202 Uxbridge Road
London
W12 7JP

Tel: +44(0)203 475 2280
Fax: +44(0)203 475 2281

info@clementacoustics.co.uk

www.clementacoustics.co.uk

ALBERT TERRACE MEWS,
LONDON NW1 7TA

NOISE IMPACT ASSESSMENT

Report **12039-NIA-02 RevA**

Prepared on 23 May 2018

Issued For:

Humphrey Kelsey Architecture
4 Primrose Hill Studios
Fitzroy Road
London
NW1 8TR

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Humphrey Kelsey Architecture to measure existing background noise levels at Albert Terrace Mews. 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

6 Albert Terrace Mews is an of end of terrace building. The property is located at the corner of Regent's Park Road and Albert Terrace Mews. As part of the development, a plant installation is proposed.

Current proposals are to install:

- 1 No. air handling unit (AHU)
- 1 No. heat recovery unit (HRU)

The AHU and HRU are to be installed in an existing ground floor side extension. The extension is formed on two sides by the brick boundary wall and on one side by the mews building. The west façade of the extension and the roof is a timber construction. The west façade of the extension will also have a louvre installed in it.

The east façade windows of 6 Albert Terrace has been identified as the nearest affected receiver with line of site to the louvre. Locations are shown in attached site plan 12039-SP1.

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 Humphrey Kelsey Architecture before the plant is installed or any noise mitigation measures are implemented.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 12039-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 attached to a tree approximately 2 metres from ground level at the front of the building. The position was considered to be free-field, and a correction for reflections has therefore not been applied. Noise levels at Position 1 were dominated by road traffic during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 13:00 on 1 March 2017 and 10:00 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.

- 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 12039-SP1.

The measured noise levels are shown as a time history in Figure 12039-TH1, with background noise levels summarised in Table 4.1.

	Minimum background noise level $L_{A90: 5min}$ dB(A)
Daytime (07:00 - 23:00)	53 dB(A)
Night-time (23:00 - 07:00)	41 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

The *London Borough of Camden* criteria for plant noise emissions are understood to be 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 10dB 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 may operate over a 24 hour period. We therefore propose to set the noise criteria at **31 dB(A)**, the value 10 dB below the minimum measured background noise level during the survey.

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. AHU – Heatstar Phoenix EC
- 1 No. HRU – Systemair TOPVEX TX/C04 EL-R

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

	Sound Power Levels in each Frequency Band							
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
AHU – Heatstar Phoenix EC - Extract	48	56	62	65	62	63	60	51
AHU – Heatstar Phoenix EC - Supply	46	52	58	61	58	58	56	47
HRU – Systemair TOPVEX TX/C04 EL-R - Extract	25	42	55	62	64	61	55	55
HRU – Systemair TOPVEX TX/C04 EL-R - Supply	31	42	43	44	44	40	34	31

Table 6.1: Manufacturer Noise Emissions Levels – AHU & HRU

The proposed plant locations are at the rear of the property at lower ground floor level and are shown on indicative site plan 12039-SP1.

The AHU and HRU will be located in a ground floor existing extension plant room, with ventilation provided via a louvred panel in the west façade.

The closest receiver has been identified as the windows on the east façade of 6 Albert Terrace which is a minimum of 10 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 attenuators are fitted to the atmosphere connections of the following:

- AHU – Heatstar Phoenix EC – Extract
- AHU – Heatstar Phoenix EC – Supply
- HRU – Systemair TOPVEX TX/C04 EL-R - Extract

The attenuators should provide the following insertion loses and should be sized so as to not to exceed a maximum pressure drop of 60 Pascals.

	Required Attenuation (dB) in each Frequency Band							
Mitigation	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
In-line attenuator	2	5	11	17	20	19	12	10

Table 6.2: Required insertion loss from attenuators

It is also recommended that the entire soffit of the plantroom is acoustically lined in order to reduce the reverberant build-up of noise.

The acoustic lining should comprise 100 mm thick mineral wool slabs having a density of 80 kg/m3. The mineral wool slabs should be faced with either fibreglass cloth or glass fibre tissue and be inert, rot proof, vermin proof, and non-hygroscopic. The slabs shall be retained behind a suitable protective facing such as perforated steel sheet or expanded metal (minimum free area of 23%).

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure fibre migration is prevented.

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	Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	31 dB(A)	28 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 recommended mitigation 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 30 dB(A) as being acceptable internal resting/sleeping conditions during night-time.

With loudest external levels of 28 dB(A), acceptable internal conditions would be met when taking the attenuation of the window 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	Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:2014*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	13 dB(A)

Table 6.4: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at Albert Terrace Mews. 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.

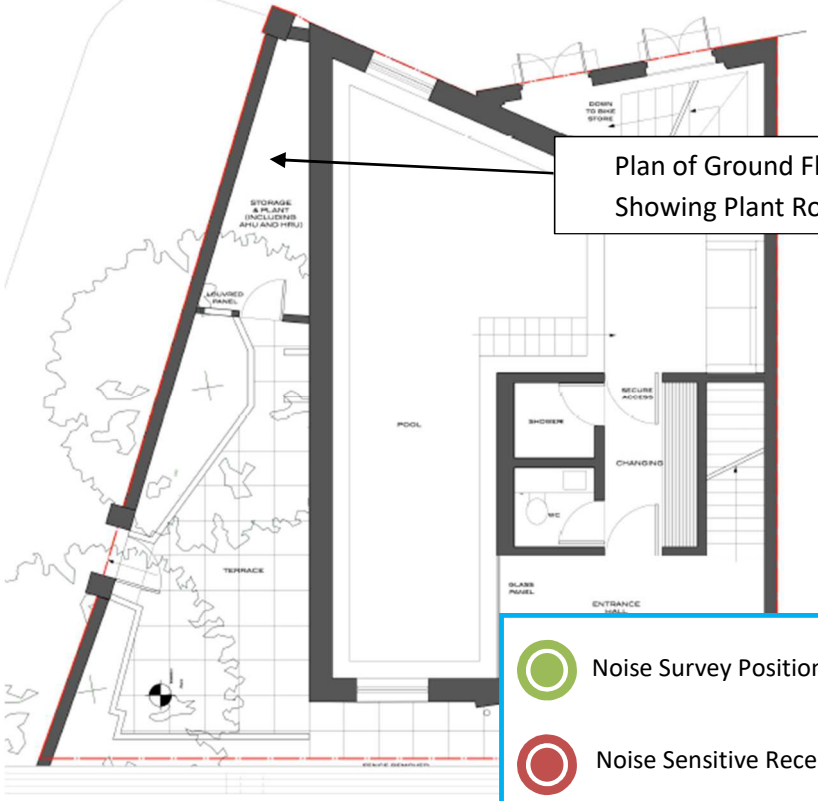
A noise impact assessment has then been undertaken using manufacturer noise data to predict the noise levels, due to the proposed plant, at the nearby noise sensitive receivers.

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

John Smethurst BSc (Hons) MIOA
Director

Western Elevation Showing Plant Room Louvre



Plan of Ground Floor Showing Plant Room

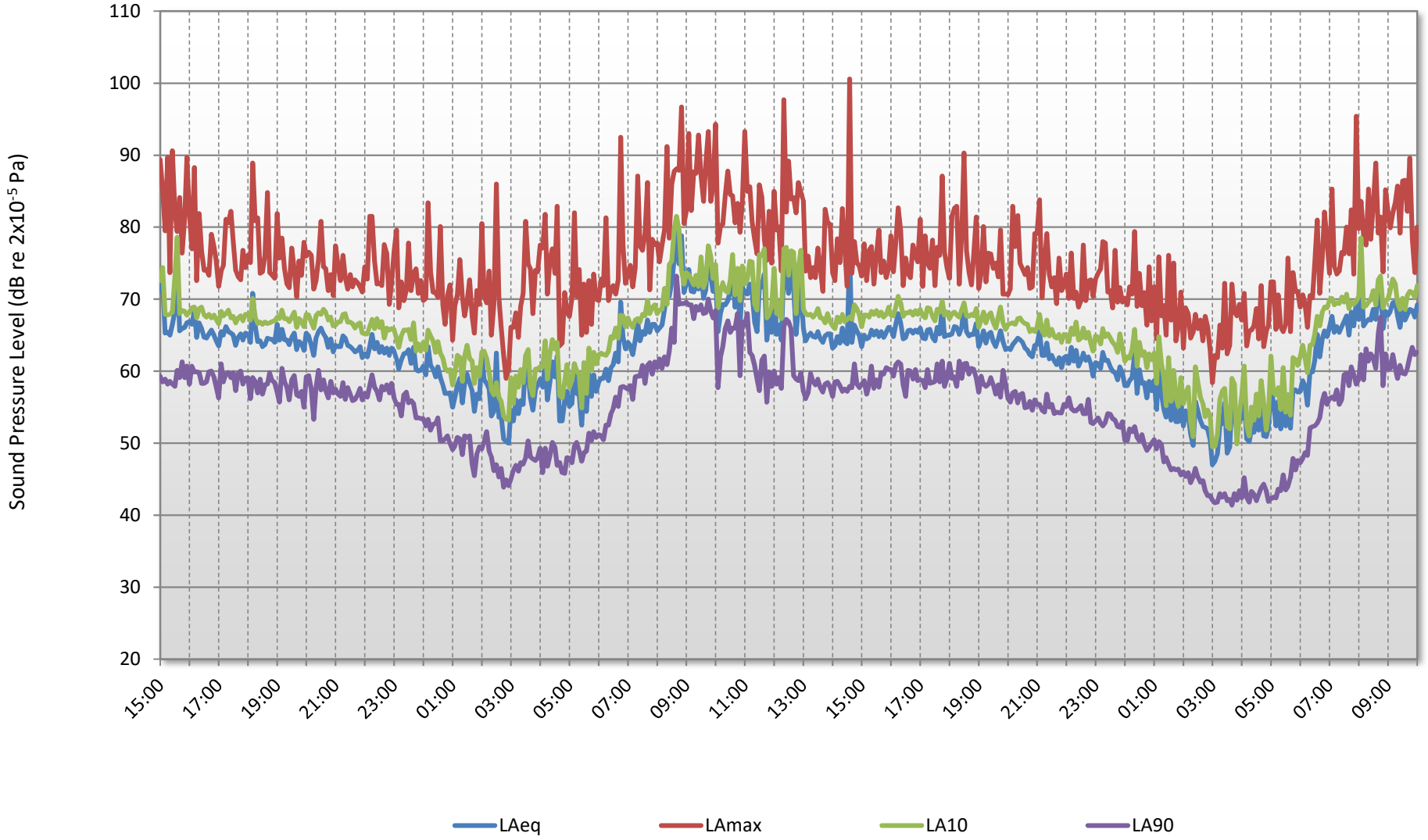
Noise Survey Position

Noise Sensitive Receiver

12039-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 23 May 2018

6 Albert Terrace, London

Environmental Noise Time History
1 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

12039
6 Albert Terrace

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Source: AHU & HRU Extract and Supply	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Manufacturer sound power at the grille									
AHU – Heatstar Phoenix EC - Extract	48	56	62	65	62	63	60	51	69
Proposed attenuator insertion losses, dB	2	5	11	17	20	19	12	10	
AHU – Heatstar Phoenix EC - Extract with attenuator	46	51	51	48	42	44	48	41	
AHU – Heatstar Phoenix EC - Supply	46	52	58	61	58	58	56	47	64
Proposed attenuator insertion losses, dB	2	5	11	17	20	19	12	10	
AHU – Heatstar Phoenix EC - Supply with attenuator	44	47	47	44	38	39	44	37	
HRU – Systemair TOPVEX TX/C04 EL-R - Extract	25	42	55	62	64	61	55	55	68
Proposed attenuator insertion losses, dB	2	5	11	17	20	19	12	10	
HRU – Systemair TOPVEX TX/C04 EL-R - Extract with attenuator	23	37	44	45	44	42	43	45	
HRU – Systemair TOPVEX TX/C04 EL-R - Supply	31	42	43	44	44	40	34	31	48
Cumulative sound power level of all plant (with attenuators), dB	48	53	53	52	49	48	50	47	56
Sound power to sound pressure correction	-11	-11	-11	-11	-11	-11	-11	-11	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (10 m)	-20	-20	-20	-20	-20	-20	-20	-20	
Sound pressure level at receiver	**20**	**25**	**25**	**24**	**21**	**20**	**22**	**19**	**28**

Design Criterion	**31**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Sound pressure level outside window	20	25	25	24	21	20	22	19	28
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**5**	**10**	**10**	**9**	**6**	**5**	**7**	**4**	**13**

Design Criterion	**30**