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10A BELMONT STREET, LONDON
PLANT NOISE IMPACT ASSESSMENT

Technical Report: R4877-4 Rev 0

Date: 27th July 2018

For: Hallmark Property Group
46 Great Marlborough Street
London
W1F 7JW

24 Acoustics Document Control Sheet

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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

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CONTENTS **Page**

1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by Hallmark Property Group to undertake an assessment of the potential noise impact from plant at 10A Belmont Street, London. Retrospective planning consent is sought from Camden Council for eight installed condenser units and an air handling unit (AHU) flue. Noise from the plant has the potential to impact nearby residential properties. A noise impact assessment has therefore been undertaken to determine the level of impact from the proposed plant.

1.2 The assessment has been undertaken following source noise measurements carried out at the site on the 21st May 2018.

1.3 All sound pressure levels quoted in this report are in dB relative to 20 µPa. All sound power levels are quoted in dB relative to 10^{-12} Watts. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

2.1 The front of 10A Belmont Street overlooks neighbouring residential properties and the building's front access road. The rear of the property faces a courtyard and access area.

2.2 Condenser units and a flue are installed to an external rear access path at ground floor level. Eight condenser units are installed and serve offices on the ground and basement floors of the property. The flue provides an extract path for a basement level air handling unit, serving an indoor swimming pool.

2.3 The nearest residential property (Flat 4) is located in 10A Belmont Street, above the rear access path, at a distance of approximately 4.5m from the centre of the condenser compound. This property is shown as Receptor 1 in Figure 1.

2.4 It is understood that the condenser units will be programmed to only operate between the hours of 08:00 to 18:00.

2.5 Road traffic in the nearby area is the dominant source of background noise at the property. In addition, existing third-party plant and ambient noise from the immediate area (i.e. pedestrians) contributes to the surrounding noise environment.

2.6 Figure 1 describes the plant and measurement location.

3.0 STANDARDS AND GUIDANCE

3.1 BS 8233:2014 [Reference 1] provides design guidance for dwelling houses, flats and rooms for residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16\ hour}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,\ 16\ hour}$ in dining rooms during the day and 30 dB $L_{Aeq,\ 8\ hour}$ in bedrooms at night.

3.2 Due to the retrospective nature of the application, the high measured noise levels produced from the plant and limited space to enclose or relocate the units, Hallmark Property Group has agreed to permanently seal shut habitable room windows overlooking the plant. In practise, this is understood to comprise 4 bedrooms, a living room and 3 studies. With this mitigation strategy it has become necessary to assess internal noise levels from plant within the closest affected habitable rooms under BS 8233: 2014.

3.3 Through conversations with Camilo Castro-Llach, Camden Council EHO, a criterion of 5 dB lower than that in BS 8233, has been agreed.

3.4 The plant will be programmed to operate between the hours of 08:00 to 18:00. Noise break-in from plant in the closest habitable rooms should be targeted to achieve 30 dB $L_{Aeq,\ 1\ hour}$ or below during this period.

3.5 Considerations due to ventilation, fire risk and other possible requirements must be confirmed by others.

4.0 ASSESSMENT METHODOLOGY

4.1 The following assessment methodology has been used:

i. Measurements have been undertaken of plant operating at maximum duty at the nearest residential property;

ii. An assessment of the resultant internal noise level against the criterion agreed with Camden Council.

5.0 PLANT NOISE MEASUREMENTS

5.1 Measurements were undertaken, at the rear of the property at ground floor level, on the 21st May 2018 to determine the noise levels produced by plant whilst operating. Source measurements were generally undertaken at 1m from the plant and at the closest affected façade as shown in Figure 1. Data was obtained in samples of one minutes in terms of the overall free-field A-weighted L_{eq}, L_{90} and $L_{max,f}$ noise levels.

5.2 Measurements were undertaken with the following instrumentation:

- Rion NL52 Class 1 sound level meter;
- Bruel and Kjaer Type 4231 Class 1 acoustic calibrator.

5.3 The instrumentation's calibration was checked before and after the measurements in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. All instruments were fitted with environmental weather shields during the surveys.

5.4 Weather conditions during the measurements were fine and dry. Due to the sheltered measurement location, wind speeds were lower than 5 m/s during the measurements.

5.5 The cumulative noise level from the condenser units, outside the closest residential receptor (Receptor 1 - Flat 4), was 65 dB L_{Aeq}. The condenser units were found not to present tonal noise characterisation. Noise from the flue associated with the basement level AHU was not measurable above the background noise level.

6.0 CALCULATIONS AND NOISE IMPACT ASSESSMENT

6.1 Calculations have been undertaken to determine the internal plant noise level at the nearest residential property from the proposed plant.

6.2 From observation and confirmation from Hallmark Property Group, the following assessment assumes standard double glazing with sealed windows and no trickle vents or penetrations in the external façade to habitable rooms overlooking the plant.

6.3 Calculations indicate that, with the condenser units operating at maximum duty, the plant will require mitigation.

7.0 MITIGATION MEASURES

7.1 It is recommended to install an acoustic enclosure around the units. The enclosure should be specified to achieve the minimum sound reduction performance stated in Table 1.

Acoustic Enclosure	**Minimum Sound Reduction Performance Octave Band Centre Frequency (Hz)**							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	6	7	10	13	17	19	13	11

Table 1: Sound Reduction Performance of Enclosure.

7.2 The enclosure should ensure that the plant units are fully enclosed on all sides, including a roof, whilst maintaining adequate airflow. Therefore, the sound reduction performance stated in Table 1 applies to all elements of the enclosure.

7.3 With affected windows sealed shut and the proposed mitigation installed as stated, calculations show that noise levels arising from the new plant within the nearest habitable room would be in the order of 29 dB $L_{Aeq,\ 1\ hour}$. This level complies with the criterion of 5 dB below the BS 8233 and is therefore considered acceptable.

8.0 CONCLUSIONS

8.1 24 Acoustics Ltd has been instructed by Hallmark Property Group to undertake an assessment of the noise impact from plant associated at Belmont Street, London.

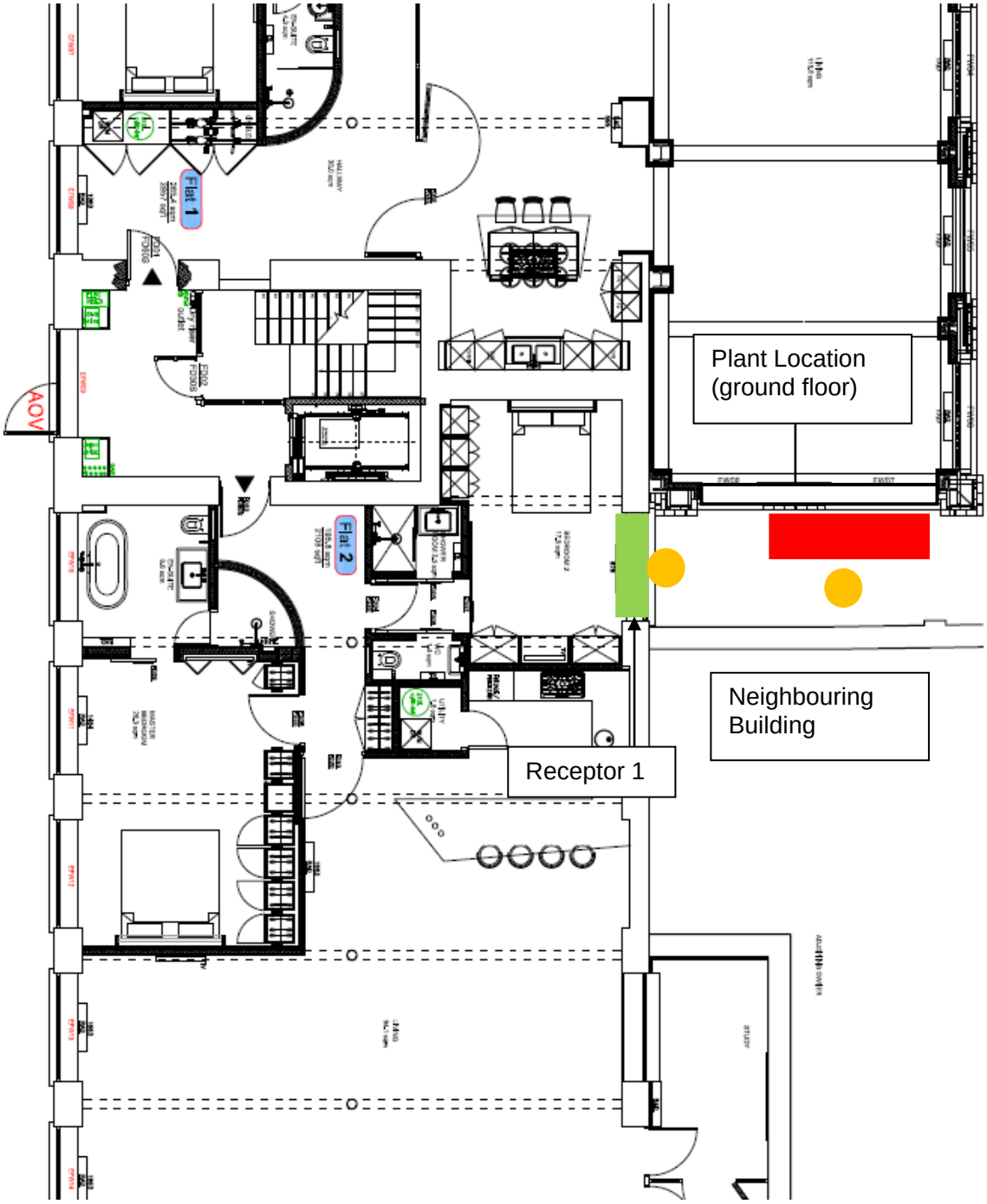
8.2 An assessment has been undertaken following plant noise measurements obtained on the 21st May 2018.

8.3 The assessment shows that noise arising from the plant at the nearest residential property will require attenuation. Attenuation performance figures have been defined.

8.4 Mitigation measures have been agreed with Hallmark Property Group to include non-openable windows to the nearest rooms and the installation of an acoustic enclosure to the plant. With these measures in place, noise from plant will achieve the criterion agreed with Camden Council Environmental Health and is therefore considered acceptable.

REFERENCES

1. British Standards Institution. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings, 2014.



= Measurement Locations

Project: Belmont Street, London	**Description:** Measurement and Plant Location Plan	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A
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APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.