

RESULTS OF A 48 HOUR NOISE LEVEL SURVEY CARRIED OUT ON THE

ROOF OF THE RESIDENTIAL PROPERTY LOCATED AT

13 BELSIZE CRESCENT, LONDON NW3

AND A REPORT ON THE NOISE IMPACT OF THE PROPOSED NEW EXTERNAL PLANT

Test Engineer : M G Roberts

Report Author : M G Roberts

Authorised for

Release by : I J Marchant

Client : Studio Nine
Project : 13 Belsize Crescent, London NW3
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RESULTS OF A 48 HOUR NOISE LEVEL SURVEY CARRIED OUT ON THE ROOF OF THE RESIDENTIAL PROPERTY LOCATED AT 13 BELSIZE CRESCENT, LONDON NW3

AND A REPORT ON THE NOISE IMPACT OF THE PROPOSED NEW EXTERNAL PLANT

1.0. <u>INTRODUCTION</u>

This report details the results of a 48-hour noise survey carried out on the roof of the residential property at 13 Belsize Crescent, London NW3.

The objectives of the survey were as follows:

- To assess the proposal to install new air source heat pump units on the roof of the building.
- To identify the nearest residential properties that might be affected by noise from the new plant.
- To establish the existing background noise level outside the nearest affected properties.
- To recommend noise limits and any necessary mitigating measures to ensure that the operation of the new plant does not disturb the occupants of the nearest affected properties and meets the planning directives of the local authority with regard to noise.

This report has been divided into the following sections for ease of analysis:

- 1.0. INTRODUCTION
- 2.0. SITE DESCRIPTION
- 3.0. TEST INSTRUMENTATION
- 4.0. TEST PROCEDURE
- 5.0. RESULTS AND EVALUATION OF NOISE CRITERIA
- 6.0. DISCUSSION OF RESULTS

2.0. <u>SITE DESCRIPTION</u>

The house located at 13 Belsize Crescent is a five storey, mid terrace property with neighbours, on either side, having very similar properties. The house is located in a residential street in a quiet part of Hampstead.

The front of the property can be seen in Photo A with the neighbouring houses on each side.

The property has a flat roof that can be seen on the attached Photos B and C and the adjacent houses have similar flat roof areas. The roof of No 11 Belsize Crescent has been recently converted to a roof terrace and has three air cooled condensers located on the boundary between their terrace and the roof of No 13. These units can be seen on the attached Photo C.

The roof of No 15 Belsize Crescent is a flat roof with no terrace and a single sealed plastic domed roof light. This roof can be seen in the attached Photo B.

3.0. <u>TEST INSTRUMENTATION</u>

All measurement equipment used during the survey complied with the requirements of BS4142:2014 "Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas". Details of the equipment are as follows:

Integrating Sound Level Meter: Rion type NL-52 class 1 Sound Level Meter fitted with a Rion type

UC-59 ½ inch condenser microphone. Serial No 01121378

Statistical Analysis Modules: Built in module capable of computing the percentile levels LA₁, LA₁₀,

 LA_{50} , LA_{90} and LA_{99} and also the LA_{eq} level.

Acoustic Calibrator: Bruel & Kjaer type 4231 electronic calibrator. Serial No 1934160

Calibration was performed before and after the survey and was +/- 0.1 dB from the reference source.

3.1. Existing Noise Climate

Road traffic travelling on surrounding roads could be heard at the start and end of the survey, so the noise levels measured will include contributions from road vehicles.

Commercial jet aircraft were observed at medium and high altitude during the manned periods at the start and the end of the survey, so it is possible that the noise levels measured could include contributions from medium altitude jet aircraft.

There are no overland railways nearby, so the noise levels measured will not include contributions from rail noise.

Construction works were not observed being carried out in the vicinity during the manned periods at the start and end of the survey so the sound levels recorded should be typical of normal daytime background noise levels.

4.0. TEST PROCEDURE

The survey was conducted during a continuous 48-hour period from 8:13 am on Tuesday the 28th of February 2023 to 8:13 am on Thursday the 2nd of March 2023.

Data was continuously acquired throughout the measurement period with the individual averaging time for statistical noise data set to 15 minutes. The following 'A' weighted statistical measurements were recorded concurrently: -

- LA₁ The Sound Pressure Level exceeded for 1% of the measurement period.
- LA₁₀ The Sound Pressure Level exceeded for 10% of the measurement period.
- LA₅₀ The Sound Pressure Level exceeded for 50% of the measurement period.
- LA₉₀ The Sound Pressure Level exceeded for 90% of the measurement period. LA₉₀ is considered to represent the "background noise level" during the measurement period and is used for the assessment of noise to determine the likelihood of complaints (See BS 4142:2014).
- LA₉₉ The Sound Pressure Level exceeded for 99% of the measurement period.
- LA_{eq} The continuous steady state Sound Pressure Level that has the same acoustic energy as the real fluctuating level.

4.1. Measurement Positions

The microphone was mounted on a tripod and positioned approximately in the centre of the roof area. The microphone was oriented vertically and was approximately 1.5 metres above the flat roof. The location of the microphone can be seen on the attached Photos B and C.

The microphone was connected by a low impedance cable to the associated instrumentation which was contained within a weatherproof housing.

4.2 Weather Conditions

The weather conditions prevailing during the measurement period were in line with those recommended in BS 4142:2014: -

Weather daytime: - Clear Weather night time: - Clear Wind daytime: - Calm Wind night time: - Calm

The microphone was protected during the survey by an acoustically transparent wind balloon.

5.0. RESULTS AND EVALUATION OF NOISE CRITERIA

The raw test data, gathered during the noise survey, is given in Appendix 'A 'of this report.

The 'A' Weighted $L_{\rm eq}$ levels measured over each 15 minute interval throughout the 48-hour period, denoted by $LA_{\rm eq}$, (15 mins), are displayed as a bar graph on the attached Sketch No QF/10856/T1 at the back of this report.

The 'A' Weighted percentile levels measured over each 15 minute interval throughout the 48-hour period, denoted by LA_{10} (15 mins), LA_{50} (15 mins) and LA_{90} (15 mins) are displayed as line graphs on the attached Sketch No QF/10856/T2 at the back of this report.

5.1. Summary of Results

The table QF/10856/D1 below summarises the noise levels taken over the 48-hour period in terms of the maximum and minimum Sound Pressure Levels recorded.

Table QF/10856/D1 - Summary of Maximum and Minimum Noise Levels

	LA _{eq}	LA ₁	LA ₁₀	LA ₅₀	LA ₉₀	LA ₉₉
Minimum	38dBA	41dBA	39dBA	37dBA	33dBA	32dBA
Maximum	77dBA	74dBA	57dBA	54dBA	52dBA	52dBA

The table QF/10856/D2 below states the minimum LA_{90} noise levels recorded during the time periods of 7.00am to 23.00pm (Daytime / Evening) and 23.00pm and 7.00am (Night time)

Table QF/10856/D2 - Minimum LA₉₀ Noise Levels - Daytime/Evening and Night time

	Minimum LA ₉₀				
Daytime/Evening (7am to 11pm)	39dBA				
Night Time (11pm to 7am)	33dBA				

5.2. <u>Summary of the Local Authority's planning requirements regarding noise for noise sensitive properties</u>

The local planning authority is the London Borough of Camden.

The Camden Local Plan sets out the Council's planning policies and replaces the Core Strategy and Development Policy planning documents (adopted in 2010). It ensures that Camden continues to have robust, effective and up-to-date planning policies that respond to changing circumstances and the borough's unique characteristics and contribute to delivering the Camden Plan and other local priorities.

The Local Plan will cover the period from 2016-2031. Policy A4 of The Local Plan is entitled Noise and Vibration and states:

The Council will seek to ensure that noise and vibration is controlled and managed. Development should have regard to Camden's Noise and Vibration thresholds (Appendix 3). We will not grant planning permission for a) a development likely to generate unacceptable noise and vibration impacts or b) a development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses. We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

The parts of Appendix 3 that we have identified as relevant to this application are as follows:

Appendix 3: Noise thresholds

The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:

- NOEL No Observed Effect Level
- LOAEL Lowest Observed Adverse Effect Level
- SOAEL Significant Observed Adverse Effect Level

Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- · Green where noise is considered to be at an acceptable level.
- Amber where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- · Red where noise is observed to have a significant adverse effect.

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

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

^{*10}dB 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.

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.

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 an NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted L_{eq} (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.

5.3. <u>Determination of noise sensitive property design criteria</u>

We believe that the sound produced by the new plant will not be intermittent or contain tones. To comply with a green rating from the table above the new plant should therefore have a Sound Pressure Level 10dB below the lowest LA_{90} background noise level at 1 metre from the nearest noise sensitive window.

The lowest recorded LA₉₀ background noise levels measured during the 48 hour survey period are given in Table QF/10856/D2 above.

Applying the above criteria gives limiting rating levels as listed in the table QF/10856/D3:

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

Table QF/10856/D3 —	Proposed Design	n Rating Levels	(LA _{eq})

Existing Noise sensitive receptor	Design Period	Lowest measured background level	Proposed rating level	Proposed Local Authority criteria
Dwellings	Day	39dBA	29dBA	Green
	Night	33dBA	23dBA	Green

5.4. <u>Summary of external noise criteria</u>

Based upon the lowest measured LA_{90} background noise levels during the survey and the Council's requirements outlined above we summarise the design rating levels to be adopted for this project in table QF/10856/D4: -

Table QF/10856/D4 - recommended design rating levels LAr, I

Type of premises	L _{Ar,T} (7am - 11pm)	L _{Ar,T} (11pm - 7am)
Noise sensitive	29dBA	23dBA

6.0. DISCUSSION OF RESULTS

It is proposed to locate three off Samsung AE160RXYDEG air source heat pump units on the roof of the house and the Table QF/10856/D5 below lists the noise level of the proposed units and the natural and required attenuation to a point 1 metre from the adjacent property's windows at the front of 15 Belsize Crescent.

<u>Table QF/10856/D5 — Noise Level of Samsung Heat Pump units on the roof of the house, operating at full duty, and the natural and required attenuation to 1 metre from the nearest neighbour's window</u>

Fauinment/Attenuation		Sound	d Pressu	ıre Lev	el (dB	ref 2 x 1	0 ⁻⁵ N/m ²	²)	dBA
Equipment/Attenuation	63	125	250	500	1k	2k	4k	8k	UDA
Samsung AE160RXYDEG 1m free field		52	50	49	45	40	33	20	50
3 Units	+5	+5	+5	+5	+5	+5	+5	+5	
Distance loss 6 metres 10logA ₅ /A ₁	-11	-11	-11	-11	-11	-11	-11	-11	
Barrier effect of roof edge (300mm)	-7	-9	-11	-13	-16	-19	-21	-21	
SPL at 1 metre from nearest window	47	37	33	30	23	15	6	ı	31
Barrier effect of Jackson Jacoustic fence 200mm higher than condensers	-2	-4	-6	-8	-10	-12	-14	-16	
Attenuated resultant SPL at 1 metre from nearest window	45	33	27	22	13	3	-	-	25

The calculation shown in Table QF/10856/D5 shows that by placing the Samsung AM160RXYDEG heat pump units inside of a peripheral barrier on the proposed roof layout, as shown in the roof detail drawing by Undercover Architecture GA306(A), with a Jackson Jacoustic fence around the units then the noise level at 1 metre from the nearest neighbour's window, in the front top floor of No 15 Belsize Crescent, will be below the limiting LAeq noise level of 29dBA and will allow the unit to be run during the daytime/evening period of 7am to 11pm, on full duty, without exceeding the planning requirements of the local authority.

Should the units be run at night they could either be controlled to run on a low noise setting or only two out of the three units could be operated. This would reduce the noise level by a further 2dB and would again satisfy the limiting LAeq level, for night time operation, of 23dBA and therefore meet the planning requirements of the local council.

The acoustic fencing around the condensers should be at least 200mm higher than the top of the units and be continuous and homogenous all around the units.

The Samsung heat pump units should also be mounted onto Emtec/VMC RD1-Green anti-vibration mountings, having a minimum static deflection of 6mm, in order to separate vibration and noise from the chassis of the units from the structure of the building.

There is a sealed plastic domed roof light on the roof of No 15 Belsize Crescent. This roof light allows access to the roof of No 15 from the top of the internal staircase. The Table QF/10856/D6 below lists the noise level of the proposed units and the natural and required attenuation to a point inside of the roof light of 15 Belsize Crescent.

<u>Table QF/10856/D6 – Noise Level of Samsung Heat Pump units on the roof of the house, operating at full duty, and the natural and required attenuation to a position inside the roof light of 15 Belsize Crescent</u>

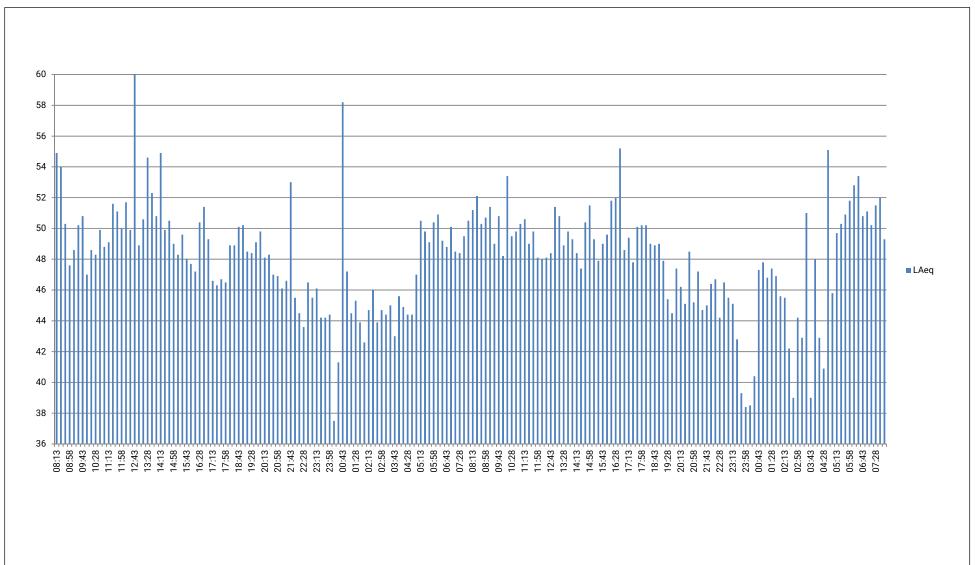
Equipment/Attenuation	Sound Pressure Level (dB ref 2 x 10 ⁻⁵ N/m ²)								
	63	125	250	500	1k	2k	4k	8k	
Samsung AE160RXYDEG 1m free field	60	52	50	49	45	40	33	20	50
3 Units	+5	+5	+5	+5	+5	+5	+5	+5	
Distance loss 3 metres 10logA ₃ /A ₁	-7	-7	-7	-7	-7	-7	-7	-7	
Directivity of source to receiver (90°)	-1	-2	-3	-5	-5	=5	-5		
Barrier effect of Jackson Jacoustic fence 200mm higher than condensers	-2	-4	-6	-8	-10	-12	-14	-16	
SPL at roof light	55	44	39	34	28	21	12	-	37
Minimum attenuation of sealed roof light	-5	-10	-15	-18	-20	-23	-25	-28	
Attenuated resultant SPL at 1 metre from nearest window	50	34	24	16	8	-	-	ı	26

The internal noise level, below the plastic roof light of No 15 Belsize Crescent, will be 26dBA which is 9dB less than the recommended internal noise level of 35dBA for residential spaces and 4dB less than the recommended noise level of 30dBA for a residential bedroom. These recommendations are contained in BS8233:2014 and are in line with the requirements of the World Health Organisation.

If the control options above are adopted at night the noise levels inside No 15' roof light will fall to 24dBA.

If the recommendations made above are followed the installation of the new Samsung AM160RXYDEG heat pump units should not exceed the limiting LAeq at 1 metre from the neighbour's nearest openable window and thereby meet the planning requirements of the local authority.

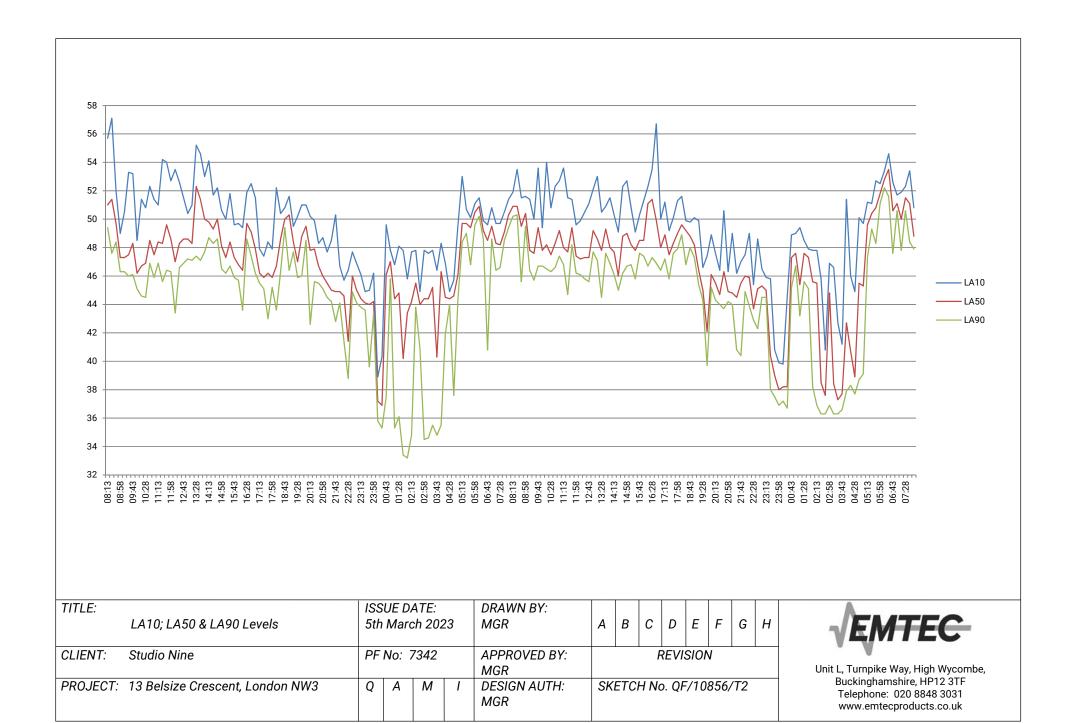
Emtec Products Ltd 23rd March 2023



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	LAeq Levels	5th	5th March 2023		23	MGR	Α	В	С	D	Ε	F	G	Н	
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Unit L, Turnpike Way, High Wycombe, Buckinghamshire, HP12 3TF Telephone: 020 8848 3031 www.emtecproducts.co.uk



EMTEC PRODUCTS LTD.

APPENDIX 'A'

Raw Data — Noise Survey
28th of February 2023 to 2nd of March 2023

EMTEC PRODUCTS LTD.

Project: Client: 13 Belsize Crescent, London NW3

Studio Nine 28th February to 2nd March 2023 01121378 Date:

Serial No:

Address	Start Time	LA _{eq}	LE	Lmax	Lmin	LA ₁	LA ₁₀	LA ₅₀	LA ₉₀	LA ₉₉
1	08:13	55	85	82	47	62	56	51	49	48
2	08:28	54	84	74	46	63	57	51	48	46
3	08:43	50	80	63	46	54	52	50	48	48
4	08:58	48	77	56	45	52	49	47	46	46
5	09:13	49	78	64	45	56	51	47	46	46
6	09:28	50	80	64	45	59	53	48	46	46
7	09:43	51	80	75	43	58	53	48	46	45
8	09:58	47	77	68	44	51	49	46	45	45
9	10:13	49	78	71	41	55	51	47	45	43
10	10:28	48	78	62	42	56	51	47	45	43
11	10:43	50	80	63	45	57	52	49	47	46
12	10:58	49	78	60	45	55	51	48	46	45
13	11:13	49	79	64	45	54	51	48	47	46
14	11:28	52	81	69	44	62	54	48	46	45
15	11:43	51	81	66	43	58	54	50	46	44
16	11:58	50	80	64	44	56	53	49	46	45
17	12:13	52	81	80	41	60	54	47	43	42
18	12:28	50	80	62	45	57	53	48	47	46
19	12:43	77	107	115	45	55	52	49	47	46
20	12:58	49	79	61	46	53	50	49	47	47
21	13:13	51	80	74	45	58	51	48	47	46
22	13:28	55	84	73	46	67	55	52	47	47
23	13:43	52	82	71	44	59	55	51	47	46
24	13:58	51	80	67	43	56	53	50	48	44
25	14:13	55	85	79	47	68	54	50	49	48
26	14:28	50	80	61	46	55	52	49	48	47
27	14:43	51	80	62	46	55	52	50	49	47
28	14:58	49	79	64	45	55	51	48	47	46
29	15:13	48	78	63	45	55	50	47	46	46
30	15:28	50	79	67	45	56	52	48	47	46
31	15:43	48	78	63	42	54	50	47	46	43
32	15:58	48	77	64	44	53	50	47	46	45
33	16:13	47	77	58	41	53	49	46	44	42
34	16:28	50	80	67	47	55	52	50	49	48
35	16:43	51	81	68	46	62	53	49	47	47
36	16:58	49	79	65	45	56	52	48	46	46
37	17:13	47	76	56	44	50	48	46	46	45
38	17:28	46	76	57	44	51	47	46	45	45
39	17:43	47	76	62	40	51	48	46	43	41
40	17:58	47	76	58	44	51	48	46	45	45
41	18:13	49	79	64	41	57	52	47	44	42
42	18:28	49	79	62	45	54	50	49	46	46
43	18:43	50	80	60	48	52	51	50	49	49
44	18:58	50	80	57	45	53	52	50	46	46
45	19:13	49	78	55	45	51	50	48	48	46
46	19:28	48	78	66	45	56	50	47	46	45
47	19:43	49	79	62	41	55	51	49	46	42
48	19:58	50	79	63	46	54	51	50	49	47
49	20:13	48	78	62	40	54	50	48	43	41

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159 23:43 39 69 51 36 43 41 39 38 37				72	49	36	47	46	40	38	37
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EMTEC PRODUCTS LTD.

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190	07:28	52	81	58	49	53	52	52	51	50
191	07:43	52	82	68	47	60	53	51	48	48
192	07:58	49	79	58	47	54	51	49	48	47

EMTEC PRODUCTS LTD.

APPENDIX 'B'

Photos and Drawing

Roof of No 13 Belsize Crescent with location of condensers on right hand side centre of roof

Nearest neighbour's windows in No 15 Belsize Crescent

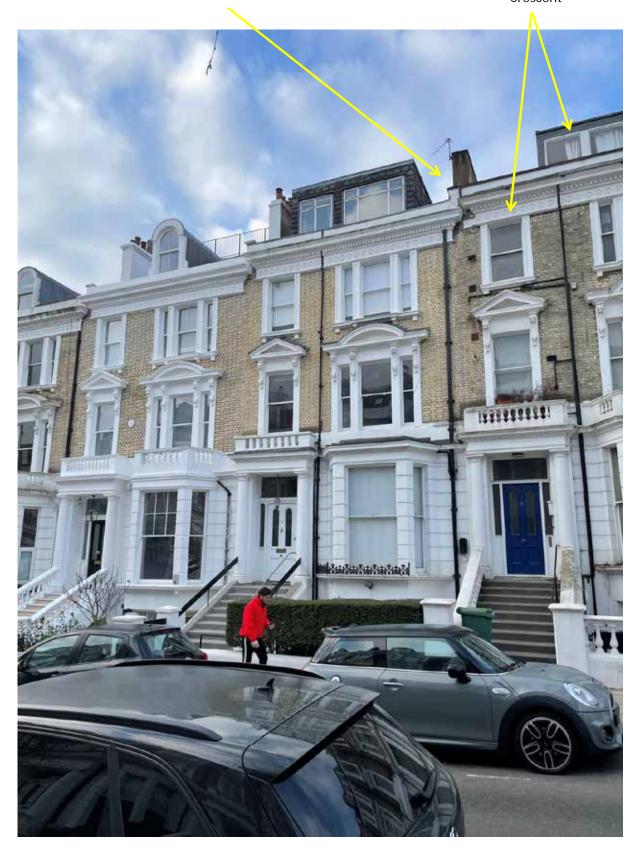


PHOTO A – Front of the property at 13 Belsize Crescent

Nearest neighbour's window at the front of 15 Belsize Crescent

Microphone location



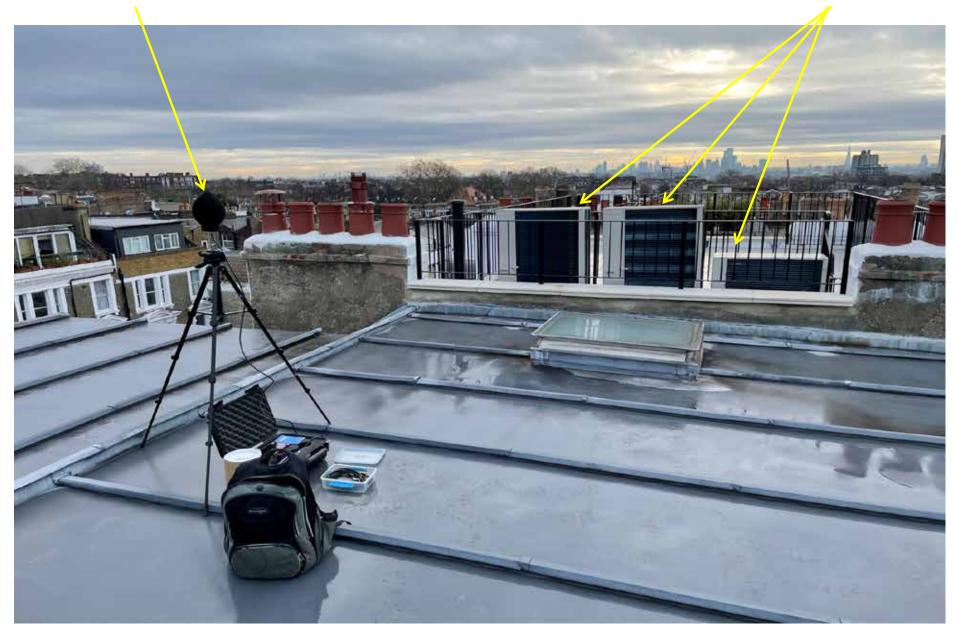


PHOTO C – Location of microphone on the roof of 13 Belzize Crescent with flat roof patio of 11 Belsize Crescent behind

