THE MULBERRY SCHOOL, 68 SHOOT UP HILL, LONDON, NW2

Plant Noise Assessment

Reference: 13344.RP01.PNA.0
Prepared: 19 February 2024
Revision Number: 0

The Mulberry House School
68 Shoot Up Hill
London
NW2 3XL

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	19 February 2024	Aaron Moroney	Robert Barlow

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RBA Acoustics Ltd have prepared this report in accordance with our Scope of Work 13344.SW01.0 dated 18 January 2024. RBA Acoustics Ltd shall not be responsible for any use of the report or its contents for any purpose other than that for which it was provided. Should the Client require the distribution of the report to other parties for information, the full report should be copied. No professional liability or warranty shall be extended to other parties by RBA Acoustics Ltd without written agreement from RBA Acoustics Ltd.

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 will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.

RBA ACOUSTICS

LONDON
44 Borough Road
London SE1 0AJ
T. +44 (0) 20 7620 1950

MANCHESTER
Bloc, 17 Marble Street
Manchester, M2 3AW
T. +44 (0) 161 661 4504

Contents

1. INTRODUCTION

It is proposed to locate new items of plant at The Mulberry House School at 68 Shoot Up Hill, London, NW2. As part of the planning application, The London Borough of Camden requires consideration be given to atmospheric noise emissions from the proposed equipment to the nearest noise-sensitive receptors.

RBA Acoustics have been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emission limits 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. SITE DESCRIPTION

The site is bounded by Shoot-Up Hill (A5) to the south-west and Minster Road to the north-west, the former of which is a busy main road. To the north-east and south-east are residential properties and the most dominant existing noise source in and around the site is road traffic on Shoot-Up Hill.

An existing condenser unit is mounted on the external wall in the undercroft on the front façade of The School, at a height of approximately three metres. A new condenser unit is proposed to be mounted directly above or below this unit. The equipment positions are indicated on the site plan in Figure 1 and photograph in Figure 3 in Appendix E.

The nearest residential receptor to the existing and proposed plant is considered to be the building at 70 Shoot-Up Hill, which has direct sight of the plant location.

The site is shown in relation to its surroundings in the site plan in Figure 1 (Appendix E).

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over the following period:

14:15 Friday 2nd February to 14:00 Monday 5th February 2024.

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period. However, based on observations during the site visits and weather reports for the area, conditions were generally considered suitable for obtaining representative noise measurements, being predominantly dry with little wind.

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

3.2 Measurement Location

To determine the existing noise climate around the site measurements were undertaken at the following location:

Measurement Position 1 – Front Playground of The Mulberry House School

A microphone was mounted on a branch of the bush running along the perimeter of the front playground of The Mulberry House School, approximately 2 metres above pavement level. At this position, the noise climate was noted to be completely dominated by road traffic on Shoot-Up Hill (A5).

The measurement position can be considered to be in free field conditions and representative of the noise climate experienced at the buildings surrounding the site, which also overlook the road.

The measurement position is also illustrated on the site plan attached in Figure 1 and photos in Figure 2 (Appendix E).

3.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix B.

The sound level meter was calibrated both prior to and on completion of the survey with no significant calibration drift observed.

3.4 Results

The noise levels measured are shown as time-histories on the attached Graphs 1-2 (Appendix E).

The lowest L_{A90} and the period averaged L_{Aeq} noise levels measured are summarised below.

Table 1 – Measured Baseline Noise Levels

Measurement Period	Lowest Background Noise Level $L_{A90,15min}$ (dB)	Period-Averaged Noise Level $L_{Aeq,T}$ (dB)
Weekdays – 07:00 – 18:00 (hours when school is occupied)	58	68
Weekdays – 18:00 – 07:00 Weekends – all hours (hours when school is unoccupied)	44	67

A summary of acoustic terminology is included in Appendix A.

4. PLANT NOISE CRITERIA

The requirements of The London Borough of Camden's Environmental Health Department regarding new building services plant are understood to typically be as follows, as referenced from Appendix 3 of the Camden Local Plan (2017):

"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."

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:

Table 2 – Plant Noise Limits

Assessment Period	Plant Noise Criteria to be achieved at 1m outside the window of the nearest Noise-Sensitive Receptor (NSR)
Weekdays – 07:00 – 18:00 (hours when school is occupied)	48
Weekdays – 18:00 – 07:00 Weekends – all hours (hours when school is unoccupied)	34

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.

Note that the criteria have been set based on the absolute lowest measured $L_{A90,15mins}$ background noise levels, rather than a typical or modal level – this approach is very much an assessment under worst-case conditions.

5. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided to RBA by The Mulberry House School and is described in the following sections.

5.1 Proposed Plant Items

The following plant is proposed for the scheme:

Table 3 – Plant Types

Ref.	Manufacturer/Model/Duty	Plant Type	Serves	Required Operating Period
CU.01	Midea MA-09N8D0-O	Condenser Unit (existing)	Server room	24-hours
CU.02	Toshiba DI Classic 1 Series (5.6kW) RAV-GV561ATP-E 2 HP	Condenser Unit (proposed)	School kitchen	07:00 – 18:00 weekdays only

As the existing condenser serves the server room, it is required to operate at all hours. The new condenser is to serve the kitchen and thus it is only required to operate during hours when the school will be occupied. These operational periods have been assumed in our assessment.

5.2 Plant Locations

The existing plant is mounted on the external wall in the undercroft, on the front façade of the building looking towards Shoot Up Hill, at a height of approximately three metres. The new unit is proposed to be mounted directly above or below this unit. The equipment positions are indicated on the site plan in Figure 1 and photograph in Figure 3 in Appendix E.

5.3 Plant 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 (dBA)
CU.01 (existing)	L_w	62
CU.02 (proposed)	L_w	63 (cooling) / 65 (heating) *

Octave band data is not available for the proposed units, the single-figure, A-weighted sound power levels have therefore been used in the assessment. For assessment purposes, CU.02 has been assumed to operate in heating mode as worst-case.

5.4 Location of the Nearest Noise-Sensitive Receptors

Based on observations made on site and discussions with the design team we understand the nearest noise-sensitive receptors to the proposed plant to be as follows:

Receptor 1 – Residential Building at 70 Shoot Up Hill

70 Shoot Up Hill is located directly opposite the site across Minster Road, approximately 20 metres north-west from the proposed plant location.

The receptor is shown in the site plan in Figure 1 in Appendix E.

5.5 Calculation of Noise Levels at Nearest Noise-Sensitive Receptors

Our calculation method for predicting noise levels from the proposed external plant at the nearest noise-sensitive receptors, based on the information above, is summarised below.

- Source Term SWL
- Radiation
- Distance Attenuation
- Reflections

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 5 – Predicted Plant Noise Levels

Operating Period	Prediction (dBA)	Criterion (dBA)
Weekdays – 07:00 – 18:00 (hours when school is occupied)	33	48
Weekdays – 18:00 – 07:00 Weekends – all hours (hours when school is unoccupied)	28	34

Noise from the proposed / installed plant installations is within the target criteria.

Noise from condenser units is typically not tonal. However, if tonal features were present, we would not expect these features to be audible at the receptor, given that the received noise levels are comfortably compliant with the target criteria, which are already 10dB below the lowest existing background noise levels measured on site.

6. 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 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. CONCLUSION

RBA Acoustics have undertaken noise monitoring at The Mulberry House School at 68 Shoot Up Hill, London, NW2. The measured noise levels are presented within this report. The resultant noise levels have been used to determine the required criteria for atmospheric noise emissions from the proposed plant installations.

The results of the assessment indicate atmospheric noise emissions from the proposed plant are within the criteria required by The London Borough of Camden. As such, the proposed plant installations should be considered acceptable in terms of noise.

Provided the above mitigation measures are included in the design and installation, the results of the assessment indicate atmospheric noise emissions from the proposed plant are within the criteria required by The London Borough of Camden and, as such, can be considered acceptable in terms of noise.

Appendix A – Acoustic Terminology

A-weighting (e.g. dB(A))	A correction applied across the frequency bands to take into account the response of the human ear, and therefore considered to be more representative of the sound levels people hear.
DeciBel (dB)	Unit used for many different acoustic parameters. It is the logarithmic ratio of the level being assessed to a standard reference level.
L_{eq}	The level of a notional steady sound which, over a stated period of time, *T*, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
$L_{Aeq,T}$	The A-weighted level of a notional steady sound which, over a stated period of time, *T*, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
L_{An} (e.g. L_{A10}, L_{A90})	The sound level exceeded for n% of the time. E.g. L_{A10} is the A-weighted level exceeded for 10% of the time and as such can be used to represent a typical maximum level. Similarly, L_{A90} is the level exceeded for 90% of the measurement period, and is often used to describe the underlying background noise.
$L_{Amax,T}$	The instantaneous maximum A-weighted 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, e.g. sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the ambient level.
NR	Noise Rating – A single figure term to describe a measured noise level which considers the frequency content of the noise, generally used for internal noise level measurements (particularly mechanical services plant).

Appendix B – Instrumentation

The following equipment was used for the measurements.

Table B1– Equipment Calibration Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1407477	U45669	18 October 2025
Norsonic Pre Amplifier	1209	22341		
Norsonic ½" Microphone	1225	358196	45668	
Norsonic Sound Calibrator	1255	125525259	U45667	18 October 2025

Appendix C – Plant Calculations

Table C1 – Example Calculation, CU.02

Parameter	dBA
Sound power level	**65**
Conversion to sound pressure level	-11
Reflection from mounting wall	+3
Distance losses at 20m	-26
Noise level at receiver	31

Table C2 – Summary Noise Levels

Unit	Received noise level (dBA) at 1m from Noise Sensitive Receptor
CU.01	28
CU.02	31
Total Received Level	**33**

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 for more than 3 days)
4 – Serious (e.g. fracture, hospitalisation for more than 24 hours, incapacitation for more than 4 weeks)
5 – Fatal (single or multiple)

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

Table D1 – Risk Ratings

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:

Table D2 – Risk Assessment

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Vibration Isolators	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3

L: Likelihood S: Severity R: Rating

Appendix E – Graphs and Site Plans

68 Shoot Up Hill, London, NW2

L_{Aeq} Time History

Measurement Position 1 - front playground

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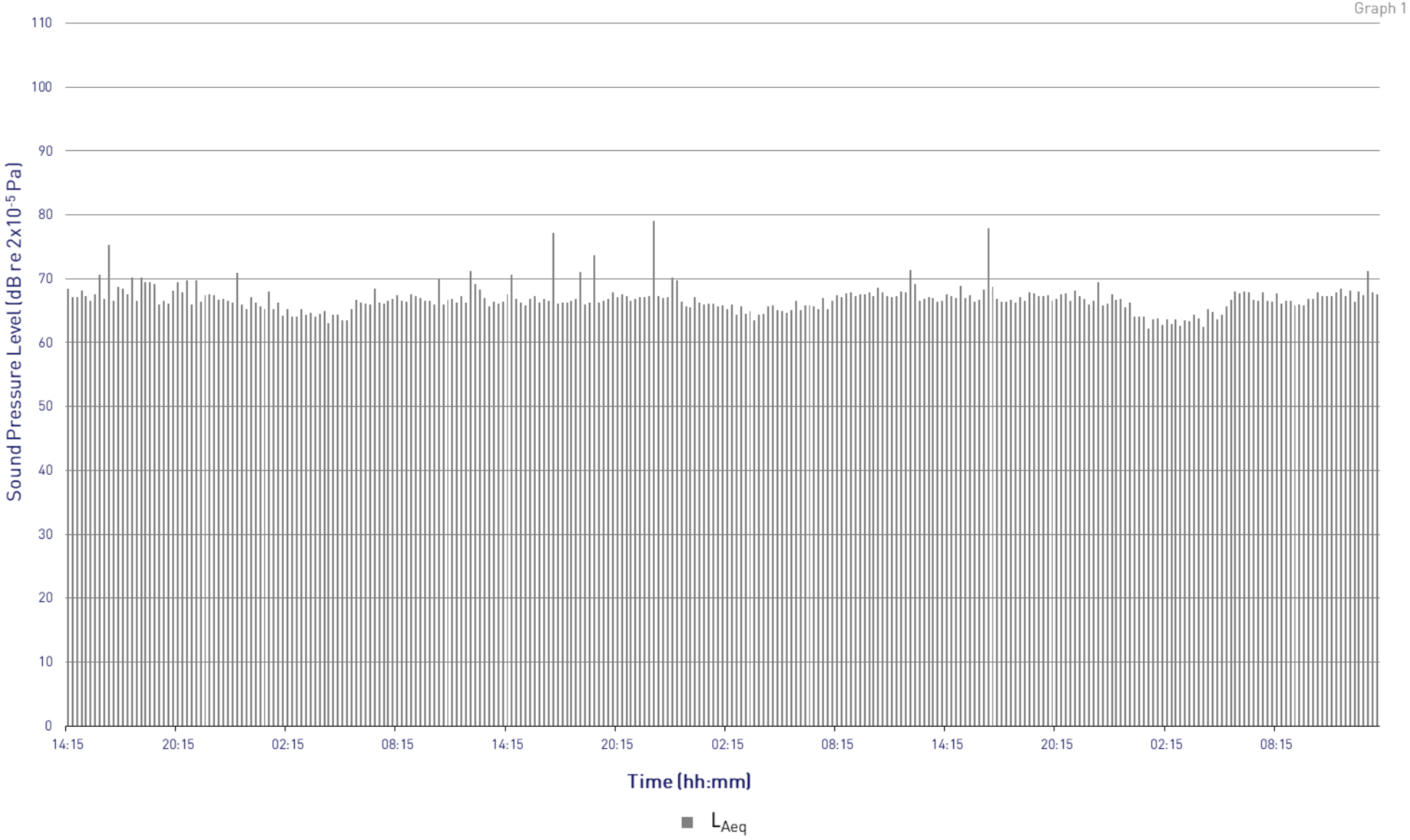
Graph 1



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

Measurement Position 1 - front playground

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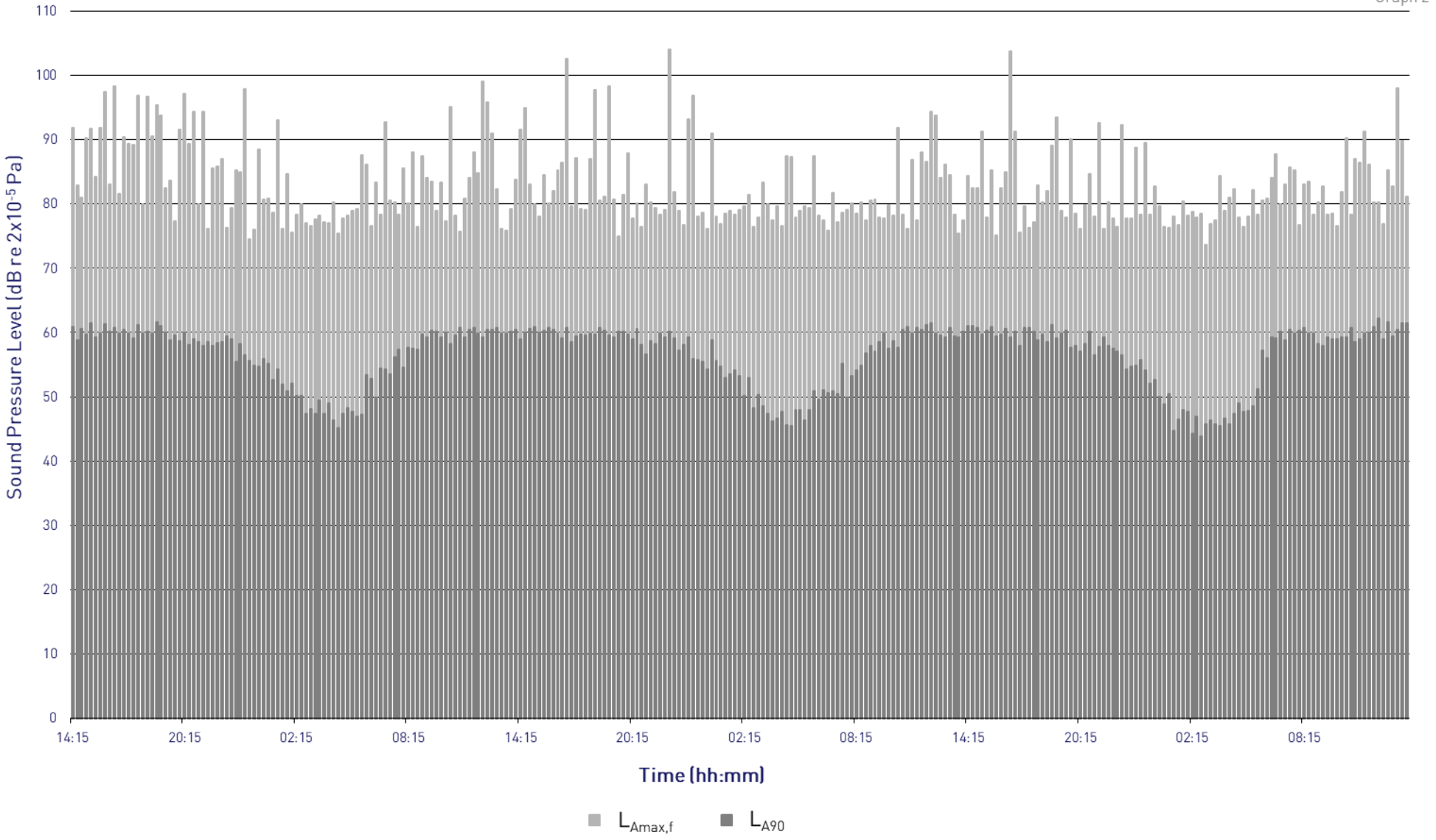
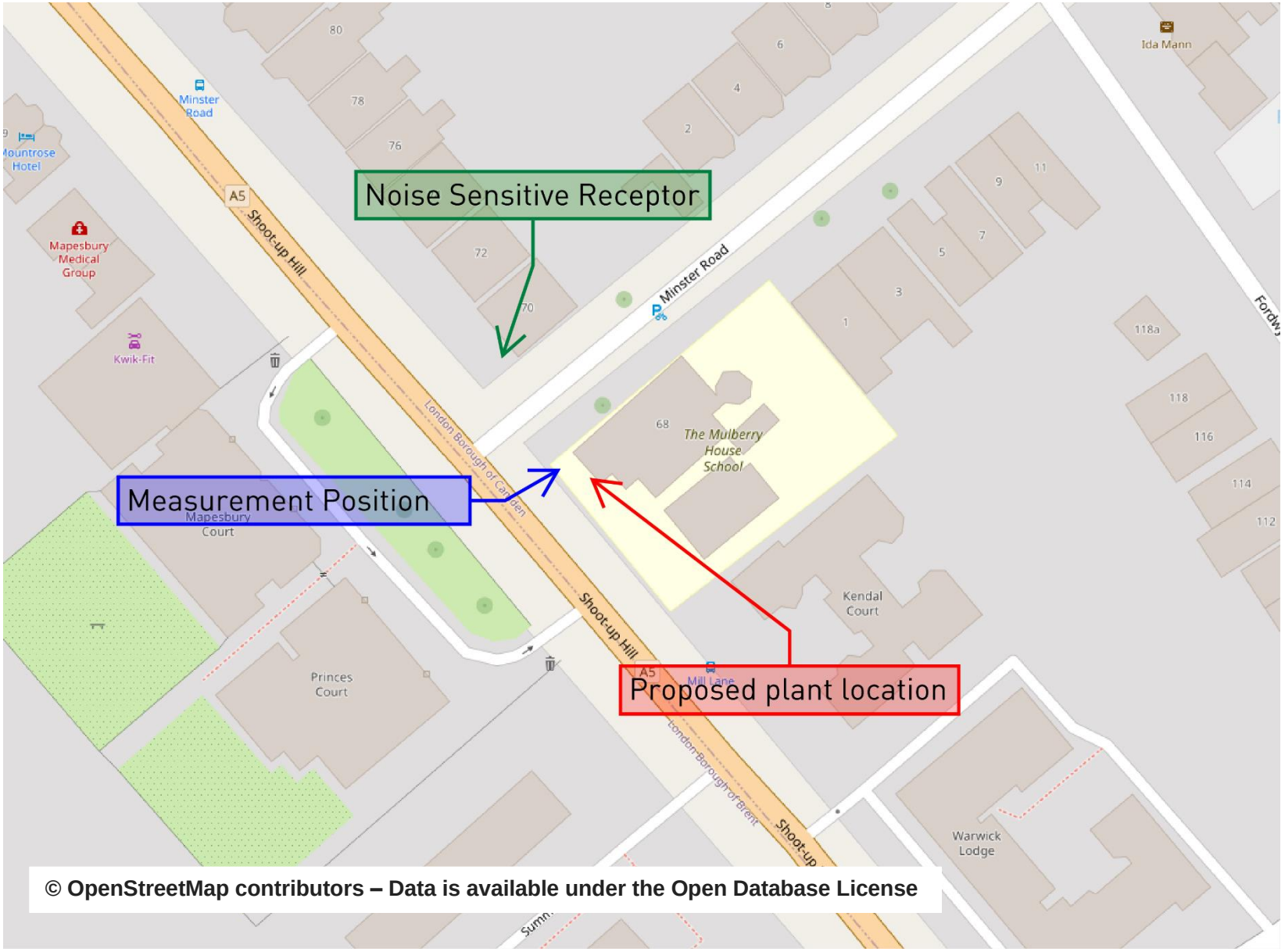
Graph 2





The Mulberry School, 68 Shoot Up Hill, London, NW2

Site Plan

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Figure 1

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Not to Scale

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The Mulberry School, 68 Shoot Up Hill, London, NW2

Photograph of Measurement Position

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Figure 2

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Not to Scale

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The Mulberry School, 68 Shoot Up Hill, London, NW2

Photograph of Existing Condenser Unit and Proposed Location for New Unit

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Figure 3

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Not to Scale

RBA ACOUSTICS

RBA ACOUSTICS
W. www.rba-acoustics.co.uk
E. info@rba-acoustics.co.uk

London:
44 Borough Road
London SE1 0AJ
T. +44 (0) 20 7620 1950

Manchester:
Bloc, 17 Marble Street
Manchester M2 3AW
T. +44 (0) 161 661 4504