

# Acoustic assessment of proposed new mechanical services equipment

28 Little Russell Street, London



Client: London Review of Books

Report Reference: 190302-R001A

Date: 04<sup>th</sup> June 2019



Revision:	Date:	Author:	Checked:
-	08/04/2019	Tommy Burn BSc (Hons) MIOA	Rob Cant MIOA
A	04/06/2019	Tommy Burn BSc (Hons) MIOA	Rob Cant MIOA

This report has been prepared by ACA Acoustics Limited (ACA) with all reasonable skill, care, and diligence in accordance with generally accepted acoustic consultancy principles and taking account of the services and terms agreed between ACA and our client. Any information provided by third-parties and referred to herein may not have been checked or verified by ACA unless expressly stated otherwise. Certain statements made in the report may constitute estimates or projections and even though these are based on reasonable assumptions and good industry practice, such forward-looking statements by their nature involve risks and uncertainties which could cause actual results to differ materially from the results predicted. ACA does not guarantee or warrant any estimate or projection contained in this report.

This report is confidential to the client and ACA accepts no responsibility whatsoever to third parties unless formally agreed by ACA. Any such party relies upon the report at their own risk. © 2018 ACA Acoustics Limited.

Head Office 12 Sheep Street Highworth Wiltshire SN6 7AA

Tel: 01793 766 324

London Office 3 Shortlands Hammersmith London W6 8DA

Tel: 0203 609 8733

Email: info@aca-acoustics.co.uk

Website: www.aca-acoustics.co.uk

Registered in England & Wales No: 08228154



# CONTENTS

0.	SUMMARY	2
1.	INTRODUCTION	3
2.	ACOUSTIC CRITERIA	4
3.	REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS	6
4.	SOUND LEVEL SURVEY	7
5.	ACOUSTIC ASSESSMENT	9
6.	CONCLUSION	11
APP	ENDIX A	. A1



#### 0. SUMMARY

- 0.1. ACA Acoustics Limited has been commissioned to assess the acoustic impact of proposed new mechanical services equipment to be installed at 28 Little Russell Street, London.
- 0.2. The assessment is required to provide evidence that noise emissions from the equipment will not be detrimental to the amenity of nearby noise-sensitive properties and complies with the requirements of London Borough of Camden Council.
- 0.3. A sound level survey was carried out over nominally a 48-hour period between 12<sup>th</sup> and 14<sup>th</sup> March 2019. Whilst on site, the author considered the sound climate during the daytime periods to be low, and comprised primarily of traffic and non-associated mechanical equipment in the vicinity. Lowest background sound levels measured at a position equivalent to that of the upper floor apartments opposite 28 Little Russell Street were LAF90 52dB during the period of the proposed equipment's operation.
- 0.4. Calculations using manufacturer's sound level data for the new equipment confirm that the rating level of the new equipment to upper floor apartments of 4 Gilbert Place will not exceed LAr 42 dB when assessed in accordance with BS 4142:2014. This is at least 10dBA below the measured background sound level during the proposed equipment operating period of 08:00 18:30 hours.
- 0.5. Noise from the proposed new equipment will not be disturbing or detrimental to the amenity of any nearby residential occupants.



#### **1. INTRODUCTION**

New mechanical services equipment is to be installed at 28 Little Russell Street, London.

ACA Acoustics Limited has been commissioned to carry out an assessment of noise emissions from the proposed mechanical plant and, where necessary, make recommendation to reduce sound levels to ensure that the amenity of nearby noise-sensitive properties is not compromised.

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

In Summary, London Borough of Camden requires an assessment 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)	SOAEL (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 bedroom 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 terms "LOAEL" and "SOAEL" are defined as the "Lowest Observed Adverse Effect Level" and "Significant Observed Adverse Effect Level" in the Planning Practice Guidance – Noise (PPG-N) and Noise Policy Statement for England (NPSE). The NPSE and PPG-N both require that significant adverse impacts are avoided and that where the impact lies somewhere between the LOAEL and SOAEL all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life, whilst considering the guiding principles of sustainable development as set out in the National Planning Policy Framework.

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 result criteria shown within Appendix A of Camden's Local Plan are 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.



# 3. **REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS**

New condensing units are proposed to the roof during the refurbishment and development of new offices at 28 Little Russell Street, London.

Closest residential properties have been identified as residential windows at top floor level of 4 Gilbert Place.

Proposed operating times of the equipment is understood to be between 08:00 – 18:30 hours.



### 4. SOUND LEVEL SURVEY

To assess sound levels from the new mechanical equipment it is necessary to establish existing background sound levels in the vicinity. Details of the sound level survey carried out by ACA Acoustics are provided below.

The background sound level survey measurement position was selected at roof level of 28 Little Russell Street, at a position equivalent to nearest residential properties overlooking the proposed equipment location. Existing background sound levels are raised due to traffic activity in the area and non-associated mechanical equipment in the vicinity.

The site was considered secure and therefore an unattended survey was carried out over nominally a 48-hour period between 12<sup>th</sup> and 14<sup>th</sup> March 2019. The survey was conducted typically following procedures set out in BS 4142:2014 and BS 7445.

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

Equipment	Serial Number
Rion sound level meter type NL-52 Class 1 complete with weatherproof and lockable outdoor environmental kit	00564867
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

The following weather conditions were recorded at the start of the survey.

Time	Temperature	Wind Speed m/s	Wind Direction	Comments
12:00 12 <sup>th</sup> March	15°C	2	North East	Dry with light cloud and light breeze

Table 3: Recorded meteorological conditions

Results of the survey are shown in Figure 1 on the following page.





Figure 1: Unmanned sound level survey results

In accordance with BS 4142:2014, the prevailing background sound level is not necessarily taken to be the lowest recorded values, but rather the level that best represents the typical background sound level in the area over a defined period. A statistical analysis of the measured background sound levels has been carried out, generally following suggested guidance contained in Section 8 of the Standard. Distribution of the measured LA90 sound levels during anticipated operating times of the new equipment are shown below.



Figure 2: Statistical analysis of measured LA90 sound levels between 08:00 – 18:30

Figure 2 confirms that background sound levels are at a level of 52dBA or higher for 20% of the assessment, and so is considered appropriate for use within the assessment.



## 5. ACOUSTIC ASSESSMENT

The development includes the installation of two new condensing units. Confirmation of the equipment models used in the assessment is provided in Table 4 below.

Description	Equipment Model	Quantity
2 <sup>nd</sup> floor condensing unit	Mitsubishi PUHZ-ZRP35VKA	1
4 <sup>th</sup> floor condensing unit	Mitsubishi PUMY-P140VKM	1

Table 4: Proposed new mechanical equipment used in the assessment

Sound emissions from the mechanical equipment can be determined from manufacturer's published data.

A computer model has been used to calculate the noise contribution from the proposed plant to outside nearest noise-sensitive windows. Environmental corrections are calculated using the assessment method of ISO 9613-2:1996.

The cumulative calculated specific sound level from the plant to outside nearby residential windows with all plant operating is shown in Table 5. Summary print-outs from the calculation models are included in Appendix A.

Receptor Location	Calculated Equipment Sound Level
Top floor residential windows	38dBA

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

Assessment of the calculated specific sound levels in accordance with BS 4142:2014 is provided in Table 6 below

Description	External receiver	Relevant Clause	Commentary
Calculated specific sound level to noise- sensitive windows	LAeq 38dB	7.1 7.3.6	New plant operating. Refer calculation sheets in Appendix A
Background sound level	LA90 52dB	8.1.3 8.3	Measured background sound level during daytime period



Acoustic feature correction	+0dB	9.2	The calculated specific sound level is more than 10dBA below the background sound level therefore no acoustic characteristics will be audible.
Rating level	LAr 38dB	9.2	
Excess of rating level over background sound level	-14dB	11	Assessment indicates negligible likelihood of adverse impact

Table 6: Calculated cumulative equipment sound levels at 1m outside noise-sensitive windows

Table 6 shows the cumulative rating level of the proposed new equipment will be at least 10dBA below the representative background LA90 sound level to outside the closest noise-sensitive properties.

BS 4142:2014 requires an assessment to consider the context of the development, rather than simply adhering to numerical values. Considering the calculated numerical value of the specific sound, allowing a reduction through partially open windows of 15dBA, as recommended in BS 8233:2014, sound levels inside the neighbouring dwellings due to the proposed new equipment will be approximately 23dBA. This is significantly below guideline levels for sleeping in bedrooms of LAeq 30dB, set out in BS 8233:2014 and is further confirmation that sound levels from the new mechanical equipment should not be detrimental to the amenity of any noise-sensitive receptors in the vicinity.

The author considers that the context of the assessment does not alter the initial estimate of the impact, and that sound levels from the new mechanical equipment should not be detrimental to the amenity of any residential occupiers in the vicinity.



#### 6. CONCLUSION

A planning application is to be submitted for the installation of new mechanical services equipment at 28 Little Russell Street, London.

ACA Acoustics have undertaken sound level surveys in the vicinity and assessment of noise from the proposed equipment using manufacturer's published acoustic data.

Calculated specific sound level for the new plant is at least 10dBA below the lowest measured background sound level. This achieves criteria as specified by London Borough of Camden Council.

It is the author's opinion that the proposed new mechanical services equipment will not be detrimental to the amenity of nearby residential occupants.



**APPENDIX A** 

Acoustic Calculations



# 28 Little Russell Street

Project Name	28 Little Russell Street	Total Noise Levels
Project Reference	190302 œ	40
Reference	Top floor windows of 4 Gilbert Place, London	30-
Description	oise Le	20
Noise Limit	- Ž	10-
dBA	30	- 63 125 250 500 1k 2k 4k 8k

# **Noise Sources**

Poforonco	Quantity		Noise Levels (dB)							
Reference	Quantity	63	125	250	500	1k	<b>2</b> k	4k	8k	
Level 2 Condenser	1	39	35	32	27	23	16	13	3	
Level 4 Condenser	1	36	34	22	22	13	6	1	-6	

#### 190302-ER-1



#### **Calculation Sheet**

# Level 2 Condenser to Top floor windows of 4 Gilbert Place, London

			Octave B	and Cent	re Freque	ency (Hz)		
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Level 2 Condenser								
Sound Power Levels	78.0	76.0	76.0	73.0	72.0	67.0	64.0	56.0
Noise Control Treatments								
Treatment - none								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dc - Condenser Directivity								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergance								
	-33.9	-33.9	-33.9	-33.9	-33.9	-33.9	-33.9	-33.9
Aatm - Atmospheric Absorption								
	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.5	-1.6
Agr - Ground Attenuation								
	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Abar - Barrier Attenuation								
	-11.4	-10.3	-12.7	-15.3	-18.1	-20.0	-20.0	-20.0
External Receiver								
External Receiver - Top floor windows of 4 Gilbert Place, London <b>Sound Pressure, Lp:</b>	38.7	34.8	32.5	26.8	23.0	16.0	12.7	3.5



#### **Calculation Sheet**

# Level 4 Condenser to Top floor windows of 4 Gilbert Place, London

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Level 4 Condenser								
Sound Power Levels	75.0	75.0	66.0	68.0	62.0	57.0	52.0	47.0
Noise Control Treatments								
Treatment - none								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dc - Condenser Directivity								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergance								
	-33.9	-33.9	-33.9	-33.9	-33.9	-33.9	-33.9	-33.9
Aatm - Atmospheric Absorption								
	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.5	-1.6
Agr - Ground Attenuation								
	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Abar - Barrier Attenuation								
	-11.4	-10.3	-12.7	-15.3	-18.1	-20.0	-20.0	-20.0
External Receiver								
External Receiver - Top floor windows of 4 Gilbert Place, London <b>Sound Pressure, Lp:</b>	35.7	33.8	22.5	21.8	13.0	6.0	0.7	-5.5

Tel: 01793 766 324 Tel: 0203 609 8733