



SUSTAINABLE DESIGN CONSULTANTS

Noise Impact Assessment

PROJECT:

15 Kidmore Road, Caversham

REPORT: 13095-NIA-01

DATE: 12/01/2018



Energy Rating Services

Second Floor, 27 -31 High Street, Kidlington, OX5 2DH

Tel: +44 (0)1865 378885

Email: info@energyratingservices.com



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13095-SP1	Indicative Site Plan
13095-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Energy Rating Services to measure existing background noise levels at 15 Kidmore Road, Caversham. The measured noise levels have been used to determine noise emission criteria for a proposed plant installation in agreement with the planning requirements of Reading Borough Council.

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 1 Calorex VSD unit.

The property north of 15 Kidmore Road, Caversham have been identified as the nearest affected 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 Energy Rating Services before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 13095-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 13095-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 at 1st storey height attached to the scaffolding on the side 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 from Kidmore Road during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 4 January 2018 at 10:00 and 5 January 2018 at 16:00.

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 13095-SP1.

The measured noise levels are shown as a time history in Figure 13095-TH1, with ambient and background noise levels summarised in Table 4.1.

	Average ambient noise levels	Typical background noise levels
	$L_{eq: T}$ dB(A)	$L_{90: 5min}$ dB(A)
Daytime (07:00 - 23:00)	60 dB(A)	48 dB(A)
Night-time (23:00 - 07:00)	32 dB(A)	32 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

It is understood that Reading Borough Council general 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 typical external background noise, at a point 1 metre outside any noise sensitive window.

It is understood that the proposed plant unit will be for residential use and therefore could operate during night-time hours. We therefore propose to set the noise criteria at 22 dB(A), the value 10 dB below the typical measured background noise level during the night-time hours.

6.0 DISCUSSION

6.1 Noise Impact Assessment

The proposed plant installation comprises 1 No. Calorex VSD 600.

Noise emissions for the proposed plant unit, 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	In-Duct Sound Power Levels in each Frequency Band								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Calorex VSD 600	56	58	65	67	68	65	63	62	72

Table 6.1: Manufacturer Noise Emissions Levels

It is understood that the plant will serve a swimming pool and will be located within the building. However, the unit will exhaust to the atmosphere at the side of the house at the approximate location which is shown on indicative site plan 13095-SP1.

The closest receiver has been identified as the window on the south façade of a residential property adjacent which is a minimum of 5 m from the proposed plant exhaust location.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that an attenuator is attached to all the atmospheric connections of the fan.

Based on the information provided, an attenuator meeting the insertion losses 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
In-Line Attenuator	6	13	23	37	43	44	35	20

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. It is understood that the full scheme has as yet been designed, therefore conservative system losses have been assumed.

Receiver	Night Time Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	22 dB(A)	20 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 attenuator 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 20 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)	8 dB(A)

Table 6.4: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 15 Kidmore Road, Caversham. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant unit in accordance with the requirements of the Reading Borough Council.

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 unit should meet the requirements of the Reading Borough Council with the recommended mitigation installed as stated herein.

Report by
John Smethurst MIOA

Checked by
Andrew Thomas AMIOA



 Proposed Plant Location

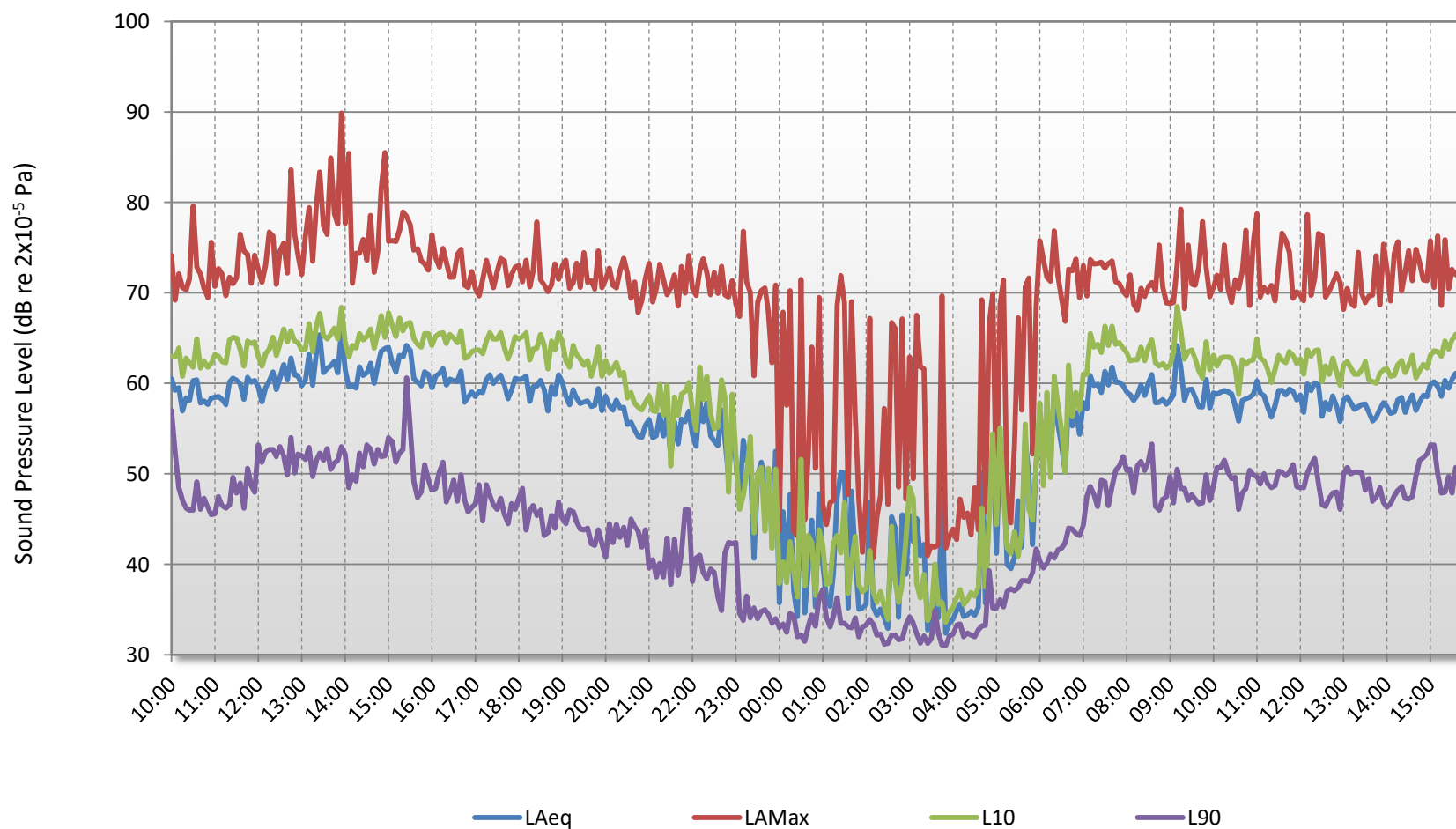
 Noise Survey Position

 Noise Sensitive Receiver

15 Kidmore Road, Caversham

Environmental Noise Time History

4 January 2018 to 5 January 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

13095

15 Kidmore Road, Caversham

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 in-duct sound power levels									
Unit Type: Calorex VSD 600	56	58	65	67	68	65	63	62	72
Specified attenuator insertion losses, dB	-6	-13	-23	-37	-43	-44	-35	-20	
Grille end reflection	-13	-9	-4	-2	0	0	0	0	
Distance correction to receiver, dB (5 m) <i>sound power to pressure</i>	-22	-22	-22	-22	-22	-22	-22	-22	
Sound pressure level at receiver	15	14	16	6	3	-1	6	20	20

Design Criterion	22
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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	15	14	16	6	3	-1	6	20	20
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	0	0	1	0	0	0	0	5	8

Design Criterion	30
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