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57A HATTON GARDEN,

57A HATTON GARDEN, LONDON

NOISE IMPACT ASSESSMENT

Report **14690-NIA-01**

Prepared on 18 April 2019

Issued For:

Kentex Electric (Southern) Ltd

Pilgrims House

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Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Kentex Electric (Southern) Ltd to measure existing background noise levels at 57a Hatton Garden, London. The measured noise levels have been used to determine noise emission criteria for a proposed plant installation in agreement with the planning requirements of the Local Authority.

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

2.0 SITE DESCRIPTION

Current proposals are to install 20 plant units on the rooftop for commercial use.

Residential flats on Hatten Wall have been identified as the nearest residential receivers. This nearest noise sensitive receiver was identified through observations on-site. If there are any receivers closer to that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receptor should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 14690-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 14690-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the site.

The microphone was mounted on the rooftop of the building. The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied. Noise levels at the monitoring position were dominated by traffic noise during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 11:11 on 25 March 2019 and 13:16 on 26 March 2019.

Weather conditions were generally dry with light winds, therefore suitable for the measurement of environmental noise.

The measurement procedure generally complied with BS 7445: 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 977 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 14690-SP1.

The measured noise levels are shown as a time history in Figure 14690-TH1, with ambient and background noise levels summarised in Table 4.1.

	Minimum background noise level $L_{90: 5min}$
Daytime (07:00 - 23:00)	58 dB(A)
Night-time (23:00 - 07:00)	47 dB(A)
Operating hours (06:00-19:00)	48 dB(A)

Table 4.1: Average ambient and minimum background noise levels

5.0 NOISE CRITERIA

The *Local Authority* general criteria for noise emissions depend on whether the existing ambient noise levels are below WHO recommended guideline levels or not. Measured ambient levels as shown in Table 4.1 are above the daytime guideline level of 55 dB(A) during daytime hours and night-time guideline level of 45 dB(A) during night-time hours.

In this instance, the *Local Authority* criteria for noise emissions are 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."*

It is understood that the proposed plant unit(s) will be for commercial use operational from 06:00 to 19:00. We therefore propose to set the noise criteria at 38 dB(A), the value 10 dB below the minimum measured background noise level during this period.

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

All units have been proposed to be wall mounted to the flat rooftop, along the north west side of the building. Based on the proposed locations of units, the plant installation has been split into 3 groups as follows:

Plant Group 1 is proposed to be furthest from the noise receptor of all the groups: Plant Group 1 contains the following units:

- 2 No. Mitsubishi heavy FDC14OVN condenser units
- 2 No. Daikin RZQSG-71L3VIB condenser units

Plant Group 2 is proposed to be located between groups 1 and 3: Plant Group 2 contains the following units:

- 1 No. Toshiba RAV-SM804CT-E condenser unit
- 3 No. Toshiba RAV-SM564UT-E condenser units
- 4 No. Sanyo SPW-C366VEH condenser units

- 4 No. Toshiba RAV-SP564AT-E condenser units

Plant Group 3 is proposed to be located be closest to the noise receiver: Plant Group 3 contains the following units:

- 3 No. Daikin RXS-5OL2VIB condenser units
- 1 No. Daikin RZQSG-71L3VIB condenser unit

Noise emissions for the proposed plant units, as provided by the manufacturer, are shown in Table 6.1. Loudest modes of operation have been used in order to present a robust worst-case assessment.

	Sound Pressure Levels (at 1 meter, dB) in each Frequency Band								
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Toshiba RAV-SM564UT-E condenser unit	46	36	35	30	29	15	10	10	32
Daikin RXS-5OL2VIB condenser unit	46	47	43.5	39.5	36.5	33	25	18	42
Toshiba RAV-SM804CT-E condenser unit	44	33	36	37.5	32	30	19	15	44
Toshiba RAV-SP564AT-E condenser unit	54	52	48	44	45	38	30	25	48
Daikin RZQSG-71L3VIB condenser unit	52.5	53.5	49.5	47	45	38	36.5	21	49
Mitsubishi heavy FDC14OVN condenser units	55	52	51	48	47	40	38	34	51
Sanyo SPW-C366VEH condenser unit	56	56	53	50	48	44	40	40	53

Table 6.1: Manufacturer noise emissions levels

The proposed plant location is on the roof of the building which is shown on indicative site plan 14690-SP1.

6.2 Noise Impact Assessment

The closest receiver has been identified as the window on the flat of a residential property on Hatten Wall to the west. The closest residential window is at the following minimum distances from the different proposed condenser unit installation locations:

- Plant Group 1: Free standing units, a minimum of 38 m from the closest receiver,
- Plant Group 2: Free standing units, a minimum of 40 m from the closest receiver,
- Plant Group 3: Free standing units, a minimum of 42 m from the closest receiver.

No screening attenuation is expected to be offered by roof elements.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.2. Detailed calculations are shown in Appendix B.

Receiver	Operating Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	38 dB(A)	36 dB(A)

Table 6.2: Noise levels and criteria at noise sensitive receivers

As presented in Table 6.2 and Appendix B, the proposed plant installations would be expected to meet the requirements of the proposed criteria, without the need for particular mitigation measures.

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: 2014 '*Guidance on sound insulation and noise reduction for buildings*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS 8233: 2014 recommends 30 dB(A) as being acceptable internal resting/sleeping conditions during night-time.

With loudest external levels of 35 dB(A), acceptable internal conditions would be met by taking the attenuation of the window itself into consideration. According to BS 8233: 2014, a typical building facade with a partially open window offers 15 dB attenuation.

It can therefore be predicted that, in addition to meeting the requirements of the set criteria, the emissions from the proposed plant would be expected to meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 6.3.

Receiver	Recommended Target – *For resting/sleeping conditions in a bedroom, in BS 8233: 2014*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	20 dB(A)

Table 6.3: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 57a Hatton Garden, London. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant units in accordance with the requirements of the Local Authority.

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

Calculations show that noise emissions from the proposed plant units should meet the requirements of the Local Authority with the recommended mitigation installed as stated herein.

Report by

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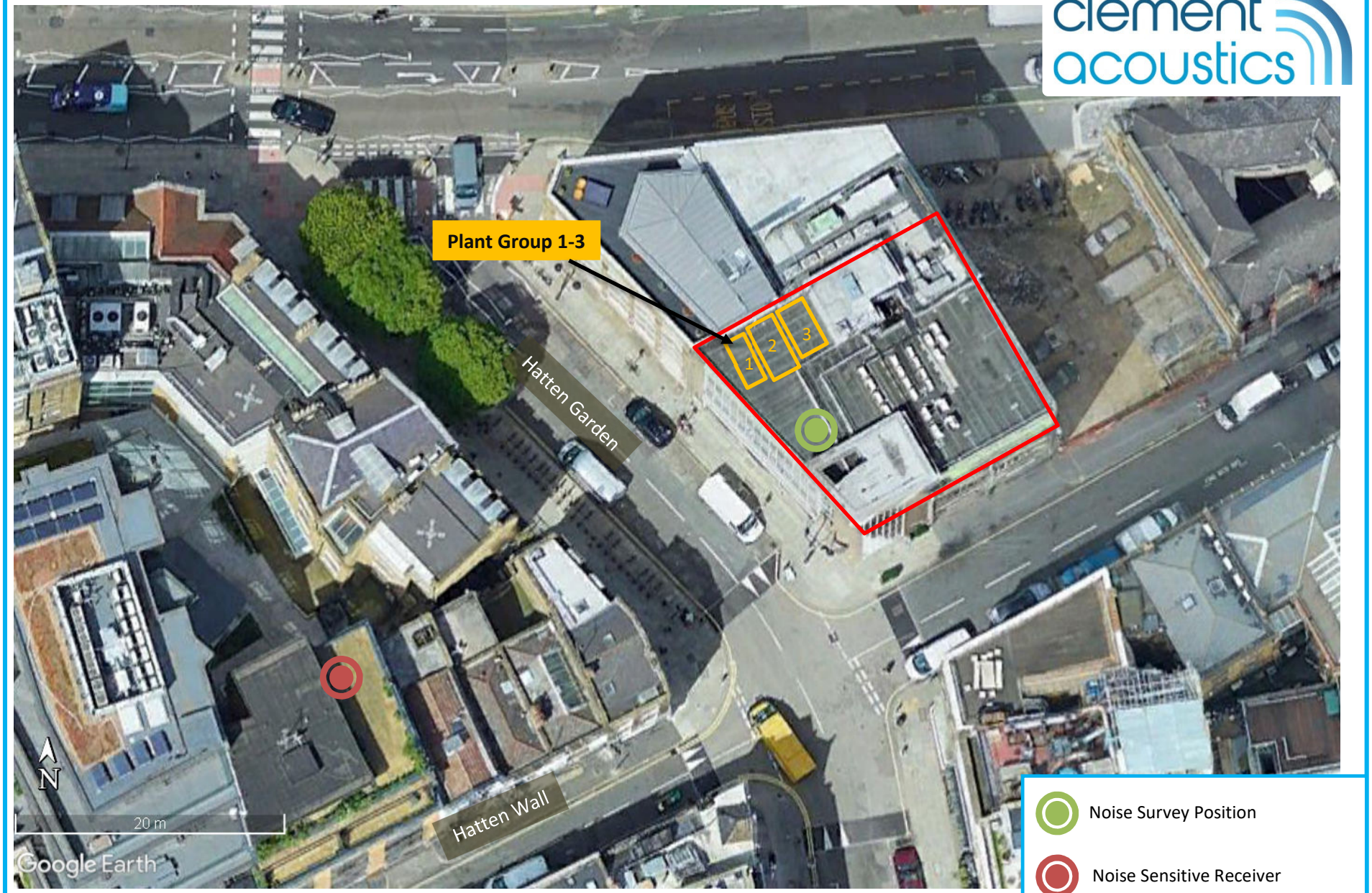
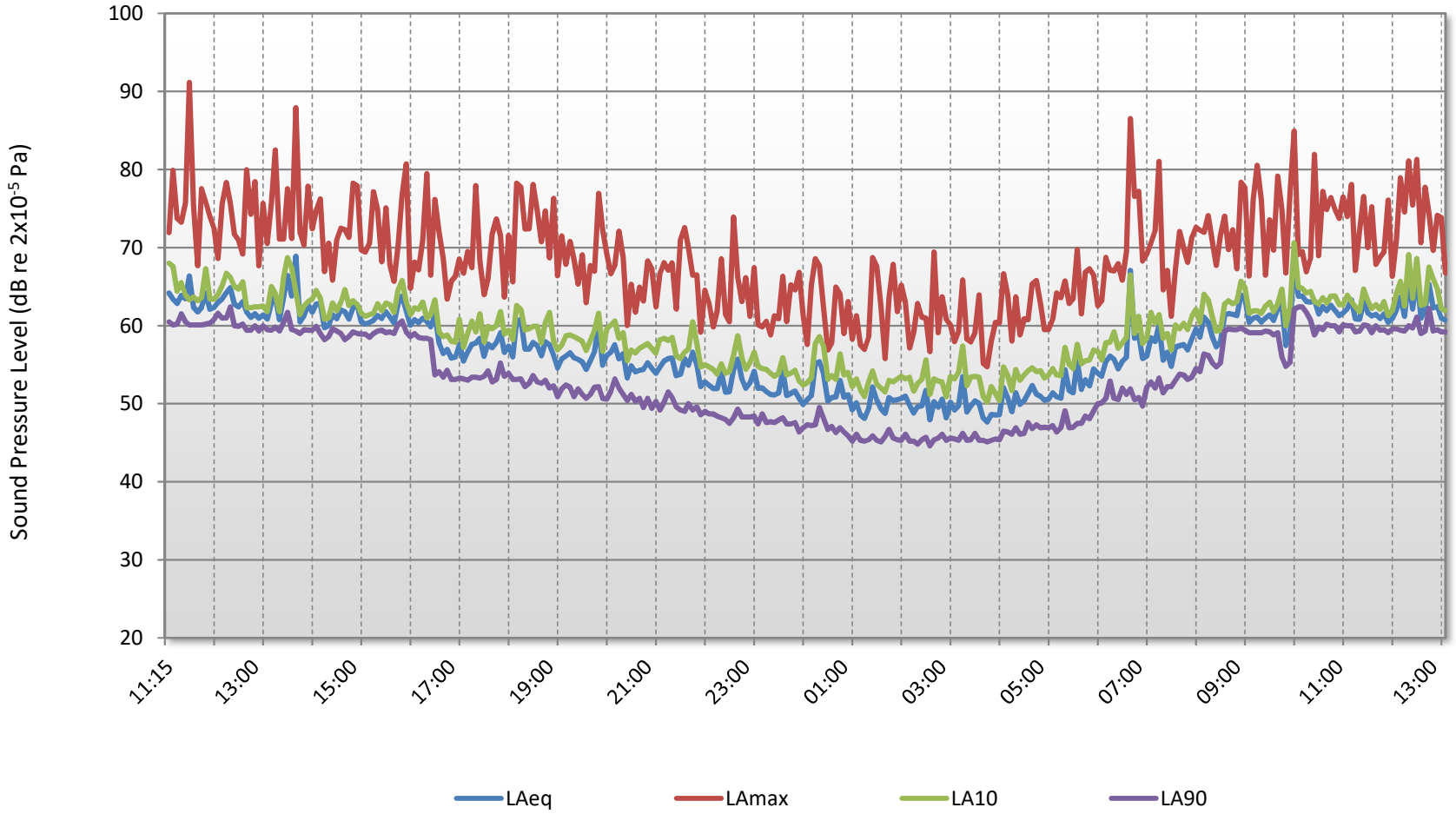


14690-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 18 April 2019

57a Hatton Garden, London

Environmental Noise Time History
25 March 2019 to 26 March 2019



14690-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 B

14690

57a Hatton Garden, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver

Source: **Plant Group 1**

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Mitsubishi heavy FDC14OVN condenser units	55	52	51	48	47	40	38	34	51
Mitsubishi heavy FDC14OVN condenser units	55	52	51	48	47	40	38	34	51
Daikin RZQSG-71L3VIB condenser unit	53	54	50	47	45	38	37	21	49
Daikin RZQSG-71L3VIB condenser unit	53	54	50	47	45	38	37	21	49
Cumulative sound pressure level at 1 m	60	59	56	54	52	45	43	37	56
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Distance correction to receiver, dB (38 m)	-32	-32	-32	-32	-32	-32	-32	-32	
Sound pressure level at receiver	**34**	**33**	**30**	**28**	**26**	**19**	**17**	**11**	**30**

Source: **Plant Group 2**

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Toshiba RAV-SM804CT-E condenser unit	44	33	36	38	32	30	19	15	38
Toshiba RAV-SM564UT-E condenser units	44	33	36	38	32	30	19	15	38
Toshiba RAV-SM564UT-E condenser units	44	33	36	38	32	30	19	15	38
Toshiba RAV-SM564UT-E condenser units	44	33	36	38	32	30	19	15	38
Sanyo SPW-C366VEH condenser unit	56	56	53	50	48	44	40	40	53
Sanyo SPW-C366VEH condenser unit	56	56	53	50	48	44	40	40	53
Sanyo SPW-C366VEH condenser unit	56	56	53	50	48	44	40	40	53
Sanyo SPW-C366VEH condenser unit	56	56	53	50	48	44	40	40	53
Toshiba RAV-SP564AT-E condenser unit	54	52	48	44	45	38	30	25	48
Toshiba RAV-SP564AT-E condenser unit	54	52	48	44	45	38	30	25	48
Toshiba RAV-SP564AT-E condenser unit	54	52	48	44	45	38	30	25	48
Toshiba RAV-SP564AT-E condenser unit	54	52	48	44	45	38	30	25	48
Cumulative sound pressure level at 1 m	64	64	60	57	56	51	47	46	60.4
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Distance correction to receiver, dB (40 m)	-32	-32	-32	-32	-32	-32	-32	-32	
Sound pressure level at receiver	**38**	**38**	**34**	**31**	**30**	**25**	**21**	**20**	**34**

Source: **Plant Group 3**

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Daikin RZQSG-71L3VIB condenser unit	53	54	50	47	45	38	37	21	49
Daikin RXS-5OL2VIB condenser units	46	47	44	40	37	33	25	18	42
Daikin RXS-5OL2VIB condenser units	46	47	44	40	37	33	25	18	42
Daikin RXS-5OL2VIB condenser units	46	47	44	40	37	33	25	18	42
Cumulative sound pressure level at 1 m	55	56	52	49	47	41	37	25	51.3
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Distance correction to receiver, dB (42 m)	-32	-32	-32	-32	-32	-32	-32	-32	
Sound pressure level at receiver	**29**	**30**	**26**	**23**	**21**	**15**	**11**	**-1**	**25**

Cummulative Sound pressure of all plant equipment at reciever	**40**	**39**	**36**	**33**	**32**	**26**	**23**	**21**	**36**

Design Criterion	**38**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window Source: Proposed plant installation	*Frequency, Hz* *63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	40	39	36	33	32	26	23	21	36
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**25**	**24**	**21**	**18**	**17**	**11**	**8**	**6**	**21**