*Table 5: Calculated cumulative equipment sound levels at 1m outside noise-sensitive windows*

# 6. ASSESSMENT OF OPERATIONAL NOISE TO ADJOINING PROPERTY

Assessment of operational noise transmission from the proposed cafe through the separating partition to the adjoining neighbour has been carried out to ensure compliance with the requirements of London Borough of Camden Council and to prevent any loss of amenity of residential occupants.

## 6.1 OPERATIONAL SOUND LEVELS

To be able to calculate the potential impact of the proposed development it is necessary to establish typical sound levels within the new cafe once it is trading; this is the source sound level data.

Sound levels have been recorded in a number of cafes and restaurants for previous projects. Spectra used in the assessment equates to an overall sound level of LAeq 73dB. This is a high sound level for a cafe and is based on a busy cafe a full capacity with patrons talking and laughing simultaneously at different tables. Note that the cafe used played music at very low 'background' levels. This is consistent with the style of cafe advised to ACA Acoustics, whereby only very low background music is proposed. It is understood that the premises are currently used as a meeting club in evening hours, with low level music played and so it is expected that music levels from the new cafe will pose no difference in the impact on the residential properties.

In the author's experience, the source levels recorded are at high level for a venue where only low-level background music is playing and were from a slightly larger restaurant with higher numbers of patrons. As such these are considered unlikely to be exceeded at the development site. Indeed, source sound levels are likely to be lower due to the lower number of patrons in this smaller room. This ensures the assessment is conservative and robust and that actual sound transmission to adjoining properties in practice will be lower than those levels calculated.

Confirmation of the source sound level data used in the assessment is shown in Table 6.

| Description | Octave Band Frequency (Hz) – LAeq (dB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** |
| LAeq in small restaurant | 69 | 68 | 71 | 71 | 67 | 65 | 61 |

*Table 6: Typical source sound levels inside busy cafe/restaurant equating to LAeq 73dB*

## 6.2 ACOUSTIC ASSESMENT

In order to assess noise transmission from the proposed cafe to the adjoining residential property, it is necessary to calculate the sound insulation performance of the existing structure.

The client was unable to arrange access into the residential flat and therefore assessment of the sound insulation performance of the separating wall has been undertaken by calculation.

It is understood that the party wall between the café and residential property is 300mm brick, with double layer insulation on wooden stud and 15mm plasterboard at ground floor level, and single layer insulation at first floor level.

A computer model has been set up based on procedures set out in BS EN ISO 12354-1:2000. Calculated airborne sound insulation performance of the separating structure will achieve airborne sound insulation performance significantly in excess of DnT,w 55dB.

Based on the source sound levels within the restaurant in section 6.3 and the sound insulation performance of the structure, calculated sound levels within the adjoining residential flat are shown in Table 3 below along with London Borough of Camden Council's criteria.

| Description | Lp in residential flat | BS 8233:2014 Criteria |
|---|---|---|
| Operational noise transmission to adjoining residential property | LAeq 20dB<br>NR 16dB | NR 35dB |

*Table 7: Calculated maximum operational noise transmission to residential flat above*

Print-outs from the computer calculation models are included in Appendix B.

Calculated operational sound transmission from the new cafe through the separating structure to the adjoining residential flat is significantly below London Borough of Camden Council's criteria to habitable rooms during operating times of the new cafe, even during very busy periods. During other times, when the sound level in the cafe will be lower, resultant sound levels within the residential flat will also be consequently lower than those calculated.

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# APPENDIX A

Acoustic calculations of mechanical services equipment

**Calculation Sheet**

# Cafe Extract fan discharge to 14 Bonny Street

| | Octave Band Centre Frequency (Hz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | |
| ***Noise Source*** | | | | | | | | | |
| Noise Source - Cafe Extract fan discharge | | | | | | | | | |
| **Sound Power Levels** | **36.0** | **48.0** | **54.0** | **60.0** | **58.0** | **61.0** | **54.0** | **46.0** | |
| ***Bend Loss*** | | | | | | | | | |
| **Levels after bend** | **37.7** | **48.1** | **53.0** | **58.0** | **55.0** | **58.0** | **51.0** | **43.0** | |
| | *1.7* | *0.1* | *-1.0* | *-2.0* | *-3.0* | *-3.0* | *-3.0* | *-3.0* | |
| ***Rect Unlined Duct Losses*** | | | | | | | | | |
| **Levels after duct** | **37.6** | **47.9** | **52.8** | **57.8** | **54.8** | **57.8** | **50.8** | **42.8** | |
| ***End Reflection - Rect Flush*** | | | | | | | | | |
| | *-1.5* | *-5.0* | *-4.2* | *-2.5* | *-0.5* | *-0.2* | *0.1* | *0.2* | |
| ***External Grille Directivity*** | | | | | | | | | |
| **Radiating Lw** | **38.7** | **42.6** | **47.4** | **52.4** | **48.8** | **49.0** | **38.9** | **27.9** | **Row A** |
| ***ISO 9613 Calculation*** | | | | | | | | | |
| **Direct Lp** | **4.1** | **8.1** | **12.9** | **17.8** | **14.2** | **14.1** | **3.3** | **-10.1** | |
| | *-34.5* | *-34.6* | *-34.6* | *-34.6* | *-34.7* | *-34.8* | *-35.5* | *-38.1* | |
| ***ISO 9613 Calculation - Reflections*** | | | | | | | | | |
| **Reflected Lp** | **-16.4** | **-12.4** | **-7.6** | **-2.7** | **-6.3** | **-6.4** | **-17.4** | **-31.8** | |
| | *-55.0* | *-55.0* | *-55.1* | *-55.1* | *-55.2* | *-55.4* | *-56.3* | *-59.7* | |
| ***Cumulative Lp at Receiver*** | | | | | | | | | |
| ***External Receiver*** | | | | | | | | | |
| External Receiver - 14 Bonny Street | | | | | | | | | |
| **Sound Pressure, Lp:** | **4.2** | **8.1** | **12.9** | **17.9** | **14.2** | **14.2** | **3.4** | **-10.1** | |



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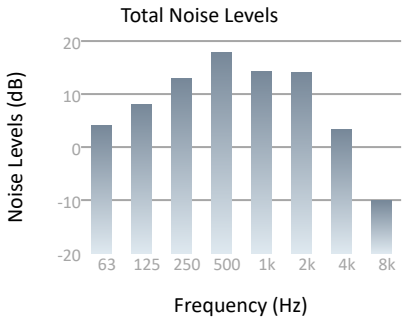
# 43-45 Camden Road

| | |
|---|---|
| **Project Name** | 43-45 Camden Road |
| **Project Reference** | 170711 |
| **Reference** | 14 Bonny Street |
| **Description** | |
| **Noise Limit** | 43 |
| **dBA** | 19.8 |




## Noise Sources

| Reference | Quantity | Noise Levels (dB) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Cafe Extract fan discharge | 1 | 4.2 | 8.1 | 12.9 | 17.9 | 14.2 | 14.2 | 3.4 | -10.1 |



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# APPENDIX B

Calculated operational sound transmission

**Calculation Sheet**

# Operational source level within cafe to Adjoining residential property

| | | Octave Band Centre Frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| ***Noise Source*** | | | | | | | | | |
| Noise Source - Operational source level within cafe | | | | | | | | | |
| **Noise Levels** | | **69.0** | **68.0** | **71.0** | **71.0** | **67.0** | **65.0** | **61.0** | **-** |
| ***Separating Element*** | | | | | | | | | |
| Separating Element - Calculated sound insulation performance of the separating partition | | - | *-45.0* | *-48.0* | *-51.0* | *-55.0* | *-57.0* | *-63.0* | - |
| ***Adjoining residential property*** | | | | | | | | | |
| Adjoining residential property | 16.1 | | | | | | | | |
| **Input** | | **-** | **23.0** | **23.0** | **20.0** | **12.0** | **8.0** | **-2.0** | **-** |



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