MARY BRANCKER HOUSE, HOLMES ROAD, KENTISH TOWN

Plant Noise Assessment

Reference:8693.RP01.PNA.0
Prepared: 22 June 2018
Revision Number: 0

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	22 June 2018	Tom Davies-Smith	Alex J Wyatt

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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 in the car park of Mary Brancker House. As part of the planning application, Camden Council 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 Camden Council'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:

Thursday 24 May to Friday 25 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 Locations

Measurements were undertaken at Position 1 with the microphone positioned 1m from a first floor window on the south-eastern façade of the building. This measurement position was considered as being representative of the noise climate as experienced at the closest residential receptors to the proposed plant at the front of the property. The prevailing noise climate was noted to comprise of noise from traffic movements along Holmes Road and the surrounding road network.

The measurement position is 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 & CRITERIA

The noise levels at the measurement position 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} noise levels measured are summarised below.

Table 2 – Measured Levels

Measurement Period	Position 1	
	L_{90} (dBA)	L_{eq} (dBA)
Daytime (07:00 – 00:00)	40	60
Night-time (00:00 – 07:00)	37	50

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

Any noise generated by new building services plant should be designed to a level 5dB below the lowest background L_{A90} 15 minute sample during operational hours, as measured 1m external to a sensitive façade. For sites where the existing L_{A90} 15 minute sample is above 60dB, plant noise should be limited to below 55dBL_{Aeq}.

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

- Daytime 35 dB
- Night-time 32 dB

In line with BS 4142: 2014, should the proposed plant be identified as having intermittent or tonal characteristics, a further penalty should be subtracted from any of the above proposed noise emission limits.

It should be noted that the above requirements are applied at the nearest existing (non-development) residential adjacencies and alternative criteria have been determined for developmental adjacencies.

Where the nearest noise sensitive receptors to the plant locations are the UNITE bedroom windows of our own development, we have developed more relevant criteria based on guidance from applicable industry standards.

We propose maximum emission limits that would result in acceptable internal noise levels in the bedrooms and studios in the event of partially open windows. BS 8233:2014 provides guidance on suitable internal noise levels which are summarised in Table 3.

Table 3 – BS 8233:2014 Residential Criteria

Room	Daytime (07:00 to 23:00 hours)	Night-time (23:00 to 07:00 hours)
Living Rooms	35 dB $L_{Aeq,16hour}$	--
Dining Room/area	40 dB $L_{Aeq,16hour}$	--
Bedrooms	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Based on the sound reduction given by a partially open window as outlined in BS 8233:2014, internal noise levels are anticipated to be approximately 15dB lower than external noise levels. To minimise the effect of plant noise on the internal noise level environs, we propose to target 5dBA below the BS 8233:2014 criteria.

We therefore propose that cumulative noise emissions from mechanical services plant to the UNITE development receptors should be below the levels detailed in Table 4 below.

Table 4 – Plant Noise Emission Limits to Mary Brancker House

Position	L_{Aeq} Noise Level limit of all operating plant (dB) at 1m from the nearest noise sensitive façade	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
All façades of Mary Brancker House	45	40

Should the proposed plant be identified as having intermittent or tonal characteristics, a further applicable penalty should be subtracted from any of the above proposed noise emission limits in Table 4.

4.0 ASSESSMENT

Our assessment has been based upon the following information:

4.1 Proposed Plant Items

2No. Mitsubishi Q-ton ESA30E Air Source Heat Pump (ASHP) units

4.2 Position of Units

The units are to be mounted to a gantry on the eastern boundary of the site. The equipment positions are indicated on the site plan in Figure 1 in Appendix D.

4.3 Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit. The octave band sound pressure levels of the unit (at 1m) are detailed as follows:

Table 5 – Manufacturer's Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Standard Operation	Lp at 1m	69	58	54	55	52	50	48	47	58
High Operation		71	63	62	59	59	54	52	48	63

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

4.4 Location of Nearest Residential Windows

Mary Brancker House Receptors

The closest residential windows to the plant are understood to be belong to a bedroom on the first floor of Mary Brancker House, approximately 3.5m from the nearest ASHP without direct line of sight due to the proposed enclosure of the units across the central courtyard.

The closest windows with direct line of sight through the louvres of the proposed enclosure are of the 1st floor studio apartments to the west of the plant, approximately 6m from the proposed plant location.

Existing Neighbouring Receptors

The nearest neighbouring (non-development) existing residential windows to the plant are understood to be located at 61 Holmes Road to the south of the site, which are at least 28m from the pair of units.

Please see the attached Site Plan 8693/SP1 which details the location of the nearest non-development residential windows.

4.5 Mitigation

It is understood that the units are to be enclosed on the north and south sides as well as on top of the units with steel sheet/plates (minimum 2mm thick) on a frame and lined with Scan Brand Acoustic tiles internally (to reduce reverberant level) and on the western side enclosed with an acoustic louvre. The louvre is to provide the attenuation levels specified in Table 5 and is achievable using Caice SH150 Acoustic louvres. The acoustic performance of the Scan Brand Acoustic Tiles is displayed in Appendix C.

Table 6 – Acoustic Louvres

Unit	Transmission Loss (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Caice SH150 Acoustic Louvre	5	5	7	9	13	13	13	12

The units will be mounted on the steel gantry on an open grid deck and it is proposed to install the Scan Brand Acoustic Tiles within the grid framing of the deck and line this underneath with 2mm (min.) steel plates to stop noise break-out to below. The steel plate beneath the units should be the size of the footprint of the units, but increased in each dimension by a minimum of 100mm.

4.6 Operating Hours

It is understood that two units will be running during operating hours (07:00-00:00). During the hours of 00:00-07:00 it is currently proposed that no units will be running, however we have assessed the night-time operation of 1No. unit if desired in the future.

4.7 Calculation of Noise Levels at Nearest Residential Window

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

- Source Term SPL
- 20LogR Distance Attenuation
- Louvre Losses
- Directivity
- Reflections

Example calculation sheets are attached for further information in Appendix C.

The results of the calculations indicate the following noise levels at the nearest affected residential windows:

Table 7 – Predicted Noise Levels

Operating Period	Mary Brancker Bedroom		Mary Brancker Studio		61 Holmes Road	
	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion
Daytime (07:00 – 00:00)	37	45	38	45	32	35
Night-time (00:00 – 07:00)	34	40	33	40	29	32

Note – The calculations have assumed Standard Operation mode for the units, assuming reasonable outdoor temperatures. The night-time calculations have assumed one unit running in Standard Operation mode, if desired

Noise from the proposed units to the rear of the property is below the target criteria in all locations.

5.0 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 advise that the ASHPs be isolated from the supporting gantry structure by means of neoprene pads with a static deflection of 5mm.

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.

6.0 CONCLUSION

Measurements of the existing background noise levels at Mary Brancker House 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 installation.

The results of the assessment indicate atmospheric noise emissions from the plant are within the criteria required by Camden Council providing suitable mitigation measures are employed. 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	1406971	4715702365	11 September 2019
Norsonic Pre Amplifier	1209	21206		
Norsonic ½" Microphone	1225	271059	4715702365	11 September 2019
Norsonic Sound Calibrator	1251	35016	U26573	11 September 2019

Appendix C – Plant calculations

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

Mary Brancker Bedroom - Daytime

Parameter	Noise Level (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Mitsubishi Q-ton ESA30E ASHP	69	58	54	55	52	50	48	47	58
Additional unit contribution	3	3	3	3	3	3	3	3	
Reflections (in enclosure)	3	3	3	3	3	3	3	3	
Acoustic Louvre Losses	-5	-5	-7	-9	-13	-13	-13	-12	
Directivity Loss from Louvre at 90°	-1	-4	-7	-7	-7	-7	-7	-7	
Distance Loss (3.5m)	-11	-11	-11	-11	-11	-11	-11	-11	
Level at Receiver	**59**	**45**	**35**	**34**	**27**	**25**	**23**	**23**	**37**

Mary Brancker Studio - Daytime

Parameter	Noise Level (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Mitsubishi Q-ton ESA30E ASHP	69	58	54	55	52	50	48	47	58
Additional unit contribution	3	3	3	3	3	3	3	3	
Reflections (in enclosure)	3	3	3	3	3	3	3	3	
Acoustic Louvre Losses	-5	-5	-7	-9	-13	-13	-13	-12	
Distance Loss (6m)	-16	-16	-16	-16	-16	-16	-16	-16	
Level at Receiver	**54**	**43**	**37**	**36**	**29**	**27**	**25**	**25**	**38**

61 Holmes Road - Daytime

Parameter	Noise Level (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Mitsubishi Q-ton ESA30E ASHP	69	58	54	55	52	50	48	47	58
Additional unit contribution	3	3	3	3	3	3	3	3	
Distance Loss (28m)	-29	-29	-29	-29	-29	-29	-29	-29	
Level at Receiver	**43**	**32**	**28**	**29**	**26**	**24**	**22**	**21**	**32**

Acoustic Absorption of Scan Brand Acoustic Tiles

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
-	0.2	0.34	0.67	0.9	1.0	1.0	-

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

Mary Brancker House, Holmes Road, Kentish Town

L_{Aeq} Time History

Position 1, Thursday 24 May to Friday 25 May

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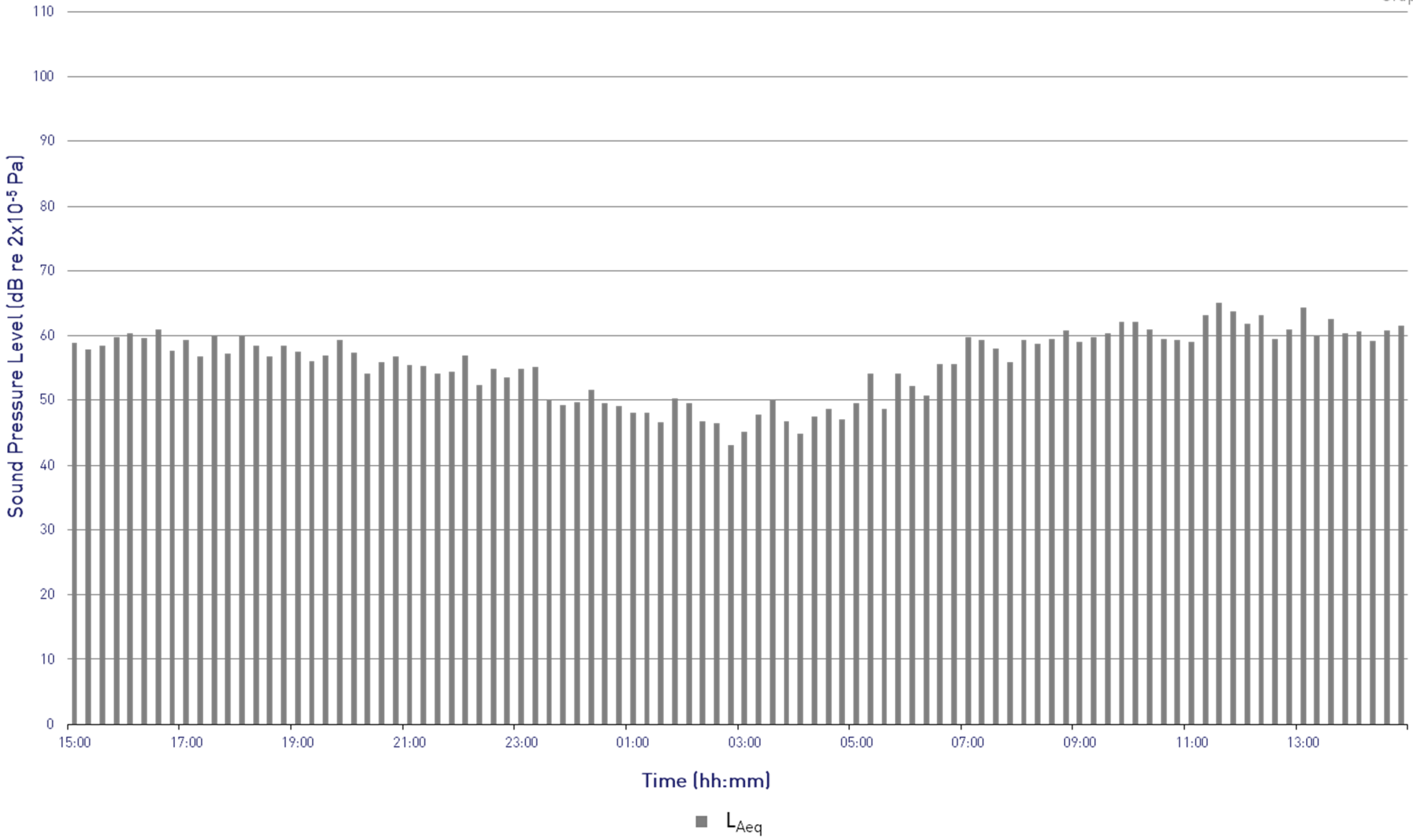
Graph 1



Mary Brancker House, Holmes Road, Kentish Town

$L_{Amax,f}$ and L_{A90} Time History

Position 1, Thursday 24 May to Friday 25 May

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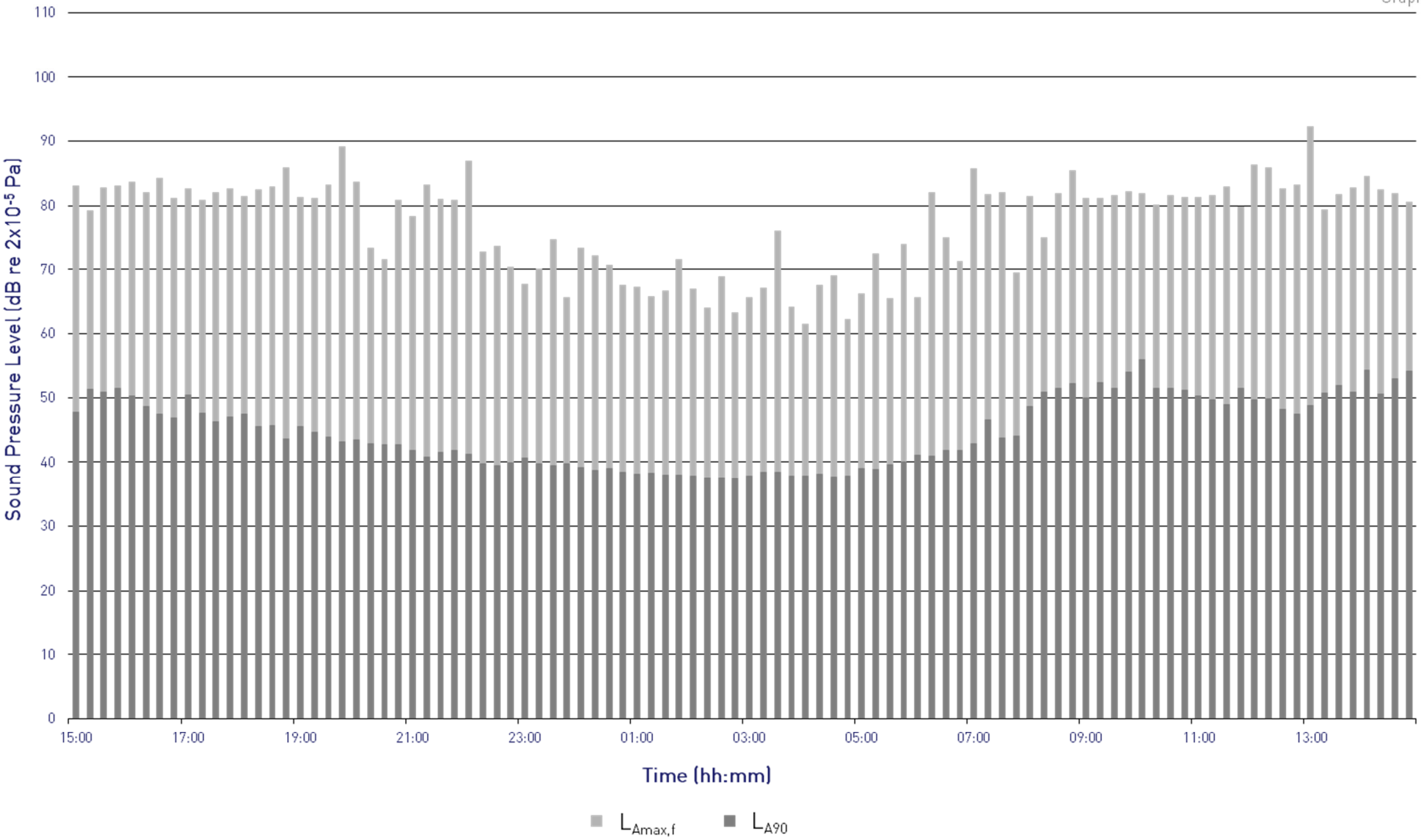
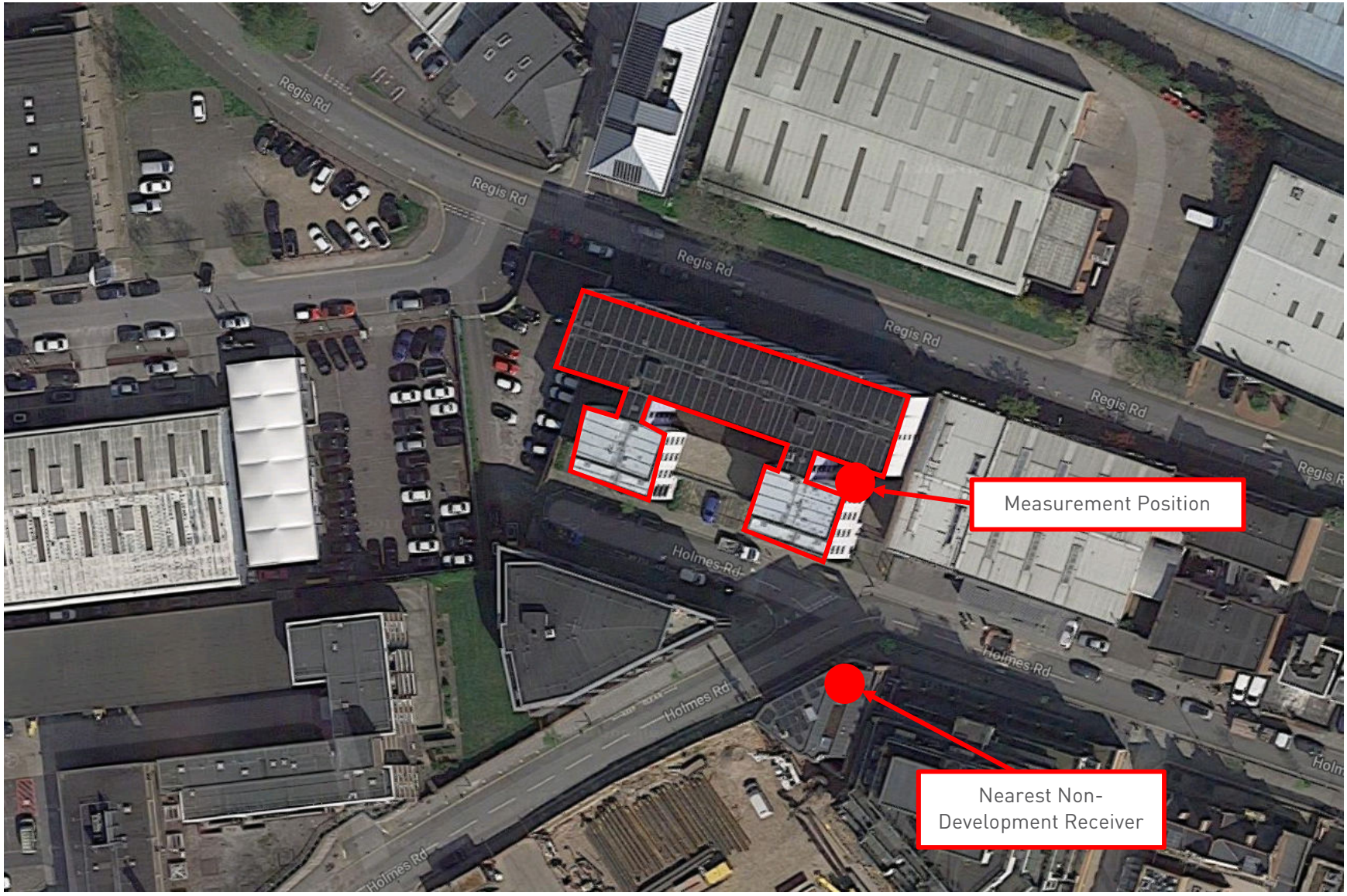
Graph 2





Mary Brancker House, Holmes Road, Kentish Town
Site Plan
Project 8693

Figure 1
22 June 2018
Not to Scale

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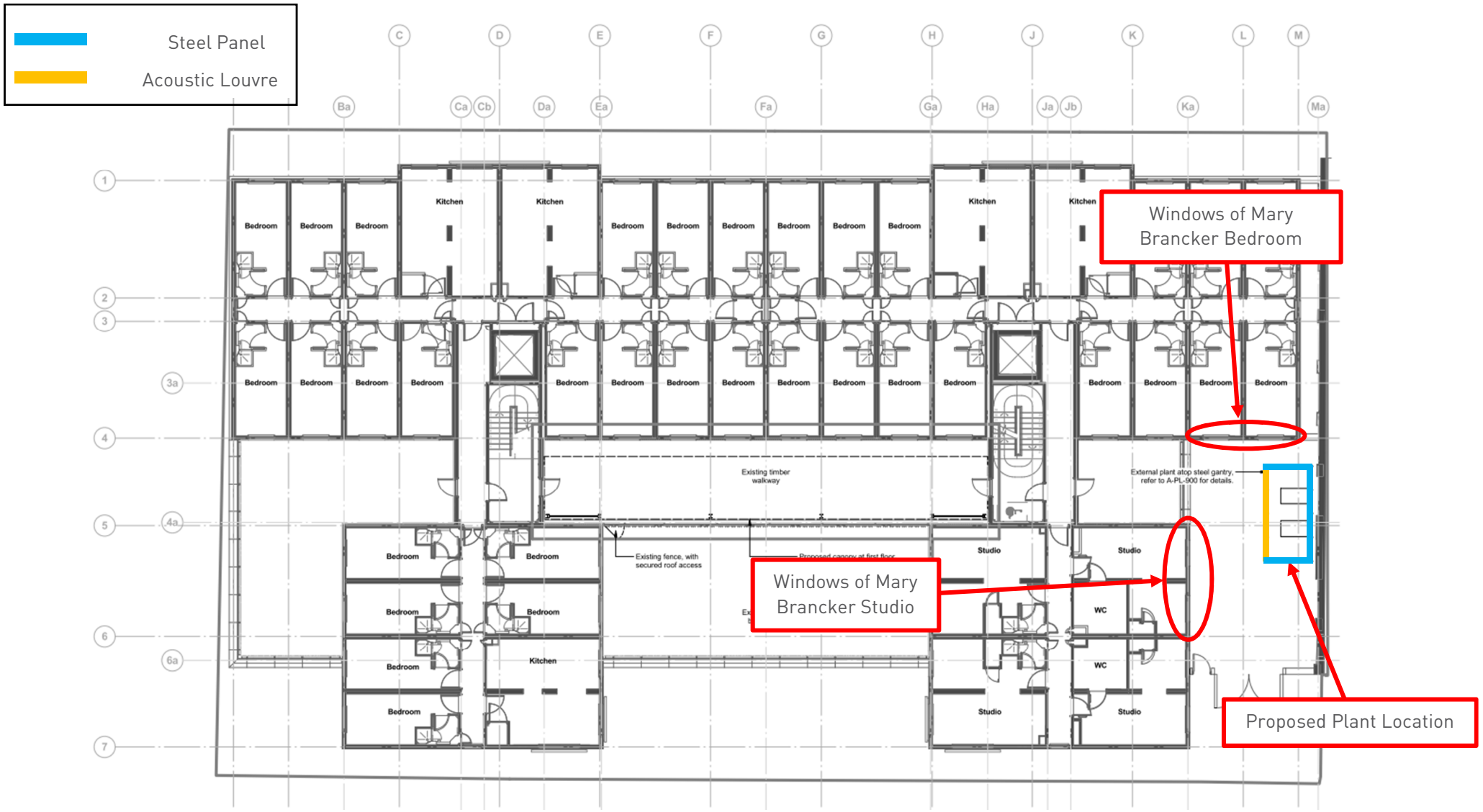

Mary Brancker House, Holmes Road, Kentish Town
Site Plan
Project 8693

Figure 2
22 June 2018
Not to Scale

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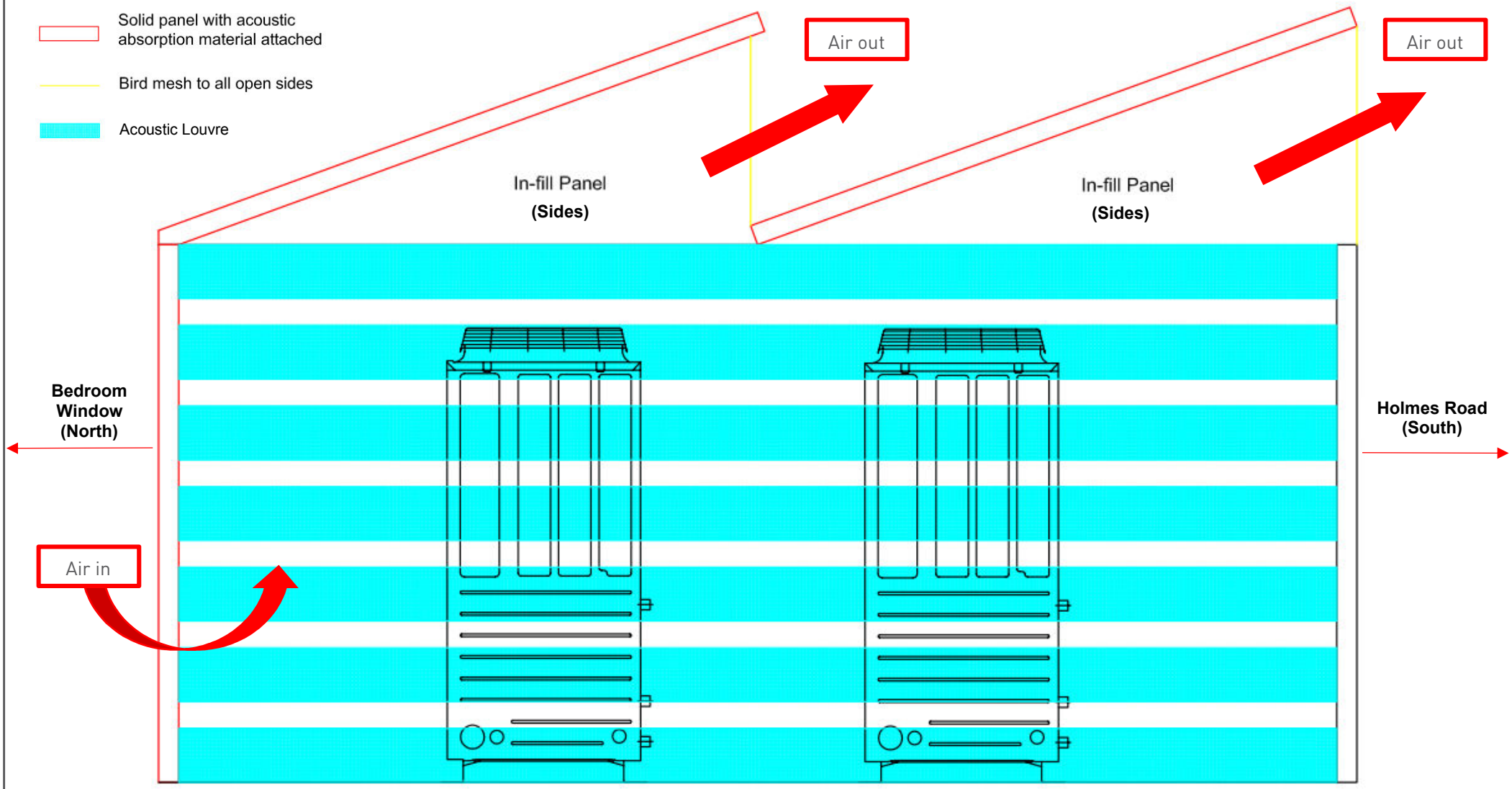

Mary Brancker House, Holmes Road, Kentish Town
Sketch of Plant Enclosure
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Figure 3
22 June 2018
Not to Scale

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