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WELL PHARMACY,
244 BARNSLEY ROAD, CUDWORTH

NOISE IMPACT ASSESSMENT

Report **12106-NIA-09**

Prepared on 15 March 2017

Issued For:

On Behalf of Well Pharmacy

committed to CSCS Platinum award

ISO 17025

ISO 9001

Institute of Acoustics sponsoring organisation

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1.0 INTRODUCTION

Clement Acoustics Ltd has been commissioned by Well Pharmacy to measure existing background noise levels at Well Pharmacy, 244 Barnsley Road, Cudworth. Measured noise levels will be used to determine noise emission criteria for the 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 two new air conditioning condenser units on a flat roof at first floor level, to the rear of the existing pharmacy building.

The proposed plant units will be for pharmacy use, and will therefore be operational during opening hours only, which are detailed below:

- Monday to Friday: 09:00 - 17:30,
- Saturday: 09:00 - 17:00,
- Sunday: Closed.

The store is located on a largely commercial high street, with residential flats located to the rear. The closest window to the proposed plant location is at a minimum distance of 10m.

All locations are shown in attached site plan 12106-SP-09.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at the position shown in Site Plan 12106-SP-09. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the surrounding area.

The surroundings and position used for the monitoring location was as follows:

- Position 1: The microphone was mounted on a 1st storey window towards the rear of the building. The position was considered not to be free-field, and a correction for reflections has therefore been applied. Noise levels at Position 1 were dominated by road traffic noise from Barnsley Road during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 13:00 on 2 March 2017 and 11:00 on 3 March 2017.

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.

- Svantek Type 971 Class 1 Sound Level Meter

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 Plan 12106-SP-09. The measured levels are shown as a time history in Figure 12106-TH-09.

Minimum background levels are shown in Table 4.1.

	Minimum background noise level $L_{A90:\ 5min}$ dB(A)
Daytime [*07:00 - 23:00*]	42
Night-time [*23:00 - 07:00*]	37
Operating Hours [*Worst Case 09:00 - 17:30*]	51

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

In order to set the noise emission criterion such that suitable levels are achieved at noise sensitive receivers, we would recommend the following:

> *"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 external background noise, at a point 1 metre outside any window of any residential property."*

As the proposed unit is for commercial use, it will only be operational during pharmacy opening hours.

Based on results shown in table 4.1, we propose to set the noise criteria as **41 dB(A)** in order to comply with the above requirement.

6.0 DISCUSSION

6.1 Proposed Installation

The proposed condenser units have been selected as follows:

- 1 No. Mitsubishi Condenser Unit type PUHZ-ZRP100VKA3,
- 1 No. Mitsubishi Condenser Unit type SUZ-KA35VA6.

The manufacturer's specified noise emissions are as shown in Table 6.1.

	Sound Pressure Level (dB) in each Frequency Band, at 1m							
Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Mitsubishi Condenser Unit type PUHZ-ZRP100VKA3	58	59	51	48	46	41	34	29
Mitsubishi Condenser Unit type SUZ-KA35VA6	51	54	47	44	42	39	32	29

Table 6.1: Manufacturer's Sound Pressure Levels

The proposed plant location is on the flat roof area towards the rear of the store, in the location shown on indicative site plan 12106-SP-09.

6.2 Noise Impact Assessment

An assessment has been undertaken for the nearest residential window, as shown in the site plan. The window is a minimum of 10m from the proposed plant location.

It is assumed the plant unit will have direct line of sight to the window.

Taking into account all necessary acoustic corrections including corrections for distance and reflections, the resulting noise level at the residential window 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 plant installation*]
Residential Window	41 dB(A)	36 dB(A)

Table 6.2: Noise levels and criteria at receiver

As shown in Table 6.2 and Appendix B, the proposed plant installation would be expected to meet the set criterion.

6.3 British Standard Recommendations

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 '*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, BS8233:2014 recommends 30dB(A) as being acceptable internal resting/sleeping conditions during night-time.

With loudest external levels of 36 dB(A), the window itself would need to provide 6 dB attenuation in order for acceptable conditions to be met. According to BS8233:2014, 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	Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:2014*	Noise Level at Receiver (due to plant installation)
Inside Nearest Window	30 dB(A)	21 dB(A)

Table 6.3: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at Well Pharmacy, 244 Barnsley Road, Cudworth. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in order to protect the amenity of nearby receivers.

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

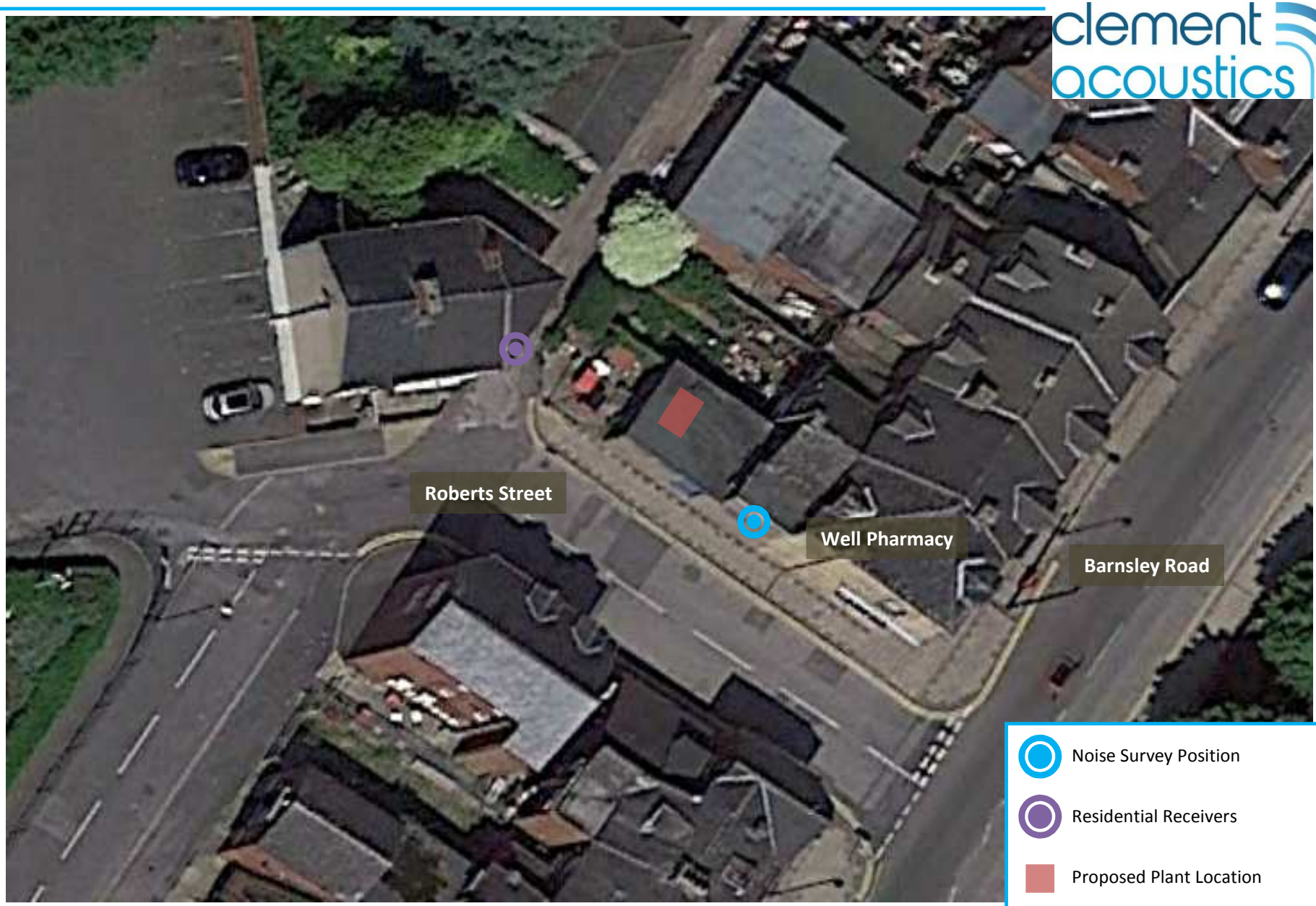
Calculations show that noise emissions from the proposed plant units would meet the set requirements and the most stringent recommendations of the relevant British Standard.

Report by

Duncan Martin MIOA

Checked by

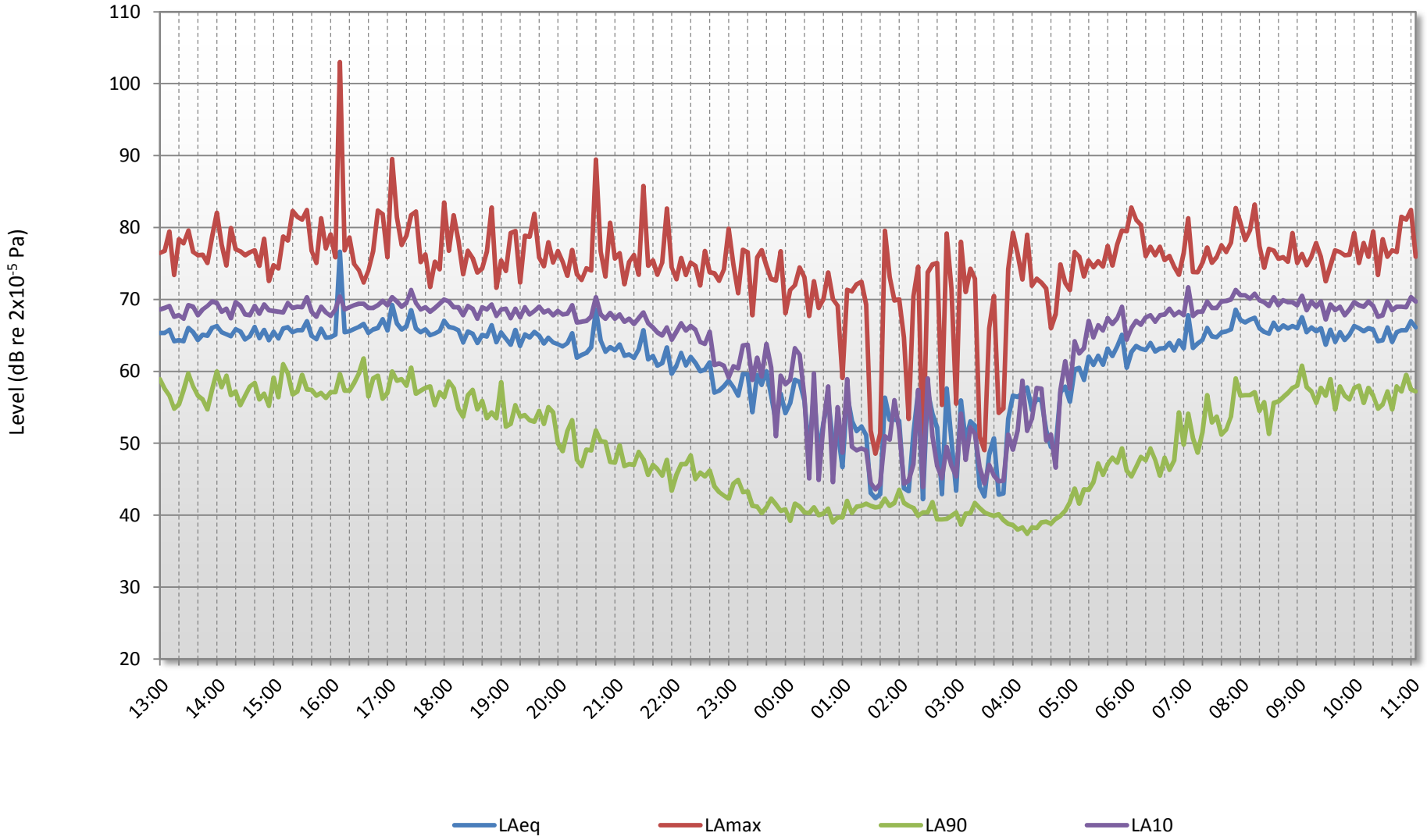
John Smethurst MIOA



12106-SP-09 Indicative site plan indicating noise monitoring position and noise sensitive receiver **Date:** 15 March 2017

Well Pharmacy, 244 Barnsley Road, Cudworth

Environmental Noise Time History
2 March 2017 to 3 March 2017



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

12106

Well Pharmacy, 244 Barnsley Road, Cudworth

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Window
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Mitsubishi Condenser Unit type PUHZ-ZRP100VKA3	58	59	51	48	46	41	34	29	51
Mitsubishi Condenser Unit type SUZ-KA35VA6	51	54	47	44	42	39	32	29	47
Cumulative sound pressure level at 1m	**59**	**60**	**53**	**50**	**48**	**43**	**36**	**32**	**53**
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (10m)	-20	-20	-20	-20	-20	-20	-20	-20	
Sound pressure level at receiver	**42**	**43**	**36**	**33**	**31**	**26**	**19**	**15**	**36**

Design Criterion	**41**

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	42	43	36	33	31	26	19	15	36
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**27**	**28**	**21**	**18**	**16**	**11**	**4**	**0**	**21**

Design Criterion	**30**