

**ENVIRONMENTAL ACOUSTIC
IMPACT ASSESSMENT**

**95 Avenue Road
South Hampstead
London
NW8 6HY**

**Reference : CS8731 – 01B
Revision : Original
Status : Planning
Issue Date: 10th May 2024**

Prepared By:

Stuart Metcalfe

Stuart Metcalfe MIOA

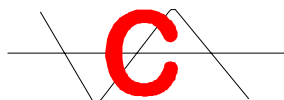
CLIENT:

**95 Avenue Road (Freehold) Limited
16 Finchley Road
London
NW8 6EB**

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Revision & Changes Log

Revision	Date	Comments/Summary of changes	Amended By:

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1 Introduction

Conabeare Acoustics Limited have been commissioned by 95 Avenue Road (Freehold) Limited to undertake an Acoustic Survey and BS4142:2014 assessment in relation to noise emissions of proposed plant at 95 Avenue Road, London, NW8 6HY for planning purposes.

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 London Borough of Camden demise which 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).

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.

LOAEL – Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.

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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This Camden requirements for noise exposure are detailed in the Local Plan Appendix 3: Noise thresholds which is reproduced thus;

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 ‘Methods for rating and assessing industrial and commercial sound’ (BS 4142) will be used. For such cases a ‘Rating Level’ of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

<i>Existing Noise sensitive receptor</i>	<i>Assessment Location</i>	<i>Design Period</i>	<i>LOAEL (Green)</i>	<i>LOAEL to SOAEL (Amber)</i>	<i>SOAL (Red)</i>
<i>Dwellings**</i>	<i>Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)</i>	<i>Day</i>	<i>‘Rating level’ 10dB* below background</i>	<i>‘Rating level’ between 9dB below and 5dB above background</i>	<i>‘Rating level’ greater than 5dB above background</i>
<i>Dwellings**</i>	<i>Outside bedroom window (façade)</i>	<i>Night</i>	<i>‘Rating level’ 10dB* below background and no events exceeding 57dB_{L_{Amax}}</i>	<i>‘Rating level’ between 9dB below and 5dB above background or noise events between 57dB and 88dB_{L_{Amax}}</i>	<i>‘Rating level’ greater than 5dB above background and/or events exceeding 88dB_{L_{Amax}}</i>

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

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There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

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3 Plant Location and Measurement Position

The site is located on Avenue Road in the South Hampstead District in North West London.

The site is bordered by Avenue Road to the East and St John's Wood Park to the West.

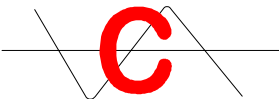
The closest sound sensitive façades are the adjacent premises within 95 Avenue Road with the ASHP plant to the Lower Ground Floor semis is at a distance of approximately 1 metres from the proposed plant location with direct line of sight.

The MVHR plant to the Lower Ground Floor semis is at a distance of approximately 3 metres from the proposed plant location without direct line of sight.

View of Property Looking North



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Sound Sensitive Façade

Proposed Plant Location



Measuring Location

Measuring Location



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Existing Noise Climate

The area is generally residential premises with transportation noise from the area being adjudged to be the dominant background noise source during the survey period.

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4 Noise Survey

5.1 Measurements

The Survey commenced at approximately 08:20 hours on Monday 18th March 2023 until approximately 08:10 hours on Tuesday 19th March 2024.

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

The microphone was located on a tripod at approximately 1.8 metres above, and at a minimum of 1m from, 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 cold and mostly dry throughout the measuring period. 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 05588.**
- **Larson Davis PRMLxT1L Preamplifier, Serial Number 055664.**

The Sound Analyser and Preamplifier were calibrated on 6th November 2023, Certificate Number 16245.

The additional following equipment was also used

- **Larson Davis type CAL200 Calibrator, Serial Number 17720 calibrated on 8th November 2023, Certificate Number 16246.**
- **Extension Cable**

Field calibration checks were made using the Calibrator and no significant drift was noted against the Calibration level of 114.0dB ± 0.2dB at 1000Hz ± 0.2%.

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5.4 Survey Results

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

- $L_{A90,15\text{min}}$ 56.1dB(A) between 07:00 hours to 19:00 hours.
- $L_{A90,15\text{min}}$ 54.5dB(A) between 19:00 hours to 23:00 hours.
- $L_{A90,15\text{min}}$ 51.3dB(A) between 23:00 hours to 07:00 hours.

6 Assessment Methodology: BS4142:2014+A1:2019

The BS 4142:2014+A1:2019 methodology involves predicting or measuring the specific sound level from the source in question and applying rating penalties for acoustic character features such as tonality, impulsivity or irregularity.

This rated sound level is then compared to the existing typical L_{A90} background sound level. Impacts are assessed as follows:

- 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.

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 L_{Aeq} . To enable casual conversation indoors during the daytime, the sound level of the interfering noise should not exceed 35 dB L_{Aeq} .

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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]
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.

BS8233:2014

BS 8233: 2014 – “Guidance on sound insulation and noise reduction for buildings” provides information on achieving internal acoustic environments appropriate to their functions.

As part of this document, recommendations are given to the internal noise levels which are commensurate with achieving acceptable resting, dining and sleeping conditions within residential properties. The values given are generally in terms of an LAeq level although reference is also made with regards to maximum noise levels, although no criterion is specified in this recently revised version of the standard.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35dB LAeq 16 hours	-
Dining	Dining Room	40dB LAeq 16 hours	-
Sleeping	Bedroom	35dB LAeq 16 hours	30dB LAeq 8 hours

It is generally accepted that a partially open window will provide a level difference of 15dB and therefore the guideline levels to achieve 30dBA within a bedroom would indicate a level of 45dBA directly outside a bedroom window would be acceptable.

Noise Change (dBA)	Category
0	No Impact
0.1 to 2.9	Slight Impact
3.0 to 4.9	Moderate Impact
5.0 to 9.9	Substantial Impact
10.0 and above	Severe Impact

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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.

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

7.1 Plant Noise Emissions Criteria

- $L_{Aeq,15min}$ 41.0dB – 24 hours.

This level is 10dB(A) below the minimum measured background noise level to provide *LOAEL (Green)* rating.

This level will then provide a level of 26-31dBA within the residential premises which is below the requirements of both the WHO and BS8233. This is also below the NR35 stipulated within Camden Council's requirements.

7.2 Proposed Plant

The proposed plant being assessed is as detailed below;

Lower Ground Floor Semis – 2 Locations

- MVHR02 - 1 number Vent Axia Sentinel Kinetic FH
- ASHP01 – 1 number Daikin Altherma EBLA09D3V3

7.3 Plant Locations

Lower Ground Floor Semis

The proposed MVHR plant is to be located within the dwelling with the termination locations at a distance of approximately 3 metres from the residential façade. This unit will operate at 80% duty.

The proposed ASHP plant is to be located within a lightwell next to the residential façade at a distance of approximately 1 metre from bedroom windows.

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7.4 Plant Noise Levels

The manufacturers sound spectrum is reproduced below.

Item	Reference	Level	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
			63	125	250	500	1k	2k	4k	8k	
MVHR02	Intake	Lw	79	69	63	61	45	26	21	26	61
MVHR02	Exhaust	Lw	74	60	56	50	38	24	21	24	53
ASHP01	Unit	Lp @ 1m	41	46	43	44	41	39	27	23	46

NOTES:

- MVHR02 includes the factory fit Acoustic Solution at 80% duty.

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 calculations as detailed below.

Un-mitigated Noise Levels

Lower Ground Floor Semi – MVHR02

The noise level for all items of plant with no mitigating measures, and with all suitable allowances made, is 22dBA.

This level is 29dBA below the lowest measured Background Level at the nearest noise sensitive façade and will provide *LOAEL* which is a GREEN rating on the Camden requirements chart.

Therefore no mitigating measures will be required to enable the target noise level to be met.

Lower Ground Floor Semi – ASHP01

The noise level for all items of plant with no mitigating measures, and with all suitable allowances made, is 55dBA.

This level is 4dBA **above** the lowest measured Background Level at the nearest noise sensitive façade and will provide *LOAEL to SOAEL* which is an AMBER rating on the Camden requirements chart.

It will therefore be necessary to reduce the noise level by 14dBA to enable the target noise level to be met.

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However as this provides heating and hot water it is unlikely that this will run during night time periods and we would therefore propose that this plant item is attenuated to 45dBA which is 10dBA below the lowest background noise level between the hours of 07:00 and 23:00 when the plant is likely to run.

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8 Recommendations

To enable the Target Level to be met the following mitigating measures will be required.

Air Source Heat Pump Units

We would recommend that the units have the airpaths acoustically treated and these mitigating measures will have the following minimum acoustic performance.

Intake and Discharge Air Acoustic Louvres

The ASHP unit should have an acoustic louvre housing fitted to allow airflow through the unit and which will require the following minimum acoustic performance.

Sound Reduction Index (dB) at Octave Band Centre Frequencies (Hz)							
63	125	250	500	1k	2k	4k	8k
3	3	5	8	13	15	15	13

The acoustic louvred housing will be 150mm thick and would need to be sized to give maximum pressure loss to suit the condensing unit requirements – 15Pa maximum.

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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 in line with BS4142:2014 has been carried out.

The assessment would indicate that the plant with mitigating measures will have a GREEN rating of LOAEL or AMBER rating of *LOAEL to SOAEL* in line with Camden Council requirements.

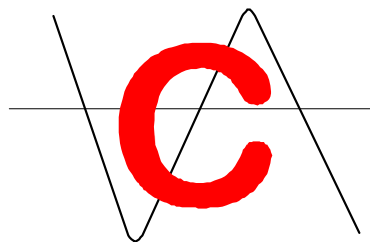
In our opinion, the scheme should be acceptable to the Local Authority subject to the proposed mitigating measures being introduced.

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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 : 96
Measurement Description	
Start	18/03/2024 8:21:47
Stop	19/03/2024 8:11:53
Duration	23:50:05.0
Run Time	23:50:05.0
Pause	0:00:00.0
Pre Calibration	18/03/2024 8:19:15

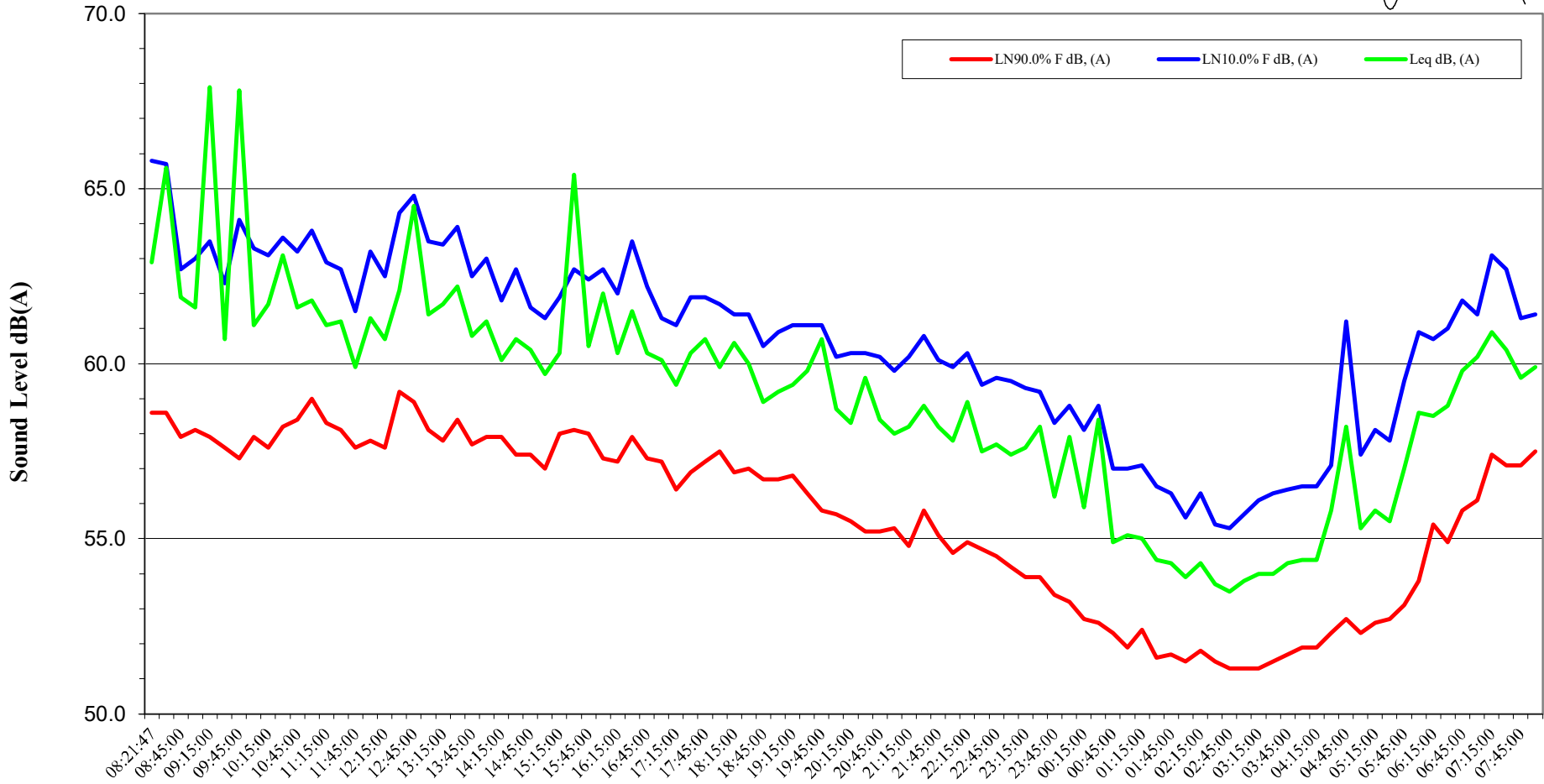
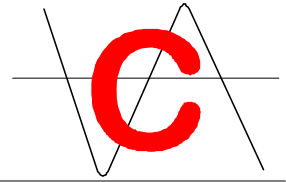


Period number	Date	Time	LN90.0% F dB, (A)	LN10.0% F dB, (A)	Leq dB, (A)
1	18/03/2024	08:21:47	58.6	65.8	62.9
2	18/03/2024	08:30:00	58.6	65.7	65.6
3	18/03/2024	08:45:00	57.9	62.7	61.9
4	18/03/2024	09:00:00	58.1	63.0	61.6
5	18/03/2024	09:15:00	57.9	63.5	67.9
6	18/03/2024	09:30:00	57.6	62.3	60.7
7	18/03/2024	09:45:00	57.3	64.1	67.8
8	18/03/2024	10:00:00	57.9	63.3	61.1
9	18/03/2024	10:15:00	57.6	63.1	61.7
10	18/03/2024	10:30:00	58.2	63.6	63.1
11	18/03/2024	10:45:00	58.4	63.2	61.6
12	18/03/2024	11:00:00	59.0	63.8	61.8
13	18/03/2024	11:15:00	58.3	62.9	61.1
14	18/03/2024	11:30:00	58.1	62.7	61.2
15	18/03/2024	11:45:00	57.6	61.5	59.9
16	18/03/2024	12:00:00	57.8	63.2	61.3
17	18/03/2024	12:15:00	57.6	62.5	60.7
18	18/03/2024	12:30:00	59.2	64.3	62.1
19	18/03/2024	12:45:00	58.9	64.8	64.5
20	18/03/2024	13:00:00	58.1	63.5	61.4
21	18/03/2024	13:15:00	57.8	63.4	61.7
22	18/03/2024	13:30:00	58.4	63.9	62.2
23	18/03/2024	13:45:00	57.7	62.5	60.8
24	18/03/2024	14:00:00	57.9	63.0	61.2
25	18/03/2024	14:15:00	57.9	61.8	60.1
26	18/03/2024	14:30:00	57.4	62.7	60.7
27	18/03/2024	14:45:00	57.4	61.6	60.4
28	18/03/2024	15:00:00	57.0	61.3	59.7
29	18/03/2024	15:15:00	58.0	61.9	60.3
30	18/03/2024	15:30:00	58.1	62.7	65.4
31	18/03/2024	15:45:00	58.0	62.4	60.5
32	18/03/2024	16:00:00	57.3	62.7	62.0
33	18/03/2024	16:15:00	57.2	62.0	60.3
34	18/03/2024	16:30:00	57.9	63.5	61.5

Period number	Date	Time	LN90.0% F dB, (A)	LN10.0% F dB, (A)	Leq dB, (A)
35	18/03/2024	16:45:00	57.3	62.2	60.3
36	18/03/2024	17:00:00	57.2	61.3	60.1
37	18/03/2024	17:15:00	56.4	61.1	59.4
38	18/03/2024	17:30:00	56.9	61.9	60.3
39	18/03/2024	17:45:00	57.2	61.9	60.7
40	18/03/2024	18:00:00	57.5	61.7	59.9
41	18/03/2024	18:15:00	56.9	61.4	60.6
42	18/03/2024	18:30:00	57.0	61.4	60.0
43	18/03/2024	18:45:00	56.7	60.5	58.9
44	18/03/2024	19:00:00	56.7	60.9	59.2
45	18/03/2024	19:15:00	56.8	61.1	59.4
46	18/03/2024	19:30:00	56.3	61.1	59.8
47	18/03/2024	19:45:00	55.8	61.1	60.7
48	18/03/2024	20:00:00	55.7	60.2	58.7
49	18/03/2024	20:15:00	55.5	60.3	58.3
50	18/03/2024	20:30:00	55.2	60.3	59.6
51	18/03/2024	20:45:00	55.2	60.2	58.4
52	18/03/2024	21:00:00	55.3	59.8	58.0
53	18/03/2024	21:15:00	54.8	60.2	58.2
54	18/03/2024	21:30:00	55.8	60.8	58.8
55	18/03/2024	21:45:00	55.1	60.1	58.2
56	18/03/2024	22:00:00	54.6	59.9	57.8
57	18/03/2024	22:15:00	54.9	60.3	58.9
58	18/03/2024	22:30:00	54.7	59.4	57.5
59	18/03/2024	22:45:00	54.5	59.6	57.7
60	18/03/2024	23:00:00	54.2	59.5	57.4
61	18/03/2024	23:15:00	53.9	59.3	57.6
62	18/03/2024	23:30:00	53.9	59.2	58.2
63	18/03/2024	23:45:00	53.4	58.3	56.2
64	19/03/2024	00:00:00	53.2	58.8	57.9
65	19/03/2024	00:15:00	52.7	58.1	55.9
66	19/03/2024	00:30:00	52.6	58.8	58.4
67	19/03/2024	00:45:00	52.3	57.0	54.9
68	19/03/2024	01:00:00	51.9	57.0	55.1
69	19/03/2024	01:15:00	52.4	57.1	55.0
70	19/03/2024	01:30:00	51.6	56.5	54.4
71	19/03/2024	01:45:00	51.7	56.3	54.3
72	19/03/2024	02:00:00	51.5	55.6	53.9
73	19/03/2024	02:15:00	51.8	56.3	54.3
74	19/03/2024	02:30:00	51.5	55.4	53.7
75	19/03/2024	02:45:00	51.3	55.3	53.5
76	19/03/2024	03:00:00	51.3	55.7	53.8
77	19/03/2024	03:15:00	51.3	56.1	54.0
78	19/03/2024	03:30:00	51.5	56.3	54.0
79	19/03/2024	03:45:00	51.7	56.4	54.3
80	19/03/2024	04:00:00	51.9	56.5	54.4
81	19/03/2024	04:15:00	51.9	56.5	54.4
82	19/03/2024	04:30:00	52.3	57.1	55.8
83	19/03/2024	04:45:00	52.7	61.2	58.2
84	19/03/2024	05:00:00	52.3	57.4	55.3
85	19/03/2024	05:15:00	52.6	58.1	55.8
86	19/03/2024	05:30:00	52.7	57.8	55.5
87	19/03/2024	05:45:00	53.1	59.5	57.0
88	19/03/2024	06:00:00	53.8	60.9	58.6
89	19/03/2024	06:15:00	55.4	60.7	58.5

Period number	Date	Time	LN90.0% F dB, (A)	LN10.0% F dB, (A)	Leq dB, (A)
90	19/03/2024	06:30:00	54.9	61.0	58.8
91	19/03/2024	06:45:00	55.8	61.8	59.8
92	19/03/2024	07:00:00	56.1	61.4	60.2
93	19/03/2024	07:15:00	57.4	63.1	60.9
94	19/03/2024	07:30:00	57.1	62.7	60.4
95	19/03/2024	07:45:00	57.1	61.3	59.6
96	19/03/2024	08:00:00	57.5	61.4	59.9

CS8731 - 95 Avenue Road, London, NW8 6HY

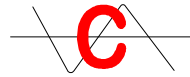


18th March 2024 to 19th March 2024 - Time

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



Project: CS8731 - 95 Avenue Road, London, NW8 6HY
 Client : 95 Avenue Road (Freehold) Limited
 Revision: Original
 Date : 10th May 2024

Item Calculation 01 - Lower Ground Floor Semi - Proposed Plant - Target Level - 41dBA

MVHR02	MVHR02 - Fresh Air Intake - Atmospheric Noise		63	125	250	500	1k	2k	4k	8k	dBA
	Fan Lw - Vent Axia Sentinel Kinetic FH - Manufacturers Data - 80%		79	69	63	61	45	26	21	26	61
	System Loss (Ducting and Bends)		0	0	0	0	0	0	0	0	
	End Reflection		-4	0	0	0	0	0	0	0	
	Distance to Listener	3 m	-21	-21	-21	-21	-21	-21	-21	-21	
	Directivity (90 Degrees)		2	2	1	0	-2	-5	-10	-15	
	Line of Sight Screening		-5	-5	-5	-5	-5	-5	-5	-5	
	Source Location (Plane)		3	3	3	3	3	3	3	3	
	Façade Effect		0	0	0	0	0	0	0	0	
	Estimated Lp at Listener MVHR01 Fresh Air Intake Only		54	48	41	38	20	-2	0	0	38
MVHR02	MVHR02 - Exhaust Air - Atmospheric Noise		63	125	250	500	1k	2k	4k	8k	dBA
	Fan Lw - Vent Axia Sentinel Kinetic FH - Manufacturers Data - 80%		74	60	56	50	38	24	21	24	53
	System Loss (Ducting and Bends)		0	0	0	0	0	0	0	0	
	End Reflection		-4	0	0	0	0	0	0	0	
	Distance to Listener	3 m	-21	-21	-21	-21	-21	-21	-21	-21	
	Directivity (90 Degrees)		2	2	1	0	-2	-5	-10	-15	
	Line of Sight Screening		-5	-5	-5	-5	-5	-5	-5	-5	
	Source Location (Plane)		3	3	3	3	3	3	3	3	
	Façade Effect		0	0	0	0	0	0	0	0	
	Estimated Lp at Listener MVHR01 Exhaust Air Only		49	39	34	27	13	-4	0	0	30
	Cumulative Noise Level - with No Mitigating Measures		55	49	42	38	21	0	3	3	39

Calculation 02 - Lower Ground Floor Semi - Proposed Plant - Target Level - 41dBA

ASHP01	ASHP Unit - Atmospheric Noise		63	125	250	500	1k	2k	4k	8k	dBA
	Unit Lp at 1 metre - Daikin Altherma EBLA09D3V3 - Manufacturers Data		41	46	43	44	41	39	27	23	46
	Additional Distance to Listener	0 m	0	0	0	0	0	0	0	0	
	Additional Surfaces (2)		6	6	6	6	6	6	6	6	
	Façade Effect		3	3	3	3	3	3	3	3	
	Estimated Lp at Listener ASHP01 Unit Only		50	55	52	53	50	48	36	32	55
	Proposed Acoustic Housing - WSD150 Acoustic Louvres		-3	-3	-5	-8	-13	-15	-15	-13	
	Resultant Noise from ASHP01 with Mitigating Measures		47	52	47	45	37	33	21	19	45

Acoustic Calibration Services Limited
Unit 6H Diamond Industrial Centre
Works Road Letchworth Garden City
Hertfordshire SG6 1LW
Tel: 01462 677 197 Mobile: 0771 886 4944
Email: trevjohnlewis@aol.com



CERTIFICATE OF CALIBRATION

Model: LD LxT1L

Serial Number: 0005588

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

Job Number: 2963

Customer Order Reference: S Metcalfe

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 and a **LD PRMLxT1L** preamplifier Serial No. **055664**. The microphone was replaced with a suitable input device in order to apply electrical signals to the preamplifier.

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 meter was adjusted to read correctly in response to a laboratory B&K 4231 sound calibrator, producing a sensitivity reading of **-27.7 dB rel 1V/Pa**. When applying the associated **LD CAL200** sound calibrator serial no: **17720**, and referencing its current certification, the calibration set-up level would be **113.7 dB** when corrected to 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: 16245

Date of Issue: 6th November 2023

Signature:

Print Name:

A handwritten signature in black ink, appearing to read 'Trevor Lewis', is written over a white background.

Trevor Lewis

Acoustic Calibration Services Limited
Unit 6H Diamond Industrial Centre
Works Road Letchworth Garden City
Hertfordshire SG6 1LW
Tel: 01462-677 197 Mobile: 0771 886 4944
Email: trevjohnlewis@aol.com



CERTIFICATE OF CALIBRATION

Model: LD CAL200

Serial Number: 17720

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

Job Number: 2964

Customer Order Reference: S Metcalfe

The acoustic calibrator was run for a period of time until a stable level was achieved. The output level was compared to the certified level of the laboratory measurement references. The calibrator was applied to the meter, removed, then reapplied to provide five separate readings, with the average value of these measurements recorded and certified.

The ambient temperature during calibration was $21.4 \pm 1^{\circ}\text{C}$.
The barometric pressure was **99.5** to **99.6** kPa.
The relative humidity was **49** to **59** %

The sound pressure level output from the Acoustic Calibrator was measured in its half inch configuration using a B&K 4134 microphone. The mean level output of the acoustic calibrator was 113.9 dB at the reference setting and 93.9 dB at the -20dB setting.

The output frequency signal of the acoustic calibrator is 1000Hz.

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: 16246

Date of Issue: 8th November 2023

Signature:

Print Name:

A handwritten signature in black ink, appearing to read 'Trevor Lewis', written over a white background.

Trevor Lewis

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Registered No: 4143457 VAT No: GB 770505441 Directors: Trevor J Lewis, G Parry BSc CPhys MInstP AMIOA, O R Clingan MIOA