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WILLIAM ELLIS EXTENSION,

PARLIAMENT HILL SCHOOL, HIGHGATE ROAD, CAMDEN

NOISE IMPACT ASSESSMENT

Report **10883-NIA-02 RevA**

Prepared on 16 October 2018

Issued For:

Farrans Construction
New Cambridge House
Bassingbourn Road
Litlington nr Royston
SG8 0SS

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics Ltd has been commissioned by Farrans Construction to measure existing background noise levels at Parliament Hill School, Highgate Road, Camden. The measured noise levels have been used to determine noise emission criteria for a proposed plant installation at the William Ellis Extension 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 ventilation, air conditioning plant and air source heat pumps [ASHP] to service proposed teaching spaces over ground and 1st floors in the proposed William Ellis Extension.

External condenser and ASHP plant units will be located on the main roof of the extension, with other internally located air handling units ducted to external facades and the roof.

The William Ellis extension is located towards the north of the school site.

The closest window to the proposed plant location is at a minimum distance of 50 m from the closest plant locations.

Locations are shown in attached site plans 10883-SP2.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements representative of receivers close to the William Ellis Extension were undertaken at one position as shown on indicative site drawing 10883-SP2. 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 boundary of the site on a pole above the perimeter fence to the east of the site. The position was considered to be free-field according to guidance found in BS4142:2014, and a correction for reflections has therefore not been applied. Noise levels at the monitoring position were dominated by surrounding traffic noise and urban sounds, with some contribution from ongoing construction noise during the installation and collection of equipment. The survey duration was therefore chosen to ensure periods outside construction work hours were captured.

Continuous automated monitoring was undertaken for the duration of the survey between 15:00 on 2 October 2018 and 01:00 on 3 October 2018.

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 10883-SP2.

The measured noise levels are shown as a time history in Figure 10883-TH2, with ambient and background noise levels summarised in Table 4.1.

	Average ambient noise level $L_{eq: T}$	Minimum background noise level $L_{90: 5min}$
Daytime (07:00 - 23:00)	64 dB(A)	44 dB(A)
Night-time (23:00 - 07:00)	59 dB(A)	39 dB(A)

Table 4.1: Average ambient and minimum background noise levels

5.0 NOISE CRITERIA

5.1 Local Authority Requirements

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 operational during typical school hours. We therefore propose to set the noise criteria at 34 dB(A), the value 10 dB below the minimum measured background noise level during daytime hours, in the absence of construction noise.

5.2 BREEAM Pol 05 Requirements

The requirements of Pol 05 are to comply with the following design criteria:

"*The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level.*"

It is therefore proposed that using the criterion of 34 dB(A) as stated in Section 5.1 is suitably robust to demonstrate compliance with all requirements.

6.0 PROPOSED PLANT INSTALLATION

Proposed plant units have been grouped according to the location of external units, or the duct terminations of internal units.

6.1 Plant Group 1 (Main Roof)

Plant Group 1 comprises an air conditioning condenser unit, 2 ASHPs and the atmosphere ducts for two air handling units, servicing the drama studio. The AHUs themselves are located internally, meaning the intake and discharge must be considered for each.

The manufacturer's specified noise emissions for Plant Group 1 units are as shown in Table 6.1.

	Noise Emission Level (dB) in each Frequency Band							
Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
1 No. Condenser Unit								
Mitsubishi Unit type MXZ-4D72VA	Overall Sound Power Level 64 dB(A)							
2 No. ASHPs								
Mitsubishi Unit type PUHZ-P140VHA4	Overall Sound Pressure Level 53 dB(A) at 1 m							
2 No. Nuaire MVHR XBC 65 - Manufacturer's Sound Power Levels								
Supply Fan Intake	64	64	57	51	49	44	33	20
Extract Fan Exhaust	70	70	64	60	57	54	46	40

Table 6.1: Manufacturer's Noise Emission Levels - Plant Group 1

The proposed location for these units and ducted terminations is on the main roof.

The plant location is approximately 50 m from the residential window, with direct line of sight assumed.

6.2 Plant Group 2

Plant Group 2 comprises a single air handling unit servicing ground floor spaces. The unit is located internally, with exhaust and intake ducts to the external building façade at ground floor level towards the southeast of the building. Noise emissions from the exhaust and intake ducts will therefore be considered.

The manufacturer's specified noise emissions for the proposed unit are as shown in Table 6.2.

	Sound Power Level (dB) in each Frequency Band							
Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
1 No. Nuaire MVHR XBC 55								
Supply Fan Intake	66	59	60	48	49	46	38	26
Extract Fan Exhaust	71	66	69	56	57	56	51	48

Table 6.2: Manufacturer's Noise Emission Levels - Plant Group 2

The proposed plant location is on the ground floor façade towards the southeast of the building.

The plant location is approximately 50 m from the residential window, with direct line of sight assumed.

7.0 NOISE IMPACT ASSESSMENT

An assessment has been undertaken for the closest identified residential window, as shown in the site plan.

Taking into account all necessary acoustic corrections including corrections for distance, reflections and acoustic corrections, the resulting noise level at the residential window would be as shown in Table 7.1. Cumulative calculations are shown in Appendix B.

Receiver	**Daytime Hours Criterion**	**Noise Level at Receiver [*due to plant installation*]**
Residential Window	34 dB(A)	32 dB(A)

Table 7.1: Noise levels and criteria at receiver

As shown in Table 7.1 and Appendix B, the proposed plant installation would be expected to meet the set criterion, without the need for particular mitigation.

8.0 CONCLUSION

A noise impact assessment of proposed plant units has been undertaken for the William Ellis Extension at Parliament Hill School, Highgate Road, Camden. The results of an environmental noise 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 as proposed.

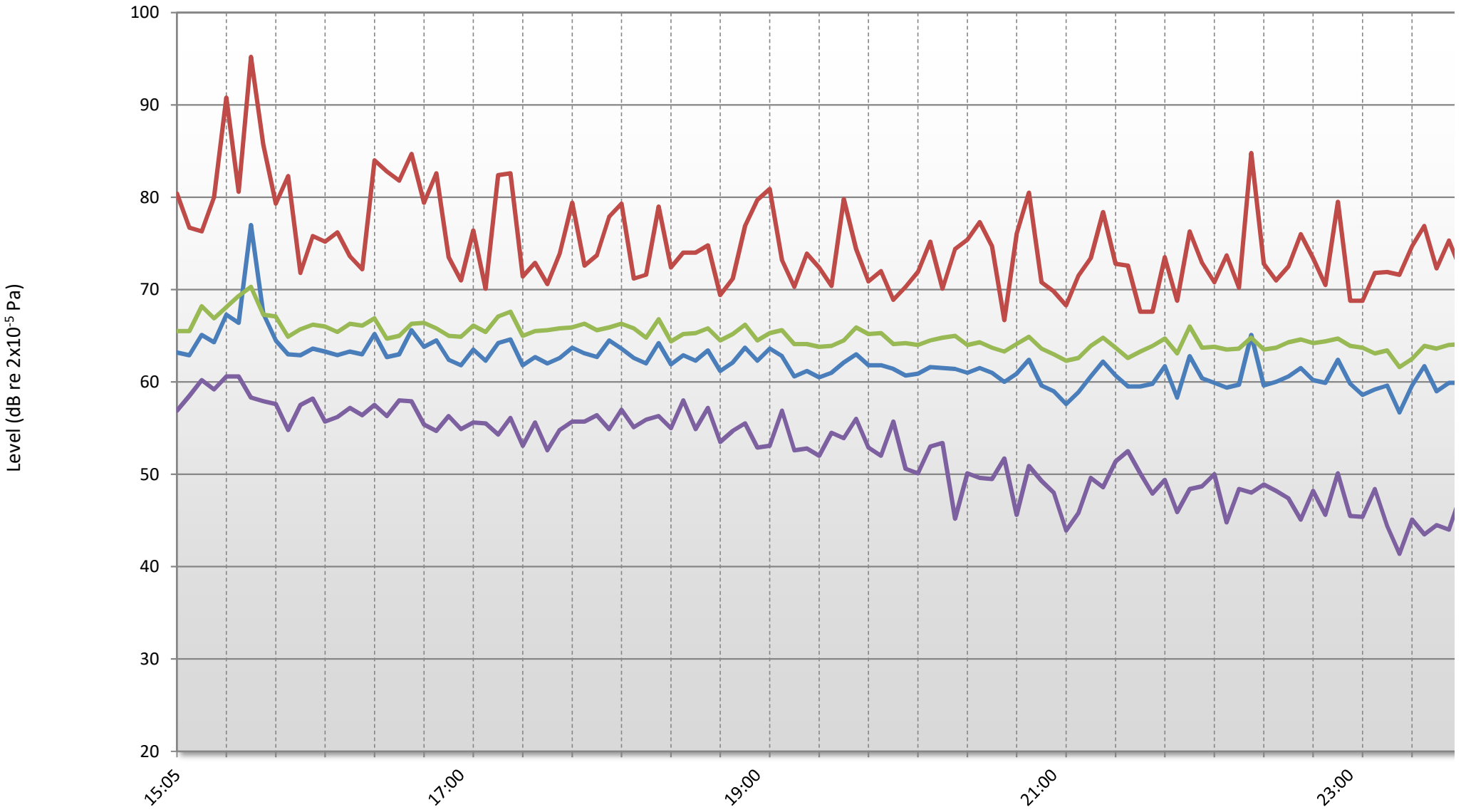
Report by	Checked by
Duncan Martin MIOA	**John Smethurst MIOA**

10883-SP2 Indicative site plan indicating noise monitoring position and nearest noise sensitive receivers

Date: 16 October 2018

Parliament Hill School, Highgate Road, Camden

Environmental Noise Time History
2 October 2018 to 3 October 2018



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

10883

William Ellis Extension - Parliament Hill School

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Calculated Receiver Levels									
Mitsubishi Condenser Unit and ASHPs	26	27	26	27	21	15	8	1	27
Nuaire MVHR XBC 65 Extract	20	26	23	20	16	12	4	0	22
Nuaire MVHR XBC 65 Supply	14	20	16	11	8	2	0	0	14
Nuaire MVHR XBC 55 Extract	21	22	28	18	20	20	15	12	26
Nuaire MVHR XBC 55 Supply	12	11	18	8	9	6	0	0	14
Nuaire MVHR XBC 55 Extract	21	22	28	18	20	20	15	12	26
Nuaire MVHR XBC 55 Supply	12	11	18	8	9	6	0	0	14
Sound pressure level at receiver	**29**	**31**	**33**	**29**	**26**	**24**	**19**	**15**	**32**

Design Criterion	**34**

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	29	31	33	29	26	24	19	15	32
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**14**	**16**	**18**	**14**	**11**	**9**	**4**	**0**	**17**

Design Criterion	**30**