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Acoustic Assessment of Proposed External Condenser at 38 Goodge Street, London

Report Reference: 140808-002A

Date: October 2014

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Site Address:	38 Goodge Street London WC1T 2QW
Client:	Nicholas Barber Shop 38A Goodge Street Marylebone London W1T 2QW
Report Reference:	140808-002
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Author:	Rob Cant MIOA
Date:	October 2014

CONTENTS

0. SUMMARY

- ACA Acoustics Limited have been commissioned by the client to assess noise emissions from a proposed new external condenser to be installed at an existing commercial property at 38 Goodge Street, London.

- The assessment is required in order to provide evidence that noise emissions from the new condenser 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 noise survey has been carried out in the vicinity to establish existing background noise levels. Whilst on site the author identified the closest residential properties as being apartments within upper floors of the development site. Closest windows of the will be nominally 3m horizontally from the condenser at upper floor level.

- Lowest background noise levels are measured at LAF90 44dB during daytime hours (09:00 – 18:00) when the barber shop is likely to be open. Based on results of the noise survey and London Borough of Camden Council's planning consent requirement, the overall noise limit for the equipment to outside nearest noise-sensitive windows is set at ≤34dBA.

- Based on calculations using manufacturer's noise data, the overall noise level for the equipment is 22dBA outside any nearby noise-sensitive windows. This achieves London Borough of Camden Council's planning consent requirement. Noise from the equipment should not be detrimental to the amenity of any residential occupiers in the vicinity. The assessments include benefit of an acoustic enclosure around the condenser. No further noise mitigation treatments are necessary.

- The proposed condenser is directly structurally linked to adjoining non-associated properties. To control structure-borne noise and vibration it is recommended that the condenser is installed on rubber or neoprene turret type vibration isolators providing minimum 8mm deflection at the working load. Details of suitable noise and vibration control measures are included within this report.

1. INTRODUCTION

A new air conditioning system with external condenser is proposed to be installed at an existing commercial property at 38 Goodge Street, London.

The Planning Department of London Borough of Camden Council requires information in the form of an acoustic report regarding noise from the new equipment. The report is required to demonstrate that the new 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 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 requirements;
- Measurement of existing background noise levels;
- Calculation of equipment noise 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 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.

Air conditioning condensers will have the potential to operate intermittently, 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 38 Goodge Street, London. 38 Goodge Street is set within a larger terraced row.

The area is predominately of commercial premises, being a mix of offices, retails shops and cafes/licensed properties. However the author understands that upper floor levels above some commercial properties are to residential apartments. Notwithstanding this, London Borough of Camden Council consider commercial offices to be noise-sensitive; the closest windows to non-associated noise sensitive properties, believed to be a residential apartment, is at upper floor levels above the development site. This is nominally 3m horizontally from the proposed condenser at upper floor level.

Planning permission is sought for new mechanical services equipment items associated with the air conditioning system. The external equipment comprises a condenser along with associated pipework and ancillaries. The condenser is to be installed within the lower-ground floor level lightwell at the rear of the building.

4. NOISE 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 noise levels at the nearest noise-sensitive properties. Details of the background noise survey carried out by ACA Acoustics Limited are provided in Sections 4.1 to 4.3 below.

4.1 Noise Measurement and Assessment Procedure

The background noise measurement position was selected at the rear façade at a position equivalent to the closest non-associated noise-sensitive windows.

The site was considered secure and therefore an unmanned noise survey was carried out over nominally a 24-hour period between 23rd and 24th September 2014. During the survey the weather included dry and calm periods.

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
Rion sound level meter type NL-31 Class 1 complete with weatherproof and lockable outdoor environmental kit	00773045
NTi Audio calibrator type CAL200 94/114dB. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	11441
Microphone extension cable and telescopic boom arrangements	-

Table 2: Equipment used

4.3 Noise Measurement Results

Complete results of the noise survey are provided in graphical form in Figure A on the following page.

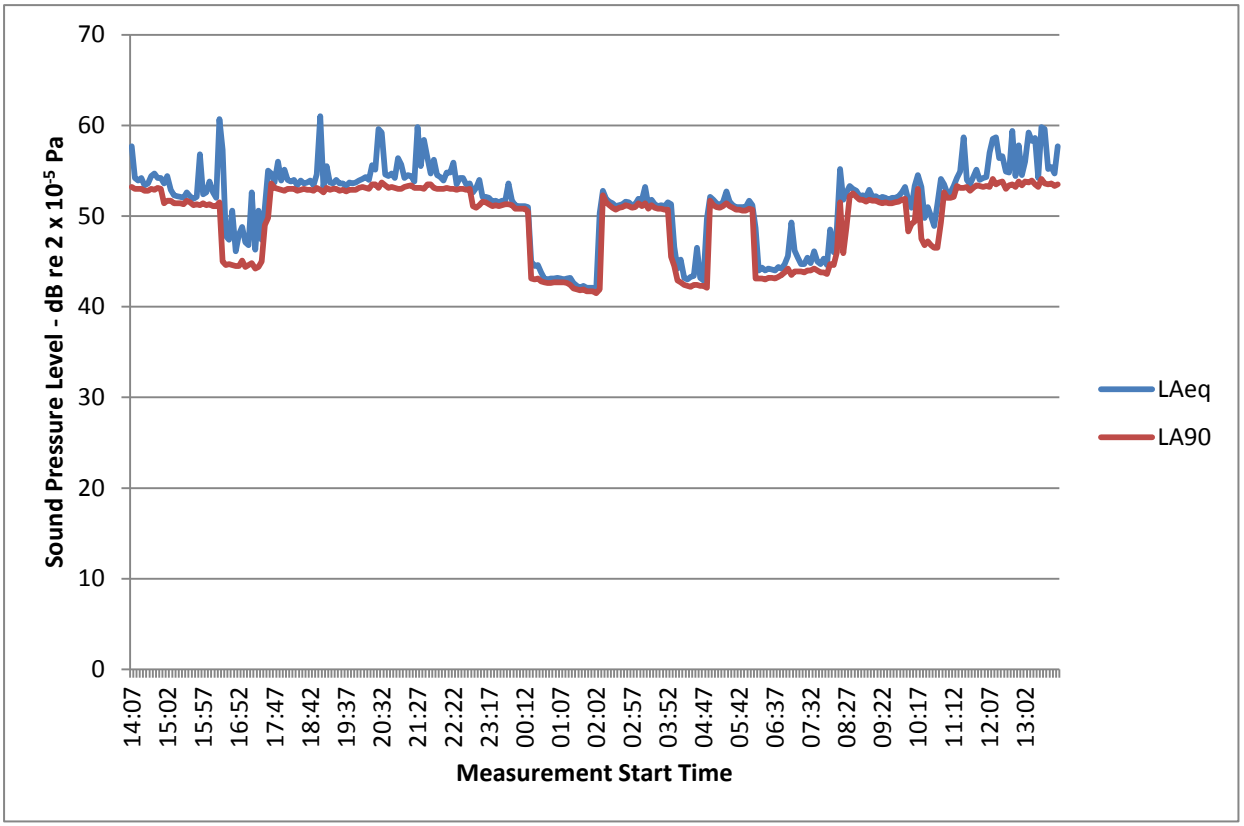

Figure A: Noise Survey Results

Existing background noise levels to the rear are dominated by noise from existing mechanical equipment serving other non-associated properties including an adjacent restaurant. The lowest measured background noise level during daytime hours (09:00 – 18:00) when the barber shop will be occupied was LA90 44dB for a short period in the middle of the afternoon.

The values recorded by ACA Acoustics Limited are used as basis for acoustic design such that noise from the proposed equipment is ≤34dBA outside nearest noise-sensitive windows. Summary of measured noise levels are provided in Table 3 below.

Time Period	Lowest Recorded LA90	Camden Council Noise Limit
Daytime (09:00 – 18:00)	44dB	≤ 34dBA

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

The limit to achieve London Borough of Camden Council's requirement outside nearby noise-sensitive windows is 34dBA; this is 10dBA below the lowest measured background noise level. At this level the equipment noise will not increase the prevailing background noise and will not be disturbing or detrimental to the amenity of nearby occupants.

5. NOISE FROM MECHANICAL SERVICES EQUIPMENT

The planning application includes installation of a an external condenser along with associated pipework and ancillaries. The condenser is to be installed externally within the rear lower-ground lightwell.

Equipment selections and system design are to be finalised, however it is anticipated that the required unit would be as Toshiba Air Conditioning's model RAV-SM564AT-E or equal and approved.

Noise levels from the proposed equipment can be determined from manufacturer's noise data. Sound power levels for the unit are shown in the calculations in Appendix A.

A computer noise model has been used to calculate the noise contribution from the equipment to outside nearest noise-sensitive windows. The model includes environmental corrections based on the calculation method of ISO 9613-2:1996 and takes account of distance between the condenser and noise-sensitive windows and environmental conditions.

The calculated noise level from the proposed condenser outside the nearest noise-sensitive windows compared with the planning requirement is shown in Table 4. Summary print-outs from the calculation model are included in Appendix A.

Description	Calculated Equipment Noise Levels	Camden Council Noise Limit
Nearest Noise-Sensitive Windows	22dBA	≤ 34dBA

Table 4: Calculated equipment noise at nearest noise-sensitive windows

Table 4 shows that the overall noise level from the equipment is at least 18dBA below the lowest measured background noise outside nearby noise-sensitive properties and achieves London Borough of Camden Council's planning consent requirements.

Resultant noise from the equipment will not be disturbing or detrimental to the amenity of nearby existing occupants. The calculations include benefit of an acoustic enclosure. Details of suitable noise control treatments are included in Section 6 of this report.

6. RECOMMENDATIONS FOR NOISE & VIBRATION CONTROL TREATMENTS

To achieve the noise limit requirement of London Borough of Camden Council it is necessary to install the condenser within an acoustic enclosure.

The condenser is indirectly structurally linked to non-associated properties and therefore although considered unlikely for this type of condenser it is possible that structure-borne noise and vibration may transmit to these properties. As such it is recommended that the condenser is isolated from the structure on vibration isolators.

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.

Suitable acoustic enclosures would be as supplied by Environ or equal and approved (Tel: 0870 383 3344). Note that the Environ enclosure used within the assessment achieves resultant noise levels significantly better than that required by London Borough of Camden; alternative suppliers with lower insertion loss performance 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.

As the proposed condenser is indirectly structurally linked to non-associated properties it is possible that structure-borne noise and vibration may transmit to these properties. Suitable isolators are typically rubber or neoprene type mounts providing a deflection of not less than 8mm at the working load. These isolators will provide ≥90% isolation efficiency at the unit operating speed.

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APPENDIX A

Acoustic Calculations

Calculation Sheet

Condenser to Residential Flat

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - Condenser									
Sound Power Levels		**69.0**	**67.0**	**63.0**	**59.0**	**60.0**	**53.0**	**43.0**	**39.0**
Silencer									
Silencer - AE1									
		-14.0	*-16.0*	*-23.0*	*-30.0*	*-37.0*	*-39.0*	*-38.0*	*-39.0*
ISO 9613 Calculation									
Conditions - 10°C 70% Humidity									
Reflection (dB)	6.0								
Gm	0.0								
Gs	0.0								
Gr	0.0								
Horiz. Distance (m)	3.0								
Source Height (m)	1.0								
Receiver Height (m)	5.0								
Barrier - No Barrier									
Distance to Barrier (m)	-								
Barrier Height (m)	-								
Screening at (m)	-								
		-16.0	*-16.0*	*-16.0*	*-16.0*	*-16.0*	*-16.0*	*-16.1*	*-16.6*
External Receiver									
External Receiver - Residential Flat									
Sound Pressure, Lp		**39.0**	**35.0**	**24.0**	**13.0**	**7.0**	**-2.0**	**-11.1**	**-16.6**

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APPENDIX B

Noise Control Treatments

environ™
Dynamic Acoustic Technology

Acoustic Enclosure Systems for Air Conditioning and Refrigeration Plant

environlite 1.2.25AC SPLIT

Versatile yet cost effective noise control solutions for small and medium sized Split Air Conditioning and Heat Pump systems that have horizontal air flow characteristics.

This attractive range of units combines superior noise reduction characteristics and application versatility with a user friendly design for ease of assembly.

An introduction:

environlite is not only physically compact and discrete; its flexibility allows for a wide range of AC applications and is particularly suited to 'difficult to access' locations. Available as a new build or retro-fit solution, environlite is supplied to the user palletised as a simple on-site self build kit.

All Environ products are a proven solution for the elimination of noise where commercial establishments coexist with domestic neighbours and environlite is especially suited to the ever growing domestic AC market.

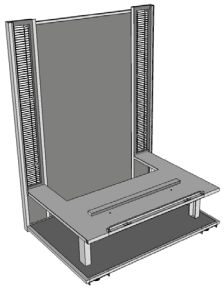
By design, environlite applies its patented noise control features to best advantage, ensuring maximum acoustic performance.

With advanced noise control technology underpinned by quality engineering and manufacturing standards, environlite solutions help alleviate local authority approval issues, whilst eliminating the air conditioning noise problem for the user.

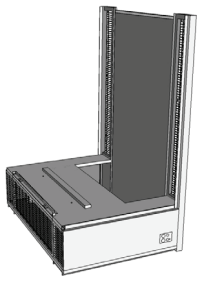
With almost infinite plant application compatibility and deriving its name from its design, environlite is matched to provide unparalleled acoustic performance to light commercial and domestic AC applications. The range is available in a variety of sizes, allowing it to by tailored to meet specific applications for new build or retro-fit noise abatement.

The integrated airways are sized to suit the requirements of the enclosed plant and full service and maintenance access is provided by the provision of removable and hinged access panels.

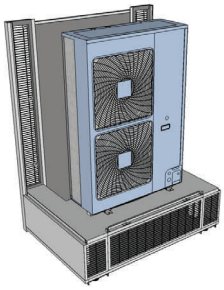
environlite is secure and gives greater flexibility regarding the positioning of plant and machinery, especially where space is at a premium. Being 'Visually Quiet', no moving parts are visible - so the enclosed plant remains out of sight and out of mind.....



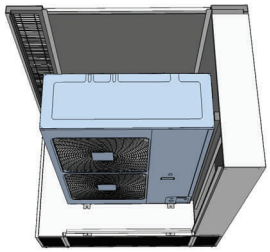
STEPS 1-4 - Structure



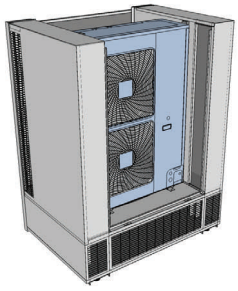
STEPS 5-6 - Air In Grilles



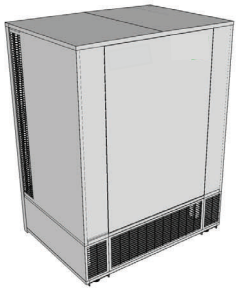
STEP 7 - Locate AC unit



STEP 8 - Fit RH Airway



STEP 9 - Fit LH Airway



STEPS 11-12 - Complete Assembly

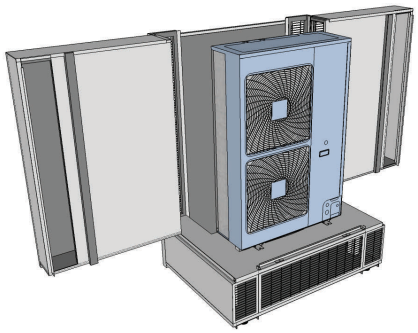
The Environ Integra, Modula and Lite acoustic designs are protected under patent

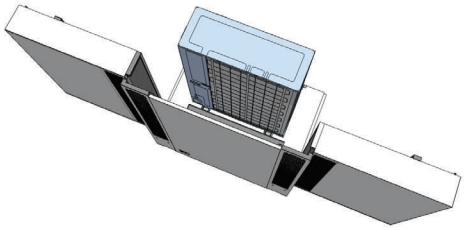
environ™
Dynamic Acoustic Technology

environlite 1.2.25AC SPLIT

Product features at a glance:

- Superior sound engineering characteristics with certified Transmission Loss performance
- Satisfies the most stringent local authority noise requirements as part of the planning or noise enforcement process
- Effective noise control solution for Air Conditioning plant with horizontal air flow requirements
- Optimised airways and grilles maximise airflow efficiencies
- Full enclosure design protects plant from the elements, virtually eliminates the effect of solar gain on the operating plant and reduces the need for condenser coil cleaning
- Ultra small footprint, quality build, strong and durable design
- A visually quiet, 'good neighbour' with a choice of external finishes to allow plant to blend into the surroundings





User Benefits:

- Effectively eliminates plant noise on New Build a Retro-fit projects
- Local authority endorsed 'Best Practical Means' solution for large Air Conditioning and Heat Pump units
- No noise nuisance enhances neighbour relations
- Secure, robust and vandal proof—no additional security required
- Reduces installation time and cost compared to other acoustic solutions

Installer Benefits:

- Supplied as a 'Flat Pack' accessory for on-site assembly
- Quick and Easy to assemble - No specialised tools necessary
- Modular sub-assemblies for ease of installation
- Floor or Wall Mount
- Integrated Services and Electrical access points.
- Commissioning, Service and Maintenance access through lockable access panels
- Noise attenuation under installation contractor control

The Environ Integra, Modula and Lite acoustic designs are protected under patent

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