



15 CHESTERFORD
GARDENS, LONDON
NW3

Plant Noise Assessment

Reference: 8706.RP01.PNA.0

Prepared: 31 May 2018

Revision Number: 0

MWAI

48 Broadley Terrace

London

NW1 6LG

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	31 May 2018	Joe Allen	Robert Barlow

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and again will need to be developed in to full working drawings by the lead designer to incorporate all other design disciplines.

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1.0 INTRODUCTION

It is proposed to locate new items of plant on the roof of 15 Chesterford Gardens, London NW3. As part of the planning application, the London Borough of Camden requires consideration be given to atmospheric noise emissions from the proposed equipment at the nearest noise-sensitive property.

RBA Acoustics have been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emissions in accordance with the London Borough of Camden's requirements. This report presents the results of the noise measurements, associated criteria and provides the required assessment.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 General

In accordance with the requirements of the Local Authority, monitoring of the prevailing background noise was undertaken over the following periods:

11:00 hours Monday 21 May to 11:00 hours Tuesday 22 May 2018

During the survey periods the weather conditions were generally appropriate for the noise measurement exercise, it being dry with light winds.

Measurements were made of the L_{A90} , L_{Amax} and L_{Aeq} noise levels over sample periods of 15 minutes duration.

2.2 Measurement Location

Measurements were undertaken with the microphone positioned on the roof of 15 Chesterford Gardens on the boundary with 17 Chesterford Gardens. This measurement position was considered as being representative of the noise climate as experienced at the closest residential receptors to the proposed plant to the rear of the property. The prevailing noise climate was noted to be quiet except for the construction works currently taking place at the property.

The measurement positions are also illustrated on the site plan in Figure 1 in Appendix D.

2.3 Instrumentation

Details of the instrumentation used to undertake the survey are provided in Appendix B.

3.0 RESULTS

The noise levels at the measurement positions are shown as time-histories on the attached Graphs 1 to 2.

In order to ensure a worst case assessment the lowest background L_{A90} noise levels measured have been used in our analyses. The lowest L_{A90} and the period averaged L_{Aeq} dB noise levels measured are summarised below.

Table 2 – Measured Levels

Measurement Period	Measured Sound Pressure Levels	
	L_{90} (dBA)	L_{eq} (dBA)
Daytime (07:00 – 23:00)	33	51
Night-time (23:00 – 07:00)	33	43

4.0 CRITERIA

The requirements of the London Borough of Camden's Environmental Health Department regarding new building services plant are understood to be as follows.

The following is taken from the London Borough of Camden Local Development Plan (issued in June 2017).

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)

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 88dBL _{Amax}

* 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.

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 $L_{eq,5mins}$ 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.

In accordance with the above we therefore propose that criteria of 10dB below the minimum background L_{A90} should be applied, as measured at 1m from the nearest noise-sensitive receptor, assuming there are no tonal characteristics.

In line with the above requirements we would propose items of mechanical services be designed so that cumulative atmospheric noise emissions from the plant do not exceed the following levels when assessed at the nearest noise-sensitive location:

- Daytime 23 dB
- Night-time 23 dB

5.0 ASSESSMENT

Our assessment has been based upon the following information:

5.1 Proposed Plant Items

Table 3 – Plant Information

Ref.	Manufacturer/Model/Duty	Plant Type
CU1	2 No. Daikin RXYSCQ5TV1	Condenser Unit

5.2 Position of Units

The units are to be located at roof level of the building behind the existing roof parapet. The equipment positions are indicated on the site plan in Figure 1 in Appendix D.

5.3 Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit. The associated plant noise levels are detailed as follows:

Table 4 – Plant Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Daikin RXYSCQ5TV1	Lp at 1m	51	53	52	53	47	41	34	27

Review of the octave band data provides no indication of any tonal characteristics associated with the proposed plant.

5.4 Location of Nearest Residential Windows

The closest residential windows to the plant were advised as being the second floor window of 17 Chesterford Garden, approximately 14m from the proposed plant location.

5.5 Calculation of Noise Levels at Nearest Residential Window

Our calculation method for predicting noise levels from the proposed plant at the nearest residential windows, based on the information stated above, is summarised below.

- Source Term SPL / SWL
- 20LogR Distance Attenuation
- Directivity
- Reflections

Calculation sheets are attached for further information in Appendix C.

The results of the calculations indicate a noise level of 20 dBA at the nearest affected residential windows from the proposed plant; this is noted to be within the target criteria

6.0 VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that condensing units and AHUs be isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures the mounts should ideally be caged and be of the restrained type.

It is important the isolation is not “short-circuited” by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the condenser and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

7.0 CONCLUSION

Measurements of the existing background noise levels at 15 Chesterford Gardens have been undertaken. The results of the measurements have been used in order to determine the required criteria for atmospheric noise emissions from the future plant installations.

The results of the assessment indicate atmospheric noise emissions from the plant are within the criteria required by City of Westminster. As such, the proposed plant installations should be considered acceptable.

Appendix A - Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g. L_{A10} , L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.

Appendix B - Instrumentation

The following equipment was used for the measurements

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1406969	4715722484	11 September 2019
Norsonic Pre Amplifier	1209	21204		
Norsonic ½" Microphone	1225	285599	4715722484	11 September 2019
Norsonic Sound Calibrator	1251	34966	U26567	11 September 2019

Appendix C – Plant calculations

A summary of the noise levels at the receiver from the proposed plant items is provided below, together with the overall predicted level.

Condensers	63	125	250	500	1k	2k	4k	8k	dBA
Lp at 1m	54	56	55	56	50	44	37	30	56
Distance Loss	-23	-23	-23	-23	-23	-23	-23	-23	
Roof Edge Screening	-7	-8	-10	-13	-15	-18	-20	-20	
Total	24	25	22	21	12	3	-6	-13	20

Appendix D – CDM Considerations

The likelihood the harm will occur can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 – Remote (almost never)
- 2 – Unlikely (occurs rarely)
- 3 – Possible (could occur, but uncommon)
- 4 – Likely (recurrent but not frequent)
- 5 – Very likely (occurs frequently)

The severity of harm can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 – Trivial (e.g. discomfort, slight bruising, self-help recovery)
- 2 – Minor (e.g. small cut, abrasion, basic first aid need)
- 3 – Moderate (e.g. strain, sprain, incapacitation > 3 days)
- 4 – Serious (e.g. fracture, hospitalisation > 24 hrs, incapacitation > 4 weeks)
- 5 – Fatal (single or multiple)

The rating value is obtained by multiply the two scores and is then used to determine the course of action.

Rating Bands (Severity x Likelihood)		
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)
May be ignored but ensure controls remain effective	Continue, but implement additional reasonable practicable controls where possible	Avoidance action is required; therefore alternative design solutions must be examined. Activity must not proceed until risks are reduced to a low or medium level

The following hazards pertinent to our design input have been identified and control measures suggested:

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Attenuators/ Acoustic Lagging	Strain of neck, limbs or back.	Contractors	3	4	12	Provide sufficient manpower/ lifting gear	1	4	4
Attenuators/ Acoustic Lagging	Skin & respiratory irritation	Contractors	4	3	12	Wear gloves and mask	1	3	3

L: Likelihood S: Severity R: Rating

Appendix E – Graphs and Site Plans

15 Chesterford Gardens

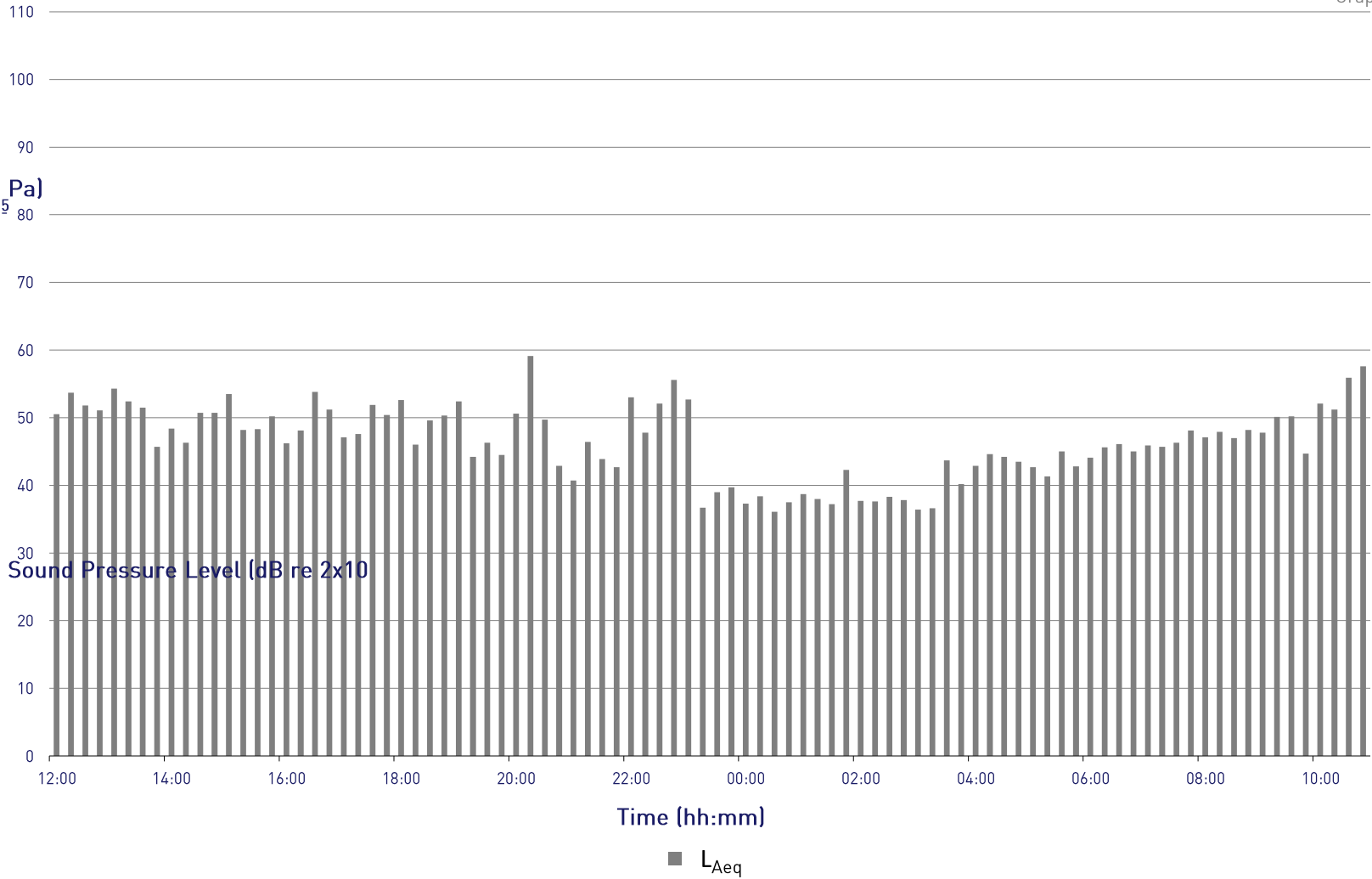
L_{Aeq} Time History

Rooftop



Project: 8706

Graph 1



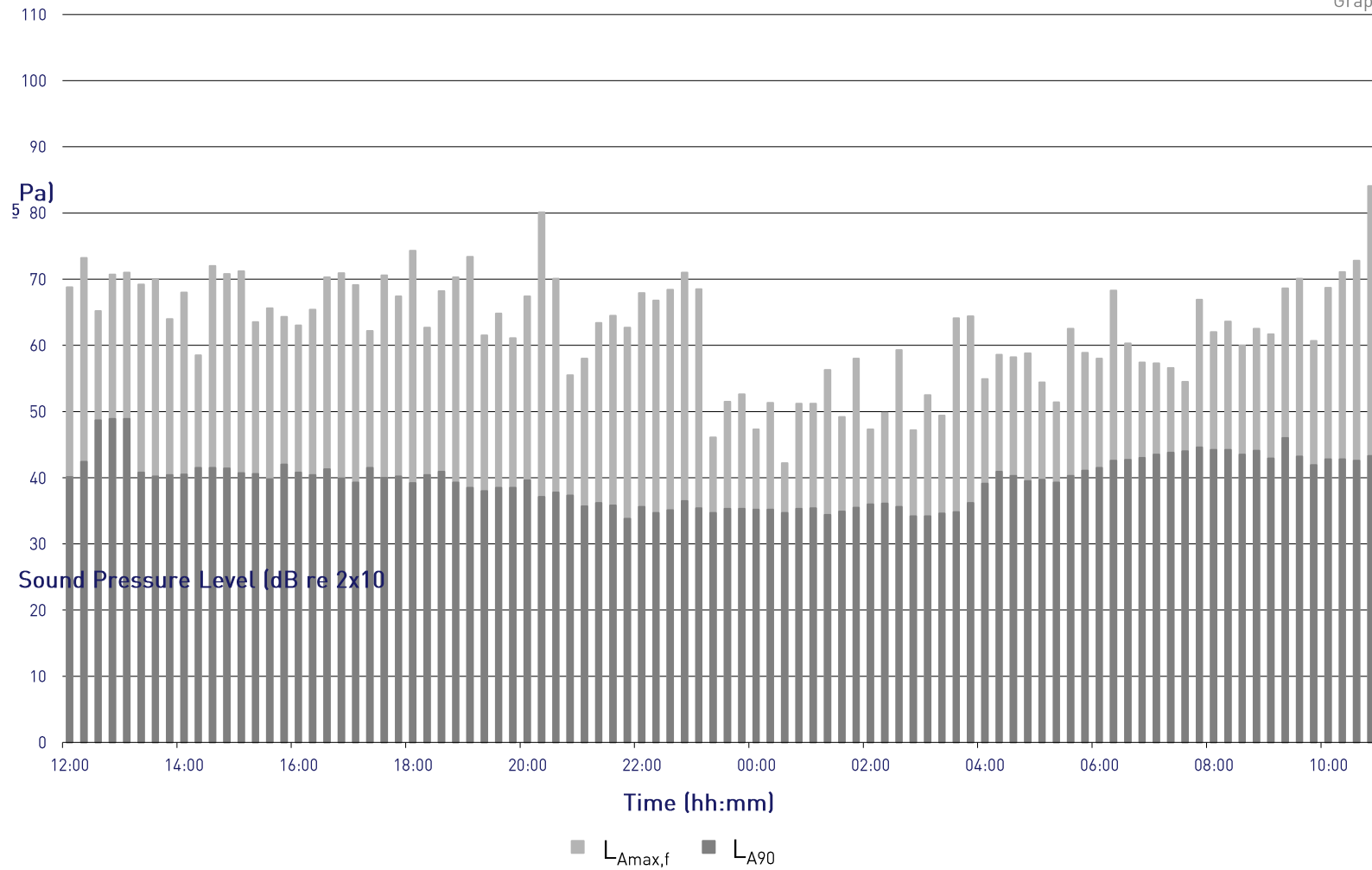
15 Chesterford Gardens
 $L_{Amax,f}$ and L_{A90} Time History

Rooftop



Project: 8706

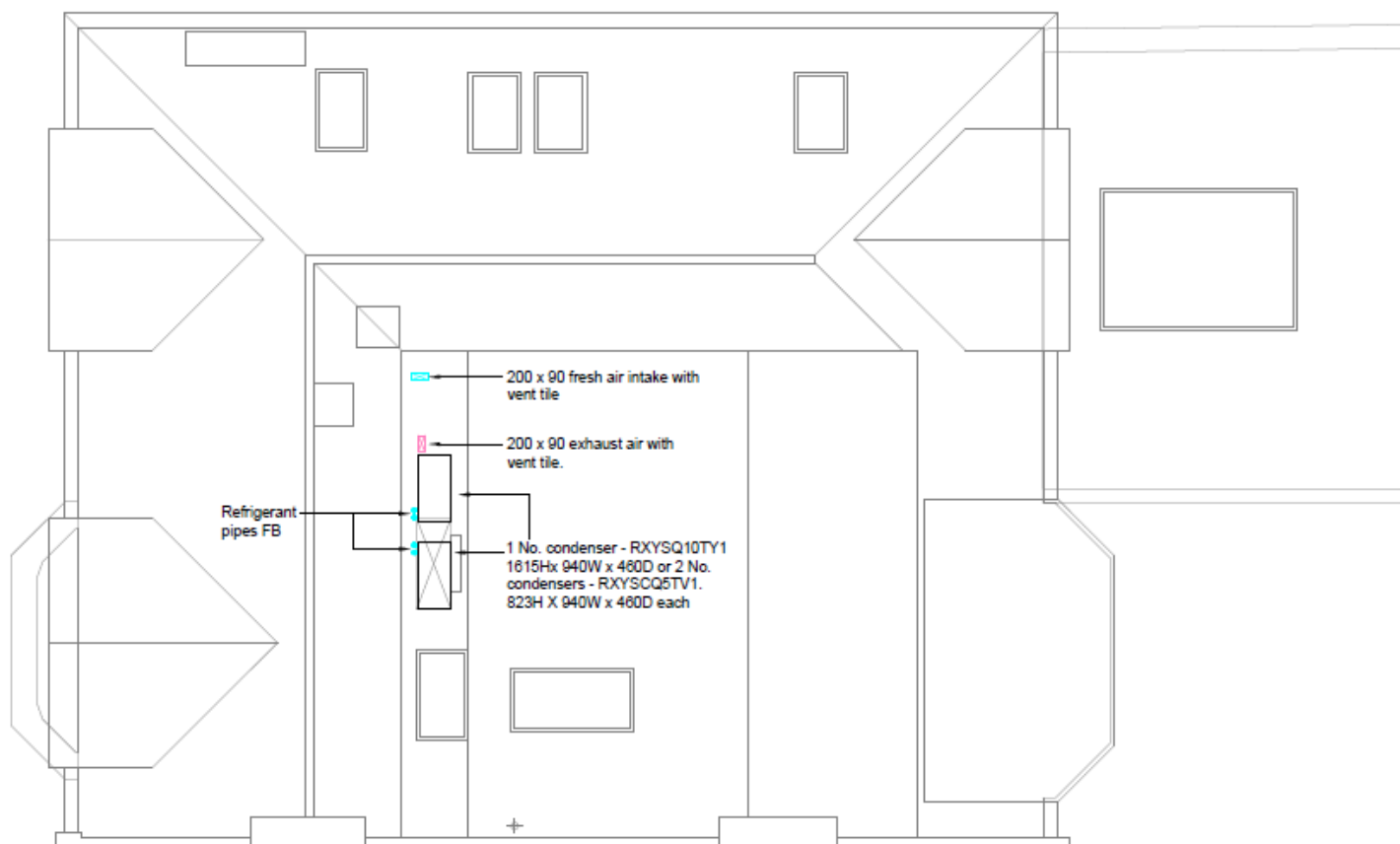
Graph 2





15 Chesterford Gardens, London NW3
Measurement Position
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Figure 1
31 May 2018
Not to Scale



15 Chesterford Gardens, London NW3
Plant Location
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Figure 2
31 May 2018
Not to Scale

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