Report VA4857.230811.NIA

88 Lancaster Avenue, Barnet

Noise Impact Assessment

14 August 2023

Urban Planning Practice

01962 461016
0203 8650332
mail@ventaacoustics.com

registered company no. 10139494

Contents

Attachments

1. Introduction

It is proposed to install a new condenser unit next to the dormer formed by the loft extention at the rear of 88 Lancaster Avenue, Barnet.

Venta Acoustics has been commissioned by Urban Planning Practice to undertake an assessment of the potential noise impact of these proposals in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the background noise levels at the most affected noise sensitive receptors. These levels are used to undertake an assessment of the likely impact with reference to the planning requirements of Barnet Council.

2. Design Criterion and Assessment Methodology

2.1 Barnet Council Planning Requirements

It is understood that Barnet Council require that noise emissions from plant are at least 5dB below the local background noise level as assessed at the most affected noise sensitive receivers.

The assessment is to be undertaken with reference to BS4142:2014.

2.2 BS4142:2014+A1:2019

British Standard BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations comprising mechanical and/or electrical plant and equipment;

The assessment methodology considers the Specific Sound Level, as measured or calculated at a potential noise sensitive receptor, due to the source under investigation. A correction factor is added to this level to account for the acoustic character of the sound as follows:

Tonality – A correction of up to 6dB depending on the prominence of tones;

Impulsivity - A correction of up to 9dB depending on the prominence of impulsivity;

Other sound characteristics - A 3dB correction may be applied where a distinctive acoustic character is present that is neither tonal nor impulsive;

Intermittency - A 3dB correction may be applied where the specific sound has identifiable on/off conditions.

An estimate of the impact of the source is obtained by subtracting the typical background noise level from the corrected Specific Sound Level.

- Typically, the greater this difference, the greater the magnitude of the impact.

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context.

2.3 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to suitable internal noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16 hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 hour}$	30 dB $L_{Aeq, 8 hour}$

Table 2.1 - Excerpt from BS8233: 2014 **[dB ref. 20µPa]**

3. Site Description

As illustrated on attached site plan VA4857/SP1, the site building is located a semi-detached house in a residential area with a large garden at the rear.

As part of the proposed loft conversion, a new condenser unit is proposed to be located on the western elevation of the dormer extension. At this location, the unit will be well screening from all surrounding residential elements.

The nearest residential neighbours are at 86 Lancaster Avenue (15m to the west), 90 Lancaster Avenue (10m to the east) and 105 Lancaster Avenue (45m to the north). To the south, the dwellings on Beech Hill are at least 96m from the proposed plant location.

The most affected noise-sensitive receiver is expected to be 86 Lancaster Avenue to the west.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Thursday 3rd and Friday 4th of August 2023 at the location shown in site plan VA4857/SP1. This location was chosen to be representative of the background noise level at the most affected noise sensitive receivers.

Continuous 5-minute samples of the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were undertaken at the measurement location.

The weather during the survey period was generally dry with light winds. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-12202-E0	UCRT23/1146	1/2/23
Larson Davis calibrator	CAL200	13049	1504971-3	28/3/23

Table 4.1 – Equipment used for the survey

The calibration of the sound level meter was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA4857/TH1.

The background noise level is determined by traffic on the surrounding roads.

The typical background noise levels measured were:

Monitoring Period	Typical[1] $L_{A90,5min}$
07:00 – 23:00 hours	40 dB
23:00 – 07:00 hours	32 dB

Table 4.2 – Typical background noise levels **[dB ref. 20 µPa]**

[1] The typical L_{A90} value is taken as the 10th percentile of all L_{A90} values measured during the relevant period.

4.3 Plant Noise Emission Limits

On the basis of the measured noise levels and the planning requirements of the Local Authority, and considering that it is not expected that tonal noise will be generated by the proposed plant units, the following plant specific sound levels should not be exceeded at the most affected noise sensitive receivers:

Monitoring Period	Design Criterion (L_{Aeq})
07:00 – 23:00 hours	35 dB
23:00 – 07:00 hours	27 dB

Table 4.3 – Specific sound pressure levels not to be exceeded at most affected noise sensitive receivers

5. Predicted Noise Impact

5.1 Proposed plant

The following plant is proposed for installation on the dormer extension at the location indicated on site plan VA4857/SP1.

This location benefits from acoustic screening, provided by the built form, from all nearby noise sensitive receptors.

Plant Item	Quantity	Proposed Model	Notes
Condensers	1	Fujitsu ASYG12LMCE	Sound Power of 61dBA

Table 5.1 – Indicative plant selections assumed for this assessment.

The manufacturer has only provided a dB(A) noise level for the unit. The assumed spectral noise levels used in the calculation have been based on a similar sized condensing unit, corresponding to the dB(A) level quoted by the manufacturer.

Plant Item	Octave Band Centre Frequency (Hz) Sound Power Level, L_w (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Fujitsu ASYG12LMCE	59	66	60	62	53	50	44	37	61

Table 5.2 Advised plant noise data used for the assessment.

5.2 Recommended Mitigation Measures

It is not anticipated that any additional mitigation measures, beyond the site's built form, will be required for the control of mechanical plant noise emissions to atmosphere.

5.3 Predicted noise levels

The cumulative noise level at the most affected noise sensitive receiver, some 15 meters away, has been calculated on the basis of the above information, with reference to the calculation methodology set out in ISO 9613-2:1996 *Attenuation of sound during propagation outdoors - Part 2: General method of calculation.*

A summary of the calculations are shown in Appendix B.

Predicted Cumulative Noise Level	Design Criterion
L_{Aeq} 17dB	L_{Aeq} 27 dB

Table 5.3 – Predicted cumulative noise level at most affected noise sensitive receiver and design criterion.

All plant and ductwork should be fitted with anti-vibration mounts in accordance with the manufacturer guidelines. This is expected to control structureborne noise to the building to acceptable levels.

5.4 Comparison to BS8233:2014 Criteria

BS8233 assumes a loss of approximately 15dB for a partially open window. The external noise level shown in Table 5.3 would result in internal noise levels that achieve the guidelines shown in Table 2.1.

5.5 BS4142 Assessment

The calculated sound pressure levels are 15dB below the night time background sound level and are at very low absolute levels. The unit is not expected to be audible at any of the neighbouring dwellings and so no acoustic character correction is applicable.

A low impact is therefore indicated.

Given the substantial difference between the predicted and design limit sound levels, the uncertainty in the calculation methodology would not risk changing the assessment outcome.

6. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the background noise climate in the locality of 88 Lancaster Avenue, Barnet in support of a planning application for the proposed introduction of new building services plant.

This has enabled noise emission limits to be set at the most affected noise sensitive receiver such that the proposed installation meets the requirements of Barnet Council.

The cumulative noise emission levels from the proposed plant have been assessed to be compliant with the plant noise emission limits.

The proposed scheme is not expected to have a significant adverse noise impact and the relevant planning requirements have been shown to be met.

Steven Liddell MIOA


Most Affected Receiver
Proposed New Plant Location
Noise monitoring location

88 Lancaster Avenue, Barnet

Environmental Noise Time History: 1

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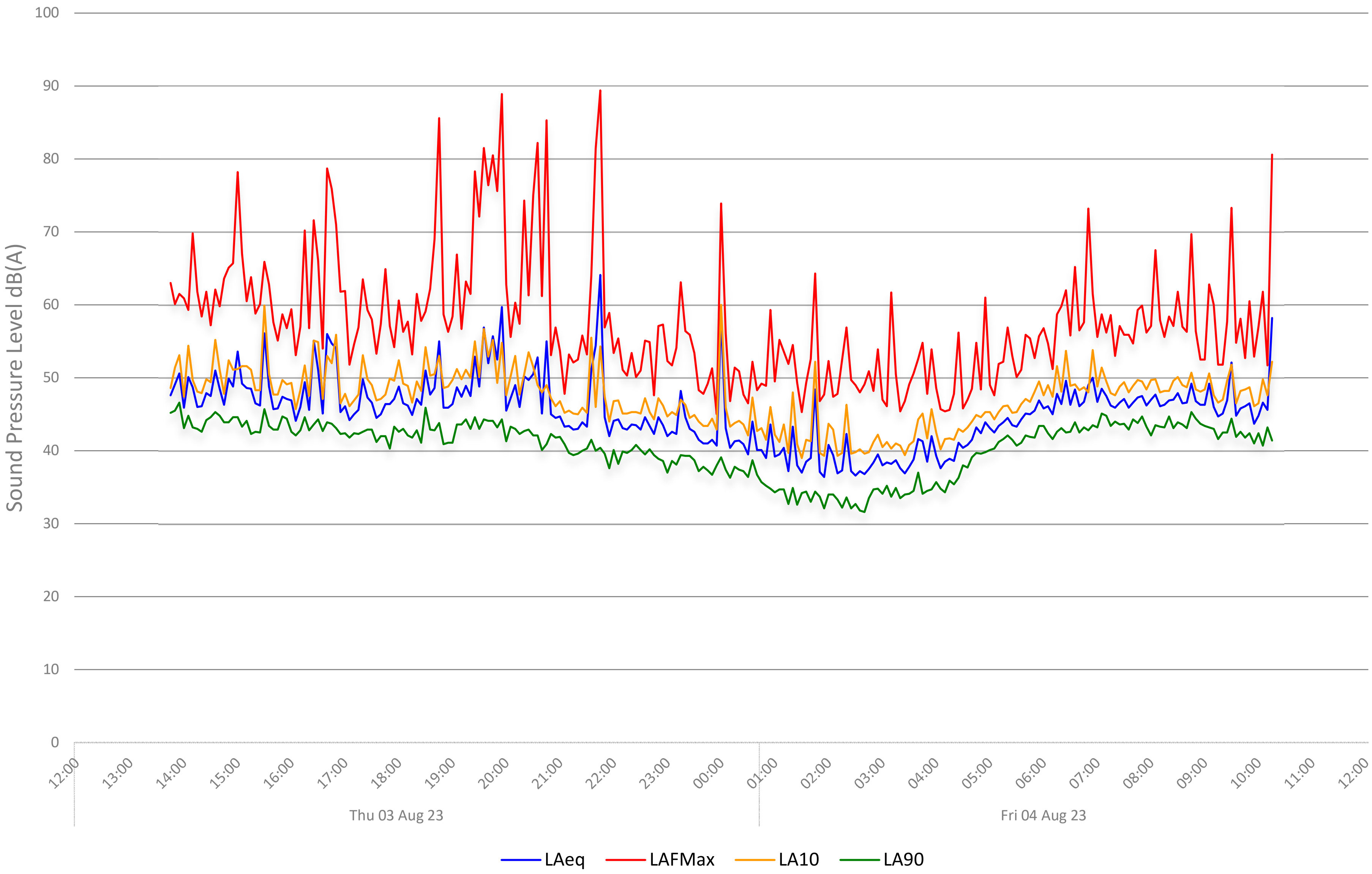
Figure VA4857/TH1



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as ‘loudness’, its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of ‘pitch’, with low frequencies producing low ‘notes’ and higher frequencies producing high ‘notes’.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the ‘A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated ‘A' weighted sound level is designated as dB(A) or L_A.
L_{eq} :	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90} :	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.
R	*Sound Reduction Index.* Effectively the *Level Difference* of a building element when measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010 and corrected for its size and the reverberant characteristics of the receive room.
D	The sound insulation performance of a construction is described in terms of the difference in sound level on either side of the construction in the presence of a sound source on one side and the reverberant characteristics of the adjoining ‘receive’ space. *D* is the arithmetic *Level Difference* in decibels between the source and receive sound levels when filtered into frequency bands.

D_{nT}	*Weighted Standardised Level Difference.* As defined in BS EN ISO 717-1, representing the *Weighted Level Difference*, when standardised for reference receiving room reverberant characteristics.
$D_{n,e}$	Normalised sound insulation of small building elements of fixed dimensions, such as vents, measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010.
$D_{n,f}$	Flanking sound insulation of lightweight elements, such as curtain wall mullions, measured in an accredited laboratory test suite in accordance with the procedures laid down in ISO 10848-2:2006
R_w D_w $D_{nT,w}$ $D_{n,e,w}$ $D_{n,f,w}$	Value of parameter, determined as above, but weighted in accordance with the procedures laid down in BS EN ISO 717-1 to provide a single-figure value.
C, C_{tr}	Spectral adaptation terms to be added to a single number quantity such as $D_{nT,w}$, to take account of the sound insulation within frequency ranges of particular interest.
$L'_{nT,w}$	*Weighted Standardised Impact Sound Pressure Level* as defined in BS EN ISO 717-2, representing the level of sound pressure when measured within a space where the floor above is under excitation from a calibrated tapping machine, standardised for the receiving room reverberant characteristics.
ΔL_w	Change in impact sound pressure level when a floor is fitted with a 'soft' or resilient covering, as measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-3:2010.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

APPENDIX B

VA4857 - 88 Lancaster Avenue, Barnet

Noise Impact Assessment

Assessment to west

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Source Noise Level	Lw	59	66	60	62	53	50	44	37	**61**
Number of Plant	1	0	0	0	0	0	0	0	0	
Quarter-spherical Radiation	Q=2	-8	-8	-8	-8	-8	-8	-8	-8	
Location correction		3	3	3	3	3	3	3	3	
Distance Loss	To 15m	-24	-24	-24	-24	-24	-24	-24	-24	
Screening loss*		-9	-11	-14	-17	-18	-18	-18	-18	
Level at receiver		**21**	**26**	**18**	**17**	**6**	**3**	**-3**	**-10**	**17**

* Screening loss limited to 18dB