
TECHNICAL MEMO

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SYNERGY HOUSE - PLANT NOISE ASSESSMENT

1 INTRODUCTION

Anderson Acoustics Ltd has been commissioned by Synergetic Management Ltd to undertake a plant noise assessment for a new condenser unit to be installed at the 4th level terrace of the Synergy House building; located at 114-118 Southampton Row, London WC1B 5AA.

The plant noise assessment has been undertaken as a desktop exercise, using the background noise survey undertaken by Sandy Brown Associates in 2014 (as part of the planning application for the development itself), as well as the manufacturer's plant noise emission levels for the new condenser.

Noise units, acoustic terminology and environmental noise criteria relevant to the assessment have been presented and briefly discussed in Section 2 of this report.

A brief description of the site and proposed development is given in Section 3.

The results of the noise survey undertaken at the site are given in Section 4.

Section 5 provides the results of the BS4142 assessment.

2 NOISE UNITS, POLICY AND CRITERIA

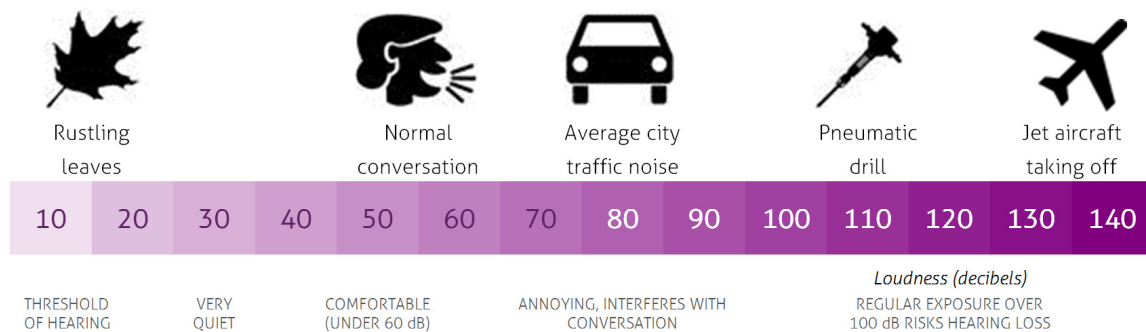
2.1 Noise Units

There is a million to one ratio between the threshold of hearing and the highest tolerable sound pressure. Noise is therefore measured using a logarithmic scale, to account for this wide range, called the decibel (dB). Noise is defined as unwanted sound and the range of audible sound varies from around 0 dB to 140 dB.

The human ear is capable of detecting sound over a range of frequencies from around 20 Hz to 20 kHz, however its response varies depending on the frequency and is most sensitive to sounds in the mid frequency range of 1 kHz to 5 kHz. Instrumentation used to measure noise is therefore weighted across the frequency bands to represent the sensitivity of the ear. This is called 'A weighting' and is represented as dB(A).

It is generally accepted that under normal conditions humans are capable of detecting changes in steady noise levels of 3 dB, whilst a change of 10 dB is perceived as a doubling or halving of the noise level. An indication of the range of noise levels commonly found in the environment is given below.

Figure 2.1: Typical noise levels



A number of different indices are used to describe the fluctuations in noise level over certain time periods. The main indices include:

- L_{A90,T}** This is the noise level exceeded for 90% of the measurement period and provides a measurement of the quieter 'lull' periods in between noise events. It is often referred to as the background noise level.
- L_{Aeq,T}** This is the "equivalent continuous A-weighted sound pressure level" and is the level of a notional steady sound which has the same acoustic energy as the fluctuating sound over a specified time period. It is often used for measuring all sources of noise in the environment, which can be referred to as the ambient noise.
- L_s** Specific sound level. This is the "equivalent continuous A-weighted sound pressure level (L_{Aeq,Tr}) produced by the specific sound source at the assessment location over a given reference time interval T_r".
- L_r** Residual sound level. This is the "equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T. The residual sound is the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound".
- L_{Ar,Tr}** Rating level. This is the "specific sound level plus any adjustment for the characteristic features of the sound". The characteristic features normally consider tonality, impulsivity and/or other sound characteristics i.e. intermittency.

Reference is often made to acoustic measurements being undertaken in 'free-field' or 'façade' locations. Free-field measurements represent a location away from vertical reflecting surfaces, normally by at least 3.5 metres. A façade measurement is undertaken, or calculated to a position 1 metre from an external façade and

a correction of up to 3 dB can be applied to account for the sound reflected from the façade. This latter position is often used when assessing the impact of external noise affecting residents inside properties.

2.2 British Standard 4142: 2014

Guidance on the rating of noise from fixed installations and sources of an industrial nature is provided in BS 4142: 2014 - *Method for Rating and Assessing Industrial and Commercial Sound*. This standard provides a procedure for the measurement and rating of noise levels outside dwellings in mixed residential and industrial areas. A methodology for predicting the likelihood of adverse impact is also provided in this document although the assessment of nuisance explicitly falls outside the scope of this British Standard.

The rating level (L_{A,r,T_r}) as defined in BS 4142 is used to rate the industrial source (known as the specific noise source) outside residential dwellings. This level is obtained by adding a correction of between 0 and 6 dB for tonal noises and between 0 and 9 dB for impulsive sources. Additionally, corrections of 3 dB can be made for other sound characteristics and intermittency of noise source.

Reference time intervals T_r of 1 hour and 15 minutes are specified for the determination of rating levels during day and night respectively.

The method for predicting the likelihood of complaints is based on differences between the rating level and the background $L_{A90,T}$ noise level. The standard states that:

"a) Typically, the greater this difference, the greater the magnitude of impact.

b) A difference of around +10 dB or more is likely to be an indication of significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or 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."

2.3 Local Authority Criteria

The Camden Local Development Framework (LDF) produced by Camden Council and adopted in 2010 contains details of the council's planning strategies and policies. The lead Local Development Framework document is the Core Strategy, which sets out the key elements of the Council's planning vision and strategy for the borough and contains strategic policies.

Development Policy 28 – *Noise and Vibration* contains guidance on the control of noise and vibration emissions in new developments likely to generate noise or new sensitive developments proposed in close proximity to noise sources. DP28 includes plant noise emissions criteria, which should not exceed 5 dB below the existing background noise level (L_{A90}) when assessed at 1m outside the nearest noise-sensitive façade, during the proposed hours of operation.

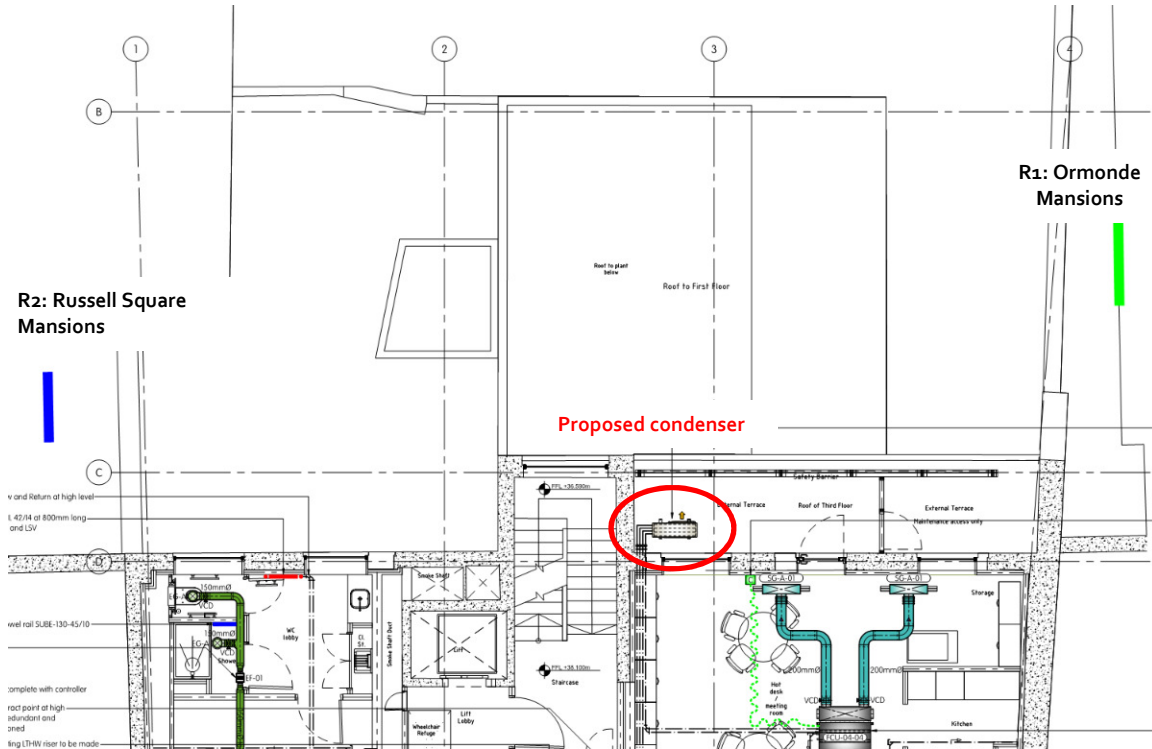
If the plant noise contains certain acoustic features which could increase the significance of impact on the nearest receptors (such as tonal elements, whines, whistles, bangs, clatters, etc.), the plant should be designed to achieve an additional 5 dB below this limit.

3 SITE DESCRIPTION

1 No. condenser unit (Samsung AJ100MCJ5EH/EU) is being proposed at the 4th floor terrace of the Synergy House building. The new unit is to be mounted on the floor, as shown in Figure 3.1 below. It is understood

there are two residential receptors at the rear of the Synergy House building overlooking the proposed condenser, both located approximately 11m from the condenser unit; indicatively marked-up in Figure 3.1 below.

Figure 3.1 – Proposed condenser location and nearest noise-sensitive receptors



It is understood the plant is likely to operate during typical commercial hours of the building (assumed to be between 07:00 – 19:00, Monday to Friday). Our assessment has been undertaken for a worst-case night-time operating scenario, since the proposed unit may sporadically be used overnight.

The sound power level of the condenser unit is shown in Table 3.1 below, provided by the manufacturer.

Table 3.1: Plant noise emission data for the Samsung AJ100MCJ5EH/EU unit

Source	63	125	250	500	1k	2k	4k	8k	Overall level
Samsung AJ100MCJ5EH/EU	72	72	72	68	66	59	55	44	70 dB(A) PWL

It should be noted that the proposed installation of the unit comprises the use of an acoustic enclosure (i.e. “Environlite 1.1.25AC S4”), which is understood to reduce the sound pressure level at 1m from the unit by 20 dB, according to the manufacturer. The manufacturer has provided tested data for a Mitsubishi PUHZ-ZRP6oVHA condenser unit, which emits 48 dB(A) sound pressure level at 1m from the unit. The Environlite acoustic enclosure reduced the Mitsubishi’s noise emissions to 22-28 dB(A) sound pressure level at 1m from the unit. Our assessment has therefore assumed a 20 dB reduction (worst-case) due to the proposed enclosure for the new condenser.

4 BACKGROUND NOISE SURVEY

The prevailing noise conditions at roof level of the building were determined by Sandy Brown Associates (SBA), who undertook the 2015 planning acoustic report (reference 14045-R03-C). The background noise levels and corresponding plant noise emission criteria were used for the assessment of an additional condenser at 5th floor level, so it has been considered appropriate to use the same criteria.

Based on the measurement results of SBA’s survey detailed in their planning report 14045-R03-C, the relevant plant noise emissions criteria are shown in Table 4.1 below. These were set to 5 dB below the measured typical background noise at the rear of the Synergy House building.

Table 4.1 – Plant noise emission criteria at 1m from the nearest noise-sensitive receptors

Assessment period	Noise sensitive receptors to the rear of Synergy House
	$L_{Aeq,Tr}$ dB
Daytime (07:00 – 23:00)	40
Night-time (23:00 – 07:00)	38

Ensuring compliance with the more onerous night-time criteria (38 dB L_{Aeq}) will also ensure compliance with the daytime criteria.

5 BS 4142 ASSESSMENT

A BS 4142 noise impact assessment of the proposed condenser unit has been undertaken. Our calculation method for predicting noise levels from the proposed plant at the nearest noise-sensitive receptors is summarised below:

- Source Term (manufacturer’s plant noise emission level)
- Sound reduction provided by the proposed Environlite 1.1.25AC S4 acoustic enclosure (20 dB)
- Screening effect due to buildings (5 dB reduction, where applicable)
- $20\log(r)$ Distance Attenuation
- Hemispherical source radiation correction (-8 dB)

The plant noise assessment results at both residential receptors is shown in Table 5.1 below:

Table 5.1 – BS 4142 Assessment

Description	L_{Aeq} dB	
	R1 – Ormonde Mansions	R2 – Russell Sq Mansions
Condenser’s sound power level	70	70
Environlite sound reduction	-20	-20
Screening effect due to buildings	0	-5
Distance attenuation (11m)	-21	-21
Predicted Specific Noise Level (L_s)	21	16
Acoustic Character Correction	0	0
Rating Level ($L_{Ar, Tr}$)	21	16
Adopted Plant Noise Emissions Criteria	38	38
Excess of Rating Level ($L_{Ar, Tr}$) over Adopted Criteria	-17	-22

Based on the above assessment, the proposed plant is highly unlikely to have any noise impact at the nearest noise-sensitive receptors. It should also be noted that, given there are several plant items already installed at the rear of the Synergy House building, the cumulative impact of all plant should be assessed. The contribution of the proposed condenser to the overall levels will be negligible, given the predicted plant noise emission levels at the nearest residential receptors are more than 15 dB below the criteria.

It can be therefore concluded that the proposed plant is expected to comply with Camden’s plant noise emissions criteria and planning permission should not be rejected on noise grounds.