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Acoustic Assessment of Proposed Mechanical Equipment at 12 Hampstead High St, London

Report Reference: 160819-002A

Date: August 2016

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Client:	R. J. Stearn Ltd 32 Vincent Avenue Regent Business Park Crownhill Milton Keynes MK8 0AB
Report Reference:	160819-002
Revision:	A: First issue
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Date:	August 2016

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0. SUMMARY

- ACA Acoustics Limited have been commissioned to assess sound levels from a proposed condensing unit at 12 Hampstead High St, London.

- The assessment is required in order to provide evidence that noise emissions from the equipment 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 to 10dBA below the prevailing background level at 1m outside windows of the nearest affected noise-sensitive property.

- A sound level survey has been carried out in the vicinity to establish existing background sound levels. Whilst on site the author identified the closest residential properties to the equipment as apartments at first floor level; the nearest window is approximately 6m from the equipment.

- Lowest background sound levels during the survey were measured at LAF90 49dB. Background sound levels are raised and comprise primarily of mechanical equipment serving 12 Hampstead High Street and surrounding residential apartment blocks. Based on results of the sound level survey and London Borough of Camden Council's requirement, the overall sound level limit for the equipment to outside nearest residential noise-sensitive windows is set at ≤39dBA.

- Based on calculations using manufacturer's noise data, the overall sound level for the equipment with benefit of acoustic treatment as described in section 7 is 38dBA outside the noise sensitive windows nearest to the plant, ensuring compliance with London Borough of Camden Council's requirements. Noise from the equipment should not be detrimental to the amenity of any residential occupiers in the vicinity.

- The proposed equipment is indirectly structurally linked to adjoining commercial premises and therefore it is recommended it is installed on vibration isolators; specification for suitable isolators is included in this report.

1. INTRODUCTION

A new condensing unit is proposed to 12 Hampstead High St, London to serve an existing bank.

The Planning Department of London Borough of Camden Council requires information in the form of an acoustic report regarding noise from the equipment. The report is required to demonstrate that the equipment complies 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 and vibration from the new equipment and, where necessary, make recommendation to reduce noise and vibration levels from the equipment to comply with London Borough of Camden Council's planning requirements.

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 equipment sound levels;
- Consideration of vibration from the proposed new equipment;
- Review of any noise/vibration control treatments necessary to the equipment to ensure compliance with the requirements of London Borough of Camden Council.

2. CAMDEN BOROUGH COUNCIL ACOUSTIC CRITERIA

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 unit would typically be described as being intermittent, with clicks as it powers up and down. 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 12 Hampstead High St, London NW3 1PY. 12 Hampstead High St is a ground floor bank with flats above. Existing mechanical services equipment is installed at lower ground level to the rear of the property.

One condensing unit is proposed to be installed externally at a location similar to existing equipment.

During the author's visits to site closest noise-sensitive properties to the proposed equipment appear to be first floor windows of residential apartments above 12 Hampstead High St. Closest windows to the equipment at lower ground floor level are around 6m from the proposed location of the condensing unit.

Various items of existing mechanical services equipment are already installed to the rear area and serve both associated and non-associated properties. This existing equipment is dominant, resulting in a raised ambient sound level.

4. SOUND LEVEL SURVEY

In order to assess noise from the mechanical services equipment in accordance with London Borough of Camden Council's requirements it is necessary to establish representative background sound levels at the nearest noise-sensitive properties. 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 between 08:00 – 17:00 on weekdays.

The background sound level survey measurement position was selected to the rear of the property on at ground floor level at an equivalent distance from the proposed equipment location to that of the nearest noise sensitive windows. The chosen site was not considered secure and so a manned survey was carried out during the latest operating times of the proposed condenser, between 14:30 and 17:00 on the 23rd August 2016. The weather remained dry and calm throughout the survey duration.

4.2 Instrumentation

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

Equipment	Serial Number
NTi Audio type XL2 Class 1 sound level meter 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

4.3 Sound Level Survey Measurement Results

Summary of measured sound levels are provided in Figure 1 and Table 3 on the following page.

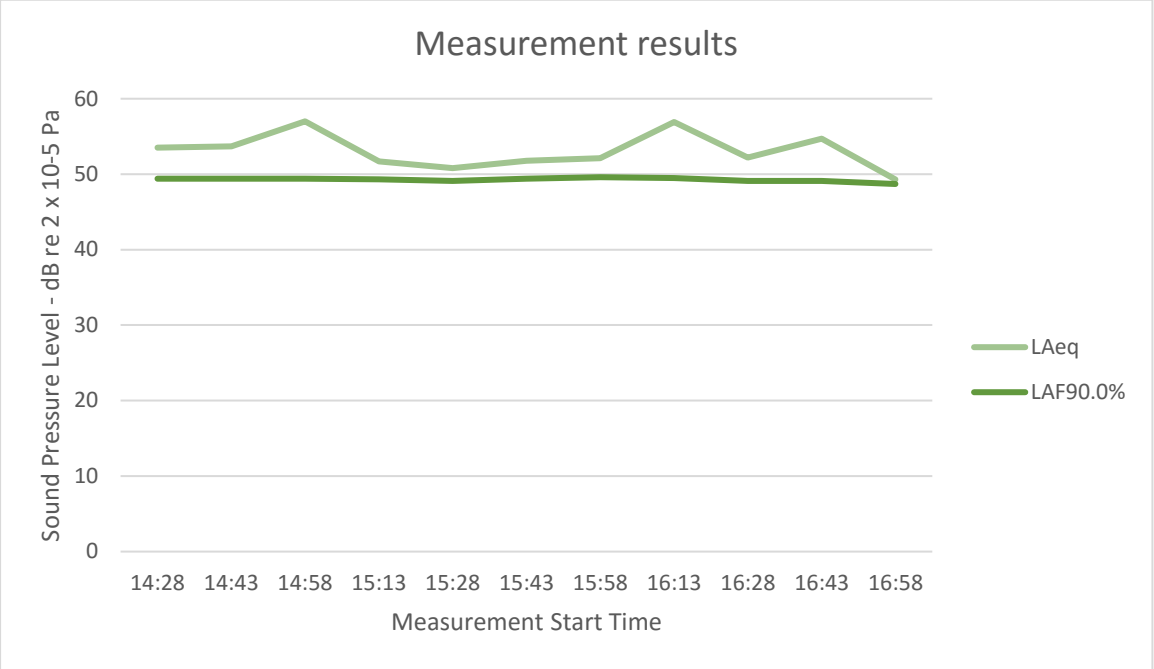

Figure 1: Sound level survey results on 23rd August 2016

The lowest measured background sound level during the operating times of the new equipment was LA90 49dB; background levels are typically steady due to dominant non-associated mechanical services equipment in the vicinity.

In accordance with London Borough of Camden Council's criteria, the values recorded by ACA Acoustics Limited are used as basis for acoustic design such that noise from the proposed equipment is ≤39dBA outside nearest residential windows (≥10dBA below the lowest recorded values).

Description	Calculated Equipment Sound Levels	London Borough of Camden Noise Limit
Closest residential property	38dBA	39dBA

Table 3: Summary sound level survey results and London Borough of Camden noise limit

The limit to achieve London Borough of Camden Council's requirement outside residential windows is 39dBA; this is 10dBA below the lowest measured background sound level over the proposed operating period of the new equipment. At this level the equipment noise will not increase the prevailing background sound level.

5. SOUND LEVELS FROM NEW MECHANICAL SERVICES EQUIPMENT

The planning application includes installation of a single condensing unit.

Noise levels from the proposed equipment can be determined from manufacturer's noise data. Manufacturer's data in terms of octave band sound power level spectra has been used in the calculations.

A computer noise model has been used to calculate the noise contribution from the equipment to outside nearest noise-sensitive windows. The model takes account of environmental corrections of ISO 9613-2:1996.

The calculated sound level from the proposed condensing unit with benefit of acoustic treatment described in section 7, to outside the nearest noise-sensitive windows compared with the planning requirement is shown in Table 4. Summary print-out from the calculation model is included in Appendix A.

Description	Calculated Equipment Sound Levels	Noise Limit
1m from closest residential noise-sensitive windows	38dBA	(London Borough of Camden Council) ≤ 39dBA

Table 4: Calculated equipment sound levels at 1m outside noise-sensitive windows

Table 4 shows that, with benefit of acoustic treatment as described in section 7, the overall sound level from the equipment is at least 10dBA below the lowest measured background noise and achieves London Borough of Camden Council's planning consent requirements.

6. VIBRATION FROM MECHANICAL EQUIPMENT

The new condenser is indirectly structurally connected to adjoining non-associated properties and it is recommended that the 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 condenser is 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 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

To achieve Camden Borough Council's noise limit criteria, it is necessary to install an acoustic louvred enclosure around the air conditioning condenser.

Alternative methods of attenuation may be acceptable including relocation of the equipment to less sensitive areas of the development. 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.

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

The acoustic louvred enclosure would be formed using Allaway Acoustics Limited's type AL1515 150mm deep louvres or equivalent. The enclosure may require steelwork supports; this should be verified by a suitable third-party or the installer accordingly. If preferred the enclosure may be fixed back to the rear wall or to a corner of two walls, subject to suitable airflow to the units (to be determined by a suitable third party accordingly).

Contact Allaway Acoustics Limited - Mike Flanagan (mike.flanagan@allawayacoustics.co.uk).

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APPENDIX A

Acoustic Calculations

Calculation Sheet

Condensing Unit to Nearest residential reciever

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - Condensing Unit									
Sound Power Levels		**65.0**	**66.0**	**64.0**	**59.0**	**56.0**	**53.0**	**46.0**	**40.0**
Noise Control Treatments									
Treatment - Acoustic Louvre									
ISO 9613 Calculation									
Horiz. Distance (m)	1.0								
Source Height (m)	1.0								
Receiver Height (m)	6.0								
Barrier - No Barrier									
Distance to Barrier (m)	-								
Barrier Height (m)	-								
Screening at (m)	-								
Q Factor - Junction									
Direct Lp		**44.8**	**45.8**	**42.8**	**34.8**	**27.8**	**20.8**	**14.7**	**10.3**
Cumulative Lp at Receiver									
External Receiver									
External Receiver - Nearest residential reciever									
Sound Pressure, Lp:		**44.8**	**45.8**	**42.8**	**34.8**	**27.8**	**20.8**	**14.8**	**10.6**

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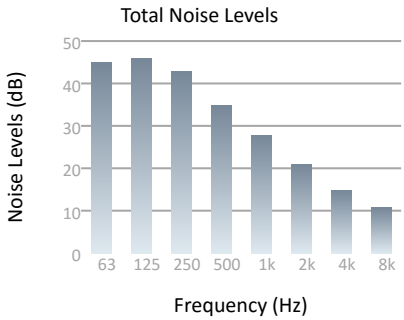
12 Hampstead High St

Project Name	12 Hampstead High St
Project Reference	160819
Reference	Nearest residential reciever
Description	Flat above 12 Hampstead High St
Noise Limit	39
dBA	38



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Condensing Unit	1	45	46	43	35	28	21	15	11

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APPENDIX B

Acoustic Mitigation Schedule

12 Hampstead High St

Schedule of Noise Control Treatments

Reference	Description	Location	Pressure Drop (Pa)	Insertion Losses (dB)							
				63	125	250	500	1k	2k	4k	8k
Acoustic Louvre	AL1515			4	4	5	8	12	16	15	13

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