

**ENVIRONMENTAL ACOUSTIC
IMPACT ASSESSMENT**

**Penthouse One
Harley House
Marylebone Road
London
NW1 5HE.**

**Reference : CS8331
Revision : Original
Status : Draft Issue
Issue Date: 16th July 2020**

Prepared By:

Stuart Metcalfe

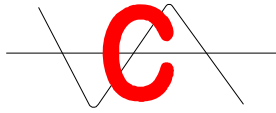
Stuart Metcalfe MIOA

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1 Introduction

Conabeare Acoustics Limited have been commissioned by Klesch Family Office, to undertake an Environmental Acoustic Survey and BS4142:2014 assessment in relation to noise emissions of proposed plant on the roof of Penthouse One, Harley House, Marylebone Road, London NW1 5HE.

The Survey was undertaken by Stuart Metcalfe MIOA who has been practicing in Building Services Acoustics and Noise Control Engineering for in excess of 30 years, is a Member of the Institute of Acoustics (MIOA) and is a Director at Conabeare Acoustics Ltd.

2 Acoustic Criteria

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

BS4142:2014 gives a method for rating sound from industrial and commercial sources affecting people inside or outside dwellings or premises used for residential purposes.

An initial estimate of the significance of the sound from the industrial/commercial nature can be assessed by subtracting the measured background noise level from the rating level (this is the specific sound level of the source with any corrections or penalties for distinctive acoustic characteristics).

Typically, the greater the difference, the greater the magnitude of the impact.

The site is located within the City of Westminster. The relevant policies and guidance regarding noise are set out in Chapter 9: Environment of the City of Westminster's Unitary Development Plan (UDP).

City of Westminster's Policy ENV7: 'Controlling Noise from Plant, Machinery and Internal Activity' of the UDP makes reference to plant maximum noise levels.

Policy ENV 7(A) states that:

- (1) *'where the existing external noise levels exceed the World Health Organization (WHO) Guideline levels of LAeq,12hrs 55dB daytime (07:00-19:00); LAeq,4hrs 50dB (19:00-23:00); LAeq,8hrs 45dB (23:00-07:00):*

either

- (a) and where noise from the proposed development will not contain tones or be intermittent sufficient to attract attention, the maximum emission level (LAeq,15min) should not exceed 10 dB below the minimum external background noise at the nearest noise sensitive properties.*

The background noise level should be expressed in terms of LA90,15min.

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or

(b) and where the noise emitted from the proposed development will contain tones, or will be intermittent sufficient to attract attention, the maximum emission level (LAeq,15min) should not exceed 15 dB below the minimum external background noise at the nearest noise sensitive properties. The background noise level should be expressed in terms of LA90,15min.

- (2) *'where the external background noise level does not exceed the above WHO Guideline levels, policy ENV 7(A)(1)(a) and (b) will apply except where the applicant is able to demonstrate to the city council that the application of slightly reduced criteria of no more than 5 dB will provide sufficient protection to noise sensitive properties:*

either

- (a) where noise emitted from the proposed development will not contain tones or be intermittent sufficient to attract attention, the maximum emission level (LAeq,15min) should not exceed 5 dB below the minimum external background noise level at the nearest noise sensitive properties.*

The background noise levels should be expressed in terms of LA90,15min.

or

- (b) where noise emitted from the proposed development will contain tone, or will be intermittent sufficient to attract attention, the maximum emission level (LAeq,15min) should not exceed 10 dB below the minimum external background noise at the nearest noise sensitive properties.*

The background noise level should be expressed in terms of LA90,15min.

Furthermore the City of Westminster has adopted the National Planning Policy Guidelines and as such References and evaluations are to be made to the National Planning Policy Framework 2012 (NPPF) and the Noise Policy Statement for England 2010 (NPSE).

The purpose of this document is to include all aspects of environmental noise within assessments i.e. environmental noise, neighbour noise and neighbourhood noise. Noise is to be considered alongside other relevant issues relating to the site and should not be considered in isolation, according to the NPSE.

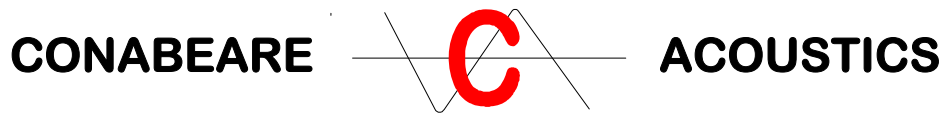
There are several key phrases within the NPSE aims and these are discussed below.
“Significant adverse” and “adverse”

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

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LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

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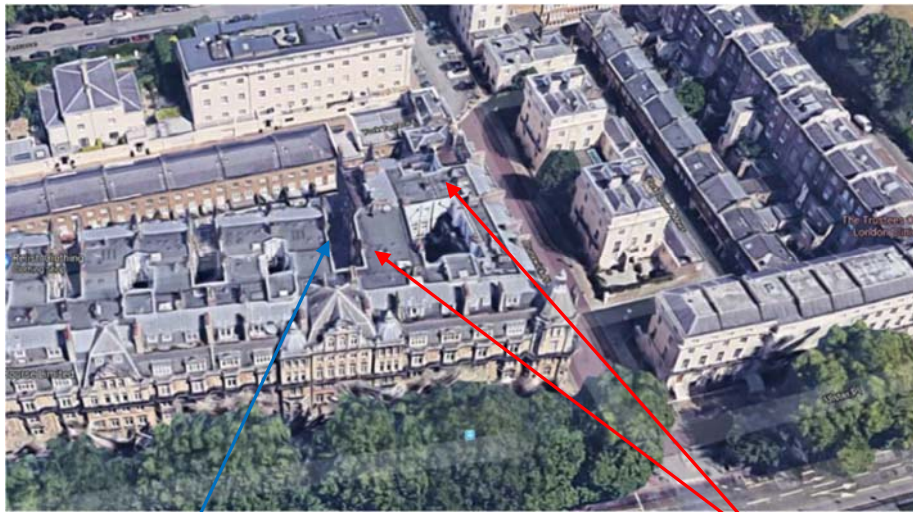
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3 Plant Location and Measurement Position

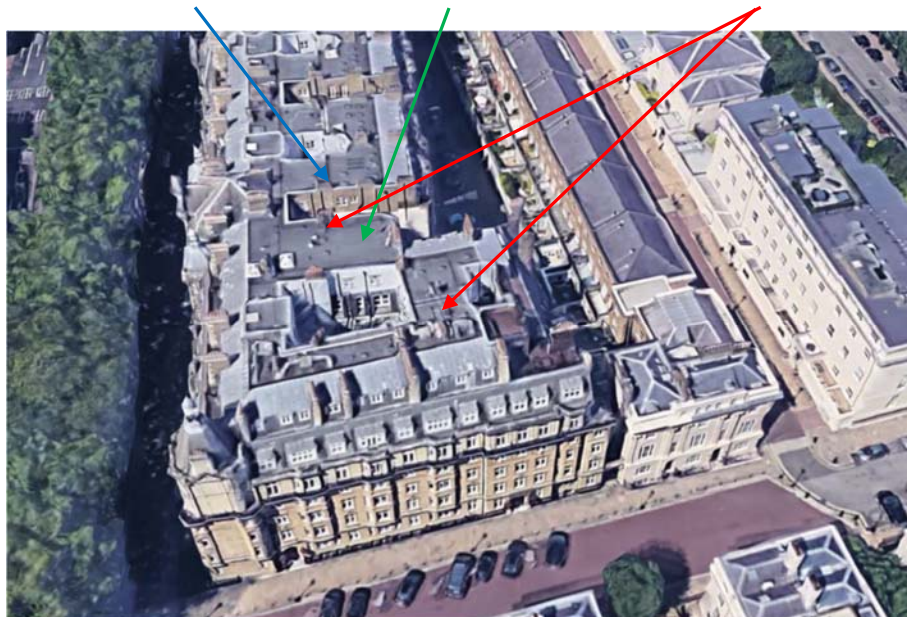
The site is located on Marylebone Road in the Marylebone District of London.

The area consists of mainly residential premises with the closest sound sensitive façade being adjudged to be the residential premises in the adjoining Block 2 of Harley House.

The nearest affected sound sensitive façade is at a distance of between approximately 3 metres and 22 metres from the proposed plant location with some screening afforded by the building edge.



Sound Sensitive Premises **Measuring Location** **Proposed Plant Location**

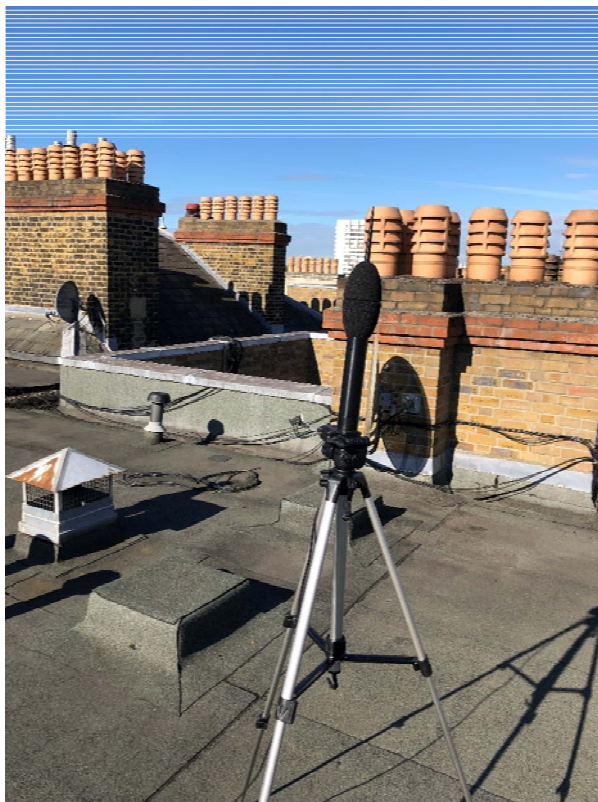


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Measuring Location and Nearest Sound Sensitive Facade



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4 Existing Noise Climate

The area is a predominantly residential premises with transportation and general noise being adjudged to be the dominant source during the survey period.

5 Noise Survey

5.1 Measurements

The Survey commenced at approximately 08:20 hours on Monday 13th July 2020 until approximately 08:20 hours on Tuesday 14th July 2020.

The Analyser was programmed to record 15 minute sampling periods over the survey duration.

The microphone was located on a tripod at approximately 1.5 metres above a reflecting plane.

The measurements and their interpretation are in accordance with BS 7445: Parts 1 and 2. All readings are Sound Pressure Levels (Lp) in dB (re 20µPa).

5.2 Weather during Survey Period

The weather was warm and mostly dry throughout the measuring period with a few overnight showers. The weather did not, in our opinion, adversely influence the readings obtained.

5.3 Instrumentation

The instrumentation used was a Type 1 Larson Davis LxT Sound Expert Sound Level Analyser confirming to IEC 651-1979 Type 1, EN60651 Type 1 and IEC 804-1985 Type 1, EN60804 Type 1.

- **Larson Davis LxT Sound Level Analyser, Serial Number 0005588.**
- **Larson Davis PRMLxT1L Preamplifier, Serial Number 055664.**

The Sound Analyser and Preamplifier were calibrated on 5th March 2020, Certificate Number 2806.

The additional following equipment was also used

- **Larson Davis type CAL200 Calibrator, Serial Number 17720 calibrated on 19th February 2020, Certificate Number 2020002312.**
- **Extension Cable**

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Field calibration checks were made using the Calibrator and no significant drift was noted against the Calibration level of $114.0\text{dB} \pm 0.2\text{dB}$ at $1000\text{Hz} \pm 0.2\%$.

5.4 Survey Results

The following is a summary of the Background (L_{A90}) levels recorded in Daytime, Evening and Night-time Periods

- $L_{A90,15\text{min}}$ 46.6dB(A) between 07:00 hours to 19:00 hours.
- $L_{A90,15\text{min}}$ 43.3dB(A) between 19:00 hours to 23:00 hours.
- $L_{A90,15\text{min}}$ 41.1dB(A) between 23:00 hours to 07:00 hours.

6 Assessment Methodology: BS4142:2014

A revision of British Standard BS 4142 was published at the end of October 2014 and replaces the previous 1997 edition. The main aim of the standard is to provide an assessment and rating method that is proportionate, sufficiently flexible and suitable for use by practitioners to inform professional judgement. The foreword to the standard clearly states that:

“The execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.”

It does this by providing a method for the determination of:

- rating levels for sources of an industrial and/or commercial nature; and
- ambient, background and residual sound levels.

An assessment framework is provided to allow the practitioner to use the rating, ambient, background and residual sound levels determined using the standard for the purposes of:

- 1) investigating complaints;
- 2) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and
- 3) assessing sound at proposed new dwellings or premises used for residential purposes.

The scope of the standard has now been widened to rating and assessing:

- a) sound from industrial and manufacturing processes;*
- b) sound from fixed installations which comprise mechanical and electrical plant and equipment;*

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c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and

d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.”

It can also be seen from above that the standard explicitly states that it can be used to investigate complaints and has been significantly widened to cover not only new, modified or additional sources of sound, but also the assessment of sound affecting new dwellings or premises to be used for residential purposes.

Like the 1997 edition, the standard provides a method for correcting the specific sound levels so as to account for acoustic features that are present at the assessment location. The approach in the 1997 edition was purely subjective and allowed for a +5 dB correction irrespective of how prominent the feature was or whether there was one feature only or a combination of tones, impulses or other features irregular enough to attract attention. The 2014 edition provides for scaled corrections up to +6 dB for tones and up to +9 dB for impulses, depending upon the prominence of the tones or impulses, as well as +3 dB corrections for:

- other sound characteristics that are neither tonal nor impulsive; and/or
- intermittent features when the sound has identifiable on/off conditions.

The corrections for tones and impulses can be assessed using subjective or reference methods. There is also an objective method for tones, which is based upon the prominence of sound pressure levels in the one-third-octave-band containing a tone in comparison to the sound pressure levels in the adjacent one-third-octave-bands.

The objective method however, does not allow for different corrections to be applied for tones differing in prominence as it only allows for a single correction of +6 dB for clearly prominent tones.

The 1997 edition assessed the likelihood of complaints using the difference between the rating level and the background sound level. A difference of around +10 dB or more indicated complaints are likely, a difference of around +5 dB was of marginal significance and a difference of more than 10 dB below the background was considered to provide a positive indication that complaints were unlikely.

The 2014 edition no longer assesses the likelihood of complaints. Instead, it can be used to assess adverse impacts.

This change was introduced because the likelihood of complaints is not a particularly appropriate benchmark, especially when it is used in a planning context, and it also aligns the standard more closely with the type of language and benchmarks that are suitable for the assessment of sound at the planning stage for new proposed development.

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It continues to use the difference between the rating level and the background sound level, though it also introduces the requirement to consider the context and states that:

- a) Typically, the greater this difference, the greater the magnitude of the impact.*
- b) A difference of around +10 dB or more is likely to be an indication of a 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 a 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."*

The context includes consideration of pertinent factors, such as:

- the absolute level of sound;
- the character and level of the residual sound compared to the character and level of the specific sound;
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

It is also considered appropriate to consider other pertinent sources of guidance. The following sections consider absolute criteria advocated by both the World Health Organisation: 1999: "Guidelines for Community Noise" and BS 8233:1999: "Sound insulation and noise reduction for buildings – Code of practice".

World Health Organisation: 1999: "Guidelines for Community Noise"

This document provides a review of the effects of noise and a description of the principles of the WHO health criteria and guidelines for Community Noise.

The effects of noise in dwellings are identified as sleep disturbance, annoyance and speech interference. For bedrooms, the critical effect is sleep disturbance. The indoor guideline value for continuous noise in bedrooms is 30 dB LAeq. To enable casual conversation indoors during the daytime, the sound level of the interfering noise should not exceed 35 dB LAeq.

Table 1 of the document summarises the guideline values for community noise in specific environments and includes the noise indices to be adopted. Significantly, the corresponding time base to be used for the assessment is also included.

The relevant extracts of Table 1 are reproduced thus:

Specific environment	Critical health effect(s)	LAeq [dB]	Time base [hours]	LAmx fast [dB]

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Dwelling, indoors	Speech intelligibility & moderate annoyance daytime & evening	35	16	45
	Sleep disturbance, night-time	30	8	

This level should be a cumulative level from all plant running normally and makes allowance for any tonal or intermittent noise from the plant.

7 Noise Assessment

The objective of any specification limiting new noises should therefore be to ensure that sound emission from the new building services plant and any other new sources, in particular, should not materially add to the existing sound climate.

The background levels measured are representative of those at the nearest sound sensitive façade.

We understand that the plant will operate on a 24 hour basis and as such we would recommend setting a target level at the nearest sound sensitive façade as below;

$$L_{Aeq,15min} \text{ 31dB(A) – 24 Hours}$$

This level is 10dB(A) below the measured background level and would provide *NOEL* – No Observed Effect Level - this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

The proposed plant being assessed is as detailed below;

- Condensing Unit CU1 1 number Panasonic U-8LE1E8
- Condensing Unit CU2 1 number Panasonic U-8LE1E8

There are also six number roof mounted Ducted Fan Coil Units however these are all considered to be extremely quiet, the maximum noise level is 34dBA at 1.5 metres, so these have been discounted from our calculations.

We have detailed the noise levels for the above equipment, to the nearest sound sensitive façade, as well as the proposed mitigating measures, within our calculation sheet as below.

Acoustic Feature Correction

We have allowed for a 3dB Acoustic Correction Feature for the sound sensitive façade.

The condensing units are considered to be intermittent in nature so an allowance of 5dB has been made for these items.

No allowance has been made for tonal noise as no items of plant are considered to be tonal in nature.

Distance Attenuation

The nearest sound sensitive façade is at a distance of between approximately 3 metres and 22 metres from the proposed and existing plant. The distance loss figures are shown on our calculation sheet.

Barrier Attenuation

There is no direct line of sight to the sound sensitive façade and we have therefore allowed for a barrier effect for the plant items.

The combined noise level for all items of plant with no mitigating measures, and with all suitable allowances made, will be 43dBA at 1 metre from the nearest sound sensitive façade.

This combined level is therefore 2dBA above the measured Background Level at the nearest noise sensitive façade.

Our attached calculation sheet details the plant item noise levels and proposed mitigating measures. With the proposed mitigating measures installed the resultant noise level will meet the proposed target level.

8 Recommendations

To ensure that the target noise levels is met it will be necessary to carry out the following mitigating measures.

Fan Coil Unit CU1

This unit will need to be moved so that it is a minimum of 8 metres from the building edge.

This will then provide suitable distance and screening reductions to enable it to be compliant.

Fan Coil Unit CU2

This unit is compliant.

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9 Conclusion

A background Noise Survey was carried during a typical day and night-time period at a location representative of the nearest sound sensitive receivers.

An assessment has been carried out and mitigating measures proposed.

In our opinion, the scheme should be acceptable to the Local Authority subject to the proposed mitigating measures being introduced.

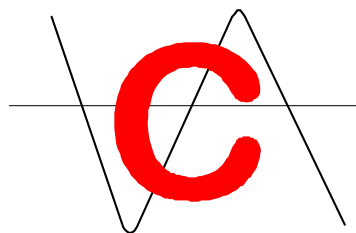
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- Period result profile -

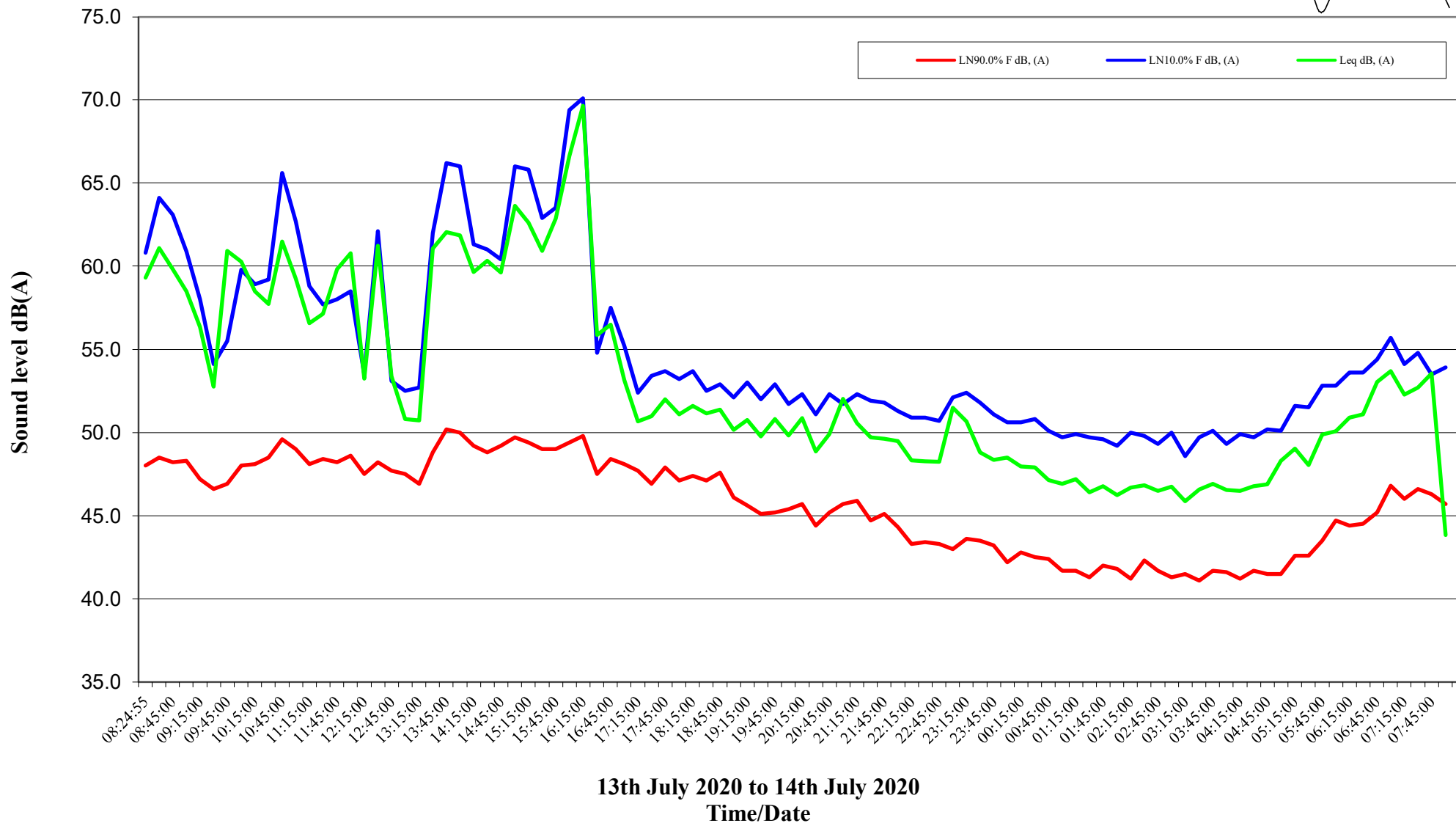
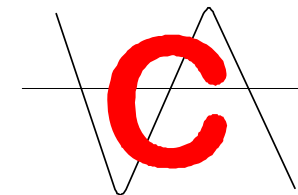
Overload occurred	No
Low battery occurred	No
Pause was used	No
Frequency weighting	A
Band	Broadband
Period time	15 min
Periods too short for LNs	No
First period listed	1 : 97
Measurement Description	
Start	13/07/2020 08:24:55
Stop	14/07/2020 08:12:33
Duration	23:47:38
Run Time	23:47:38
Pause	00:00.0
Pre Calibration	13/07/2020 08:22



Period number	Date	Time	LN90.0% F	LN10.0% F	Leq
			dB, (A)	dB, (A)	dB, (A)
1	13/07/2020	08:24:55	48.0	60.8	59.3
2	13/07/2020	08:30:00	48.5	64.1	61.1
3	13/07/2020	08:45:00	48.2	63.1	59.8
4	13/07/2020	09:00:00	48.3	60.9	58.5
5	13/07/2020	09:15:00	47.2	58.0	56.3
6	13/07/2020	09:30:00	46.6	54.1	52.7
7	13/07/2020	09:45:00	46.9	55.5	60.9
8	13/07/2020	10:00:00	48.0	59.8	60.3
9	13/07/2020	10:15:00	48.1	58.9	58.5
10	13/07/2020	10:30:00	48.5	59.2	57.7
11	13/07/2020	10:45:00	49.6	65.6	61.5
12	13/07/2020	11:00:00	49.0	62.7	59.3
13	13/07/2020	11:15:00	48.1	58.8	56.6
14	13/07/2020	11:30:00	48.4	57.7	57.1
15	13/07/2020	11:45:00	48.2	58.0	59.8
16	13/07/2020	12:00:00	48.6	58.5	60.8
17	13/07/2020	12:15:00	47.5	53.5	53.2
18	13/07/2020	12:30:00	48.2	62.1	61.2
19	13/07/2020	12:45:00	47.7	53.1	53.4
20	13/07/2020	13:00:00	47.5	52.5	50.8
21	13/07/2020	13:15:00	46.9	52.7	50.7
22	13/07/2020	13:30:00	48.8	62.0	61.0
23	13/07/2020	13:45:00	50.2	66.2	62.0
24	13/07/2020	14:00:00	50.0	66.0	61.8
25	13/07/2020	14:15:00	49.2	61.3	59.7
26	13/07/2020	14:30:00	48.8	61.0	60.3
27	13/07/2020	14:45:00	49.2	60.4	59.6
28	13/07/2020	15:00:00	49.7	66.0	63.6
29	13/07/2020	15:15:00	49.4	65.8	62.6
30	13/07/2020	15:30:00	49.0	62.9	60.9
31	13/07/2020	15:45:00	49.0	63.5	62.9
32	13/07/2020	16:00:00	49.4	69.4	66.6
33	13/07/2020	16:15:00	49.8	70.1	69.7
34	13/07/2020	16:30:00	47.5	54.8	55.9
35	13/07/2020	16:45:00	48.4	57.5	56.5
36	13/07/2020	17:00:00	48.1	55.2	53.2
37	13/07/2020	17:15:00	47.7	52.4	50.7
38	13/07/2020	17:30:00	46.9	53.4	51.0
39	13/07/2020	17:45:00	47.9	53.7	52.0
40	13/07/2020	18:00:00	47.1	53.2	51.1

Period number	Date	Time	LN90.0% F	LN10.0% F	Leq
			dB, (A)	dB, (A)	dB, (A)
41	13/07/2020	18:15:00	47.4	53.7	51.6
42	13/07/2020	18:30:00	47.1	52.5	51.1
43	13/07/2020	18:45:00	47.6	52.9	51.4
44	13/07/2020	19:00:00	46.1	52.1	50.2
45	13/07/2020	19:15:00	45.6	53.0	50.8
46	13/07/2020	19:30:00	45.1	52.0	49.8
47	13/07/2020	19:45:00	45.2	52.9	50.8
48	13/07/2020	20:00:00	45.4	51.7	49.8
49	13/07/2020	20:15:00	45.7	52.3	50.9
50	13/07/2020	20:30:00	44.4	51.1	48.8
51	13/07/2020	20:45:00	45.2	52.3	49.9
52	13/07/2020	21:00:00	45.7	51.7	52.0
53	13/07/2020	21:15:00	45.9	52.3	50.6
54	13/07/2020	21:30:00	44.7	51.9	49.7
55	13/07/2020	21:45:00	45.1	51.8	49.6
56	13/07/2020	22:00:00	44.3	51.3	49.5
57	13/07/2020	22:15:00	43.3	50.9	48.3
58	13/07/2020	22:30:00	43.4	50.9	48.3
59	13/07/2020	22:45:00	43.3	50.7	48.2
60	13/07/2020	23:00:00	43.0	52.1	51.5
61	13/07/2020	23:15:00	43.6	52.4	50.7
62	13/07/2020	23:30:00	43.5	51.8	48.8
63	13/07/2020	23:45:00	43.2	51.1	48.3
64	14/07/2020	00:00:00	42.2	50.6	48.5
65	14/07/2020	00:15:00	42.8	50.6	48.0
66	14/07/2020	00:30:00	42.5	50.8	47.9
67	14/07/2020	00:45:00	42.4	50.1	47.1
68	14/07/2020	01:00:00	41.7	49.7	46.9
69	14/07/2020	01:15:00	41.7	49.9	47.2
70	14/07/2020	01:30:00	41.3	49.7	46.4
71	14/07/2020	01:45:00	42.0	49.6	46.8
72	14/07/2020	02:00:00	41.8	49.2	46.2
73	14/07/2020	02:15:00	41.2	50.0	46.7
74	14/07/2020	02:30:00	42.3	49.8	46.8
75	14/07/2020	02:45:00	41.7	49.3	46.5
76	14/07/2020	03:00:00	41.3	50.0	46.7
77	14/07/2020	03:15:00	41.5	48.6	45.9
78	14/07/2020	03:30:00	41.1	49.7	46.6
79	14/07/2020	03:45:00	41.7	50.1	46.9
80	14/07/2020	04:00:00	41.6	49.3	46.5
81	14/07/2020	04:15:00	41.2	49.9	46.5
82	14/07/2020	04:30:00	41.7	49.7	46.8
83	14/07/2020	04:45:00	41.5	50.2	46.9
84	14/07/2020	05:00:00	41.5	50.1	48.3
85	14/07/2020	05:15:00	42.6	51.6	49.0
86	14/07/2020	05:30:00	42.6	51.5	48.0
87	14/07/2020	05:45:00	43.5	52.8	49.9
88	14/07/2020	06:00:00	44.7	52.8	50.1
89	14/07/2020	06:15:00	44.4	53.6	50.9
90	14/07/2020	06:30:00	44.5	53.6	51.1
91	14/07/2020	06:45:00	45.2	54.4	53.0
92	14/07/2020	07:00:00	46.8	55.7	53.7
93	14/07/2020	07:15:00	46.0	54.1	52.3
94	14/07/2020	07:30:00	46.6	54.8	52.7
95	14/07/2020	07:45:00	46.3	53.5	53.6
96	14/07/2020	08:00:00	45.7	53.9	43.9

CS8331 - Penthouse One, Harley House, Marylebone Road, London NW1 5HE.



Glossary of Terms

L_{A90}	The sound pressure level in dB(A) which is exceeded for 90% of the time and is taken to be the effective lowest background sound level for the period by such methods of sound rating as that recommended in BS4142:2014. It will also be used as a basis for selecting limiting sound levels from new plant by Local Planning Authorities when setting Planning Consent Conditions.
L_{Aeq}	The “equivalent continuous sound level” for the measuring period, defined as the level in dBA which, if held constant over the measuring period, would produce the same amount of sound energy as does the actual varying ambient sound level. It is a measure of the amount of sound energy affecting the site from sources other than new plant or operations.
L_{A10}	The sound level exceeded for 10% of the time over the sample period. Originally used as a measure of subjective reaction to traffic noise in particular, it can also be taken as an indication of the practical maximum sound level that the building envelope will have to protect against.
dBA	Describes measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dBA broadly agree with people’s assessment of loudness. A change of 3dBA is the minimum perceptible under normal conditions, and a change of 10dBA corresponds roughly to halving or doubling the loudness of a sound.

Conabeare Acoustics Limited

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Project: CS8331 - Penthouse One, Harley House, Marylebone Road, London NW1 5HE.
Client : Klesch Family Office
Revision: Original
Date : 16th July 2020

Calculation 01 - 24 Hours - Existing Proposals

Item		Proposed Plant - Target Level - 31dBA at 1 metre from Sound Sensitive Façade									
Condensing Unit				63	125	250	500	1k	2k	4k	8k dBA
CU1	Unit Lp at 1 metre - Panasonic U-8LE1E8			64	63	60	58	55	51	46	43 60
	Additional Distance Loss	3	m	-10	-10	-10	-10	-10	-10	-10	-10
	Acoustic Feature Correction for Intermittent Noise			5	5	5	5	5	5	5	5
	Façade Effect			3	3	3	3	3	3	3	3
	Screening - building edge			-8	-10	-13	-15	-18	-21	-24	-27
	Lp at Listener			54	51	45	41	35	28	20	14 43
Condensing Unit - Discharge				63	125	250	500	1k	2k	4k	8k dBA
CU2	Unit Lp at 1 metre - Panasonic U-8LE1E8			64	63	60	58	55	51	46	43 60
	Additional Distance Loss	22	m	-27	-27	-27	-27	-27	-27	-27	-27
	Acoustic Feature Correction for Intermittent Noise			5	5	5	5	5	5	5	5
	Façade Effect			3	3	3	3	3	3	3	3
	Screening - building edge			-10	-13	-15	-18	-21	-24	-27	-30
	Lp at Listener			35	31	26	21	15	8	0	-6 23
Combined Predicted Resultant at 1 metre from Penthouse 2 Side Façade				54	51	45	41	35	28	20	14 43

Calculation 02 - 24 Hours - Revised Location

Item		Proposed Plant - Target Level - 31dBA at 1 metre from Sound Sensitive Façade									
Condensing Unit				63	125	250	500	1k	2k	4k	8k dBA
CU1	Unit Lp at 1 metre - Panasonic U-8LE1E8			64	63	60	58	55	51	46	43 60
	Additional Distance Loss	10	m	-20	-20	-20	-20	-20	-20	-20	-20
	Acoustic Feature Correction for Intermittent Noise			5	5	5	5	5	5	5	5
	Façade Effect			3	3	3	3	3	3	3	3
	Screening - building edge			-10	-13	-15	-18	-21	-24	-27	-30
	Lp at Listener			42	38	33	28	22	15	7	1 30
Condensing Unit - Discharge				63	125	250	500	1k	2k	4k	8k dBA
CU2	Unit Lp at 1 metre - Panasonic U-8LE1E8			64	63	60	58	55	51	46	43 60
	Additional Distance Loss	22	m	-27	-27	-27	-27	-27	-27	-27	-27
	Acoustic Feature Correction for Intermittent Noise			5	5	5	5	5	5	5	5
	Façade Effect			3	3	3	3	3	3	3	3
	Screening - building edge			-10	-13	-15	-18	-21	-24	-27	-30
	Lp at Listener			35	31	26	21	15	8	0	-6 23
Combined Predicted Resultant at 1 metre from Penthouse 2 Side Façade				43	39	34	29	23	16	8	2 31

Acoustic Calibration Services Limited
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or
cal@acousticcalibration.co.uk
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CERTIFICATE OF CALIBRATION

Model: LD LxT1LC1

Serial Number: 025445

Organisation: Conabeare Acoustics Limited, 11 Chilton Enterprise Centre, Station Road, Theale, Berkshire RG7 4AA

Job Number: 2806

Customer Order Reference: 10588

The Sound Level Meter was assessed for conformance with International Standard BS EN 61672-3:2006 as modified by TPS 49 Edition 1. The manufacturer claims Class 1 accuracy conformance and it was against these requirements that all the results were evaluated.

The sound level meter was fitted with a PCB 377B02 Serial No. 304334 measurement microphone, a LD PRMLxT1L preamplifier Serial No. 055664 and an unmarked 12 ft microphone extension cable. The microphone was replaced with a suitable input device in order to apply electrical signals to the preamplifier.

A B&K 4231 Acoustic Calibrator Serial No: 2705996 was utilised in establishing the initial acoustic calibration setting.

The sound level meter passed all tests carried out with no deviations from Class 1 specification, in accordance with the modified BS EN 61672-3:2006.

The sound level meter should be set to read **113.8dB** when used with the associated acoustic calibrator, microphone, preamplifier and 12 ft microphone extension cable, as detailed above at reference atmospheric pressure.

All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

Certificate No: 15766
Date of Issue: 5th March 2020

Signature: 
Print Name: Trevor Lewis

Calibration Certificate

Certificate Number 2020002312

Customer:

PC Environmental Ltd.

Unit 5, Claylands Park Claylands Road

Bishops Waltham

Southampton, SO32 1QD, United Kingdom

Model Number CAL200

Serial Number 17720

Test Results Pass

Initial Condition As Manufactured

Description Larson Davis CAL200 Acoustic Calibrator

Procedure Number D0001.8386

Technician Scott Montgomery

Calibration Date 19 Feb 2020

Calibration Due

Temperature 23 °C ± 0.3 °C

Humidity 32 %RH ± 3 %RH

Static Pressure 100.9 kPa ± 1 kPa

Evaluation Method The data is acquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.

Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	08/15/2019	08/15/2020	001021
Larson Davis Model 2900 Real Time Analyzer	04/02/2019	04/02/2020	001051
Microphone Calibration System	03/04/2019	03/04/2020	005446
1/2" Preamplifier	09/17/2019	09/17/2020	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/06/2019	08/06/2020	006507
1/2 inch Microphone - RI - 200V	05/21/2019	05/21/2020	006510
Pressure Transducer	06/24/2019	06/24/2020	007310

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