ACAACOUSTICS

Acoustic assessment of proposed new mechanical services equipment serving 52 Lambs Conduit Street, London

Report Reference: 161207-002B

Date: January 2017

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Site Address:	52 Lamb's Conduit St Camden Town London WC1N
Client:	Firstplan
Report Reference:	161207-002

Revision:	**Description:**	**Revision Date:**	**Author:**
A	First issue	January 2017	Tommy Burn BSc(hons) AMIOA
B	Second issue – Minor amendments	January 2017	Tommy Burn BSc(hons) AMIOA

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0. SUMMARY

- ACA Acoustics Limited have been commissioned by the client to assess noise emissions from proposed mechanical equipment associated with a new commercial property at 52, Lambs Conduit Street, London.

- The assessment is required in order to provide evidence that noise emissions from the equipment will not be detrimental to the amenity of nearby residential properties and complies with the requirements of London Borough of Camden Council. London Borough of Camden Council's requirement, applicable at this site, is that noise from the equipment shall not exceed 10dB below the existing background LA90 outside nearby noise-sensitive properties.

- A survey has been carried out in the vicinity to establish existing background sound levels. Lowest background sound levels during the proposed operating times of the new equipment were measured at LAF90 37dB to outside the closest noise-sensitive properties. Based on results of the sound level survey and London Borough of Camden Council's requirement, the overall noise limit for the equipment to outside nearest noise-sensitive windows is set at ≤ 27dBA.

- Calculated sound levels from the proposed equipment to outside the nearest residential properties, including benefit of acoustic treatment detailed within this report, are LAeq 26dB at the windows overlooking the equipment, therefore achieving London Borough of Camden Council's requirements. Noise from the equipment should not be detrimental to the amenity of residential occupiers in the vicinity. The assessment includes benefit of noise control treatments as set out in this report.

- The mechanical equipment will not be directly structurally linked to adjoining non-associated properties however it is advised that the equipment is installed on high-performance vibration isolators. Details of suitable isolators are included in this report.

1. INTRODUCTION

New mechanical equipment is to be installed at 52, Lambs Conduit Street, London to serve a new commercial property.

The Planning Department of London Borough of Camden Council requires information in the form of an acoustic report regarding noise from the proposed new equipment. The report is required to demonstrate that the equipment will comply with London Borough of Camden Council's acoustic requirements applicable for mechanical services equipment affecting nearby noise-sensitive properties.

ACA Acoustics Limited has been commissioned by the client to carry out an assessment of noise from the equipment and, where necessary, make recommendation to reduce noise and vibration levels to ensure that the amenity of the adjoining residential properties is not compromised.

This report presents results of the noise survey and assessment and includes:

- Review of London Borough of Camden Council's noise-related planning requirements;
- Measurement of existing background sound levels;
- Calculation of proposed equipment sound levels;
- Review of any noise/vibration control treatments necessary to the equipment to ensure compliance with the requirements of London Borough of Camden Council.

2. LONDON BOROUGH OF CAMDEN COUNCIL PLANNING CONSENT ACOUSTIC REQUIREMENTS

London Borough of Camden Council's policies relating to noise from new mechanical services equipment are contained within the Council's Local Development Framework; Policy DP28.

In Summary, London Borough of Camden's noise-related conditions are:

Noise level from plant and machinery at which planning permission will not be granted:	
Noise at 1m external to a sensitive façade;	*5dBA < LA90*
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise at 1m external to sensitive façade where LA90 > 60dB	*55dB LAeq*

Table 1: London Borough of Camden Council noise-related planning conditions

Each of the above is applicable over a period of 60 minutes and measured at 1m external to noise-sensitive facades.

The characteristic of noise from the condensing units would typically be described as having distinct impulses as the units power on and off as required by the load on the system. Therefore to ensure that the assessment is robust and that the amenity of nearby occupiers is not detrimentally affected, the more onerous noise condition of 10dBA below the existing background noise is used for the assessment in this report.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 52, Lambs Conduit Street, London. 52, Lambs Conduit Street is a 4 storey development. The proposed development incorporates a shop to the ground floor and basement level. Existing residential flats are situated at first, second, and third floor level.

New mechanical services equipment is to be installed at rear ground floor level This will include two condensing units only.

The closest noise-sensitive window has been identified by the author as first floor flats above 52 Lambs Conduit Street.

Lambs Conduit Street is a moderately busy street; however the location of the proposed equipment is to the rear of the property and heavily screened from pedestrian and traffic noise. Windows overlooking the equipment are also screened, resulting in a low background sound level. Figure 1 shows aerial photo of the site, with the condensing unit location marked in red.

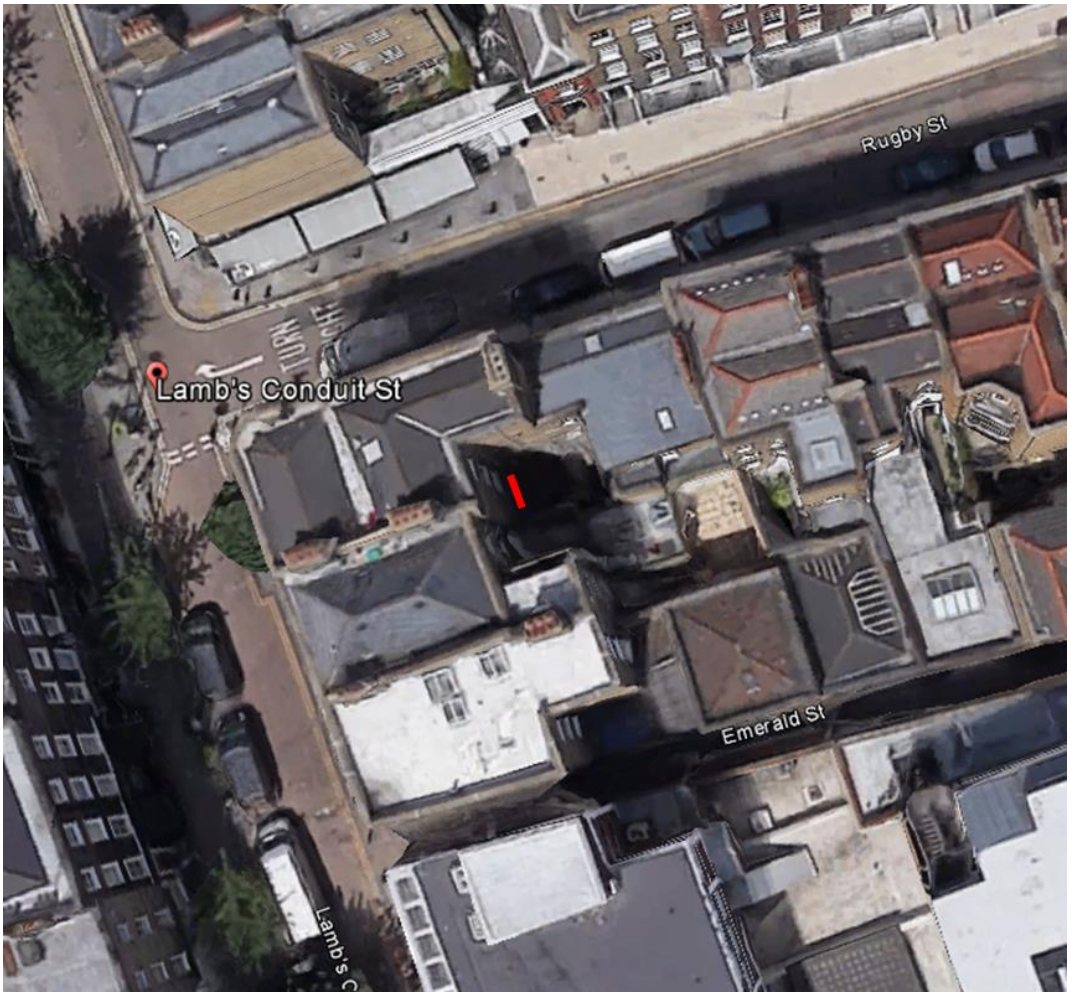

Figure 1 – Site location aerial photo

4. BACKGROUND SOUND LEVEL SURVEY

In order to assess noise from the mechanical services equipment it is necessary to establish representative background sound levels in the vicinity. Details of the background sound level survey carried out by ACA Acoustics Limited are provided in Sections 4.1 to 4.3 below.

4.1 Sound Level Survey Measurement and Assessment Procedure

The proposed equipment will operate until midnight.

A 24-hour unattended background survey was carried out at ground floor level, from Monday 12th to Tuesday 13th December 2016. The weather remained calm and dry over the period of the proposed equipment's operation.

4.2 Instrumentation

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

Equipment	Serial Number
Rion sound level meter type NL-31 Class 1 complete with weatherproof and lockable outdoor environmental kit	00431030
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

4.3 Sound Level Survey Measurement Results

The lowest measured background sound level during operating times of the equipment was LAF90 37dB. Full results are shown in graphical form in Figure 2 and in tabular form in Table 3 below.

Description	Lowest measured LAF90
Monday 12th to Tuesday 13th December 2016	37dBA

Table 3: Summary sound level survey results

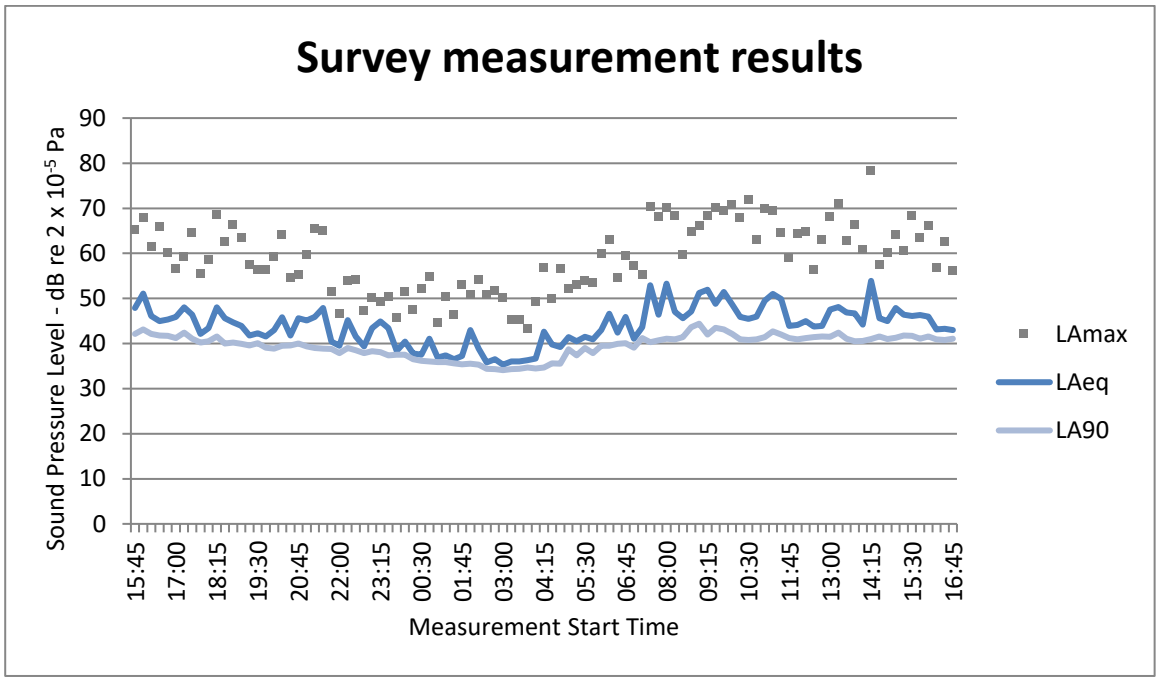

Figure 2: Sound level survey results

From the results shown in Figure 2 it can be seen the measured background sound level remains fairly constant, fluctuating only a small amount over the proposed equipment operating time. The values recorded by ACA Acoustics Limited are used as basis for acoustic design such that sound levels from the proposed new equipment are ≤27dBA outside the closest noise sensitive residential windows.

5. SOUND LEVELS FROM NEW MECHANICAL SERVICES EQUIPMENT

The development includes the installation of two condensing units.

A computer model has been used to calculate the noise contribution from the equipment to outside nearest noise-sensitive windows. The model incorporates environmental corrections set out in ISO 9613-2:1996.

Table 4 shows the proposed items of mechanical equipment to be installed, along with calculated sound levels at the nearest residential receivers with benefit of acoustic treatment as provided in Section 7. Cumulative levels of the equipment at the nearest residential receivers are shown in Table 5.

Item	Make/Model	Reference	Equipment sound power level Source: Manufacturers data Lw (dBA)
Condensing Unit	Mitsubishi FDC100VNX	CU1	66
Condensing Unit	Mitsubishi FDC100VNX	CU2	66

Table 4: Manufacturers equipment sound power levels

The cumulative calculated sound level from the proposed equipment, including benefit of acoustic treatment detailed within Section 7, to outside the noise sensitive residential window compared with the planning requirement is shown in Table 5. Summary print-outs from the calculation models are included in Appendix A.

Description	Calculated Equipment Sound Levels	London Borough of Camden Noise Limit
Closest residential property	26dBA	≤ 27dBA

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

Table 5 shows that the overall sound level from the equipment does not exceed a level 10dB below the lowest measured background sound level to outside the closest residential property. Resultant noise from the equipment will not be disturbing or detrimental to the amenity of nearby residential occupants. The calculation includes benefit of noise control treatments to the new equipment. Details of the noise control treatments are provided in Section 7 below.

6. VIBRATION FROM MECHANICAL EQUIPMENT

The proposed condensing units are directly structurally connected to the adjoining non-associated properties and so it is necessary to ensure structure-borne noise does not pass into the residential property. As a result, in order to prevent the units exceeding the maximum permissible limits it is recommended that all new equipment be installed on suitable vibration isolators.

To control the potential for vibration or vibration-induced noise transmitting to the premises, it is recommended that the condensers are installed on rubber or neoprene turret type mounts or pads providing a deflection of not less than 6mm at the working load.

The rubber turret type vibration isolators proposed are readily available from most acoustic hardware suppliers, including Allaway Acoustics Limited (Contact Chris Williams – Tel: 01992 550825).

7. RECOMMENDATIONS FOR NOISE CONTROL TREATMENTS

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.

Alternative methods of attenuation to those detailed below may be acceptable, for example relocation of noisy equipment to other, less sensitive, areas of the development. Full details of any alternative scheme, including working drawings and expected attenuation should be submitted and approved prior to manufacture.

It is recommended that the condensers are installed in a high-performance acoustic enclosure such as those supplied by Environ Technologies Limited or equal and approved. Acoustic performance of a suitable enclosure is shown in Appendix B.

Structural supports/steelwork and access panels or doors may be required and should be determined by the successful supplier accordingly.

APPENDIX A

Acoustic Calculations

Calculation Sheet

CU1 to 1st floor window

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - CU1										
Sound Power Levels		**51.0**	**58.0**	**62.0**	**64.0**	**62.0**	**59.0**	**54.0**	**46.0**	
Noise Control Treatments										
Treatment - High performance enclosure										
Attenuated Lw		**37.0**	**42.0**	**39.0**	**34.0**	**25.0**	**20.0**	**16.0**	**7.0**	**Row A**
ISO 9613 Calculation										
Horiz. Distance (m)	0.5									
Source Height (m)	0.5									
Receiver Height (m)	5.0									
Barrier - No Barrier										
Distance to Barrier (m)	-									
Barrier Height (m)	-									
Screening at (m)	-									
Q Factor - Corner										
Direct Lp		**24.9**	**29.9**	**26.9**	**21.9**	**12.9**	**7.8**	**3.7**	**-5.6**	
ISO 9613 Calculation - Reflections										
Type of Reflecting Surface - Walls with windows, recesses or bays										
Q Factor - Junction										
Source Height (m)	0.5									
Reflecting Height (m)	3.0									
Barrier - No Barrier										
Distance to Barrier (m)	-									
Barrier Height (m)	-									
Screening at (m)	-									
Reflected Lp		**0.0**	**12.5**	**9.4**	**4.4**	**-4.6**	**-9.6**	**-13.9**	**-23.8**	
Cumulative Lp at Receiver										
External Receiver										
External Receiver - 1st floor window										
Sound Pressure, Lp:		**24.9**	**30.0**	**27.0**	**22.0**	**12.9**	**7.9**	**3.8**	**-5.6**	

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Calculation Sheet

CU2 to 1st floor window

		Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Noise Source										
Noise Source - CU2										
Sound Power Levels		**51.0**	**58.0**	**62.0**	**64.0**	**62.0**	**59.0**	**54.0**	**46.0**	
Noise Control Treatments										
Treatment - High performance enclosure										
Attenuated Lw		**37.0**	**42.0**	**39.0**	**34.0**	**25.0**	**20.0**	**16.0**	**7.0**	**Row A**
ISO 9613 Calculation										
Horiz. Distance (m)	0.5									
Source Height (m)	0.5									
Receiver Height (m)	5.0									
Barrier - No Barrier										
Distance to Barrier (m)	-									
Barrier Height (m)	-									
Screening at (m)	-									
Q Factor - Corner										
Direct Lp		**24.9**	**29.9**	**26.9**	**21.9**	**12.9**	**7.8**	**3.7**	**-5.6**	
ISO 9613 Calculation - Reflections										
Type of Reflecting Surface - Walls with windows, recesses or bays										
Q Factor - Junction										
Source Height (m)	0.5									
Reflecting Height (m)	3.0									
Barrier - No Barrier										
Distance to Barrier (m)	-									
Barrier Height (m)	-									
Screening at (m)	-									
Reflected Lp		**0.0**	**12.5**	**9.4**	**4.4**	**-4.6**	**-9.6**	**-13.9**	**-23.8**	
Cumulative Lp at Receiver										
External Receiver										
External Receiver - 1st floor window										
Sound Pressure, Lp:		**24.9**	**30.0**	**27.0**	**22.0**	**12.9**	**7.9**	**3.8**	**-5.6**	

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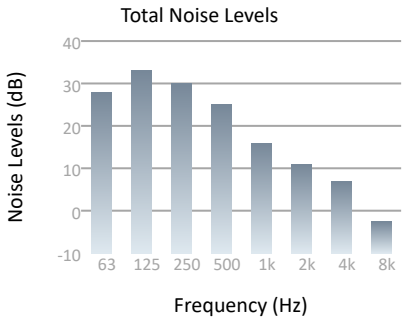
52 Lambs Conduit Street

Project Name	52 Lambs Conduit Street
Project Reference	161207
Reference	1st floor window
Description	
Noise Limit	-
dBA	26



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
CU1	1	24.9	30	27	22	12.9	7.9	3.8	-5.6
CU2	1	24.9	30	27	22	12.9	7.9	3.8	-5.6

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APPENDIX B

Typical Noise Control Treatments

Schedule of Noise Control Treatments

Reference	Description	Location	Pressure Drop (Pa)	Insertion Losses (dB)							
				63	125	250	500	1k	2k	4k	8k
High performance enclosure	Environlite Acoustic Enclosure			14	16	23	30	37	39	38	39

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