

47 FARRINGDON ROAD, LONDON

NOISE IMPACT ASSESSMENT

Report **13378-NIA-01 RevB**

Prepared on 04 April 2018

Issued For:

Apollo Interiors Ltd

AGB Building

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1.0 INTRODUCTION

Clement Acoustics has been commissioned by Apollo Interiors Ltd to measure existing background noise levels at 47 Farringdon Road, 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 London Borough of Camden.

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 two Panasonic CU-4E27PBE condenser units with four existing units (2 Daikin RX71GV and 2 Fuji AOY G24) on the east wall flanking the ground floor.

A window to an adjacent property, Flat 43, has been identified by the Local Authority as the closest residential receiver. Apollo Interiors Ltd have confirmed that the rear facade of Flat 43 is a minimum of 5 m from the proposed plant location.

Locations are shown in attached site plan 13378-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 13378-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 a 1st storey flat roof at the rear of the building. The microphone was positioned 1m in front of the wall and as such the monitoring position is not considered free-field according to the guidance of BS8233:2014. Based on the presence of the reflective surface and the nature of surrounding noise sources, a correction for reflections of 3 dB has been applied, in line with the recommendations of the standard. Noise levels at the monitoring position were dominated by noise due to existing plant units during the installation and collection of equipment.

The effects of existing plant units will be minimised by basing noise emission criteria on minimum

background noise levels. As shown in the attached time history, there are periods of plant inactivity, which will drive the minimum background noise level and resulting criterion.

Continuous automated monitoring was undertaken for the duration of the survey between 02 March 2018 at 14:30 and 05 March 2018.

Weather conditions were high winds and snowing heavily, therefore not 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 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 13378-SP1.

The measured noise levels are shown as a time history in Figure 13378-TH1, with ambient and background noise levels summarised in Table 4.1.

	Average ambient noise level $L_{eq: T}$ dB(A)	Minimum background noise level $L_{90: 5min}$ dB(A)
Daytime (07:00 - 23:00)	66 dB(A)	51 dB(A)
Night-time (23:00 - 07:00)	65 dB(A)	48 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

The *London Borough of Camden* general 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 units will be for a dental practice in the basement and ground floor of 47 Farringdon Road which previously was a retail unit. It will be operational 09:00 – 17:30 Monday – Friday. We therefore propose to set the noise criteria at 38 dB(A), the value 10 dB below the minimum measured background noise level during the night time hours (this is in case the units stay on permanently).

6.0 NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 2 No. Panasonic CU-4E27PBE condenser units

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.

Unit	Sound Pressure Levels (at 1 meters, dB) in each Frequency Band								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Panasonic CU-4E27PBE*	54	53	49	50	47	44	40	32	52

Table 6.1: Manufacturer Noise Emissions Levels

**Spectral data was not available from the manufacturer of the unit. The spectral data for the proposed plant was therefore taken from a similar unit with the same overall level.*

The proposed plant location is on the first floor roof at the rear of the building which is shown on indicative site plan 13378-SP1.

The closest receiver has been identified as the window on the rear facade of an adjacent residential property, which is a minimum of 5 m from the proposed plant location.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that an enclosure is installed around the plant. The enclosure should provide sufficient attenuation to achieve a maximum sound pressure level of 52 dB(A) when measured at 1 m in all directions.

Based on the information provided, an enclosure meeting the sound reduction indices as stated in Table 6.2 should be suitable to achieve this.

Mitigation	Required Attenuation (dB) in each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Louvred Enclosure	3	2	3	4	7	11	12	11

Table 6.2: Required Attenuation from Mitigation

6.3 Noise Impact Assessment

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.3. Detailed calculations are shown in Appendix B.

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

Table 6.3: Noise levels and criteria at noise sensitive receivers

As presented in Table 6.3 and Appendix B, the proposed plant installation with acoustic enclosure would be expected to meet the requirements of the proposed criteria.

6.4 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 30dB(A) as being acceptable internal resting/sleeping conditions during night-time.

With loudest external levels of 38 dB(A), acceptable internal conditions would be met without 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 6.4.

Receiver	Recommended Target – <i>For resting/sleeping conditions in a bedroom, in BS8233:2014</i>	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	23 dB(A)

Table 6.4: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 47 Farringdon Road, 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 London Borough of Camden.

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.

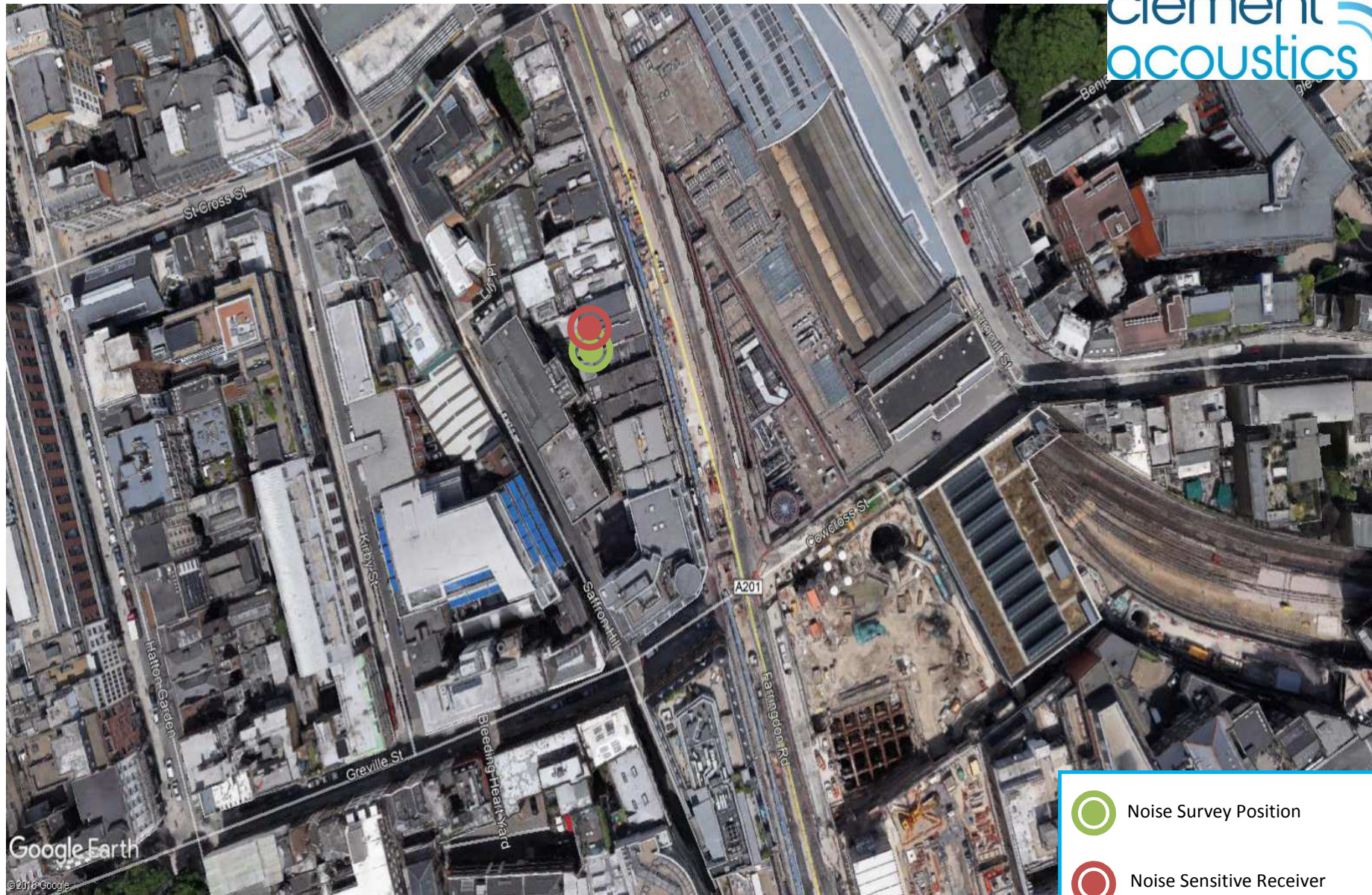
Calculations show that noise emissions from the proposed plant units should meet the requirements of the London Borough of Camden with the recommended mitigation installed as stated herein.

Report by

Lewis Hart AMIOA

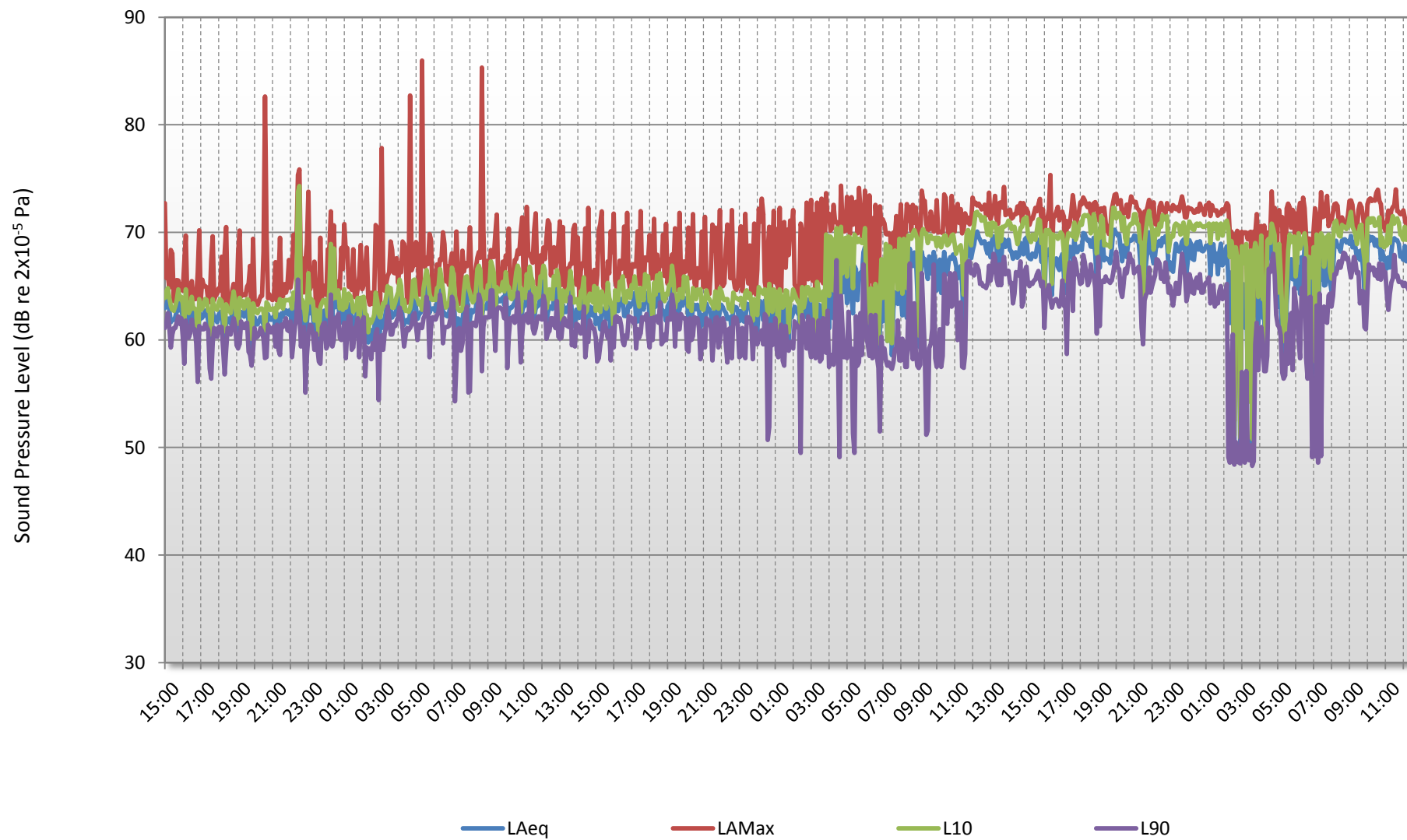
Checked by

Duncan Martin MIOA



47 Farringdon Rd, London

Environmental Noise Time History
02 March 2018 to 05 March 2018



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

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47 Farringdon Road, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver

Source: Proposed plant installation

	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Manufacturer provided sound pressure level at 1 metre									
Panasonic CU-4E27PBE	54	53	49	50	47	44	40	32	52
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	
Mitigation, dB	-3	-2	-3	-4	-7	-11	-12	-11	
Distance correction to receiver, dB (5 m)	-14	-14	-14	-14	-14	-14	-14	-14	
Sound pressure level at receiver	43	43	38	38	32	25	20	13	38

Design Criterion 38

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window

Source: Proposed plant installation

	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound pressure level outside window	43	43	38	38	32	25	20	13	38
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	28	28	23	23	17	10	5	-2	23

Design Criterion 30