RBA ACOUSTICS

# 55 FRAZIER STREET, LONDON SE1 7FL

## Plant Noise Assessment

Reference: 10765.RP01.PNA.0
Prepared: 29 January 2021
Revision Number: 0

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# Plant Noise Assessment

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| Revision | Comment | Date | Prepared By | Approved By |
|---|---|---|---|---|
| 0 | First issue of report | 29 January 2021 | Maxim Billingham | Callum Brewer |
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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.

In line with our Environmental Policy, up to two hard copies of the report will be provided upon request. Additional copies of the report, or further hard copies of revised reports, would be subject to an administrative cost of £20.00 (+VAT) per copy.

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# 1.0 INTRODUCTION

RBA Acoustics has been appointed to undertake a noise impact assessment in relation to the proposal to install new items of plant on the roof of the third-floor level of 55 Frazier Street, London SE1 7FL to service the corresponding property.

As part of the noise impact assessment, the London Borough of Lambeth requires that consideration be given to atmospheric noise emissions from the proposed equipment at the nearest noise-sensitive property.

This report provides the details of an environmental sound monitoring survey undertaken at the east corner of the property and the details and results of an assessment in accordance with the requirements of the London Borough of Lambeth in relation to the likely impact of noise from the proposed items of plant on the nearby noise sensitive properties.

The report occasionally employs technical terminology. In order to assist the reader, a glossary of terms is presented in Appendix A.

# 2.0 SITE DESCRIPTION

The building at 55 Frazier Street, London SE1 7FL is a four-storey building located within a mixed-use area. The building itself comprises the commercial clinic at the ground floor level with private residential apartments on the subsequent upper levels. The site is bounded by Frazier Street to the east and Lower Marsh to the north. The site is adjacent to NOX Hotel to the west and a communal area belonging to the nearby residential block of flats on the south. Across the Frazier Street to the east of the site is located Oasis Academy Johana primary school.

The new items of plant are proposed to be installed on the roof of an apartment on the third-floor level, overlooking the Frazier Street to the east of the building.

The closest residential receptors to the proposed plant location are located on the fourth floor of 25 Lower Marsh (NOX Hotel), at approximately 5m, and the fourth floor of 27A Lower Marsh, at approximately 15m.

A plan of the site showing the location of the site and the nearest noise sensitive receptors is illustrated in Figure 1 in Appendix B.

# 3.0 ENVIRONMENTAL NOISE SURVEY

## 3.1 General

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

14:00 hours, Thursday 21 January to 13:00 hours, Friday 22 January 2021

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.

## 3.2 Measurement Locations

Measurements were undertaken with the microphone positioned on a pole attached to the tripod on the third-floor level summer terrace at a height of approximately 12m above the pavement level, towards the east of 55 Frazier Street building.

This measurement position was considered as being representative of the noise climate as experienced at the closest residential receptors to the proposed plant. The prevailing noise climate was noted to be dominated by the traffic and pedestrian along Frazier Street, Lower Marsh and Baylis Road. The occasional train noise from the Waterloo station were also noted to contribute to the noise climate.

The measurement position is also illustrated on the site plan in Figure 1 and Figure 3 in Appendix B.

## 3.3 Instrumentation

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

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

# 4.0 RESULTS

In order to ensure a worst-case assessment, the typical-lowest background $L_{A90}$ noise levels measured have been used in our analyses.

*"Typical-Lowest" Background Levels*

When considering the existing background levels of a site, BS 4142:2014, Methods for Rating and Assessing Industrial and Commercial Sound" recommends assessing to the "typical" measured $L_{A90,\ 15mins}$ background levels, BS 4142:2014 goes on to state:

> *"In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."*

BS 4142:2014 suggests that statistical analysis is a suitable method to determine the "typical" background level. This can be carried out by calculating the level of the most-commonly occurring $L_{A90,\ 15mins}$ period during the proposed operating hours of equipment.

We generally consider that designing to the most-commonly occurring $L_{A90,\ 15mins}$ period is not sufficient during those slightly quieter periods. In our opinion, a more representative value would be the "typical-lowest" level, which can be determined statistically as the lowest rounded $L_{A90,\ 15mins\ level}$ which occurs for at least 10% of the assessment period.

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

Table 1 – Measured Levels

| Measurement Period | Typical-lowest measured $L_{90,\ 15\ minutes}$ (dBA) | Average Measured $L_{eq,\ 15\ minutes}$ (dBA) |
|---|---|---|
| Daytime (07:00 – 23:00) | 48 | 56 |
| Night-time (23:00 – 07:00) | 45 | 51 |

The noise levels at the measurement positions are shown as time-histories on the attached Graphs 1 and 2 in Appendix B.

# 5.0 CRITERIA

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

> *"Noise from any mechanical equipment or building services plant, as measured in accordance with BS4142: 2014, shall not exceed the background noise level LA90,15minutes dB, when measured outside the window of the nearest noise sensitive or residential premises."*

With regards to this statement, any proposed new building services plant should be designed such that the cumulative noise generated by the units is at least 10dB below the existing background noise level $L_{A90}$ 15 minute sample during operational hours, as measured at 1m outside the nearest noise-sensitive residential window.

- Daytime 38dBA
- Night-time 35dBA

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.

# 6.0 ASSESSMENT

Our assessment has been based upon the following information:

## 6.1 Proposed Plant Items

Table 2 – Plant Information

| Ref. | Manufacturer/Model/Duty | Plant Type |
|---|---|---|
| CU.01 | Daikin 5MXM90N | Condenser A/C Unit |

The equipment position is indicated on the site plan in Figure 2 in Appendix B.

## 6.2 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) | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | dBA |
| AHU.01 (cooling) | $L_p$ at 1m | 57 | 56 | 55 | 51 | 46 | 41 | 35 | 26 | 52 |
| AHU.01 (heating) | $L_p$ at 1m | 54 | 57 | 55 | 51 | 46 | 41 | 35 | 28 | 52 |

In order to provide a worst-case assessment, the noise data used for heating mode operation has been used as noise produced when the unit operates in this mode is higher.

## 6.3 Affected Receptors

*Receptor 1*

The closest residential window to the plant location is understood to be the fourth-floor level window belonging to NOX Hotel located at 25 Lower Marsh, at 5m distance to the south of the proposed plant area.

*Receptor 2*

The closest residential window to the plant location is understood to be the fourth-floor level window belonging to 27A Lower Marsh, at 15m distance to the north-east of the proposed plant area.

The above receptors are shown in the attached site plan in Figure 1.

## 6.4 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 $L_p$
- 20LogR distance attenuation
- Acoustic screening from the façade of the building
- Reflections

Calculation sheets are attached for further information in Appendix D.

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

Table 4 – Predicted Noise Levels

| Operating Period | Predicted Worst-case noise level at nearest noise sensitive receptor window ($LA_{eq,T}$ dBA) | | | |
|---|---|---|---|---|
| | Receptor 1 | | Receptor 2 | |
| | Prediction | Criterion | Prediction | Criterion |
| Daytime (07:00 – 23:00) | 27 | 38 | 32 | 38 |
| Night-time (23:00 – 07:00) | 27 | 35 | 32 | 35 |

Noise from the proposed unit at the lightwell of the property is within the target criteria required by the London Borough of Lambeth. Therefore, no mitigation is required.

# 7.0 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 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.

# 8.0 CONCLUSION

RBA Acoustics has undertaken a noise impact assessment in relation to the proposal to install new items of plant on the roof of an apartment on the third-floor level of 55 Frazier Street, London SE1 7FL.

Baseline environmental sound monitoring was undertaken at the site between Thursday 21 January to Friday 22 January 2021 in order to determine the typically prevailing background sound levels at the nearest noise sensitive properties to the site. The nearest affected residential properties to the site are understood to be 25 Lower Marsh and 27A Lower Marsh.

Based on the background noise measurements undertaken and the provided plant noise data an assessment in accordance with the London Borough of Lambeth's requirements has been undertaken.

Based on the above, the results of our assessment suggest that noise levels from the new proposed items of plant at 55 Frazier Street are within the criteria required by Lambeth's council and no further mitigation is required.

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# 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 – Graphs and Site Plans

55 Frazier Street

$L_{Aeq}$ Time History

Measurement Position 1, Thursday 21st January to Friday 22nd January 2021

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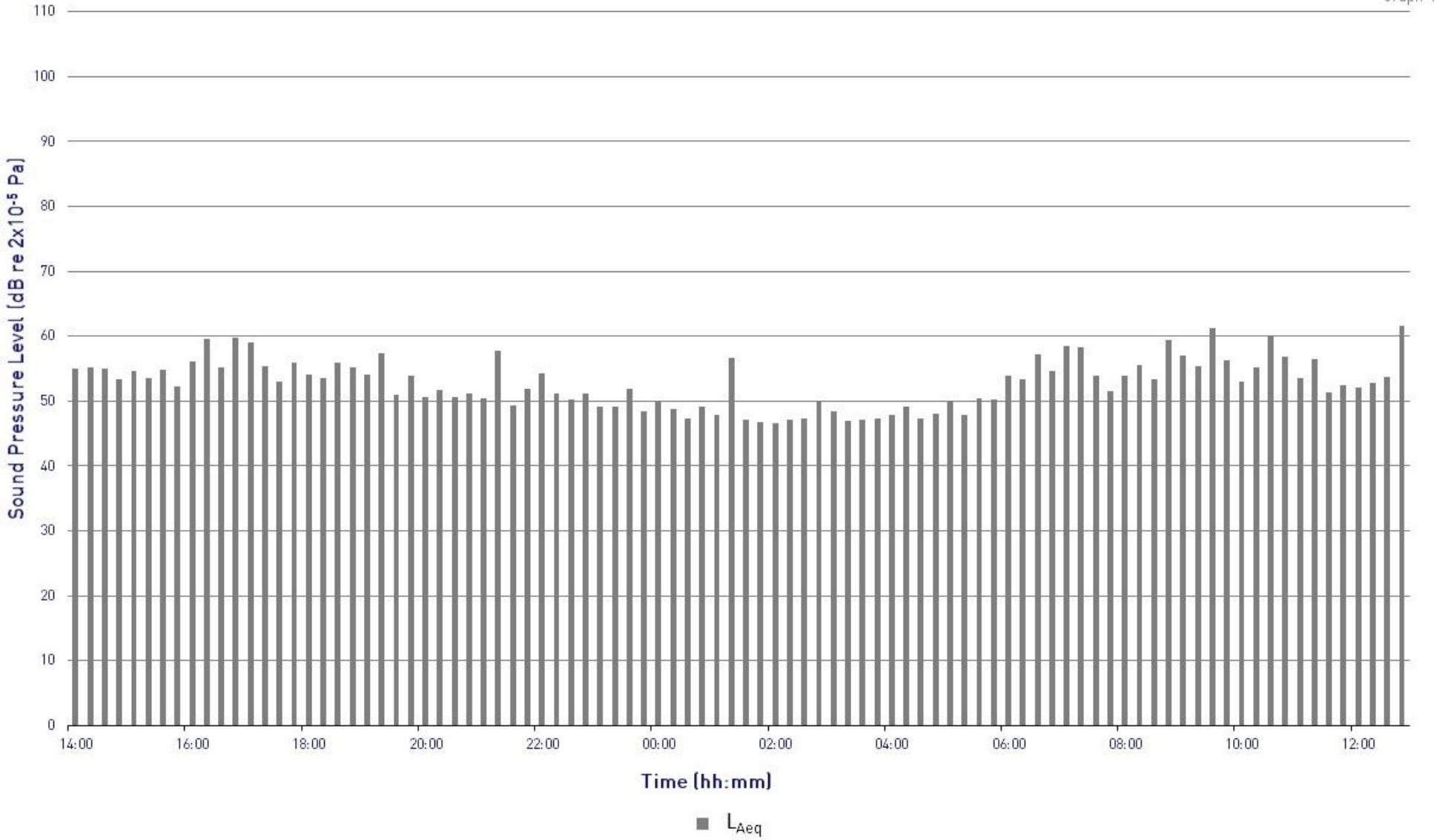
Graph 1



55 Frazier Street

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

Measurement Position 1, Thursday 21st January to Friday 22nd January 2021

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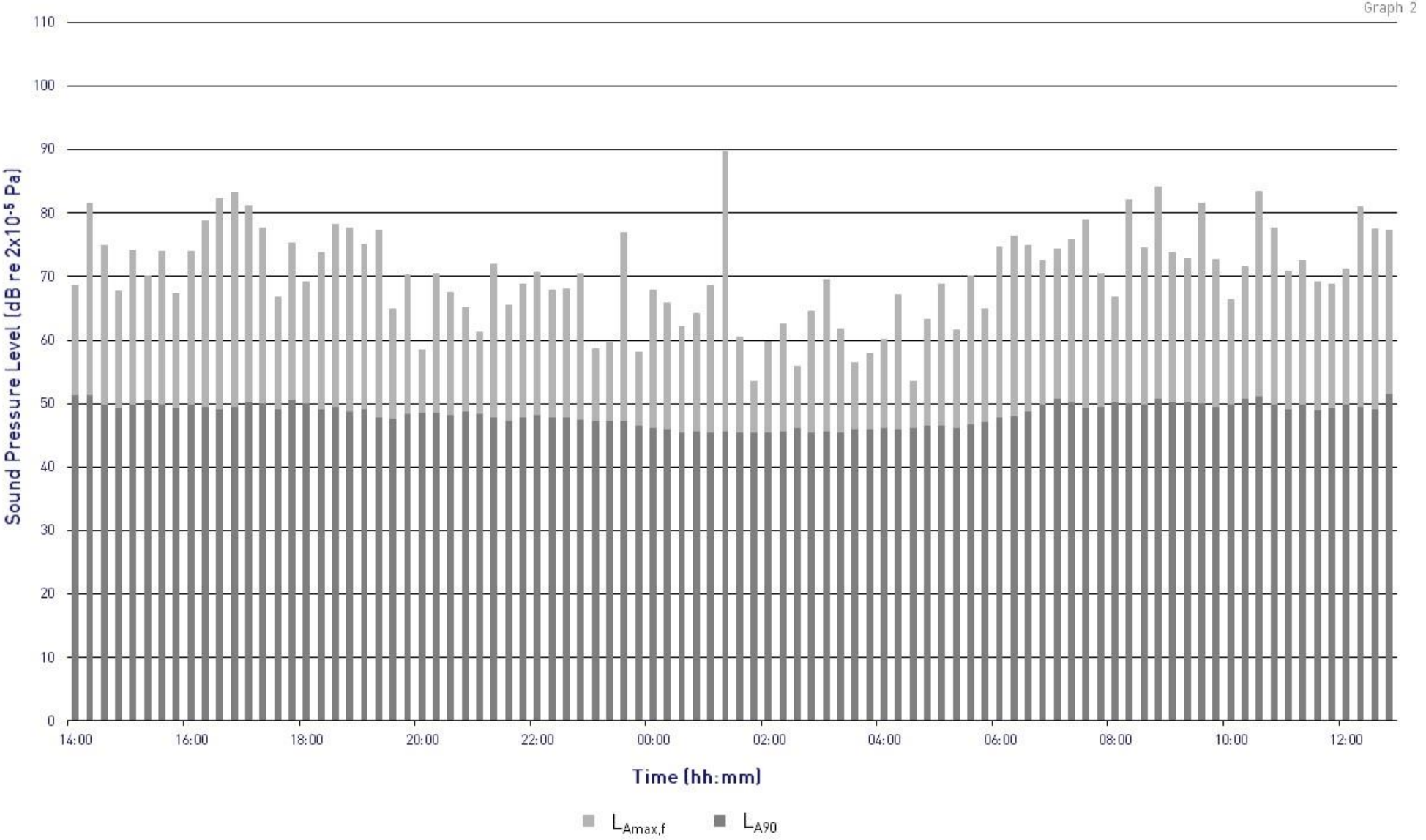
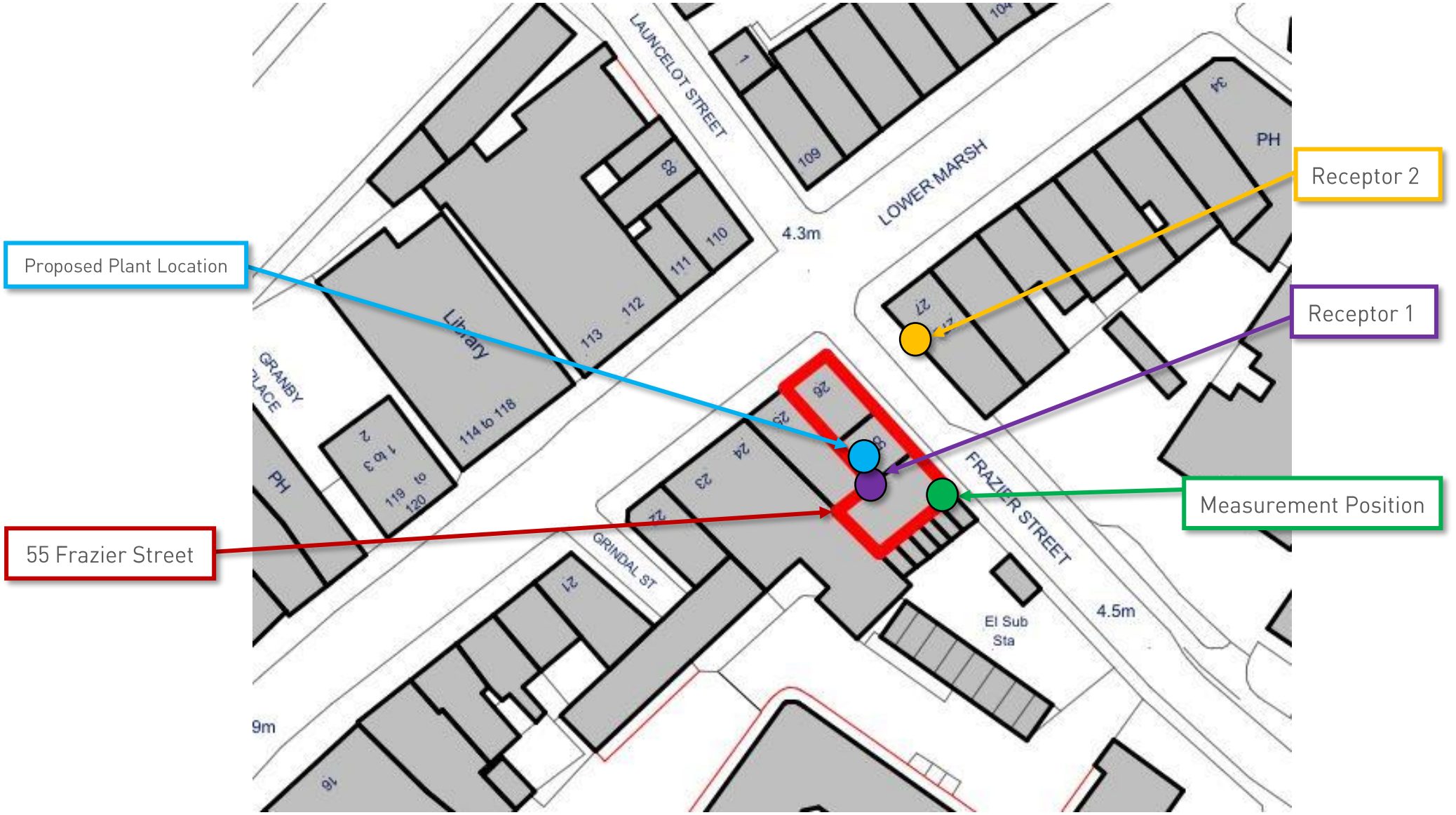
Graph 2






55 Frazier Street, London SE1 7FL
Site Plan showing the measurement position
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Figure 1
29 January 2021
Not to Scale

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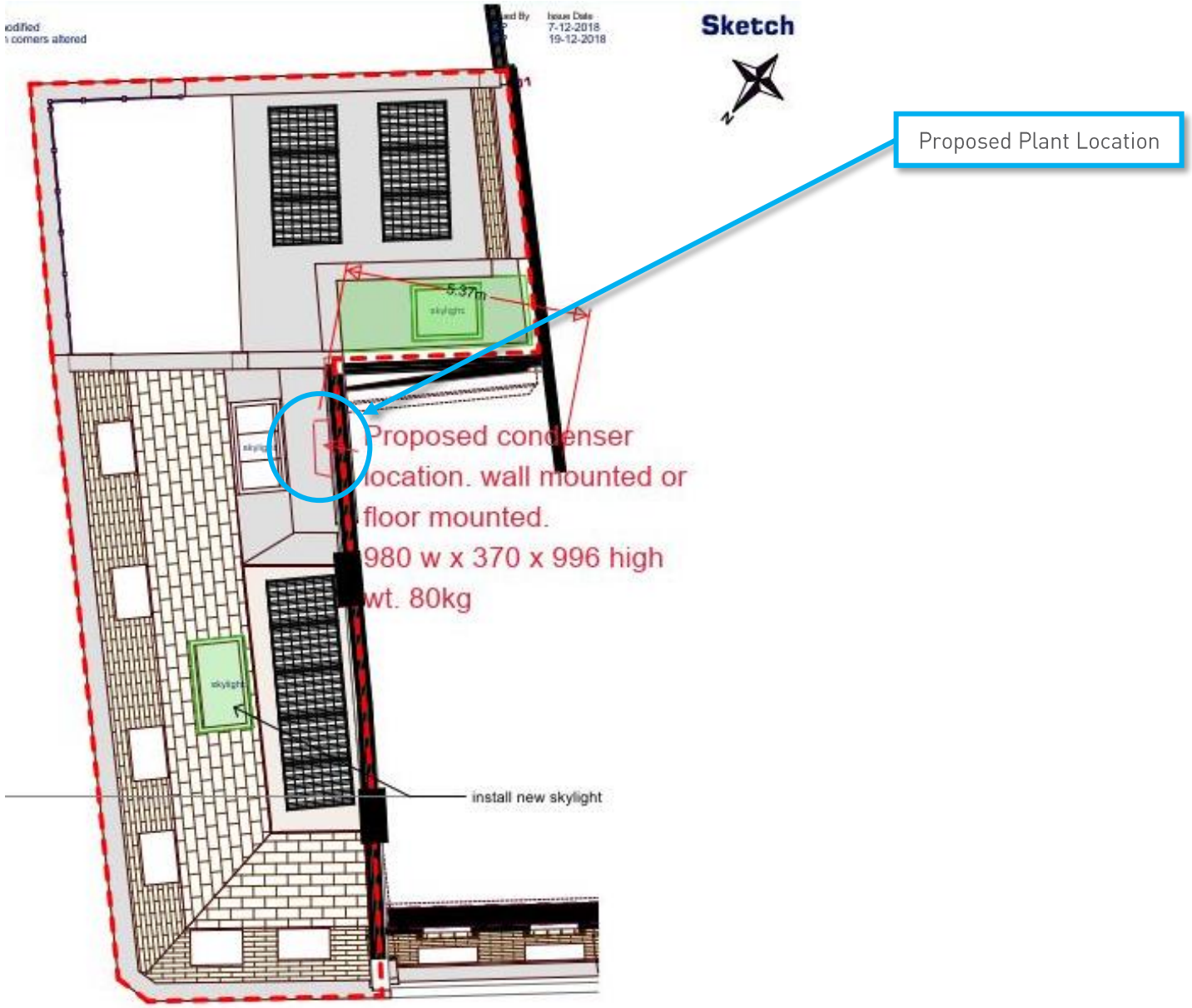


55 Frazier Street, London SE1 7FL
Site Plan showing location of the proposed plant
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Figure 2
29 January 2021
Not to Scale

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55 Frazier Street, London SE1 7FL
Site Plan showing the microphone position
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Figure 3
29 January 2021
Not to Scale

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# Appendix C - Instrumentation

The following equipment was used for the measurements.

| Use | Manufacturer | Model Type | Serial No. | Calibration | |
|---|---|---|---|---|---|
| | | | | Certificate No. | Expiry Date |
| Background Noise Monitoring Survey | Norsonic Type 1 Sound Level Meter | Nor140 | 1403127 | 30803 | 30 January 2021 |
| | Norsonic Pre Amplifier | 1209A | 12071 | 30816 | 31 January 2021 |
| | Norsonic ½“ Microphone | 1225 | 41473 | | |
| | Norsonic Sound Calibrator | 1251 | 31986 | 30801 | 30 January 2021 |

# Appendix D – Plant calculations

An example calculation is provided below.

| Receptor 1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Noise Level (dB) at Octave-band Centre Frequency (Hz) | | | | | | | | dBA |
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Lp at 1m | 54 | 57 | 55 | 51 | 46 | 41 | 35 | 28 | 52 |
| Distance loss (5m) | -14 | -14 | -14 | -14 | -14 | -14 | -14 | -14 | - |
| Screening of facade | -8 | -10 | -12 | -15 | -18 | -20 | -20 | -20 | - |
| Reflections | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | - |
| **Lp at 1m** | **35** | **36** | **32** | **25** | **17** | **10** | **4** | **0** | **27** |

| Receptor 2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Parameter | Noise Level (dB) at Octave-band Centre Frequency (Hz) | | | | | | | | dBA |
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| Lp at 1m | 54 | 57 | 55 | 51 | 46 | 41 | 35 | 28 | 52 |
| Distance loss (15m) | -24 | -24 | -24 | -24 | -24 | -24 | -24 | -24 | - |
| Reflections | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | - |
| **Lp at 1m** | **33** | **36** | **34** | **30** | **25** | **20** | **14** | **7** | **32** |

*Possible discrepancies within one dB are subject to the number rounding.

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