MAX FORDHAM

81 Belsize Park Gardens

Noise Impact Assessment

Issue 04

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1.0 INTRODUCTION

Max Fordham LLP have been appointed to provide acoustics advice in relation to the proposed refurbishment of Belsize Park Gym, 81 Belsize Park Gardens. Max Fordham LLP are full members of the Association of Noise Consultants (ANC).

The site was previously in use as a gym including swimming pool, squash courts and dance studios. The proposal is for the existing building to be retained and converted to provide accommodation for Hampstead Fine Arts College. As part of the works, a selection of new plant equipment is to be installed on the roof. This noise impact assessment aims to assess the impact of this additional plant equipment, including the effect on the nearest identified noise sensitive receptors (NSRs).

In addition, the noise breakout from the activity of the school and the site suitability for education use will be assessed.

1.1 Site

The location is bounded by residential premises to the north and residential gardens to the south as shown in Figure 1.

Figure 1: Proposed site location. Site boundary indicated approximately by red line.

2.0 RELEVANT POLICY AND GUIDANCE

2.1 National Planning Policy

2.1.1 National Planning Policy Framework

Planning Policy Guidance Note 24 (PPG24), which was generally used for overall guidance to planners regarding environmental noise, particularly for residential sites, was replaced in March 2012 by the more general advice given in the National Planning Policy Framework (NPPF).

The NPPF (last updated July 2021) states in paragraph 174e), that planning policies and decisions should contribute to and enhance the natural and local environment by "preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability." Furthermore, it states in paragraphs 185 and 187 that planning policies and decisions should:

- mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life [paragraph 185 a)],
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason [paragraph 185 b)], and
- be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established [paragraph 187].

2.1.2 Noise Policy Statement for England

The NPPF document also refers to the Noise Policy Statement for England (March 2010). The Noise Policy Statement for England (NPSE) sets out (paragraph 1.6) the long term vision of Government noise policy: "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

The NPSE also states: "Excessive noise can have wide-ranging impacts on the quality of human life, health (for example owing to annoyance or sleep disturbance) and use and enjoyment of areas of value such as quiet places and areas with high landscape quality."

The NPSE also cites (in the Explanatory Note section) the following three aims:

- First aim of the NPSE: Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Second aim of the NPSE: Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Third aim of the NPSE: Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The NPSE also states (paragraph 2.2) that "examples of noise management can be found in many areas including reducing noise source; the use of the land use and transport planning systems, compensation measures, the statutory nuisance and licensing regimes and other related legislation."

The NPSE (in the Explanatory Note section) also introduces guidance to assist in defining the adverse impacts:

- NOEL – No Observed Effect Level: this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.
- LOAEL – Lowest Observed Adverse Effect Level: this is the level above which adverse effects on health and quality of life can be detected.

- SOAEL – Significant Observed Adverse Effect Level: this is the level above which significant adverse effects on health and quality of life occur.

These categories are discussed further in the Planning Practice Guidance section below.

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heared, but does not cause any change in behaviour, attitute or other physicological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitute or other physicological response e.g. turning up volume of television; speaking more loudly, where this no alternaive ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affect the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitute or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windeows closed most of the time because of the noise. Potential for slleep distrubance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate the effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The NPSE acknowledges (paragraph 2.15) that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations.

2.1.3 Planning Practice Guidance (PPG – Noise)

The government's Planning Practice Guidance web pages provide advice on various issues, including noise (https://www.gov.uk/guidance/noise--2). The noise advice (March 2014, last update July 2019) states in the context of considering when noise is relevant to planning, "noise needs to be considered when new development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced)." (Paragraph: 001, Reference ID: 30-001-20190722, Revision date: 22-07-2019.)

The Planning Practice Guidance pages also include more explanation of the effect level categories noted above, providing an explanatory Noise Exposure Hierarchy Table, which explores how actions such as a requirement for noise mitigation, or prevention of a development, might be assessed with respect to whether noise levels are considered above the category thresholds. The Noise Exposure Hierarchy Table (Paragraph: 005, Reference ID: 30-005-20190722, Revision date: 22-07-2019) is reproduced here:

In summary, with respect to National Planning Policy, neither the Planning Practice Guidance pages, nor the National Planning Policy Framework or Noise Policy Statement for England documents, provide quantitative advice such as the use of absolute noise limits. Thus, authorities still generally interpret and express national and local non-quantitative policies by issuing quantitative noise-related planning conditions.

2.2 BS 4142:2014

BS 4142:2014+A1:2019 "Methods for Rating and Assessing Industrial and Commercial Sound" addresses the likelihood of adverse impact from noise generated by plant equipment. A noise rating is determined and compared with the existing local background sound level, and several cumulative acoustic feature corrections to the noise rating are available to apply where appropriate. For example, if the noise includes a distinguishable tone, impulse, intermittency, or other readily distinguishable sound characteristic.

BS 4142:2014 seeks to determine a "representative" background sound level, stating that "…the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods".

The assessment of the impact depends upon the margin by which the rating level of the specific sound source exceeds the background sound level but also promotes a consideration of the context in which the sound occurs when making an assessment. BS 4142:2014 states that an initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level, while considering the following points:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d) The lower the rating level is, relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Note then, a BS 4142:2014 assessment may deduce a low impact where the specific sound level is approaching the background sound level, and thus may conclude that the specific noise is acceptable.

2.3 Camden Local Plan (2017)

Policy A1 of the Camden Local Plan outlines how the council aims to protect quality of life and how development will consider, amongst other factors, noise and vibration levels. The local plan also states that the Council will require an acoustic report to accompany any development that is likely to generate noise. The general guidance is given in Policy A4:

"We will not grant planning permission for:

a. development likely to generate unacceptable noise and vibration impacts; or

b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development."

The character of the noise for any noise generating uses must be taken into consideration. As well as the general guidance, the following specific thresholds are set out for industrial and commercial noise sources – reproduced from Table C in Appendix 3.

Existing noise sensitive receptor	Assessment location	Design Period	LOAEL	LOAEL to SOAEL	SOAEL
Dwellings**	Garden used for main amenity (free field) and outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dB L_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dB L_{Amax}
10dB should be increase to 15dB if the noise contains audible tonal elements. However if it can demonstrated that there is no significant difference in the character of the residual background noise then this reduction may not be required. **Levels are given for dwellings, however, levels are use-specific and different levels will apply dependent on the use of the premises.					

The LOAEL/SOAEL definitions correspond to those given in NPPF and PPG – Noise.

The following caveats should be noted:

- The council will take into account the likely times of occupation for types of development
- There are smaller pieces of equipment on commercial premises such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels may not afford the necessary protection. In these cases, the Council will generally also require a NR specification of NR35 or below (based upon $L_{eq,5mins}$ at 1m from the façade of the NSR), where the noise sensitive premises is located in a quiet background area.

2.4 BB93: Acoustic Design of Schools - Performance Standards

For school complexes, Building Regulation E4 applies. Therefore, the design criteria for the project are the performance standards set out in Building Bulletin 93: Acoustic Design of Schools. This primarily covers sound insulation, internal ambient noise levels (including mechanical services noise) and room acoustics / reverberation control. New build standards have been applied.

With respect to site suitability for educational use, the indoor ambient noise level is applicable. The specific requirements for indoor ambient noise levels, as applied to key room types are listed in Table 1 where IANL is the "Indoor Ambient Noise Level". Up to a 5dB relaxation may be acceptable onsite for refurbished buildings. The building is not naturally ventilated and any derogation for this is not applicable.

Table 1: BB93 Indoor Ambient Noise Level

Room Type	IANL ($L_{Aeq,30min}$ dB)
Music Teaching / Music Practice	≤35
Multipurpose space	
Drama Studio*	
General Teaching	
Art / Graphics / Photography Studios	≤40
Library / Study / Staff rooms / Offices / Medical Rooms	
Open plan resource areas / Common Room	
Corridors + Stairwells	≤45
Café / Gallery	
WCs / Changing Rooms / Kitchen	≤50

*Drama studio criteria is more onerous than dance studio

3.0 ASSESSMENT CRITERIA

3.1 Plant Noise Emission Limits

Camden Local Plan sets LOAEL as 10 dB below the representative background noise level at the nearest noise-sensitive receptor, with rating levels between 9dB below and 5dB above background being LOEL to SOAEL. It is proposed to adopt a target of 10dB below the representative background noise level outside windows and 5dB below the representative background noise level in the immediately adjacent roof gardens.

3.2 Site Suitability for Educational Use

Site suitability for educational use will be assessed based on achieving the internal ambient noise level criteria from BB93 for the relevant spaces. This is based on the new-build standards for mechanically ventilated spaces with up to 5dB relaxation being acceptable for refurbished buildings. These are reproduced in Table 2.

Table 2: BB93 Indoor Ambient Noise Level Criteria

Room Type	IANL ($L_{Aeq,30min}$ dB)
Music Teaching / Music Practice	≤35
Multipurpose space	
Drama Studio*	
General Teaching	
Art / Graphics / Photography Studios	≤40
Library / Study / Staff rooms / Offices / Medical Rooms	
Open plan resource areas / Common Room	
Corridors + Stairwells	≤45
Café / Gallery	
WCs / Changing Rooms / Kitchen	≤50

3.3 Noise Breakout from the Arts College

The main sources of activity noise from within the proposed development activity in the multipurpose space and music rooms. These are buffered from the party wall by other spaces/circulation. The party wall has been tested between the existing building and 3 residential premises on Lancaster Stables. The measured sound insulation performance was $D_{nT,w}+C_{tr}$ 60-65dB. An additional wall lining along the party wall is proposed to further minimise any noise breakout. This should provide a very high level of sound insulation to the adjacent properties on Lancaster Stables.

Music noise breakout through the façade to the rear of the houses on Belsize Park gardens will be calculated and compared with the existing ambient noise level.

4.0 BASELINE NOISE CLIMATE

4.1 Methodology

A long-term unattended measurement on the roof of the existing building was taken between 11:45 on Monday 7th November and 14:15 on Sunday 13th November 2022 (approx. 146 hours). This is marked as LT1 on Figure 2. In addition, a 15-minute attended measurement was taken at street level at 11:00 on Monday 14th November at the location marked ST1 on Figure 2.

All measurements were taken at least 1.5m above ground/roof level and 3.5m from reflecting façades. Measurement procedures are in accordance with BS7445-1:2003.

Figure 2: Noise measurement locations

4.2 Equipment

The following equipment was used for the survey:

Item	Make	Type	Serial no.	Calibration Intervals	Last Calibrated	Next Due Calibration	Calibration Certificate Number
Class 1 sound level meter	Norsonic	140	1405942	2 years	26/02/21	26/02/23	U37205 U37206
Microphone preamplifier	Norsonic	1209	15804	2 years	26/02/21	26/02/23	U37205 U37206

Microphone	Norsonic	1225	208215	2 years	26/02/21	26/02/23	37204
Calibrator	Norsonic	1251	34059	1 year	17/12/21	17/12/22	U39785

4.3 Weather

For the majority of the unattended measurement period, windspeeds were recorded as 5 m/s or below. At the start of the measurement period, the windspeed exceeded this value, with a maximum of 8 m/s recorded at 00:00 on Tuesday 8th November. At this time there was also rain recorded, although it was dry throughout the rest of the measurement period. During the short-term attended measurement the weather was dry, and windspeeds did not exceed 5 m/s.

4.4 Noise Climate

The main source of noise at the two measurement locations was traffic noise from Belsize Park Gardens, including vans and motorbikes. Additionally, sirens could occasionally be heard passing along other nearby roads. On setup and collection of the survey, there was noise from tree cutting and other maintenance work along Belsize Park Gardens. Noise could also be heard from groups of pedestrians, particularly at ST1; however, this was considerably quieter than passing vehicles.

4.5 Results

A time-history of the key unattended noise parameters is given in Figure 3. A summary of the parameters to be used in this assessment are given in Table 3. The weekday daytime ambient noise level during the 0800-1800 hour period (times when nursery is occupied) is 49dBA.

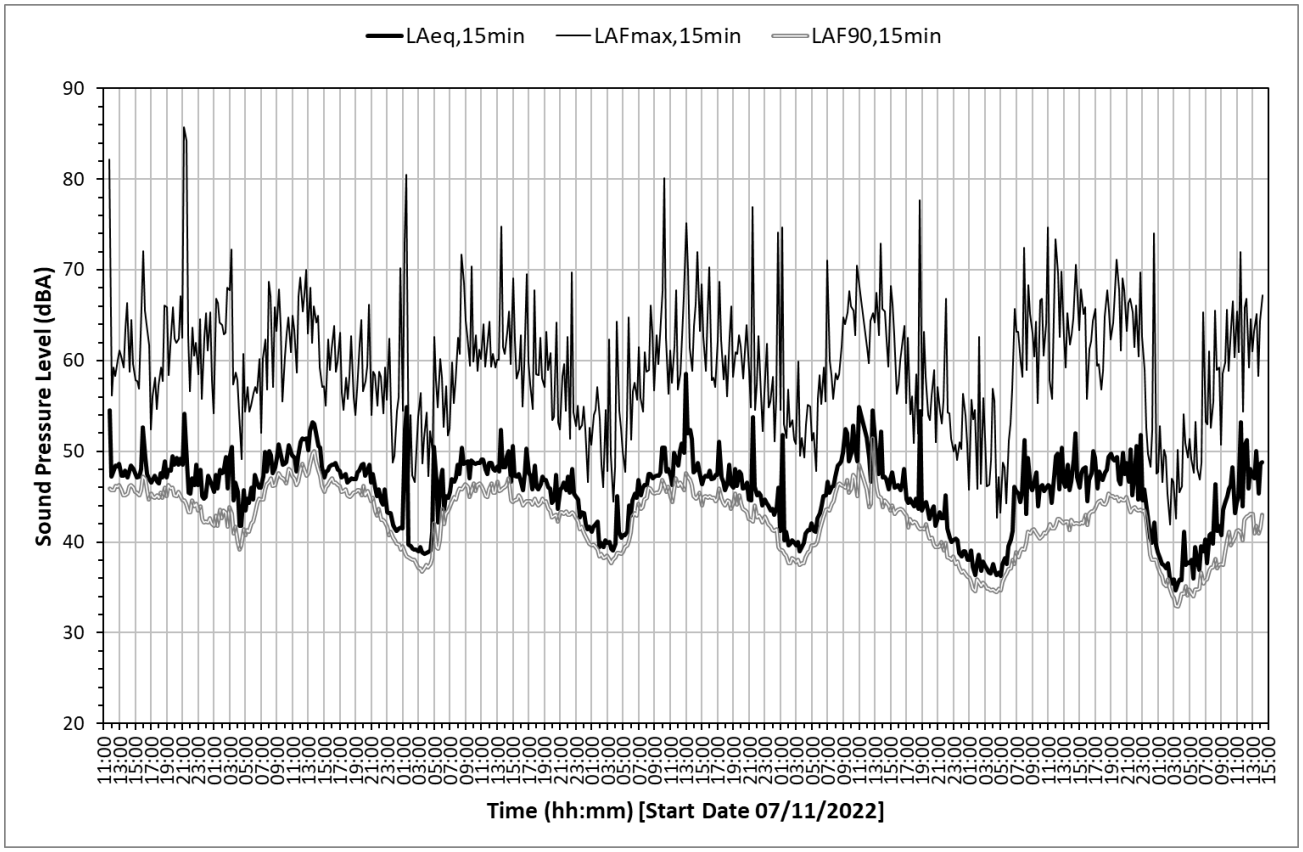


Figure 3: Unattended measurement results (L1) on 7th-13th November 2022

Table 3: Key unattended measurement results

Period	Mean ambient noise levels / dB $L_{Aeq,T}$	Representative* background noise levels / dB $L_{A90,15min}$	Maximum noise levels / dB $L_{AFmax,15min}$
Daytime (0700-2300 hours)	48	44	80
Night-time (2300-0700 hours)	43	38	81
* 40th percentile			

The results for the spot measurement are given in Table 4.

Table 4: Attended measurement results

Location	Ambient noise level / dB $L_{Aeq,15min}$	Background noise level / dB $L_{A90,15min}$	Maximum noise level / dB $L_{AFmax,15min}$
S1	55	44	75

5.0 ASSESSMENT

5.1 Plant Noise Emission

Plant noise emission limits are set at 10 dB below the representative background noise level at the nearest noise-sensitive receptors and 5dB below the representative background noise level at gardens / roof terraces. This is based on the plant being non-tonal. If any plant is replaced with products containing tonal elements or feature characteristics, further penalties should be applied in accordance with BS4142:2014.

Period	Representative Background Noise Level / dB L_{A90}	Plant noise rating limit at nearby windows / dB L_{Ar}	Plant noise rating limit at roof gardens / dB L_{Ar}
Day (07:00-23:00)	44	34	39
Night (23:00-07:00)	38	28	-

The proposed roofplant comprises 2 ASHPs (Clade Acer 75KW Ultra Low Noise) each with a sound pressure level of 33dBA at 1m. These are pre-packaged units with a high level of acoustic attenuation built-in and have been modelled as 2 horizontal area sources each with a sound power of 54.7dBA. The units are assessed as being operational in the day and night-time periods.

In addition, 7 no. MVHR units and 1 no. AHU are proposed on the roof as shown by the blue markers in Figure 5. The MVHR units comprise 4 no. XBC+65, 1 no. XBC+45, 1 no. XBC+10 and 1 no.XBC+15. The noise levels from the casing radiated, fresh air intake and discharge have considered for each unit running at 75% duty. The AHU has been modelled at the proposed design duty. Full sound power level data is given in Appendix 7.1 and 7.2. The MVHR/AHU units are not considered to be operational at night.

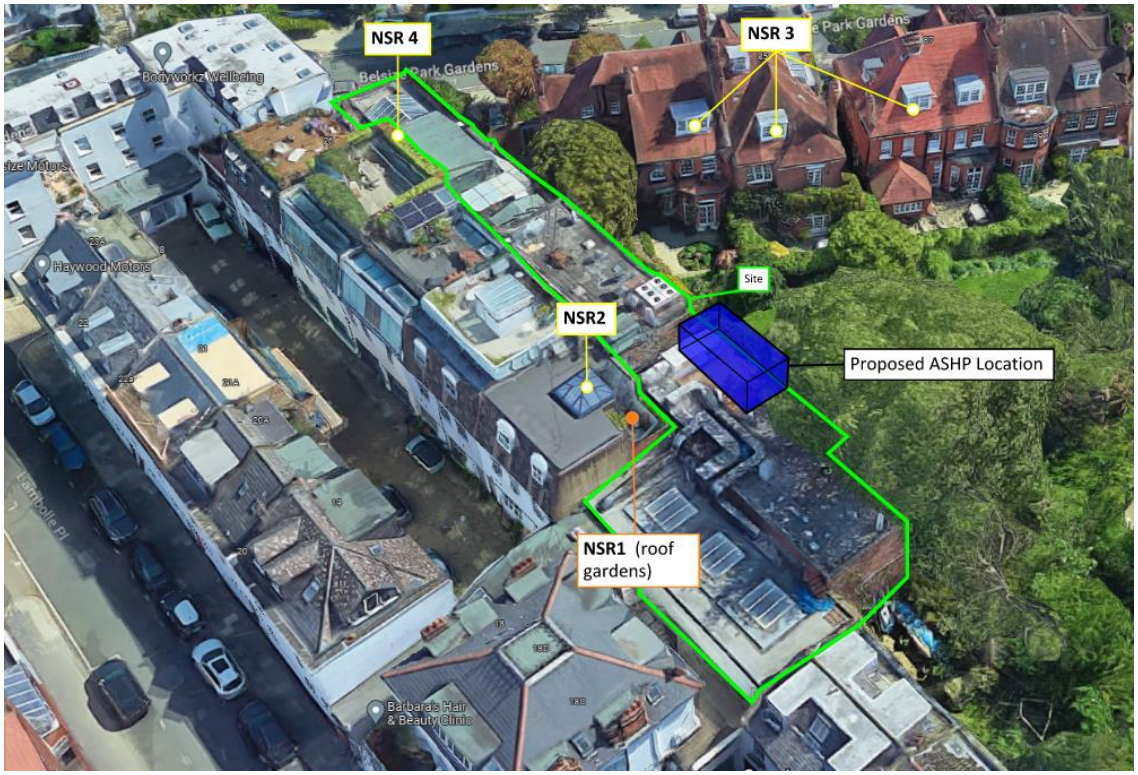


Figure 4: Proposed location of the 2No. ASHPs, and the nearest noise-sensitive receptors (NSRs)

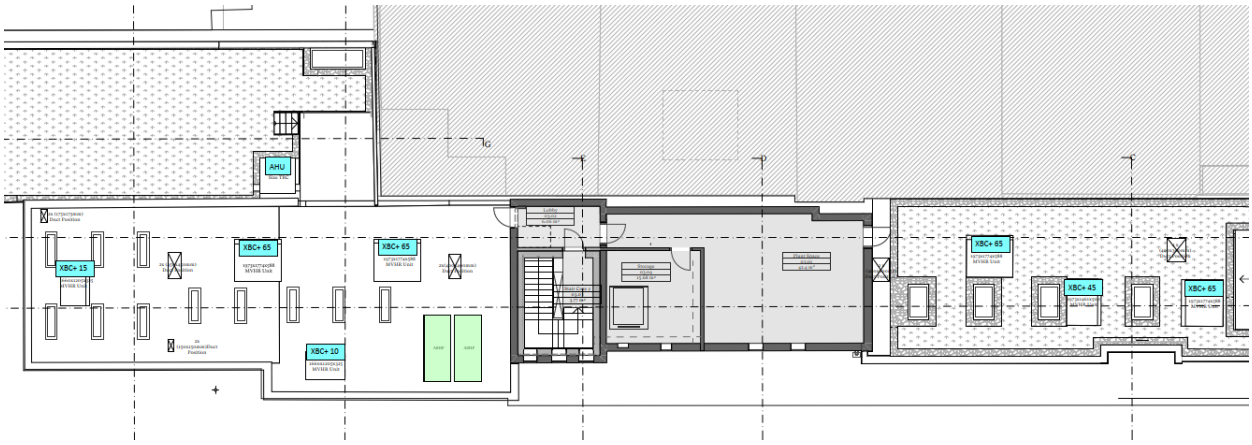


Figure 5: Proposed location of MVHR & AHU units (blue) and ASHPs (green)

In order to meet the criteria, induct attenuation has been allowed for on the MVHR intake / exhaust. The following insertion losses have been assumed:

Frequency / Hz	63	125	250	500	1k	2k	4k	8k
Fresh air intake attenuator insertion loss / dB	6	13	25	37	44	43	30	20
Exhaust attenuator insertion loss / dB	6	13	25	37	44	43	30	20

The following induct attenuation is assumed to the AHU fresh air intake and exhaust:

Frequency / Hz	63	125	250	500	1k	2k	4k	8k
Fresh air intake attenuator insertion loss / dB	6	9	19	38	43	35	24	20
Exhaust attenuator insertion loss / dB	6	9	19	38	43	35	24	20

The predicted noise levels at the receptors with the proposed ASHPs, MVHRs and AHU (including mitigation) is given in Table 5. No feature corrections for tonality / intermittency have been applied, as the noise associated with the type of plant being used is typically broadband with no strong tonal character; therefore, the rating level is the same as the specific level. The plant noise emission limits are met in all cases.

Table 5: Predicted plant noise emission limits at the receptor

	Period	Plant noise rating limit / dBA	Predicted plant noise rating level / dBA	Criterion met?
Nearest roof gardens (NSR1)	Daytime (0700-2300)	39	30	Yes
Nearest window on Lancaster Stables (NSR2)	Daytime (0700-2300)	34	29	Yes
	Night-time (2300-0700)	28	25	Yes
Nearest window on Belsize Park Gardens (NSR3)	Daytime (0700-2300)	34	28	Yes
	Night-time (2300-0700)	28	24	Yes
Nearest window on No. 4 Lancaster Stables (NSR4)	Daytime (0700-2300)	34	32	Yes
	Night-time (2300-0700)	28	14	Yes

Should plant items change, the noise levels will need to be reviewed and appropriate mitigation selected to meet the criteria.

Providing the criteria are met, 'no observed adverse effect level' is predicted and therefore no significant impact is considered.

5.2 Site Suitability for Educational Use

The proposed ventilation strategy is for mechanical ventilation using MVHR with cooling provision. With the existing constructions (and new windows / glass blocks) combined with a mechanical ventilation strategy, it is considered that the BB93 internal ambient noise levels can be met. Thus, the site is considered suitable for educational use.

5.3 Noise Breakout from the Arts College

The rooms have been strategically orientated so as to keep music / drama activities away from the party wall with separating corridor elements in most locations acting as a 'buffer zone'. In addition, it is proposed to line the party wall with an independent lining comprising 2 layers of plasterboard to increase the sound insulation performance between the college and the adjacent mews houses. In the existing condition for noise levels up to 78dBA in the arts college, <15dBA (10dB below the measured ambient noise level) is predicted in an adjacent residential space. This will be further improved with the independent wall lining.

The music rooms do not have traditional windows to external, rather triple layer glass blocks. With this construction, the predicted noise levels at 1m from the façade of the residential properties opposite is predicted to be <45dBA. This is less than the prevailing daytime ambient noise climate of 48dBA. Although, it may be audible due to the tonal nature of music, it is not expected to cause significant disturbance.

6.0 CONCLUSION

A noise survey has been undertaken at the former gym Belsize Park Gardens. This has been used to assess the representative background noise levels and prevailing ambient noise levels.

Plant noise emission limits are set at 10dB below the representative background noise levels for the day and night-time periods. Thus, the plant noise rating limit is set at 34dB L_{Ar} and 28dB L_{Ar} in the day and night-time respectively. Noise levels at gardens, including rooftop terraces, have been limited to 5dB below the daytime ambient noise level (39dB L_{Ar}). The proposed plant comprises 2 no. ASHPs, 7 no. MVHR units and 1 no. AHU on the roof of refurbished building. With the proposed induct attenuators to the AHU and MVHR units, the plant noise emission limits can be met. On this basis, no observed adverse effect level is predicted and therefore no significant impact.

The proposed Arts College building will be mechanically ventilated and design to meet the BB93 internal ambient noise level criteria. The site is, therefore, considered suitable for educational use.

Noise breakout through both through the party wall and to residential premises opposite. Mitigation has been introduced to minimise noise transfer to the adjacent properties – orientation of the rooms and party wall upgrades. The noise break-out from activity noise is considered to have no significant impact.

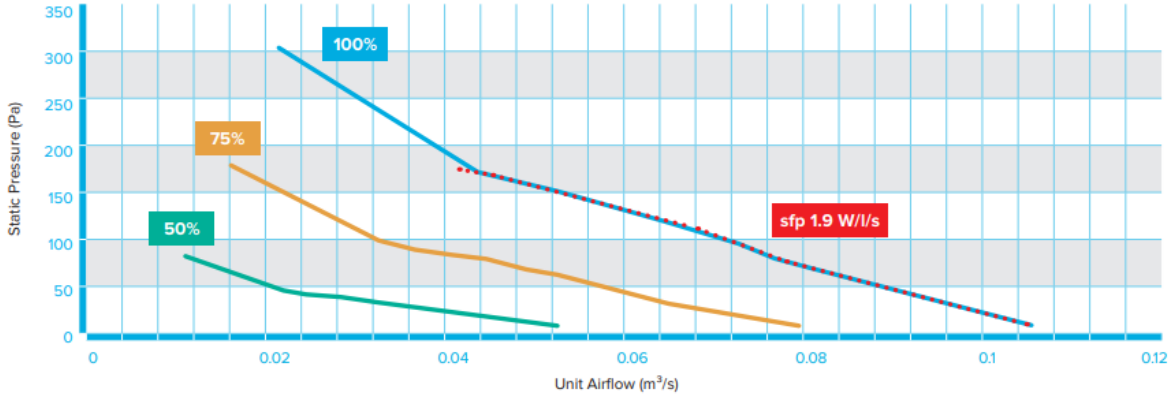
7.0 APPENDICIES

7.1 Sound Power Data for MVHR Units

XBOXER XBC+ 10

PERFORMANCE & TECHNICAL INFORMATION

PERFORMANCE CHART



TECHNICAL INFORMATION

HEATER TYPE	VOLTAGE	PHASE	FREQUENCY	INPUT POWER (W)	FAN SPEED (rpm)	FLC (A)	SC (A)	MAX OPERATING TEMPERATURE (°C)	UNIT WEIGHT (kg)
LPHW	230	1	50	160	3200	1.5	1.5	40	147
Electric*	230	1	50	160	3200	9	9	40	155
None	230	1	50	160	3200	1.5	1.5	40	143

Relevant to BC, ES, CO or AT control types. *Inlcudes 1.5kW electric heater.

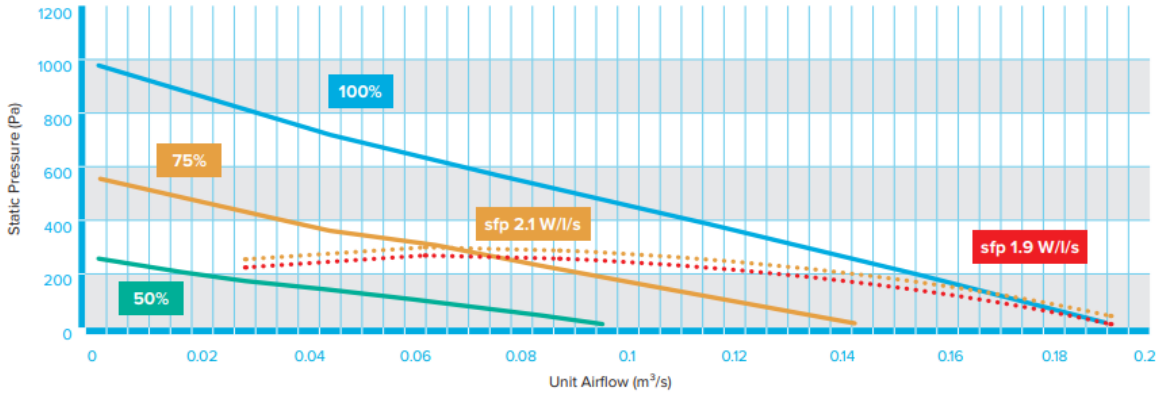
SOUND DATA

FAN SPEED	SOUND POWER LEVELS (db re 1 pW)	FREQUENCY (Hz)								SPHERICAL dBA@3m
		63	125	250	500	1K	2K	4K	8K	
100%	Induct Intake	68	57	50	51	57	50	42	38	24
	Induct Supply	73	69	60	61	63	59	54	52	
	Induct Discharge	73	70	60	62	63	60	55	53	
	Induct Extract	67	56	50	50	56	50	54	36	
	Casing Radiated	59	55	40	41	39	35	32	21	
75%	Induct Intake	62	51	44	45	51	44	36	32	20
	Induct Supply	67	63	54	55	57	53	48	46	
	Induct Discharge	67	64	54	56	57	54	49	47	
	Induct Extract	61	50	44	44	50	44	34	30	
	Casing Radiated	53	49	34	35	33	29	26	<20	

XBOXER XBC+ 15

PERFORMANCE & TECHNICAL INFORMATION

PERFORMANCE CHART



TECHNICAL INFORMATION

HEATER TYPE	VOLTAGE	PHASE	FREQUENCY	INPUT POWER (W)	FAN SPEED (rpm)	FLC (A)	SC (A)	MAX OPERATING TEMPERATURE (°C)	UNIT WEIGHT (kg)
LPHW	230	1	50	340	4000	2.8	2.8	40	187
Electric*	230	1	50	3340	4000	16	16	40	195
None	230	1	50	340	4000	2.8	2.8	40	183

Relevant to BC, ES, CO or AT control types. *Inlcudes 3kW electric heater.

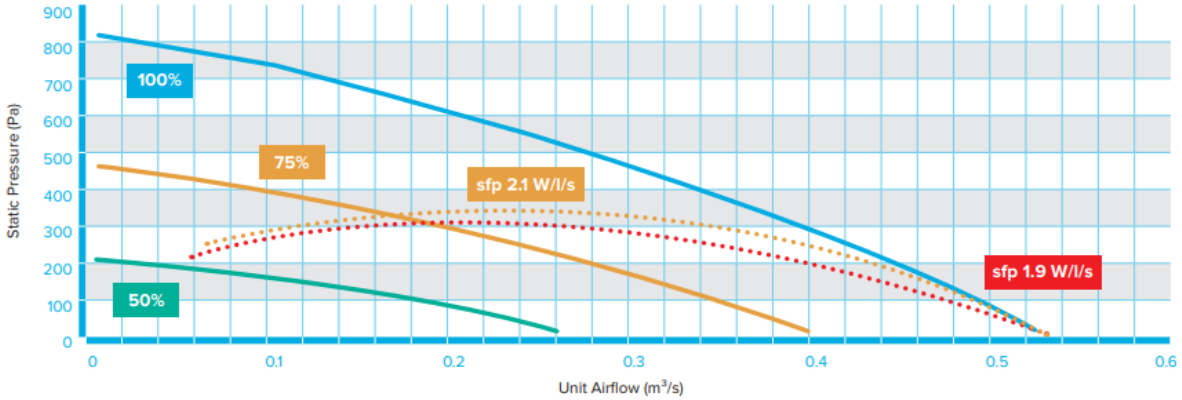
SOUND DATA

FAN SPEED	SOUND POWER LEVELS (db re 1 pW)	FREQUENCY (Hz)								SPHERICAL dBA@3m
		63	125	250	500	1K	2K	4K	8K	
100%	Induct Intake	70	60	55	56	62	55	47	43	26
	Induct Supply	75	72	65	66	668	64	59	57	
	Induct Discharge	75	73	65	67	68	65	60	58	
	Induct Extract	69	59	55	55	61	55	45	41	
	Casing Radiated	61	57	42	43	41	37	34	23	
75%	Induct Intake	64	54	49	50	56	49	41	37	20
	Induct Supply	69	66	59	60	62	58	53	51	
	Induct Discharge	69	67	59	61	62	59	54	52	
	Induct Extract	63	53	49	49	55	49	39	35	
	Casing Radiated	555	5511	336	377	335	3311	28	<20	

XBOXER XBC+ 45

PERFORMANCE & TECHNICAL INFORMATION

PERFORMANCE CHART



TECHNICAL INFORMATION

HEATER TYPE	VOLTAGE	PHASE	FREQUENCY	INPUT POWER (W)	FAN SPEED (rpm)	FLC (A)	SC (A)	MAX OPERATING TEMPERATURE (°C)	UNIT WEIGHT (kg)
LPHW	230	1	50	1100	2400	6.9	6.9	40	291
Electric*	230	1	50	5600	2400	27	27	40	298
None	230	1	50	1100	2400	6.9	6.9	40	287

Relevant to BC, ES, CO or AT control types. *Inlcudes 4.5kW electric heater.

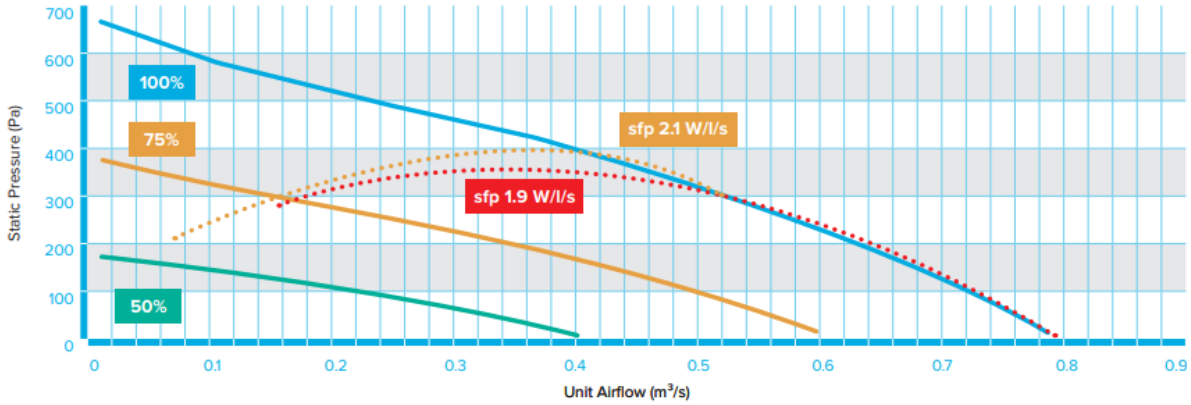
SOUND DATA

FAN SPEED	SOUND POWER LEVELS (db re 1 pW)	FREQUENCY (Hz)								SPHERICAL dBA@3m
		63	125	250	500	1K	2K	4K	8K	
100%	Induct Intake	83	75	75	64	64	62	54	45	35
	Induct Supply	87	80	85	71	72	71	66	62	
	Induct Discharge	88	81	85	71	72	72	66	64	
	Induct Extract	84	75	76	63	64	63	53	44	
	Casing Radiated	74	65	62	47	45	44	40	29	
75%	Induct Intake	77	69	69	58	58	56	48	39	29
	Induct Supply	81	74	79	65	66	65	60	56	
	Induct Discharge	82	75	79	65	66	66	60	58	
	Induct Extract	78	69	70	57	58	57	47	38	
	Casing Radiated	68	59	56	41	39	38	34	23	

XBOXER XBC+ 65

PERFORMANCE & TECHNICAL INFORMATION

PERFORMANCE CHART



TECHNICAL INFORMATION

HEATER TYPE	VOLTAGE	PHASE	FREQUENCY	INPUT POWER (W)	FAN SPEED (rpm)	FLC (A)	SC (A)	MAX OPERATING TEMPERATURE (°C)	UNIT WEIGHT (kg)
LPHW	230	1	50	1540	1700	8	8	40	469
Electric*	230	1	50	10540	1700	47	47	40	476
None	230	1	50	1540	1700	8	8	40	465

Relevant to BC, ES, CO or AT control types. *Inlcudes 9kW electric heater.

SOUND DATA

FAN SPEED	SOUND POWER LEVELS (db re 1 pW)	FREQUENCY (Hz)								SPHERICAL dBA@3m
		63	125	250	500	1K	2K	4K	8K	
100%	Induct Intake	79	79	72	66	64	59	48	34	35
	Induct Supply	83	85	79	74	72	68	61	54	
	Induct Discharge	85	85	79	75	72	69	61	55	
	Induct Extract	81	79	70	67	64	60	48	35	
	Casing Radiated	71	69	56	51	45	41	35	20	
75%	Induct Intake	73	73	66	60	58	53	42	28	29
	Induct Supply	77	79	73	68	66	62	55	48	
	Induct Discharge	79	79	73	69	66	63	55	49	
	Induct Extract	75	73	64	611	58	54	42	29	
	Casing Radiated	65	63	50	45	39	35	29	<20	

7.2 Sound Power Data for AHU unit

nuaire **SUMMARY FAN DATA SHEET**

Nuaire, Western Industrial Estate, Caerphilly, CF83 1NA, United Kingdom. email:info@nuaire.co.uk
UK Commercial enquiries T:029 2085 8200 UK Residential enquiries T:029 2085 8500 International enquiries T:+44.29 2085 8497

This data sheet produced on 19 Jul 2023 16:12 using software version 5.8.4576.0

Project: n/a
Belsize Park Gym
Location: BPS Flat

Technical Data
Boxer Packaged Solution - Horizontal Plate Heat Exchanger

Fan Code:	**B10H/LC/CO-L**
Installation Manual Links:	671828
Supply	
Required duty:	650 l/s at 200 Pa
Addition for ancillaries:	+11.83 Pa
Actual duty:	986 l/s at 488 Pa
Actual at required flow:	650 l/s at 786 Pa
Extract	
Required duty:	650 l/s at 200 Pa
Actual duty:	1092 l/s at 564 Pa
Actual at required flow:	650 l/s at 876 Pa
When speed controlled to required duty:	
Motor input power:	**0.745 kW**
Specific Fan Power:	**1.1 W/(l/s)**
At full speed:	
Motor input power:	3 kW
Specific Fan Power:	2.7 W/(l/s)
Maximum Fan Speed:	2,450 RPM
Electrical Supply:	3 Phase 50 Hz
Nominal Motor Rating	2.8 kW
Motor Current (flc):	13 A
Motor Current (sc):	13 A
Max. operating temp:	60°C
Weight:	1,154 kg

Starting currents are nominal.

Sound Data
Noise calculated speed controlled to required duty (59.53%)

Sound Power Levels re 1 pWatts (Hz):

Hz	63	125	250	500	1k	2k	4k	8k	dBA
Breakout	68	56	64	52	44	31	23	<16	36
Open Intake	62	59	67	60	54	49	44	40	41
Open Supply	68	65	74	72	71	65	60	56	54
Open Extract	62	59	67	60	54	49	44	40	41
Open Discharge	68	65	74	72	71	65	60	56	54
For 100% speed:	+3	+4	+6	+8	+12	+12	+12	+12	

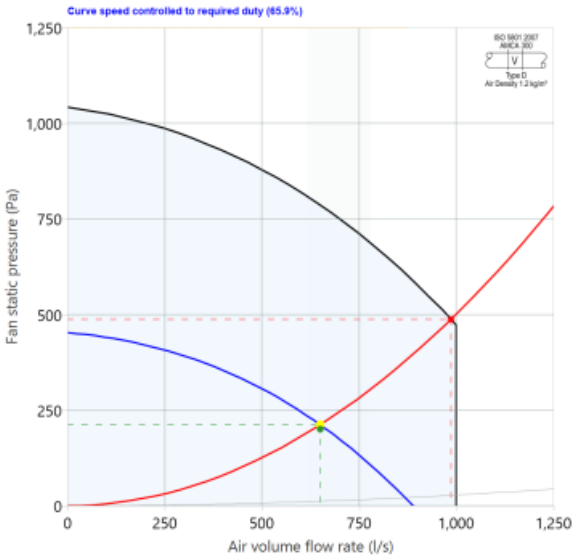
dBA is spherical at 3 metres. For hemi-spherical add 3 dBA.

B10AH/AA900-L

At all volumes	-6	-9	-19	-38	-43	-35	-24	-20

Please note that the noise data stated on this data sheet for the unit and/or silencer is tested in accordance with UK, European and International industry laboratory standards. However onsite conditions may vary and we would recommend that this information is verified by an acoustic specialist in order to ensure its suitability for the intended application.

Performance Chart (supply)



Performance Chart (extract)