200 GRAY'S INN ROAD, LONDON

Plant Noise Assessment

Reference: 11635.RP01.PNA.0
Prepared: 15 February 2022
Revision Number: 0

C McCaffrey Esq.
Tate Stevenson Architects Ltd.
Unit 1A Rawdon Court
Main Street
Moira
Co. Down
BT67 0LQ

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	15 February 2022	Matt Wildman	Russell Richardson

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RBA Acoustics Ltd have prepared this report in accordance with our Scope of Work 11635.SW01.0 dated 17 January 2022. 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

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1. INTRODUCTION

It is proposed to locate new items of plant at 200 Gray's Inn Road, London. As part of the planning application, Camden Council requires consideration be given to atmospheric noise emissions from the proposed equipment to the nearest noise-sensitive receptors.

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

A summary of acoustic terminology is included in Appendix A.

2. SITE DESCRIPTION

Gray's Inn Road (A5200) runs along the front of the building and has an almost constant traffic flow. Coley Street, Elm Street and Gough Street to the side and rear of the building experience only occasional vehicle movements, primarily being used by pedestrians, although noise from Gray's Inn Road is clearly audible around the building.

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:

16:00 Wednesday 2 February to 15:00 Monday 7 February 2022.

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 – Rear of Building

Measurements were taken at the north corner of 200 Gray's Inn Road with the microphone positioned on an A-Frame overlooking Gough Street, extended 1m away from the building façade at roof level. The noise climate at this location was noted to consist of traffic noise from the surrounding road network and noise from existing items of plant on the roof of the building and the adjacent building.

Construction associated with roadworks on Gough Street as well as development of the building across the road was noted to be occurring during our attendance on site. Further liaison with site personnel as well as review of the survey data revealed that construction occurs from approximately 08:00 until 18:00 from Monday to Friday and 08:00 – 13:00 on Saturday.

Although noise from these activities dominated the noise climate as this position, the minimum L_{A90} levels measured for daytime have not been affected by these activities and, as a result, are reflective of the typical background noise climate when construction is not occurring.

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 in Table 1.

Table 1 – Measured Levels

Measurement Period	Position 1 – Rear of Building	
	Lowest $L_{A90,15min}$ (dB)	L_{Aeq} (dB)
Daytime (07:00 – 23:00)	54	63
Night-time (23:00 – 07:00)	54	56

4. PLANT NOISE CRITERIA

The requirements of Camden Council's Environmental Health Department regarding new building services plant are outlined in the Camden Local Plan (2017):

> *"[...] 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:

- Daytime (07:00 to 23:00) 44 dBA
- Night-time (23:00 to 07:00) 44 dBA

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 residential adjacencies and alternative criteria should be incorporated if there are also commercial properties affected by the proposed plant installations.

5. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided to RBA Acoustics by Tate Stevenson Architects Ltd and is described in the following sections.

5.1 Proposed Plant Items

The following plant is proposed for the scheme:

Table 2 – Plant Types

Ref.	Manufacturer/Model/Duty	Plant Type
CU1	Daikin REYQ18-U	Air Conditioning Unit
CU2	Daikin REYQ18-U	Air Conditioning Unit
CU3	Daikin REYQ18-U	Air Conditioning Unit
CU4	Daikin REYQ18-U	Air Conditioning Unit

5.2 Plant Locations

It is proposed to locate 4No. Daikin REYQ18-U Units on the roof of the building, to the northeast, alongside various other existing items of plant. The approximate equipment positions are indicated on the site plan in Figure 1 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 3 – Plant Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Daikin REYQ18-U	L_p at 1m	68	64	60	60	56	53	53	46

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

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 – Postmark

The nearest residential receptors have been identified as the flats occupying the highest floor of the Taylor Wimpey Postmark development at 12 Mount Pleasant overlooking Gough Street, the closest windows of which are directly opposite the proposed plant location approximately 26m away. Due to a lower building height considerable screening will be provided by both the roof edge and stair core of 200 Gray's Inn Road.

The receptors are 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 plant at the nearest noise-sensitive receptors, based on the information above, is summarised below.

- Source Term L_p
- Distance Attenuation
- Directivity
- Reflections
- Screening

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 4 – Predicted Noise Levels

Operating Period	Noise Level (dB) at Receptor 1 – Postmark	
	Prediction	Criterion
Daytime (07:00 – 23:00)	35	44
Night-time (23:00 – 07:00)	35	44

Noise from the proposed plant installations is below the criterion and therefore no mitigation is required.

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 200 Gray's Inn Road, London. 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 Camden Council. As such, the proposed plant installations should 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.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1407793	4712338926	9 December 2023
Norsonic Pre Amplifier	1209	23228		
Norsonic ½" Microphone	1225	468954		3 December 2023
Norsonic Sound Calibrator	1255	125525796	Cal 022-2021-14779	8 December 2023

Appendix C – Plant Calculations

Table C1 – Example Calculation, CU1

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
L_p at 1m	68	64	60	60	56	53	53	46	62
Reflections	+3	+3	+3	+3	+3	+3	+3	+3	-
Screening	-5	-6	-6	-7	-9	-11	-14	-17	-
Distance losses to 26m	-28	-28	-28	-28	-28	-28	-28	-28	-
Noise level at receiver	38	33	29	28	22	17	14	4	29

Table C2 – Summary Noise Levels

Unit	Received noise level (dB) at 1m from Receptor 1
CU1	29
CU2	29
CU3	29
CU4	29
Total Received Level	35

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

200 Grays Inn Road

L_{Aeq} Time History

Measurement Poisiton 1 - Rear of Building, Wednesday 2nd February to Monday 7th January 2022

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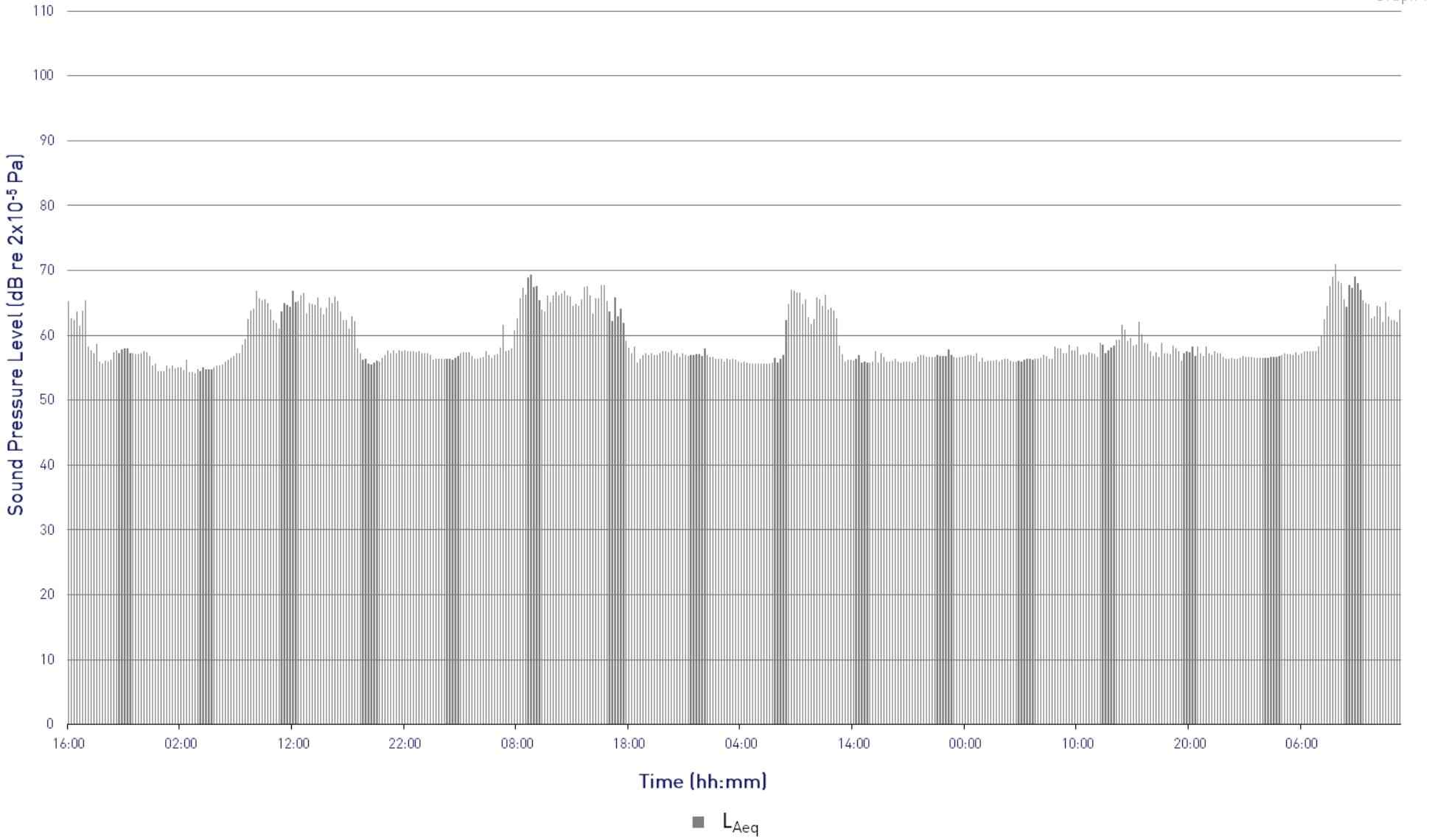
Graph 1



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

Measurement Poisiton 1 - Rear of Building, Wednesday 2nd February to Monday 7th January 2022

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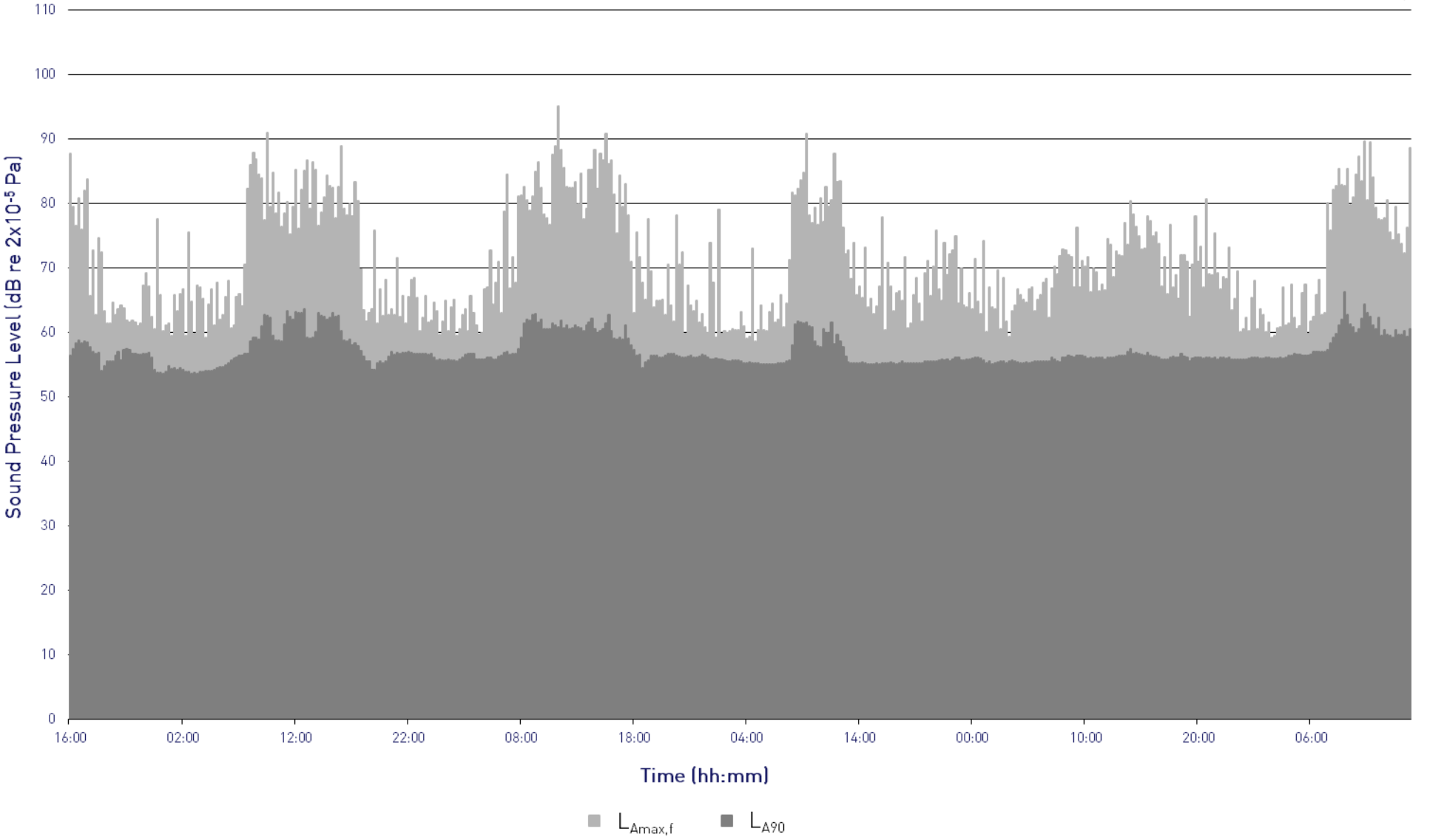
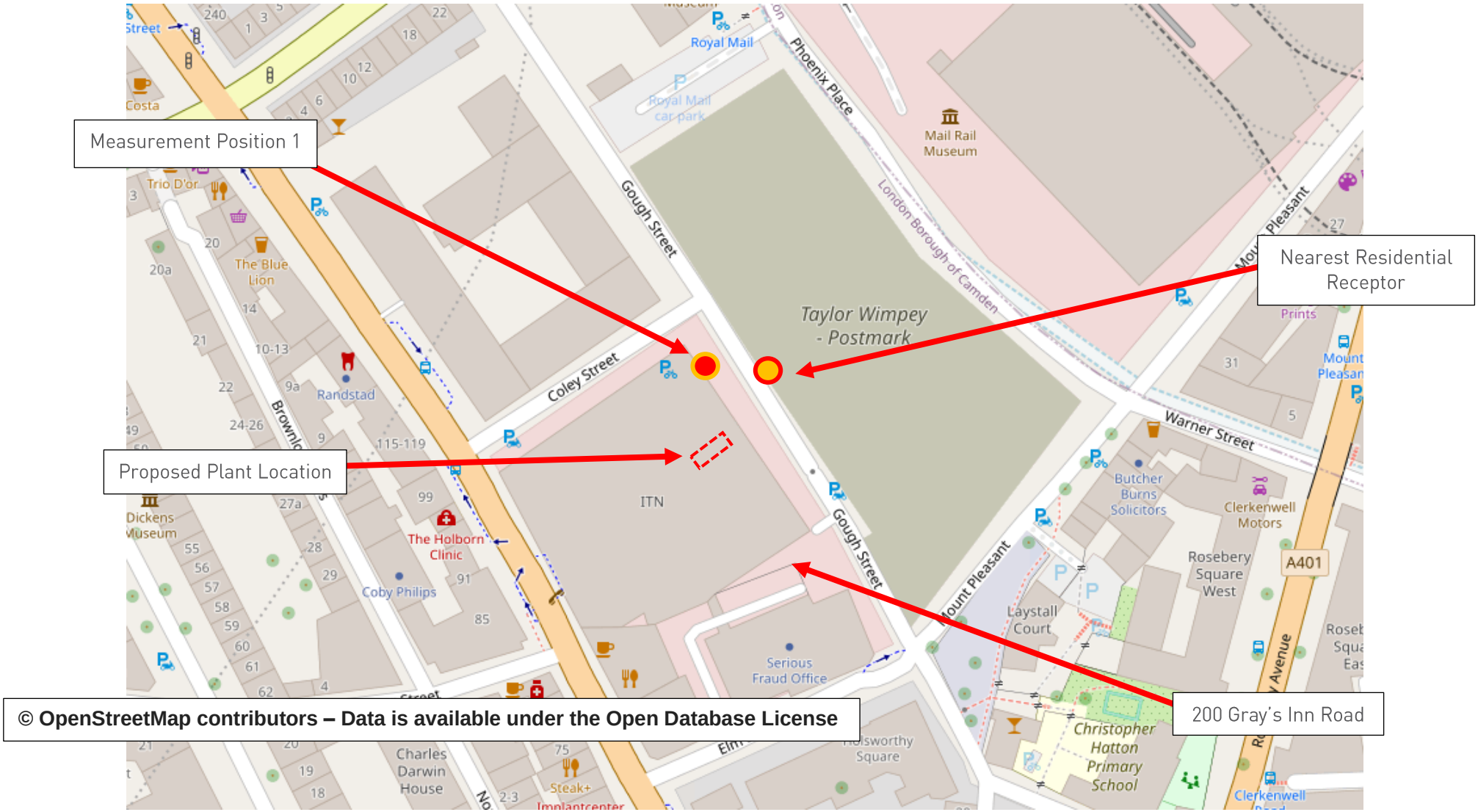
Graph 2





200 Gray's Inn Road, London

Site Plan (Approximate)

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Figure 1

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Not to Scale

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200 Gray's Inn Road, London

Photograph showing measurement position

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Figure 2

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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