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34 PERCY STREET, WESTMINSTER, LONDON

PLANNING COMPLIANCE REPORT

Report **8402-NIA-01**

Prepared on 7 August 2013

Issued For:

Manor Press Properties Ltd

70 Charlotte Street

London

W1T 4QG

committed to CSCS Platinum award

ISO 17025

ISO 9001

Institute of Acoustics sponsoring organisation

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Manor Press Properties Ltd, 70 Charlotte Street, London, W1T 4QG to measure existing background noise levels at 34 Percy Street, Westminster, London, W1T 2DG . The measured noise levels will be used to determine noise emission criteria for the plant installation in agreement with the planning requirements of the City of Westminster.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

The plant installation is comprised of a total of 4 external condenser units. 3 Condenser units have been fitted at the rear of the property at first floor level against the existing rear façade wall. One condenser unit has been installed within a basement level light-well at the front of the property on 34 Percy Street. All plant unit locations are as shown in indicative site plan 8402-SP1.

The front and rear first floor facade windows of the adjacent property 35 Percy Street have been identified as the nearest residential noise sensitive receiver, a noise impact assessment and planning compliance report has therefore been undertaken as detailed in this report.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 8402-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receivers.

Continuous automated monitoring was undertaken for the duration of the survey between 17:02 on 24 July 2013 and 11:09 on 26 July 2013. Weather conditions were generally dry with light winds, therefore suitable for the measurement of environmental noise.

Background noise levels at the monitoring positions consisted mainly of traffic noise from surrounding roads as well as an observed influence from existing plant units servicing nearby commercial premises. During the noise survey period it was ensured that installed units subject to this report where not in use at any point. Any influence from existing plant or mechanical units will be minimised by using minimum background noise in all assessments.

The measurement procedure generally complied with BS7445:1991. *Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*.

3.2 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 RESULTS

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured at the location shown in site drawing 8402-SP1.

The measured noise levels are shown as a time history in Figure 8402-TH1.

Average ambient and minimum background noise levels are shown in Table 4.1.

	Average ambient noise level $L_{Aeq:\ 5min}$ dB(A)	Minimum background noise level $L_{A90:\ 5min}$ dB(A)
Daytime (07:00 - 23:00)	60	46
Night-time (23:00 - 07:00)	51	45

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

The City of Westminster's general criteria for noise emissions depends on whether the existing ambient noise levels are below WHO recommended guideline levels or not. Measured ambient levels as shown in Table 3.1 are above both the daytime guideline of 55 dB(A) during daytime hours and the night-time guideline level of 45 dB(A) during night-time hours.

In this instance, the City of Westminster criteria for noise emissions is as follows:

"The 'A' weighted sound pressure level from the plant, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of any residential property."

As the plant units are for residential use and could therefore be used at any time, we propose to set the noise criteria at 35 dB(A), the value 10 dB below the minimum measured background noise at any time.

6.0 DISCUSSION

6.1 Proposed Installation

The plant installation is comprised of the following:

- 4 No. Samsung AQV18VBGX Air Conditioning Units

Spectral noise emission data for the specified plant units is currently unavailable from the manufacturer. Overall noise emission data supplied by the manufacturer has therefore been used in conjunction with similar manufacturer unit spectral data, shifted to meet the overall measured level of the specific unit.

Loudest modes of operation have been used in order to present a robust assessment as shown in Table 6.1

	Sound Pressure Level (dB) in each Frequency Band at 1m							
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Samsung AQV18VBGX Air Conditioning Units	61	63	59	55	50	49	45	32

Table 6.1 Manufacturer Sound Pressure Levels at 1m

Following an on-site investigation of the surrounding area and properties, the nearest residential receiver is the adjacent property 35 Percy Street. Investigation would suggest that some of the units within this property are commercial and some residential. At the rear façade only kitchen and bathroom windows could be identified, leading to the assumption of bedrooms/living rooms of these assumed residential properties being located at the front façade or possibly at higher floor levels.

In order to provide a robust assessment calculations have been conducted assuming the nearest noise sensitive receiver to be a first floor window of the front and rear façades of 35 Percy Street.

6.2 Noise Impact Assessment – Receiver 1 Rear Facade

Two plant units have been mounted to the north east rear façade wall of 34 Percy Street at first floor level, these units are located at a distance of approximately 7m from the suggested noise sensitive receiver. One plant unit has been mounted to the north-west rear façade wall within a recess created by the adjacent property fire escape and perimeter wall at a distance of approximately 4m from the suggested noise sensitive receiver. Neither plant installation at the rear of the property will have a direct line of sight with the assumed nearest noise sensitive receiver. In order to provide a robust assessment, calculation will also include noise emissions from the plant unit installation at the front of the property located under the gantry stair case, within a basement light well area.

All plant installations are as shown on indicative site plan 8402-SP1.

Taking into account all necessary acoustic corrections including, distance and screening provided by the building envelope, the resulting noise level at the suggested rear façade residential window would be as shown in Table 6.2. Detailed calculations are shown in Appendix B1.

Receiver 1	24 Hour Criterion	Noise Level at Receiver (due to proposed plant)
First Floor Rear Window	35 dB(A)	36 dB(A)

Table 6.2: Noise levels and criteria at noise sensitive receiver

As shown in Table 6.2 and Appendix B1, the proposed plant installation would be expected to marginally exceed the requirements of the City of Westminster by 1dB. It should be noted that an exceedance of 1dB would be considered imperceptible. Further comment would also suggest, as per the previous discussion, that only kitchen and bathroom areas are noted to be placed at the rear façade of the property on 35 Percy Street.

6.3 British Standard Requirements

Further calculations have been undertaken to assess whether the noise emissions from the proposed plant unit would be expected to meet recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233:1999 '*Sound insulation and noise reduction for buildings – Code of Practice*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:1999 recommends 30dB(A) as being 'Good' internal resting/sleeping conditions.

With external levels of 36 dB(A) the window would need to provide 6dB attenuation in order for 'good' conditions to be met. According to BS8233:1999, even a partially open window offers 10-15 dB attenuation.

It can therefore be predicted that noise emissions from the plant installation would be expected to comfortably meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 6.3, with detailed calculations shown in Appendix B1.

Receiver	'Good' Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:1999*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	26 dB(A)

Table 6.3 Noise levels and criteria inside nearest residential space

6.4 Noise Impact Assessment – Receiver 2 Front Facade

One plant unit has been installed within the front façade basement light well underneath a steel staircase. The plant installation is approximately 7m from the assumed first floor front façade residential window of 35 Percy Street. Due to the location of the plant unit within the basement light-well there will be no direct line of sight with the assumed nearest noise sensitive receiver. In order to provide a robust assessment, calculation will also include noise emissions from the plant unit installations at the rear of the property.

All plant installations are as shown on indicative site plan 8402-SP1.

Taking into account all necessary acoustic corrections including, distance and screening provided by the building envelope, the resulting noise level at the front façade residential window would be as shown in Table 6.4. Detailed calculations are shown in Appendix B2.

Receiver 2	24 Hour Criterion	Noise Level at Receiver (due to proposed plant)
First Floor Front Window	35 dB(A)	36 dB(A)

Table 6.4: Noise levels and criteria at noise sensitive receiver

As shown in Table 6.4 and Appendix B2, the proposed plant installation would be expected to marginally exceed the requirements of the City of Westminster by 1dB. It should be noted that an exceedance of 1dB would be considered imperceptible. It should be noted that the overall noise criterion is based upon measurements conducted at the rear façade of the property which is screened from noise emanating from surrounding roads. We would therefore anticipate that noise levels at the front façade would be higher than those at the rear and therefore residents would be unlikely to be affected by the noise emissions of the plant installation at the front façade of 34 Percy Street.

6.5 British Standard Requirements

Further calculations have been undertaken to assess whether the noise emissions from the proposed plant unit would be expected to meet recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233:1999 '*Sound insulation and noise reduction for buildings – Code of Practice*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:1999 recommends 30dB(A) as being 'Good' internal resting/sleeping conditions.

With external levels of 36 dB(A) the window would need to provide 6dB attenuation in order for 'good' conditions to be met. According to BS8233:1999, even a partially open window offers 10-15 dB attenuation.

It can therefore be predicted that noise emissions from the plant installation would be expected to comfortably meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 6.5, with detailed calculations shown in Appendix B2.

Receiver	'Good' Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:1999*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	26 dB(A)

Table 6.5 Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 34 Percy Street, Westminster, London, W1T 2DG. The results of the survey have enabled criteria to be set for noise emissions from the plant units in accordance with the requirements of the City of Westminster.

A noise impact assessment has then been undertaken using manufacturer noise data to predict the noise levels due to the current installation at the nearby noise sensitive receivers.

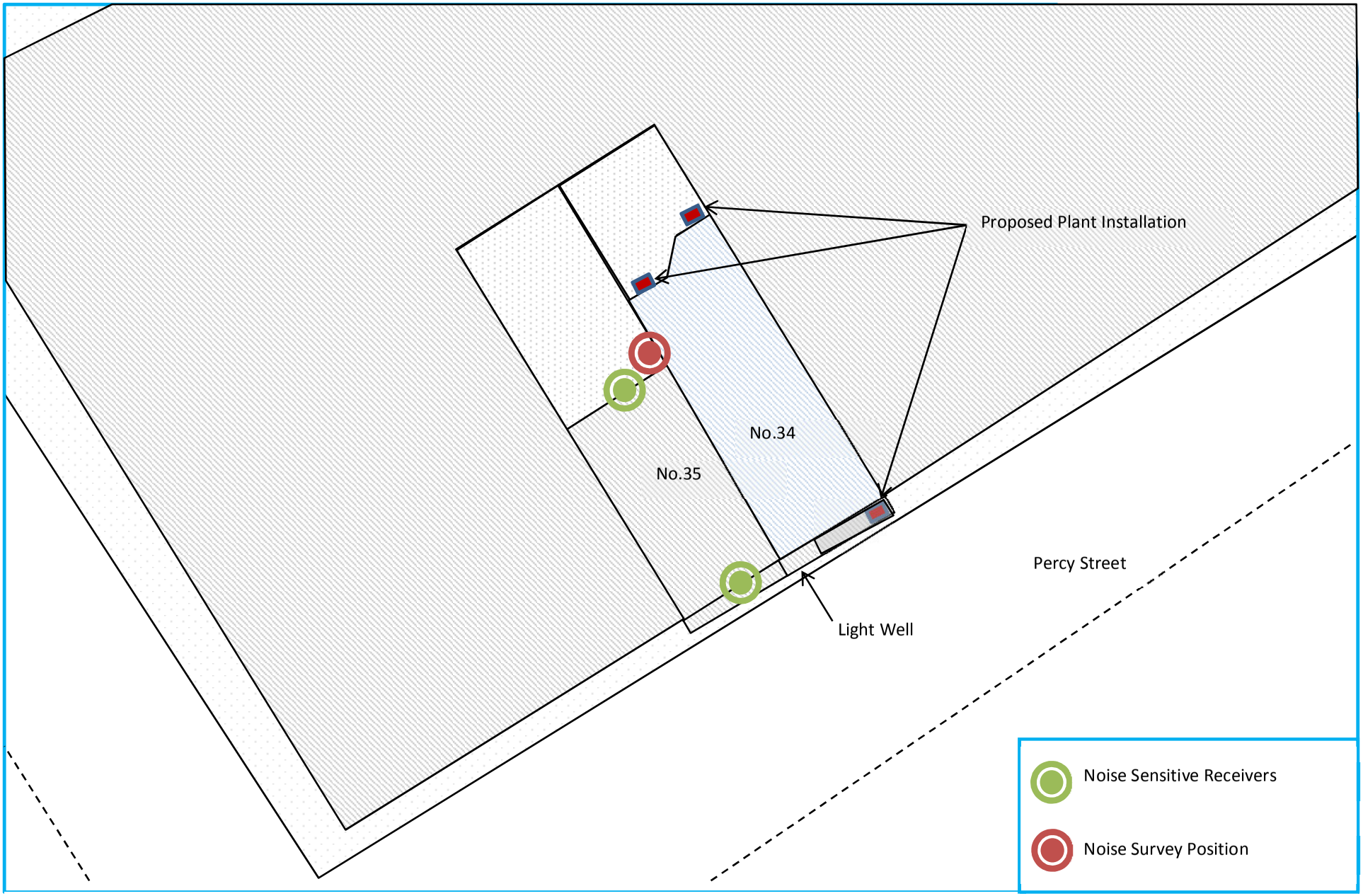
Calculations show that noise emissions from the installed plant units would marginally exceed the requirements of the City of Westminster by 1dB. An exceedance of 1dB would be considered imperceptible to human hearing and remain 9dB below the minimum measured background noise level. Further calculations have shown that the plant installation would meet the recommendations of the relevant British Standard 8233:1999.

Report by

Nicholas Dobbs AMIOA

Checked by

Florian Clement MIOA

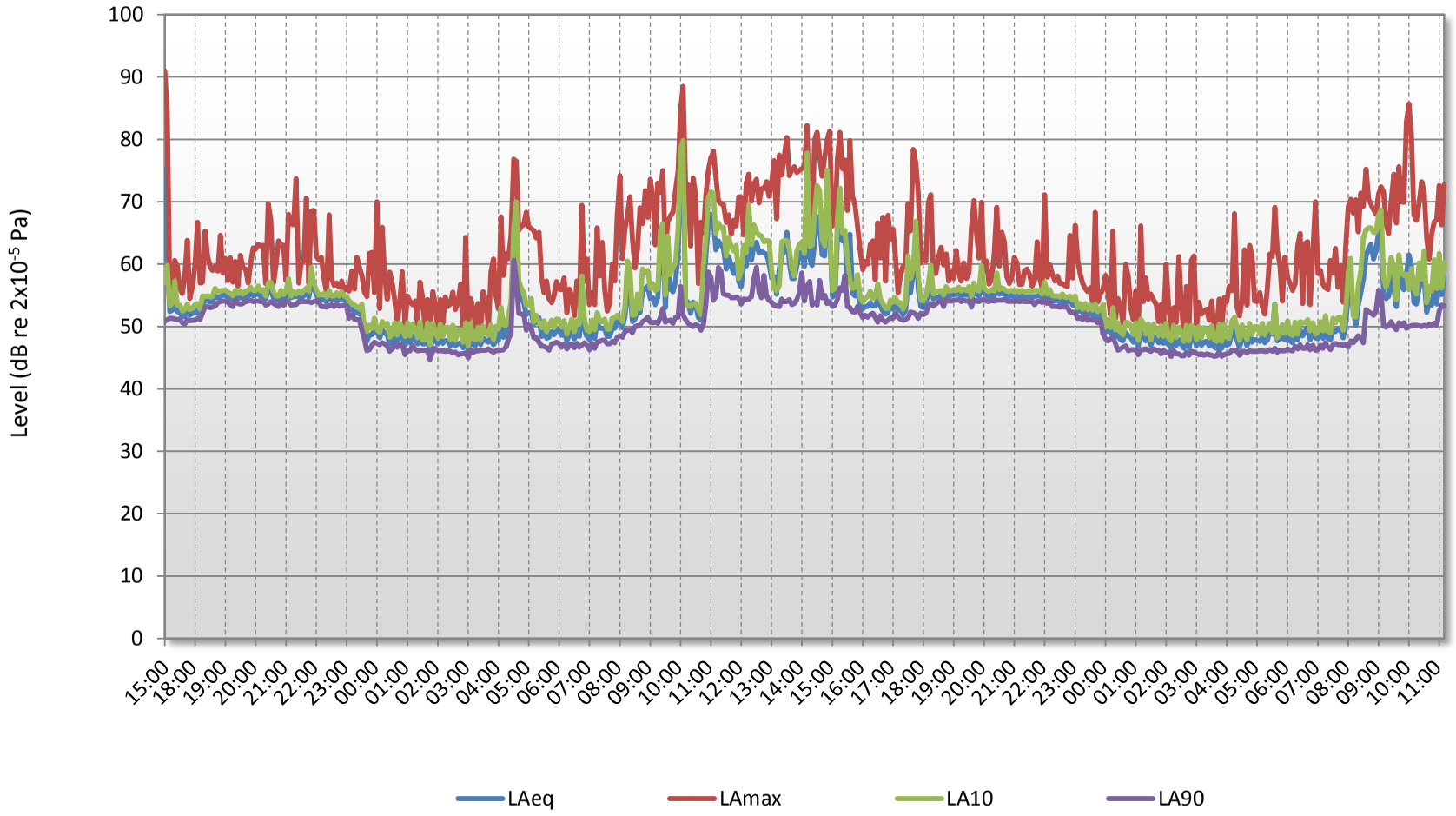


8402-SP1 Indicative site plan showing noise monitoring position and nearest noise sensitive receivers **Date:** 14 August 2013

34 PERCY STREET, WESTMINSTER

Environmental Noise Time History

24 July to 26 July 2013



8402-TH1

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B1

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34 PERCY STREET, WESTMINSTER, LONDON

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Reciever - Rear Façade
Source: Plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressue level at 1 metre									
Samsung Air Conditioning Unit Type: AQV18VBGX	61	63	59	55	50	49	45	32	58
Correction for number of units, (2)	3	3	3	3	3	3	3	3	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (7m)	-17	-17	-17	-17	-17	-17	-17	-17	
Attenuation provided by building envelope, dB	-12	-14	-17	-17	-17	-17	-17	-17	
Sound pressure level at receiver	**38**	**38**	**31**	**27**	**22**	**21**	**17**	**4**	**30**

Manufacturer provided sound pressue level at 1 metre									
Samsung Air Conditioning Unit Type: AQV18VBGX	61	63	59	55	50	49	45	32	58
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (4m)	-12	-12	-12	-12	-12	-12	-12	-12	
Attenuation provided by building envelope, dB	-9	-12	-14	-14	-14	-14	-14	-14	
Sound pressure level at receiver	**43**	**42**	**36**	**32**	**27**	**26**	**22**	**9**	**35**

Manufacturer provided sound pressue level at 1 metre									
Samsung Air Conditioning Unit Type: AQV18VBGX	61	63	59	55	50	49	45	32	58
Correction for reflections, dB	9	9	9	9	9	9	9	9	
Distance correction to receiver, dB (14m)	-23	-23	-23	-23	-23	-23	-23	-23	
Attenuation provided by building envelope, dB	-24	-27	-30	-30	-30	-30	-30	-30	
Sound pressure level at receiver	**23**	**22**	**15**	**11**	**6**	**0**	**0**	**0**	**13**

	44	**44**	**37**	**33**	**28**	**27**	**23**	**11**	**36**

Design Criterion	**35**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Cummulative level of plant units

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	44	44	37	33	28	27	23	11	36
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level inside nearest noise sensitive premises	**34**	**34**	**27**	**23**	**18**	**17**	**13**	**1**	**26**

Design Criterion	**30**

APPENDIX B2

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34 PERCY STREET, WESTMINSTER, LONDON

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Reciever - Front Façade
Source: Plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressue level at 1 metre									
Samsung Air Conditioning Unit Type: AQV18VBGX	61	63	59	55	50	49	45	32	58
Correction for number of units, (2)	3	3	3	3	3	3	3	3	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (14m)	-23	-23	-23	-23	-23	-23	-23	-23	
Attenuation provided by building envelope, dB	-24	-27	-30	-30	-30	-30	-30	-30	
Sound pressure level at receiver	**20**	**19**	**12**	**8**	**3**	**2**	**-2**	**-15**	**11**

Manufacturer provided sound pressue level at 1 metre									
Samsung Air Conditioning Unit Type: AQV18VBGX	61	63	59	55	50	49	45	32	58
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (14m)	-23	-23	-23	-23	-23	-23	-23	-23	
Attenuation provided by building envelope, dB	-24	-27	-30	-30	-30	-30	-30	-30	
Sound pressure level at receiver	**17**	**16**	**9**	**5**	**0**	**-1**	**-5**	**-18**	**8**

Manufacturer provided sound pressue level at 1 metre									
Samsung Air Conditioning Unit Type: AQV18VBGX	61	63	59	55	50	49	45	32	58
Correction for reflections, dB	9	9	9	9	9	9	9	9	
Distance correction to receiver, dB (7m)	-17	-17	-17	-17	-17	-17	-17	-17	
Attenuation provided by building envelope, dB	-8	-10	-13	-13	-13	-13	-13	-13	
Sound pressure level at receiver	**45**	**45**	**38**	**34**	**29**	**0**	**0**	**0**	**36**

	45	**45**	**38**	**34**	**29**	**5**	**3**	**0**	**36**
						Design Criterion			**35**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Cummulative level of plant units

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	45	45	38	34	29	5	3	0	36
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level inside nearest noise sensitive premises	**35**	**35**	**28**	**24**	**19**	**-5**	**-7**	**-10**	**26**
						Design Criterion			**30**