63 Frognal, Hampstead, London, NW3 6YA
Background Noise Level

For
Gregory Phillips Architects
17 Savile Row
London
W1S 3PN

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By
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1. Forward

Planning permission is being sought for the installation of two heat rejection units to the sides of the house. This report was commissioned to establish the effect of the new units on the background noise level around the site in support of the planning application.

2. Summary

The background noise level ($L_{A90,\ 15\ mins}$) in the front garden of 63 Frognal is a minimum of 35 dBA and the calculated levels due to the new units at the nearest residential windows is less than 30 dBA. Therefore the Council criterion has been satisfied.

3. Author

This report has been written by Tim Lewers, trading as Tim Lewers Acoustics. He has a degree in Mechanical Engineering from City University and an MSc in Sound and Vibration Studies from Southampton University. He has been a member of the Institute of Acoustics for 26 years, is an Member of the Association of Noise Consultants and holds the Diploma and Certificate of Competence in Noise Measurement from the Institute of Acoustics.

4. Employer

Leighann Heron of Gregory Phillips Architects commissioned the report on behalf of the owner of the house.

5. Noise Principles and Standards Used

There are no national standards available to assess the background noise level. BS7445:1991 was used as the basis for the measurement proceedure.

6. The Site and its Surroundings

The site is a quiet residential road some distance from the centre of Hampstead. The building is a large family house which is to be refurbished to include two new heat rejection units in the lightwells.

7. Measurement Methodology

The microphone was placed in the front garden of the house at a height of 1.2 m and 3.5 m from the front of the house; see Fig 1. Measurements were made using 15-minute measurement intervals for a total period of 24 hours.

The sound level meter was a NOR118 serial number 31500, (with NOR1225 microphone, serial number 52233) which was calibrated, before and after the measurements, with a NOR1251 calibrator, serial number 31059, to 114 dB with no change in calibration over the measurement period. The meter was last subject to a verification calibration in May 2012 by Campbell Associates.

The date of the test was between 7 and 8 February 2013. The weather conditions throughout this period were fine and calm with no rain or fog.

8. Noise Conditions Imposed by the Local Council

The London Borough of Camden Council require that all new external heat rejection units are selected in order that the background noise level at the nearest residential window is not increased above a very small amount. The criterion is that the noise level 1 m from the nearest noise sensitive window must be at least 5 dBA below the lowest background noise level as defined by the L_{A90} measured over a 24 hour period.

9. Evaluation and Analysis of the Measurement Results

Figure 2 shows the L_{A90} levels, in 15 minute intervals, over the 24 hour measurement period. At night the level drops to a low of 35 dBA.

The noise ratings of each of the two new Daikin RXQ5P7W1B units is 54 dBA, measured from a hard floor 1 m from the unit in an anechoic chamber.

These units are to be placed in lightwells, one on either side of the house. A position one metre from the nearest noise sensitive windows to these lightwells is 6 m and 8 m from their respective units. The attenuations due to these distances are 15 dBA and 18 dBA. As there is no acoustic absorption in these wells all the noise generated in the well will be radiated into the atmosphere from the openings.

Considering the noise radiated from a light well, the attenuation at large angles away from the vertical is significant and at 60° (the angle a line from the nearest windows to the lightwells subtends to the vertical) the attenuation is 12 dBA.

The background noise due to the unit will be the noise level at 1 m, minus the attenuation with distance, minus the attenuation due to radiation from a lightwell. For one unit this is 54 - 15 - 12 = 27 dBA and the other is 54 - 18 - 12 = 24 dBA.

10. Recommendations

No further measures are required to ensure that these heat rejection units will not disturb residents on either side of the house.

11. Conclusion

The noise levels at 1 m from the nearest noise sensitive windows due to the heat rejection units mounted in the lightwells will be 24 dBA and 27 dBA. The lowest background noise level is L_{A90} = 35 dB and therefore the council criterion of the maximum permitted additional noise level of 30 dBA will be met.

Tim Lewers February 2013

Glossary of Terms

The Decibel

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and is ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 2 x 10-5 pascals) and the threshold of pain is around 120 dB.

Frequency, Hz

Frequency is analogous to musical pitch. It depends on the rate of vibration of the air molecules that transmit the sound and is measured as a number of cycles per second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes the frequency range is normally divided up into discrete bands. The most commonly used bands are octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency, and one-third octave bands, in which each octave band is divided into three. The bands are described by their centre frequency value and the range that is used for sound insulation measurements are 100 Hz to 3.15 kHz.

A weighting

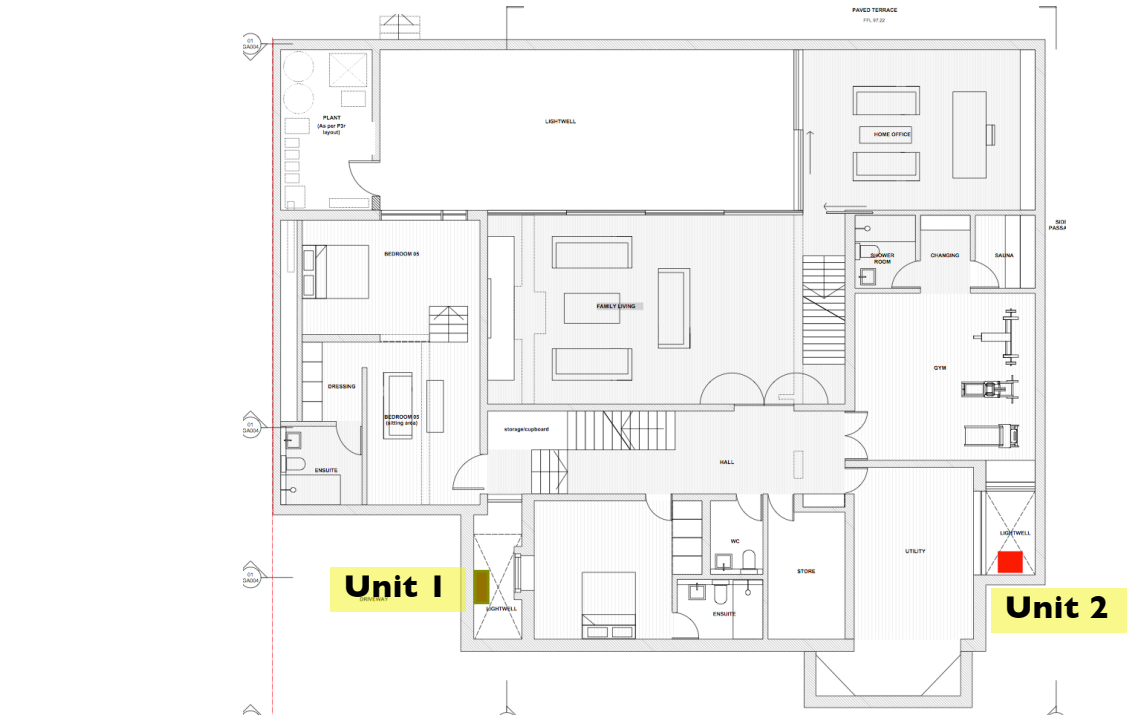
The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network, which approximates to this response and allows sound levels to be expressed as an overall single figure, in dBA.

Leq

The equivalent continuous sound level (Leq)is a notional sound level. It is the sound level which if maintained for a given length of time would produce the same acoustic energy as a fluctuating noise over the same period.

Statistical Level, L90

This is the sound pressure level that is exceeded for 90% of the time. Consequently it is indicative of the general ambient noise level in the absence of any higher level, short duration, events that occur during the period.


PAVED TERRACE
PLANT
(As per P3r layout)
LIGHTWELL
HOME OFFICE
BEDROOM 05
FAMILY LIVING
SHOWER ROOM
CHANGING
SAUNA
GYM
DRESSING
BEDROOM 05
(sitting area)
ENSUITE
storage/cupboard
HALL
WC
STORE
UTILITY
LIGHTWELL
ENSUITE
LIGHTWELL
Unit 1
Unit 2


Noise Sensitive Window
Unit 1
Unit 2
Noise Sensitive Window
Microphone Position

Figure 1

Figure 2 - Background Noise Level - 63 Frognal