

Project:	84 Fitzjohn's Avenue, Hampstead, London, NW3 6NP	Date:	27/07/20
Client:	Slender Winter Partnership Ltd	Ref:	4670



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Report Title:	Environmental Noise Survey		
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1.0 Introduction

As part of refurbishment works to the property 84 Fitzjohn's Avenue, Hampstead, London, NW3 6NP, it is proposed that a number of items of air-conditioning plant be installed within the grounds of the site.

Paragon Acoustic Consultants Ltd has been commissioned to conduct an environmental noise survey to obtain statistical noise data to characterise the existing local background and ambient noise climate at the site and to derive noise limits to atmosphere based on Local Authority Noise Policy and other relevant guideline documents. This information shall be used at the appropriate stage of the project to determine if the proposed new mechanical plant selections will meet with the derived noise limits and if deemed necessary, mitigation measures required to meet with Local Authority Noise Policy requirements.

Given the residential nature of the site, the possibility of 24-hour operation has been considered.

2.0 Site Description and Proposed Plant Location

2.1 Site Description

The site under consideration is situated at 84 Fitzjohn's Avenue, Hampstead, London, NW3 6NP, within The London Borough of Camden.

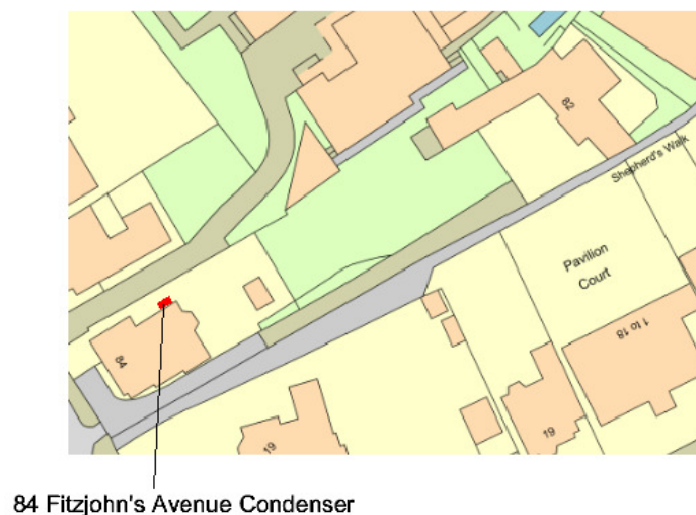
Number 84 Fitzjohn's Avenue is a 4/5 storey property located with its frontage on the east side of Fitzjohn's Avenue. This large detached residential premises comprises different ownership apartments. To the north of the site lies the Fitzjohn's Primary School, comprising a number of different educational buildings, certain of which are within 8 metres of the site. To the east lie the grounds and property of 82 Fitzjohn's Avenue. To the south lies Spring Walk, being a pedestrianised walkway. Beyond Spring Walk lie the grounds and residential / commercial properties with their frontage on Thurlow Road.

The site is illustrated by plan in Appendix A.

2.2 Proposed Plant Locations

An extract of drawing indicating the proposed plant location is shown below

Figure 1: Proposed Plant Location



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3.0 Existing Noise Climate

3.1 Road Traffic

Noise emanating from vehicular road traffic was deemed to provide a significant contribution to the ambient noise climate proximal to the nearest affected residential premises. The overall noise comprises both individual "event" type emissions from vehicles passing along local roads, and also continuous low frequency "rumble" due to middle distance traffic flows.

3.2 Rail Traffic

Rail traffic was not observed during the manned period at the start and end of the survey.

3.3 Aircraft

Aircraft over flights were observed sporadically during the manned survey at the start and end of the period. Their contribution to the background noise climate will have been included within the measurements taken.

3.4 Mechanical Noise Sources

No mechanical noise sources were observed at the site.

3.5 Construction Noise

Construction noise was audible during the manned periods at the site. It is unusual for construction noise to occur prior to 08:00 hours and after 18:00 hours or at weekends and public holidays. The Local Authority usually also restrict construction hours where planning is required. As such, it is unlikely likely that construction noise will impact on the readings between 18:00 and 08:00 hours.

4.0 Environmental Noise Survey

4.1 Measurements

The noise monitoring took place between the following dates / times:

- Start : 20/07/2020 at approximately 13:00 hours
- End : 22/07/2020 at approximately 10:20 hours

The noise monitoring was generally un-manned and was undertaken at the location as described below.

- **MP1:** On the north side of 84 Fitzjohn's Avenue

The measurement location is illustrated on the site layout drawing in Appendix A.

Various statistical broad-band and spectral sound pressure level measurements were obtained during the survey. A measurement time interval $T_m = 15$ minutes was used for sampling. Measurements of the percentile level $L_{A90,T}$ were made using time weighting F as per clause 3.4 of BS 4142:2014.

The quantities recorded included:

- **L_{Aeq} :** the equivalent continuous A-weighted sound pressure level over the measurement period
- **L_{Amax} :** the maximum A-weighted sound pressure level for the measurement period
- **L_{A10} :** the A-weighted sound pressure level exceeded for 10% of the measurement period

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- **L_{A90}**: the A-weighted sound pressure level exceeded for 90% of the measurement period

4.2 Weather during survey period

The weather conditions at the start of the manned period of the survey were warm and dry with a slight breeze. At the end of the survey the weather conditions were similar. The weather forecast did not indicate that adverse weather conditions would occur for the survey duration.

4.3 Instrumentation

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of BS EN 60804, BS EN 60651, BS EN 60942, BS EN 61260, and BS EN 61672-1:

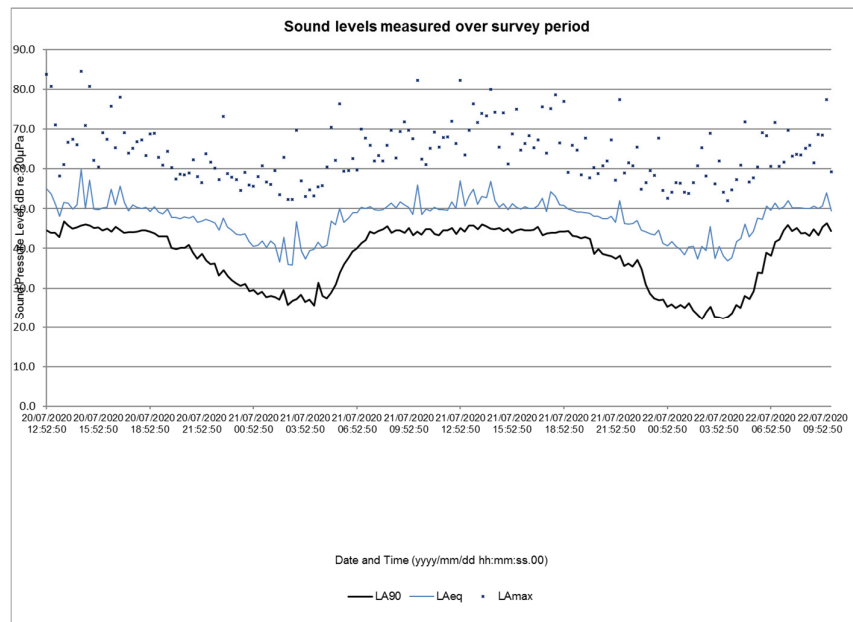
- **MP1**: SVAN 971 Sound level meter serial number 56214, pre-amplifier type SV18 serial number 57307, and type 7052E ½" microphone serial number 65484.

Calibration checks were made prior to and after completion of measurements using a Norsonic Type 1251 acoustical calibrator complying with Class 1 of BS EN 60942, calibration level 114.0 dB ± 0.3 dB, @ 1.0 kHz. All instrumentation carries a current manufacturer's certificate of conformance a copy of which is available upon request.

4.4 Results

The recorded survey data is shown within Appendix B. Broadband sound pressure level data over the survey period (L_{A90} background levels, L_{Aeq} and L_{Amax} measurements) are shown graphically below:

Figure 2: Graphical Survey Data – MP1



The L_{A90} background noise levels have been statistically assessed for daytime/evening and night-time periods in order to determine the values of the “Typically Lowest Existing Representative Background Noise Level”.

The following graphs show the results of the statistical assessment of L_{A90} background noise levels for the 15 minute sampling periods:

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Figure 3: L90 distribution for Daytime and Evening periods over the survey duration – MP1

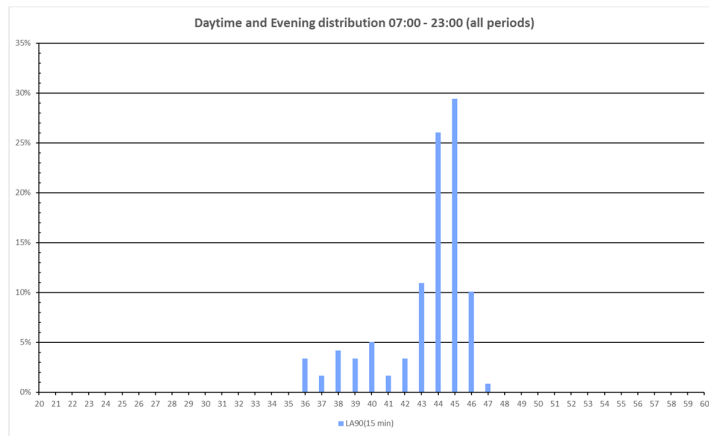
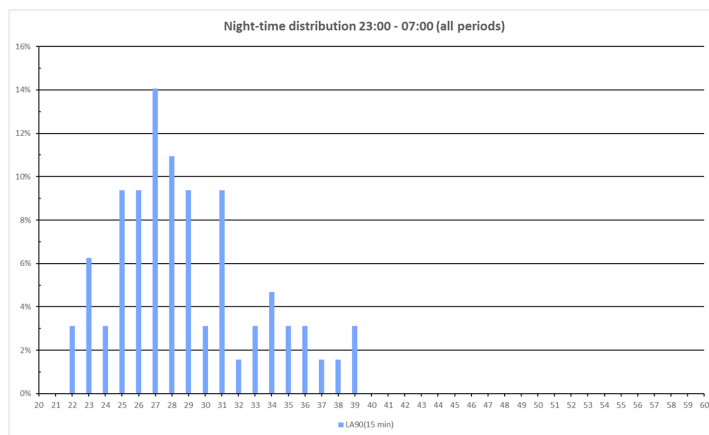


Figure 4: L90 distribution for Night-time periods over the survey duration– MP1



For this distribution of data, the typically lowest existing representative background noise levels are considered to be as follows:

Table 1: Typically Lowest Existing Representative Background Noise Level

Measurement Position	Daytime / Evening 07:00-23:00 $L_{A90,(15 \text{ min})}$	Night-time 23:00-07:00 $L_{A90,(15 \text{ min})}$
MP1 measurement position (north side of 84)	44 dB	27 dB

5.0 Evaluation of External Noise Criteria

The local vicinity contains properties of mixed usage, which must be given due consideration in terms of acceptable levels of noise exposure from the new plant.

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5.1 Noise Sensitive Properties

It is necessary to consider the requirements of the Local Authority. Recent correspondence from the London Borough of Camden advised the following:

“For the correct criterion, reference should be made the Noise Thresholds in Appendix 3 of the Local Plan 2017, specifically Table C/ the “Design Criterion of 10dB below background which increases to 15 dB if the noise source requires acoustic correction.

Table C of the Appendix 3 of the Local Plan 2017 *advises the following:*

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
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 57dBL _{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 88dBL _{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The document confirms that the 'Rating Level' shall be required to be 10 dB below the background and this should be increased to 15dB if the noise contains audible tonal elements.

The above document confirms that *“levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises”*. As such, the proposed noise limits for commercial premises are confirmed as follows:

5.2 School Buildings

The methods described in BS4142:2014 use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. It is considered reasonable that the adjacent school property shall be assessed in line with the guidelines provided in Building bulletin 93 (BB 93)

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Building bulletin 93 specifies upper limits for indoor ambient noise levels in terms of LAeq,30mins during normal teaching hours. An extract of Table 1 of the Document is reproduced as follows:

Figure 5: Extract of Table 1 of BB93

Type of room	Room classification for the purpose of airborne sound insulation in Tables 3a and 3b		Upper limit for the indoor ambient noise level LAeq,30mins dB	
	Activity noise (Source room)	Noise tolerance (Receiving room)	New build	Refurbishment
Nursery school rooms <i>Primary school:</i> classroom, class base, general teaching area, small group room <i>Secondary school:</i> classroom, general teaching area, seminar room, tutorial room, language laboratory	Average	Medium	35	40

In view of the details presented above it is considered reasonable to adopt a noise criterion of 35 dB LAeq,30mins for the school building located to the north of the sites under consideration.

It is also reasonable to consider a noise criterion external to school building windows that takes account of the internal design figure, plus the loss expected through an open window. In a research study conducted for DEFRA NANR116: "Open/Closed Window Research", numerous references are provided which quantify losses through open and partially open windows:

Figure 6: DEFRA NANR16 Summary of findings

Information Source	Summary of Findings
PPG 24 (1994) ^[9]	A reduction of 13 dB(A) from the facade level is assumed for an open window
WHO (1999) ^[4]	A reduction of 15 dB from the facade level is assumed for a partially open window. (no reference)
BS 8233 (1999) ^[8]	Windows providing rapid ventilation and summer cooling are assumed to provide 10 - 15 dB attenuation (no specific reference)
BRE Digest 338 (1988) ^[6]	A partly open window has an averaged level difference, $D_{1m,100-3150}$ of 15 dB
DoE Design Bulletin 26 (1972) ^[7]	A reduction of 5 dB(A) with a window wide open
Nelson - Transportation Noise (1987) ^[5]	Sound insulation of an open single window is 5 - 15 dB. (theoretical)
Mackenzie & Williamson DoE Report (1972-73) ^{[9],[10]}	A vertical sliding sash window open 0.027 m ² (summer night-time ventilation) and 0.36 m ² (daytime summer ventilation) provided a sound level reduction of 16 and 11 dB(A) respectively. (Lab Study)
Kerry and Ford (1973 - 74) ^{[11],[12]}	A horizontal sliding sash window open 25 mm and 200 mm provided averaged sound reduction indices, R_w of 14 and 9 dB respectively. (Field Study)
Lawrence and Burgess (1982 - 83) ^{[13],[14]}	A vertical sliding sash open 9% of the total facade provided a sound reduction index R_w 10 dB. (Field study)
Hopkins (2004) ^[15]	Road traffic noise reductions through window openings resulted in reductions of between $D_{2m,n,T}$ 8 and 14 dB. (Field Study)

Table 1.1 Summary of open-window acoustic transmission literature

The findings of the study are referenced in this report to substantiate the use of a 5dB loss through a wide-open window.

5.3 External Noise Criteria

The derived external noise criteria which the new building services plant shall be required to achieve are shown below:

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Table 2: Limiting Noise Criteria Applicable at The Affected Premises

Plant Location	Receptor	Daytime / Evening 07:00-23:00	Night-time 23:00-07:00
		L _{Art,(15 min)}	L _{Art,(15 min)}
Plant associated with 84 Fitzjohn's Avenue	Day – Gardens used for main amenity, outside living and dining and bedroom windows (façade). Night-time – Outside bedroom windows (façade). ^[3] Nearest residential receptor will be other apartments within 84 Fitzjohn's Avenue	34 dB ^{[1][2]}	17 dB ^{[1][2]}
	School premises	40 dB L _{Aeq 30 min} ^[2]	

[1] Note: Noise levels to be assessed in accordance with BS4142:2014. L_{ArT} is the "Rating" noise level that includes corrections for the character of the noise. A 5dB penalty shall be included where noise emitted from the proposed development will contain tones sufficient to attract attention at the receiver position/s.

[2] Note: The limiting noise levels are deemed to be considered at a position 1 metre outside the nearest affected premises.

[3] Note: Levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

General note: It is taken that the noise Criteria apply at the surrounding third-party premises. Noise levels may be exceeded external to windows of the client's premises.

6.0 Vibration

It is recommended that the client provisions for appropriate vibration isolation mountings for the proposed mechanical plant items. It is recommended that the plant be installed on vibration isolation mounts providing a minimum of 98% isolation efficiency at all forcing frequencies using an isolation mount system approved by the plant supplier. In addition, all pipework should be suitably isolated from the building structure.

7.0 Conclusions

A detailed environmental noise survey has been undertaken to determine the underlying ambient and background noise climate in 84 Fitzjohn's Avenue, Hampstead, London, NW3 6NP. Appropriate external noise criteria have been identified on the basis of Local Authority noise policy, and other industry standards, codes of practice and references. These external noise criteria will be used in the future selection of mechanical plant and any noise mitigation scheme necessary.

With due consideration to achieving compliance with these external noise criteria, future objections would not be expected in respect of noise emissions from any new fixed mechanical plant which may form part of the planning application.

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Appendix A: Site Plan



MP1

