Wessex Acoustic Services
Environmental Noise Consultants

Environmental Noise Assessment

Proposed change of use
85 Fawn Crescent, Hedge End, SO30 2QD

Report by: Richard Maidment MSc. BSc. MIOA.
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WESSEX ACOUSTIC SERVICES
31 CREECH VIEW, DENMEAD, WATERLOOVILLE, HAMPSHIRE, PO7 6SU
TEL: 07446 449080
EMAIL: wessex-acoustics@virginmedia.com

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1. Summary

1.1. The purpose of this report is to assess the potential conflict of use in respect of loss of amenity due to noise from activities associated with the proposed change of use from Class B1 (business use) to C3 (residential dwelling) on the ground floor of 85 Fawn Crescent, Hedge End, SO30 2QD.

1.2. The local authority has expressed concerns regarding the proposed change of use due to:
   a) The impact of noise associated with activities from the proposed residential dwelling upon the neighbouring office unit.
   b) The impact of noise associated with the neighbouring office unit upon the proposed residential dwelling.

1.3. As there are currently no commercial or light industrial activities in the neighbouring premises, measurements were taken of the operational noise levels within the applicant's office to use as indicative source noise levels.

1.4. Measurements were also taken of ambient noise levels within the office when unoccupied.

1.5. These levels have been compared with recommended appropriate internal noise levels for both office and residential environments within British Standard BS8233:1999 "Sound insulation and noise reduction for buildings – Code of practice".

1.6. The results of the measurements and predictions based upon the sound insulation of the separating wall indicate that the internal noise levels should be within recommended guidelines and it can be concluded that there should be no adverse impacts due to noise as a result of the proposed change of use.

2. Description of Development

2.1. The development currently consists of a 3 storey town house in a terrace of 4 similar properties within a suburban housing estate constructed in 2003.

2.2. The ground floor of the property consists of two rooms which have B1 permission for business use as an office or light industry appropriate to a residential area, whilst the two upper floors of the property have C3 use as a residential dwelling.

2.3. There is no physical separation between the two uses within the building; both areas are accessed by a common front door and hallway and there is no door to the stairway leading to the first floor accommodation.

2.4. To all intents and purposes all the properties in the terrace look like residential houses from the outside. There are no commercial frontages, delivery / loading bays or storage areas. See Appendix A: "Photographs of development".

2.5. The dimensions of the rooms on the ground floor with B1 use are 1.79m x 3.9m for the front study and 3.48m x 3.43m for the rear work room.

2.6. The study is large enough for a single office space and the rear work area has a suitable working space probably for two people.

2.7. The proposed development is to remove the B1 use from the ground floor so as to form a single three storey residential dwelling.

2.8. The local authority has expressed concerns regarding the proposed change of use due to:
c) The impact of noise associated with activities from the proposed residential dwelling upon the neighbouring office unit.
b) The impact of noise associated with the neighbouring office unit upon the proposed residential dwelling.

3. Source noise levels

3.1. It would appear that none of the ground floor accommodation in any of the neighbouring properties is currently used for commercial or industrial purposes; therefore it has proven impossible to take any meaningful noise measurements of the impact of neighbouring commercial activities from within the applicant's property.

3.2. Any "light industry appropriate to a residential area" would by its very definition imply activities which are not noisy in nature, and unlikely to involve the use of heavy machinery. At this location any operations would also need to be appropriate for use within what is effectively a terraced house and not a purpose built industrial unit.

3.3. The physical size of the ground floor B1 accommodation, lends itself more favourably towards an office rather than a light industrial use.

3.4. The applicant actually works from home and uses the ground floor front study as an office; therefore after consultation with the local EHO it was decided to use his activities as a measure of typical noise levels generated within a home office environment.

3.5. Continuous measurements were taken in the office over a two day period from 14:00hrs on 12/11/2012 to midnight on 14/11/2012.

3.6. On the 14/11/2012 the applicant was absent from the property and did not return until around 20:00hrs, which enabled measurement of ambient noise levels within the unoccupied room over an extended period. See "Appendix B: Measured Data" for detail.

4. Sound insulation of structure

4.1. The separating wall between the two properties is of an unknown construction but would appear to consist of a masonry block wall with dry lined plasterboard panels.

4.2. It is fair to assume that the separating wall is the same construction on all floors, consequently given the building was completed in 2003 it must have complied with the sound insulation requirements of Approved Document E "Resistance to the passage of sound" in order to ensure compliance with the current Building Regulations.

4.3. Therefore it can be assumed that the sound insulation performance of the separating wall should have a minimum value of D_{ntw}+Ctr 45dB.

4.4. Dntw is a field measurement which includes flanking transmission of the structure therefore assuming a standard reverberation time of 0.5 seconds in the receiving room it can be considered to represent the A weighted broad band level difference across the structure for a noise source with a spectrum similar to that represented by the Ctr adaptation term. i.e. the separating wall will reduce the noise by 45dB(A).

5. Target Criteria

5.1. Appropriate noise levels for office and residential environments can be obtained from Tables 5 and 6 of British Standard BS8233:1999 "Sound insulation and noise reduction for buildings – Code of practice".

5.2. However section 7.3 and 7.6.1.2 of the code states that the noise source in question "should be steady such as that due to road traffic, mechanical services or continuously running plant" and "occupants will usually tolerate higher levels of anonymous noise such as that from road traffic, than noise from neighbours, which may trigger complex emotional reactions. Only anonymous noise is considered in Tables 5 and 6 of the Code".

5.3. There is an assessment procedure within British Standard BS4142:1997 "rating industrial noise affecting mixed residential and industrial areas", however this is an external assessment, which in this case would not provide any relevant information as there is no external noise associated with the B1 use.

5.4. Consequently in the absence of any specific criteria it is proposed to use the BS8233 design guidelines for internal noise based upon the assumption that the character of the source noise contains no impulsive or low frequency components and is continuous.

5.5. Table 5 of BS8233 recommends a design target for indoor ambient noise levels in unoccupied spaces of $LAeq,_T$ 40 – 50dB to enable reasonable conditions for study and work requiring concentration, which should be appropriate for an office environment.

5.6. It also recommends a design target of $LAeq,_T$ 30-40dB in living rooms and 30-35dB in bedrooms to ensure reasonable resting / sleeping conditions.

5.7. The time base T should be appropriate to the activity involved; as it is unlikely to be appropriate for a B1 use to operate in such a location during the night it is proposed that an appropriate time base would be 10 hours (08:00 -

18:00hrs) for the office environment, and 16 hours (07:00-23:00hrs) for the residential property.

6. Assessment

Impact of proposed residential use upon neighbouring B1 use

6.1. The standard of sound insulation required by Approved Document E should be sufficient to control "normal" domestic noise, therefore as the building was constructed in compliance with The Building Regulations it must be assumed that any noise created by normal domestic use within the proposed development will not have a detrimental impact upon the neighbouring B1 business use.

6.2. Only noise as a result of unreasonable behaviour could potentially be an issue, however this is a matter more appropriately dealt with using statutory nuisance legislation rather than the planning process.

6.3. Assuming a level difference across the separating partition of 45dB(A) would indicate that noise levels in the proposed domestic property would need to reach 85dB(A) for 10 hours before exceeding the recommended design target of 40dB(A) for an office environment, which is unlikely given that normal domestic activities would not generate such levels.

Impact of B1 use upon proposed residential use

6.4. Ignoring the measured noise levels in the office between 20:00 and 23:00hrs when the applicant returned home, the ambient noise level in the unoccupied room is $LAeq_{(16hr)}$ 27dB.

6.5. Assuming the operational noise levels measured in the office of $LAeq_{(10hr)}$ 50dB are indicative of noise levels within the neighbouring B1 use and a level difference of 45 dB(A) across the separating wall, results in predicted noise immission levels of 5dB(A), which would have no impact upon the ambient noise levels.

6.6. Consequently the ambient noise level would remain unchanged and would be well within the criteria recommended in BS8233 for both living rooms and bedrooms.

7. Conclusions

7.1. The results of the assessments indicate that the proposed conversion of the ground floor accommodation within 85 Fawn Crescent from B1 business to C3 residential use should result in no noise impacts upon either the proposed residential accommodation or the neighbouring existing business use.

Appendix A: Site Photographs



Front facade 85 Fawn Crescent



Rear facade 85 Fawn Crescent



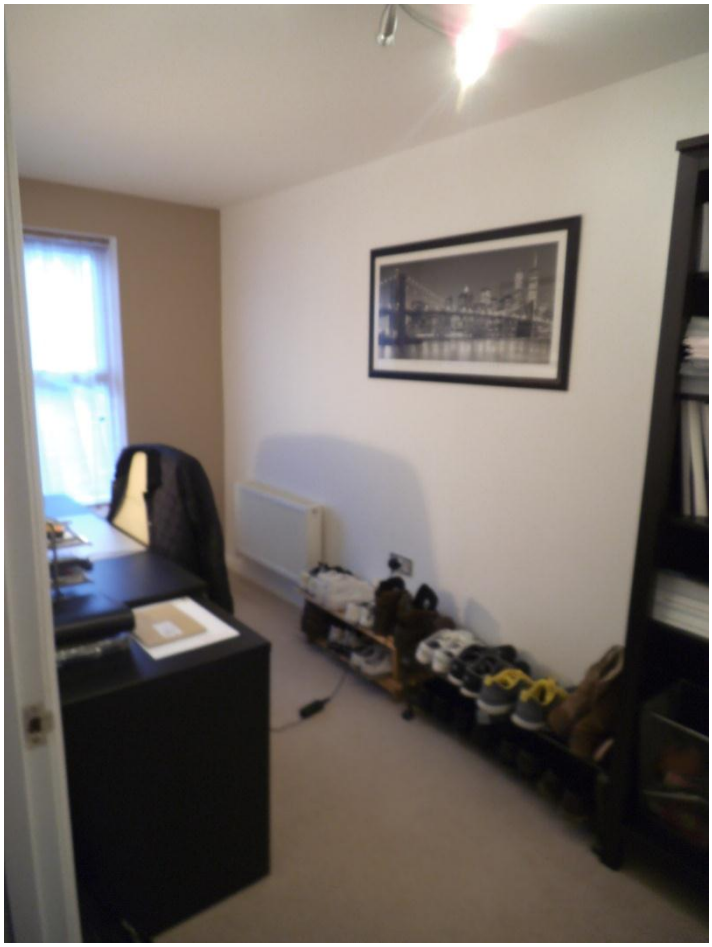
Street scene



Street scene opposite development



Rear workroom (Currently B1 use)



Front Study (Currently B1 use)

Appendix B Measured data

Equipment:

Bruel & Kjaer 2238 analyser ser no.2457024.
Bruel & Kjaer 4188 microphone ser no. 2428735.
Bruel & Kjaer 4231 calibrator ser no. 2466116
Windshield
Tripod

Table 1: $LAeq_{(1hour)}$ Values measured in Ground Floor Study

Date and Start time	$LAeq_{(1hr)}$ dB
13/11/2012 08:00:00	**26.8**
13/11/2012 09:00:00	**42.1**
13/11/2012 10:00:00	**52.9**
13/11/2012 11:00:00	**52.8**
13/11/2012 12:00:00	**50.1**
13/11/2012 13:00:00	**46.4**
13/11/2012 14:00:00	**52.3**
13/11/2012 15:00:00	**47.9**
13/11/2012 16:00:00	**54.7**
13/11/2012 17:00:00	**36.7**
13/11/2012 18:00:00	27.9
13/11/2012 19:00:00	26.1
13/11/2012 20:00:00	24.4
13/11/2012 21:00:00	23.6
13/11/2012 22:00:00	22
13/11/2012 23:00:00	20.4
14/11/2012 00:00:00	21.4
14/11/2012 01:00:00	20.4
14/11/2012 02:00:00	20.2
14/11/2012 03:00:00	20.7
14/11/2012 04:00:00	20.9
14/11/2012 05:00:00	21.4
14/11/2012 06:00:00	23.2
14/11/2012 07:00:00	26.6
14/11/2012 08:00:00	**28.5**
14/11/2012 09:00:00	**25.1**
14/11/2012 10:00:00	**26.3**
14/11/2012 11:00:00	**31**
14/11/2012 12:00:00	**30**
14/11/2012 13:00:00	**27.6**
14/11/2012 14:00:00	**25.9**
14/11/2012 15:00:00	**27.3**
14/11/2012 16:00:00	**26.7**
14/11/2012 17:00:00	**28.2**
14/11/2012 18:00:00	**26.8**
14/11/2012 19:00:00	**25.8**
14/11/2012 20:00:00	***45***
14/11/2012 21:00:00	***39.1***
14/11/2012 22:00:00	***41.1***

Figures in red (13/11/ 2012, 08:00 – 17:00) - were used to establish operational noise levels for B1 use. Calculated value of $LAeq_{(10hr)}$ 50.3dB

Bold figures (14/11/2012 08:00- 22:00) were used to establish ambient noise levels in unoccupied space when applicant absent from the property. Highlighted figures were ignored as this was the period when the applicant returned and there was activity within the room.

Calculated value of $LAeq_{(16hr)}$ 27dB

Glossary of Technical Terms

"A" weighting	Filter used in the measurement of noise to simulate the frequency response of the human hearing range.
Ctr	Spectrum adaptation term used in the assessment of sound insulation to simulate the performance of a building element against a typical traffic noise frequency spectrum.
dB, dB(A)	"Decibels". A logarithmic scale used to describe the magnitude of sound. Sound is generally measured by fluctuations in pressure (Pa, Pascalls), human hearing ranges from 20 μPa to 20,000 Pa. The decibel scale compresses these figures to a more manageable range of 0 – 140dB. The human ear responds to continuous sound sources in broadly the following way: • A 1 dB increase is the smallest audible change in level under laboratory it would only be noticeable if two sounds were presented in quick succession. • A 3dB increase is the smallest noticeable audible change which could be detected over a period of time. • A 10dB increase represents a doubling of loudness. The suffix (A) simply identifies that the sound has been measured using an "A" weighting filter.
Dntw	"Standardised weighted level difference". Field measurement to rate the sound insulation performance of a building element. The measured level difference is corrected to allow for a standard reverberation time of 0.5 seconds in the receiving room.
Leq, LAeq.	"Equivalent continuous noise level". Noise levels vary with time. The Leq is the level of a steady sound that has the same amount of energy as the fluctuating noise being measured. Although not strictly true a simple definition would be a time weighted average. The inclusion of "A" in the term denotes the measurement has been obtained using an A weighting filter.