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16 NEW COLLEGE COURT, FINCHLEY ROAD, LONDON

PLANNING COMPLIANCE REPORT

Report 16159.PCR.01

For:

Rolufre Ltd

13 New College Parade

London

NW3 5EP

Site Address	Report Date	Revision History
16 New College Court, Finchley Road, London, NW3 5EP	21/06/2017	

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Rolufre Ltd, 13 New College Parade, London, NW3 5EP, to undertake a noise impact assessment of the proposed plant installation at 16 New College Court, Finchley Road, London, NW3 5EP. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for a kitchen extract fan installation.

This report presents the overall methodology and results from the environmental survey followed by calculations to demonstrate the feasibility of the plant installation to satisfy the emissions criterion at the closest noise-sensitive receiver and outline mitigation measures as appropriate.

2.0 ENVIRONMENTAL NOISE SURVEY AND EQUIPMENT

2.1 Procedure

Automated noise monitoring was undertaken by KP Acoustics Ltd at the position shown in Site Plan 16159.SP1. This location was chosen in order to collect representative noise data in relation to the nearest noise sensitive receiver relative to the proposed plant installation. Continuous automated monitoring was undertaken for the duration of the survey between 10:10am on 20 June 2017 and 10:15am on 21 June 2017.

Initial inspection of the site revealed that the background noise profile at the monitoring location was dominated by the road traffic noise from the surrounding roads, noise from existing plant units and noise from an existing Nursery School playground.

The weather during the course of the survey was generally dry with wind speeds within acceptable tolerances and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2007 Acoustics *"Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels"*.

2.2 Equipment

The equipment calibration was verified before and after the survey and no calibration irregularities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 958A Class 1 Sound Level Meter
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

The results from the continuous noise monitoring are shown as a time history of L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} averaged over 5 minute sample periods shown in Figure 16159.TH1.

Background noise levels are shown in Table 3.1.

	Background noise level $L_{A90: 5min}$ dB(A)
Daytime (07:00-23:00)	50
Night-time (23:00-07:00)	48
Operating Hours (10:00-23:00)	51

Table 3.1: Measured background noise levels

Measured ambient noise levels are shown in Table 3.2.

	Levels dB(A)
Daytime $L_{Aeq,16hour}$	62
Night-time $L_{Aeq,8hour}$	54

Table 3.2 Site average noise levels for daytime and night time

4.0 NOISE CRITERIA

The criterion of The London Borough of Camden for noise emissions of new plant in this instance is as follows:

"The proposed plant and machinery shall be operated so as to ensure that any noise generated is "not audible" outside the nearest residential premises. To demonstrate inaudibility, you will need to provide calculations that show that the plant noise level is 10dBA below the lowest background level (LA90 (15minutes)) 1m from the nearest residential window, over the proposed operating hours. Tonality must also be taken into consideration."

As operating hours of the proposed plant installation is from 10:00am to 11:00pm, we therefore propose to set the noise criterion as shown in Table 4.1 in order to comply with the above requirement. Note that compliance to the above criterion would inherently demonstrate compliance to BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*'.

	Operating hours (10:00am-11:00pm)
Noise criterion at nearest receiver	41 dB(A)

Table 4.1: Proposed Noise Emissions Criteria at receiver.

5.0 DISCUSSION

It is understood that the plant installation is comprised of the following unit:

- 1 No Fan Helios GBW EC450/4 T120

The closest noise sensitive receivers will be, the residential window located approximately 6 metres from the proposed Kitchen extract fan location (as shown in SP1) and the closest Nursery School window located approximately 3.5 metres away (As shown in SP1) .

The sound power levels as provided by the manufacturer for the fan unit is shown in Table 5.1.

	L_w (dBA) by octave frequency band (Hz)							
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Helios GBW EC450/4 T120 – Case Breakout	61	61	58	56	57	57	52	44
Helios GBW EC450/4 T120 – Outlet	70	67	68	70	76	75	72	59

Table 5.1 Manufacturer's Sound Power Levels.

5.1 Objective overview

Taking all acoustic corrections into consideration, including distance corrections, the noise level expected at the closest windows receivers would be as shown in Table 5.2. Detailed calculations are shown in Appendix B. The acoustic feature correction has not been applied to the proposed plant unit, as these will feature no irregular noises or tonal characteristics.

Receiver - Nearest Noise Sensitive Window	Criterion	Noise Level at Receiver
Receiver 1 – Residential window (As shown in SP1)	41dB(A)	26dB(A)
Receiver 2 - Nursery School window (As shown in SP1)		39dB(A)

Table 5.2 Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the plant installation would satisfy the emissions criterion set satisfies the emissions criteria set based on the requirements of The London Borough of Camden. However, this is providing that the mitigation measures indicated in Section 5.3 are implemented.

5.2 Noise Impact Assessment

Furthermore, the predicted noise levels of 26dB(A) and 39dB(A) at nearest noise sensitive receiver is to be considered outside of the nearest residential window. Window may be closed or partially closed leading to further attenuation, as follow. Further calculations have been undertaken to assess whether the noise emissions from the plant units installation would be expected to meet the recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receiver.

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 30 dB(A) as being the value for internal resting/sleeping conditions in night-time and 35 dB(A) as being the value for internal resting/sleeping conditions in daytime.

With a calculated external level of 30dB(A) at nearest noise sensitive receiver, the residential window itself would need to provide an additional nominal attenuation in order for the conditions to be achieved. According to BS8233:2014, even a partially open window offers 10-15dB attenuation, thus leading to a further reduced interior noise level.

Receiver	Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:2014 and BB93 for indoor ambient noise level*	Noise Level at Receiver
Receiver 1 – Residential	35 dB(A)	20 dB(A)
Receiver 2 (Nursery School Classroom window)	35 dB(A)	29 dB(A)

Table 5.3 Noise levels and criteria inside nearest residential and classroom spaces

Predicted level is shown in Table 5.3, with detailed calculations shown in Appendix B. It can therefore be stated that, as well as complying with the requirements of The London Borough of Camden, the noise emissions from the plant unit installations would be expected to comfortably meet the most stringent recommendations of the relevant British Standard.

5.3 Proposed Mitigation Measures

In order to reduce noise emissions from the proposed kitchen extract system to within the criteria specified in Section 4.0, we would recommend that an acoustic silencer needs to be installed. The silencer should be installed directly after the proposed fan within the ductwork in order to reduce noise emissions from the duct breakout and flue termination point.

The acoustic silencer should provide the minimum attenuation characteristics shown in Table 5.4.

	Attenuation Levels (dB) in each Frequency Band (at 1m)							
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Acoustic Silencer (900 mm length, 45% free area)	2	5	11	17	20	19	12	10

Table 5.4: Required attenuation levels for the proposed silencer.

The aforementioned silencer could be provided by companies such as Noico Ltd, or any similar acoustic solutions supplier.

In order to ensure that no structure-borne noise is transferred within any noise-sensitive spaces, we would recommend adopting any suitable elements of the anti-vibration strategy shown in Appendix C.

6.0 CONCLUSION

An environmental noise survey has been undertaken at 16 New College Court, Finchley Road, London NW3 5EP, by KP Acoustics Ltd between 10:10am on 20 June 2017 and 10:15am on 21 June 2017. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant installation.

Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receiver for compliance with current requirements.

Calculations show that noise emissions from the proposed plant installation would meet the requirements of The London Borough of Camden, BS8233:2014 British Standard and BB93, providing that the mitigation measures outlined in Section 5.3 are installed.

Report by
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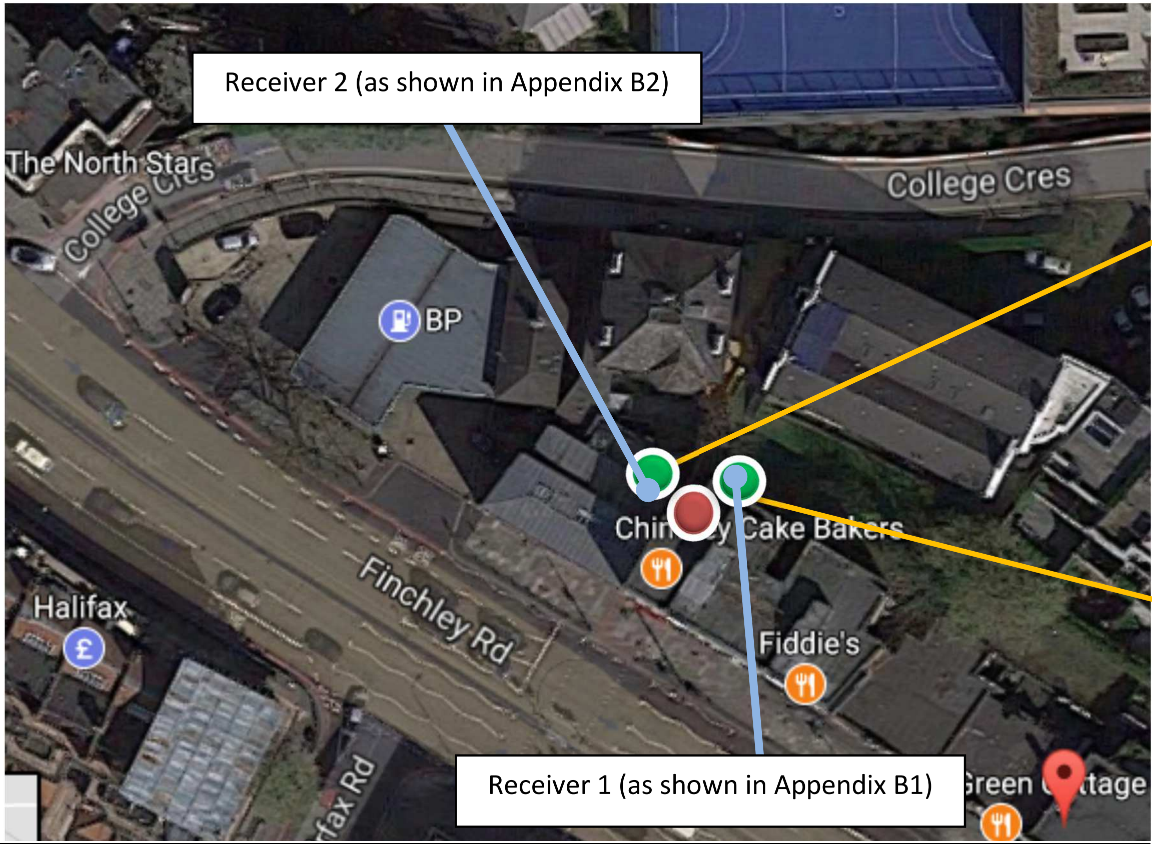

Noise Survey Monitoring Position

Closest Noise Sensitive Receiver

Title:

Indicative site plan showing noise monitoring position and closest noise sensitive receivers

(ref. Google Maps)

Date: 21 June 2017

FIGURE 16159.SP1

KP acoustics

16 New College Court, Finchley Rd, London NW3 5EP
Environmental Noise Time History
20th to 21st June 2017

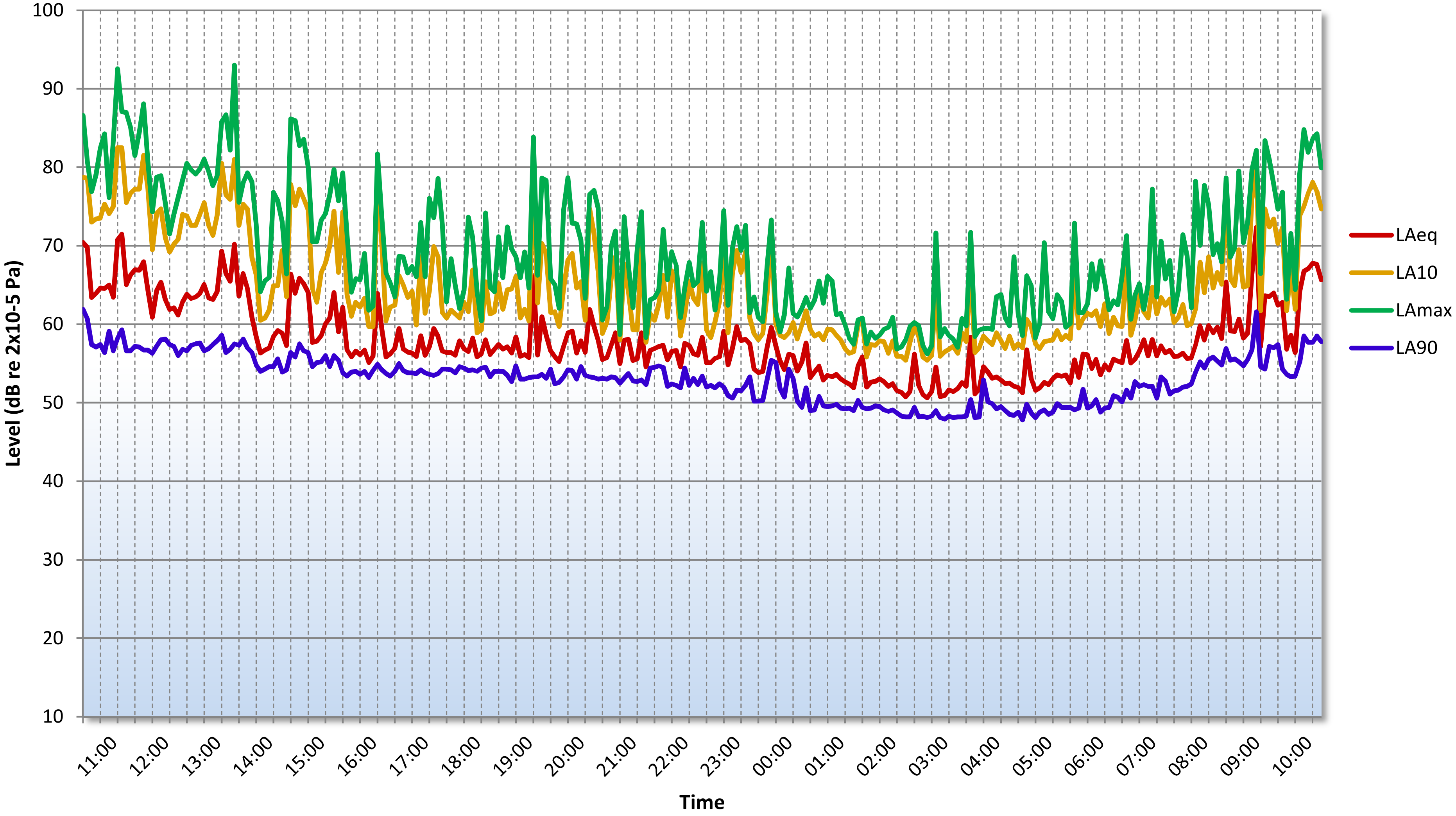

Figure 16159.TH1

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where 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 no 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 no 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 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

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 a single source and 4 sources produce a 6dB 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

Hearing perception is 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 guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

16 New College Court, Finchley Road, London, NW3 5EP

PROPOSED PLANT UNIT EMISSIONS CALCULATIONS

Source: Proposed Kitchen Exctract System Installation	*Frequency, Hz*								
Receiver: Nearest Noise Sensitive Window (as shown in SP1)	***63***	***125***	***250***	***560***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturers Sound Power/Pressure Levels									
Fan Helios GBW EC450/4 T120 - Fan Breakout									
Fan Helios GBW EC450/4 - (Sound Power Level, dB)	61	61	58	56	57	55	52	44	
Correction to Sound Pressure Level at 1m	-11	-11	-11	-11	-11	-11	-11	-11	
Correction due to surface reflection	3	3	3	3	3	3	3	3	
Attenuation provided by distance (min. 6m)	-16	-16	-16	-16	-16	-16	-16	-16	
Attenuation provided by building envelope	-10	-12	-15	-18	-21	-24	-27	-30	
Total Sound Pressure Levels from Fan Helios GBW EC450/4 T120 - Fan Breakout at closest noise sensitive receiver	**27**	**25**	**19**	**14**	**12**	**7**	**1**	**0**	**18**
Fan Helios GBW EC450/4 T120 - Duct Breakout (outlet)									
Fan Helios GBW EC450/4 T120 - (Sound Power Level, dB)	70	67	68	70	76	75	72	59	
–TLout (Normalized duct breakout transmission loss, dB)	-17	-20	-23	-25	-29	-33	-40	-40	
Correction due to duct breakout area (10 log (S/A))	17	17	17	17	17	17	17	17	
Lw(out)	70	64	62	62	64	59	49	36	
10 log(πrL)	15	15	15	15	15	15	15	15	
Sound Pressure Level at 1m	65	59	57	57	59	54	44	31	
Correction due to surface reflection	3	3	3	3	3	3	3	3	
Attenuation provided by distance (min. 4m)	-12	-12	-12	-12	-12	-12	-12	-12	
Attenuation provided by building envelope	-7	-9	-12	-15	-18	-21	-24	-27	
Attenuation due to proposed silencer (900mm length, 45% free area)	-2	-5	-11	-17	-20	-19	-12	-10	
Total Sound Pressure Levels from Fan Helios GBW EC450/4 T120 - Duct Breakout (Inlet) at closest noise sensitive receiver	**47**	**36**	**25**	**16**	**12**	**5**	**0**	**0**	**25**
Fan Helios GBW EC450/4 T120 - Flue termination point									
Fan Helios GBW EC450/4 T120 - (Sound Power Level, dB)	70	67	68	70	76	75	72	59	
Correction to Sound Pressure Level at 1m	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation provided by distance (min. 5m)	-14	-14	-14	-14	-14	-14	-14	-14	
Attenuation at duct termination due to end reflections loss	-2	-3	-1	0	0	0	0	0	
Attenuation Provided by Directivity	-3	-5	-7	-9	-11	-11	-11	-11	
Attenuation provided by building envelope	-8	-10	-13	-16	-20	-24	-27	-30	
Attenuation due to proposed silencer (900mm length, 45% free area)	-2	-5	-11	-17	-20	-19	-12	-10	
Total Sound Pressure Levels from Fan Helios GBW EC450/4 T120 - Duct termination point at closest noise sensitive receiver	**30**	**19**	**11**	**3**	**0**	**0**	**0**	**0**	**11**
Sound pressure level 1m from closest noise sensitive receiver	**48**	**37**	**27**	**19**	**16**	**10**	**4**	**0**	**26**

Design Criterion	**41**

APPENDIX B2

16 New College Court, Finchley Road, London, NW3 5EP

PROPOSED PLANT UNIT EMISSIONS CALCULATIONS

Source: Proposed Kitchen Exctract System Installation	*Frequency, Hz*								
Receiver: College School Pre-Prep - Closest Window (As shown in SP1)	***63***	***125***	***250***	***560***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturers Sound Power/Pressure Levels									
Fan Helios GBW EC450/4 T120 - Fan Breakout									
Fan Helios GBW EC450/4 - (Sound Power Level, dB)	61	61	58	56	57	55	52	44	
Correction to Sound Pressure Level at 1m	-11	-11	-11	-11	-11	-11	-11	-11	
Correction due to surface reflection	3	3	3	3	3	3	3	3	
Attenuation provided by distance (min. 4m)	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation provided by building envelope	-5	-7	-9	-12	-15	-18	-21	-21	
Total Sound Pressure Levels from Fan Helios GBW EC450/4 T120 - Fan Breakout at closest noise sensitive receiver	**37**	**35**	**30**	**25**	**23**	**18**	**12**	**4**	**29**
Fan Helios GBW EC450/4 T120 - Duct Breakout (outlet)									
Fan Helios GBW EC450/4 T120 - (Sound Power Level, dB)	70	67	68	70	76	75	72	59	
–TLout (Normalized duct breakout transmission loss, dB)	-17	-20	-23	-25	-29	-33	-40	-40	
Correction due to duct breakout area (10 log (S/A))	17	17	17	17	17	17	17	17	
Lw(out)	70	64	62	62	64	59	49	36	
10 log(πrL)	15	15	15	15	15	15	15	15	
Sound Pressure Level at 1m	65	59	57	57	59	54	44	31	
Correction due to surface reflection	3	3	3	3	3	3	3	3	
Attenuation provided by distance (min. 4m)	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation due to proposed silencer (900mm length, 45% free area)	-2	-5	-11	-17	-20	-19	-12	-10	
Total Sound Pressure Levels from Fan Helios GBW EC450/4 T120 - Duct Breakout (Inlet) at closest noise sensitive receiver	**55**	**46**	**38**	**32**	**31**	**27**	**24**	**13**	**38**
Fan Helios GBW EC450/4 T120 - Flue termination point									
Fan Helios GBW EC450/4 T120 - (Sound Power Level, dB)	70	67	68	70	76	75	72	59	
Correction to Sound Pressure Level at 1m	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation provided by distance (min. 10m)	-20	-20	-20	-20	-20	-20	-20	-20	
Attenuation at duct termination due to end reflections loss	-2	-3	-1	0	0	0	0	0	
Attenuation Provided by Directivity	-4	-5	-7	-10	-11	-11	-11	-11	
Attenuation due to proposed silencer (900mm length, 45% free area)	-2	-5	-11	-17	-20	-19	-12	-10	
Total Sound Pressure Levels from Fan Helios GBW EC450/4 T120 - Duct termination point at closest noise sensitive receiver	**31**	**23**	**18**	**12**	**14**	**14**	**18**	**7**	**22**
Sound pressure level 1m from closest noise sensitive receiver	**56**	**47**	**39**	**33**	**32**	**28**	**25**	**14**	**39**

Design Criterion	**41**

ANTI-VIBRATION MOUNTING SPECIFICATION REFERENCE DOCUMENT

1.0 General

1.1 All mountings shall provide the static deflection, under the equipment weight, shown in the schedules. Mounting selection should allow for any eccentric load distribution or torque reaction, so that the design deflection is achieved on all mountings under the equipment, under operating conditions.

1.2 It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail. Particular attention should be paid to mountings which will be exposed to atmospheric conditions to prevent corrosion.

1.3 All mountings shall be colour coded, or otherwise marked, to indicate their load capacity, to facilitate identification during installation.

Where use of resilient supports allows omission of pipe flexible connections for vibration/noise isolation, it shall be the Mechanical Service Consultant's or Contractor's responsibility to decide whether such devices are required to compensate for misalignment or thermal strain.

2.1 Type A Mounting (Caged Spring Type)

2.1.1 Each mounting shall consist of cast or fabricated telescopic top and bottom housings enclosing one or more helical steel springs as the principle isolation elements, and shall incorporate a built-in levelling device. The housing should be designed to permit visual inspection of the springs after installation, i.e. the spring must not be totally enclosed.

2.1.2 The springs shall have an outside diameter of not less than 75% of the operating height, and be selected to have at least 50% overload capacity before becoming coil-bound.

2.1.3 The bottom plate of each mounting shall have bonded to it a rubber/neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.1.4 Mountings incorporating snubbers or restraining devices shall be designed so that the snubbing, damping or restraining mechanism is capable of being adjusted to have no significant effect during the normal running of the isolated machine.

2.1.5 All nuts, bolts or other elements used for adjustment of a mounting shall incorporate locking mechanisms to prevent the isolator going out of adjustment as a result of vibration or accidental or unauthorised tampering.

2.2 Type B Mounting (Open Spring Type)

2.2.1 Each mounting shall consist of one or more helical steel springs as the principal isolation elements, and shall incorporate a built-in levelling device.

2.2.2 The springs shall be fixed or otherwise securely located to cast or fabricated top and bottom plates, shall have an outside diameter of not less than 75% of the operating height, and shall be selected to have at least 50% overload capacity before becoming coil-bound.

2.2.3 The bottom plate shall have bonded to it a rubber/ neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.3 Type C Mounting (Rubber/Neoprene Type)

Each mounting shall consist of a steel top plate and base plate completely embedded in oil resistant rubber/neoprene. Each mounting shall be capable of being fitted with a levelling device, and should have bolt holes in the base plate and a threaded metal insert in the top plate so that they can be bolted to the floor and equipment where required.

3.0 Plant Bases

3.1 **Type A Bases (A.V. Rails)**

An A.V. Rail shall comprise a steel beam with two or more height-saving brackets. The steel sections must be sufficiently rigid to prevent undue strain in the equipment and if necessary should be checked by the Structural Engineer.

3.2 **Type B Bases (Steel Plant Bases)**

Steel plant bases shall comprise an all-welded steel framework of sufficient rigidity to provide adequate support for the equipment, and fitted with isolator height saving brackets. The frame depth shall be approximately 1/10 of the longest dimension of the equipment with a minimum of 150 mm. This form of base may be used as a composite A.V. rail system.

3.3 **Type C Bases (Concrete Inertia Base: for use with steel springs)**

These shall consist of an all-welded steel pouring frame-work with height saving brackets, and a frame depth of approximately 1/12 of the longest dimension of the equipment, with a minimum of 100 mm. The bottom of the pouring frame should be blanked off, and concrete (2300 kg/m^3) poured in over steel reinforcing rods positioned 35 mm above the bottom. The inertia base should be sufficiently large to provide support for all parts of the equipment, including any components which over-hang the equipment base, such as suction and discharge elbows on centrifugal pumps.