ACOUSTIC COMMISSIONING REPORT

FOUNTAIN HOUSE, WELWYN GARDEN CITY

PR8098 16059-AC-01

Date: 11/02/2021

27-31 High Street
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www.erscltd.co.uk

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by ERS Consultants Ltd to undertake an assessment of installed external plant units at Fountain House, Welwyn Garden City. A previously undertaken background noise survey was used to set noise emissions criteria in agreement with the planning requirements of the Local Authority.

This report presents the noise impact measurements and outlines any necessary additional mitigation measures.

2.0 SITE DESCRIPTION

As part of recent development works, condenser units have been installed for residential use at Fountain House. The units are installed on the main roof of the building, distributed across the roof area.

The cumulative installation comprises new units.

Residential properties on the top floor of Fountain House itself have been identified as the closest affected receivers.

Locations are shown in attached site plan 16059-AC-01-SP1.

3.0 NOISE EMISSIONS CRITERIA

3.1 Procedure

A predictive noise impact assessment has previously been undertaken for the plant installation using manufacturer noise data.

The noise impact assessment is detailed in Clement Acoustics Ltd report 16059-NIA-01 RevC, issued in December 2020. Based on the measured noise levels and local authority requirements, noise emissions criteria were set as follows:

- Night-time plant operation: Criterion 38 dB(A).

It should be noted the criteria are based on achieving a level 10 dB below the minimum background noise level, which is considered suitably robust.

4.0 DISCUSSION

4.1 Measurement Procedure

The plant units are distributed across the main roof of the building, with plant locations shown in attached site plan 16059-AC-01-SP1.

A site visit was undertaken in order to take manual measurements of the installed plant units, such that noise emissions could be measured and assessed.

Measurements were taken in single octave bands between 63Hz and 8kHz and lasted between 2 minutes and 3 minutes, depending on the fluctuation of background noise levels.

Measurements were taken with all plant units running, and with all units switched off in order to provide a reference residual noise level.

Measurements were undertaken close to an identified residential window and terrace area. The receiver and measurement locations are indicated the attached site plan and shown in Figure 4.1.

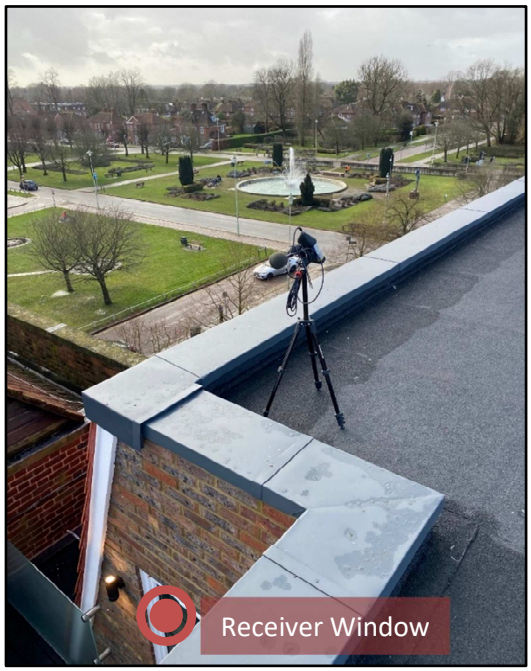


Figure 4.1: Monitoring location used for receiver measurements

4.2 Noise Measurement Results

The cumulative level due to all plant units operating was measured in the identified location. All units were then switched off and the measurement repeated. The measured plant noise level is then corrected for ambient noise as shown in Table 4.1.

Measurement Location	Comments on Plant Installation	Measured Ambient Noise Level $L_{Aeq,5mins}$
At roof edge, close to receiver window	New plant installation non-operational, existing ambient noise only	59 dB(A)
	New plant installation operational, cumulative effects of ambient and specific noise	59 dB(A)
	Calculated Noise Emission Level at Roof Edge	**< 49 dB(A)**

Table 4.1: Measured ambient and specific noise levels - Cumulative

As shown in Table 4.1, the contribution of plant noise emissions did not increase the cumulative noise level above the residual noise level. This is therefore indicative that the contribution from plant noise emissions is at least 10 dB below the residual noise levels.

In order to assess whether the installation is in line with the predictions made in the predictive Noise Impact Assessment, the measured levels have been manipulated using the same transfer functions established in Report 16059-NIA-01 RevC, to account from the screening of the roof edge, which blocks line of sight to the residential window. It should be noted that the lowest screening correction use for the different plant locations has been used in order to present a robust assessment.

Spectral calculations are shown in Appendix B, where the transfer functions applied are also shown. The calculated receiver noise levels are shown in Table 4.2, where they are compared with the previously established criterion.

Scenario	Criterion for Relevant Period	Noise Level at Receiver (due to installed plant)
Night-time Operation [*All Plant Units Operational*]	38 dB(A)	38 dB(A)

Table 4.2: Noise levels and criteria at noise sensitive receivers

As shown in Table 4.2, the predicted noise level due to the plant contribution is expected to comply with the established criterion. It should be noted that this is the maximum possible contribution from the plant installation, limited by the measured residual noise level.

Noise from the rooftop plant installation was completely inaudible at the roof edge, even during lulls in traffic, completely masked by road traffic noise. The plant noise will be further reduced by the screening of the roof edge.

We are therefore satisfied that all plant has been correctly installed and noise emission levels are not expected to be audible at surrounding windows. This is supported by subjective observations.

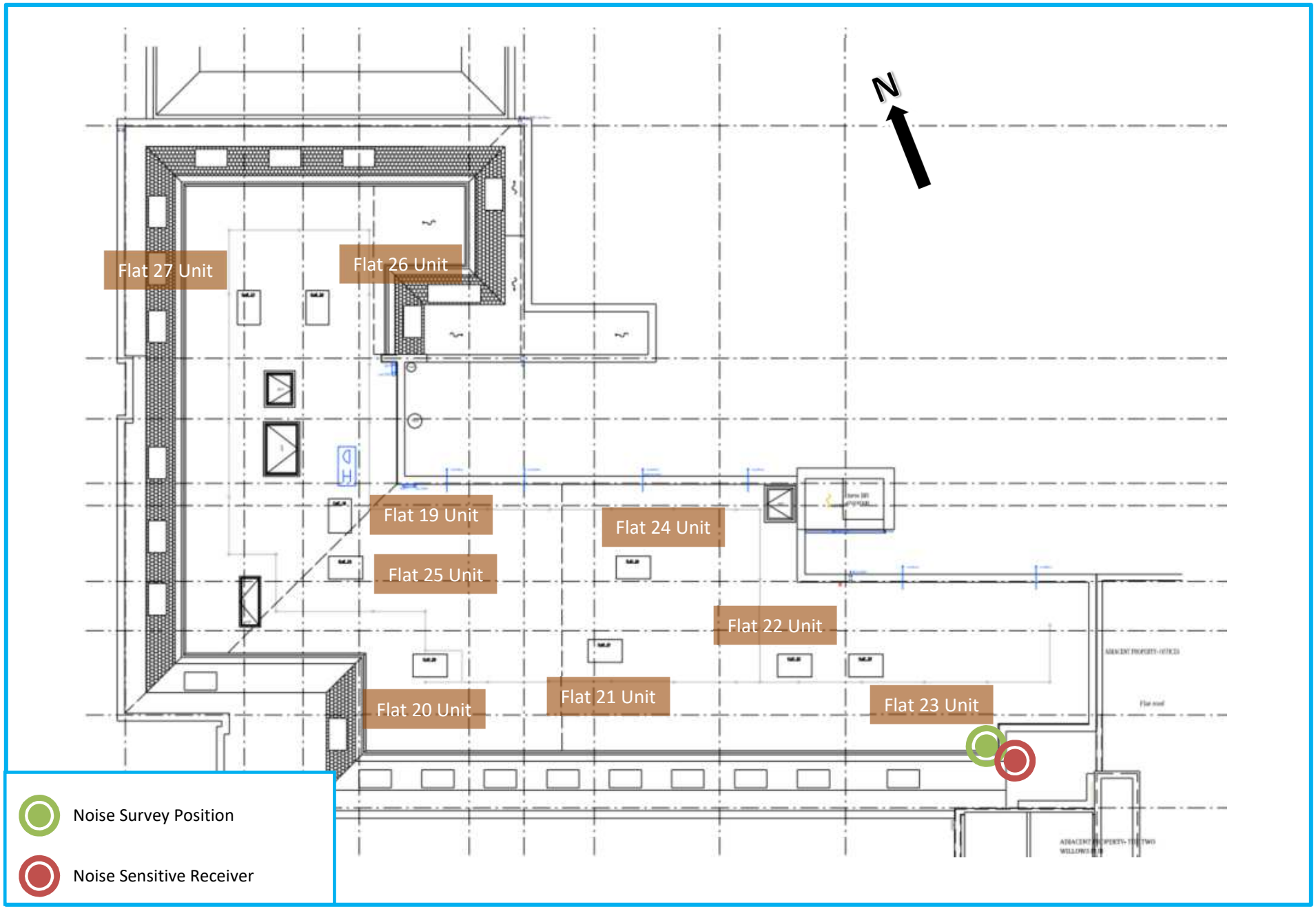
5.0 CONCLUSION

A noise impact assessment has been undertaken for installed plant units at Fountain House, Welwyn Garden City. A previously undertaken noise survey was used to set criteria for noise emissions in accordance with the requirements of the Local Authority.

Manual measurements were then undertaken of the installed plant units in order to calculate noise levels at residential windows due to the plant installation.

Measurements and calculations show that noise emissions from the plant installation are expected to be within the requirements of the Local Authority and inaudible at residential windows.

Report by	Checked by
Duncan Martin MIOA	**Florian Clement MIOA**



16059-AC-01-SP1 Indicative site plan indicating plant locations and assessed sensitive receivers **Date:** 11 February 2021

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10 dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B

16059

Fountain House, Welwyn Garden City

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Residential Window
Source: Operational plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Measured sound pressure level at roof edge									
Cumulative level with all plant units operating	63	58	53	53	55	53	45	35	59
Residual noise level with plant units switched off	63	57	53	53	55	52	46	36	59
Maximum contribution from plant unit operation	**52**	**50**	**41**	**41**	**45**	**43**	**35**	**24**	**49**
Correction for screening of roof edge (dB)	-3	-5	-6	-8	-11	-13	-16	-20	
Sound pressure level at receiver	**49**	**46**	**35**	**33**	**35**	**30**	**19**	**4**	**38**

Design Criterion	**38**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	49	46	35	33	35	30	19	4	38
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**34**	**31**	**20**	**18**	**20**	**15**	**4**	**-11**	**23**

Design Criterion	**30**