163-203 EVERSHOLT STREET

Plant Noise Assessment

Reference: 9211.RP01.PNA.0
Prepared: 19 February 2019
Revision Number: 0

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	19 February 2019	Daniel Flood	Andrew Heath

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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

The owners of 163 -203 Eversholt Street, Camden are planning to create new plant rooms on mezzanine levels of the ground and first floor levels. Three new AHU units will be installed, with the extract and supply louvres situated on the western elevation of the building. 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

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

16:45 hours Thursday 7 February to 15:45 hours Tuesday 8 February 2019.

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, it was considered suitable for obtaining representative noise measurements, it being mostly dry with little wind.

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 the rear elevation of 183 Eversholt Street, at 2nd floor level. The microphone was mounted at 1m from the façade. The prevailing noise climate was noted to be determined by road and rail traffic noise. The results at this position are subject to façade reflection effects.

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 1 – Measured Levels

Measurement Period	Position 1	
	L_{90} (dBA)	L_{eq} (dBA)
Daytime (07:00 – 19:00)	49	57
Evening (19:00 – 23:00)	48	52
Night-time (23:00 – 07:00)	45	49

4.0 CRITERIA

The requirements of Camden Council's Development Policies 2010-2025, Local Development Framework regarding noise levels from new plant and machinery are confirmed as follows.

Table 2 – Camden Council Noise Thresholds

Noise description and Location of measurement	Period	Time	Noise Level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	10dB(A) <L_{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	10dB(A) <L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90} >60dB	Day, evening and night	0000-2400	55dB L_{Aeq}

In line with BS 4142: 2014 and as illustrated within Table 2, should the proposed plant be identified as having intermittent or tonal characteristics, an additional 5dB should be subtracted from any of the above proposed noise emission limits.

In addition to the above, Camden require consideration to be taken with regards to the Observable Adverse Effect Level of noise sources within the borough. After communicating with an Environmental Health Officer for Camden council, the criteria states the following:

> *"BS 4142 states that if the rating level does not exceed the background noise level, then this is an indication of the specific sound source having a low impact, and a difference of +10 dB is likely to be an indication of a significant adverse impact. The advice regarding these impacts is dependent on the context and to account for this when determining the example values for LOAEL and SOAEL it will be assumed that the character of the residual background noise is different to the character of the specific noise from the proposed development, as such 10dB or below background should be achieved, (with 15 dB being achieved if the noise has a tonal element).*

These levels have been determined appropriate in the Camden context, to guard against future complaints once the development is in used, and, to protect against 'background noise creep', as required by Camden's Noise Strategy. 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."

Analysis of proposed AHU units illustrated that the noise spectra contains a tonal element at 125 Hz, for both the extract and supply. We therefore propose that a criteria of 10dB below the minimum background L_{A90} should be applied, as measured at 1m from the nearest noise-sensitive receptor. Target criteria are therefore given in Table 3.

Table 3 – Camden Council Noise Thresholds

Measurement Period	Target Noise Criteria (dB)
Daytime (07:00 – 19:00)	39
Evening (19:00 – 23:00)	38
Night-time (23:00 – 07:00)	35

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.

5.0 ASSESSMENT

Our assessment has been based upon the following information:

5.1 Proposed Plant Items

Table 4 – Plant Information

Ref.	Manufacturer/Model/Duty	Plant Type
AHU – 01 First Floor	Loran CTL 020	Air handling unit
AHU – 02 Ground Floor	Loran CTL 020	Air handling unit
AHU – 03 First Floor	Loran CTL 020	Air handling unit

5.2 Position of Units

The new AHU units are to be located in newly created plant rooms in mezzanine areas of the ground and first floor. The extract/supply louvres for this plant will be situated on the western elevation of the building.

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 units. It is understood that the plant will consist of three AHU units of the same model and make. The associated plant noise levels are detailed as follows:

Table 5 – Plant Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
AHU Supply	Lw	57	71	62	66	67	66	63	56
AHU Extract	Lw	56	75	66	66	59	61	60	54

Review of the octave band data shows that a tonal element is present at 125 Hz.

5.4 Location of Nearest Residential Windows

Receptor 1

The closest residential windows to AHU 01 and AHU 02 were advised as being to the west of site, belonging to the residential block of Genridding, Ampthill Square.

Receptor 2

The closest residential windows to AHU 03 were advised as being to the west of site, belonging to the residential block of Mickledore, Ampthill Square.

5.5 Mitigation

We recommend that all AHUs allow for in-duct silencers. The silencers should be capable of achieving the performance levels detailed in the specification below.

Table 6 – In-duct Silencers / Attenuators

Unit	Indicative length (mm) and free area (%)	Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
AHU 01 Extract	600mm, 35%	3	6	10	14	20	19	14	13
AHU 01 Supply	600mm, 35%	3	6	10	14	20	19	14	13
AHU 02 Extract	600mm, 35%	3	6	10	14	20	19	14	13
AHU 02 Supply	600mm, 35%	3	6	10	14	20	19	14	13
AHU 03 Extract	600mm, 35%	3	6	10	14	20	19	14	13
AHU 03 Supply	600mm, 35%	3	6	10	14	20	19	14	13

5.6 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
- In-duct Silencers / Attenuators
- 20LogR Distance Attenuation
- Directivity
- 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 7 – Predicted Noise Levels

Operating Period	Receptor 1 – Glenridding, Ampthill Square		Receptor 1 – Mickledore, Ampthill Square	
	Prediction	Criterion	Prediction	Criterion
Daytime (07:00 – 19:00)	34	39	31	44
Evening (19:00 – 23:00)	34	38	31	43
Night-time (23:00 – 07:00)	34	35	31	40

Noise from the proposed units is predicted to meet the target criteria provided the in-duct silencers outlined in Table 6 are adopted.

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 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 163 - 203 Eversholt Street 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 Camden Council's 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.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406262	U25090 / U25091(RT's)	22 March 2019
Norsonic Pre Amplifier	1209	20487		
Norsonic ½" Microphone	1225	225566	25089	22 March 2019
Norsonic Sound Calibrator	1251	34429	U28218	27 March 2020

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.

Assessment to Glenridding

Detail	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
AHU Extract	57	71	62	66	67	66	63	56	
Silencer	3	6	10	14	20	19	14	13	
End Reflection	8	4	1	0	0	0	0	0	
Directivity	+1	+2	+3	+4	+5	+6	+6	+6	
Hemispherical Radiation	-8	-8	-8	-8	-8	-8	-8	-8	
Distance loss	-24	-24	-24	-24	-24	-24	-24	-24	
Result	15	31	22	24	20	21	23	17	29
Correction for two units	18	34	25	27	23	24	26	21	32
AHU Supply	56	75	66	66	59	61	60	54	
Silencer	3	6	10	14	20	19	14	13	
End Reflection	8	4	1	0	0	0	0	0	
Directivity	+1	+2	+3	+4	+5	+6	+6	+6	
Hemispherical Radiation	-8	-8	-8	-8	-8	-8	-8	-8	
Distance loss	-24	-24	-24	-24	-24	-24	-24	-24	
Result	14	35	26	24	12	16	20	15	27
Correction for two units	17	38	29	27	15	19	24	19	30
Total at receiver									34

Assessment to Mickledore

Detail	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
AHU 03 Extract	57	71	62	66	67	66	63	56	
Silencer	3	6	10	14	20	19	14	13	
End Reflection	8	4	1	0	0	0	0	0	
Directivity	+1	+2	+3	+4	+5	+6	+6	+6	
Hemispherical Radiation	-8	-8	-8	-8	-8	-8	-8	-8	
Distance loss	-24	-24	-24	-24	-24	-24	-24	-24	
Result	15	31	22	24	20	21	23	17	29
AHU 03 Supply	56	75	66	66	59	61	60	54	
Silencer	3	6	10	14	20	19	14	13	
End Reflection	8	4	1	0	0	0	0	0	
Directivity	+1	+2	+3	+4	+5	+6	+6	+6	
Hemispherical Radiation	-8	-8	-8	-8	-8	-8	-8	-8	
Distance loss	-24	-24	-24	-24	-24	-24	-24	-24	
Result	14	35	26	24	12	16	20	16	27
Total at receiver									31

Appendix D – Graphs and Site Plans

163 - 203 Eversholt Street

L_{Aeq} Time History 7- 8 February 2019

Western Elevation

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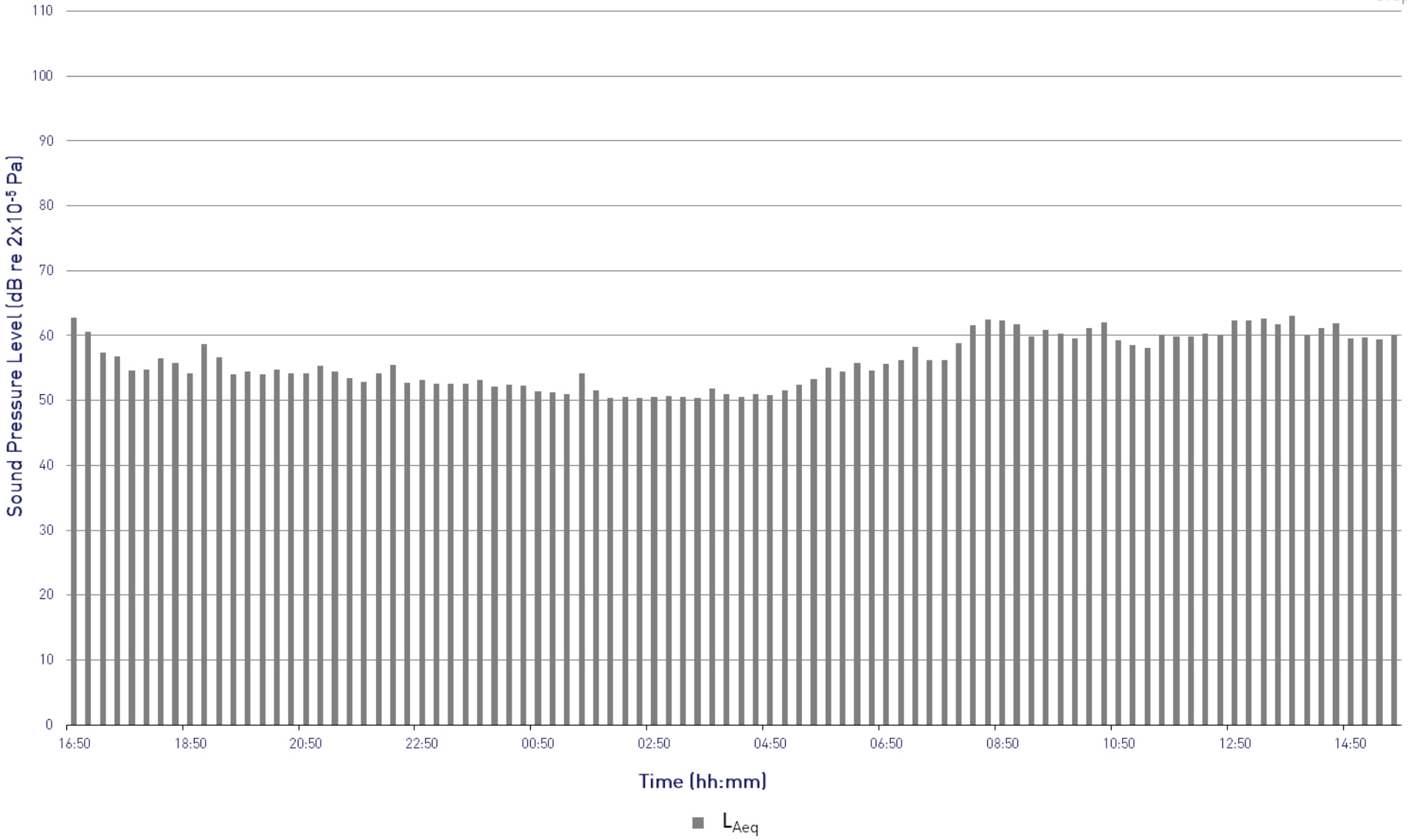
Graph 1



163 - 203 Eversholt Street

$L_{Amax,f}$ and L_{A90} Time History 7 - 8 February 2019

Western Elevation

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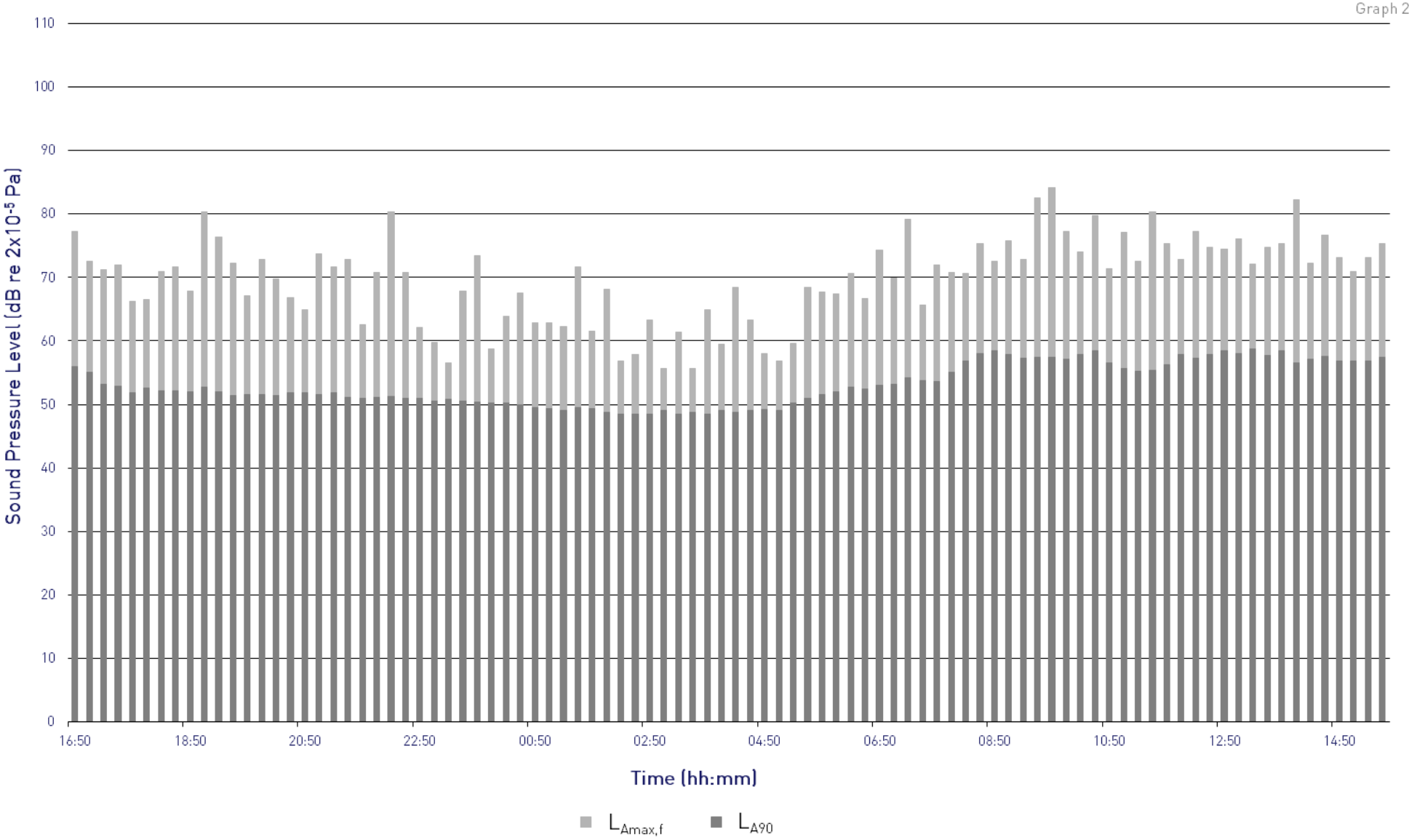
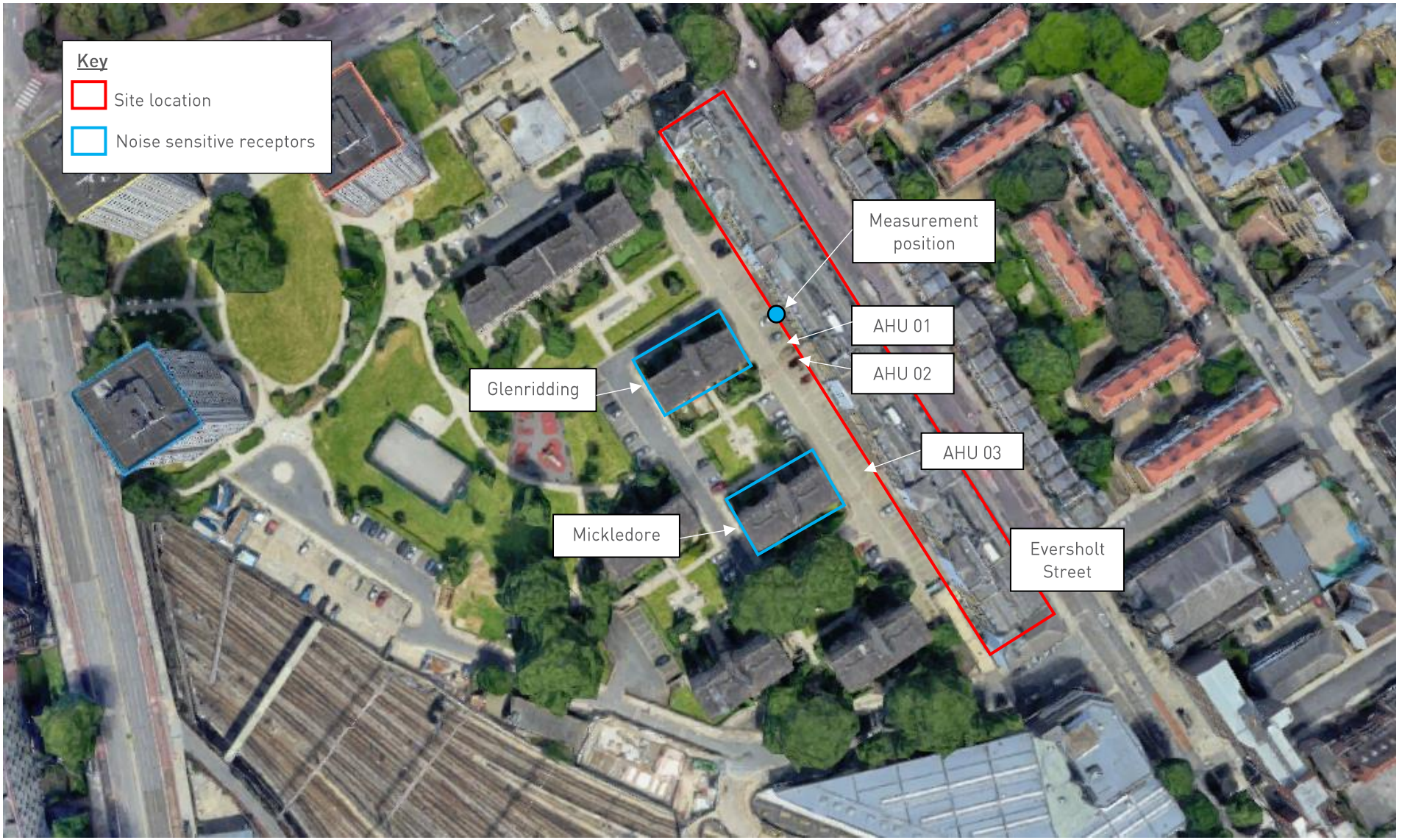
Graph 2





163-203 Eversholt Street
Site location Plan
Project 9211

Figure 1
19 February 2019
Not to Scale

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